INTEGRATED BIRTH CARE
A TRIPLE AIM

QUALITY OF BIRTH CENTRE CARE IN THE NETHERLANDS

INGE BOESVELD

INTEGRATED BIRTH CARE: A TRIPLE AIM

Quality of birth centre care in the Netherlands

Inge Boesveld

The studies presented in this thesis were conducted at the Jan van Es Institute, Netherlands Expert Centre Integrated Primary Care and Division Woman and Baby of University Medical Centre Utrecht, in collaboration with NIVEL, Netherlands Institute for Health Services Research, TNO, Department of Child Health, Erasmus University Medical Centre, Department of Obstetrics and Gynaecology, Leiden University Medical Centre, Department of Obstetrics, all located in the Netherlands.

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Quality of birth centre care in the Netherlands

Integrale geboortezorg: van drieën één…

Kwaliteit van zorg in geboortecentra in Nederland

(met een samenvatting in het Nederlands)

Proefschrift

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Inge Caroline Boesveld - Haitjema

geboren op 17 maart 1966

te Amsterdam

Promotoren:	Prof.dr. A. Franx
	Prof.dr. R.G. de Vries
Copromotoren:	Dr. T.A. Wiegers
	Dr. M.A. Bruijnzeels

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Opponent:	Dr. M.P. Amelink - Verburg

Zevenmaal opnieuw geboren
klein gekregen uitgeworpen
wordt een mens om mens te worden.

Zeventig maal zeven bomen
zullen bloeien waar wij wonen
licht zal op het water stromen.

Huub Oosterhuis

CONTENTS

CHAPTER 1

GENERAL INTRODUCTION

Background

In the Netherlands, yearly about 170.000 women give birth. Many of these women do this without medical intervention and the majority of the new-born babies are healthy, but this is not always the case. In 2015, the Dutch Perinatal Register (PRN) registered the birth of 169.267 babies: 809 of them were born dead after 22 weeks of pregnancy or more (4.8 ‰) and 511 died within 28 days after birth (3.0‰) (1). About 85 % of this perinatal mortality is associated with one or more of the pathologies that have become known as the "Big 4" (2): congenital abnormality, preterm birth, intrauterine growth restriction or asphyxia. In addition, perinatal morbidity can cause both short- and long-term consequences. Preterm born babies and children with intrauterine growth restriction more often develop learning, behavioural and mobility problems. Also, growth retarded babies have a higher chance to develop diabetes and heart diseases in adulthood (3,4). Although perinatal mortality and morbidity cannot fully be avoided, part of it can be prevented by more effective prevention and better cooperation in birth care (5). Birth centres, especially those in close proximity to an obstetric unit, are assumed to offer an opportunity for more integrated care, because of this proximity (6). A better understanding of the organization of birth centres and their quality of care is necessary in order to explore this assumption.

Dutch maternity care system

An important feature of the Dutch maternity care system is a clear distinction between three levels of care provision: primary, secondary and tertiary care. Primary care is provided in the community, secondary care in general hospitals, and tertiary care in ten perinatology centres, of which eight are in the university medical centres. The system is founded on the notion that pregnancy, childbirth and puerperium are physiological processes (7,8). Primary care midwives in the community are responsible for care for healthy women, with a physiological pregnancy, labour and post-partum period. In a few, mostly rural, areas general practitioners provide this care. When complications arise or pharmacological pain relief is requested, responsibility shifts to secondary or tertiary obstetric care. Professionals in each echelon work autonomously and play complementary roles (9). Risk selection and role division between professionals is based on the List of Obstetric Indications (10,11). In this document, professional groups involved in maternity care (the Royal Dutch Organization of Midwives (KNOV), the Dutch Society for Obstetrics and Gynaecology (NVOG), and the Dutch General Practitioners Association (LHV)) reached general agreement on indications for consultation and referral. The list is the foundation of protocols and agreements between individual midwives and obstetricians and of regional agreements, made in Maternity Care Networks (in Dutch Verloskundige Samenwerkingsverbanden (VSVs)) (12). These networks are organised around hospitals and consists of multidisciplinary professionals working in both primary and secondary care. The objective of Maternity

Care Networks is, in addition to providing birth care in collaboration and synergy, to define maternity care policy at a regional level, to discuss specific problems, and to find joint solutions for identified problems (13).

Regulation by Dutch government and politics

For more than 55 years, the Dutch government and health insurance companies have promoted collaboration between maternity care providers, always with the aim of improving quality of maternity care. Since the publication of the first Obstetric Indication List in 1959, several reports have been written and recommendations made (see e.g. (6,10,11,14-19). In 2009, the ongoing Euro-Peristat study reported outcomes of pregnancy and birth in several European countries (20), creating concern in the government, among politicians and among the wider public. In this report the Netherlands ranked near the bottom in terms of perinatal mortality rate, and although there were questions about the comparability of data from disparate countries, the data led some to conclude that the poor outcomes might be related to the division between primary and secondary care (21-23). As a result, a ministerial steering committee on pregnancy and childbirth (Stuurgroep Zwangerschap en Geboorte) was commissioned to analyse the situation and to suggest improvements in the maternity care system (6). One of its seven main recommendations was to improve and restructure collaboration between all providers in maternity care by more integration in Maternity Care Networks. Another recommendation was to investigate the use of birth centres to improve perinatal outcomes, based on an assumption that birth centres might provide higher quality of care because they offer a better opportunity for more integrated care. At the time the committee made this recommendation there was no evidence for that assumption. There were no studies of the nature and degree of integration of birth centres and there were no data on the effects of integration on quality of birth care.

Birth centres

The percentage of home births in the Netherlands is high compared to other developed countries, but is decreasing rapidly. In 2000 30.3% of all births took place at home. In 2015, the number of home birth decreased to 13.1 % (1). This may be the result of changing attitudes of Dutch women (24). More healthy women are opting for a hospital birth, because they do not feel safe at home, or are asking for referral to receive treatment (e.g. pain medication) that cannot be provided in primary care (25-27). Media attention given to the Euro-Peristat data and the report of the steering committee may have contributed to this change in attitude.

These trends led to an increase of births in obstetric hospital units, resulting in overpressure of these units. To accommodate the growing number of low-risk women who do not want to give birth at home, several birth centres were established, with a

large variation in philosophy, characteristics, and service delivery (23,28). Birth centres are settings where women with uncomplicated pregnancies can give birth in a home-like environment. When complications arise or threaten the birth, or pharmacological pain relief is requested, referral to an obstetric unit in a hospital is necessary (29,30). Studies on birth centre care in other countries showed that low risk women who planned to give birth in a birth centre had significantly fewer interventions (including intra partum caesarean sections, use of obstetric analgesia and augmentation of labour) compared to women who planned to give birth in a conventional labour setting (31-35). Birth centres can be located either freestanding, alongside or on-site an obstetric ward (29). In freestanding birth centres, when a woman or baby is referred for obstetric or paediatric assistance, transfer is necessary by car or ambulance. For alongside birth centres, transfers are made by bed or wheelchair. In on-site birth centres, transport in case of referral is not necessary as the secondary caregiver (obstetrician or paediatrician) can enter the birthing room. Birth centres located close to an obstetric unit (alongside or on-site) are assumed to offer a special opportunity for more integrated care.

Integrated care

Integrated care refers to a co-ordinated and coherent set of services, which are planned, managed and delivered to individual service users across several organizations and co-operating professionals (36,37). The goal of integrated care is to offer a continuum of care for service users that crosses the boundaries of public health, primary, secondary, and tertiary care (38-40). Integrated care is increasingly promoted in developed countries for people with complex needs (e.g. multiple chronic diseases). In these countries, health care systems are facing a variety of inter-related challenges: growing demand for health services, fragmentation of services, changing health needs, and increasing influence of economic, political and social factors on health care delivery. Based on evidence, policymakers facing these challenges promote integrated care as a way to reduce costs, improve quality of care, and generate better patient outcomes (40-43). In 2013, a conceptual framework – the “Rainbow Model of Integrated care” – was created by the Jan van Es Institute in an effort to contribute to a better understanding and operational consensus of integrated care (44).

Adapting the Dutch maternity care system

Although evidence is available about the effectiveness of integrated care for chronic illness, until now, there is no evidence for this assumption in birth care, even though current government policy in the Netherlands is based on it. From 2017, for example, the payment system for maternity care allows bundled payment for both primary and secondary maternity care providers, a change that will require more cooperation or even integration between both echelons (45). To arrange this, the current Dutch maternity care

system needs to be adapted. In short, the system is characterized by two complementary but also sometimes conflicting themes: 1) risk selection of pregnant women for specialist care and 2) collaboration between primary and secondary professionals. The first theme defines the domains and responsibilities necessary for determining the indications for specialist care, and the second theme underscores the importance of cooperation between care providers (46). Also, delivering integrated (birth) care demands both inter-professional and inter-organizational collaboration and therefore requires development of new clinical practices (47).

Within integrated birth care, pregnant women and their needs and preferences are at the centre. Continuous evaluation of perinatal outcomes and client experiences will improve quality of care and makes it more effective and appropriate. Using the most recent opinions of client organizations and professional groups, in 2016 the "Standard for Integrated Birth Care" ("Zorgstandaard Integrale Geboortezorg") was developed. It describes the necessary care for pregnant women, outlining both the content and organization of birth care (48). In 2017, all Maternity Care Networks in the Netherlands are to have formulated how to implement this standard.

Because birth centres, in particular those that are located close to an obstetric unit, are considered to be organizations where integrated care is most easily realized, a better understanding of the organization of birth centres in the Netherlands is essential. Combining knowledge about levels of integration in birth centres with perinatal outcomes, client experiences, and costs will allow to test the assumption that integrated birth care improves quality of care. Recent research on improving health care systems suggests that it requires simultaneous pursuit of three linked aims: "improving the individual experience of care, improving the health of populations and reducing the per capita costs of care". Integrated care organizations can contribute to realizing this "Triple Aim"(42). Because of the novelty of the concept and despite the large uptake of this philosophy in health care recently, there is limited empirical evidence about the Triple Aim. Knowledge of levels of integration, combined with results of both client experiences, perinatal outcomes, and costs of birth centres can contribute to build knowledge about this concept.

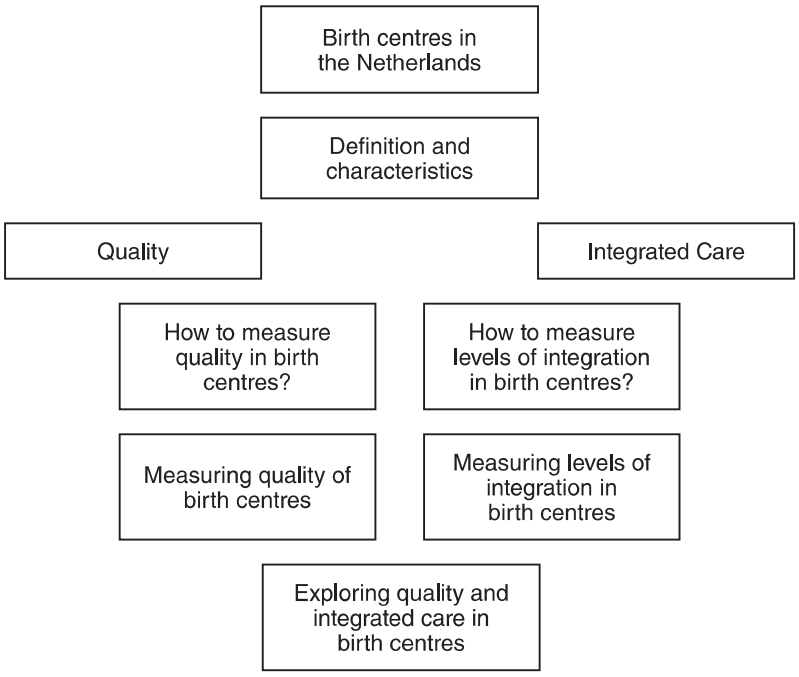
Research objective

The Dutch Birth Centre Study is designed to evaluate the performance of birth centres and their possible added value to the quality of the Dutch maternity care. The study was funded by ZonMw (the Netherlands Organization for Health Research and Development) in the context of the research program Pregnancy and Childbirth. This program contributes to the reduction of preventable perinatal mortality and morbidity through applied research conducted within regional consortia and through national research. Evaluation of birth centres was a theme within this program, prioritized by the Minister of Health. This national study presents evidence-based recommendations

for organization and functioning of future birth centres. The study was performed by a unique collaboration of research institutes and universities: Jan van Es Institute, NIVEL, TNO, University Medical Centre Utrecht, Erasmus University Medical Centre, Leiden University Medical Centre, and Tilburg University. The research in this thesis is mostly based on data derived from the Dutch Birth Centre Study.

The aim of this thesis is to describe the development and use of structure and process quality indicators for birth centres in the Netherlands and their level of integration, and to explore the assumption that more integrated birth centres can provide higher quality of care. Overall conclusions of the Birth Centre Study are not described in this thesis. The study provided three theses which are closely connected but focus on different aspects of birth centre care. The present thesis focuses on the organization of birth centres and related aspects on quality and integrated care.

Figure 1. Overview thesis



Research Questions

This thesis seeks to answer the following questions:

1) What is the definition of birth centres in the Netherlands and how can identified birth centres, based on this definition, be characterised?
2) What indicators can be identified to assess structure and process quality aspects of birth centres in the Netherlands?
3) Are the identified structure and process birth centre quality indicators usable to assess quality of birth centre care?
4) Can the newly developed set of structure and process birth centre quality indicators

be used to determine differences between birth centres in the quality of care?

5) What are key features of the Rainbow Model of Integrated Care?
6) How can birth centres in the Netherlands be classified, based on the dimensions of integration described in the Rainbow Model of Integrated Care?
7) How can Maternity Care Networks be described using the dimensions of integration of the Rainbow Model of Integrated Care?
8) Are integration questionnaires for birth centres and Maternity Care Networks useful for the evaluations of integrated birth care?
9) Are the Triple Aim components (experienced quality of care, perinatal outcomes and costs) interrelated for women who planned to give birth in a birth centre?
10) Is the integration profile of birth centres related to the Triple Aim?

Outline of Thesis

Chapter 2 includes the study design of the Dutch Birth Centre Study, on which most of the studies in this thesis are based. In **Chapter 3**, the development of a definition of birth centres in the Netherlands, and the identification and description of their characteristics are described (Q1). The content of Chapter 4 and 5 is related to assessment of quality in birth centres: **Chapter 4** describes the development of structure and process birth centre quality indicators and in the study described in **Chapter 5** these indicators are tested in the Dutch birth centres. It also describes the assessment of birth centres based on these indicators (Q2-Q4). **Chapter 6** describes the development of a taxonomy that specifies key features of integrated primary care based on the Rainbow Model of Integrated Care. Based on this taxonomy, questionnaires were developed to determine levels of integration in birth centres and Maternity Care Networks (Q5). In **Chapter 7**, the assessment of integration profiles of birth centres is described and a classification of these centres, based on the integration profiles is presented (Q6). This assessment is used in **Chapter 8** to describe Maternity Care Networks using the dimensions of integration of the Rainbow Model of Integrated Care (Q7). **Chapter 9** includes the process of validation of the Integration Questionnaire for birth centres and Maternity Care Networks (Q8). In **Chapter 10** we explore the hypothesis of interdependence of the Triple Aim components (experience of care, perinatal outcomes and costs) and whether they are related to the integration profiles of birth centres. (Q9 and Q10). In the general discussion in **Chapter 11**, the major findings of this thesis are summarised and discussed. It also elaborates limitations and recommendations for research, practice and policy. **Chapter 12** summarises the thesis, both in English and in Dutch.

References

(1) Perined. Perinatale Zorg in Nederland 2015. Utrecht: Perined, 2016.

(2) Ministerie VWS. Ketenzorg zwangerschap en geboorte. Kamerstuk 29 323/22. Available at https://www.rijksoverheid.nl/documenten/kamerstukken/2008/07/16/ketenzorg-zwangerschap-en-geboorte (accessed 29 Sept2016). 2008;49.

(3) Barker DJ, Hales CN, Fall C, Osmond C, Phipps K, Clark P. Type 2 (non-insulin-dependent) diabetes mellitus, hypertension and hyperlipidaemia (syndrome X): relation to reduced fetal growth. Diabetologia 1993;36(1):62-67.

(4) Barker DJ, Osmond C, Golding J, Kuh D, Wadsworth ME. Growth in utero, blood pressure in childhood and adult life, and mortality from cardiovascular disease. BMJ 1989 Mar 4;298(6673):564-567.

(5) Bonsel G, Birnie E, Denktas S, Poeran J, Steegers E. Lijnen in de perinatale sterfte, Signalementstudie Zwangerschap en Geboorte 2010. Rotterdam: Erasmus MC 2010.

(6) Stuurgroep Zwangerschap en geboorte. Een goed begin, veilige zorg rond zwangerschap en geboorte. Advies Stuurgroep Zwangerschap en Geboorte.Utrecht Stuurgroep Zwangerschap en Geboorte 2009.

(7) Health Council of the Netherlands. European primary care. The Hague: health council of the Netherlands, 2004.

(8) NZA Visiedocument Eerstelijns Verloskundige zorg. https://www.nza.nl/104107/10057/Visiedocument_Eerstelijns_verloskundige_zorg.pdf. (Accessed 8 Aug16).

(9) Posthumus A, Schölmerich V, Waelput A, Vos A, De Jong-Potjer L, Bakker R, et al. Bridging between professionals in perinatal care: towards shared care in the Netherlands. Matern Child Health J 2013;17(10):1981-1989.

(10) College voor Zorgverzekeringen. Verloskundig Vademecum. 2003.

(11) Ziekenfondsraad. Verloskundig Vademecum. Amstelveen. Ziekenfondsraad. 1999.

(12) Boesveld-Haitjema I, Waelput A, Eskes M, Wiegers T. Verloskundige samenwerkingsverbanden in Nederland: stand van zaken. NTOG 2008.

(13) Pieters A, van Oirschot C, Akkermans H. No cure for all evils: Dutch obstetric care and limits to the applicability of the focused factory concept in health care. International Journal of Operations & Production Management 2010;30(11):1112-1139.

(14) Kloostermanlijst WB. De verloskundige indicatielijst. Eindrapport.Deel 1987;1:29.

(15) Sikkel A. De verloskundige organisatie in Nederland. Leidschendam: Ministerie van Volksgezondheid en Milieuhygiëne 1979.

(16) Verloskunde Adviescommissie. Verloskundige organisatie in Nederland: uniek, bewonderd en verguisd: eindrapport. : Ministerie van Welzijn, Volksgezondheid en Cultuur; 1987.

(17) Ziekenfondsraad. De Verloskundige Indicatielijst. Amstelveen. Ziekenfondsraad. 1987.

(18) Ministerie van WVC. Regeringsstandpunt Adviescommissie Kloosterman. Rijswijk. Ministerie van WVC. 1989.

(19) Verloskunde Stuurgroep Modernisering. Eindrapport: Meerjarenvisie op de verloskundige zorgverlening in de 21e eeuw. Stuurgroep Modernisering Verloskunde, augustus 2000.

(20) Zeitlin J, Mohangoo A, Cuttini M. The European Perinatal Health Report: comparing the health and care of pregnant women and newborn babies in Europe. J Epidemiol Community Health 2009;63(9):681-682.

(21) Evers AC, Brouwers HA, Hukkelhoven CW, Nikkels PG, Boon J, van Egmond-Linden A, et al. Perinatal mortality and severe morbidity in low and high risk term pregnancies in the Netherlands: prospective cohort study. BMJ 2010;341.

(22) Tuffnell D. Place of delivery and adverse outcomes. BMJ 2010;341.

(23) van der Kooy J, Poeran J, de Graaf JP, Birnie E, Denktas S, Steegers EA, et al. Planned home compared with planned hospital births in the Netherlands: intrapartum and early neonatal death in low-risk pregnancies. Obstetrics & Gynecology 2011;118(5):1037-1046.

(24) De Vries R, Nieuwenhuijze M, Buitendijk SE, Members of Midwifery Science Work Group. What does it take to have a strong and independent profession of midwifery? Lessons from the Netherlands. Midwifery 2013;29(10):1122-1128.

(25) Offerhaus PM, de Jonge A, van der Pal-de, Karin M, Hukkelhoven CW, Scheepers PL, Lagro-Janssen AL. Change in primary midwife-led care in the Netherlands in 2000–2008: A descriptive study of caesarean sections and other interventions among 807,437 low risk births. Midwifery 2015;31(6):648-654.

(26) Amelink Verburg M, Rijnders M, Buitendijk S. A trend analysis in referrals during pregnancy and labour in Dutch midwifery care 1988–2004. BJOG: An International Journal of Obstetrics & Gynaecology 2009;116(7):923-932.

(27) Anthony S, Amelink-Verburg M, Jacobusse G, Van der Pal-de Bruin, KM. De thuisbevalling in Nederland 1995-2002: rapportage over de jaren 2001-2002 2005.

(28) Wiegers T, de Graaf H, van der Pal K. De opkomst van geboortecentra en hun rol in de zorg. Tijdschrift voor gezondheidswetenschappen 2012;90(8):475-478.

(29) Laws PJ, Lim C, Tracy S, Sullivan EA. Characteristics and practices of birth centres in Australia. Australian and New Zealand Journal of Obstetrics and Gynaecology 2009;49(3):290-295.
(30) American Association of Birth Centers. Definition of Birth Center. Available at: http://c.ymcdn.com/sites/www.birthcenters.org/resource/resmgr/About_AABC_-_Documents/AABC_Position_Statement_-_DE.pdf. Accessed July, 23, 2016.
(31) Brocklehurst P, Hardy P, Hollowell J, Linsell L, Macfarlane A, McCourt C, et al. Perinatal and maternal outcomes by planned place of birth for healthy women with low risk pregnancies: the Birthplace in England national prospective cohort study. BMJ 2011;343(7840):d7400.
(32) Hodnett ED, Downe S, Walsh D, Weston J. Alternative versus conventional institutional settings for birth. Cochrane Database Syst Rev 2010;9.
(33) Laws PJ, Tracy SK, Sullivan EA. Perinatal outcomes of women intending to give birth in birth centers in Australia. Birth 2010;37(1):28-36.
(34) Rooks JP, Weatherby NL, Ernst E, Stapleton S, Rosen D, Rosenfield A. Outcomes of care in birth centers. The National Birth Center Study. N Engl J Med 1989;321(26):1804-1811.
(35) Stewart M, McCandlish R, Henderson J, Brocklehurst P. Review of evidence about clinical, psychosocial and economic outcomes for women with straightforward pregnancies who plan to give birth in a midwife-led birth centre, and outcomes for their babies. Report of a structured review of birth centre outcomes. Report of a structured review of birth centre outcomes.Updated July 2005.
(36) Minkman M, Ahaus K, Fabbricotti I, Nabitz U, Huijsman R. A quality management model for integrated care: results of a Delphi and Concept Mapping study. Int J Qual Health Care 2009 Feb;21(1):66-75.
(37) Fabbricotti I. Integrated care in Europe: description and comparison of integrated care in six EU countries 2003.
(38) Goodwin N, Peck E, Freeman T, Posaner R. Managing across diverse networks of care: lessons from other sectors. Report to the NHS SDO R&D Programme.Birmingham: Health Services Management Centre, University of Birmingham 2004.
(39) Valentijn PP, Boesveld IC, Van der Klauw, Denise M, Ruwaard D, Struijs JN, Molema JJ, et al. Towards a taxonomy for integrated care: a mixed-methods study. International journal of integrated care 2015;15.
(40) Kodner DL. All together now: a conceptual exploration of integrated care. Healthc Q 2009;13 Spec No:6-15.
(41) Grone O, Garcia-Barbero M, WHO European Office for Integrated Health Care Services. Integrated care: a position paper of the WHO European Office for Integrated Health Care Services. Int J Integr Care 2001;1:e21.
(42) Berwick DM, Nolan TW, Whittington J. The triple aim: care, health, and cost. Health Aff (Millwood) 2008 May-Jun;27(3):759-769.
(43) Coleman K, Austin BT, Brach C, Wagner EH. Evidence on the Chronic Care Model in the new millennium. Health Aff (Millwood) 2009 Jan-Feb;28(1):75-85.
(44) Valentijn PP, Schepman SM, Opheij W, Bruijnzeels MA. Understanding integrated care: a comprehensive conceptual framework based on the integrative functions of primary care. International Journal of Integrated Care 2013;13.
(45) Rijksoverheid. www.rijksoverheid.nl (accessed 28 August2016).
(46) de Veer A, Meijer W, Groenewegen P. Samenwerkingsverbanden in de verloskundige zorg: eindrapport Project Verloskundige Samenwerkingsverbanden, deel I. 1996.
(47) D'Amour D, Goulet L, Labadie JF, Martin-Rodriguez LS, Pineault R. A model and typology of collaboration between professionals in healthcare organizations. BMC Health Serv Res 2008 Sep 21;8:188-6963-8-188.
(48) Zorginstituut Nederland. Zorgstandaard Integrale Geboortezorg. Available at https://www.zorginstituutnederland.nl/binaries/content/documents/zinl-www/kwaliteit/kwaliteit-geboortezorg/kwaliteit-geboortezorg/kwaliteit-geboortezorg/zinl%3Adocuments/zorgstandaard-integrale-geboortezorg-versie-1-1/Zorgstandaard+Integrale+Geboortezorg+versie+1+1.pdf (Accessed 5 Dec2016).

CHAPTER 2

THE DUTCH BIRTH CENTRE STUDY: STUDYDESIGN OF A PROGRAMMATIC EVALUATION OF THE EFFECT OF BIRTH CENTRE CARE IN THE NETHERLANDS

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Abstract

Background

Birth centres are regarded as settings where women with uncomplicated pregnancies can give birth, assisted by a midwife and a maternity care assistant. In case of (threatening) complications referral to a maternity unit of a hospital is necessary. In the last decade up to 20 different birth centres have been instituted in the Netherlands. This increase in birth centres is attributed to various reasons such as a safe and easy accessible place of birth, organizational efficiency in integration of care and direct access to obstetric hospital care if needed, and better use of maternity care assistance. Birth centres are assumed to offer increased integration and quality of care and thus to contribute to better perinatal and maternal outcomes. So far there is no evidence for this assumption as no previous studies of birth centres have been carried out in the Netherlands.

Design

The aims are 1) Identification of birth centres and measuring integration of organization and care; 2) Measuring the quality of birth centre care; 3) Effects of introducing a birth centre on regional quality and provision of care; 4) Cost-effectiveness analysis; 5) In depth longitudinal analysis of the organization and processes in birth centres. Different qualitative and quantitative methods will be used in the different sub studies. The design is a multi-centre, multi-method study, including surveys, interviews, observations, and analysis of registration data and documents.

Discussion

The results of this study will enable users of maternity care, professionals, policy makers and health care financers to make an informed choice about the kind of birth location that is appropriate for their needs and wishes.

Background

The Dutch maternity care system is based on the notion that pregnancy, birth and the puerperium are primarily physiological processes. Most pregnant women are initially considered as 'low risk' and in 2012 85 % of them initially received antenatal care from an independently operating community midwife. The remaining 15 % of pregnant women received antenatal care from a secondary or tertiary obstetrician from the beginning of pregnancy onwards, mostly due to a history of medical or obstetrical problems (1).If risk factors arise during pregnancy, during labour or in the postpartum period, a woman is referred to secondary care. Secondary care is provided under the responsibility of an obstetrician and clinical midwives or trainee obstetricians can be involved. This risk selection and role division between the professions is based on the List of Obstetric Indications, a document that designates the appropriate level of care for more than a hundred obstetrical conditions (2) Interventions such as augmentation of labour, pharmacological pain relief, continuous foetal monitoring or instrumental birth only take place in secondary or tertiary care. One important aim of the Dutch model is to ensure safe midwifery-led care under the responsibility of an independent community midwife for women with low risk pregnancies, regardless whether they prefer to give birth at home, in a birth centre or in a hospital. The percentage of home births in the Netherlands is high com-pared to other developed countries but is decreasing rapidly. In 2012, 15.7 % of all births in the Netherlands took place at home compared to 30.3 % in 2000 (1) This may be due to a changing trend in women's choices for the planned place of birth, shifting from home to hospital, as well as to a considerable rise in non-urgent referrals to obstetrician-led care for pain relief (3,4).

These trends led to a substantial increase of births in obstetric hospital units. To accommodate the growing number of low-risk women who do not want to deliver at home several birth centres were established in the Netherlands with a large variation in their philosophies, characteristics and service delivery (5-7). Studies on birth centre care in other countries than the Netherlands show that low risk women who planned birth in a birth centre experience significantly fewer interventions compared to women who planned birth in a conventional labour setting, including fewer intra partum caesarean sections, and less frequent use of obstetric analgesia and augmentation of labour (8-12) The Birthplace study in England showed that adverse perinatal outcomes were not significantly different for low risk nulliparous women who planned birth in freestanding midwifery units and alongside midwifery units compared with planned birth in an obstetric unit. For multiparous women, birth in freestanding and alongside midwifery units significantly and substantially reduced the odds of experiencing an unplanned caesarean section, instrumental birth or episiotomy (8).

The effect of the introduction of a relatively large number of birth centres on the quality and the effective-ness of the Dutch maternity care system have not been studied up to

now. The objectives of the Dutch Birth Centre Study can be summarized as follows:

1. To determine process, structure and outcome quality indicators enabling the assessment of the quality of birth and postpartum care in a birth centre, in collaboration with the various care providers and clients involved;
2. To develop a typology of birth centres based on the level of integration of organization and care, also making use of the quality indicators mentioned;
3. To assess the effect of birth centre care in relation to the different types of birth centres in terms of optimality and adverse outcomes;
4. To study the impact of the introduction of birth centre care on the local adjacent birth and postpartum care system by comparing process indicators and perinatal and maternal outcomes before and after the introduction of a birth centre;
5. To study the cost effectiveness of birth centre care compared with usual care (home birth and birth under community midwifery led care in a hospital);
6. To assess experiences of both clients and care givers (working either within or in collaboration with a birth centre);
7. To perform a longitudinal multiple case study investigating the organizational processes in a limited number of selected birth centres from an operational, medical, behavioural and administrative perspective;
8. To translate results of this study into recommendations for future birth and postpartum care in the Netherlands;

In this paper we introduce the Dutch Birth Centre Study and its design.

Methods/design

Study design

The Dutch Birth Centre Study consists of five sub studies which are linked to one another:

1. Inventory of birth centres, development of quality indicators, definition of Birth Centre, measuring integration of organization and care
2. Measuring the quality of birth centre care
3. Effects of introducing a birth centre on regional quality and provision of care
4. Cost-effectiveness analysis
5. In depth longitudinal analysis of the organization and processes in birth centres

Different qualitative and quantitative methods will be used in the sub studies. Data collection includes observations, interviews (individual and group interviews), questionnaires (clients, caregivers, managers of birth centres), standard registered data and additional registrations. Data collected in one sub study will be shared with other sub studies as much as possible to make sure that the birth centres and other professionals involved in birth and postpartum care are minimally burdened by participating in the various evaluations. This study will be conducted in the period 2013–2015.

Instruments

Dutch Birth Centre questionnaire

To characterize all Dutch birth centres the Dutch Birth Centre questionnaire will be developed based on the questionnaire of Laws et al. to characterize Australian birth centres (13). This questionnaire includes questions about background, organisation and service of the birth setting: location, size, personnel, equipment, vision, management, judicial status, financial status, use of protocols, inter-professional cooperation and level of integration on six different domains (see below: measuring integration of organisation and care). It shall be adjusted to the Dutch situation with questions about transfer in case of referral, reasons for an obstetrician to come to the birth centre in case of urgent referral, facilities, postpartum stay, responsibility of care and potential quality indicators. Because quality indicators for birth centre care in the Netherlands are not available, they will be developed (see 1.2: developing quality indicators).

Repro-Q

Client-experiences will be assessed by using the postnatal part of the Repro-Q (14).The Repro-Q consists of the following components: 1) characteristics of the process of care; 2) questions about the 8 domains of the concept of responsiveness of the World Health Organisation (WHO); 3) additional questions including experienced outcomes; 4) the valuation of the relative importance of the various domains; 5) the respondent's socio-demographic characteristics (15).

Case report form

Individual baseline and outcome data are collected from the Netherlands Perinatal Registry (http://www.perina treg.nl). The Netherlands Perinatal Registry (PRN-foundation) is a joint effort of the four professional organisations that provide perinatal care in the Netherlands: KNOV (Royal Organisation of Midwives in the Netherlands), LHV (National Organisation of General Practitioners), NVOG (Dutch Association of Obstetrics & Gynaecology) and NvK (Paediatric Association of the Netherlands). All professional organisations have their own voluntary based medical registry. Those registries are linked to one combined PRN-registry. The participation rate of obstetric caregivers (gynaecologists and midwives) is almost 100 %. All Dutch paediatricians working in a hospital with a neonatal intensive care unit (NICU) participate, as well as 60 % of the paediatricians working in hospitals without NICU (1).

To collect all additional process indicators and volumes for the different parts of the study a case record form shall be developed that includes (if applicable) date, time of day and dilatation at first and last visit at home before the actual birth and referral. We will also collect the time of start of continuous support by midwife and birth attendant, transport and arrival at birth centre or hospital, time of first action by secondary caregiver, time

of arrival in birth centre postpartum and of the return home postpartum and number of hours of maternity care assistance at home. Furthermore data are collected about place of referral, type of transport in case of referral, discipline of the birth attendant and if the situation occurred that the preferred hospital or birth centre was fully booked.

Outcome measures

Serious adverse outcomes are expected to be very low as the study population consists of women with an uncomplicated pregnancy who will start labour under midwifery-led care. Therefore the two main outcome measures will be composite measures: the Optimality Index (OI) and a composite measure of adverse neonatal and maternal out-comes (16).

The Optimality Index is a composite score combining background and outcome data based on a simple scoring system: optimal or not optimal. The optimal score is maximal perinatal outcome with minimal intervention placed against the woman's health status. The OI is very suitable to compare groups with comparable risk profile or to correct group comparisons for differences in risk profile (17,18) [17, 18]. Background data include age, parity, obstetric history, postal codes to characterize neighbourhood effects and social economic status, origin (Dutch or non-Dutch), together indicating the risk profile (19). Elements included in the outcome part of the Optimality Index are for ex-ample: colour of amniotic fluid, induction/augmentation of labour, episiotomy, instrumental (vaginal) birth, Caesarean section, placental retention (>30 min) and Apgar score at 5 min.

The composite adverse outcome score will include maternal and neonatal outcome indicators. Adverse maternal outcome indicators are maternal death (within 42 days of giving birth), third or fourth degree of perineal trauma, placental retention, postpartum haemorrhage (>1000 ml), and admission to an intensive care unit or obstetric high care unit. Adverse neonatal outcome indicators are still-birth after presentation in labour, early neonatal death (<7 days), Apgar score <7 after 5 min, neonatal encephalopathy, meconium aspiration, admission to neonatal unit within 48 h of birth and birth weight below 5th percentile.

Description of sub studies

Sub study 1

Identification of birth centres, development of quality indicators, definition of Birth Centre, measuring integration of organization and care. The aim is to study the way birth centres are organised, what services are provided, who is responsible, and to measure the level of integration of care of birth centres.

Identification of birth centres

Birth centres in their current presentation are relatively new in the Netherlands. Therefore no clear definition and no list of birth locations that can be considered a birth centre

is currently available. To examine the large variety of possible birth centres criteria for inclusion are selected: birth settings where out-of-home community midwifery led care is provided in a home-like environment to women at low risk of medical complications at the onset of labour. Every birth location that can be included will be invited to participate in this part of the study. Based on the characteristics birth centres are examined by three independent researchers and a selection of all potential Dutch birth centres is made.

- Inclusion criteria participants: all locations in the Netherlands that could be considered a birth centre
- Method: systematic inquiries
- Expected outcome: identification of all potential Dutch birth centres (reference date August 2013)

Developing a comprehensive set of structure and process quality indicators for birth centre care

A comprehensive set of structure and process quality indicators will be developed to evaluate birth centre care using a multi-staged approach. The development process consists of three phases: 1) identification of existing structure and process quality indicators in birth care (literature study); 2) translating indicators for maternity care in general into determinants for measuring structure and process quality of birth centre care; 3) determinant selection of relevant structure and process quality indicators (two-step web-based Delphi consultation) (20). The web-based, anonymous nature of the Delphi technique ensures that a single individual cannot dominate the consensus formation. Professionals from different disciplines who are working with or in a birth-centre-like setting with several years of experience, representatives of health insurance companies, policy-makers and advisors will be invited to participate in the Delphi consultation. The experts are instructed to rate the determinants both on relevance to a birth centre setting and on feasibility of use and, if necessary, to comment on them or add new topics. Each determinant will be rated by each expert on a seven-point Likert scale (1 = not at all relevant/feasible; 4 = neutral; 7 = very much relevant/feasible). Agreement among experts is defined as 80 % or more of the ratings within a range of three (i.e. 5-6-7 of 4-5-6). In the first round determinants with a median score of ≥ 6 with agreement on both ratings are considered to be relevant and feasible to collect and are accepted instantly. Determinants scored with a median score of ≤3 are rejected. Median scores of >3 and <6 with agreement or ≥6 without agreement are scored again in the second Delphi round. In the sec-ond round, the experts are informed about the median scores of relevance and feasibility of the total expert group, their own scores and the comments of the respondents regarding determinants for which no consensus is reached in the first round. They are instructed to re-consider their own rating of the determinants presented in the first round as well as to rate and comment possible new elements the same way

as in the first round.

This procedure will result in a list of potential structure and process quality indicators for birth centres in the Netherlands. In order to test whether these quality indicators actually can measure the quality of birth centres, they will be validated within the presumed selection of birth centres.

- Inclusion criteria participants: professionals working with or in a birth centre, representatives of health insurance companies, policymakers and advisors
- Method: two-step web-based Delphi consultation
- Instrument: web-based questionnaire
- Expected outcome: a list of potential structure and process quality indicators for birth centres in the Netherlands

Definition of a birth centre in the Netherlands

The Dutch Birth Centre questionnaire will be sent to a (management) representative of each birth location as identified in the first step of the study. A definition for different types of birth centres in the Netherlands will be developed based on internationally used definitions and the information obtained through our questionnaire. The characteristics of all Dutch birth centres will be described.

- Inclusion criteria participants: management representatives in all birth locations identified previously
- Method: survey
- Instrument: Dutch Birth Centre questionnaire (adjusted Laws questionnaire)
- Expected outcome: preliminary classification/ typology of birth locations into birth centres and other birth settings

Measuring integration of organization and care

To construct a typology of birth centres we will use the concept of integrated care. This concept was developed first for the increasing number of people with a chronic disease. Different (health-related) disciplines are involved in the continuous care for persons with a chronic disease. For in-stance, care for a person with diabetes mellitus type II may involve a general practitioner, a dietician, and a physiotherapist, but also an endocrinologist. The essence of integrated care is a continuum of care for service users which crosses the boundaries of primary, secondary, tertiary and public health care (20-22) The definition of the WHO illustrates the extensive conceptualization of integrated care: “a concept bringing together inputs, delivery, management and organization of services related to diagnosis, treatment, care, rehabilitation and health promotion. Integration is a means to improve the services in relation to access, quality, user satisfaction and efficiency” (23) Domains of integration are 1) clinical, 2) professional, 3) organisational, 4) systemic, 5) functional, and 6) normative integration [24]. Based on the scores on the different

domains an overall score of integration will be calculated to define the level of integration for each birth centre as low, medium or high.

- Inclusion criteria participants: all birth locations identified preliminary as birth centre
- Method: survey and interview
- Instruments: Dutch Birth Centre questionnaire, interview topic list, conceptual framework on integrated care
- Expected outcome: level of integration for each birth centre

Sub study 2

Measuring the quality of birth centre care

The aim is to study the process and outcomes of birth centre care, compared to birth at home and birth in a hospital, for pregnant women under the responsibility of the independently operating community midwife at the start of labour. Client experiences and provider satisfaction are included in the outcome measures. At the end of the total study all different outcomes will be linked with each other.

Measuring process and outcomes of birth centre care

Midwifery practices in the area of all birth locations in this study will record the data for each birth under their care during 3 months: data routinely recorded in the Netherlands Perinatal Registry and additional process indicators not available from the Netherlands Perinatal Registry.

- Inclusion criteria participants: all low risk women starting labour while in care with a participating community midwife for a period of 3 months
- Method: standard and additional health care registration
- Instruments: Optimality Index and a composite measure of adverse neonatal and maternal outcome
- Expected Outcome: quality of care in birth centre versus home or hospital birth for low risk women.

Client experiences

To assess client experiences the postnatal part of the Repro-Q will be used. Especially for this study, questions about facilities and transfer are added for women who received care in a birth centre. The same midwifery practices as in sub study 2.1 will be asked to distribute information of this part of the study and an acceptance paper form to each woman that receives care in their postpartum period regardless who gave natal care to them. These women will be approached 6 to 8 weeks after they give birth by the way they preferred to answer the questions on client experiences i.e. by email, by post or by telephone. A reminder will be sent after 4 weeks.

- Inclusion criteria participants: all women in their postpartum period under care of participating community midwives for a period of 3 months
- Method: Survey
- Instrument: Repro-Q with added questions
- Expected outcome: women's experiences with perinatal care

Care providers experiences

To assess the experiences of professionals working within and with a birth centre a questionnaire will be developed based on earlier questionnaires used in work-force planning (25,26) The development will be a joint effort with other Dutch researchers to create a multipurpose questionnaire. The questionnaire will contain questions about personal background, current job situation, cooperation with other care providers, current job evaluation and future job situation and will be sent to all care givers working in or with a birth centre like community midwives, clinical midwives, obstetricians, paediatricians and maternity care assistants.

- Inclusion criteria participants: all care providers working in and with birth centres in the Netherlands
- Method: Survey
- Instruments: Care provider questionnaire
- Expected outcome: providers' experiences and satisfaction

Sub study 3

Effects of introducing a birth centre on regional quality and provision of care

The aim of the evaluation is to gain insight into the effect of the introduction of a birth centre in a region on planned place of birth and the outcomes of the provided birth and postpartum care.

Process and outcome

In May 2011 a baseline assessment was performed in areas where a birth centre was intended to start before June 2013. Ten regions collected data for more than 3 months. Midwifery practices in the area of an intended birth centre recorded the following data for each birth under their care: data routinely recorded in the Netherlands Perinatal Registry and additional process indicators not available from the Netherlands Perinatal Registry (see sub study 2). The follow-up measurement has been conducted in the second half of 2013. Data collection has resulted in around 3000 births for the pre-test period and will result in 3000 births for the post-test period. These numbers are sufficient to describe changes in the region between the period before the birth centre started and afterwards. Logistic regression analysis will be performed to study the difference in planned place of birth between the period before and after the start of the birth centre. Linear regression

analysis will be per-formed to test the mean differences in the Optimality Index between the period before and after the birth centre started. All analyses will be adjusted for potential confounders such as maternal age, parity and gestational age.

- Inclusion criteria participants: all low risk women starting labour while in care with a participating community midwife for a period of at least 3 months before the start of the birth centre and a minimum of 3 months afterwards
- Method: standard and additional health care registration
- Instruments: case record form, Optimality Index and a composite measure of adverse neonatal and maternal outcome
- Expected outcome: effect of the start of a birth centre on regional quality of care for low risk women

Sub study 4

Cost-effectiveness analysis The costs and effects of women with planned place of birth at a birth centre will be compared to women with a planned place of birth home and hospital under midwifery led care.

Effects

The outcome measure for the effect study will be the Optimality Index. At least three midwifery practices in the area of each birth centre in this study will record data for each birth that started under their care during 3 months: data routinely recorded in the Netherlands Perinatal Registry and additional process indicators not available from the Netherlands Perinatal Registry (see sub study 2). A sample size of nine birth centres per level of integration (low, medium, high, see sub study 1.4) with 66 women per centre achieves 80 % power to detect an effect size of 0.2 (ICC = 0.005, alpha = 0.05).

- Inclusion criteria participants: all low risk women starting labour while in care with a participating community midwife and living and having a birth centre as an option for planned place of birth for a period of at least 3 months
- Method: standard and additional health care registration
- Instruments: case record form, Optimality Index and a composite measure of adverse neonatal and maternal outcome
- Expected outcome: effect of planned place of birth (home, conventional labour setting or birth centre) on regional quality of care for low risk women

Costs

For the births included in the effectiveness part the costs will be assessed. Costs of birth in this study include the health care costs from the start of labour until 7 days after birth. These costs consist of a) medical interventions during birth such as: referral, augmentation, pharmaceutical and non-pharmaceutical pain relief, continuous foetal

monitoring, intra partum antibiotics prophylaxis, continuous support of labour, birth by caesarean section, instrumental vaginal birth, manual placenta removal and blood transfusion, b) use of hospital facilities such as: hospital admission and length of stay, and c) staffing such as: at-tending midwife or obstetrician or both, maternity care assistance during childbirth and in the days thereafter.

Volume of health care resource use will be registered prospectively on the case record form used by the at-tending midwife. Costs of birth and postpartum care are estimated by a detailed cost price analysis. Other re-source use (e.g. hospital days) will be translated into costs using standard prices (25).

Total costs per woman according to planned place of birth will be calculated. Mean differences between the groups and their 95 % confidence intervals will be estimated using non parametric bootstrapping due to the skewed nature of cost data.

- Inclusion criteria participants: all low risk women starting labour while in care with a participating community midwife and living and having a birth centre as an option for planned place of birth for a period of at least 3 months
- Method: measurement of quantities and assignment of unit costs by detailed cost price analysis and use of standard prices
- Instruments: case record forms
- Expected outcome: effect of planned place of birth on costs

Economic evaluation

The aim of the economic evaluation is to study the cost-effectiveness of the care provided by different types of birth centres compared to home birth and hospital birth under midwifery led care. The economic evaluation will be performed from a health care perspective. The time horizon of the economic evaluation is from the start of labour until 7 days after birth. Due to this short time frame no discounting will take place.

Costs and effects (as measured by the Optimality Index) will be transformed in a net-monetary benefit (NMB) estimate. Using the net benefit regression approach cost-effectiveness acceptability curves will be generated which show the probability of being cost-effective for the differ-ent planned places of birth: at home, the different types of birth centres and hospital birth for all acceptable levels of the willingness to pay (27).

- Inclusion criteria participants: all women starting labour while in care with a participating community midwife during a period of 3 months
- Method: incremental net benefit method
- Instruments: case record form and Optimality Index
- Expected outcome: cost-effectiveness of birth centre care compared to home or hospital birth for low risk women

Sub study 5

In depth longitudinal analysis of the organization and processes in birth centres

The aim of this study is to assess to what extent different degrees of organizational integration (on the continuum from partial to fully integrated obstetric care) lead to differences in performance.

Design and longitudinal in depth analysis

This longitudinal qualitative research focuses on arriving at a deeper level of understanding of the process of care and cooperation and its development over time. The re-search design for this study is that of a process study using the grounded theory methodology (28). Seven birth centres will be selected after an initial first exploratory round of visits by theory-driven case selection (29).

Data will be collected through investigating from a so-called engaged scholarship/ quasi-ethnographic perspective, in which from a variety of data sources over a substantial period of time conclusions will be drawn. This means that observations will take place in each of the birth centres for a number of days at a time, during daytime and during night-time, to observe ongoing activities and to interview care providers as well as clients.

Data will be analysed using the constant comparative method. The purpose is to attain new insights by breaking through standard ways of thinking about phenomena reflected in the data (28). In this way concepts emerge as theory is formed. Analysis will start as soon as the first data are collected and continue with each additional data collection. The first step in the analysis will be coding the transcripts of the observations and interviews. The analysis and findings will be based on a triangulation of different types of data (30). First, the researcher will make comprehensive detailed field notes of the observations and informal conversations. Second, surveys will be used. Third, qualitative dimensions such as distances between birth centre and obstetrical ward and time needed for transfer in case of referral will be measured. Fourth, a member-check will be conducted to verify the collected information. Fifth, the researcher will keep a diary in which she reports her own behaviour and feelings, as distinct from her observations in the field notes. Sixth, peer-reviewing will be conducted by evaluation of the work by one or more colleagues.

- Inclusion criteria participants: birth centres selected by theory-drive selection
- Method: observations and interviews
- Instruments: fly-on-the-wall observations, topic list for interviews, member checks and peer reviews
- Expected outcome: improved understanding how different aspects of organizational design, care processes and collaboration (a) interrelate and (b) how they affect (non-medical) outcomes

Overall analysis

The insights of all sub studies will be put together, whereby the various elements of the research will be integrated. The national quantitative results will be combined with the in-sights from the interviews, the cost effectiveness results, client and professional experiences and the information and mirror sessions of the in-depth study to provide insight in the quality of birth centre care in the Netherlands. The regional quantitative results will provide insight into the development over time in a changing health care setting. Based on the confrontation of the various kinds of information more insight can be gained about birth centre care in general and about the strengths and weaknesses of different ways to organise birth centres in particular.

This form of triangulation of information that results from various scientific paradigms is an exciting process that will be carried out by the principal investigators of the participating organizations. It will lead to recommendations for further development of birth centres in the Netherlands.

Considerations

This study will be carried out by an unique collaboration of several organizations, each with their own proven expertise in the field of the organization of health care and perinatal care in particular. Prior to as well as during the study period all organizations will be involved in both the planning and execution of all related sub studies. A broad advisory committee will be formed by representatives of all different kind of maternity care providers, research consortia, professional organizations, health insurance companies, national health department and clients to discuss the process and preliminary outcomes of this study. Design and planning of the study were presented to the Medical Ethics Committee of the UMCU (University Medical Centre Utrecht). They confirmed that this study agrees with Dutch legal regulations for the methods used for this study and because of that official ethical approval of this study is not required (31).

Discussion

The Dutch Birth Centre study will evaluate the effect of birth centre care in the Netherlands from different angles and combining different research methods. In this way the Dutch Birth Centre Study will provide information on the functioning of different birth centres as well as their contribution to the quality of birth and postpartum care and the effect of the level of integration on the organisation of birth centre care; it also will evaluate the quality of birth centre care in terms of process and health outcomes, compared to birth at home or on a maternity ward in a hospital. Client and provider experiences are included in the outcome measures. An economic evaluation will assess cost-effectiveness of birth centre care compared to care as usual (i.e. home birth and hospital birth). In-depth analysis will provide in-formation on how different

degrees of organizational integration on the continuum from partial to fully integrated birth care will lead to differences in performance.

In 2009 a steering committee instituted by the Dutch ministry of Health published a report called 'A good start' (in Dutch: 'Een goed begin') (32). This offered Dutch maternity care givers tools to help to improve their performance and because of that perhaps lower the relatively high mortality rates in the Netherlands (33) This report also pointed out that birth centres might play a role in improving perinatal outcome but only if the surplus value could be demonstrated. This study aims to evaluate the performance of birth centres and their possible added value to the Dutch maternity care system.
The sudden increase in birth centres as integral part of the maternity care system is a relatively new development in the Netherlands. Until now, it seems that each region is developing its own version, based on local preferences, available space, and (lack of) mutual trust. Generally applicable standards for birth centre care are not available and there is no evidence of their added value. This study is designed to fill these gaps in our knowledge, to provide minimum standards for birth centre care and to compare their performance to the traditional care provision at home or in a hospital.
The results of this study will enable care providers, policy makers, health care financers, professionals and users of maternity care to make an educated choice about the kind of birth location that is appropriate for their needs and wishes.

References

(1) Perinatal care in The Netherlands 2012 (in Dutch: Perinatale zorg in Nederland 2012). Utrecht, The Netherlands: The Netherlands Perinatal Registry; 2013.

(2) College voor Zorgverzekeringen. Verloskundig Vademecum 2003. Diemen: College Voor Zorgverzekeringen; 2003.

(3) Amelink-Verburg MP, Rijnders MEB, Buitendijk SE. A trend analysis in referrals during pregnancy and labour in Dutch midwifery care 1988–2004. BJOG. 2009;116:923–32.

(4) Offerhaus PM, Hukkelhoven CWPM, de Jonge A, van der Pal-de Bruin KM, Scheepers PLH, Lagro-Janssen ALM. Persisting rise in referrals during labor in primary midwife-led care in The Netherlands. Birth. 2013;40:192–201.

(5) Denkta S, Bonsel GJ, Van der Weg EJ, Voorham AJJ, Torij HW, De Graaf JP, et al. An urban perinatal health programme of strategies to improve perinatal health. Matern Child Health J. 2012;16:1553–8.

(6) De Graaf JP, Stam-Happel M, Schuur O, Willems MC, van Wieren WJ, Steegers EAP. Bevallen in een geboortecentrum. Med Contact (Bussum). 2003;58:1815–7.

(7) Wiegers T, de Graaf H, van der Pal K. De opkomst van geboortecentra en hun rol in de zorg. Tijdschr voor Gezondheidswetenschappen. 2012;8:475–8.

(8) Brocklehurst P, Hardy P, Hollowell J, Linsell L, Macfarlane A, McCourt C, et al. Perinatal and maternal outcomes by planned place of birth for healthy women with low risk pregnancies: the Birthplace in England national prospective cohort study. BMJ. 2011;343(November):d7400.

(9) Hodnett E, Downe S, Walsh D, Weston J. Alternative versus conventional institutional settings for birth (Review). Cochrane Database Syst Rev 2010:Art. No.: CD000012. DOI: 10.1002/14651858.CD000012.

(10) Laws PJ, Tracy SK, Sullivan EA. Perinatal outcomes of women intending to give birth in birth centers in Australia. Birth. 2010;37:28–36.

(11) Rooks J. The Stockholm Birth Centre Trial: maternal and infant outcome. J Nurse Midwifery. 1997;44:159–62.

(12) Stewart M, Mccandlish R, Henderson J, Brocklehurst P. Review of Evidence about Clinical, Psychosocial and Economic Outcomes for Women with Straightforward Pregnancies Who Plan to Give Birth in a Midwife-Led Birth Centre , and Outcomes for Their Babies . Report of a Structured Review of Birth Centre Outcomes. Oxford: NPEU National Perinatal Epidemiology Unit; 2005:1–80.

(13) Laws PJ, Lim C, Tracy S, Sullivan EA. Characteristics and practices of birth centres in Australia. Aust N Z J Obstet Gynaecol. 2009;49:290–5.

(14) Van der Kooy J, Valentine NB, Birnie E, Vujkovic M, de Graaf JP, Denkta S, et al. Validity of a questionnaire measuring the world health organization concept of health system responsiveness with respect to perinatal services in the Dutch obstetric care system. BMC Health Serv Res. 2014;14:622.

(15) Valentine N, Darby C, Bonsel GJ. Which aspects of non-clinical quality of care are most important? Results from WHO's general population surveys of "health systems responsiveness" in 41 countries. Soc Sci Med. 2008;66:1939–50.

(16) Low LK, Miller J. A clinical evaluation of evidence-based maternity care using the Optimality Index. J Obstet Gynecol Neonatal Nurs. 2006;35:786–93.

(17) Low LK, Seng JS, Miller JM. Use of the Optimality Index-United States in perinatal clinical research: a validation study. J Midwifery Womens Health. 2008;53:302–9.
(18) Murphy PA, Fullerton JT. Measuring outcomes of midwifery care: development of an instrument to assess optimality. J Midwifery Womens Health. 2001;46:274–84.
(19) Krieger N, Chen JT, Waterman PD, Soobader M-J, Subramanian SV, Carson R. Choosing area based socioeconomic measures to monitor social inequalities in low birth weight and childhood lead poisoning: The Public Health Dis-parities Geocoding Project (US). J Epidemiol Community Health. 2003;57:186–99.
(20) Valentijn PP, Boesveld IC, Van Der Klauw DM, Ruwaard D, Struijs JN, Molema JJW, et al. Towards a taxonomy for integrated care: a mixed-methods study. Int J Integr Care. 2015; Jan–Mar; URN:NBN:NL:UI:10-1-114808.
(21) Goodwin N, 6 P, Peck E, Freeman T, Posaner R. Managing Across Diverse Networks of Care: Lessons from Other Sectors. London; 2004:1–400.
(22) Kodner D. All together now : a conceptual exploration of intergrated care. Healthc Q. 2009;13(October 2009):6–15.
(23) Gröne O, Garcia-Barbero M. Integrated care: a position paper of the WHO European Office for Integrated Health Care Services. Int J Integr Care. 2001;1:e21.
(24) Valentijn PP, Schepman SM, Opheij W, Bruijnzeels M. Understanding integrated care: a comprehensive conceptual framework based on the integrative functions of primary care. Int J Integr Care. 2013; Jan–Mar, URN:NBN:NL:UI:10-1-114415.
(25) Van der Doef M, Maes S. The Leiden Quality of Work Questionnaire: its construction, factor structure, and psychometric qualities. Psychol Rep. 1999;85(3 Pt 1):954–62.
(26) Solinís RN, Zabalegui IB, Arce RS, Rodríguez LSM, Polanco NT. Development of a questionnaire to assess interprofessional collaboration between two different care levels. Int J Integr Care 2013; Apr–Jun, URN:NBN:NL:UI:10-1-114421
(27) Hoch JS, Rockx MA, Krahn AD. Using the net benefit regression framework to construct cost-effectiveness acceptability curves: an example using data from a trial of external loop recorders versus Holter monitoring for ambulatory monitoring of “community acquired” syncope. BMC Health Serv Res. 2006;6:68.
(28) Strauss AL, Corbin JM. Grounded theory procedures and techniques. Basics of qualitative research 1990. (Vol. 15). Newbury Park, CA: Sage.
(29) Yin RK. Case Study Research: Design and Methods, vol. 5. 2003. p. 219.
(30) Mays N, Pope C. Qualitative research in health care, Assessing quality in qualitative research. BMJ. 2000;320:50–2.
(31) http://www.ccmo.nl/en/ccmo-directives. Accessed 8th July 2015.
(32) Van der Velden J. Een Goed Begin, Veilige Zorg Rond Zwangerschap En Geboorte. 2009. p. 51.
(33) Zeitlin J, Mohangoo A, Cuttini M, Alexander S, Barros H, Blondel B, et al. The European Perinatal Health Report: comparing the health and care of pregnant women and newborn babies in Europe. J Epidemiol Community Health. 2009;63:681–2.

CHAPTER 3

DEFINING AND DESCRIBING BIRTH CENTRES IN THE NETHERLANDS: A COMPONENT STUDY OF THE DUTCH BIRTH CENTRE STUDY

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Abstract

Background

During the last decade, a rapid increase of birth locations for low-risk births, other than conventional obstetric units, has been seen in the Netherlands. Internationally some of such locations are called birth centres. The varying international definitions for birth centres are not directly applicable for use within the Dutch obstetric system. A standard definition for a birth centre in the Netherlands is lacking. This study aimed to develop a definition of birth centres for use in the Netherlands, to identify these centres and to describe their characteristics.

Methods

International definitions of birth centres were analysed to find common descriptions. In July 2013 the Dutch Birth Centre Questionnaire was sent to 46 selected Dutch birth locations that might qualify as birth centre. Questions included: location, reason for establishment, women served, philosophies, facilities that support physiological birth, hotel-facilities, management, environment and transfer procedures in case of referral. Birth centres were visited to confirm the findings from the Dutch Birth Centre Questionnaire and to measure distance and time in case of referral to obstetric care.

Results

From all 46 birth locations the questionnaires were received. Based on this information a Dutch definition of a birth centre was constructed. This definition reads: "Birth centres are midwifery-managed locations that offer care to low risk women during labour and birth. They have a homelike environment and provide facilities to support physiological birth. Community midwives take primary professional responsibility for care. In case of referral the obstetric caregiver takes over the professional responsibility of care". Of the 46 selected birth locations 23 fulfilled this definition. Three types of birth centres were distinguished based on their location in relation to the nearest obstetric unit: freestanding (n=3), alongside (n=14) and on-site (n=6). Transfer in case of referral is necessary for all freestanding and alongside birth centres. Birth centres vary in their reason for establishment and their characteristics.

Conclusions

Twenty-three Dutch birth centres were identified and divided into three different types based on location according to the situation in September 2013. Birth centres differed in their reason for establishment, facilities, philosophies, staffing and service delivery.

Background

Throughout the world, birth centres are regarded as homelike settings where women with uncomplicated pregnancies can give birth with a midwife with the assistance of a maternity care assistant (maternity care assistant). When complications arise or when medicinal pain relief is requested, referral to a hospital obstetric unit takes place (1-5). Birth centres differ from hospital obstetric units in management, staffing and the absence of medical obstetrical services as induction of labour, pharmacological pain relief, continuous foetal monitoring and instrumental birth. In general, birth centres focus on a model of care (e.g. the midwifery model) which ensures continuity of caregiver, a family-centred approach and informed client participation in choices related to the management of care (1,6,7). In some countries they have been implemented as a response to counter the medicalization of childbirth by putting into practice the philosophy that in most cases childbirth is a physiological process (1,8). There are various nomenclatures for the birth centre concept based on their location in relation to hospital obstetric services: freestanding from a hospital (separate from a hospital, within a non-obstetric hospital, 'stand-alone') or attached to/within a hospital (alongside, co-located, in-hospital, integrated within or on the same campus) (1-3, 8-11). Besides this distinction, differences are seen in their founding philosophies (1,9).

Dutch women, considered at the start of labour to have low obstetric risk can choose the place where they want to give birth: at home or out of home. Out of home birth can take place within a hospital setting or in a birth location outside of a hospital. The woman's own community midwife is the responsible caregiver during labour and birth, regardless the location. If additional obstetrical medical assistance is required, the woman is referred to a hospital obstetric unit to receive secondary care under responsibility of an obstetrician. During the last decade, a rapid increase in the number of out of home birth locations has been seen in the Netherlands. Several factors may be responsible for this sudden increase: women's choice for home birth has decreased in recent years, leading to a higher demand for alternative birth locations that could not be provided by hospitals (13). Besides that, birth centres are assumed to be a birth location that could provide more organizational efficiency by integration of perinatal care with better use of maternity care assistance (14,15). Thereby birth centres are seen as a safe alternative place of birth with fast access to an obstetric unit in case of referral (15). Identification of these 'birth centres' is challenging as the term itself is used loosely: not all locations that call themselves birth centre in the Netherlands are places where women can actually give birth (16-19). The term is also used for locations that house for example community midwifery practices, maternity care assistance organizations (see Box 1) and ultrasound facilities.

The varying international definitions for birth centre are not directly applicable for use within the Dutch obstetric system where the place of birth is interrelated with the clear role division between primary and secondary obstetric care. Between 2013 and 2016

the Dutch Birth Centre Study was carried out to evaluate birth centre care provision and its effects on perinatal outcomes, experiences of clients and caregivers and economic outcomes (14). This evaluation was not possible without a consistent definition of birth centres for the Netherlands and information about their characteristics regarding location, available equipment and services and the model of care provided.
This study is part of the Dutch Birth Centre Study and aimed to develop a standard definition of birth centre for use in the Netherlands in order to identify all Dutch birth centres and to describe their characteristics.

Methods

The methods used in the development of the birth centre definition were 1) the primary data collection, 2) a literature review and 3) a consensus process.

Data collection tools

Three different data collection tools were used. The first one was a short digital survey to make a basic selection of potential birth centres in the Netherlands. The second one was the Dutch Birth Centre Questionnaire, used to get more information about the characteristics of these presumed birth centres and the third tool was the semi-structured interview for the confirmation and elucidation of earlier findings.

Short digital survey for potential birth centres

This tool was developed to obtain information about the place of birth options for low obstetric risk women in the Netherlands. It enquired about the existence of a) a homelike location for birth services for b) low risk women, that c) differed from the conventional hospital labour and birth setting. It was sent to the chair of every group of obstetricians associated with each of the 98 hospitals with maternity care in the Netherlands and to the chair of the local midwifery peer group in the vicinity of each of those hospitals.

Development of the Dutch Birth Centre Questionnaire (DBCQ)

A measurement tool for use in the Netherlands was developed based on an Australian questionnaire used to study birth centres (1). Permission was obtained for this survey tool that contains questions regarding issues as staffing, founding philosophies and physical characteristics of birth centres. Additional questions were added relating specifically to birth centre care provision in the Netherlands. These covered issues as initiators, reason for establishment, estimated number of births in 2013, need for transfer in case of urgent referrals and judicial status. The DBCQ consisted of 150 questions and was used to collect data from birthing locations that were presumed to be birth centres. In January 2014 all selected birth centres were asked to provide the number of actual births that took place at the birth centre in 2013.

Box 1: Short overview of the maternity care system and role and status of midwives in the Netherlands

The Dutch maternity care system is based on the notion that pregnancy, birth and the puerperium are primarily physiological processes. Most pregnant women are initially considered as 'low risk' and receive antenatal care from an independently practicing community midwife. A woman is referred to secondary care if risk factors arise during any time from the start of the pregnancy, until the postpartum period or if medicinal pain relief is requested during childbirth. Secondary care is provided under the responsibility of an obstetrician and clinical midwives or trainee obstetricians can be involved. This risk selection and role division between the professions is based on the List of Obstetric Indications, a document that designates the appropriate level of care for more than a hundred obstetrical conditions (12,35,26).

To work as a midwife in the Netherlands four years of education at the midwifery academy (Bachelor) have to be completed. After that, you are obliged to register in a nationwide register for health professionals (37). Dutch midwives have not been trained or educated as nurses. Dutch midwives can be divided into community midwives (autonomous and independent working in local midwifery practices) and clinical midwives (working under supervision of the obstetrician in a hospital). The community midwife attends birth of low risk women, regardless the location (at home, in a birth centre or in a hospital) and is assisted by a maternity care assistant (a vocational education of three years). The maternity care assistant is employed by a maternity care assistance organization. Every community midwifery practice has several contracts with different health care insurers. Everybody in the Netherlands is obliged to insure oneself for standard care; midwifery care and maternity care assistance are both included (38). The clinical midwife attends births of women who are referred from the community midwife to secondary care or women who are high risk from the beginning of the pregnancy. Clinical midwives are part of the staffing of a hospital.

Semi-structured interviews

Semi-structured interviews were designed to gather information from directing managers of those birth locations that qualified as presumed birth centre. Topics addressed included aspects of management and clinical leadership. During these interviews, information received from the DBCQ was confirmed and additional information was collected regarding time and distance from the birth centre to the hospital obstetric unit. Depending on the local situation, the distance from the birth centre to the obstetric unit was measured by counting steps or by kilometres on a navigation system. Time for transfer by bed or car was measured using a stopwatch during a simulated referral with transfer situation. All interviews were conducted by one researcher (IB).

Development of a definition for birth centre in the Dutch context

In March 2013, international definitions of birth centres were searched in Pubmed and common elements within these definitions were identified. Using literature and data from the DBCQ, the characteristics of these elements were identified for the definition. A concept definition for birth centre was developed and discussed with the Dutch Birth Centre Study research group. Members of this group included 2 professors of obstetrics, 4 senior researchers and 3 PhD-students, two of whom were midwives (one practising). In addition, the Dutch Birth Centre Study Advisory Committee discussed and adjusted the concept definition until consensus was reached (14). After a final agreement from the project group, the definition was finalized.

Identification of Birth Centres

Between April 2013 and June 2013, the locations that might qualify as a birth centre were collected in collaboration with The Royal Dutch Organisation of Midwives (KNOV), College of Perinatal Care (CPZ) and STBN (foundation for project management and innovation in natal care). A call was also posted in the popular LinkedIn Group "Dutch birth care in motion" to obtain information about other potential birth centres. The Short Digital Survey was sent to midwives and obstetricians working in the vicinity of the identified potential birth centres. If they responded positively for all three questions, the location was presumed to be a birth centre. This resulted in a list of presumed birth centres for the study.

Representatives from each presumed birth centre were contacted by telephone, informed about the study and asked to participate. The local manager of each birth location was the primary person asked to answer the DBCQ. If the local manager was not available, the Chair of the Board or a midwife associated with the birth location was asked to respond on behalf of the birth centre. In July 2013, the DBCQ was sent by email to all presumed birth centres. Non-responders were contacted again in August 2013. All answers to the open-ended questions were analysed by two researchers (MHe and IB) and categorized after consensus was reached. The semi-structured interviews with managers of the presumed

birth centres were conducted by one researcher (IB) between January 2014 and April 2015. In May 2015 all birth centres were identified made in line with the Dutch definition of a birth centre and based on the information from September 2013.

Analyses

Descriptive data analyses were conducted using the Statistical Package for Social Sciences (SPSS) version 22.0 (SPSS Inc., Chicago, IL, USA).

Results

In total, 93 birth locations were identified as potential birth centres. After completion of the short digital survey, 47 birth locations were excluded because they were not homelike (n=35), did not differ from the conventional labour ward on the obstetric unit (n=27) or were not accessible as a birth location for low risk women who start labour under care of a community midwife (n=8). More reasons for exclusion could be appropriate for one birth location. The remaining 46 locations were considered to be presumed birth centres and received the DBCQ. All questionnaires were returned of which 44 were fully completed. Two questionnaires were returned incomplete because the questions were not applicable for these two birth locations as being a presumed birth centre.

Definition of a Dutch birth centre

Seven recurring elements were found after review of international birth centre definitions: 1) population to be served, 2) responsible professional for care provided, 3) environment, 4) philosophy, 5) location in relation to the nearest obstetric unit, 6) need for transfer in case of referral and 7) management structure (midwife/obstetrician). Using the information from the DBCQ (Table 1), characteristics were identified and formulated for the seven elements.

All 46 presumed birth centres could be considered as locations to serve low risk women under the care of a community midwife at the onset of labour in a homelike environment. They all reported commitment to physiological birth and provided methods to deal with discomfort and pain during labour and birth that are considered standard care in Dutch primary care midwifery practice.

Management differed between being midwifery managed and obstetrical managed. To stay in line with international definitions the advisory committee of the Dutch Birth Centre study advised to include only locations that were midwifery managed as one of the conditions for the definition of a birth centre. Midwifery managed was defined as: “In the organizational structure it is formally established that an independent community midwife is actively and constructively involved in policy making and organisation of the content of care.” Due to the large variations in answers in the questionnaire and the interviews for this question,

we created a list of conditions of which at least one had to be applicable to fulfil this item. These conditions were: the independent community midwife should be either 1) the owner of the birth location; 2) the floor manager of the birth location; 3) a member of the board of the birth location; 4) a member of the board of an integrated organization in which the birth location is a participant or 5) participating in a committee which is responsible for the local care content of the birth location.

The following definition of a birth centre was developed (Figure 1):
Birth centres are midwifery-managed locations that offer care to low risk women during labour and birth. They have a homelike environment and provide facilities to support physiological birth. Independent community midwives take primary professional responsibility for care. In case of referral the secondary caregiver (obstetrician or paediatrician) takes over the professional responsibility of care.

Three types of birth centres were identified based on location:
A ***freestanding birth centre*** is located separate from a hospital with obstetric services. In case of referral the woman needs to be transferred to a hospital with obstetric services which will normally be by car or ambulance.
An ***alongside birth*** centre is located in a hospital with obstetric services or on such a hospital's grounds, but separate from the obstetric unit. In case of referral the woman needs to be transferred which will normally be by bed or wheelchair.
An ***on-site birth*** centre is located within an obstetric unit of a hospital. In case of referral the woman does not need to be transferred: the secondary caregiver (obstetrician or paediatrician) will enter the birthing room.

Selection of birth centres
Nineteen of the 46 presumed birth centres were excluded because they were not midwifery managed. Twenty seven presumed birth centres appeared to fit the definition based on the answers of the DBCQ. Their managers were interviewed and these locations were visited to confirm the fit of the definition and to obtain additional data. Another four birth centres were excluded because there was no involvement of the community midwife as defined in the definition. In total, 23 birth centres were identified in the Netherlands.

Table 1 Characteristics of included birth locations as presumed birth centres

Topic	Content	Characteristics	Included birth locations n=46 (%)[1]
Philosophy	Commitment to physiological birth and facilities that contribute to the fulfilment of that philosophy	Facilities for discomfort and pain management which are allowed to be used in primary care (bath, shower, massage, nitrous oxide and/or TENS)	46 (100)
		Facilities to encourage spontaneous pushing in non-supine positions (birth chair, birthing ball)	42 (91)
		Assistance for community midwife during labour and birth by a maternity care assistant	42 (93)
		Providing one-to-one support	23 (51)
Environment	Homelike	Alterable lighting / homelike atmosphere	46 (100)
		No 'medical' equipment in sight	26 (57)
Responsibility for care	Community midwife	A Dutch community midwife is an independent medical professional who has full responsibility for providing care for healthy low risk women during pregnancy, childbirth and postpartum. The midwife conducts antenatal assessments, supports women giving birth at a place of their choice (at home, in a birth centre or in a hospital), and provides post-natal care up to six weeks postpartum. If medical assistance is required, the midwife will refer the women to a secondary caregiver (obstetrician or paediatrician). Community midwives in the Netherlands have a greater degree of autonomy in relation to the other medical professions than do midwives in most countries, but only as far as the low-risk population is concerned.	46 (100)
Population	Low risk women	Low risk women are women with a singleton pregnancy of a child in cephalic presentation who start labour spontaneously between 37 and 42 weeks and who do not have any medical or obstetric risk factors that are an indication for secondary care, such as formulated in the so-called List of Obstetric Indications (12). They can choose where they would like to give birth (at home, in a hospital or in a birth centre).	46 (100)
	Medium risk women	Medium risk women are low risk women with a "medium risk" indication. Due to a specific reason they are advised to give birth in hospital but still under community midwife led care. The official medium risk indications according to the so-called List of Obstetric Indications are postpartum haemorrhage or retained placenta after a previous birth.	23 (50)
Management	Midwifery managed	In the organizational structure it is formally established that an independent community midwife is leading in care content and organization.	23 (50)
	Obstetric managed	In the organizational structure the obstetrician is leading in care content and organization.	23 (50)

Physical transfer in case of referral	Always needed	By wheelchair, bed, car or ambulance	10 (22)
	Always with exceptions	By wheelchair or bed but for some urgent reasons an exception is made and the secondary caregiver (obstetrician or paediatrician) will enter the room	13 (28)
	Not needed	The obstetrician enters the room	23 (50)
Location in relation to obstetric unit	Freestanding	Separate from the obstetric unit, in a different building than the hospital with an obstetric unit	3 (7)
	Alongside	Separate from the obstetric unit but in a hospital with an obstetric unit	17 (37)
	On-site	On the same ward as the obstetric unit	26 (57)

[1] *due to one missing value some percentages are calculated based on available data*

Characteristics

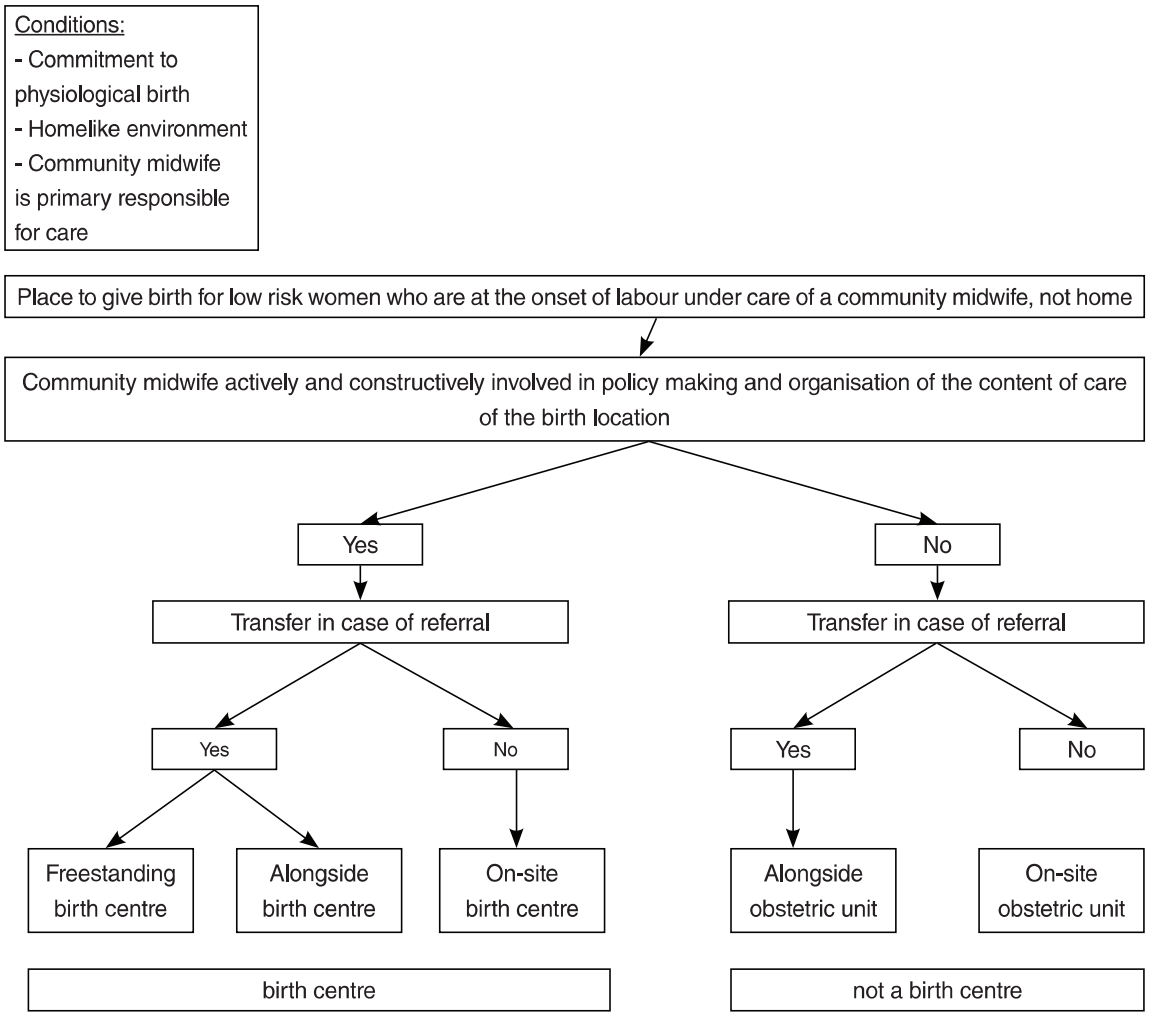
Establishment

Most of the birth centres (n=21) mentioned more than one reason for establishment. The most stated reasons were: the wish for a more homelike environment as opposed to conventional birthing rooms within the obstetric unit (74%), and the possibility to provide one-to-one support during early labour (57%). Competition and marketing were also mentioned as reasons: ten birth centres (44%) were opened in order to compete with other hospitals offering a birth location for women with low obstetrical risk. Birth centres also mentioned logistics as a reason for establishment: in two regions (9%) the distance to a referral obstetric unit was perceived as being too large without the establishment of a strategically placed birth location for low obstetric risk women. Seven birth centres (30%) reported establishment because of a capacity problem in hospitals or in primary care services (shortages of birthing rooms at the conventional labour ward and shortages of midwives and/or maternity care assistants). More than three quarter (78%) of the birth centres reported that local community midwives were responsible for initiating the establishment of the birth centre.

Location

Table 2 shows that three birth centres were freestanding and two of them were located in a hospital without obstetric unit. In case of referral, the distance to the nearest hospital obstetric unit was between 3.7 and 30 kilometres and took respectively 15 to 27 minutes by car or ambulance (from departure out of the birth centre to arrival at the obstetric unit). Fourteen birth centres were located in a hospital but separate from its obstetric unit (alongside). In six of these birth centres referral with transfer to secondary care meant a move to another floor by elevator. Exceptions for transfer were locally described and included situations as shoulder dystocia (n=9), resuscitation of the neonate (n=8), postpartum haemorrhage (n=4), (eclamptic) insult (n=4), Apgar score below 7 after 5 minutes (n=4), placental retention (n=3), prolapse of the umbilical cord (n=3) and foetal distress (n=2). In those situations the secondary caregiver came to the birth centre in case

Figure 1 Flowchart for selection of type of birth location



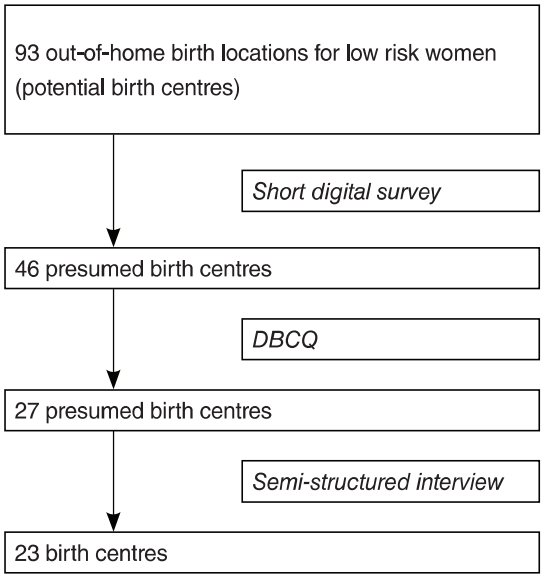
of referral. In five of the 14 hospitals with an alongside birth centre there was also the possibility for low risk women to give birth under the care of their own community midwife on the conventional labour ward. The rooms on this ward were different in environment, staffing, service and facilities compared to the rooms in the birth centre. Transfer time from the alongside birth centre to the nearest obstetric unit varied between 10 seconds and 3.5 minutes.

Six birth centres were located within an obstetric unit (on-site). For low risk women who gave birth at an on-site birth centre transfer was not needed in case of referral because the obstetrician with the obstetric team entered the room. Besides the other conditions as noted in Figure 1, they were distinctive from the conventional obstetric unit because of the active participation and responsibility of independent community midwives in the content of care and organization of this location. In case all beds in the obstetric unit were occupied the birthing rooms in the birth centre were used as obstetric birthing rooms as well. This was in contrast to the situation in freestanding and alongside birth centres.

Facilities to support physiological birth

All birth centres had a non-clinical homelike atmosphere. 74% of the birth centres have no medical equipment like a cardiotocography machine or a resuscitation bag and mask in sight. At the other birth centres this equipment in sight was minimalized by putting it not in a front position. All birth centres provided facilities to support pushing in a non-supine position (birthing stool, birthing ball), methods for discomfort and pain management that were allowed to be used in primary care (bath and shower) and one-to-one or one-to-two support by a maternity care assistant as much as wanted and needed by the woman in labour and her partner.

Figure 2 Flowchart for identification of Dutch birth centres



Staffing

In all birth centres a maternity care assistant assisted the community midwife during labour, birth and postpartum. The maternity care assistant was part of the staffing of the birth centre in thirteen out of twenty three birth centres (57%). In twelve of these birth centres the maternity care assistant was 24/7 present. When not part of the staffing the maternity care assistant was on call for assistance during labour and came to the birth centre after a request by the community midwife. Midwives were not part of the staffing of the birth centre itself but were independent workers or part of the staffing of the larger organization that included the birth centre. They arrived at the birth centre only with a woman in labour or for postpartum care if applicable.

Family centred care

In thirteen birth centres (57%) it was possible for the woman to stay for up to 10 days postpartum. In four of these centres the woman stayed in the same room as where she gave birth; in the other she had to change rooms on the ward or in the building. In all except

one of these thirteen birth centres it was possible for the partner to stay one or more nights as well if desired. During the postpartum stay, a maternity care assistant was available on the ward 24 hours per day in every birth centre. Hotel-like facilities were present in all 23 birth centres.

Philosophies

Philosophies were ranked each from 'not important' to 'very important'. The number of birth centres that ranked a philosophy as important or very important on the five point Likert scale are shown in Table 3 divided by type of birth centre. The philosophies 'to provide a non-clinical homelike environment' and 'commitment to physiological birth' were shared among all birth centres. These philosophies are part of the definition of a birth centre and the identification of birth centres was based on this definition. Two out of six of the on-site birth centres claimed that 'minimal obstetric intervention' was an important or very important philosophy for their birth centre. For the philosophy 'minimal pharmacological pain management' this was the case for three out of six of the on-site birth centres.

Finance and legal entity

The establishment of the birth centres was financed in many different ways. In 55% the local hospital was involved, in 32% a maternity care assistance organization, in 23% an insurance company, in 23% STBN and in 14% the community midwives. For two locations this information was unknown by the person who filled out the questionnaire. In 61% the birth centre itself was an independent legal entity.

Discussion

This study was undertaken to better understand the phenomenon 'birth centre' in the Netherlands. A standard definition for birth centre was developed, 23 birth centres were identified and their characteristics were described. Based on their location in relation to the nearest hospital obstetric unit, three different types of birth centres were seen: freestanding, alongside and on-site. Dutch birth centres differed in their reasons for establishment, services provided, founding philosophies, staffing and service delivery.

In the Netherlands, the term 'birth centre' has a broad scale of meanings, varying from midwifery practices to locations for preconception consults, which is confusing (16-19). To have clarity about the term birth centre, we developed a definition for 'birth centre' for use in the Netherlands that is in line with international definitions, i.e. it is a place to give birth (1-5). In general, there was not much discussion in the project group of the Dutch Birth Centre Study to describe the different options for the characteristics within the definition as provided by the answers of the DBCQ (as shown in Table 2) (14). In the definition created for use in the English Birthplace study, the term 'straightforward pregnancies' was used to describe the group of woman who were eligible to give birth in

a birth centre (5). Although this was taken in consideration, it was decided that the term 'low risk' was a more appropriate term to use in the Dutch maternity system with its clear risk selection as written in the List of Obstetric Indications (see Box 1) (12) .

This is the first study in the Netherlands that has looked into the classification and description of the characteristics of birth centres. With this classification, it will be possible to study the effects of birth centre care provision on many different aspects such as perinatal outcomes and client and healthcare provider satisfaction (14). The interest in the evaluation of birth centre care in the Netherlands is shown by the enthusiastic participation with this sub-study by the professionals working in or with a birth centre. We identified all birth centres operating in September 2013 with some interviews held 1.5 year after filling out the DBCQ. Although it was specifically asked during these interviews to answer the questions as how the situation appeared at September 2013 some recall bias is not ruled out. It is important to acknowledge that as birth centres evolve quickly in number, location, organization and characteristics, current practice might already be different in some ways.

All Dutch birth centres claimed that it was important to be committed to a physiological way of birth. We found that at on-site birth centres medical equipment was more often in sight than in alongside or freestanding birth centres. In addition, as on-site birth centres are located on the obstetric unit, there is easy access to technology and medical interventions during labour and birth. Physicians working at the obstetric unit are trained to look for pathology, and maybe therefore more likely to intervene. Stark et al. found that the support of physiological labour and birth for low risk women when giving birth at the obstetric unit is more difficult than at another location different from the hospital obstetric unit (21). Therefore, it might be more challenging to support physiological labour and birth at an on-site birth centre than at an alongside or freestanding birth centre.

Birth centres are homelike by having decorative changes like a specially designed bed and dim lighting and by providing hotel-like facilities. Facilities like a bath provide an option for non-pharmacological pain management that is associated with a significant reduction in risk of transfer and fewer interventions during labour (22,23). A birth environment that is calming and reduces stress supports physiological birth (24). Although there is a wide variation in the interpretation of the element homelike among Dutch birth centres and the use of the facilities, birth centres could be a stimulating environment for midwives to give a stronger focus on physiological birth to enhance quality in Dutch maternity care. However, the creation of a culture that supports physiological birth involves more than the cosmetic appearance of the birth setting (21). Worldwide there is discussion about safety and distance of travel time from a freestanding birth centre to a hospital with an obstetric unit in case of referral during birth (25-30). Travel time differed from 5 to 60 min with a median of 15 min in Germany, to a median duration of 50 minutes in urgent situations in England (29,30). International studies showed that despite the time needed

Table 2 Characteristics of Dutch birth centres (September 2013)

	Freestanding birth centre n=3	**Alongside birth centre n=14**	**On-site birth centre n=6**	**TOTAL n=23 (%)**
Length of operation (in years)				
< 2	1	7	4	12 (52)
2 to 6	1	5	1	7 (30)
6+	1	2	1	4 (17)
Location				
Not in a hospital	1			1 (4)
In a hospital without obstetric unit	2			2 (9)
Attached to a hospital with an obstetric unit		1		1 (4)
In a hospital on a different floor than the obstetric unit		5		5 (22)
In a hospital on the same floor but on a different ward than the obstetric unit		6		6 (27)
In a hospital on the same floor on the same ward as the obstetric unit		2	6	8 (35)
Number of women receiving intrapartum birth centre care in 2013 [1]				
0-300	3	3	2	8 (35)
301-1000		8	2	10 (43)
1000+		2	1	3 (23)
No 'medical' equipment in sight	3	11	3	17 (74)
Birth chair	3	13	6	22 (96)
Medium risk-indications in birth centre			4	4 (17)
24/7 caregiver at birth centre	1	6	5	12 (52)
Moment of admittance at birth centre for women in labour				
As indicated by the woman	3	7	2	12 (52)
As indicated by the community midwife		7	4	11 (48)
Physical transfer needed in case of referral				
Always	3	4		7 (30)
Always, with exceptions		10		10 (43)
Not needed			6	6 (27)

Birth assistance by a maternity care assistant (maternity care assistant)	3	14	6	23 (100)
One-to-one support by maternity care assistant	1	7	4	12 (52)
Possibility to stay over postpartum (without medical indication)	1	7	5	13 (57)
Change rooms postpartum for stay over		3	1	4 (17)
Hotel facilities in the birthing room				
Television	2	12	5	19 (83)
WiFi	2	14	4 (67)	20 (87)
Music-installation	3	10	3 (50)	16 (70)
Normal bed for partner	1	4	2 (33)	7 (30)
Coffee maker	3	12	3 (50)	18 (78)
Fridge	1	9	6	16 (70)
Microwave	2	10	1	13 (57)

[1] *for two birth centres these data are not available because they started during 2013*

for a intrapartum transfer, planning to give birth in a freestanding birth centre significantly raised the likelihood of having a spontaneous, uncomplicated birth with good outcome for mother and infant (2,25,26,29,31-33). In the Netherlands, referred low risk women with a travel time of at least 20 minutes had no higher risk of adverse outcomes (34). In this study we found that some birth centres had been established in strategic locations to reduce travel time to secondary care. The maximum transfer time found was 27 minutes. Although international studies showed positive effects of travel time at freestanding birth centres and the travel time in the Netherlands is shorter, the effect of travel time for freestanding birth centres to obstetric units shall be studied in another part of the Dutch Birth Centre study (2,14,25,26,29,31-33).

Conclusions

It was possible to develop a comprehensive definition for a Dutch birth centre that is based on the common elements found in international definitions with context specific characteristics for the Netherlands. From the many locations calling themselves birth centres, it was possible to identify and select birth centres in line with our definition. This methodology has contributed to the ongoing research into the effects of birth centre care provision and could be valuable for future research in this area.

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References

(1) Laws PJ, Lim C, Tracy S, Sullivan E a. Characteristics and practices of birth centres in Australia. Aust. N. Z. J. Obstet. Gynaecol. 2009;49:290–5.

(2) Brocklehurst P, Hardy P, Hollowell J, Linsell L, Macfarlane A, McCourt C, et al. Perinatal and maternal outcomes by planned place of birth for healthy women with low risk pregnancies: the Birthplace in England national prospective cohort study. BMJ. 2011;343:d7400.

(3) Stewart M, Mccandlish R, Henderson J, Brocklehurst P. Review of evidence about clinical , psychosocial and economic outcomes for women with straightforward pregnancies who plan to give birth in a midwife-led birth centre , and outcomes for their babies . Report of a structured review of birth centre outcomes. Oxford; 2005.

(4) AABC. Definition of Birth Center. 2013. Available from: http://www.birthcenters.org/about-aabc/position-statements/definition-of-birth-center. Accessed 13 Apr 2013.

(5) Rowe R. Birthplace terms and definitions: consensus process Birthplace in England research programme. Final report part 2. 2011. http://www.nets.nihr.ac.uk/__data/assets/pdf_file/0004/84946/FR2-08-1604-140.pdf . Accessed 18 May 2013.

(6) DATA COLLECTIONS UNIT (DCU). Queensland Perinatal Data Collection - Manual of Instructions for the completion and notification of births to the Perinatal Data Collection. 2012. https://www.health.qld.gov.au/__data/assets/pdf_file/0014/161303/pdc_instruction_manual_2012.pdf . Accessed 15 May 2013.

(7) Hodnett ED, Downe S, Walsh D. Alternative versus conventional institutional settings for birth. Cochrane database Syst. Rev. 2012;8:CD000012.

(8) Gottvall K, Waldenström U, Tingstig C, Grunewald C. In-hospital birth center with the same medical guidelines as standard care: a comparative study of obstetric interventions and outcomes. Birth. 2011;38:120–8.

(9) Waldenström U, Lawson J. Birth centre practices in Australia. Aust. N. Z. J. Obstet. Gynaecol. 1998;38:42–50.

(10) Rogers C, Harman J, Selo-Ojeme D. Perceptions of birth in a stand-alone centre compared to other options. Br. J. Midwifery. 2011;19:237–44.

(11) Thorgen A, Crang-Svalenius E. Birth centres in the East Midlands: views and experiences of midwives. Br. J. Midwifery. 2009;17:144–51.

(12) College voor Zorgverzekeringen. Verloskundig vademecum. Eindrapport van de Commissie Verloskunde van het College voor Zorgverzekeringen. [Obstetrical manual Final report of the Obstetric working Group of the National Health Insurance Board CVZ]. Diemen; 2003.

(13) Stichting Perinatale Registratie Nederland. Perinatale Zorg in Nederland 2013. Utrecht, the Netherlands; 2014.

(14) Hermus MAA, Wiegers TA, Hitzert MF, Boesveld IC, van den Akker-van Marle ME, Akkermans HA, et al. The Dutch Birth Centre Study: study design of a programmatic evaluation of the effect of birth centre care in the Netherlands. BMC Pregnancy Childbirth. 2015;15:148.

(15) Stuurgroep zwangerschap en geboorte. Een goed begin, veilige zorg rond zwangerschap en geboorte. 2009.

(16) Geboortecentrum Baarn. http://www.geboortecentrumbaarn.nl. Accessed 2 Jan 2017.

(17) Geboortecentrum Puur. https://www.geboortecentrumpuur.nl/hoofddorp . Accessed 24 Aug 2016.
(18) Geboortecentrum Zaandam Zuid. http://www.geboortecentrumzaandamzuid.nl/. Accessed 19 Aug 2013.
(19) Geboortecentrum Lindehttps://www.geboortecentrumlinde.nl/ . Accessed 21 Jan 2017
(20) CCMO (central committee on research involving human subjects). http://www.ccmo.nl/en/ccmo-directives . Accessed 8 Jul 2015.
(21) Stark MA, Remynse M, Zwelling E. Importance of the Birth Environment to Support Physiologic Birth. J. Obstet. Gynecol. Neonatal Nurs. 2016;45:285–94.
(22) Lukasse M, Rowe R, Townend J, Knight M, Hollowell J. Immersion in water for pain relief and the risk of intrapartum transfer among low risk nulliparous women: secondary analysis of the Birthplace national prospective cohort study. BMC Pregnancy Childbirth. 2014;14:60.
(23) Cluett ER, Burns E. Immersion in water in labour and birth. Cochrane database Syst. Rev. 2009;CD000111.
(24) Buckley S. Hormonal Physiology of Childbearing: Evidence and Implications for Women, Babies, and Maternity Care. Washington D.C.: National Partnership for Women & Families.; 2015. http://childbirthconnection.org/pdfs/CC.NPWF. Accessed 26 Sep 2015.
(25) Kruske S, Schultz T, Eales S, Kildea S. A retrospective, descriptive study of maternal and neonatal transfers, and clinical outcomes of a Primary Maternity Unit in rural Queensland, 2009–2011. Women and Birth. 2015;28:30–9.
(26) Grigg CP, Tracy SK, Tracy M, Schmied V, Monk A. Transfer from primary maternity unit to tertiary hospital in New Zealand - timing, frequency, reasons, urgency and outcomes: Part of the Evaluating Maternity Units study. Midwifery. 2015;31:879–87.
(27) Grzybowski S, Stoll K, Kornelsen J, Allen V, Jilwah N, Joseph K, et al. Distance matters: a population based study examining access to maternity services for rural women. BMC Health Serv. Res. BioMed Central; 2011;11:147.
(28) David M, Berg G, Werth I, Pachaly J, Mansfeld A, Kentenich H. Intrapartum transfer from a birth centre to a hospital – reasons, procedures, and consequences. Acta Obstet. Gynecol. Scand. 2006;85:422–8.
(29) Christensen LF, Overgaard C. Are freestanding midwifery units a safe alternative to obstetric units for low-risk, primiparous childbirth? An analysis of effect differences by parity in a matched cohort study. BMC Pregnancy Childbirth. 2017;17:14.
(30) Rowe RE, Townend J, Brocklehurst P, Knight M, Macfarlane A, McCourt C, et al. Duration and urgency of transfer in births planned at home and in freestanding midwifery units in England: secondary analysis of the Birthplace national prospective cohort study. BMC Pregnancy Childbirth. 2013;13:224.
(31l) Overgaard C, Møller AM, Fenger-Grøn M, Knudsen LB, Sandall J. Freestanding midwifery unit versus obstetric unit: a matched cohort study of outcomes in low-risk women. BMJ Open 2011;1(2).
(32) Stapleton SR, Osborne C, Illuzzi J. Outcomes of Care in Birth Centers: Demonstration of a Durable Model. J. Midwifery Womens. Health [Internet]. 2013;58:3–14.
(33) Waldenström U, Nilsson C-A. A Randomized Controlled Study of Birth Center Care versus Standard Maternity Care: Effects on Women's Health. Birth. 1997 Mar;24(1):17-26.
(34) Ravelli ACJ, Jager KJ, de Groot MH, Erwich JJHM, Rijninks-van Driel GC, Tromp M, et al.

Travel time from home to hospital and adverse perinatal outcomes in women at term in the Netherlands. BJOG. 2011;118:457–65.

(35) Amelink-Verburg MP, Buitendijk SE. Pregnancy and Labour in the Dutch Maternity Care System: What Is Normal? The Role Division Between Midwives and Obstetricians. J. Midwifery Womens Health. 2010;55:216–25.

(36) Hermus MAA. Development of the Optimality Index-NL2015, an instrument to measure outcomes of maternity care SUBMITTED.

(37) Ministerie van Volksgezondheid Welzijn en Sport. BIG-register. https://www.bigregister.nl/overbigregister/ . Accessed 14 Feb 2017.

(38) KNOV. Midwifery in the Netherlands. 2016. http://www.knov.nl/samenwerken/tekstpagina/489/midwifery-in-the-netherlands/ . Accessed 15 Jul 2016.

CHAPTER 4

DEVELOPING QUALITY INDICATORS FOR ASSESSING QUALITY OF BIRTH CENTRE CARE: A MIXED-METHODS STUDY

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Abstract

Background

Birth centres are described as settings where women with uncomplicated pregnancies can give birth in a home-like environment assisted by midwives and maternity care assistants. If complications arise or threaten, the woman is referred to a maternity unit of a hospital where an obstetrician will take over responsibility. In the last decade, a number of new birth centres have been established in the Netherlands, based on the assumption that birth centres provide better quality of care since they offer a better opportunity for m ore integrated care than the existing system with independent primary and secondary care. At present, there is no evidence for this assumption The Dutch Birth Centre Study is designed to present evidence-based recommendations for organization and functioning of future birth centres in the Netherlands). A necessary first step in this evaluation is the development of indicators for measuring the quality of the care delivered in birth centres in the Netherlands. The aim of this study is to identify a comprehensive set of structure and process indicators to assess quality of birth centre care.

Methods

We used mixed methods to develop a set of structure and process quality indicators for evaluating birth centre care. Beginning with a literature review, we developed an exhaustive list of determinants. We then used a Delphi study to narrow this list, calling on experts to rate the determinants for relevance and feasibility. A multidisciplinary expert panel of 63 experts, directly or indirectly involved with birth centre care, was invited to participate.

Results

A panel of 42 experts completed two Delphi rounds rating determinants of the quality of birth centre care based on their relevance (to the setting) and feasibility (of use). A set of 30 determinants for structure and process quality indicators was identified to assess the quality of birth centre care in the Netherlands.

Conclusions

We identified 30 determinants for structure and process quality indicators concerning birth centre care. This set will be validated during the evaluation of birth centres in the Dutch Birth Centre Study.

Background

Internationally, birth centres are described as settings where women with uncomplicated pregnancies can give birth in a home-like environment. In the Netherlands, women with uncomplicated pregnancies can choose where they want to give birth: at home, in a birth centre or in a hospital (1). At any location, community midwives are responsible for care during labour and birth. When additional medical assistance is required, the women will receive specialist care under responsibility of an obstetrician at an obstetric unit. Birth care in a birth centre is provided by community midwives, assisted by maternity care assistants. The own community midwife accompanies the woman to the centre when she will give birth. In most birth centres, midwives and maternity care assistants are only present at the centre when a woman is in labour.

Birth centres have been present in the Netherlands since the 19th century (2), but not until the year 2000 did the number of these centres begin to grow considerably. This appeared to be a reaction to a severe shortage of maternity care providers, especially primary care midwives and maternity care assistants but also obstetric nurses in hospitals. Birth centres were seen as a solution, because they reduce the pressure on hospital maternity wards by providing women who do not want to give birth at home with a safe and home-like alternative. And because birth centres allow midwives to supervise multiple births simultaneously, they also reduce the pressure on community midwives. These birth centres were typically built right next to, or within, the walls of a hospital. However, most of them disappeared again when the problem of the shortage of maternity care providers was alleviated by a dropping birth rate following the millennium baby boom.

In recent years perceptions about the safety of the maternity care system in the Netherlands began to change. An important cause for this was the publication of the Euro-Peristat data, alarming the Netherlands because of its relatively high perinatal mortality compared to other European countries (3). It was suggested that this might be related to the strict division between primary and secondary care in the Dutch maternity care system (4-7). The basic feature of this system is that for healthy women community midwives or general practioners are the responsible care providers (primary care), and for women with pre-existing and emerging pathology obstetricians are the responsible care providers (secondary care) (8). Media attention given to the Euro-Peristat data and the report from a special committee set up by the Minister of Health (Steering Group “Pregnancy and Childbirth”) (9) may have attributed to a change in the attitudes and behaviour of Dutch women and their care providers with an increasing number of women choosing, or being referred to, a hospital to give birth (10): in 2000 30.3% of all births took place at home but this fell to 13.1% in 2015 (11). More and more healthy women are opting for a hospital birth because they do not feel safe at home, or are asking for referral to receive treatment (i.e. pain medication) that

cannot be provided in primary care (12). Birth centres can be seen as an opportunity to keep these healthy women away from the clinical setting, to provide a safe and home-like alternative, but to be close enough to a hospital to be able to take them in quickly when referral is warranted. In their report, the Steering Group recommended more integration in maternity care, by improved cooperation between primary and secondary care and the introduction of birth centres with close links to hospitals. They also recommended further research on the added value of birth centres (8). In recent years, following these recommendations, a number of new birth centres have been established in the Netherlands, based on the assumption that birth centres provide better quality of care – as measured by perinatal and maternal outcomes – since they offer a better opportunity for more integrated care than the existing system with independent primary and secondary care (13). At present, there is no evidence for this assumption because there is no reliable way to measure degree and quality of integration in care provision. The Dutch Birth Centre Study is designed to present evidence-based recommendations for organization and functioning of future birth centres in the Netherlands, based on careful assessment of existing birth centres (14). A necessary first step in this process is development of indicators for measuring the quality of the care delivered in birth centres in the Netherlands.

Although formulated in 1990, the definition of quality of care provided by the Institute of Medicine (IOM) is still widely accepted: "quality of care is the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge" (15). Usually three dimensions of quality of care are distinguished: structure (the capacity to provide high quality care), process, and outcome (16). Measures of these three dimensions are called indicators. To assess quality of care, indicators should be developed for the seven domains of quality identified by the IOM: effectiveness, safety, timeliness, efficiency, equity, accessibility and patient-centeredness (17). Internationally, standards for birth centres are available and can provide a tool for measuring the quality of service provided to childbearing families in birth centres (18,19), but these standards must be adjusted for specific settings of these centres, in our case, the unique maternity care system in the Netherlands. A number of outcome quality indicators are available to assess birth centre care (i.e. perinatal and maternal mortality and morbidity) (20-27), but structure and process indicators, specifically developed for birth centre care, are scarce.

In this article we describe a set of determinants for structure and process indicators for assessing the quality of birth centre care and we explain the approach we used to develop this set. We only describe the development of determinants for structure and process indicators, because a newly validated Optimality Index (OI-NL2015) and a Composite Adverse Outcome Score (CAOS) were used to evaluate outcomes of birth centre care (14).

Methods

Study Design

In order to develop a comprehensive set of structure and process quality indicators to evaluate birth centre care, we used mixed methods. Three phases were followed in the development process: 1) identification of existing quality indicators in birth care, 2) translating structure and process indicators into determinants, 3) determinant selection by Delphi consultation. The study was conducted in the first half of 2013 as part of the Dutch Birth Centre Study (14).

1. Identification of existing quality indicators in birth care

In the first phase of the study, we used various sources to find existing quality indicators in birth care. We began with an Internet search for documents from Dutch Institutes that had developed quality indicators for maternity care. Documents that described the (development of) quality indicators by midwives, obstetricians and maternity care assistants were obtained. Next, we reviewed international scientific literature about birth centres in order to identify existing quality indicators. We searched PubMed and the Cochrane Library using the Mesh terms: "birthing centres", "quality indicator", "health care" and search terms "quality" and "birth centre". We used references from these articles to find other relevant articles and documents related to quality indicators in maternity care.

2. Translating indicators into determinants

In the second phase we translated the structure and process indicators that we had identified into determinants (or topics): elements that identifies the nature of the indicator. We used a framework based on the seven domains of quality according to the IOM (effectiveness, safety, timeliness, efficiency, equity, accessibility and patient-centeredness.) We added an eighth domain, "Law on the Accessibility of Healthcare Facilities", because of obligations placed on healthcare facilities by this law in the Netherlands. The research group used their experience to add topics that were missing in the resulting list. No outcome indicators were included. We then created a questionnaire that members of an expert panel could complete in a minimum amount of time in order to maximize our response rate.

3. Determinant selection by Delphi consultation

We initiated an online Delphi study with the goal of obtaining consensus among a group of experts. The online Delphi technique is an anonymously structured approach, in which information is gathered from a group of participants through a number of Delphi rounds. The web-based anonymous nature of the Delphi technique ensures that a single individual cannot dominate the consensus formation. Moreover

all participants are equally able to change their opinion in the course of the process (28,29). Our Delphi study consisted of two online questionnaires.

Participants

We selected participants for the expert panel from the Research Advisory Group of the Dutch Birth Centre Study (14), participants of former panels of developing indicators in maternity care in the Netherlands, professionals from different disciplines who are working with or in a birth centre with several years of experience, representatives of health insurance companies, policymakers, clients and advisors in birth care. Of the care providers, only experts who are actually involved in birth (centre) care were invited and all health care disciplines related to birth (centre) care were represented. We included professionals in our heterogeneous expert panel: (11 (community and clinical) midwives, 2 general practitioners, 5 maternity care assistants, 6 obstetricians, 4 paediatricians, 5 obstetrics and gynaecology nurse specialists, 7 managers from birth centres, 5 representatives from health insurance companies, 3 representatives from clients and 15 other experts (i.e. policymakers, advisors and research experts). We limited the number of participating clients, because their view on quality of birth centre care is examined in another part of the study (14).

Rating determinants by experts: first Delphi round

In May 2013, we sent a link to an online questionnaire by e-mail to the expert panel. The experts were instructed to rate the determinants on relevance (to the setting) and feasibility (of use) and, if necessary, to comment on them. Each determinant was rated on a seven-point Likert scale (1 = not at all relevant/feasible; 4 = neutral; 7 = very much relevant/feasible). Finally, experts were encouraged to suggest additional relevant subjects that should be taken into consideration in the assessment of the quality of birth centre care. All ratings from the first Delphi round were analysed in Excel and distributions of scores were presented in median scores for each determinant. We considered determinants with a median score of ≥ 6 with agreement to be relevant and feasible to collect and accepted these immediately. Agreement was defined when 80% or more of the ratings were within a range of three (i.e. 5-6-7 of 4-5-6). Determinants that scored with a median score of ≤ 2 were rejected. Median scores of > 3 and < 6 with agreement or ≥ 6 without agreement were discussed again in the second Delphi round. Furthermore, all the comments on determinants from the first round were analysed and the descriptions of determinants were re-phrased in cases of ambiguity. All proposed new determinants from the first round were categorized in domains. New determinants were coded and two researchers of our research group decided, using a consensus method, which determinants should be submitted in the second round. Items the research group already had decided to include in the

overall study (i.e. professional experiences and topics related to integration) were not included in the second round.

Rating determinants by experts: second Delphi round

In the second Delphi round, the experts were informed about the median scores on relevance and feasibility of the total expert group, their own scores and the comments of the respondents regarding determinants for which no consensus was reached in the first round. They were instructed to re-consider their rating of the determinants presented in the first round as well as to rate and comment on the new elements the same way as in the first round. This was done to allow experts to revise their opinion of the first round while considering the ratings and comments provided by the other members of the expert panel. The link to the personalized online questionnaire was sent by email ten days after the first round. Again, the median scores and the degree of agreement were calculated. Only scores ≥ 6 with agreement were adopted into the list. Determinants with scores for relevance ≥ 6 with agreement, but feasibility between 3 and 6 were presented to the research group for a final decision.

Results

Figure 1 shows the total process that led to the selection of structure and process quality indicators of birth centres, and the number of determinants (topics) at each step. (Figure 1)

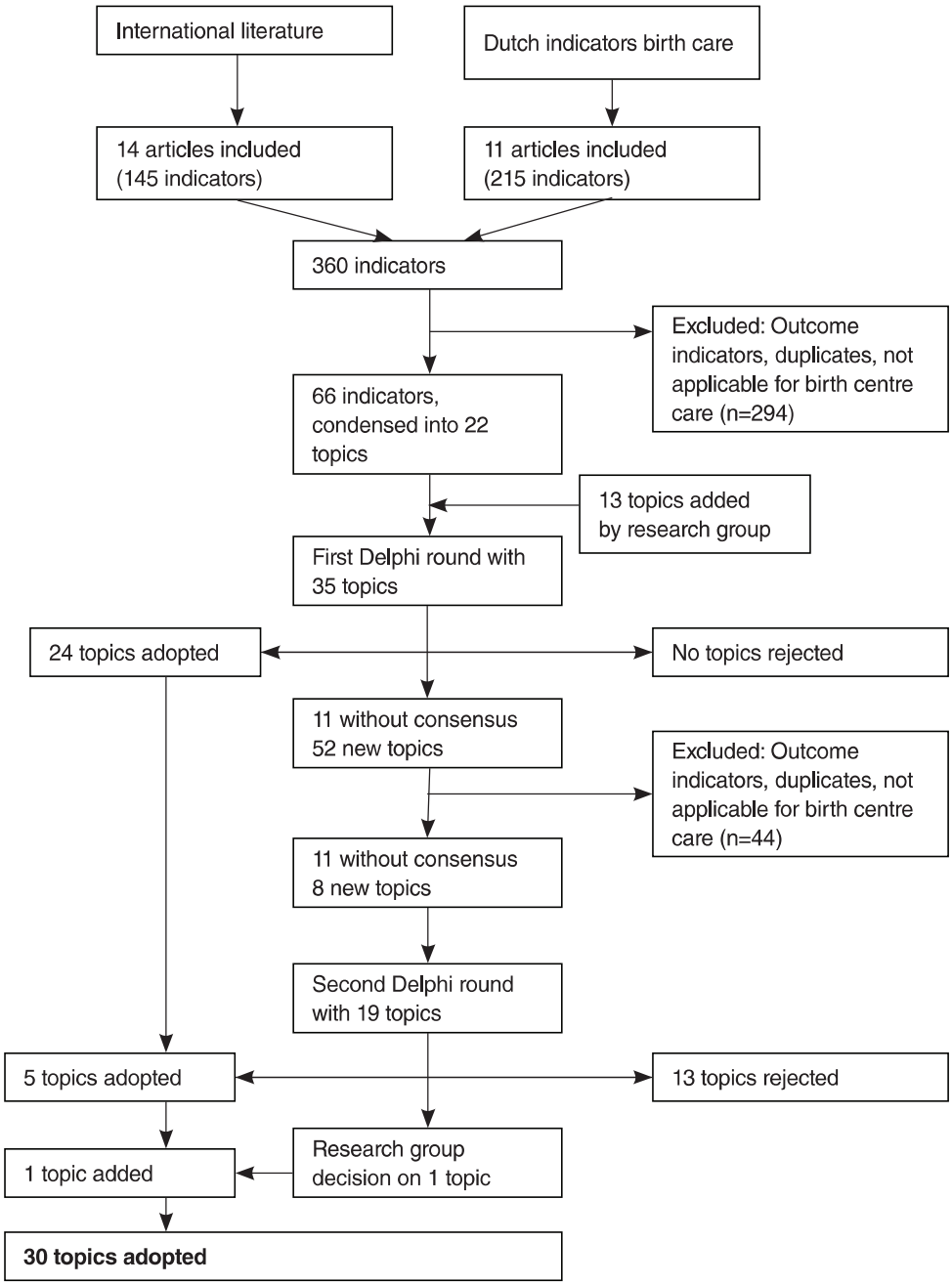
Identification of existing quality indicators in birth care

215 indicators were derived from Dutch sources, 145 from international literature. We eliminated duplication and excluded all outcome indicators. Indicators that clearly do not determine quality of care in a birth centre (because it is clear that this kind of care does not occur in birth centres, i.e. caesarean section) were also excluded from this list. Finally 66 structure and process indicators were identified.

Translating indicators into determinants

These 66 literature-based indicators were divided into seven themes matching the seven domains of quality according to the United States Institute of Medicine (IOM). The research group added a domain “Law Accessibility of Healthcare Facilities”. In these eight domains, 22 topics were identified, because several indicators appeared to relate to the same topic, albeit with different wordings. The research group added another 13 topics that they missed, based on their experience. After this process, the topics were formulated as 35 determinants to be included in the first questionnaire for the online Delphi panel.

Fig. 1 Flowchart selection process indicators quality birth centres



Determinant selection by Delphi consultation

The questionnaire in the first Delphi round was completed by 48 experts (response rate of 76 %). 42 of them also completed the questionnaire in the second round (response rate of 88%). During the first round, 24 of the 35 determinants were accepted for inclusion, none were rejected right away, leaving 11 topics without consensus. 22 experts mentioned 52 new topics they missed in the questionnaire. These topics were labelled and categorized, after which two researchers of our research group decided, based on consensus, that 8 of them would be included in the second Delphi round. In the second round, the 11

topics from the first round on which no consensus was reached and the 8 new topics were presented to the expert panel. This resulted in the acceptance of another five determinants and the rejection of 13 determinants. One determinant was presented to the research group because of low feasibility according to the experts. The research group accepted this determinant, so finally 30 determinants resulted from the Delphi consultation. Table 1 shows the selected determinants per IOM quality domain. Table 2 shows all determinants included in the Delphi procedure with the number or rated scores on the Likert Scale.

Discussion

In this study, part of the DBC Study, we identified a set of 30 determinants, to be translated into 30 structure and process quality indicators that can be used to assess the quality of birth centre care in the Netherlands. The new developed determinants are derived from existing quality indicators in maternity care in the Netherlands (used to measure quality of care by midwives, obstetricians and maternity care assistants) and indicators derived from international documents containing birth centre care. The experts selected 5 determinants that are used by Laws in the research on characteristics and practices of birth centres in Australia (20) and 4 determinants derived from Dutch existing quality indicators. They also selected 3 determinants which were formulated in a quality framework of birth centre care, proposed by the Royal Dutch Organization of Midwives (KNOV). Ten selected determinants are used by different organizations to assess quality of care (e.g. maternity care assistance, emergency care) (30-34). Finally, 7 new determinants were selected by the experts. The final set of indicators will be included in the on-going study to evaluate birth centre care in the Netherlands.

Strength

A strength of the development of this set determinants for indicators is that it is developed in collaboration with all parties involved in birth centre care, and is based on consensus. Therefore it can be expected that all professionals in the field will accept assessing the quality of birth centre care using this set of indicators.

Limitations

We are aware that the set determinants for indicators we developed has its limitations. Firstly, to assess care in general, structure, process and outcome indicators should be used. However, because there are already a large number of quality indicators to assess outcomes of birth centre care, this set contains only structure and process indicators (35). The expert panel chose 19 structure and 11 process indicators to asses birth centre care. For the same reason the set we developed does not include indicators of women's experiences of care, because they can be regarded as outcome indicators (36). Thirdly, this set only consists of determinants for indicators. The process for developing structure

and process quality indicators for birth centres still needs to be described. Also, we do not yet know whether this set of determinants for indicators will be able to differentiate between birth centres or not. It has yet to prove itself in practice: the Dutch National Birth Centre Study will be the first to use these indicators to assess the quality of care.
Finally, although our study was focused on Dutch birth centres, we expect that this set of determinants for indicators will be applicable in other settings where birth centres are used.

Conclusions

We used an online Delphi-method to develop a list of thirty determinants for structure and process indicators to measure quality of birth centre care. We will describe the process for developing quality indicators from these determinants and evaluate the validity and reliability of these indicators as part of the Dutch Birth Centre Study. It is important to underscore that indicators are part of an on-going cycle of quality improvement. Indicators should never be static. Changes in evidence or clinical relevance, a consistently high performance or a low variation in achievement, new developments and demographic changes in the population of childbearing women, all may be criteria for removing an indicator or adding a new one in a future list of determinants for quality indicators for birth centre care.

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Table 1: Selected determinants per domain

Determinant	Type of indicator	Rating on	Median score Likert scale (1-7)	Consensus (%)	Conclusion round 1 (80% consensus)	Conclusion round 2 (80% consensus)
Domain: effectiveness						
Written agreements on care aspects (i.e. by hospital care, obstetricians)	structure	Relevance	7	100	Include	
		Feasible	6	87,5		
Structural evaluation of the care provided in the birth centre	structure	Relevance	7	93,7	Include	
		Feasible	6	83,4		
Maternity care assistant present during labour	process	Relevance	6	87,5	Include	
		Feasible	6,5	79,2		
(Integrated) ICT system with hospital and midwifery practices	structure	Relevance round 1	6	75	Submit again	
		Feasible round 1	5	54,3		
		Relevance round 2	6	90,5		Include
		Feasible round 2	6	76,2		
Domain: safety						
Facilities at a birth centre in relation to emergency care (i.e. CPR resuscitation)	structure	Relevance	7	95,9	Include	
		Feasible	7	97,9		
Joint (interdisciplinary) emergency care training	process	Relevance	6	95,8	Include	
		Feasible	6	87,5		
Agreements with ambulance service and nearest hospital about urgent referrals	structure	Relevance	7	89,6	Include	
		Feasible	6	77		

Domain: timeliness						
Necessary transport time from birth centre to hospital	process	Relevance	7	100	Include	
		Feasible	7	96		
In case of referral from the birth centre durante partu: required time between decision to refer and treatment in hospital	process	Relevance	7	95,9	Include	
		Feasible	6	81,3		
Domain: efficiency						
In case of referral from the birth centre durante partu: guaranteed access to the hospital with which agreements were made	process	Relevance	7	100	Include	
		Feasible	6	87,6		
Distance between birth centre and hospital	structure	Relevance	7	98	Include	
		Feasible	7	96		
Cooperation with (almost) all relevant organizations in the region (such as midwifery practices and maternity care assistance organisations)	process	Relevance	6	89,5	Include	
		Feasible	6	81,3		
Protocols on care aspects	structure	Relevance	7	87,5	Include	
		Feasible	6,5	81,3		
Participation of birth centre in local maternity care consultation and cooperation group (VSV)	process	Relevance	7	85,4	Include	
		Feasible	6	81,3		
Indoor connection between birth centre and hospital	structure	Relevance	6	84	Include	
		Feasible	7	96		
Joint use of an electronic patient record	structure	Relevance round 1	6	87,6	Submit again	
		Feasible round 1	6	66,7		
		Relevance round 2	6	95,2		Include

		Feasible round 2	6	85,7		
System of quality improvement (i.e. accreditation)	structure	Relevance round 1	6	70,9	Submit again	
		Feasible round 1	5	56,3		
		Relevance round 2	6	85,7		Decision Research group: include
		Feasible round 2	5	80,9		
Multidisciplinary education as result of formulated points of improvement from perinatal audit	process	Relevance round 2	6	90,5	New in round 2	Include
		Feasible round 2	6	83,3		
Domain: equity						
Care pathways formulated with chain partners	structure	Relevance	6	95,9	Include	
		Feasible	6	79,2		
Birth centre has vision of birth care	structure	Relevance	7	91,8	Include	
		Feasible	6	75		
Formal partnership agreement with chain partners	structure	Relevance	6	83,4	Include	
		Feasible	7	81,3		
Admission agreement for professionals who use birth care facilities at the birth centre	structure	Relevance round 1	6	69,3	Submit again	
		Feasible round 1	7	75,5		
		Relevance round 2	6	81		Include
		Feasible round 2	7	85,7		
Domain: accessibility						
24 /7 telephone accessibility birth centre	process	Relevance	7	100	Include	
		Feasible	7	98		
Physical access to birthing centre for clients (i.e. parking)	structure	Relevance	7	96	Include	
		Feasible	6	78		

Physical access to birthing centre for midwives and maternity care assistants (e.g. parking)	structure	Relevance	6	92	Include	
		Feasible	6	80		
Domain: patient-centeredness						
Facilities at a birth centre in relation to pain management (i.e. nitrous oxide)	structure	Relevance	6	100	Include	
		Feasible	6	83,7		
Continuous presence of a healthcare provider during labour	process	Relevance	7	98	Include	
		Feasible	6	81,3		
Structural research on client experiences	structure	Relevance	7	98	Include	
		Feasible	6	85,5		
Focusing on the patients (i.e. use individual birth plan)	process	Relevance	6	89,6	Include	
		Feasible	6	83,4		
Participation and representation of clients in organisation (i.e. in the board)	structure	Relevance round 2	6	85,7	New in round 2	Include
		Feasible round 2	6	78,6		

Table 2: All determinants included in the Delphi-procedure

			Scores Likert Scale (N)											
Determinant	Domain*	Rating on	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Do not know**	**Total (N)**	**Median**	**Consensus (%)**	**Conclusion round 1 (80% consensus)**	**Conclusion round 2 (80% consensus)**
Adopted after first round															
Necessary transport time from birth centre to hospital	3	Relevance					3	13	34		50	7	100	Include	
		Feasible				2	4	14	30		50	7	96		
24 /7 telephone accessibility birth centre	6	Relevance			2			6	42		50	7	100	Include	
		Feasible			1	3		10	36		50	7	98		
Facilities at a birth centre in relation to pain management (i.e. nitrous oxide)	7	Relevance	1	1	2	2	12	17	14		49	6	100	Include	
		Feasible	1		3	3	5	14	22	1	49	6	83,7		
Written agreements on care aspects (i.e. by hospital care, obstetricians)	1	Relevance					4	17	27		48	7	100	Include	
		Feasible		1	1	2	4	18	20	2	48	6	87,5		
In case of referral from the birth centre durante partu: guaranteed access to the hospital with which agreements were made	4	Relevance					3	9	36		48	7	100	Include	
		Feasible			1	4	9	12	21	1	48	6	87,6		
Distance between birth centre and hospital	4	Relevance				1	7	15	27		50	7	98	Include	

		Feasible			2	1	14	33		50	7	96	
Continuous presence of a health-care provider during labour	7	Relevance			1	6	14	27		48	7	98	Include
		Feasible		1	5	3	12	14	13	48	6	81,3	
Structural research on client experiences	7	Relevance			1	2	18	27		48	7	98	Include
		Feasible	1		2	4	3	15	23	48	6	85,5	
Physical access to birthing centre for clients (i.e. parking)	6	Relevance			2	6	16	26		50	7	96	Include
		Feasible		1	2	7	2	13	24	1	50	6	78	
Care pathways formulated with chain partners	5	Relevance			1	7	18	21	1	48	6	95,9	Include
		Feasible		1		8	7	14	17	1	48	6	79,2	
Facilities at a birth centre in relation to emergency care (i.e. CPR resuscitation)	2	Relevance			2	4	11	32		49	7	95,9	Include
		Feasible			1		10	37	1	49	7	97,9	
In case of referral from the birth centre durante partu: required time between decision to refer and treatment in hospital	3	Relevance			1	3	12	31	1	48	7	95,9	Include
		Feasible		3	3	9	10	20	3	48	6	81,3	
Joint (interdisciplinary) emergency care training	2	Relevance			2	7	17	22		48	6	95,8	Include
		Feasible		1	5	7	19	16		48	6	87,5	
Structural evaluation of the care provided in the birth centre	1	Relevance			2	1	16	28	1	48	7	93,7	Include
		Feasible		2	4	8	18	14	2	48	6	83,4	

Physical access to birthing centre for midwives and maternity care assistants (e.g. parking)	6	Relevance				4	9	17	20		50	6	92	Include
		Feasible		1	2	6	3	15	22	1	50	6	80	
Birth centre has vision of birth care	5	Relevance		1		3	3	15	26		48	7	91,8	Include
		Feasible		1	4	7	5	11	20		48	6	75	
Cooperation with (almost) all relevant organizations in the region (such as midwifery practices and maternity care assistance organ-isations)	4	Relevance	1	1		3	4	16	23		48	6	89,5	Include
		Feasible		2	1	6	8	14	17		48	6	81,3	
Agreements with ambulance service and nearest hospital about urgent referrals	2	Relevance	2			3	4	9	30		48	7	89,6	Include
		Feasible	1		1	8	4	10	23	1	48	6	77	
Focusing on the patients (i.e. use of individual birth plan)	7	Relevance				4	2	24	17	1	48	6	89,6	Include
		Feasible			2	4	14	13	13	2	48	6	83,4	
Maternity care assistant present during labour	1	Relevance			2	4	7	12	23		48	6	87,5	Include
		Feasible		2	2	5	2	12	24	1	48	6,5	79,2	
Protocols on care aspects	4	Relevance	2		1	2	3	10	29	1	48	7	87,5	Include
		Feasible	3		1	4	3	12	24	1	48	6,5	81,3	
Participation of birth centre in local maternity care consultation and cooperation group (VSV)	4	Relevance	2			5	1	10	30		48	7	85,4	Include
		Feasible	1		1	6	3	13	23	1	48	6	81,3	
Indoor connection between birth centre and hospital	4	Relevance	2		1	5	8	11	23		50	6	84	Include

		Feasible				2	2	13	33		50	7	96		
Formal partnership agreement with chain partners	5	Relevance	2	1		5	5	15	20		48	6	83,4	Include	
		Feasible		1	1	7	3	10	26		48	7	81,3		
Adopted after second round															
Joint use of an electronic patient record	4	Relevance round 1				6	3	19	20		48	6	87,6	Submit again	
		Feasible round 1	1	2	3	8	5	8	19	2	48	6	66,7		
		Relevance round 2	1			1	1	20	19		42	6	95,2		Include
		Feasible round 2	1		2	3	5	16	15		42	6	85,7		
(Integrated) ICT system with hospital and midwifery practices	1	Relevance round 1		1		9	3	17	16	2	48	6	75	Submit again	
		Feasible round 1	1	3	4	12	3	9	14	2	48	5	54,3		
		Relevance round 2				3	6	19	13	1	42	6	90,5		Include
		Feasible round 2	1		2	5	10	13	9	2	42	6	76,2		
System of quality improvement (i.e. accreditation)	4	Relevance round 1			1	10	8	12	14	3	48	6	70,9	Submit again	
		Feasible round 1	2	1	1	7	9	11	11	6	48	5	56,3		
		Relevance round 2	1			4	8	16	12	1	42	6	85,7		decision Research group: include
		Feasible round 2	2		1	3	15	10	9	2	42	5	80,9		

Admission agreement for professionals who use birth care facilities at the birth centre	5	Relevance round 1	1		3	4	6	10	18	7	49	6	69,3	Submit again	
		Feasible round 1			1	3	3	8	26	8	49	7	75,5		
		Relevance round 2	1		1	3	4	13	17	3	42	6	81		Include
		Feasible round 2				5		7	29	1	42	7	85,7		
Multidisciplinary education as result of formulated points of improvement from perinatal audit	4	Relevance round 2	1			3	1	17	20		42	6	90,5		Include
		Feasible round 2			1	5	3	16	16	1	42	6	83,3		
Participation and representation of clients in organisation (i.e. in the board)	7	Relevance round 2	1			5	12	14	10		42	6	85,7		Include
		Feasible round 2	1			7	7	9	17	1	42	6	78,6		
Rejected after round 2															
Opportunities to stay in the birth centre after giving birth	7	Relevance round 1	2	2	4	15	9	11	6		49	5	71,4	Submit again	
		Feasible round 1	1	1	3	5	6	13	19	1	49	6	77,5		
		Relevance round 2	2	4	5	7	10	9	5		42	5	61,9		Reject
		Feasible round 2			3	4	3	14	18		42	6	83,3		
Legal entity (i.e. foundation, association)	8	Relevance round 1	2	2	5	16	7	8	4	5	49	4	57,2	Submit again	
		Feasible round 1		1	1	8	2	10	21	6	49	6	67,4		

		Relevance round 2	3	3	1	20	3	6	2	4	42	4	57,1		Reject
		Feasible round 2				5	4	11	19	3	42	6	80.9		
Independent supervisory board	8	Relevance round 1	2	2	2	7	6	13	13	3	48	6	66,7	Submit again	
		Feasible round 1	2	2		7	3	12	20	2	48	6	73		
		Relevance round 2		1	1	6	5	17	11	1	42	6	78,6		Reject
		Feasible round 2			1	7	2	17	14	1	42	6	78,6		
Multidisciplinary composition of the board of the birth centre (e.g. midwives, maternity care organization and hospital)	4	Relevance round 1	3	1	2	4	10	11	17		48	6	79,1	Submit again	
		Feasible round 1	1		1	5	5	8	28		48	7	85,4		
		Relevance round 2	1	1	1	6	5	18	10		42	6	78,6		Reject
		Feasible round 2				3	2	9	28		42	7	92,7		
Publication of annual report	8	Relevance round 1	2		1	8	9	14	14		48	6	77,2	Submit again	
		Feasible round 1		2		4	2	14	25	2	49	7	85,5		
		Relevance round 2		1		8	7	14	12		42	6	78,6		Reject
		Feasible round 2				6		7	28	1	42	7	83,4		

Number of births and postpartum stays that occur per year in the birth centre	4	Relevance	2	2	2	6	7	13	16		48	6	75	submit again	
		Feasible			1	2	5	15	25		48	7	93,8		
		Relevance round 2	2	1		6	5	21	7		42	6	78,6		Reject
		Feasible round 2				1		8	33		42	7	97,6		
Facilities at a birth centre in relation to stay (i.e. possibilities for father to stay overnight, private shower and/or toilet in room, bath)	7	Relevance round 1		2	4	4	10	13	16		49	6	79,6	Submit again	
		Feasible round 1			1	6	6	10	26		49	7	85,7		
		Relevance round 2		1	4	4	8	12	13		42	6	78,7		Reject
		Feasible round 2			1	1	4	8	27	1	42	7	92,8		
24 hours presence of a caregiver in birth centre (maternity care assistant or midwife)	2	Relevance round 2	3	3	2	4	4	13	12	1	42	6	69.1		Reject
		Feasible round 2	1	2	1	2	2	8	24	2	42	7	80,9		
Independent or freestanding setting with a home-like, non-clinical atmosphere	6	Relevance round 2	4	1	8	8	7	9	5		42	4,5	54,7		Reject
		Feasible round 2		2	2	5	6	14	13		42	6	78,6		
Detailed business plan for the birth centre	4	Relevance round 2		2	1	8	7	15	6	3	42	5,5	71,4		Reject
		Feasible round 2			1	4	4	15	17	1	42	6	85,7		

Participation of the birth centre in scientific research	1	Relevance round 2	1		3	10	14	6	7	1	42	5	71,4	Reject
		Feasible round 2	1			7	8	12	13	1	42	6	78,6	
Transfer from birthing room to a residence room when the mother of newly-born child wants/can/ has to stay a (part of her) childbed period;	7	Relevance round 2	2	3	1	14	6	8	2	6	42	4	50	Reject
		Feasible round 2	1	1	1	7	5	9	12	6	42	5,5	50	
Staff in the birth centre mirrors the population that (may) use the birth centre	7	Relevance round 2	9	3	4	13	4	3	2	4	42	4	50	Reject
		Feasible round 2	4	4	1	12	3	10	5	3	42	4	38,1	

** Description of Domains:*

1: Effectiveness
2: Safety
3: Timeliness
4: Efficiency
5: Equity
6: Accessibility
7: Patient-centeredness
8: Law on accessibility of health care facilities

References

(1) Wiegers T, de Graaf H, van der Pal K. (2012). De opkomst van geboortecentra en hun rol in de zorg. Tijdschrift voor gezondheidswetenschappen 2012; 90(8), 475-478.

(2) de Graaf JP, Merkus H, Ravelli A, Bonsel G, Steegers E. Short history of Dutch obstetric care and birth centres in particular. In: Perinatal and maternal health inequalities: effects of places of residence and delivery 2013:14.

(3) Zeitlin J, Mohangoo A, Cuttini M. The European Perinatal Health Report: comparing the health and care of pregnant women and newborn babies in Europe. J Epidemiol Community Health 2009;63(9):681-682.

(4) Evers AC, Brouwers HA, Hukkelhoven CW, Nikkels PG, Boon J, van Egmond-Linden A, et al. Perinatal mortality and severe morbidity in low and high risk term pregnancies in the Netherlands: prospective cohort study. BMJ 2010;341.

(5) Tuffnell D. Place of delivery and adverse outcomes. BMJ 2010;341.

(6) van der Kooy J, Poeran J, de Graaf JP, Birnie E, Denktas S, Steegers EA, et al. Planned home compared with planned hospital births in the Netherlands: intrapartum and early neonatal death in low-risk pregnancies. Obstetrics & Gynecology 2011;118(5):1037-1046.

(7) de Jonge A, Baron R, Westerneng M, Twisk J, Hutton EK. Perinatal mortality rate in the Netherlands compared to other European countries: A secondary analysis of Euro-PERISTAT data. Midwifery 2013; 29:1011-1018.

(8) Commissie Verloskunde. Verloskundig Vademecum 2003. Diemen: College voor Zorgverzekeringen, 2003.

(9) Stuurgroep Zwangerschap en Geboorte. Een goed begin - Advies Stuurgroep zwangerschap en geboorte. Den Haag: 2009.

(10) de Vries RG, Paruchuri Y, Lorenz K, Vedam S. Moral science: ethical argument and the production of knowledge about place of birth. J Clin Ethics 2013 Fall;24(3):225-238

(11) Stichting Perinatale Registratie Nederland. Perinatale Zorg in Nederland 2015. Utrecht: Stichting Perinatale Registratie Nederland, 2016.

(12) Anthony S, Amelink-Verburg M, Jacobusse G, van der Pal-de Bruin, KM. De thuisbevalling in Nederland 1995-2002. Rapportage over de jaren 2001-2002 (Home births in the Netherlands 1995-2002. Report for the years 2001-2002). PRN/TNO rapport KvL/JPB 2005;2005.

(13) Bonsel GJ, Birnie E, Denktas S, Poeran J, Steegers EAP. Lijnen in de Perinatale Sterfte,
Signalementstudie Zwangerschap en Geboorte 2010. Rotterdam:Erasmus MC,2010.

(14) Hermus MA, Wiegers TA, Hitzert MF, Boesveld IC, van den Akker-van Marle ME, et al. The Dutch Birth Centre study: study design of a programmatic evaluation of the effect of birth centre care in the Netherlands. BMC Pregnancy and Childbirth. 2015;15(1):148.

(15) Lohr KN, Schroeder SA. A strategy for quality assurance in Medicare. N Engl J Med 1990;322(10):707-712.

(16) Donabedian A. Explorations in Quality Assessment and Monitoring: Ill.: Health Administration Press; 1980.

(17) Institute of Medicine (US). Committee on Quality of Health Care in America. Crossing the quality chasm: A new health system for the 21st century. National Academies Press; 2001.

(18) American Association of Birth Centers. Standards for Birth Centers. Perkiomenville: AABC, 2008.
(19) The Royal College of Midwives. Standards for Birth Centres in England: a Standards Document. London: RCM, 2009.
(20) Laws PJ, Lim C, Tracy S, Sullivan EA. Characteristics and practices of birth centres in Australia. Australian and New Zealand Journal of Obstetrics and Gynaecology 2009;49(3):290-295.
(21) Laws PJ, Tracy SK, Sullivan EA. Perinatal outcomes of women intending to give birth in birth centers in Australia. Birth 2010;37(1):28-36.
(22) Stapleton SR, Osborne C, Illuzzi J. Outcomes of care in birth centers: demonstration of a durable model. Journal of Midwifery & Women's Health 2013.
(23) Rooks J P, Weatherby N L, Ernst E K, Stapleton S, Rosen D, Rosenfield A. Outcomes of care in birth centers. The National Birth Center Study. The New England journal of medicine. 1989; 321(26), 1804-1811.
(24) Stewart M, McCandlish R, Henderson J, Brocklehurst P. Review of evidence about clinical, psychosocial and economic outcomes for women with straightforward pregnancies who plan to give birth in a midwife-led birth centre, and outcomes for their babies. Report of a structured review of birth centre outcomes. Updated July 2005.
(25) Waldenstrom U, Nilsson C, Winbladh B. The Stockholm birth centre trial: maternal and infant outcome. BJOG 1997;104(4):410-418.
(26) Byrne JP, Crowther CA, Moss JR. A randomised controlled trial comparing birthing centre care with delivery suite care in Adelaide, Australia. Australian and New Zealand Journal of Obstetrics and Gynaecology 2000;40(3):268-274.
(27) Hollowell J, Puddicombe D, Rowe R, Linsell L, Hardy P, Stewart M. The Birthplace national prospective cohort study: perinatal and maternal outcomes by planned place of birth. Birthplace in England research programme. Final report part 4: NIHR service delivery and organisation programme, 2011 .
(28) Keeney S, McKenna H, Hasson F. The Delphi technique in nursing and health research. John Wiley & Sons, 2010.
(29) Skulmoski GJ, Hartman FT, Krahn J. The Delphi method for graduate research. Journal of information technology education 2007;6:1.
(30) Kooistra M, Waelput A, Offerhaus P, et al. Kwaliteitsindicatoren voor de eerstelijnsverloskunde. RIVM rapport 260101005. 2009.
(31) Zichtbare Zorg Eerstelijnsverloskunde. Zorginhoudelijke indicatoren zichtbare zorg eerstelijnsverloskunde. 2012.
(32) Zorginstituut Nederland (2012). Kwaliteitsindicatoren kraamzorg
(33) Zorgverzekeraars Nederland (2013). Rapport Kwaliteitsvisie spoedeisende zorg,
(34) KNOV. Kwaliteitskader geboortecentra (2010) 2010.Accessed 20 Februar 2013. http://www.knov.nl/werk-en-organisatie/tekstpagina/268/geboortecentra/
(35) Wiegers TA, Keirse MJNC, Berghs GAH, van der Zee J. An approach to measuring quality of midwifery care. Journal of Clinical Epidemiology 1996;49(3):319-325.
(36) van der Kooy, J., Valentine, N. B., Birnie, E., Vujkovic, M., de Graaf, J. P., Denktas, et al. (2014). Validity of a questionnaire measuring the world health organization concept of health system responsiveness with respect to perinatal services in the Dutch obstetric care system. BMC health services research, 14(1), 1.

CHAPTER 5

AN APPROACH TO ASSESSING THE QUALITY OF BIRTH CENTRES

Submitted:

Boesveld IC, Hermus MAA, van der Velden-Bollemaat EC, Hitzert M, de Graaf JJ, Franx A, Wiegers TA.

Abstract

Objective

To determine the usability of a recently developed set of 30 structure and process birth centre quality indicators, constructed by an expert panel in a Delphi study.

Design

We designed an explorative study using mixed-methods including literature, a survey, interviews and observations. The study is part of the Dutch Birth Centre Study. We first determined the measurability of birth centre quality indicators by describing them in detail. Information on the operationalization of the indicators was searched in Dutch quality reports, literature, interviews and the experience of the research group of the Dutch Birth Centre Study. Next we assessed the birth centres in the Netherlands using these indicators using data derived from the Dutch Birth Centre General Questionnaire, the Dutch Birth Centre Integration Questionnaire, interviews, and policy documents.

Setting and Participants

Representatives of 23 birth centres in the Netherlands.

Measurements and findings

28 indicators could be used to assess birth centres in the Netherlands. Differences between birth centres were shown: the scores on 28 indicators ranged from 7 to 22. Scientific evidence for the specific content of quality indicators is scarce. A number of these indicators can be combined or specified so that they are easier to assess. Some quality indicators are only applicable for some birth centres (e.g. only for freestanding or alongside birth centres).

Key conclusions and implications for practice

28 of the 30 quality indicators are usable to assess structure and process quality of birth centres. De set of quality indicators can contribute to the development of a quality system for birth centres. Further research is necessary to formulate standards or minimum quality requirements for birth centres and to improve the set of birth centre quality indicators.

Introduction

Birth centres are midwifery-managed settings, offering care to low risk women during labour and birth. A birth centre provides facilities that support physiological birth in a homelike environment. Community midwives take primary professional responsibility for care. In case of a referral the obstetrician takes over professional responsibility of care .Referral to an obstetric unit in a hospital is necessary when complications arise or threaten, or pharmacological pain relief is requested (1-3). Compared to obstetric units, birth centres have stronger focus on childbirth as being family events, and provide personal continuity of midwifery care. The centres differ from obstetric units by the absence of continuous foetal monitoring devises, pharmacological pain relief, induction of labour and instrumental birth. In some countries, birth centres have developed to counter medicalization of childbirth, based on the physiological philosophy of childbirth (2,4). In the Netherlands, women with uncomplicated pregnancies can choose where they want to give birth: at home, in a birth centre or in a hospital (5). At any location, community midwives are responsible for care during labour and birth. When additional medical assistance is required, the women will receive specialist care under responsibility of an obstetrician at an obstetric unit. Role division between primary and secondary professionals is based on a list of obstetric indications (6).

During the last decades, several birth centres have been established in the Netherlands for several reasons: 1) as an alternative for home birth in regions where maternity units in hospitals are too far away as result of concentration of hospital care; 2) as a means to reduce the pressure on hospital maternity wards, as result of a substantial rise of births taking place in those wards because of several societal trends (e.g. media reports about perinatal mortality rates, changing views of risk, increasing requests for pain relief); 3) in competition with neighbouring hospitals to attract more patients; 4) to offer a more homelike environment than the current delivery rooms (7-11). Furthermore, in 2009 a ministerial steering committee published a report, suggesting ways for Dutch maternity caregivers to improve quality of care (12). One of the recommendations in this report was to investigate whether an increase in the number of birth centres would improve perinatal outcomes, based on the assumption that birth centres will be able to provide higher quality of care since they could offer a better opportunity for more integrated care (13). At present, there is no evidence for this assumption. Besides, birth centres show a large variation in service delivery, characteristics and philosophies. Due to a lack of national standards for birth centre care each centre developed its own version based on local preferences, available space and mutual trust. The Dutch Birth Centre Study is developed to present evidence-based recommendations for the organization and functioning of birth centres, now and in the future (14). To evaluate the quality of birth centres, both structure, process, and outcome indicators should be used. A number of outcome indicators are available to assess birth centre care (e.g. perinatal

and maternal mortality and morbidity, Optimality Index, Composite Adverse Outcome Index) (14). However, there are no existing structure and process indicators for birth centres. Internationally, standards for birth centres are available and can provide a tool for measuring quality of service provided in birth centres (15,16). Yet, these standards need to be adjusted for the unique maternity care system in the Netherlands. Therefore, in the first half of 2013 a set of 30 structure and process quality indicators for birth centres was developed, based on literature and a Delphi study (see Chapter 4). The set was developed for the seven domains of quality identified by the IOM: effectiveness, safety, timeliness, efficiency, equity, accessibility and patient-centeredness (17). The aim of the present study, part of the Dutch Birth Centre Study, is to determine whether the constructed structure and process birth centre quality indicators are usable to assess the quality of care in birth centres in the Netherlands.

Methods

Study design

Our study was an explorative study conducted among all 23 birth centres present in September 2013 in the Netherlands. The centres were identified based on the definition of a birth centre (see Chapter 2)]. We used the set of 30 constructed structure and process birth centre quality indicators, based on literature and a Delphi study (Chapter 3). For this study, 63 experts directly or indirectly involved with birth centre care were invited: community and clinical midwives, general practitioners, maternity care assistants, obstetricians, paediatricians, obstetrics and gynaecology nurse specialists, managers of birth centres, representatives from health insurance companies and clients, policymakers, advisors and researchers. A panel of 42 experts completed two Delphi rounds. The experts identified indicators that have to do with different characteristics of birth centres, e.g. location of the birth centre in relation to the obstetric unit, accessibility, facilities, client participation, quality improvement, agreements. Table 1 presents the set of identified indicators (see Table 1).

To determine whether the constructed birth centre quality indicators are usable to assess quality of care in birth centres, we used mixed methods including literature study, survey, interviews and observations. Two phases were followed: 1) determining measurability of birth centre quality indicators, 2) assessing birth centres on these indicators.

1. Determining measurability of birth centre quality indicators

First the indicators were described in detail following a format used in earlier studies on quality of maternity care in the Netherlands (see table 2) (18,19). Information on the operationalization of the 30 indicators was searched in Dutch quality reports, literature, interviews and the experience of the research group of the Dutch

Birth Centre Study. This group included two professors of obstetrics, four senior researchers and three PhD-students; two of them being midwives (one practising). We started with investigating Dutch quality reports, because they include evaluated and used descriptions and definitions of indicators in primary or secondary birth care in the Netherlands. If no relevant information was available in these reports, we searched other literature, mostly Dutch articles. The phrasing of the indicator from the Delphi study was used as search term, in Google scholar and Scopus. We also screened sources as guidelines or published reports of relevant organizations in birth care, like the Royal Dutch Organization of Midwives (KNOV) and the Dutch Society for Obstetrics and Gynaecology (NVOG). (See additional reference file 1). If no information was available, data derived from interviews with managers and professionals working in or with birth centres were used to formulate a suggestion for a definition. These interviews were held with (management) representatives of the birth centres to examine quality aspects. The suggestions were discussed in the research group of the Dutch Birth Centre Study. Ultimately, the research group decided which definition would be included in the tables. If no clear definition could be determined, we concluded that this indicator could not be used.

2. Assessing birth centres on birth centre quality indicators

To assess birth centres on the birth centre quality indicators, several data were used: data derived from the Dutch Birth Centre Questionnaire (DBCQ), interviews, observations, Dutch Birth Centre Integration Questionnaire (DBC-IQ) and policy documents. The DBCQ is developed for the Dutch Birth Centre Study to characterize all Dutch birth centres (Chapter 2) and is based on the questionnaire of Laws et al. to characterize Australian birth centres (2). This questionnaire included questions about management, services and facilities at the birth setting, location, size, philosophy, financial structure and staffing. All questions were categorical except the questions about philosophies. Respondents were asked to rank different philosophies on level of importance on a five point Likert scale. With permission of the author we adapted and completed this questionnaire with questions that are typical for birth centre care in the Netherlands to create the DBCQ. The additional questions included questions about management, initiators and reason for establishment, need for transfer in case of urgent referrals, judicial status and questions about quality, related to the quality indicators. All these questions were categorical and sometimes there was an open space to fill out their own answer if those mentioned were not applicable. The total questionnaire included 150 questions.

The DBCQ was sent to the managers of all birth centres in the Netherlands. All respondents filled in this questionnaire (response 100%). One researcher (IB) visited all but one of the birth centres between January 2014 and April 2015 to examine the quality

aspects. We asked managers of birth centres to select two or three care providers from different professions working within or with the birth centre to be interviewed: depending on the local situation community midwives, maternity care assistants, clinical midwives, obstetric nurse specialists and gynaecologists were invited to be interviewed. The researcher (IB) contacted all participants to explain the study. Two weeks before the visits and interviews, the DBC-IQ was sent to the manager and selected professionals of each birth centre by e-mail. One week later a reminder was sent to the non-responders. Before each visit a topic list was made in order to structure the interviews, based on the responses to the DBCQ and DBC-IQ. During the visits, observations were done in the birth centres and semi-structured interviews were held with management representatives of the centres and the selected professionals. Managers of birth centres were asked to show documents such as available policy documents, agreements and folders to the researcher. The aim of the interviews and visits was to determine missing or unclear answers from the questionnaire. During this visit additional information about time and distance from birth centre to the obstetric unit in case of referral was collected: depending on the local situation the distance from the birth centre to the obstetric unit was measured by counting steps or by kilometres on a navigation system. Time for transfer by bed or car was measured by stopwatch.

With participants' informed consent, all interviews were audiotaped and transcribed verbatim. Quality aspects were determined, based on the replies to the DBCQ, notes made during observations and the transcriptions of the interviews. Additional, policy documents were consulted to retrieve missing data.

To assess birth centres on meeting the birth centre quality indicators, the indicators were scored as 'yes', 'no', 'not applicable' or 'no data available' by another researcher (EvdV). The researcher (IB) who visited the birth centres, checked these scores. Each 'yes' gave a score of one point. In this way, each birth centre received a final score between 0 and 30. We also calculated the number of birth centres that scored each indicator. Data analyses were performed using SPSS version 22 (IBM Statistics).

Results

1. Determining measurability of birth centre quality indicators

To determine whether the birth centre quality indicators are applicable in birth centres we described each indicator in detail, including a specification of the available criteria. Table 3 contains these specifications of birth centre quality indicators (see Table 3).

For indicator 1 (distance between birth centre and hospital) no criterion or optimal value is available that is relevant for all birth centres, therefore this indicator could only be described. These distances vary in our study from no distance at all in on-site birth centres (in case of a referral to secondary care, the woman does not need to be transferred) to more than 30 kilometres for one of the freestanding birth centres. All freestanding

Table 1. Birth centre quality indicators

Nr.	Indicator	Domain IOM	Type
1	Distance between birth centre and hospital	Efficiency	Structure
2	Indoor connection between birth centre and hospital	Efficiency	Structure
3	Necessary transport time from birth centre to hospital	Timeliness	Process
4	Physical access to birthing centre for clients (e.g. parking)	Accessibility	Structure
5	Physical access to birthing centre for midwives and maternity care assistants (e.g. parking)	Accessibility	Structure
6	24 /7 telephone accessibility birth centre	Accessibility	Process
7	Facilities at a birth centre in relation to emergency care (e.g. CPR resuscitation)	Safety	Structure
8	Facilities at a birth centre in relation to pain management (e.g. nitrous oxide)	Patient-centeredness	Structure
9	Birth centre has vision of birth care	Equity	Structure
10	Cooperation with (almost) all relevant organizations in the region (such as midwives and maternity care assistance providers)	Efficiency	Process
11	Formal partnership agreement with chain partners	Equity	Structure
12	Participation birth centre in a Maternity Care Network	Efficiency	Process
13	Written agreements on care aspects (e.g. by hospital care, obstetricians)	Effectiveness	Structure
14	Protocols on care aspects	Efficiency	Structure
15	Care pathways formulated with chain partners	Equity	Structure
16	Agreements with ambulance service and nearest hospital about urgent referrals	Safety	Structure
17	In case of reference from the birth centre durante partu: guaranteed access to the hospital with which agreement were made	Efficiency	Process
18	In case of reference from the birth centre durante partu: required time between decision to refer and treatment in hospital	Timeliness	Process
19	Maternity care assistant present during labour	Effectiveness	Process
20	Continuous presence of a healthcare provider during labour	Patient-centeredness	Process
21	Joint (interdisciplinary) emergency care training	Safety	Process
22	Structural evaluation of the provided care in the birth centre	Effectiveness	Structure
23	Focusing on the patients (e.g. use individual birth plan)	Patient-centeredness	Process
24	Structural research on client experiences	Patient-centeredness	Structure
25	Admission agreement for professionals who use birth care facilities at the birth centre	Equity	Structure
26	Joint use of an electronic care record	Efficiency	Structure
27	(Integrated) ICT system with hospital and midwife practices	Effectiveness	Structure

28	Participation and representation of clients in organisation (e.g. in the board)	Patient-centeredness	Structure
29	Multidisciplinary education as result of formulated points of improvement from perinatal audit	Efficiency	Process
30	System of quality improvement (e.g. accreditation)	Efficiency	Structure

birth centres are located more than 1 kilometre from a hospital with obstetrical services (median 12 km, range 3,7 – 30,5 km). All alongside birth centres are located within a distance of 250 metres from the obstetric unit.

2. Assessing birth centres on birth centre quality indicators

To assess birth centres on the birth centre quality indicators, we collected data from all birth centres on 29 of the 30 indicators. We concluded that indicator 18 (required time between decision to refer and start of treatment in the hospital) could not be scored, because no data were available for this indicator from any of the birth centres as this is not standard registered. Therefore, we scored birth centres on 28 indicators. Indicator 16

Table 2. Elements table definitions per indicator, based on Kooistra et al (2008 and 2009)

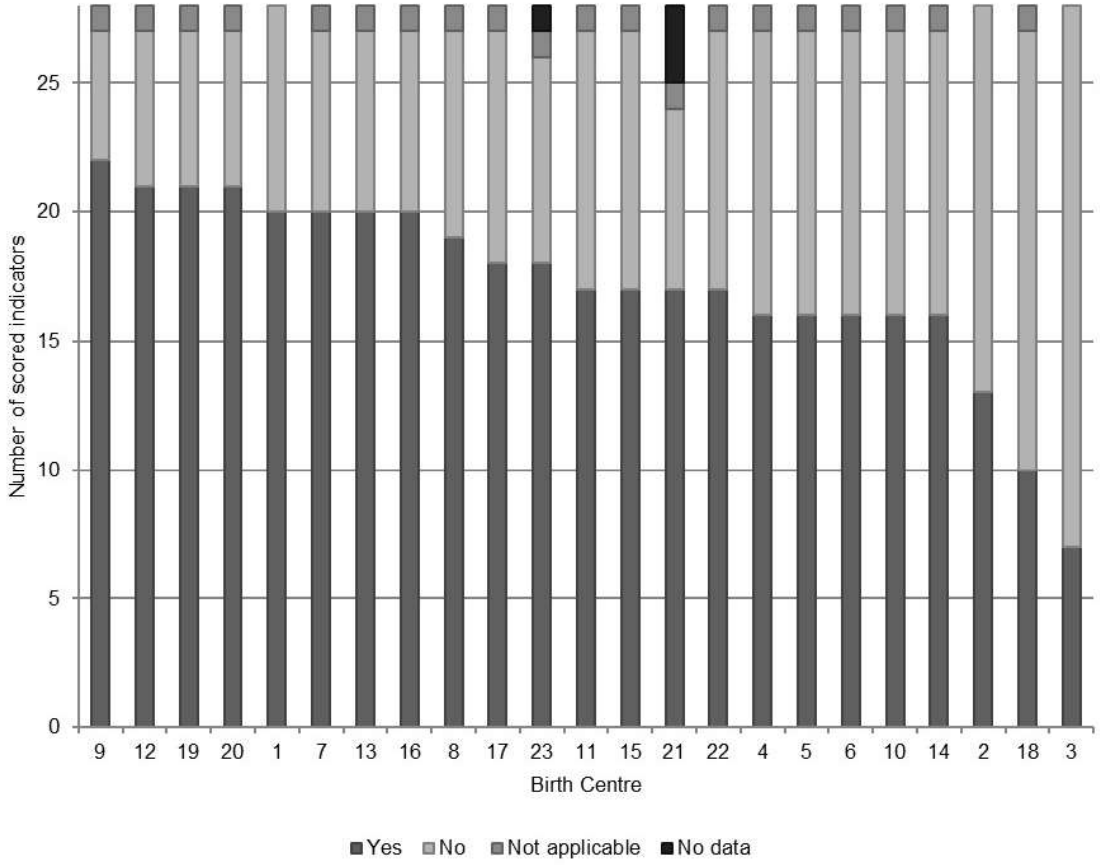
Element	Description
Relation to quality	Describes the relevance of the indicator.
Definition	Description of the indicator.
Operationalization	Describes how the indicator has been measured.
Yes/no	Describes criteria when indicator is measured up.
Data collection	Describes which data have been used.
Based on	Describes the source of definition of the indicator
Type indicator	Structure indicator: describes conditions to provide care. Process indicator: describes what is done in giving and receiving care.
Quality domain	Describes the IOM quality domain that covers the indicator (effectiveness, safety, timeliness, efficiency, equity, accessibility and patient-centeredness.
Available evidence in literature	Describes evidence in literature about relationship of indicator and perinatal outcome.

(agreements with ambulance service and nearest hospital about urgent referrals) is only relevant for freestanding birth centres (n=3). This indicator was scored 'not applicable' for the rest of the birth centres. Figure 1 shows the results of the assessment of the 28 indicators (see Figure 1). Differences between birth centres are shown: the scores ranged from 7 to 22: the lowest scoring centre scored positive on 7 of the 28 indicators (25%), the highest on 22 of 28 (79%).

We also calculated the number of birth centres that scored each indicator. Figure 2 shows the result of this assessment.

19 indicators were scored positive in 10 to 90% of the birth centres. On 7 indicators (3,7,8,11,13,19 and 25) more than 90% of the birth centres scored positive, on 4 indicators (16, 23, 28 and 30) less than 10%. Furthermore, we found overlap between indicator 22 (structural evaluation of the provided care in the birth centre) and 30 (system of quality improvement). No birth centre had a system of quality improvement. We observed that indicators 2 and 16 (indoor connection between birth centre and agreements with ambulance service and nearest hospital about urgent referrals) are complementing each

*Figure 1. Scored indicators per birth centre (sorted)**



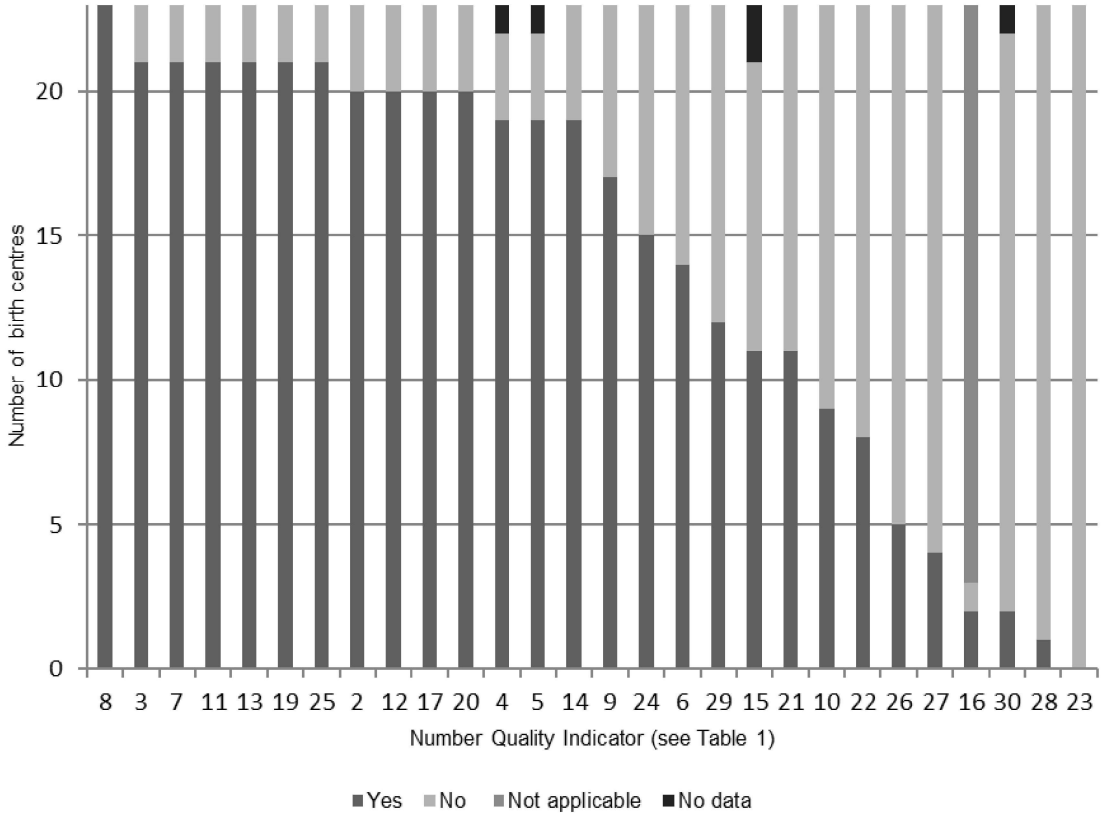
other. Indicator 2 is only applicable for alongside and on-site birth centres. If a birth centre has not such a connection, agreements with ambulance service are necessary. All birth centres scored the same on indicator 4 and 5, both covering physical access (one for clients and one for midwives and maternity care assistants). We ascertained that indicators 26 and 27 both cover ICT facilities (joint use of an electronic care record and (integrated) ICT system with hospital and midwifery practices).

Discussion

In this study, part of the Dutch Birth Centre Study, we tested a set of 30 structure and process birth centre quality indicators constructed by an expert panel in a Delphi

study, to determine whether they can be used to assess quality of birth centre care in the Netherlands. We found 28 of these indicators feasible and useful to assess the structure and process quality of birth centres. We noted that one indicator (indicator 1: distance between birth centre and hospital) was not applicable, because of a missing criterion or optimal value. This indicator is derived from Laws et al (2). In their study the distance from the birth centre to a hospital varied from 2 to 15 kilometres. In our study the variation is much larger (from no distance to more than 30 kilometres). In the Netherlands there is no consensus on the maximum safe distance or travel time to a hospital with an obstetric unit in case of referral during birth. It is stated in national guidelines that a woman should be in de hospital within 45 minutes after the need

Figure 2. Number of birth centres scored per indicator (sorted)



for replacement. However, the fore mentioned steering committee on pregnancy and childbirth recommended that every woman should count on care and treatment by an obstetric professional within 15 minutes in case of acute complications regardless day or night (12,20) Laws et al. did not formulate a standard or a recommended distance. Ravelli et al. found an association between a travel time from home to hospital of 20 minutes or more by car and an increased risk of mortality and adverse outcomes in women at term in the Netherlands. However, for women who were low risk at the start of

labour, the mortality rate was not increased. When low risk women changed risk status to high risk during labour, they had a non-significantly higher risk of mortality and adverse outcomes (21). Therefore, we conclude that it is not possible to formulate a criterion for a maximum distance from birth centre to hospital. Further research is necessary to determine what the criterion for distance between the birth centre and the nearest hospital with an obstetric unit should be and how important it is for birth centres to meet this indicator. A second indicator (indicator 18: required time between decision to refer and start of treatment in hospital in case of a referral) could not be scored because the required information was not available. This information is not standard registered, not in birth centres, but not in hospitals either. The professionals themselves will have to decide whether or not to include this information in their registration to use this indicator in the future. As criterion could be applied the above described legal guidelines concerning urgent care.

Because of these two findings, we conclude that 28 indicators are usable to assess the quality of birth centres. However, there is little evidence in literature to sustain that these quality indicators are associated with (perinatal) outcomes. For six quality indicators, some scientific basis is available from international literature (indicator 3, 10, 15, 20 ,22 and 30) (2,19,21-44).

We noticed differences between birth centres: the scores varied from 7 to 22. Quality indicators are developed to provide an indication of the quality of care. Because we observed differences between birth centres, birth centres may differ in quality of care.

Strengths and weakness of this study

Our study is the first study to assess birth centre care based on structure and process quality indicators. All birth centres in the Netherlands (reference date September 2013) participated in this study, which gives a unique overview of the current state of birth centre care in the Netherlands. Until now, no information was available about their quality. To assess the feasibility of these quality indicators, we used information derived from different sources. Because of this multi-source data collection, we think the reliability of this study is satisfactory. However, our data are collected at a given moment and birth centres are developing rapidly. A new assessment of birth centres on quality indicators will most likely yield different results. In addition, quality indicators may change as well, based on new evidence or new consensus. However, the aim of our study was first of all to determine the feasibility of the recently developed indicators, and following that, to assess birth centres on these structure and process quality indicators.

Some limitations can also be noticed. We are aware that, to assess the quality of birth centre care, particularly outcome indicators are needed. However, in this study we deliberately focused on structure and process indicators since outcome data are also collected in other sub studies of the Dutch Birth Centre Study. These results will be

reported elsewhere. We came across various problems, including a lack of adequate definitions, missing evidence and a lack of widely accepted standards or criteria for birth centre care in the Netherlands. Based on the present study it is not possible to formulate these standards.

Implications for practice and research

The presented set of indicators is constructed and tested in order to make important quality aspects for birth centres transparent for consumers, payers, health care professionals and policy makers. Minimal standards of quality of care in birth centres can be formulated based on this set of quality indicators. Our study therefore contributes to the development of a quality system for birth centres. However, we observed that the constructed set of quality indicators can be improved at several points. Some of the indicators that were scored by most of the birth centres are very general and might be formulated more specific. For example indicator 8 (facilities at a birth centre in relation to pain management) scored positive by all birth centres. Because there are no minimum requirements about pain relief facilities that should be available in a birth centre, a wide range of facilities is possible so that all birth centres meet this indicator. Further research is necessary, in collaboration with professionals in birth care, to determine if minimum requirements can be formulated for these indicators. Three of the indicators that were scored by most of the birth centres can be combined with other indicators. We consider indicator 13, 14 and 15 (written agreements on care aspects, protocol on care aspects and care pathways formulated with chain partners) as overlapping each other. Several managers and professionals working within or with birth centres stated in the interviews that they did not know the difference between these agreements. In the literature, different definitions are used. In our study we defined a protocol as "a requirement from which professionals never deviate", written agreements as "local interpretations of guidelines" and care pathways as "complex interventions for the mutual decision-making and organization of care processes for a well-defined group of patients during a well-defined period" (38,39). Swinkels et al., however, describe a protocol as "a description of the procedure to be followed at the local level. Protocols guide decisions of professionals in daily practice and should therefore be tailored to local conditions. The protocol is preferably a translation of a general accepted national guideline to the local situation of the professionals" (40). In all birth centres, these three forms of agreements have to do with procedures about logistic affairs during labour (in addition to concerning decisions). Because of the unclear and overlapping definitions and corresponding confusion in practice, we propose to combine these three indicators and to formulate a clear definition.

Beside indicators that were scored by most of the birth centres, we also determined that some indicators partly overlap or complement each other, for example two indicators

having to do with evaluation of care (indicator 22 and 30). At the time of the data collection no birth centre had a system of quality improvement. Structural evaluation of provided care can be an element in a system of quality improvement (e.g. the plan-do-check-act cycle) (37), but a standard or guideline for such a system is not yet nationwide available. We propose to combine indicator 22 and 30 into one indicator. Indicator 2 (indoor connection) is only applicable for alongside and on-site birth centres. If a birth centre has not such a connection, agreements with ambulance service (indicator 16) are necessary. We propose to combine these into one indicator. Some indicators are found to be similar (indicators 4 and 5, and 26 and 27). Indicator 4 is based on a report of the KNOV (45), indicator 5 was formulated by the Delphi panel (Chapter 4). Based on the assumption that the amount of traffic does not differ for clients and professionals (41), we propose to combine these indicators. Indicators 26 and 27 cover ICT facilities (joint use of an electronic care record and (integrated) ICT system with hospital and midwifery practices). At present, only a few birth centres met these indicators, and both indicators are strongly related. Therefore, we also propose to combine indicators 26 and 27.

Conclusion

We found that 28 of the 30 quality indicators, constructed by an expert panel in a Delphi study, are feasible and useful to assess the structure and process quality of birth centres in the Netherlands. Scientific evidence for minimum requirements or standards is scarcely available. Some quality indicators are only applicable for some birth centres (e.g. only for freestanding or alongside birth centres). A number of indicators can be combined or specified so that they are easier to assess. Further research is necessary to formulate standards or minimum quality requirements and to improve the set of birth centre quality indicators.

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Design and planning of the study were presented to the Medical Ethics Committee of the UMCU (University Medical Centre Utrecht) who confirmed that an official ethical approval of this study is not required.

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Table 3. Specifications birth centre structure and process quality indicators

	Indicator	Relation to quality	Definition	Operationalization	Yes/No	Data collection	Based on*
1	Distance between birth centre and hospital	The distance between the birth centre and the hospital must be limited so that, if necessary, rapid referral to an obstetric unit in a hospital is possible for the safety of mother and child. The distance shall be large enough to maintain the homelike environment and the number of referrals and requests for pain relief can be reduced by a greater distance.	-	Estimated distance from the delivery rooms in the birth centre to the nearest obstetric unit in a hospital (in meters).	-	Measured by observation while visiting the birth centre.	(2)
2	Indoor connection between birth centre and hospital	Covered, dry connection contributes to a fast and comfortable movement if the pregnant woman should be referred.	Dry connection between the birth centre and the nearest hospital.	Does the birth centre have an indoor connection with the hospital? Method of questioning: DBCQ: Which option best describes the actual location of the birth centre compared to the obstetric unit of the (nearest) hospital? (Multiple answers) Interview: Can you briefly describe how the route is to come from the birth centre to the obstetric unit?	Birth centres answering positively on the question that the birth centre has an indoor connection to the hospital	DBCQ and interview	(2)
3	Necessary transport time from birth centre to hospital	A rapidly movement as possible so that if necessary a rapid transfer to secondary care is possible.	Up to 15 minutes to get to a hospital from the delivery rooms in the birth centre to the nearest obstetric unit	Estimated time to get to a hospital to the nearest obstetric unit from the delivery rooms in the birth centre	Birth centres that meet the standard for 15 minutes.	Measured by observation while visiting the birth centre.	(2)

4	Physical access to birthing centre for clients (e.g. parking)	Midwives and maternity care assistants must be present at any moment in time in a birth centre to support the client.	Physical accessibility means sufficient or separate parking situation and not hindered traffic fuss	Is the birth centre easily accessible for midwives and maternity care assistants? Answering options: Parking {1 = separate parking spaces; 2 = no separate parking spaces, ample parking; 3 = no separate parking spaces, insufficient parking; 4 = unknown}. Traffic: {1 = quiet traffic situation; 2 = heavy traffic, not an obstacle; ; 3 = heavy traffic, obstruction; 4 = unknown}	Birth centres answering the question with answer option 1 or 2.	Measured by observation while visiting the birth centre.	(45)
5	Physical access to birthing centre for midwives and maternity caregivers (e.g. parking)	Clients should be able to be in time in a birth centre at any moment	Physical accessibility means sufficient or separate parking situation and not hindered traffic fuss	Is the birth centre easily accessible for clients? Answering options: Parking {1 = separate parking spaces; 2 = no separate parking spaces, ample parking; 3 = no separate parking spaces, insufficient parking; 4 = unknown}. Traffic: {1 = quiet traffic situation; 2 = heavy traffic, not an obstacle; ; 3 = heavy traffic, obstruction; 4 = unknown}	Birth centres answering the question with answer option 1 or 2.	Measured by observation while visiting the birth centre.	Delphi panel (Boesveld et al., 2016)
6	24 /7 telephone accessibility birth centre	Whenever necessary, clients and midwives or obstetric active general practitioner must always be able to phone a birth centre.	The number of hours per week that a midwife or obstetric active general practitioner or client can phone the birth centre for non-urgent questions.	Is the birth centre 24/7 accessible by phone? Method of questioning Does the birth centre have a direct phone number? If yes, how many hours a day is the birth centre accessible for non-urgent questions?	Birth centres answering the question positively that having a 24-hour telephone access.	DBCQ a	(51)

7	Facilities at a birth centre in relation to emergency care (e.g. CPR resuscitation)	Facilities should be present to use in case emergency.	Urgent care: care, comprising the recognition, stabilization and resuscitation of all acute medical patients (NZA.)	Is oxygen present at the birth centre to use in case for a child with a bad start? Method of questioning: In what way is oxygen present at the birth centre to use in case of a child with a bad start? 1. An oxygen equipment (balloon and tank) is present on the delivery room of the birth centre 2. There is an oxygen balloon on the delivery room of the birth centre on site, oxygen comes out of the wall. 3. There is a (mobile) reanimation table present at the birth centre. 4. The midwife should take her own oxygen to the birth centre 5. Other, namely...	Birth centres answering option 1, 2 or 3.	DBCQ a	(2)
8	Facilities at a birth centre in relation to pain management (e.g. nitrous oxide)	Birth centres have access to resources for pain management if desired.	Pain relief in a birth centre is defined as: bath, shower, sterile water injections, nitrous oxide for use by primary care professionals	Are there facilities for pain relief present in the birth centre? Method of questioning What facilities for pain relief are available / possible in the birth centre? (Bath, Shower, sterile water injections, nitrous oxide for use by primary care professionals, nitrous oxide for use by the secondary care professionals, pethide / prazine, remifentanyl, epidural anesthesia, none of the options mentioned, otherwise)	Birth centres who report having any of the following facilities: bath, shower, sterile water injections or nitrous oxide for use by primary care professionals.	DBCQ	(2)

9	Birth centre has vision of birth care	A shared vision on birth care promotes cooperation and contributes to uniform acting.	A vision is a jointly defined position, which is detailed in a policy plan.	Does the birth centre itself formulated a specific vision on birth care?	Birth centres answering the question positively.	DBCQ	Delphi panel
10	Cooperation with (almost) all relevant organizations in the region (such as midwifes and maternity care providers)	Birth centres form a network with all relevant organizations in the region to offer together healthy and safe care during pregnancy and birth.	Relevant is defined as relevant within the region (most organizations within the regional maternity care network) Relevant organizations: midwifery practises, maternity care organizations, gynaecologists from nearest hospital, paediatricians from nearest hospital, youth health, general practitioner).	1. Are there cooperation agreements with partners in the chain, which collaborates with the birth centre? 2. Which organizations have formulated such collaboration agreements? (Midwifery practices, maternity care organizations, gynaecologists from nearest hospital, paediatricians from nearest hospital, youth health, general practitioners, otherwise ...)	Birth centres answering question 1 positively, provided that, on question two answers that they have collaboration agreements with paediatricians, gynaecologists, maternity care assistants and midwives.	DBCQ	(64, 66, 68)
11	Formal partnership agreement with chain partners	A formal partnership agreement ensures collaboration between different organizations and contribute to a common and effective practise.	A formal partnership agreement is a written, recorded agreement on collaboration between the birth centre and the organization (e.g., hospital, maternity care organizations, midwifery practices)	Are these agreements formalized in a cooperation?	Birth centres answering the question positively	DBCQ	(54)

12	Participation birth centre in a regional maternity care network	A regional maternity care network contributes to the quality of care. Collaboration in birth care aims to promote cooperation between midwives, general practioners and gynaecologists in a way that provides optimal individual care to clients. The various professionals in birth care can achieve this effect by creating agreements within maternity care networks on individual care, the organization of birth care and quality of care.	Birth centres participating in a regional maternity care network.	Does the birth centre participates at the maternity care network of the collaborative hospital?	Birth centres answering the question positively.	DBCQ	(12,50)
13	Written agreements on care aspects (e.g. by hospital care, obstetricians)	Tuning in written arrangements is important to provide appropriate care. A good transfer of data after the postpartum period is essential to ensure continuity of care for the child.	Written agreements are defined as local interpretations of guidelines from professional groups.	Does the birth centre have written agreements with and the various links in the chain of care (midwives, obstetric active practitioners, gynaecologists, paediatricians, maternity care assistants, ambulance service?)	Birth centres answering the question positively.	Interview & policy documents	(19,56, 64,65, 67,68)
14	Protocols on care aspects	Protocols support actions of the professional and reflect the evidence-based knowledge.	Protocols are defined as rules, which professionals do not differ in principle.	Does the birth centre have multidisciplinary protocols established about collaboration with partners in the chain? (care, organizational)	Birth centres answering positive for both levels (care and organizational)	DBCQ	(19,50, 51,54, 56,64,67)
15	Care pathways formulated with chain partners	Pathways provide the opportunity to give an integral vision, form and content, which contributes to the quality and efficiency of care.	Care pathways often have a strong multidisciplinary character, a strong focus on improving both the quality and efficiency of care, trying to achieve the goals related to pathways in a structured and systematic manner.	Are there pathways formulated?	Birth centres answering positive for both levels (care and organizational)	Interview	Delphi panel

16	Agreements with ambulance service and nearest hospital about urgent referrals	Good agreements promote the delivery of appropriate care, especially in emergency situations where the ambulance service is required for a rapid transport to the hospital.	Written arrangements between the birth centre, ambulance service and the nearest hospital.	Are written agreements available with ambulance service and the nearest hospital? Method of questioning: Are written agreements available between the birth centre and the various links in the chain of care (midwives, midwife practitioners, gynaecologists, paediatricians, maternity care, and ambulance service?)	Birth centres answering the question positively that there are written agreements available with ambulance service and nearest hospital for emergency referrals.	Interview	Indicator 13
17	In case of reference from the birth centre durante partu: guaranteed access to the hospital with which agreement were made	The accessibility and responsible access to the 2elijnsvoorziening must be guaranteed at all times in case of intrapartum reference.	The accessibility and responsible access to the obstetric unit is always guaranteed.	Has the birth centre agreements with the nearest hospital ton guaranteed access in case of emergency situations?	Birth centres answering the question positively.	DBCQ	(54)
18	In case of reference from the birth centre durante partu: required time between decision to reference and treatment in hospital	To avoid wasting time, parallel actions starts in the event of a referral, so that treatment can be started as soon as possible. Good collaboration between supply chain partners is necessary for this.	The time in which to be launched after the decision to refer parallel actions so that the necessary action can be given without delay.	Estimated time from the delivery room of the birth centre that specialist care and staff in an obstetric unit is available for the woman in case of an emergency situation. Estimated time in the event of a resuscitation of the new-born from the delivery room of the birth centre to the specialized unit for resuscitation, included the staff.If applicable: What is the estimated time that a dedicated team is on site to accompany a resuscitation?	-	Interview	(2,56,68)

19	Maternity care assistant presence during labour	The maternity care assistant supports women and assist the midwife during and immediately after childbirth	The maternity care assistant is present during labour.	Is the maternity care assistant present during labour? Method of questioning: Who assist the midwife during labour? 1. Internal maternity care assistant of always the same maternity care organization 2. External maternity care assistant of always the same maternity care organization 3. External maternity care assistant of different maternity care organizations 4.Bstetric and gynaecology nurse specialist 5. Other	Birth centres answering option 1, 2 or 3.	DBCQ	(65,67)
20	Continuous presence of a healthcare provider during labour	To properly support the client during childbirth and reducing interventions, continuous presence of a caregiver is required.	Labour: the first stage of labour begins with the latent stage, followed by the active phase and the transition phase. From the active stage of labour, after complete dilatation of the cervix start medical responsibility and is the women supervised continuously. The medical professional determines this moment. Not left alone: not left alone by midwives, obstetric active General practitioner, maternity care assistant, or obstetrics and gynaecology nurse specialist. Active phase: the active phase begins at 5 cm dilatation and good in partu.	Did the birth centres ensure that women in labour were not left alone from the active phase? (in consultation with the women)	Birth centres answering the question positively.	Interview & policy documents	(65)

21	Joint (interdisciplinary) emergency care training	In case of emergency, professionals need to be well rehearsed, joint training contribute to this.	Joint training: a multidisciplinary training with all relevant organizations. Emergency care: care conducted in urgent emergency situations.	Is training organized in the birth centre participating both primary and secondary care givers, training together emergency obstetric situations?	Birth centres answering the question positively.	DBCQ	(67,50)
22	Structural evaluation of the provided care in the birth centre	Structural evaluation n of care can lead to actions to improve patientcare if necessary.	Structural evaluation is defined as the structural discussion, such as perinatal audit.	Does structural evaluation of care take place in the birth centre? Method of questioning: In our birth centre: 1. doesn't structural evaluation of care with different disciplines took place 2: does incidental evaluation of care with different disciplines took place; 3. does regularly evaluation of care with different disciplines took place; 4. does structural evaluation of care with different disciplines took place and if necessary points for improvement are formulated	Birth centres answering the question with answer option 4.	DBC_IQ (prior to the interviews)	(50,65,67)
23	Focusing on the patients (e.g. use individually birth plan)	Care during pregnancy and childbirth should be organized around mother and (unborn) child. The professionals are thereby serving the interests of mother and child.	Patient focus is defined as respecting the preferences and desires of the client.	1. Is a format for a birth plan drafted by the birth centre together with other chain partners? 2. Has the birth centre agreements with interpreters, immigrant care consultants etcetera, for with whom no communication is possible without support guide?	Birth centres answering both questions positively.	DBCQ	(19,51,65)

24	Structurally research on client experiences	Several instruments have been developed to measure the quality of care from the perspective of the client, using research of client experiences. With a client survey professionals can measure the client experiences. This analysis forms the basis to improve	Witch research on client experiences, professionals can measure the experience of clients structurally. Several customer surveys are available such as ReproQ questionnaire and client survey of the KNOV.	Does client experiences be evaluated?	Birth centres answering the question positively.	DBCQ	(19, 51)
25	Admission agreement for professionals who use birth care facilities at the birth centre	By written agreements with various professionals the quality of care provided by these professionals is guaranteed.	An admission agreement is a long-term agreement between a caregiver and a care facility (such as a birth centre), for undetermined time	Does the birth centre have written admission agreements with the professionals that use the delivery rooms in the birth centre?	Birth centres answering the question positively.	DBCQ	(68)
26	Joint use of an electronic care record	An electronic health record improves the continuity of care, transmission of information between healthcare professionals, and enables automatic delivery of input for perinatal registration databases.	A joint electronic health record is defined as a digital care record, which can be used by different health care providers involved.	Does a joint electronic health record be used by multiple supply chain partners?	Birth centres answering the question positively.	DBCQ	Delphi panel
27	(Integrated) ICT system with hospital and midwife practices	ICT is a means to optimal support collaboration in the chain of care.	An integrated IT system is defined as an ICT system of the birth centre which is linked to the system of other disciplines in the healthcare chain.	Is the birth centre connected to the IT system of other disciplines in the chain? Method of questioning: The ICT systems of the various disciplines / organizations in the birth centre ... 1. Are not integrated (the client tells her story again and again at every health care provider) 2. Are (partially) shared between professionals or phrase open to different caregivers 3. Forming a single system 4. Forming a single system and is accessed by the client (has access to its own care record)	Birth centres answering option 3 or 4.	DBC_IQ (prior to the interviews)	Delphi panel

28	Participation and representation clients in organisation (e.g. in the board)	When clients are involved and participate in the organization, the care can better fit to client's needs.	Involvement and participation is defined as take part of sitting on the board of the government of the organization, evaluating client experiences or organize a client panel.	Do clients be involved in (shaping) the organization of the birth centre? Method of questioning: DBCQ: Who forms the management/board of the birth centre? DBC_IQ: The birth centre.... 1. Does not evaluate client experiences. 2. Evaluate client experience: the data will be used to improve the process of care 3. Clients are actively involved in improving care (e.g. client board, client focus group, etc.) 4. Clients decide actively about the provision of care and services through the birth centre. They are represented in the government of the birth centre	Birth centres that answered clients presenting in the government (DBCQ) or answered option 3 or 4 in the DBC_IQ	DBCQ and interview DBC_IQ (prior to the interviews)	Delphi panel
29	Multidisciplinary education in result of formulated points of improvements from perinatal audit	Joint training provides insight into each other's expertise and promotes the acceptance and implementation of improvement	Joint training: a multidisciplinary education with all relevant organizations. Perinatal audit: a form of structural evaluation of provided care.	Are multidisciplinary trainings organized in the birth centre as a result of points of improvement, arranged for example from structural evaluation of perinatal audit?	Birth centres answering the question positively.	DBCQ	Delphi panel
30	System of quality improvement (e.g. accreditation)	The Royal Dutch Organization of Midwives (KNOV) has developed various instruments to analyse quality of their own practice management, including the Practice Analysis Instrument (PAI). This can judge a practice themselves to what extent they meet the quality standards. This analysis forms the basis to put in improvements.	Systematic quality improvements covers the whole of monitoring, improving and borrowing the quality of maternity care and organization.	Does the birth centre organize systematic quality improvement?	Birth centres answering the question positively.	Interview	(50)

** Number corresponds with reference list*

References

(1) American Association of Birth Centers. Definition of Birth Center.Available at: http://c.ymcdn.com/sites/www.birthcenters.org/resource/resmgr/About_AABC_-_Documents/AABC_Position_Statement_-_DE.pdf. Accessed July, 23, 2016.

(2) Laws PJ, Lim C, Tracy S, Sullivan EA. Characteristics and practices of birth centres in Australia. Australian and New Zealand Journal of Obstetrics and Gynaecology 2009;49(3):290-295.

(3) Stewart M, McCandlish R, Henderson J, Brocklehurst P. Review of evidence about clinical, psychosocial and economic outcomes for women with straightforward pregnancies who plan to give birth in a midwife-led birth centre, and outcomes for their babies. 2004.

(4) Gottvall K, Waldenström U, Tingstig C, Grunewald C. In-Hospital Birth Center with the Same Medical Guidelines as Standard Care: A Comparative Study of Obstetric Interventions and Outcomes. Birth 2011;38(2):120-128.

(5) Wiegers T, de Graaf H, van der Pal K. The establishment of birth centres and their role in maternity care. [In Dutch: De opkomst van geboortecentra en hun rol in de zorg]. Tijdschrift voor gezondheidswetenschappen 2012;90(8):475-478.

(6) College voor Zorgverzekeringen. Verloskundig Vademecum. 2003.

(7) Nederland SPR. Perinatal Care in the Netherlands 2014 [Perinatale Zorg in Nederland 2014]. Stichting Perinatale Registratie Nederland. 2015.

(8) Amelink-Verburg M, Rijnders M, Buitendijk S. A trend analysis in referrals during pregnancy and labour in Dutch midwifery care 1988–2004. BJOG: An International Journal of Obstetrics & Gynaecology 2009;116(7):923-932.

(9) Offerhaus PM, Hukkelhoven CW, Jonge A, Pal-de Bruin KM, Scheepers PL, Lagro-Janssen AL. Persisting Rise in Referrals During Labor in Primary Midwife-led Care in the Netherlands. Birth 2013;40(3):192-201.

(10) Zeitlin J, Mohangoo A, Cuttini M. The European Perinatal Health Report: comparing the health and care of pregnant women and newborn babies in Europe. J Epidemiol Community Health 2009;63(9):681-682.

(11) De Vries R, Nieuwenhuijze M, Buitendijk SE, Members of Midwifery Science Work Group. What does it take to have a strong and independent profession of midwifery? Lessons from the Netherlands. Midwifery 2013;29(10):1122-1128.

(12) Stuurgroep Zwangerschap en geboorte. A good start, safe birth care (In Dutch: Een goed begin, veilige zorg rond zwangerschap en geboorte). Advies Stuurgroep Zwangerschap en Geboorte.Utrecht Stuurgroep Zwangerschap en Geboorte 2009.

(13) Bonsel GJ, Birnie E, Denkta- S, Poeran J, Steegers EAP editors. Lines in perinatal mortality. (In Dutch: Lijnen in de perinatale sterfte, Signalementstudie Zwangerschap en Geboorte).. Rotterdam: Erasmus MC; 2010.

(14) Hermus MA, Wiegers TA, Hitzert MF, Boesveld IC, van den Akker-van, M Elske, Akkermans HA, et al. The Dutch Birth Centre Study: study design of a programmatic evaluation of the effect of birth centre care in the Netherlands. BMC pregnancy and childbirth 2015;15(1):148.

(15) College Perinatale Zorg. www.collegepz.nl (Accessed 28/8/16).

(16) Ackerman B, Cooke P, Hutcherson A. Standards for birth centres in England: a standards document. RCM, London 2009.

(17) Institute of Medicine (US). Committee on Quality of Health Care in America. Crossing the quality chasm: A new health system for the 21st century. : National Academies Press; 2001.
(18) Kooistra M, Schuitemaker N, Franx A, Wolf H, Graafmans W, Westert G. Quality Indicators for obstetric care: develoment and use in the Netherlands (In Dutch: Kwaliteitsindicatoren voor de obstetrie: ontwikkeling en gebruik in Nederland). RIVM rapport 260101001 2009.
(19) Zorginstituut Nederland. Quality indicators maternity care assistant (In Dutch: Kwaliteitsindicatoren kraamzorg). 2012.
(20) Beleidsregels ex artikel 4 Wet toelating zorginstellingen. http://wetten.overheid.nl/BWBR0026437/2009-09-30 (accessed 2016, April, 15. 2006.
(21) Ravelli A, Jager K, De Groot M, Erwich J, Rijninks-van Driel G, Tromp M, et al. Travel time from home to hospital and adverse perinatal outcomes in women at term in the Netherlands. BJOG: An International Journal of Obstetrics & Gynaecology 2011;118(4):457-465.
(22) Hingstman L, Boon H. Obstetric care in the Netherlands: regional differentiation in home delivery. Soc Sci Med 1988;26(1):71-78.
(23) KNOV. Standpunt Reanimatie van de pasgeborene in de thuissituatie of vergelijkbare omstandigheden. http://www.knov.nl/vakkennis-en-wetenschap/tekstpagina/545/reanimatie-van-de-pasgeborene-in-de-thuissituatie-of-vergelijkbare-omstandigheden/ (accessed 2016, April, 15).
(24) Valentijn PP, Vrijhoef HJ, Ruwaard D, de Bont A, Arends RY, Bruijnzeels MA. Exploring the success of an integrated primary care partnership: a longitudinal study of collaboration processes. BMC health services research 2015;15(1):32.
(25) Hodnett ED, Downe S, Edwards N, Walsh D. Home-like versus conventional institutional settings for birth. Birth 2005;32(2):151-151.
(26) Minkman MMN. Developing integrated care: towards a development model for integrated care. : Kluwer; 2012.
(27) Amelink-Verburg MP, de Winter-de Ree, Charlotte CC, van der Lans, Sylvia MGA, den Ouden AL. Evaluation of Critical Incidents in Dutch Maternity Care. The role of primary care midwives in the Netherlands 2011:141.
(28) de Vries M, van Weert JC, Jansen J, Lemmens VE, Maas HA. Step by step development of clinical care pathways for older cancer patients: necessary or desirable? Eur J Cancer 2007;43(15):2170-2178.
(29) Hodnett E, Gates S, Hofmeyr G, Sakala C. Continuous support for women during childbirth. Birth 2005;32(1):72-72.
(30) Van Lonkhuijzen L, Dijkman A, van Roosmalen J, Zeeman G, Scherpbier A. A systematic review of the effectiveness of training in emergency obstetric care in low-resource environments. BJOG: An International Journal of Obstetrics & Gynaecology 2010;117(7):777-787.
(31) Mancey-Jones M, Brugha RF. Using perinatal audit to promote change: a review. Health Policy Plan 1997 Sep;12(3):183-192.
(32) Eskes M, Waelput AJ, Erwich JJ, Brouwers HA, Ravelli AC, Achterberg PW, et al. Term perinatal mortality audit in the Netherlands 2010-2012: a population-based cohort study. BMJ Open 2014 Oct 14;4(10):e005652-2014-005652.
(33) Lundgren I, Berg M, Lindmark G. Is the childbirth experience improved by a birth plan? Journal of Midwifery & Women's health 2003;48(5):322-328.

(34) Kuo S, Lin K, Hsu C, Yang C, Chang M, Tsao C, et al. Evaluation of the effects of a birth plan on Taiwanese women's childbirth experiences, control and expectations fulfilment: a randomised controlled trial. Int J Nurs Stud 2010;47(7):806-814.
(35) Brown SJ, Lumley J. Communication and decision-making in labour: Do birth plans make a difference? Health Expectations 1998;1(2):106-116.
(36) Zuidgeest M, Strating M, Luijkx K, Westert G, Delnoij D. Using client experiences for quality improvement in long-term care organizations. Int J Qual Health Care 2012 Jun;24(3):224-229.
(37) Donabedian A. Explorations in Quality Assessment and Monitoring: Ill. : Health Administration Press; 1980.
(38) Vanhaecht K, De Witte K, Sermeus W. The impact of clinical pathways on the organisation of care processes. 2007.
(39) Schrijvers, AJP, Busch V, de Leeuw JRJ. Samenwerken voor de allerkleinsten in het OKC, Fase 1: vroegsignalering van psychosociale opvoed- en opgroeiproblemen in de Amsterdamse OKC's tijdens de kraamperiode; een literatuuroverzicht van definities. 2010.
(40) Swinkels J, Dunnink T, Vermeulen H. Doel van richtlijnontwikkeling. Handboek evidence-based richtlijnontwikkeling: Springer; 2014. p. 3-9.
(41) Schee E, Delnoij D, Kerssens J. Keuze van ziekenhuizen: welke overwegingen zijn belangrijk voor consumenten? 2005.
(42) KNOV. Standaard 'Hygiëne en infectiepreventie in de eerstelijns verloskundige praktijk', wetenschappelijke onderbouwing http://www.knov.nl/fms/file/knov.nl/knov_downloads/832/file/H_en_I_Wetenschappelijke_onderbouwing.pdf?download_category=richtlijnen-praktijkkaarten (accessed 2016, April,15).
(43 KNOV. Richtlijn medicamenteuze pijnbehandeling tijdens de bevalling. 2008 http://www.nvog.nl/upload/files/definitief-richtlijn-pijnbehandeling-bij-de-partus_def-091208.pdf (accessed 1 April 2016.
(44) KNOV. Handreiking inhoud verlostas en zuurstofkoffer http://www.knov.nl/fms/file/knov.nl/knov_downloads/758/file/Handreiking_%27Inhoud_verlostas_en_zuurstofkoffer%27.pdf?download_category=overig (accessed 2016, April, 15).
(45) KNOV. Kwaliteitskader Geboortecentra http://www.knov.nl/werk-en-organisatie/tekstpagina/268/geboortecentra/ (accessed 2016, April,15). Utrecht .

Additional reference file

(46) Anthony S, Amelink-Verburg M, Jacobusse G, et al.: De thuisbevalling in Nederland 1995-2002: rapportage over de jaren 2001-2002. TNO;2005.
(47) De Borst J, Wiegers T. Organization of emergency care in perinatal care. [In Dutch: Organisatie van spoedzorg in de verloskundige keten]. NIVEL; 2010.
(48) de Vries J. Zorgpaden: Achtergronden en context. Integrale oncologische zorgpaden. 2009:9.
(49) Hingstman L, Boon H. Obstetric care in the Netherlands: Regional differentiation in home delivery. Soc Sci Med. 1988;26(1):71-78.
(50) Kooistra M, Schuitemaker N, Franx A, et al. Kwaliteitsindicatoren voor de obstetrie: Ontwikkeling en gebruik in Nederland. RIVM rapport 260101001. 2009.

(51) Kooistra M, Waelput A, Offerhaus P, et al. Quality indicators for midwifery care. [In Dutch: Kwaliteitsindicatoren voor de eerstelijnsverloskunde. RIVM rapport 260101005. 2009
(52) Zorginstituut Nederland. Kwaliteitsindicatoren kraamzorg. 2012
(53) KNOV a. Informatiebrief: Geboorteplan http://www.knov.nl/fms/file/knov.nl/knov_downloads/901/file/Informatieblad%20Geboorteplan%20%281%29.pdf?download_category=overig (accessed 13 April 2016].
(54) KNOV b. Kwaliteitskader geboortecentra]. http://www.knov.nl/werk-en-organisatie/tekstpagina/268/geboortecentra/ (accessed 2016, April, 15)
(55) KNOV c. Richtlijn Niet vorderende ontsluiting: Aanbeveling voor verloskundig beleid, begeleiding en preventie]. http://www.knov.nl/fms/file/knov.nl/knov_downloads/455/file/KNOV-Standaard%20Niet%20vorderende%20ontsluiting.pdf?download_category=overig (accessed 1 May 2016).
(56) Landelijk netwerk acute zorg. Ketenbrede kwaliteitsindicatoren set acute zorg. http://www.nivel.nl/sites/default/files/bestanden/Ketenbrede-Kwaliteitsindicatorensets-Acute-Zorg.pdf (accessed 2016, April,1).
(57) Luxford K, Safran DG, Delbanco T. Promoting patient-centered care: A qualitative study of facilitators and barriers in healthcare organizations with a reputation for improving the patient experience. Int J Qual Health Care. 2011;23(5):510-515.
(58) Nationaal Kompas Bereikbaarheidsnormen basisdiensten acute zorg. http://www.nationaalkompas.nl/zorg/acute-zorg/beschrijving/ (accessed 2016, April 14)
(59) NHG . Huisarts, ketenzorg en ICT. https://www.nhg.org/sites/default/files/content/nhg_org/uploads/nhg_-_huisarts_ketenzorg_en_ict_-_14_mei_2014_-_definitief.pdf (accessed 2016. April 14).
(60) NVOG a. Faciliteiten. www.nvogdocumenten.nl (accessed 2016, April, 16)
(61) NVOG b. Werkafspraken. www.nvog-documenten.nl .(accessed 2016, April 14)
(62) NZA. Terminology.:Terminologie]. www.nza.nl (Accessed 2016, April,16).
(63) Perinatale Audit Nederland [PAN] Het wat en waarom van perinatale audit. https://www.perined.nl/wat-doen-we/audits (accessed 2016, April, 23)
(64) Voerman G, Maassen I, Braspenning J. (2009) Publieke indicatoren voor de zorg rondom zwangerschap en bevalling in de eerste lijn. IQ Healthcare, Nijmegen.
(65) VSV Zwolle. Protocol parallelle acties. https://www.vsvzwolle.nl/userfiles/file/Protocol%20Parallelle%20Acties%20VSV%20Zwolle%20eo%20-%2028%20december%202013.pdf.
(66) Zichtbare Zorg Eerstelijnsverloskunde. Zorginhoudelijke indicatoren zichtbare zorg eerstelijnsverloskunde http://www.knov.nl/fms/file/knov.nl/knov_downloads/929/file/Indicatorengids%20EVK%20verslagjaar%202011_def.pdf?download_category=overig (accessed 2016, May,1)
(67) Zichtbare Zorg Kraamzorg Kwaliteitsindicatoren kraamzorg 2011] www.actiz.nl/stream/c-kwaliteitsindicatoren-kraamzorg-2011 (accessed 2016, April,1)
(68) Zichtbare Zorg Ziekenhuizen Indicatorenset zwangerschap en bevalling. 2011
(69) Zorgverzekeraars Nederland (2013) Rapport Kwaliteitsvisie spoedeisende zorg].www.lumc.nl (accessed 2016, April,1).
(70) Zorgtransparant De toelatingsovereenkomst tussen het ziekenhuis en de medisch specialist. www.zorgtransparant.nl (2016, May,1)

CHAPTER 6

TOWARDS A TAXONOMY FOR INTEGRATED CARE: A MIXED-METHODS STUDY

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Abstract

Introduction

Building integrated services in a primary care setting is considered an essential important strategy for establishing a high-quality and affordable health care system. The theoretical foundations of such integrated service models are described by the Rainbow Model of Integrated Care (RMIC), which distinguishes six integration dimensions (clinical, professional, organisational, system, functional and normative integration). The aim of the present study is to refine the RMIC by developing a taxonomy that specifies the underlying key features of the six dimensions.

Methods

First, a literature review was conducted to identify features for achieving integrated service delivery. Second, a thematic analysis method was used to develop a taxonomy of key features organised into the dimensions of the RMIC. Finally, the appropriateness of the key features was tested in a Delphi study among Dutch experts.

Results

The taxonomy consists of 59 key features distributed across the six integration dimensions of the RMIC. Key features associated with the clinical, professional, organisational and normative dimensions were considered appropriate by the experts. Key features linked to the functional and system dimensions were considered less appropriate.

Discussion

This study contributes to the ongoing debate of defining the concepts and typology of integrated care. This taxonomy provides a development agenda for establishing an accepted scientific framework of integrated care from an end-user, professional, managerial and policy perspective.

Introduction

Integrated care is increasingly being promoted as a means for improving accessibility, affordability and the quality of health care, especially for people with complex needs (1,2). Essential for achieving desired health outcomes and limiting costs, primary care is considered the cornerstone of such integrated care approaches (3-5). However, despite the increasing popularity of developing integrated service models in a primary care setting a solid knowledge base is lacking (6). In particular, the knowledge base is hampered by the lack of common terminology and typology regarding integrated care (2).

In a recent article, we proposed the Rainbow Model of Integrated Care (RMIC) (7) as a framework to unravel the complexity of integrated care. The RMIC distinguishes four dimensions that play inter-connected roles on the macro- (system integration), meso- (organisational, professional) and micro-level (clinical integration) and two more dimensions (functional and normative integration) that enable the connectivity between the various integration levels (see Table 1). The RMIC is considered useful for understanding the complex and multi-dimensional nature of integrated care (8). However, the underlying key features of these six integrated care dimensions are yet unknown. Insight into the underlying key features is essential for achieving a common operational understanding of integrated care and for contributing to program implementation, policy formulation and research analysis.

Consequently, there is a need for a common taxonomy that can classify the broad spectrum of integrated care approaches. A taxonomy is a formal system to classify a multifaceted complex phenomena (9), and, in this study, this complex phenomena is "integrated care." A taxonomy applied to integrated care would facilitate the description and comparison of different integrated care programs which is essential for translating research findings and evidence into practical tools for policy and practical implementation. Likewise, this taxonomy is needed to support effective deployment of integrated service models in a primary care setting. The aim of the present study is to contribute to a better understanding and operational consensus regarding the concept of integrated care by addressing the following objectives:

1. Based on a literature review, define the RMIC by developing a taxonomy that specifies the underlying key features of the six integrated care dimensions;
2. Investigate the appropriateness of the key features to achieve integrated care in a primary care setting among a group of experts from The Netherlands.

Theory and methods

Theoretical background

Integrated care, as defined by Leutz (1999), is a broad inter-sectorial system approach that aims to align the health care system (acute, primary medical and skilled) with other human service systems (e.g. long-term care, education, and vocational and housing services) (10). Primary care, as stated in the Alma-Ata declaration of 1978 (11), describes a similar inter-sectorial system approach with a distinct community and socio-political

Table 1: Integrated care dimensions of the RMIC

Level	Dimension	Description
Micro	Clinical integration	The coordination of person-focused care in a single process across time, place and discipline.
Meso	Professional integration	Inter-professional partnerships based on shared competences, roles, responsibilities and accountability to deliver a comprehensive continuum of care to a defined population.
Meso	Organisational integration	Inter-organisational relationships (e.g. contracting, strategic alliances, knowledge networks, mergers), including common governance mechanisms, to deliver comprehensive services to a defined population.
Macro	System integration	A horizontal and vertical integrated system, based on a coherent set of (informal and formal) rules and policies between care providers and external stakeholders for the benefit of people and populations.
Micro, Meso, Macro	Functional integration	Key support functions and activities (i.e. financial, management and information systems) structured around the primary process of service delivery to coordinate and support accountability and decision making between organisations and professionals in order to add overall value to the system.
Micro, Meso, Macro	Normative integration	The development and maintenance of a common frame of reference (i.e. shared mission, vision, values and culture) between organisations, professional groups and individuals.

Adopted from Valentijn et al. (2013) (7)

focus. However, theoretical discourses on integrated care and primary care as a broad inter-sectorial system approach have failed to produce practical relevance for practices and policies (12). To bridge this gap, a common taxonomy is needed to move towards a clearer operational consensus regarding integrated care as a whole.

In this article, integrated care refers to ambulatory care settings in which a network of multiple professionals and organisations across the health and social care system provide accessible, comprehensive and coordinated services to a population in a community. Based on the RMIC, integration of services can be achieved at a system (system integration), institutional (organisational integration), professional (professional integration) and service (clinical integration) levels. The distinctions between these different levels provide comprehensive insight into the features needed to achieve integrated care within a system. Throughout this paper, we refer to features of integrated care as entities, processes, or structures which operate in particular contexts to achieve integrated care.

Methods

We applied a mixed-method approach consisting of: 1) a literature review, 2) a thematic analysis to develop a taxonomy, and 3) a Delphi study to test the relevance of the taxonomy among a group of experts from The Netherlands. Because no patients were involved in this study, ethical approval was not required under Dutch law.

Literature review

A literature review was conducted to identify the key features that could be used to organise integrated care. The databases Cochrane Library, Medline, Scopus, and Business Source Premier were searched for articles published during the period from January 2002 to December 2012 and written in English. Because the present study specifically focused on the organisation of integrated care, the focus of the literature review was narrowed to system (inter-sectorial), organisational (inter-organisational) and professional (inter-professional) models of integration. The following search terms were used: "delivery of health care," "integrated service system," "integrated systems," "inter-organizational collaboration," "inter-organizational cooperation," "inter-professional collaboration" or "inter-professional work" and "quality model." The detailed search and selection strategy appears in "Additional file 1."

To be included, publications had to meet the following criteria: 1) a description of a theory or model of inter-sectorial, inter-organisational or inter-professional service delivery, 2) a description of the features (underlying entities, processes, or structures) used to achieve integrated service delivery. Publications were excluded that reported clinical interventions and a main focus on clinical outcome measures (e.g. HbA1c levels or hospital re-admission rates) or process indicators (e.g. percentage of patients receiving treatment).

Two researchers (PV and IB) independently reviewed the titles and abstracts. Only when both of the researchers independently found the title and abstracts relevant, the article was retrieved. Any disagreements between the researchers were resolved by consensus. For every included publication, we briefly described the theory or model, the study design, and the main research theme of the article.

Thematic analysis

A three-step thematic analysis method was used (13, 14) to synthesise the results of the literature review and to develop a taxonomy of key features. First, two researchers (PV and IB) generated an initial list of features from the included articles. To be initially included, features had to meet the following three criteria: 1) Relevance (related to achieving clinical, professional, organisational, system, functional and/or normative integration); 2) Theoretical foundation (presence of a theory, model or logic was described in the article); and 3) Clarity (clear definition or descriptions of the reported

features). Thereafter, the initial list of features was categorised across the six dimensions of the RMIC according to the description of each feature as reported in the literature. Any disagreements between the researchers were resolved by consensus. Second, three researchers (PV, IB and MB) independently assessed the compiled taxonomy and combined features into overarching key features within each integrated care dimension. During three discussion rounds, overarching key features were compared for agreement among the researchers and iterative revisions were made. Also, features that were identical or nearly identical were merged and descriptions were formed during these rounds. Finally, two external researchers (DK and JM) and a research assistant independently reviewed the preliminary taxonomy and offered feedback for refining the descriptions of the key features. Feedback included suggestions for merging and/or reorganising specific key features within and between the different dimensions. PV and IB summarised the feedback and revised the taxonomy accordingly.

Delphi study

A Delphi study was conducted using the RAND UCLA appropriateness method (15). In the first round, a self-administered questionnaire was used, and in the second round the experts revalued their first round score after a group discussion in a physical meeting. The aim of the second discussion round was to determine if ratings were different due to real disagreement or due to a misunderstanding or misinterpretation of the features (15). A purposive sampling strategy was used to identify experts with experience in practice or science regarding the deployment of integrated service models in a primary care setting. The following selection criteria were used for the experts: a scientific (doing research) or practical (working in a professional or service organisation) background regarding the organisation of integrated primary care delivery. Based on this criteria, experts were selected to ensure that a balanced number of both were represented. Thirty-three experts were approached by e-mail and/or telephone and invited to participate. We then included experts that indicated that they would be available to participate in both consensus rounds. Following the RAND UCLA appropriateness method, between nine and fifteen experts were ultimately selected (15).

During round one, the experts received written information on the research aims and details of the Delphi procedure. After they committed to participate, they received a link to an online questionnaire and were asked to rate the appropriateness of each feature for achieving integrated care in a primary care setting on a nine-point Likert-scale, ranging from 1 (completely irrelevant) to 9 (extremely relevant). The features were randomly presented to the experts to avoid order and information bias, which could potentially transpire especially if the features were presented in the order of the six RMIC dimensions. In addition, all experts were invited to suggest possible rephrasing of the descriptions of the features and add new features. After one week, reminders were sent

by e-mail to non-responders.

In round two, a face-to-face meeting of the expert panel took place which was chaired by one of the researchers (MB) with experience in facilitating group discussions. The meeting's goal was to discuss the results of round one and revalidate the features. Based on the results of round one, a summary report was provided to the experts with the following key feedback information: 1) respondents' own ratings in round one, 2) median agreement rating, 3) summary of qualitative comments, as well as 4) whether consensus was achieved at round one. Because of time, we decided to only discuss the features that did not reach agreement in the first round. We clustered these features by theme (e.g. leadership, strategy, value creation, external environment) and asked the highest and lowest scoring panel member to clarify his or her consideration. Next, a short discussion among all group members took place. Finally, the experts were asked to, once again, individually rate the features that were not agreed upon in the first round.

Data Analysis

The data extracted during the thematic analysis process were listed and analysed using MS Excel. The criteria of the RAND UCLA appropriateness method were used to analyse the data from the Delphi study (15). We categorized the overall panel median as follows: 1-3 as inappropriate, 4-6 as equivocal and 7–9 as appropriate. Agreement signified that ≥ 70% of panellists' ratings were within the same 3-point region (that is, 1–3, 4–6, or 7–9) as the observed median. A feature was defined as "appropriate" with an overall panel median score of ≥ 7 and a level of agreement of ≥ 70% within the 3-point region 7–9. A panel median of 4-6 or median with a consensus of ≤ 70% within the same 3-point region was defined as "equivocal." A feature with a panel median of 1-3 and a level of agreement of ≥ 70% within the 3-point region 1-3, was defined as "inappropriate." The decision rules used in both rounds are shown in Table 2. Values were computed using SPSS version 21 for Windows (IBM Statistics).

Table 2: Decision rules of the Delphi study

		Median (1-3)	**Median (4-6)**	**Median (7-9)**
Round 1	Agreement (≤ 70 %)	Equivocal; discussion round 2	Equivocal; discussion round 2	Equivocal: discussion round 2
	Agreement (≥ 70%)	Inappropriate; excluded after round 1	Equivocal; discussion round 2	Appropriate; included after round 1
Round 2	Agreement (≤ 70 %)	Equivocal	Equivocal	Equivocal
	Agreement (≥ 70%)	Inappropriate	Equivocal	Appropriate

Results

Literature review

Our literature search yielded 534 potentially relevant publications (Figure 1). After screening titles and abstracts, we retrieved 214 potentially relevant publications for their full-text. We excluded 320 publications because they were not considered relevant to the current study. Out of the 214 eligible publications, 13 duplicates were removed and another 122 publications were excluded for reasons given in Figure 1. Finally, a total of 79 publications were included in the literature review.

Most of the included publications were based on empirical studies (66%, n = 52); other publications were based on non-empirical study designs (27%, n = 27). Table 3 lists the main research topics of the included publications. Approximately one-third of the publications focused on inter-organisational collaboration (30%, n = 24); other common themes were integrated service delivery (18%, n = 14), inter-professional collaboration (11%, n = 9) and inter-organisational learning (10%, n = 8). More descriptive information can be found in "Additional file 2."

Table 3: Research themes of the included publications

Main research topic	Studied by
Accountable care organizations	(16-18)
Integrated care networks	(19-23)
Integrated service delivery	(24-37)
Inter-organisational collaboration	(38-61)
Inter-organisational learning	(62-69)
Inter-professional collaboration	(70-78)
Inter-professional learning	(79-82)
Quality improvement collaborative	(83-85)
Combined themes	(86) *a* (87, 88) b
Other	(89-94)

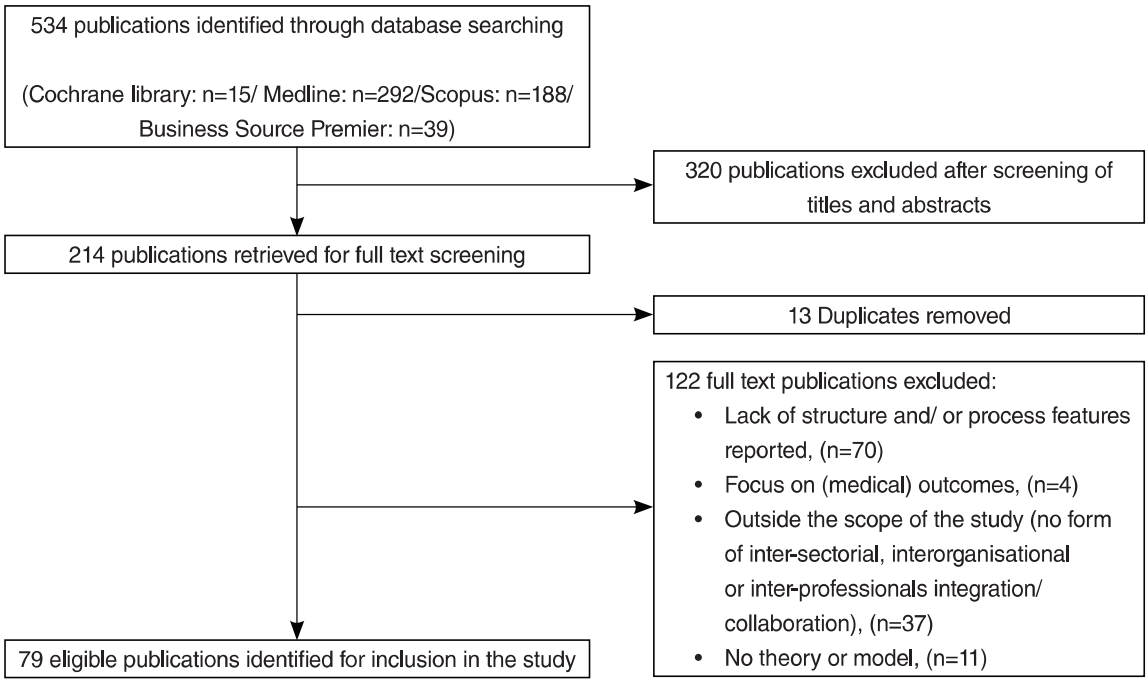
a Combination of the research themes inter-professional and inter-organisational collaboration.
b Combination of the research themes inter-organisational and inter-professional learning.

Thematic analysis

Figure 2 provides a schematic overview of the thematic analyse process employed to synthesise the literature and to develop the taxonomy of key features. The reasons for removing features at each step of the thematic analysis process appear in the dashed boxes in Figure 2. First, an initial list of 1,685 features was extracted from the 79 included publications of which 1,680 features were categorised across the six dimensions of

the RMIC (see Step 1 in Figure 2). Second, the compiled taxonomy of 1,680 features was reviewed by three authors (PV, MB and IB) to identify the broader and overarching key features per dimension. During the first discussion round, 274 key features were identified by the three reviewers. There was little disagreement among the three authors on combining features to form over-reaching key features, and any existing disagreement was easily resolved by discussion. During these subsequent discussion phases, most features were merged within each dimension due to similar or nearly identical content. After the third discussion round, ninety-four potential key features were identified (see Step 2 in Figure 2). Finally, the compiled taxonomy was reviewed by two external reviewers (DK and JM) and a research assistant. Based on the feedback of the reviewers, the features were further merged and refined within and between the six dimensions based on their similar content (see Step 3 in Figure 2). The resulting taxonomy of fifty-nine key features is shown in Table 4.

Figure 1: Flowchart of the literature search



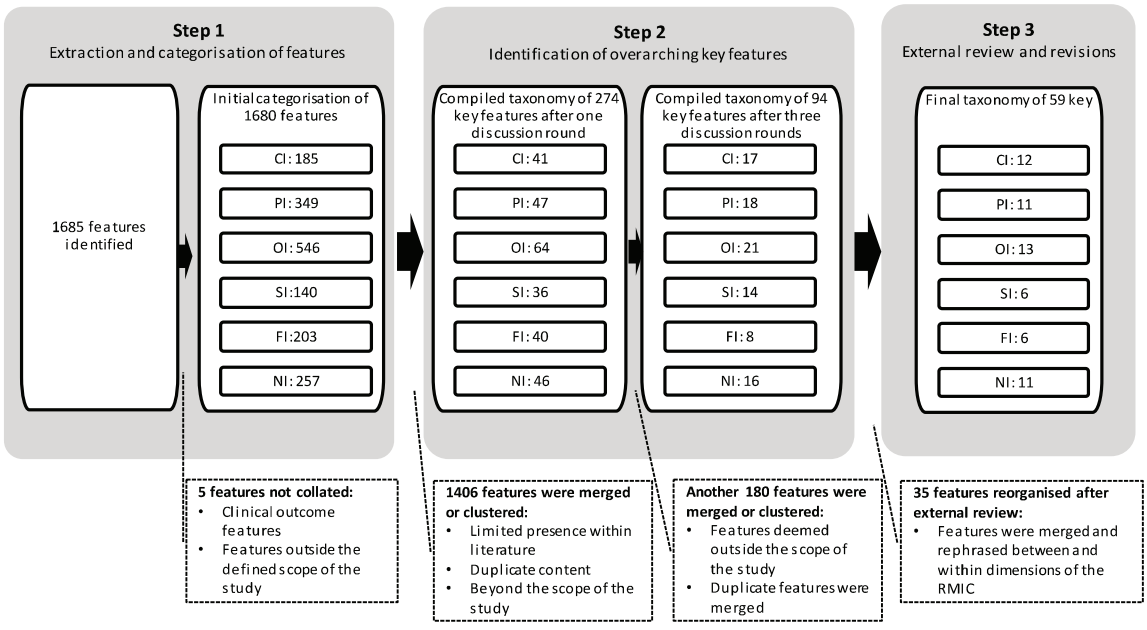
Delphi study

In total, fourteen persons participated in the first round of the expert panel (response rate 40%). The main reason experts choose not to participate was their inability to be available for the second face-to-face meeting. The panel was a balanced group of experts with a scientific (50%, n=7) or practical (50%, n=7) background. The panellists had a mean age of 45.4 years (SD: 11.3, range: 28-68), and a mean of 11.6 years (SD: 8.8, range 4-40) of experience in integrated care initiatives. Based on round one, 25 of the 59 key features were considered appropriate (overall panel median of 7-9 and

consensus of ≥ 70% within the same 3-point region, see Table 5). Thirty-four features were rated as equivocal for achieving integrated care in a primary care setting (overall panel median of 4-6 or median with consensus of ≤ 70% within the same 3-point region). None of the key features were considered inappropriate (overall panel median of 1-3 and consensus of ≥ 70% within the same 3-point region), and the experts did not propose any new features.

In the second round, one expert with practical experience and three scientific experts could not attend, resulting in a ten-member panel. This had no major impact on the composition of the panel compared to round one. The panellists in round two had a mean age of 47.5 years (SD: 11.5, range: 28-68), and a mean of 10.9 years (SD: 8.8, range 4-40) of experience. Discussion during the second round on the thirty-four equivocal features resulted in an extra nine features rated as appropriate. Within the clinical dimension, the key features *interaction between professional and client* (no. 6) and *population needs* (no. 11), and within the organisational dimension the key features *interest management* (no. 27) and *managerial leadership* (no. 32) were rated appropriate after the second round. Within functional dimension the key feature *regular feedback of performance indicators* (no. 48) reached consensus after the second round. Furthermore, within the normative dimension the key features *sense of urgency* (no.50), *visionary leadership* (no. 53), *quality features of the informal collaboration* (no. 55) and *linking cultures* (no. 56) were rated appropriate. Twenty-four key features remained equivocal after the second round, and only one key feature was rated as inappropriate, namely *reputation* (no. 57) within the normative dimension.

Figure 2: Flowchart of the thematic analysis process



Abbreviations: CI, clinical integration; PI, professional integration; OI, organisational integration; SI, system integration; FI, functional integration; and NI, normative integration

The results in Table 5 show that the appropriate key features are unevenly distributed across the six dimensions of the taxonomy. In particular, within the dimension of system integration, *stakeholder management* (no. 40) was the only key feature considered appropriate. Additionally, within the dimension of functional integration, half of the key features that refer to key support functions were considered equivocal by the experts; *human resource management* (no. 43), *resource management* (no. 45) and *support systems and services* (no. 46). Particularly noteworthy within the dimension of clinical integration is that five of its key features (nos. 3, 4, 8, 10 and 12) were considered equivocal by the experts for achieving integrated care in a primary care setting.

Corresponding features across the dimensions of the taxonomy, such as value creation and leadership, also showed an uneven pattern. For example, key features concerning value creation (nos. 21, 24 and 37) were only considered appropriate from a "professional" integration perspective (no. 21) and not from an organisational or system integration perspective. Moreover, key features regarding leadership (nos. 19, 32 and 53) were only considered appropriate from an organisational perspective and normative integration perspective, but not from a professional integration perspective (no. 19).

Discussion

This study aimed to define a taxonomy to contribute to the ongoing debate of specifying the concept of integrated care using a theory-driven mixed-method approach. Based on the theoretical foundations of the RMIC (7) and a literature review, we developed a taxonomy of 59 key features distributed across six integration dimensions (clinical, professional, organisational, system, functional and normative integration). A Delphi study further indicated that 34 of these 59 key features were considered appropriate for achieving integrated care in a primary care setting. The majority of the key features associated with the clinical, professionals, organisational and normative dimensions of integration were considered appropriate for achieving integration in a primary care setting. Key features associated with the functional and system dimensions of integration were considered less appropriate.

The results of the Delphi study indicated that the key features associated with the professional and organisational dimensions were considered appropriate for achieving integration in a primary care context. This result is not surprising as the professional and organisational perspective regarding integrated care has been the prime focus of practice, science and policies (2, 95). Moreover, the experts considered the key features associated with the normative dimension of the taxonomy as appropriate enablers for achieving integrated service models in a primary care setting. While existing integrated care theories, models and instruments tend to have a limited focus on these "soft enabling features" of integrated care (96-99), it is, nevertheless, very likely that these normative or soft features play a crucial role in the development of various complex inter-sectorial,

inter-organisational and inter-professional service models of integration. Although the existing academic literature also suggests that functional integration (e.g. information management systems) are important enabling mechanisms for achieving integrated care (100), fewer of these key features were considered appropriate when compared to the normative key features.

An intriguing finding was that, despite socio-political influences being frequently mentioned as essential preconditions for achieving integrated care (2, 5, 101, 102), the experts considered most of the key features associated with the system integration perspective as equivocal for achieving integration in a primary care setting. A possible explanation for this inconsistency might be found in the composition of our expert panel, as we did not explicitly include experts with a macro-policy background (e.g. policymakers or health insurers). This might have resulted in the underexposure of the macro-system perspective in the results of our Delphi study. On the other hand, at the micro-clinical level, the experts considered the key features related to the involvement of clients and patients as equivocal for achieving integration in a primary care setting. Most of the experts considered integrated service delivery as a "backstage" process for the benefit of clients and patients. This opinion does not concur with the current academic literature that highlights the key position of patients in the integration process (2, 103-106). This inconsistency might be explained by the fact that patients and clients were not included in the expert panel. The lack of interest being placed at the macro- (system) and micro- (patient) levels made us aware that integrated care can be defined from multiple perspectives depending on the actors involved (e.g. patients, professionals, managers and policymakers) (2). This indicates the need to develop assessment tools which take into account these various perspectives (e.g. a 360-degree feedback method) when evaluating the performance of an integrate care approach.

Strengths and weaknesses

The strength of this study is its theory-driven mixed-method approach. The taxonomy is theoretically grounded on the RMIC (7) and has a solid base in the current academic literature. The strength of the thematic analysis procedure lies in its potential to synthesise and identify common features across a heterogeneous mix of publications (13, 14, 107). The Delphi study added substantially towards consensus-based terminology regarding the development of integrated service models within a primary care context.

A limitation of the study relates to the composition of our expert panel, as patients and experts with a macro-policy background were not included. As noted earlier, the lack of emphasis on key features associated with the macro- (system) perspective and patient involvement in achieving integrated care might be due to the composition of our expert panel. We are aware of the fact that this form of selection bias might be present in our Delphi study. However, it appears difficult to include all perspectives in one expert panel

without introducing other serious forms of bias (e.g. conflict of interest) (15, 108). We did not explicitly included experts with a macro-policy background because their presence could influence the (strategic) behaviour of the practice experts, as they are (financially) dependent on these experts for the continuity of their practices. Besides, the results of the Delphi study also confirms that an expert opinion regarding integrated care has a more limited scope compared to a broad theoretical discourse of integrated care (2, 109-111). Another limitation of this study relates to the subjective interpretation process during the thematic analyses method. Although the synthesis process was systematic and independently verifiable, subjective judgements of the researchers could have had an impact on the construction of the key features of the taxonomy (14, 112).

Another challenge in the present study relates to the complex nature of integrated care, which can never be fully rationalised or standardised (113-115). However, the vast majority of research on integrated care is based on an industrial-quality improvement logic which holds that quality standardisation leads to better outcomes and allows for more systematic evaluations (115). Researchers (ourselves included) often struggle with the delicate balance of collating, analysing and synthesising findings which are academically defensible against research methods that do not necessarily appreciate the underlying epistemological assumptions of integrated care. We have attempted to use a more pragmatic approach to address this gap. By developing a taxonomy that holds much promise, our study aimed to potentially guide the modelling and development of pioneering research approaches across traditional disciplinary boundaries in order reveal the complex inter-relationships at a system, institutional, professional and service level (115). We think further debate about the underlying epistemological assumptions, methodology and quality considerations of integrated care would be extremely useful. We invite other scholars to explore with us the philosophical basis of integrated care and to establish an agreed upon “state of the science.”

Implications for practice and research

Our study fills an important gap in the knowledge base of the concept of integrated care. The key features of the taxonomy provide a crucial differentiation to describe and analyse various types of integrated service models (ranging from comprehensive towards more selective). In this way, the taxonomy might be a valuable contribution for health care professionals, managers, patient organisations, health care service purchasers, and policymakers involved in the complex organisation of integrated service delivery. The taxonomy can also serve as set of hypotheses for future empirical investigation. Moreover, our study is a vital step towards the creation of a common language and an understanding of the concept of integrated care. Future research should explore the relevance and acceptability of our taxonomy in order to establish a common terminology regarding integrated care. In addition, researchers

could examine the categorisation of the key features among the dimensions of integrated care in order to further refine the current taxonomy.

Conclusion

This study established a taxonomy for integrated care based on the theoretical foundations of the RMIC. The taxonomy can be considered a first step towards a common typology and operational consensus regarding integrated care. More work is needed to develop research methodologies that take into account the various integration processes from an end-user, professional, managerial and policy perspective in a synergetic way. For this purpose, the taxonomy has established a further developmental agenda for both research and practice.

Acknowledgements

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Table 4: Taxonomy of 59 key features

Key features per dimension		Description#
Clinical integration		
1.	Centrality of client needs	The principle of care is to address the needs of clients in terms of medical, psychological and social aspects of health.
2.	Case management	Coordination of care for clients' with a high risk profile (e.g. identifying risks, developing policies and guidance).
3.	Patient education	Education for clients is focused on medical, psychological and social aspects of health.
4.	Client satisfaction	User satisfaction of the individual client is central to the organisation of care.
5.	Continuity	The organisation of care aims to provide fluid care delivery for an individual client.
6.	Interaction between professional and client	Attitude and behavioural characteristics between professional and client regarding all health needs of the client.
7.	Individual multidisciplinary care plan	Implementation of a multidisciplinary care plan at the individual client level.
8.	Information provision to clients	Provide unambiguous and understandable information at the individual client level.
9.	Service characteristics	Provision of services is focused on medical, psychological and social aspects of health.
10.	Client participation	Clients are (pro)actively involved in the design, organisation and provision of care at the operational level.
11.	Population needs	The interdisciplinary approach is consistent with the dominant needs of the population.
12.	Self-management	Tailor-made support of self-management at the individual client level.
Professional integration		
13.	Inter-professional education	Inter-professional education for professionals focused on interdisciplinary collaboration.
14.	Shared vision between professionals	A shared vision between professionals focused on the content of care.
15.	Agreements on interdisciplinary collaboration	Agreements on the establishment of interdisciplinary cooperation at the operational level.
16.	Multidisciplinary guidelines and protocols	Multidisciplinary guidelines and protocols are implemented in coherence with the operational level.
17.	Inter-professional governance	Inter-professional governance **is** focused on openness, integrity and accountability between professionals at the operational level (e.g. joint accountability, appeal on pursued policies and responsibilities).
18.	Interpersonal characteristics	Interpersonal characteristics of the professionals involved in the partnership (e.g. trust, equality, respect, values).

1.	Clinical leadership	Accepted leadership with power and influence at the operational level (e.g. professional status characteristics such as reputation, specialization, position and seniority).
2.	Environmental awareness	Environmental awareness of professionals with regard to economic, social and political developments.
3.	Value creation for the professional	Value is added for the individual professional through interdisciplinary collaboration.
4.	Performance management	Performance management at the operational level is focused on improving health outcomes for the individual client and the population.
5.	Creating interdependence between professionals	Creating mutual interdependencies between professionals regarding interdisciplinary collaboration.

Organisational integration

6.	Value creation for organisation	Value is added through the collaboration of each involved organisation.
7.	Inter-organisational governance	Inter-organisational governance is focused on openness, integrity and accountability between organisations at the strategic level (e.g. joint responsibilities, strategy and policy).
8.	Informal managerial network	Informal network of managers within the collaboration.
9.	Interest management	A climate that attempts to bridge the various interests (e.g. social, organisational and personal) at the operational, tactical and strategic level.
10.	Performance management	Collective elaborated performance management between organisations within the collaboration.
11.	Population needs as binding agent	The needs of the population are central in the collective policy of the various organisations in the collaboration.
12.	Organisational features	Organisational features of inter-organisational collaboration (e.g. legal structure, number of organisations, profit vs. non-profit).
13.	Inter-organisational strategy	A collective elaborated strategy exists between the organisations within the collaboration.
14.	Managerial leadership	Leadership with power and influence at a strategic level (e.g. reputation, seniority and formal position).
15.	Learning organisations	Collective learning power between the organisations within the collaboration (e.g. joint research and development programs).
16.	Location policy	A collective location policy between the organisations within the collaboration (e.g. coordinated housing and facilities).
17.	Competency management	Collectively utilize and select competencies of professionals and staff to the greatest possible extent for the objectives of the collaboration.

	1. Creating interdependence between organisations	The organisation of the collaboration aims to create mutual interdependencies between organisations (e.g. multi-year rental agreement).
System integration		
	2. Social value creation	Value is added through the collaboration of social objectives and interests.
	3. Available resources	Available resources in the environment of the collaboration (e.g. usable buildings, (over)capacity, professionals and funding streams).
	4. Population features	Health determinants of the population in the environment of the partnership (e.g. population composition and use of care).
	5. Stakeholder management	Engagement of various stakeholders (e.g. municipality, patient organisations and health insurance companies).
	6. Good governance	Creating trust towards external stakeholders (e.g. municipality and health insurance companies) based on working method, reputation, management, control and/or supervision.
	7. Environmental climate	Political, economic and social climate within the environment of the collaboration (e.g. market characteristics, regulatory framework, competition).
Functional integration		
	8. Human resource management	Aligned Human Resource Management within the collaboration (e.g. joint staffing and personnel).
	9. Information management	Aligned information management systems accessible at an operational, tactical and strategic level (e.g. monitoring and benchmarking systems).
	10. Resource management	Coherent use of resources (e.g. collective real estate and funding).
	11. Support systems and services	Aligned support systems and services at the operational level (e.g. facility management and secretarial support).
	12. Service management	Aligned service management for the client (e.g. collective telephone numbers, counter assistance and 24-hour access)
	13. Regular feedback of performance indicators	Regular feedback of performance indicators for professionals at the operational level to enable them to improve their performance.
Normative integration		
	14. Collective attitude	Collective attitude within the collaboration towards open communication, sincerity and respect at operational, tactical and strategic levels.
	15. Sense of urgency	Awareness regarding the need and purpose to collaborate at the operational, tactical and strategic levels.
	16. Reliable behaviour	The extent to which the agreements and promises within the collaboration are fulfilled at operational, tactical and strategic levels.

1.	Conflict management	The ability to effectively manage interpersonal conflicts within the collaboration.
2.	Visionary leadership	Leadership based on a personal vision that inspires and mobilizes people.
3.	Shared vision	A collectively shared long-term vision within the collaboration at the operational, tactical and strategic levels.
4.	Quality features of the informal collaboration	Effectiveness and efficiency of the informal collaboration at the operational, tactical and strategic levels (e.g. group dynamics and attention to the undercurrent).
5.	Linking cultures	Linking cultures (e.g. values and norms) with different ideological values within the collaboration at the operational, tactical and strategic levels.
6.	Reputation	Individual reputation of those people involved in the collaboration.
7.	Transcending domain perceptions	The ability to transcend one's own professional domain within the collaboration at the operational, tactical and strategic levels.
8.	Trust	The extent to which those involved in the collaboration at operational, tactical and strategic levels trust each other.

 # Descriptions are derived from the literature, and were refined during Step 3 of the thematic analysis process.

Table 5: Results of the Delphi study

	Delphi study				
	Round 1 (n= 14)		**Round 2** (n= 10)		
Taxonomy for integrated care	Panel median (30th and 70th percentile)	Agreement (%)	Panel median (30th and 70th percentile)	Agreement (%)	Final consensus
Clinical integration					
1. Centrality of client needs	8.5 (6.5-9)	71.4	N/A	N/A	Appropriate
2. Case management	8 (7.5-8)	85.7	N/A	N/A	Appropriate
3. Patient education	5 (4.5-7)	42.9	4 (3.3-5.7)	60	Equivocal
4. Client satisfaction	6.5 (5-8)	35.7	5 (5-7)	50	Equivocal
5. Continuity	8 (7.5-9)	78.6	N/A	N/A	Appropriate
6. Interaction between professional and client	7 (5-8.5)	50	8 (6.3-8.7)	70	Appropriate
7. Individual multidisciplinary care plan	7.5 (7-8)	78.6	N/A	N/A	Appropriate
8. Information provision to clients	5 (4.5-7)	57.1	7 (6-7.7)	60	Equivocal
9. Service characteristics	8 (7.5-9)	78.6	N/A	N/A	Appropriate
10. Client participation	6 (5-8)	42.9	5.5 (4.3-6)	60	Equivocal
11. Population needs	7 (5.5-8.5)	57.1	7 (7-8)	80	Appropriate
12. Self-management	5 (3.5-7)	35.7	4.5 (4-5.7)	70	Equivocal
Professional integration					
13. Inter-professional education	8 (7.5-8)	92.9	N/A	N/A	Appropriate
14. Shared vision between professionals	8 (8-9)	78.6	N/A	N/A	Appropriate
15. Agreements on interdisciplinary collaboration	8 (8-9)	85.7	N/A	N/A	Appropriate
16. Multidisciplinary guidelines and protocols	7.5 (7-8)	85.7	N/A	N/A	Appropriate
17. Inter-professional governance	7.5 (6.5-8)	71.4	N/A	N/A	Appropriate

1.	Interpersonal characteristics	6 (4.5-7.5)	35.7	6 (3.6-6.7)	40	Equivocal
2.	Clinical leadership	6 (5-7)	42.9	7 (6-7.7)	60	Equivocal
3.	Environmental awareness	5 (3-6.5)	42.9	5.5 (4.3-7)	60	Equivocal
4.	Value creation for the professional	7.5 (6.5-8)	71.4	N/A	N/A	Appropriate
5.	Performance management	6.5(5-8)	35.7	7.5 (5.3-8.7)	60	Equivocal
6.	Creating interdependence between professionals	6 (5-6.5)	64.3	5 (5-6)	60	Equivocal
Organisational integration						
7.	Value creation for organisation	5 (4.5-6.5)	57.1	4.5 (3.3-5)	60	Equivocal
8.	Inter-organisational governance	7 (6.5-8)	71.4	N/A	N/A	Appropriate
9.	Informal managerial network	5 (4.5-6.5)	50	4.5 (3.3-5)	70	Equivocal
10.	Interest management	7.5 (6-8)	64.3	8 (7-8)	90	Appropriate
11.	Performance management	7 (7-8)	78.6	N/A	N/A	Appropriate
12.	Population needs as binding agent	7 (6.5-7)	71.4	N/A	N/A	Appropriate
13.	Organisational features	6 (5-7)	50	6 (6-7)	60	Equivocal
14.	Inter-organisational strategy	8 (7-8)	92.9	N/A	N/A	Appropriate
15.	Managerial leadership	6.5 (5-7.5)	35.7	7 (7-7.7)	80	Appropriate
16.	Learning organisations	7 (6.5-8)	71.4	N/A	N/A	Appropriate
17.	Location policy	6 (6-7)	50	6.5 (6-7)	40	Equivocal
18.	Competency management	7 (6.5-8)	71.4	N/A	N/A	Appropriate
19.	Creating interdependence between organisations	5.5 (3.5-7.5)	35.7	4 (3-5)	50	Equivocal
System integration						
20.	Social value creation	6 (4-8)	21.4	6 (4-8.4)	40	Equivocal
21.	Available resources	6 (5.5-7)	42.9	6 (6-7)	60	Equivocal
22.	Population features	4 (3-5.5)	28.6	5.5 (5-6.7)	60	Equivocal

1.	Stakeholder management	7.5 (6.5-8)	71.4	N/A	N/A	Appropriate
2.	Good governance	6.5 (5-8)	35.7	6 (5-6)	70	Equivocal
3.	Environmental climate	5 (3-6.5)	35.7	6.5 (5-7)	40	Equivocal
Functional integration						
4.	Human resource management	7 (5-7.5)	64.3	6.5 (5.3-7)	40	Equivocal
5.	Information management	8 (7-8.5)	92.9	N/A	N/A	Appropriate
6.	Resource management	6 (5-7)	50	6 (5-7)	60	Equivocal
7.	Support systems and services	6 (5-7)	50	6 (5-6)	80	Equivocal
8.	Service management	7.5 (6.5-8)	71.4	N/A	N/A	Appropriate
9.	Regular feedback of performance indicators	7 (6-8)	57.1	7 (6.3-8)	70	Appropriate
Normative integration						
10.	Collective attitude	8 (7-8)	78.6	N/A	N/A	Appropriate
11.	Sense of urgency	6.5 (6-8)	28.6	8 (6.3-8)	70	Appropriate
12.	Reliable behaviour	8 (6.5-8)	71.4	N/A	N/A	Appropriate
13.	Conflict management	6 (4-7)	42.9	6 (6-7)	60	Equivocal
14.	Visionary leadership	7 (5.5-8)	64.3	7 (7-8)	80	Appropriate
15.	Shared vision	8 (8-8)	92.9	N/A	N/A	Appropriate
16.	Quality features of the informal collaboration	7 (5-7)	57.1	7 (7-8)	90	Appropriate
17.	Linking cultures	7 (5-8)	57.1	7.5 (6.3-8)	70	Appropriate
18.	Reputation	4 (3-5)	35.7	3.5 (3-4)	50	Inappropriate
19.	Transcending domain perceptions	8 (8-8)	92.9	N/A	N/A	Appropriate
20.	Trust	8 (8-8.5)	100	N/A	N/A	Appropriate

Additional file 1: Search parameters

Database	Search terms	Limits	Yields	Included after screening of titles and abstracts	Duplicates removed	Included after screening of full-text	Publications
Cochrane Library	("Delivery of Health Care, Integrated"(Mesh)) AND quality model	2002 – 2012 (10 years) English	3	0	0	0	
	integrated service systems and quality model	2002 – 2012 (10 years) English	12	0	0	0	
Medline	Inter-organizational collaboration AND models	2002 – 2012 (10 years) English	18	14	0	8	(54), (86), (71), (87), (44), (61), (40), (76)
	("Delivery of Health Care, Integrated"(Mesh)) AND quality model	2002 – 2012 (10 years) English	194	79	0	27	(70), (37), (27) (25), (24), (32), (89) (93), (83), (51), (34), (59), (31), (30), (35), (49), (78) (90), (36), (23), (29), (18), (26), (16), (17), (88), (20)
	("Delivery of Health Care, Integrated"(Mesh)) AND "Total Quality Management"(Mesh)	2002 – 2012 (10 years) English	80	18	3	5	(81), (68), (94), (85), (92)

Scopus	Inter-organizational collaboration AND model	2002 – 2012 (10 years) English Medicine Business, Management and Accounting Social Sciences Environmental Science Health Professions Psychology Article Review	77	48	1	17	(57), (52), (42), (58), (46), (67), (55), (64), (45), (53), (39), (66), (60), (63), (50), (65), (48)
	Inter-organizational cooperation AND model	2002 – 2012 (10 years) English Business, Management and Accounting Social Sciences Medicine Nursing Environmental Science Health Professions Article Review	45	18	2	9	(43), (47), (62), (38), (41), (22), (69), (21), (56)
	Inter-professional collaboration AND model	2002 – 2012 (10 years) English Medicine Nursing Social Sciences Health Professions Psychology Article Review	28	17	0	7	(75), (72), (84), (19), (80), (74), (77)

	Inter-professional work AND model	2002 – 2012 (10 years) English Medicine Nursing Social Sciences Business, Management and Accounting Health Professions Psychology Article Review	38	14	3	6	(79), (91), (73), (82), (33), (28)
Business Source Elite (EBSCO host)	Integrated systems AND quality model	2002 – 2012 (10 years) English Academic journals	34	6	0	0	
	Integrated delivery systems AND quality model	2002 – 2012 (10 years) English Academic journals	5	0	4	0	
Total			**534**	**214**	**13**	**79**	

Additional file 2: Characteristics of included studies

Author(s)	Year	Context	Sample size	Study design	Study focus
Amiel and Pincus (24)	2011	Integrated service delivery.	N/A	Descriptive study	A conceptual framework for the delivery psychiatric services.
Antoncica and Prodan (38)	2008	Inter-organisational collaboration.	226 executives.	Cross-sectional study	The relationship between corporate entrepreneurship and organisational performance within inter-organisational relationships.
Axelsson and Bihari Axelsson (39)	2006	Inter-organisational collaboration.	N/A	Expert opinion	The development of a conceptual framework for inter-organisational integration in public health.
Bai, Wells and Hillemeier (40)	2009	Inter-organisational collaboration.	75 child welfare agencies.	Prospective cohort study	Relationship between inter-organisational relationships and use of mental health services.
Bainbridge et al. (19)	2010	Integrated care networks.	N/A	Expert opinion	Development of a conceptual framework for the evaluation of integrated palliative care networks.
Balmer et al. (87)	2011	Inter-organisational and inter-professional learning.	N/A	Descriptive study	Exploration of different alliance competencies.
Barceló et al. (83)	2010	Quality improvement collaborative.	10 public health centres.	Case-control study	Using collaborative learning to improve the quality of diabetes care.
Béland and Hollander (25)	2011	Integrated service delivery.	N/A	Review of literature	Models on integrated care delivery for the frail elderly.
Biro, Moreland, and Cowgill (20)	2003	Integrated care networks.	N/A	Descriptive study	Framework for developing a balanced scorecard to establish benchmarks.
Blackmore, Mecklenburg and Kaplan (26)	2011	Integrated service delivery.	N/A	Descriptive study	Collaborative efforts among providers, payers, and employers.
Squire, Cousins and Brown (62)	2009	Inter-organisational learning.	104 manufacturing firms.	Cross-sectional study	The effect of relational factors on knowledge transfer within cooperation.
Briner et al. (89)	2010	Clinical risk management.	N/A	Descriptive study	Development of a monitoring instrument for clinical risk management.
Castelnovo (41)	2005	Inter-organisational collaboration.	N/A	Expert opinion	The development of a conceptual model for an integrated system of local governments.

Chan, Chong and Zhou (42)	2012	Inter-organisational collaboration.	505 employees of Malaysia firms.	Cross-sectional study	The diffusion of electronic collaboration in supply chain management.
Choi and Ko (63)	2012	Inter-organisational learning.	119 employees of Korean firms.	Cross-sectional study	The relationship between Inter-organisational learning and electronic collaboration.
Clarke and Fuller (43)	2010	Inter-organisational collaboration.	N/A	Descriptive study	The development of collaborative strategic management model.
Cohen et al. (27)	2011	Integrated service delivery.	N/A	Descriptive study	The development of an integrated complex care model.
D'Amour et al. (86)	2008	Inter-professional and inter-organisational collaboration.	N/A	Descriptive study	The development of a model for inter-professional and inter-organisational collaboration.
DeMuro (16)	2011	Accountable Care Organisations	N/A	Expert opinion	Strategies for governing an accountable care organisation.
Dunlop and Holosko (44)	2005	Inter-organisational collaboration.	N/A	Descriptive study	The role and contribution of relational processes in inter-organisational partnerships.
Epping-Jordan et al. (90)	2004	Chronic Care Model.	N/A	Expert opinion	The development of framework which emphasizes community and policy aspects of improving care.
Evans and Alleyne (79)	2009	Inter-professional learning.	N/A	Expert opinion	The development of a knowledge transfer process model.
Evans and Baker (28)	2012	Integrated service delivery.	N/A	Expert opinion	The development of a framework to characterize the behaviours of actors within health systems.
Fann, Ell and Sharpe (29)	2012	Integrated service delivery.	N/A	Expert opinion	Identification of key components of integrated psychosocial services.
Faulkner and Laschinger (91)	2008	Structural and psychological empowerment of nurses.	282 nurses.	Cross-sectional study	The relationship between structural and psychological empowerment and perceived respect of nurses.
Fleury (21)	2006	Integrated care networks.	N/A	Expert opinion	The development of a typology of Integrated care networks.
Fryers, Young and Rowland (70)	2012	Inter-professional collaboration.	N/A	Descriptive study	The development of an evaluation framework for team coordination.

Gagliardi, Dobrowb and Wright (71)	2011	Inter-professional collaboration.	N/A	Review of literature	Exploration of inter-professional collaboration models.
Garriga (45)	2009	Inter-organisational collaboration.	N/A	Descriptive study	A framework to conceptualize structural and relational factors of stakeholder cooperation.
Gowen, Henagan and McFadden (92)	2009	Transformational leadership, knowledge management and quality management.	370 hospitals in the USA.	Cross-sectional study	Relation between transformational leadership, knowledge management and quality management on organisational performance.
Handfield et al. (46)	2009	Inter-organisational collaboration.	151 manufacturing and service firms in the UK.	Cross-sectional study	Relation between organisational entrepreneurship and supply management.
Hastie and Fahy (72)	2011	Inter-professional collaboration.	N/A	Descriptive study	Inter-professional interactions in birthing units.
Hirsch and Meyer (47)	2010	Inter-organisational collaboration.	N/A	Expert opinion	A framework to assess the behavioural aspects in an inter-organisational partnership.
Hudson (73)	2007	Inter-professional collaboration.	N/A	Expert opinion	Pessimism and optimism in professional integration.
Huerta, Casebeer and VanderPlaat (48)	2006	Inter-organisational collaboration.	N/A	Expert opinion	A framework to conceptualize inter-organisational relationships in health care.
Huotari (64)	2008	Inter-organisational learning.	N/A	Expert opinion	Development of a model for inter-organisational learning in a multi-actor network.
Huxham and Hibbert (65)	2008	Inter-organisational learning.	N/A	Descriptive study	A conceptualization of inter-organisational learning.
Jarvenpaa and Majchrzak (66)	2008	Inter-organisational learning.	104 security professionals in the USA.	Cross-sectional study	Assessment of knowledge-sharing in inter-organisational collaborations.
Knoben and Oerlemans (67)	2012	Inter-organisational learning.	400 South African firms.	Cross-sectional study	The relation between a sets of external actors and Inter-organisational knowledge links.
Kowalska (49)	2007	Inter-organisational collaboration.	N/A	Descriptive study	Exploration of the relation between health care financing and integration.
Kümpers et al. (88)	2006	Inter-organisational and inter-professional learning.	N/A	Descriptive study	Conceptualization of knowledge transfer in health care networks.

Leech, van Wyk and Uys (74)	2007	Inter-professional collaboration.	N/A	Descriptive study	Exploration of the role of community nurses in primary care clinics.
Légaré et al. (75)	2011	Inter-professional collaboration.	N/A	Descriptive study	Conceptualisation of inter-professional approach of shared discussion making in primary care.
Lough and Klevay (76)	2012	Inter-professional collaboration.	N/A	Expert opinion	The development of inter-professional collaboration model.
McGill and Santoro (50)	2004	Inter-organisational collaboration.	N/A	Expert opinion	Exploration of the resource and competitive interdependence between organisations.
Meijboom, Haan and Verheyen (22)	2004	Integrated care networks.	N/A	Expert opinion	Conceptualisation of economic organisation theory in health networks.
Minkman et al. (30)	2009	Integrated service delivery.	31 Dutch integrated care experts.	Review of literature and consensus procedure	Development of a quality management model for integrated care.
Minkman, Ahaus and Huijsman (31)	2009	Integrated service delivery.	31 Dutch integrated care experts.	Expert opinion	A framework for the development process of integrated care services.
Minkman et al. (32)	2011	Integrated service delivery.	84 care networks.	Cross-sectional study	Quality indicators to assess integrated care services.
Minott et al. (51)	2010	Inter-organisational collaboration.	N/A	Expert opinion	Exploration of a group employed model.
Morgan et al. (80)	2009	Inter-professional learning.	N/A	Descriptive study	Evaluation of a community-based medical education program.
Ngai, Jin and Liang (52)	2008	Inter-organisational collaboration.	N/A	Descriptive study	Conceptualization of inter-organisational Knowledge management.
Ngai, Chau and Chan (53)	2011	Inter-organisational collaboration.	N/A	Descriptive study	Exploration of the relationship between supply chain competence and supply chain agility on firm performance.
Nolan et al. (68)	2005	Inter-organisational learning.	N/A	Descriptive study	Evaluation of a framework to spread improvements in a health care setting.
Olckers, Gibbs and Duncan (81)	2007	Inter-professional learning.	N/A	Expert opinion	Conceptualisation of inter-professional learning of health professionals.

Olson, Balmer and Mejicano (54)	2011	Inter-organisational collaboration.	N/A	Descriptive study	Conceptualisation of success factors for inter-organisational collaboration in the health sector.
Paier and Scherngell (55)	2011	Inter-organisational collaboration.	191 organisations participating in research projects.	Cross-sectional study	Evaluation of features for Inter-organisational R&D collaborations.
Pettersen and Rokkan (56)	2006	Inter-organisational collaboration.	Companies in the French seafood industry.	Cross-sectional study	Conceptualization of buyer tolerance of conflict in international business relationships.
Phillips et al. (93)	2010	Clinical governance in primary care/ Other.	N/A	Review of literature	Exploration of the concept of clinical governance and the relation with quality and safety.
Pinto et al. (84)	2011	Quality improvement collaborative.	20 health organisations in the UK.	Cross-sectional study	The effect of situational factors on a quality improvement program.
Pomietto et al. (85)	2009	Quality improvement collaborative.	N/A	Descriptive study	Evaluation of a quality improvement project.
Reilly et al. (33)	2003	Integrated service delivery.	331 consultants in old age psychiatry in the UK and Ireland.	Cross-sectional study	Relation between integrated structures and services.
Robinson, Anning and Frost (82)	2005	Inter-professional learning.	N/A	Expert opinion	Conceptualization of inter-professional learning in a multi-agency team setting.
Rocha and Miles (57)	2009	Inter-organisational collaboration.	N/A	Expert opinion	Conceptualization of a collaborative entrepreneurship model for inter-organisational partnerships.
Sanders (58)	2007	Inter-organisational collaboration.	245 CEOs of manufacturing companies in the USA.	Cross-sectional study	Relationship between e-business technologies, organisational collaboration, and performance.
Schulz and Geithner (69)	2010	Inter-organisational learning.	N/A	Descriptive study	Exploration of the development of inter-organisational learning networks.

Shields et al. (17)	2011	Accountable Care Organisations.	N/A	Descriptive study	Integrating of independent physicians into an accountable care organisation.
Shields (18)	2011	Accountable Care Organisations.	N/A	Expert opinion	Exploration of success factors for an accountable care organisation.
Sicotte, D'Amour and Moreault (77)	2002	Inter-professional collaboration in primary care.	343 programme co-ordinators within a community health centre.	Cross-sectional study	Exploration of success factors for inter-professional collaboration in community health centres.
Speir et al. (59)	2009	Inter-organisational collaboration.	N/A	Descriptive study	Evaluation of a model for regional collaboration in health care.
Stock, Reece and Cesario (78)	2004	Inter-professional collaboration.	N/A	Descriptive study	Description of an interdisciplinary model for geriatric patients.
Strandberg-Larsen et al. (34)	2010	Integrated service delivery.	976 general practitioners in the US and Denmark.	Cross-sectional study	Exploration of clinicians' perceptions of clinical integration in two different health sectors.
Thompson et al. (94)	2003	Process optimisation in the care chain.	N/A	Descriptive study	Description of the implementation of Toyota production system method in a health system.
Ueoka (35)	2008	Health care Improvement in conflict areas.	N/A	Descriptive study	Description of a health care improvement model in conflict areas.
Vaccaro, Parente and Veloso (60)	2010	Inter-organisational collaboration.	113 senior managers in the Brazilian automobile industry.	Cross-sectional study	The effect of knowledge management tools on the performances of business units in inter-organisational relationships.
Visschedijk et al. (36)	2003	Integrated service delivery.	N/A	Expert opinion	Conceptualization of the integration of leprosy services into the general health services.
Wan and Wang (23)	2003	Integrated care networks.	100 integrated health care networks in the US	Retrospective cohort study	The effect of integration on performance in health care networks.

Wells and Weiner (61)	2007	Inter-organisational collaboration.	N/A	Descriptive study	Exploration of cooperative evolution in community health centres.
Zou et al. (37)	2012	Integrated service delivery.	N/A	Descriptive study	Exploration of factors that influence the integration of health services.

N/A: Not applicable

References

(1) Grone O, Garcia-Barbero M. Integrated care: a position paper of the WHO European Office for Integrated Health Care Services. Int J Integr Care 2001, 1:e21.

(2) Kodner DL. All together now: a conceptual exploration of integrated care. Healthc Q 2009, 13 (Special Issue):6-15.

(3) World Health Organization. The world health report 2008: Primary health care - now more than ever. Geneva: World Health Organization; 2008.

(4) Starfield B, Shi L, Macinko J. Contribution of primary care to health systems and health. Milbank Q 2005, 83(3):457-502.

(5) Berwick DM, Nolan TW, Whittington J. The triple aim: care, health, and cost. Health Aff 2008, 27(3):759-769.

(6) Plochg T, Klazinga N. Community-based integrated care: myth or must? International Journal for Quality in Health Care 2002, 14(2):91-101.

(7) Valentijn PP, Schepman SM, Opheij W, Bruijnzeels MA. Understanding integrated care: a comprehensive conceptual framework based on the integrative functions of primary care. Int J Integr Care 2013, 13:e010.

(8). Goodwin N. Understanding integrated care: a complex process, a fundamental principle. Int J Integr Care 2013, 13:e011.

(9) Patton MQ. Qualitative Research and Evaluation Methods, 3d Edition. Thousand Oaks: Sage Publications; 2002.

(10) Leutz WN. Five laws for integrating medical and social services: lessons from the United States and the United Kingdom. Milbank Q 1999, 77(1):77-110.

(11) World Health Organization. Declaration of Alma-Ata. Primary health care: report of the International Conference on Primary Health Care. Geneva: World Health Organization; 1978.

(12) Vasan A, Ellner A, Lawn SD, Gove S, Anatole M, Gupta N, Drobac P, Nicholson T, Seung K, Mabey DC. Integrated care as a means to improve primary care delivery for adults and adolescents in the developing world: a critical analysis of Integrated Management of Adolescent and Adult Illness (IMAI). BMC medicine 2014, 12(1):6.

(13) Lucas PJ, Baird J, Arai L, Law C, Roberts HM. Worked examples of alternative methods for the synthesis of qualitative and quantitative research in systematic reviews. BMC Med Res Methodol 2007, 7:4.

(14) Greenhalgh T, Wong G, Westhorp G, Pawson R. Protocol-realist and meta-narrative evidence synthesis: evolving standards (RAMESES). BMC medical research methodology 2011, 11(1):115.

(15) Fitch K, Bernstein SJ, Aguilar MD, Burnand B, LaCalle JR. The RAND/UCLA Appropriateness Method User's Manual. Santa Monica: RAND Corporation; 2001.

(16) DeMuro PR. 7 strategies for success in governing an ACO. Healthc Financ Manage 2011, 65(5):78-82.

(17) Shields MC, Patel PH, Manning M, Sacks L. A model for integrating independent physicians into accountable care organizations. Health Aff 2011, 30(1):161-172.

(18) Shields M. From Clinical Integration to Accountable Care. Annals of Health Law 2011, 20:151-164.

(19) Bainbridge D, Brazil K, Krueger P, Ploeg J, Taniguchi A. A proposed systems approach

to the evaluation of integrated palliative care. BMC palliative care 2010, 9(1):8.
(20) Biro LA, Moreland ME, Cowgill DE. Achieving excellence in veterans healthcare: A balanced scorecard approach. Journal for Healthcare Quality 2003, 25(3):33-39.
(21) Fleury M. Integrated service networks: the Quebec case. Health Services Management Research 2006, 19(3):153-165.
(22) Meijboom B, de Haan J, Verheyen P. Networks for integrated care provision: an economic approach based on opportunism and trust. Health Policy 2004, 69(1):33-43.
(23) Wan TT, Wang BB. Integrated healthcare networks' performance: a growth curve modeling approach. Health Care Manag Sci 2003, 6(2):117-124.
(24) Amiel JM, Pincus HA. The medical home model: new opportunities for psychiatric services in the United States. Current Opinion in Psychiatry 2011, 24(6):562-568.
(25) Béland F, Hollander MJ. Integrated models of care delivery for the frail elderly: international perspectives. Gaceta Sanitaria 2011, 25:138-146.
(26) Blackmore CC, Mecklenburg RS, Kaplan GS. At Virginia Mason, collaboration among providers, employers, and health plans to transform care cut costs and improved quality. Health Aff 2011, 30(9):1680-1687.
(27) Cohen E, Bruce-Barrett C, Kingsnorth S, Keilty K, Cooper A, Daub S. Integrated complex care model: lessons learned from inter-organizational partnership. Healthc Q 2011, 14 (Special Issue):64-70.
(28) Evans JM, Baker GR. Shared mental models of integrated care: aligning multiple stakeholder perspectives. Journal of health organization and management 2012, 26(6):713-736.
(29) Fann JR, Ell K, Sharpe M. Integrating psychosocial care into cancer services. Journal of Clinical Oncology 2012, 30(11):1178-1186.
(30) Minkman M, Ahaus K, Fabbricotti I, Nabitz U, Huijsman R. A quality management model for integrated care: results of a Delphi and Concept Mapping study. International Journal for Quality in Health Care 2009, 21(1):66-75.
(31) Minkman MM, Ahaus KT, Huijsman R. A four phase development model for integrated care services in the Netherlands. BMC Health Services Research 2009, 9(1):42.
(32) Minkman MM, Vermeulen RP, Ahaus KT, Huijsman R. The implementation of integrated care: the empirical validation of the Development Model for Integrated Care. BMC health services research 2011, 11(1):177.
(33) Reilly S, Challis D, Burns A, Hughes J. Does integration really make a difference? A comparison of old age psychiatry services in England and Northern Ireland. Int J Geriatr Psychiatry 2003, 18(10):887-893.
(34) Strandberg-Larsen M, Schiøtz ML, Silver JD, Frølich A, Andersen JS, Graetz I, Reed M, Bellows J, Krasnik A, Rundall T. Is the Kaiser Permanente model superior in terms of clinical integration?: a comparative study of Kaiser Permanente, Northern California and the Danish healthcare system. BMC Health Services Research 2010, 10(1):91.
(35) Ueoka A. A systematic approach to combat healthcare improvement: task force 62 medical brigade combat healthcare support system mode. U.S. Army Medical Department Journal 2008, :19-24.
(36) Visschedijk J, Engelhard A, Lever P, Grossi, Maria Aparecida de Faria, Feenstra P. Leprosy control strategies and the integration of health services: an international perspective. Cadernos de saude publica 2003, 19(6):1567-1581.

(37) Zou G, Wei X, Walley JD, Yin J, Sun Q. Factors influencing integration of TB services in general hospitals in two regions of China: a qualitative study. BMC Health Services Research 2012, 12(1):21.
(38) Antoncic B, Prodan I. Alliances, corporate technological entrepreneurship and firm performance: Testing a model on manufacturing firms. Technovation 2008, 28(5):257-265.
(39) Axelsson R, Axelsson SB. Integration and collaboration in public health—a conceptual framework. Int J Health Plann Manage 2006, 21(1):75-88.
(40) Bai Y, Wells R, Hillemeier MM. Coordination between child welfare agencies and mental health service providers, children's service use, and outcomes. Child Abuse Negl 2009, 33(6):372-381.
(41) Castelnovo W. Organizing E-Government for Small Local Government Organizations. In E-government; ICT professionalism. (Edited by Mazzeo A, Bellini R, Motta G. Boston: Springer; 2008:1-10.
(42) Chan FT, Yee-Loong Chong A, Zhou L. An empirical investigation of factors affecting e-collaboration diffusion in SMEs. Int J Prod Econ 2012, 138(2).
(43) Clarke A, Fuller M. Collaborative strategic management: strategy formulation and implementation by multi-organizational cross-sector social partnerships. J Bus Ethics 2010, 94(1):85-101.
(44) Dunlop JM, Holosko MJ. The Story Behind the Story of Collaborative Networks–Relationships Do Matter! J Health Soc Policy 2005, 19(3):1-18.
(45) Garriga E. Cooperation in Stakeholder Networks: Firms''Tertius Iungens' Role. J Bus Ethics 2009, 90(4):623-637.
(46) Handfield R, Petersen K, Cousins P, Lawson B. An organizational entrepreneurship model of supply management integration and performance outcomes. International Journal of Operations & Production Management 2009, 29(2):100-126.
(47) Hirsch B, Meyer M. Integrating soft factors into the assessment of cooperative relationships between firms: Accounting for reputation and ethical values. Business Ethics: A European Review 2010, 19(1):81-94.
(48) Huerta TR, Casebeer A, Vanderplaat M. Using networks to enhance health services delivery: perspectives, paradoxes and propositions. Healthc Pap 2006, 7(2):10-26.
(49) Kowalska K. Managed care and a process of integration in health care sector: A case study from Poland. Health Policy 2007, 84(2):308-320.
(50) McGill JP, Santoro MD. Managing value and vulerability in complex collaborations: Allying with competitors. Advances in Interdisciplinary Studies of Work Teams 2004, 10:263-286.
(51) Minott J, Helms D, Luft H, Guterman S, Weil H. The group employed model as a foundation for health care delivery reform. Issue brief (Commonwealth Fund) 2010, 83:1-24.
(52) Ngai EW, Jin C, Liang T. A qualitative study of inter-organizational knowledge management in complex products and systems development. R&d Management 2008, 38(4):421-440.
(53) Ngai EW, Chau DC, Chan T. Information technology, operational, and management competencies for supply chain agility: Findings from case studies. The Journal of Strategic Information Systems 2011, 20(3):232-249.

(54) Olson CA, Balmer JT, Mejicano GC. Factors contributing to successful interorganizational collaboration: The case of CS2day. J Contin Educ Health Prof 2011, 31(S1):S3-S12.
(55) Paier M, Scherngell T. Determinants of collaboration in European R&D networks: empirical evidence from a discrete choice model. Industry and Innovation 2011, 18(1):89-104.
(56) Pettersen IB, Rokkan AI. Buyer tolerance of conflict in cross-national business relationships: an empirical study. Advances in International Marketing 2006, 16:213-243.
(57) Rocha H, Miles R. A model of collaborative entrepreneurship for a more humanistic management. J Bus Ethics 2009, 88(3):445-462.
(58) Sanders NR. An empirical study of the impact of e-business technologies on organizational collaboration and performance. J Oper Manage 2007, 25(6):1332-1347.
(59) Speir AM, Rich JB, Crosby I, Fonner Jr E. Regional collaboration as a model for fostering accountability and transforming health care. Seminars in thoracic and cardiovascular surgery 2009, 21(1):12-19.
(60) Vaccaro A, Parente R, Veloso FM. Knowledge management tools, inter-organizational relationships, innovation and firm performance. Technological Forecasting and Social Change 2010, 77(7):1076-1089.
(61) Wells R, Weiner BJ. Adapting a dynamic model of interorganizational cooperation to the health care sector. Medical Care Research and Review 2007, 64(5):518-543.
(62) Squire B, Cousins PD, Brown S. Cooperation and Knowledge Transfer within Buyer–Supplier Relationships: The Moderating Properties of Trust, Relationship Duration and Supplier Performance. Br J Manage 2009, 20(4):461-477.
(63) Choi S, Ko I. Leveraging electronic collaboration to promote interorganizational learning. Int J Inf Manage 2012, 32(6).
(64) Huotari R. Development of Collaboration in Multiproblem Cases Some Possibilities and Challenges. Journal of Social Work 2008, 8(1):83-98.
(65) Huxham C, Hibbert P. Manifested Attitudes: Intricacies of Inter-Partner Learning in Collaboration. Journal of Management Studies 2008, 45(3):502-529.
(66) Jarvenpaa SL, Majchrzak A. Knowledge collaboration among professionals protecting national security: Role of transactive memories in ego-centered knowledge networks. Organization Science 2008, 19(2):260-276.
(67) Knoben J, Oerlemans LA. Configurations of inter-organizational knowledge links: Does spatial embeddedness still matter? Reg Stud 2012, 46(8):1005-1021.
(68) Nolan K, Schall MW, Erb F, Nolan T. Using a framework for spread: the case of patient access in the Veterans Health Administration. Joint Commission Journal on Quality and Patient Safety 2005, 31(6):339-347.
(69) Schulz K, Geithner S. Between exchange and development: organizational learning in schools through inter-organizational networks. Learning Organization, The 2010, 17(1):69-85.
(70) Fryers M, Young L, Rowland P. Creating and sustaining a collaborative model of care. Healthcare Management Forum 2012, 25(1):20-25.
(71) Gagliardi AR, Dobrow MJ, Wright FC. How can we improve cancer care? A review of interprofessional collaboration models and their use in clinical management. Surg Oncol 2011, 20(3):146-154.

(72) Hastie C, Fahy K. Inter-professional collaboration in delivery suite: A qualitative study. Women and Birth 2011, 24(2):72-79.
(73) Hudson B. Pessimism and optimism in inter-professional working: The Sedgefield Integrated Team. Journal of Interprofessional Care 2007, 21(1):3-15.
(74) Leech R, van Wyk N, Uys C. The management of infant developmental needs by community nurses-Part 1: Description of the responsibilities of community nurses with regard to the management of infant developmental needs. Curationis 2007, 30(2):91-103.
(75) Légaré F, Stacey D, Gagnon S, Dunn S, Pluye P, Frosch D, Kryworuchko J, Elwyn G, Gagnon M, Graham ID. Validating a conceptual model for an inter-professional approach to shared decision making: a mixed methods study. J Eval Clin Pract 2011, 17(4):554-564.
(76) Lough ME, Klevay AM. Collaborative partnerships between critical care and psychiatry. Crit Care Nurs Clin North Am 2012, 24(1):81-90.
(77) Sicotte C, D'Amour D, Moreault M. Interdisciplinary collaboration within Quebec community health care centres. Soc Sci Med 2002, 55(6):991-1003.
(78) Stock RD, Reece D, Cesario L. Developing a comprehensive interdisciplinary senior healthcare practice. J Am Geriatr Soc 2004, 52(12):2128-2133.
(79) Evans MM, Alleyne J. The concept of knowledge in KM: A knowledge domain process model applied to inter-professional care. Knowledge and Process Management 2009, 16(4):147-161.
(80) Morgan S, Smedts A, Campbell N, Sager R, Lowe M, Strasser S, Sager, Simon Morgan Anna Smedts Richard, Lowe M. From the bush to the big smoke—development of a hybrid urban community based medical education program in the Northern Territory, Australia. Rural Remote Health 2009, 9:1175.
(81) Olckers L, Gibbs TJ, Duncan M. Developing health science students into integrated health professionals: a practical tool for learning. BMC medical education 2007, 7(1):45.
(82) Robinson M, Anning A, Frost N. 'When is a teacher not a teacher?': knowledge creation and the professional identity of teachers within multi-agency teams. Studies in Continuing Education 2005, 27(2):175-191.
(83) Barceló A, Cafiero E, de Boer M, Mesa AE, Lopez MG, Jiménez RA, Esqueda AL, Martinez JA, Holguin EM, Meiners M. Using collaborative learning to improve diabetes care and outcomes: The VIDA project. Primary Care Diabetes 2010, 4(3):145-153.
(84) Pinto A, Benn J, Burnett S, Parand A, Vincent C. Predictors of the perceived impact of a patient safety collaborative: an exploratory study. International Journal for Quality in Health Care 2011, 23(2):173-181.
(85) Pomietto M, Docter AD, Van Borkulo N, Alfonsi L, Krieger J, Liu LL. Small steps to health: building sustainable partnerships in pediatric obesity care. Pediatrics 2009, 123(Supplement 5):308-316.
(86) D'Amour D, Goulet L, Labadie J, Martín-Rodriguez LS, Pineault R. A model and typology of collaboration between professionals in healthcare organizations. BMC Health Services Research 2008, 8(1):188.
(87) Balmer JT, Bellande BJ, Addleton RL, Havens CS. The relevance of the alliance for CME competencies for planning, organizing, and sustaining an interorganizational educational collaborative. J Contin Educ Health Prof 2011, 31(S1):S67-S75.
(88) Kümpers S, Mur I, Hardy B, Maarse H, Raak Av. The importance of knowledge transfer

between specialist and generic services in improving health care: a cross-national study of dementia care in England and The Netherlands. Int J Health Plann Manage 2006, 21(2):151-167.

(89) Briner M, Kessler O, Pfeiffer Y, Wehner T, Manser T. Assessing hospitals' clinical risk management: Development of a monitoring instrument. BMC health services research 2010, 10(1):337.

(90) Epping-Jordan J, Pruitt S, Bengoa R, Wagner E. Improving the quality of health care for chronic conditions. Quality and Safety in Health Care 2004, 13(4):299-305.

(91) Faulkner J, Laschinger H. The effects of structural and psychological empowerment on perceived respect in acute care nurses. J Nurs Manag 2008, 16(2):214-221.

(92) Gowen III CR, Henagan SC, McFadden KL. Knowledge management as a mediator for the efficacy of transformational leadership and quality management initiatives in US health care. Health Care Manage Rev 2009, 34(2):129-140.

(93) Phillips CB, Pearce CM, Hall S, Travaglia J, de Lusignan S, Love T, Kljakovic M. Can clinical governance deliver quality improvement in Australian general practice and primary care? A systematic review of the evidence. Med J Aust 2010, 193(10):602-607.

(94) Thompson DN, Wolf GA, Spear SJ. Driving improvement in patient care: lessons from Toyota. J Nurs Adm 2003, 33(11):585-595.

(95) Ahgren B. The Art of Integrating Care: Theories Revisited. The Open Public Health Journal 2012, 5:36-39.

(96) Minkman M, Ahaus K, Fabbricotti I, Nabitz U, Huijsman R. A quality management model for integrated care: results of a Delphi and Concept Mapping study. International Journal for Quality in Health Care 2009, 21(1):66-75.

(97) Ahgren B, Axelsson R. Evaluating integrated health care: a model for measurement. Int J Integr Care 2005, 5:e01.

(98) Bazzoli GJ, Shortell SM, Dubbs N, Chan C, Kralovec P. A taxonomy of health networks and systems: bringing order out of chaos. Health Serv Res 1999, 33(6):1683.

(99) Browne G, Roberts J, Gafni A, Byrne C, Kertyzia J, Loney P. Conceptualizing and validating the human services integration measure. Int J Integr Care 2004, 4:e03.

(100) Shortell SM, Gillies RR, Anderson DA. The new world of managed care: creating organized delivery systems. Health Aff 1994, 13(5):46-64.

(101) Armitage GD, Suter E, Oelke ND, Adair CE. Health systems integration: state of the evidence. Int J Integr Care 2009, 9:e82.

(102) Suter E, Oelke ND, Adair CE, Armitage GD. Ten key principles for successful health systems integration. Healthcare Quarterly 2009, 13 (Special Issue):16-23.

(103) Shaw S, Rosen R, Rumbold B. What is integrated care? An overview of integrated care in the NHS. London: The Nuffield Trust; 2011.

(104) Lorig KR, Holman HR. Self-management education: history, definition, outcomes, and mechanisms. Annals of Behavioral Medicine 2003, 26(1):1-7.

(105) Barlow J, Wright C, Sheasby J, Turner A, Hainsworth J. Self-management approaches for people with chronic conditions: a review. Patient Educ Couns 2002, 48(2):177-187.

(106) Nolte E, McKee M. Integration and chronic care: a review. In Caring for people with chronic conditions: A health system perspective. Edited by Nolte E, McKee M. Maidenhead: Open University Press; 2008:64-91.

(107) Mays N, Pope C, Popay J. Systematically reviewing qualitative and quantitative evidence

to inform management and policy-making in the health field. J Health Serv Res Policy 2005, 10(suppl 1):6-20.

(108) Campbell SM, Hann M, Roland MO, Quayle JA, Shekelle PG. The effect of panel membership and feedback on ratings in a two-round Delphi survey: results of a randomized controlled trial. Med Care 1999, 37(9):964-968.

(109) Fulop N, Mowlem A, Edwards N. Building integrated care: lessons from the UK and elsewhere. London: The NHS Confederation; 2005.

(110) Contandriopoulos AP, Denis JL, Touati N, Rodriguez C. The integration of health care: dimensions and implementation. Working Paper N04-01. Canada: University of Montreal: Groupe de Recherche Interdisciplinaire en sante (GRIS); 2003.

(111) Delnoij D, Klazinga N, Glasgow IK. Integrated care in an international perspective. Int J Integr Care 2001, 2:e04.

(112) Greenhalgh T, Robert G, Macfarlane F, Bate P, Kyriakidou O. Diffusion of innovations in service organizations: systematic review and recommendations. Milbank Q 2004, 82(4):581-629.

(113) Miller WL, McDaniel RR, Crabtree BF, Stange KC. Practice jazz: understanding variation in family practices using complexity science. J Fam Pract 2001, 50(10):872-880.

(114) Miller WL, Crabtree BF, McDaniel R, Stange KC. Understanding change in primary care practice using complexity theory. J Fam Pract 1998, 46(5):369-376.

(115) Begun JW, Zimmerman B, Dooley K. Health care organizations as complex adaptive systems. In Advances in health care organization theory. Edited by Mick SS, Wyttenback ME. San Francisco: Jossey-Bass; 2003:253-288.

CHAPTER 7

TYPOLOGY OF BIRTH CENTRES IN THE NETHERLANDS USING THE RAINBOW MODEL OF INTEGRATED CARE

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Abstract

Background

The goal of integrated care is to offer a continuum of care that crosses the boundaries of public health, primary, secondary, and tertiary care. Integrated care is increasingly promoted for people with complex needs and has also recently been promoted in maternity care systems to improve the quality of care. Especially when located near an obstetric unit, birth centres are considered to be ideal settings for the realization of integrated care. At present, however, we know very little about the degree of integration in these centres and we do not know if increased levels of integration improve the quality of the care delivered. The Dutch Birth Centre Study is designed to evaluate birth centres and their contribution to the Dutch maternity care system. The aim of this particular sub-study is to classify birth centres in clusters with similar characteristics based on integration profiles, to support the evaluation of birth centre care.

Methods

This study is based on the Rainbow Model of Integrated Care. We used a survey followed by qualitative interviews in 23 birth centres in the Netherlands to determine which integration profiles can be distinguished and to describe their discriminating characteristics. Cluster analysis was used to classify the birth centres.

Results

Birth centres were classified into three clusters: 1)“Mono-disciplinary-oriented birth centres” (n=10): which are mainly owned by primary care organizations and established as physical facilities to provide an alternative birthplace for low risk births; 2) “Multi-disciplinary-oriented birth centres” (n=6): which are mainly multi-disciplinary oriented and can be regarded as facilities to give birth, with a focus on integrated birth care; 3) “Mixed Cluster of birth centres” (n=7): which have a range of organizational forms that differentiate them from centres in the other clusters.

Conclusion

We identified a recognizable classification, with similar characteristics between birth centres in the clusters. The results of this study can be used to relate integration profiles of birth centres to quality of care, costs, and perinatal outcomes. This assessment makes it possible to develop recommendations with regard to the type and degree of integration of Dutch birth centres in the future.

Background

The essence of integrated care is a continuum of care for service users, crossing the boundaries of public health, primary, secondary, and tertiary care (1-3). Integrated care is increasingly promoted for people with complex needs (e.g. multiple chronic diseases) and has more recently been recommended for maternity care systems (3). Delivering integrated (birth) care demands both inter-professional and inter-organizational collaboration and therefore requires development of new clinical practices (4). Birth centres, especially when they are located near an obstetric unit, are considered to be ideal settings for integrated care (5) and are a relatively new phenomenon in the Dutch maternity care system. Founded on the notion that pregnancy, birth and puerperium are primarily physiological processes, this system traditionally includes primary as well as secondary (and tertiary) health care. Most pregnant women are healthy ('low risk') and therefore start antenatal care with a community midwife (6). Women with uncomplicated pregnancies can choose where they want to give birth, either at home, in a hospital or in a birth centre. Birth centres are settings where women with uncomplicated pregnancies can give birth in a homelike environment. When complications arise or threaten the birth or pharmacological pain relief is requested, referral to an obstetric unit in a hospital is necessary (7-9). Birth centres in the Netherlands can be located according to their position in relationship to an obstetric ward, that is, either freestanding, alongside or on-site (8). For freestanding birth centres, in the case that a woman or baby is referred for obstetric or paediatric assistance, transfer is necessary by car or ambulance. For alongside birth centres, transfers are made via bed or wheelchair. In on-site birth centres, transport in case of referral is not necessary as the secondary caregiver (obstetrician or paediatrician) can enter the birthing room.

In the course of the last decade, several birth centres were established for various reasons (e.g. as result of centralization of hospitals or due to a changing trend in women's choices for planned place-of-birth), resulting in a substantial rise of births taking place in hospital maternity wards (6). Furthermore, in 2009 a ministerial steering committee published a report suggesting ways for Dutch maternity caregivers to improve the quality of care (5). The committee was created following the publication of data from Euro-Peristat showing a relatively high perinatal mortality in the Netherlands as compared to other European countries (10). Although there were questions about the comparability of data from disparate countries, the data caused concern and led some to conclude that the poor outcomes might be related to the division between primary and secondary care in the Dutch system (11-13). In their report to the Minister of Health, the committee recommended – among other things – an investigation of the use of birth centres to improve perinatal outcomes, based on an assumption that birth centres might provide higher quality care because they offer a better opportunity for more integrated care. At the time the committee made this recommendation, there was no evidence for

that assumption. There were no studies of the nature and degree of integration of birth centres in the Netherlands and there were no data on the effects of integration on quality of care.

The Dutch Birth Centre Study was designed to evaluate the performance of birth centres and their possible added value to the quality of the Dutch maternity care (6). Because the number of births in most birth centres is very small and the number varies greatly between centres, we decided a necessary first step in the study was to find a reliable way to classify the centres based on common characteristics (14-16). Besides location, we considered that this classification should be based on characteristics of integration of care given the assumption that birth centres offer an opportunity for more integrated care. Therefore, the aim of this study was to classify birth centres in clusters based on integration characteristics.

Methods

Study design

In this study, we used a combination of surveys and qualitative interviews. The data generated by the interviews were used to validate the information from the questionnaires. The study was conducted from January 2014 until August 2015 as part of the Dutch Birth Centre Study (6).

Theoretical background

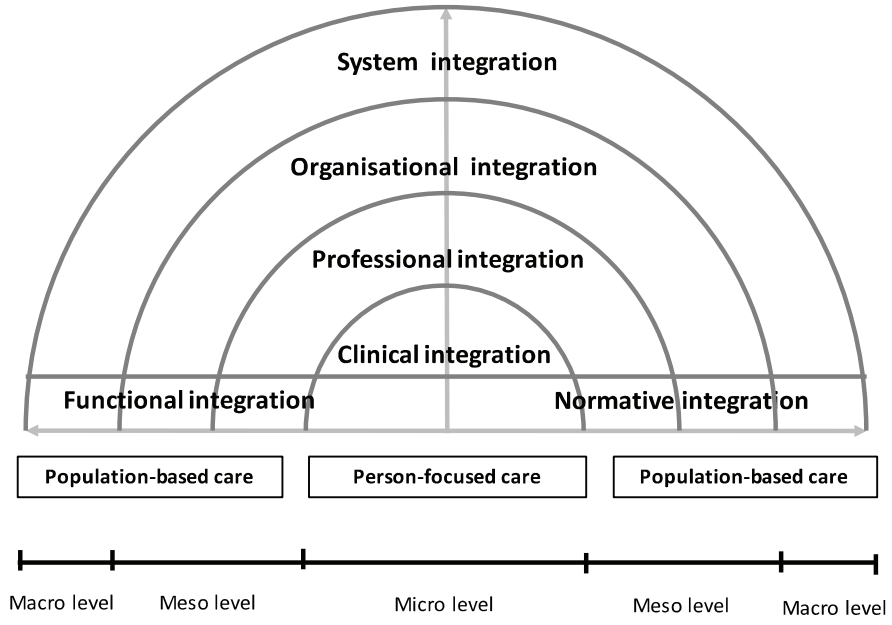
In this study, we used the concept of integrated care to construct a typology of birth centres. We based our work on a conceptual framework developed by Valentijn et al (17). Their "Rainbow Model of Integrated care" (Figure 1) combines the functions of primary care with dimensions of integrated care. The model distinguishes four dimensions that play inter-connected roles on the micro- (clinical integration), meso- (professional and organizational integration) and macro-level (system integration) of a health care system. The model also includes two dimensions that enable the connectivity between the various integration levels (functional and normative integration). The model is specified in a taxonomy consisting of 59 integration determinants, based on literature study and a Delphi study among Dutch experts (3). In the present study, we used this taxonomy to construct a typology of birth centres in the Netherlands.

Development of the birth centre integration questionnaire

Because a validated questionnaire to examine integrated care in birth centres was lacking, we constructed a questionnaire based on a survey that was used to examine integrated care in primary care organizations (18). For each dimension of integration, we identified four integration determinants. The inclusion procedure for the determinants was based on the highest median score from a panel assembled for a Delphi study (3) and its applicability in birth (centre) care. For each determinant, we formulated a

multiple-choice question. The answer categories correspond with stages of integration and range from one (not integrated) to four (fully integrated) forming a nominal scale, with equal weighting between the answer categories (17). Statements corresponding to each stage were derived from the primary care questionnaire and birth centre practice (18). The questionnaire was pilot tested by three community midwives familiar with birth centre care. Some questions/statements were adapted based on their comments. Due to the short duration of our study and the limited number of birth centres, we could not test the questionnaire for validity and reliability. In order to compensate for this, we used qualitative interviews to validate the collected information (19,20) and sequential data collection. In the first phase, quantitative data were collected and described. In the second phase, semi-structured interviews were used to refine the quantitative results obtained in the first phase. Table 1 shows the dimensions of integration and their integration determinants.

Figure 1. Rainbowmodel of Integrated Care



Data collection procedure

The Dutch Birth Centre Study started with the identification of birth locations regarded as birth centres and the development of a definition for birth centres in the Netherlands (6,21). Subsequently, managers of the identified birth locations (nationally, 46 in total) were invited to complete the "Dutch Birth Centre questionnaire". Based on the definition for birth centres, 23 birth centres were identified at the reference date (September 2013). These centres were included in our study and invited to participate. All the managers gave their permission to visit and conduct interviews at their birth centres. We asked managers of birth centres to select two or three care providers, familiar

Rainbow model of integrated care

Clinical integration refers to the coherence in the primary process of care delivery to individuals. It requires a person-focused perspective and includes the aspect of the clients as a co-creators in the care process and shared responsibility between professional and client. Professional integration refers to partnerships between professionals both within and between organisations. These partnerships can be characterised as forms of horizontal and/or vertical integration. To deliver a comprehensive continuum of care, professionals have to share accountability, problem solving and decision-making. As a consequence of this process the professional autonomy is affected and the traditional hierarchy and defined roles become diffused. Organisational integration refers to the extent that services are delivered in a linked-up way. It is necessary to deliver population-based care because of the collective responsibility for the health and wellbeing of a population. Population-based care can be achieved through hierarchical governance structures, network-like governance mechanisms or through marked based governance structures between organisations. In the field of primary care, organisational integration is often realised in a network construction. These complex network arrangements require effective mechanisms of governance and accountability. System integration refers to integration of a health system to realise a holistic approach. It requires a tailor-made combination of structures and processes to fit the needs of people across the continuum of care. Both horizontal and vertical integration are needed to counteract the fragmentation and should be incorporated to provide coordinated care across the entire care continuum. Functional integration supports clinical, professional, organisational and system integration and includes coordination of key support functions as human resources, strategic planning, information management, financial management and quality improvement. Functional integration is the linking of information, management and financial systems around the primary process of service delivery. Normative integration also achieves connectivity. It can provide a common frame of reference, necessary for providing a continuum of care when various actors are in involved (3)

with the organization of the centre, from different professions working within or with the birth centre to be interviewed. Community midwives and, depending on the local situation, maternity care assistants, clinical midwives, obstetric nurse specialists and gynaecologists were invited to be interviewed. Our aim was to form a multi-disciplinary view of the organization and collaboration in and with birth centres. The first author (IB) contacted all participants to explain the study. Quantitative and qualitative data

were collected sequentially (20). Two weeks before the visits and interviews, the "Birth Centre Integration questionnaire" was sent by e-mail to the manager and the selected professionals of each birth centre. One week later a reminder was sent to the non-responders. Based on the responses to the "Birth Centres Integration questionnaires" and the "Dutch Birth Centre questionnaire," a specific topic list for each individual birth centre was made before each visit in order to structure the interviews. The aim of the interviews was to obtain an additional qualitative view of the degree and nature of integration in the birth centres, and to validate the collected data from the questionnaires. The first author (IB) visited the birth centres and interviewed all respondents.

With participants' informed consent, all interviews were audiotaped and transcribed verbatim. These transcriptions were collected per birth centre and coded deductively based on the determinants per dimension of integration (22). As a member check to validate the qualitatively generated data, a summary was written for each birth centre, containing the most important findings from the visits and interviews and characterizing the birth centre on aspects of integration (23,24). All respondents reviewed and agreed with these summaries. Because of the multi-disciplinary characteristic of integrated care (15) the research group decided to interpret the answers with the same specific perspectives in mind, namely the context of integration between primary and secondary care and the integration at the birth centre level. Using these perspectives, together with the transcriptions of the interviews and findings from the visits, the first author (IB) completed an integration questionnaire for each birth centre.

Data analysis

The analysis presented here is based on the quantitative data from the questionnaires. There are two stages in our analysis: 1) calculating the mean score on integration determinants and dimensions for each birth centre, 2) classifying the birth centres based on these mean scores.

Calculating integration scores per birth centre

The questionnaire consists of six dimensions of integration, each divided into four determinants. First, we calculated the mean scores of all respondents per dimension for each birth centre (range 1-4). Then we calculated the mean scores of all respondents, including the first author (IB) for the birth centres on the six dimensions of integration (range 1-4). We also computed a total integration score per birth centre by calculating the mean score of the six dimensions combined (range 1-4).

Cluster analysis

A four-step procedure was followed to classify the birth centres into different clusters (18). We conducted a cluster analysis using the mean scores on the six dimensions

of integration. First, the appropriate number of clusters was decided by hierarchical cluster analysis using Ward's method and the Euclidian Distance. Second, a non-hierarchical analysis (K-means method) was performed to validate and adjust the results of the hierarchical procedures. We also performed this analysis using the initial cluster centroids from Ward's method as seed points (15). Third, the stability of the cluster assignment between the hierarchical and non-hierarchical method was assessed using Cohen's coefficient of agreement (25). A between-subgroup post-hoc test, using a one-way analysis of variance (ANOVA), was used to examine the differences between the clusters on the integration determinants. Fourth, we used the cluster means for each of the six dimensions of integration and the total integration score to provide a meaningful interpretation of the clusters (26-28). Based on these cluster means, the research group of the Dutch Birth Centre Study judged the results of the clustering appropriate for a meaningful and understandable interpretation. All data analyses were performed using SPSS version 22 (IBM Statistics).

Results

Between January 2014 and April 2015, 23 birth centres were visited. During these visits, the first author interviewed 69 (managerial) representatives and professionals working within or with a birth centre (range 2-5 per birth centre). Birth centre integration questionnaires were sent to 73 managers and professionals, 61 completed the questionnaire (response rate of 84%). One birth centre was unable to participate in the interviews, because of their workload. However, one professional completed the questionnaire. A researcher (MHi) who was familiar with this birth centre because of her involvement in another part of the Dutch Birth Centre Study also filled in the questionnaire based on her knowledge of this centre.

Integration scores per birth centre

Table 2 shows the mean scores for each birth centre on the six dimensions of integration and the total integration score based on the mean scores of respondents, including the questionnaire completed by the first author.

Cluster analysis

Based on the hierarchical cluster analysis (using Ward's method) the birth centres were classified into three clusters. This classification showed a good agreement with the non-hierarchical cluster analysis ($\kappa = 0.799$, $p < .001$) and with this analysis using the initial cluster centroids from the hierarchical method as seed points ($\kappa = 0.865$, $p < .001$). Table 3 shows the mean scores on the integration determinants and dimensions of integration for the clusters. Results of the between-subgroup post-hoc comparisons identified statistically significant differences between the clusters for the perceived

Table 2 Mean scores birth centres on integration dimensions

Birth Centre	Clinical Integration	Professional Integration	Organizational Integration	Functional Integration	System Integration	Normative Integration	Total Integration
				Mean scores			
1	2.92	2.75	2.58	2.17	2.33	3.58	2.72
2	2.13	1.63	1.50	1.88	2.00	3.13	2.04
3	2.20	1.85	1.85	1.45	2.48	3.15	2.16
4	2.08	2.50	2.67	1.42	2.07	3.50	2.37
5	2.50	2.00	2.19	1.88	2.50	3.50	2.43
6	2.42	1.67	1.88	1.63	2.17	2.71	2.08
7	2.88	2.33	1.94	2.13	2.50	2.88	2.44
8	2.44	3.38	3.38	2.33	2.73	3.19	2.91
9	3.25	3.69	3.50	3.31	3.15	3.63	3.42
10	2.06	2.19	2.38	1.38	2.20	3.13	2.22
11	2.17	2.17	2.71	2.00	3.20	3.71	2.66
12	2.38	1.81	2.63	1.38	2.17	3.00	2.23
13	2.75	2.17	2.58	1.96	2.60	3.33	2.57
14	2.42	2.08	1.75	1.58	1.80	3.63	2.21
15	2.17	2.25	2.25	1.67	2.00	2.67	2.17
16	3.25	2.58	2.42	2.67	2.27	3.42	2.77
17	2.25	2.75	2.50	1.67	2.20	3.33	2.45
18	2.00	1.38	2.00	1.44	2.65	2.92	2.06
19	3.08	3.61	3.31	3.35	2.65	3.21	3.20
20	2.92	2.38	2.48	2.44	2.50	3.38	2.68
21	2.00	3.00	2.75	2.50	3.00	3.50	2.79
22	2.75	2.69	2.56	2.25	2.05	2.94	2.54
23	2.35	3.54	3.25	3.17	3.43	3.75	3.25

degree of clinical integration ($F(2,20) = 9.64$, $p = .001$), professional integration ($F(2,20) = 15.0$, $p < .001$), organizational integration ($F(2,20) = 16.5$, $p < .001$), functional integration ($F(2,20) = 25.2$, $p < .001$) and system integration ($F(2,20) = 23.5$, $p < .001$). No significant differences were found for the normative dimension ($F(2,20) = 3.37$, $p = .55$) (see Table 3).

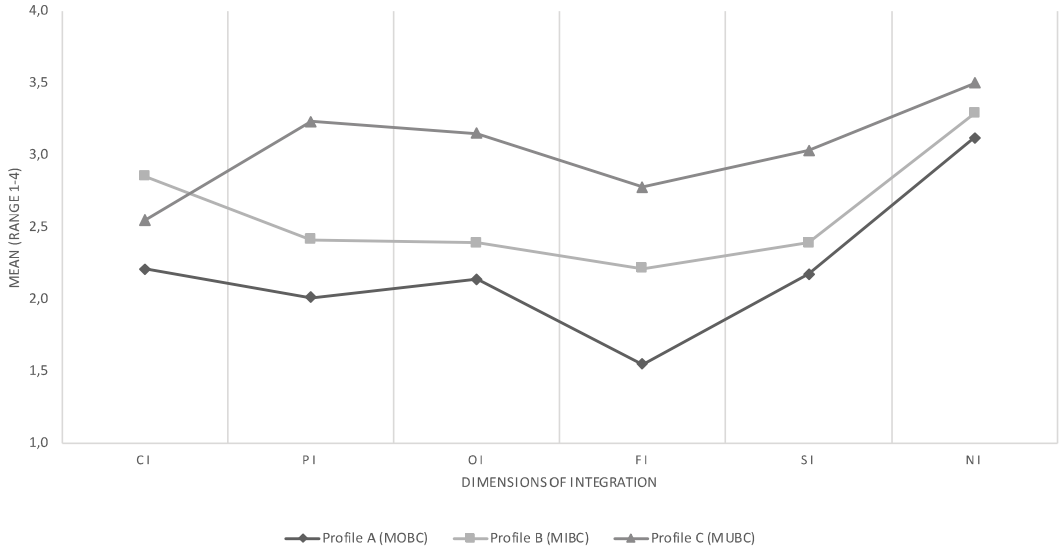
Characteristics of clusters of birth centres

We labelled the three clusters according to their average characteristics regarding their integration profiles: Mono-disciplinary-oriented birth centres (MOBC), Mixed cluster of birth centres (MIBC) and Multi-disciplinary-oriented (see Figures 2 and 3).

Profile A: Mono-disciplinary-oriented birth centres (MOBC)

This cluster includes 43.5 % of the birth centres (n = 10) and is characterized by integration scores on the six dimensions of integration lower than the average score of all birth centres combined and lower than the birth centres in the other clusters. The results of the interviews indicated that birth centres in this cluster are mainly mono-disciplinary (primary care) oriented and are more focused on being a facility to give birth than on improving collaboration between care providers or realizing care integration. They were established as physical facilities to provide an alternative birthplace for low risk births. Some of these

Figure 2. Integration profiles of clusters of birth centres.



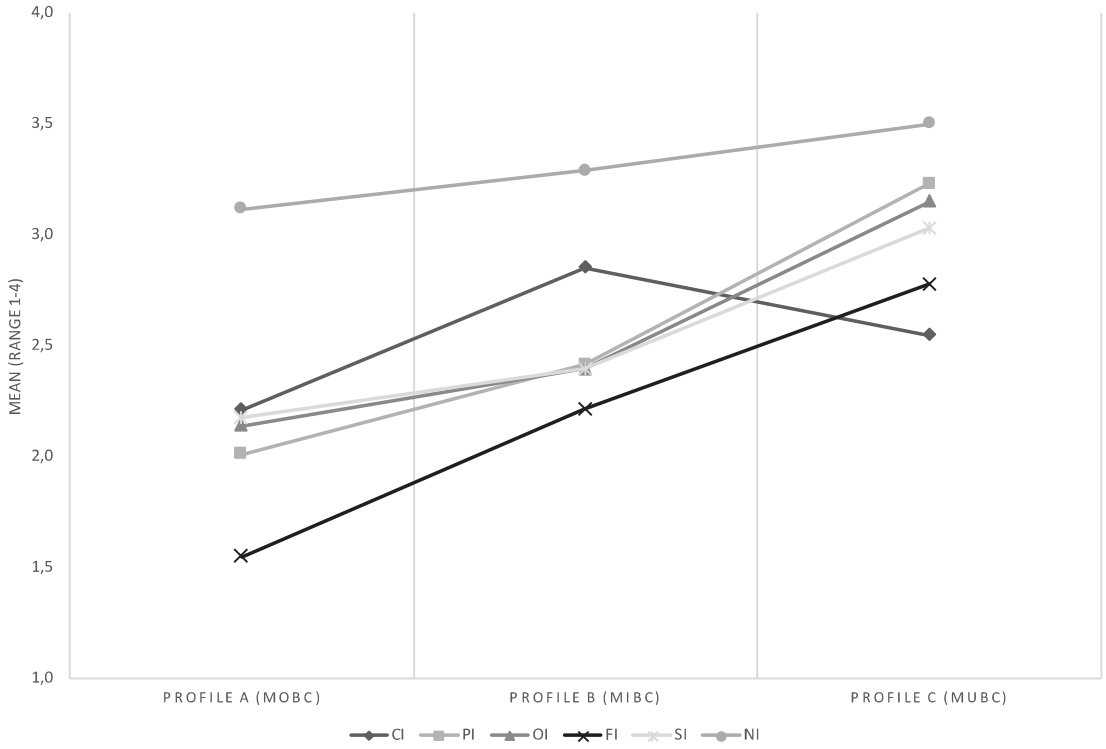
birth centres were established to reduce the pressure on hospital maternity wards, others to provide an alternative to home birth. Centres in this cluster are almost all owned by primary care organizations (community midwives or maternity care assistance organizations). They were *not* established with the intention to realize integrated care; their focus is more on practical issues. Protocols, guidelines and other agreements are not discussed in the birth centre itself, but at a different level, at local networks called "lMaternity Care Networks (24). These networks are located around hospitals.

Profile B: Mixed cluster of birth centres (MIBC)

Birth centres in this cluster make up 30.4 % (n = 7) of the centres. Compared to all birth centres, these centres are characterized by lower scores than average on the professional, organizational and system integration dimensions and relatively higher than average scores on the clinical and functional integration dimensions. Their scores on normative integration were average. Birth centres in this cluster had higher scores on all integration dimensions compared to the cluster MOBC. Compared to cluster

MUBC (described below) these centres had higher clinical integration scores and lower scores on the other dimensions. Both the results of the interviews and the questionnaire indicated that birth centres in this cluster differ more from each other in their organization than the centres in the other clusters. It is difficult to indicate an overall characteristic for the birth centres in this cluster except that they have the highest integration scores of all clusters on the clinical dimension (although the differences are not significant when compared to cluster MUBC *(p* = .082*)*). In governance structure and ownership they are more comparable to the birth centres in cluster MOBC, but on the functional dimension they are more comparable to the birth centres in cluster MUBC.

Figure 3. Mean scores dimensions of integration per cluster of birth centres.



CI: Clinical Integration, PI: Professional Integration, OI: Organizational Integration, FI: Functional Integration, SI; System Integration, NI: Normative Integration

Profile C: Multi-disciplinary-oriented birth centres (MUBC)

Birth centres in this cluster comprise 26.1 % (n = 6) of the centres and are characterized by integration scores on the six dimensions of integration that are higher than the average scores of all the birth centres. The interviews taught us that birth centres in this cluster are mainly multi-disciplinary (both primary and secondary care) oriented. These birth centres can be regarded as facilities to give birth, with a focus on integrated (birth) care. They have governance structures consisting of both primary and secondary care organizations. The disciplines involved have formulated

a joint vision on birth care and the birth centres themselves decide on agreements, protocols, and guidelines.

Discussion

This study has successfully classified birth centres into three clusters with distinctive characteristics according to their integration profiles, based on the Rainbow model of integrated care and the corresponding taxonomy. Birth centres with similar characteristics were identified in two of these clusters. The third cluster is a mixed cluster of birth centres. We observed statistically significant differences between the clusters. The integration profiles of the clusters show patterns similar to theories about development of collaborative groups (see Figure 3). Birth centres in the MUBC's show highest scores on the normative dimension, followed by professional, organizational, system, and functional integration. Lowest scores are shown for clinical integration. Integration is to a large extent based on professional behaviour and attitude. Informal coordination mechanisms based on culture, shared values, and vision are essential conditions to make steps towards integration on a professional and organizational level. Functional integration is an important enabler in this process (1,3). Patient centred care (clinical integration) is a key concept of integrated care but demands a change in focus in organizations that are traditionally more physician-centred (29).

Our classification system serves to highlight developments in birth care in the Netherlands. As a result of the public and political debate after the publication of the Euro-Peristat studies(10), the Dutch government promoted integration of primary and secondary care as a way to improve perinatal outcomes. In most regions, this collaboration had already existed for many years in in the form of Maternity Care Networks but the intensity of the collaboration varied across regions. For birth centres established in regions with a high intensity of collaboration, it seems to be a logical step to arrange more multidisciplinary-orientated centres. Professionals working in these regions seem to be more likely to abandon former structures and to adopt new governing structures (such as shared ownership). These birth centres are found in the MUBC cluster. They are all multi-disciplinary oriented and consider birth centres to be a way to arrange integrated care.

In regions where collaboration between primary and secondary care is less intense, the change towards delivering more integrated care seems to be more difficult. In these regions the distance between primary and secondary care is larger, often based on visionary differences on birth care. Birth centres established in these regions, mostly opt for separate governance structures. These centres focus more on being a comfortable facility to give birth than on improving collaboration between care providers. Some of these centres were established as a result of the centralization of hospitals, offering an alternative to home birth in regions where maternity units in hospitals are too far away. Others were established in competition with neighbouring hospitals, offering a more home-like environment than the

current maternity wards, or as a result of too much pressure on hospital maternity wards because of the shift from home to hospital birth (6). These birth centres are found in the MOBC cluster. Some birth centres in this cluster are located in regions with good collaboration in Maternity Care Networks, according to the professionals we interviewed. However, they explicitly choose to establish their birth centre separate from clinical care facilities for several reasons, including a desire to keep a separation between physiological and obstetric care and to prevent the demands of clinical care providers from influencing their professional work. Their organization is more fragmented, as shown in the differences on the professional, organizational, system and functional integration dimensions. However, some professionals working within or with birth centres in this cluster stated that the establishment of their birth centre worked to accelerate improved collaboration in their Maternity Care Networks.

Birth centres in the MIBC cluster appear to be in the middle of this process: they are either on their way to more integrated care, but still in separate organizations, or disengaging from a collaboration that may have been too close. Most of the centres in this cluster have existed for a relatively long time (over five years) and in our interviews professionals working in or with these centres pointed out that collaboration in their region worked well. However, they have chosen to organize their birth centre apart from secondary care. In addition, they are focussed on achieving integration in the clinical dimension, which is probably closest to their own professional work.

Our classification of birth centres is comparable with observations in other integrated care organizations. Shortell et al. developed a taxonomy of Accountable Care Organizations in the USA, based on eight attributes of these organizations such as size, scope of services offered, and the use of performance accountability mechanisms (14). They identified three clusters: 1) smaller physician-led practices, which are centred in primary care with a relatively high degree of physician performance management; 2) larger integrated systems, which offer a broad scope of services; 3) hybrid Accountable Care Organizations: moderately sized, joint hospital-physician and coalition-led groups, that offer a moderately broad scope of services. If we overlay our findings on theirs, our MOBCs are like their physician-led practices, MUBCs match up with the integrated system group, and our MIBCs are similar to their hybrid Accountable Care group. Afrite and Mousquès developed a typology of multidisciplinary group practices, health care networks and health care centres in France (16). They identified five clusters: 1) associative health care centres: relatively old, with frequent multi-professional cooperation and coordination; 2) older municipal health care centres: with a range of non-physicians roles and functions that are more developed than in associative health care centres; 3) recently established but less well integrated health care networks; 4) fairly recent and poorly integrated multidisciplinary group practices; 5) relatively recent and better integrated multidisciplinary group practices. Interpreting their clusters, our MOBC and MUBC belong in their classification of multidisciplinary group practices, health care network and health care centres. The authors also identified different stages of integrated care in the

multidisciplinary group practices and a group with more managerial government structures in the health care centres. Valentijn et al. developed a typology of Integrated Care Projects in the Netherlands, based on perceived degree of integration of stakeholders at the professional, organizational and system levels (15)]. They identified three clusters in those projects: 1) United Integration Perspectives: characterized by above average integration scores on the three dimensions; 2) Disunited Integration Perspectives: characterized by average scores on system and professional integration and relatively low organizational integration scores; 3) Professional-orientated Integration Perspectives: characterized by low system - average organization - and high professional integration scores. Here too, our classification of birth centres overlaps with their classification: the United Integration Perspective group seems to be comparable with our MUBC cluster, the Disunited Integration Perspectives group with our MOBC cluster and the Professional-orientated Integration Perspectives group with our MIBC cluster. However, we also see some differences in these classifications. Our MUBC and MIBC clusters seem to score more evenly over the different dimensions. Valentijn et al. also compared these groups to effectiveness over time and perceived degree of integration (i.e. rated success). Both the Professional-orientated Integration Perspectives and United Integration Perspective groups showed an increase in collaboration processes over time and Disunited Integration Perspectives Integrated Care Projects were characterized by a decrease in collaboration processes over time. They concluded that effectiveness of Integrated Care Projects is improved when all stakeholders (professionals, managers and policymakers) perceive a high degree of integration. This implies that it is possible that MUBCs and MOBCs could be more effective than MIBCs. In the Dutch Birth Centre Study, we did not assess birth centres on their effectiveness over time. We recommend exploring this in a follow up study. Future studies should focus in more detail on how integration in birth (centre) care influences the effectiveness of collaboration processes.

Strengths and weaknesses of this study

This study, part of the Dutch Birth Centre Study, is the first study to classify birth centres based on integration profiles. All birth centres in the Netherlands participated in this study which gives a unique overview of the level of integration in birth centres. For our study, we used a self-constructed questionnaire because a validated was lacking. Using a non-validated questionnaire introduced some problems in the reliability of the results of our study. To minimize these problems, we developed a study design that used a standardised questionnaire combined with personal interviews. All interviews were conducted by the same researcher, who afterwards also completed the questionnaire. In this way, quantitative data derived from a non-validated questionnaire were complemented with qualitative data, increasing reliability. Another possible limitation of this study is the potential bias in the selection and number of respondents per birth centre. We asked managers of birth centres to select two or three care providers from different professions working within or with the birth

centre to fill in the questionnaire and to be interviewed, which could result in selection bias. To counter this, the researcher also filled in the questionnaire complementing quantitative data with qualitative data.

Implications for practice and further research

Our study shows that the birth centre integration questionnaire can differentiate between birth centres based on integration variables. Except on the normative dimension, we identified statistically significant differences between clusters of birth centres on all dimensions. However, the questionnaire needs validation. It is possible that respondents gave socially desirable answers to some integration determinants in the normative dimension (e.g. trust and reliable behaviour). In other dimensions the hierarchy of the answers to some of the questions is questionable. The results of this study and another study (assessing Maternity Care Networks) will be used to validate the questionnaire, resulting in a validated instrument for future research in birth care. Based on this validation, the instrument can be used to assess integration aspects in other organizational forms in birth care, both national and international. With this assessment, recommendations for the organization of birth care in the future can be made. It will enable policy makers, health care financiers, professionals and users of maternity care to make an informed choice about the effectiveness of different ways of organizing care at birth.

Conclusion

Based on the "birth centre integration questionnaire", birth centres in the Netherlands can be classified in three clusters according to different integration profiles. Although based on a non-validated questionnaire, which has its limitations, results of this study will allow future assessments of the relationship between integration profile and quality, costs, experiences of clients and professionals, and perinatal and maternal outcomes of birth centre care. With this assessment, recommendations for the organization of birth care in the future can be made. Further research is needed to assess the validity of the birth centre integration questionnaire. Based on this validation, the instrument can be used to assess integration aspects in other organizational forms in birth care, both national and international.

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Table 1: Integrated care dimensions and determinants of the Rainbow Model of Integrated care

Level	Dimension	Description dimension	Determinant	Description determinant
Micro	Clinical integration	The coordination of person-focused care in a single process across time, place and discipline.	Case management	Coordination of care for clients' with a high-risk profile (e.g. identifying risks, developing policies and guidance).
			Continuity	The organization of care is aimed to provide fluid care delivery for an individual client.
			Individual multidisciplinary care plan	Implementation of a multidisciplinary care plan at the individual client level.
			Client participation	Clients are (pro) actively involved in the design, organization and provision of care at the operational level.
Meso	Professional integration	Inter-professional partnerships based on shared competences, roles, responsibilities and accountability to deliver a comprehensive continuum of care to a defined population.	Inter-professional education	Inter-professional education for professionals focused on interdisciplinary collaboration.
			Shared vision between professionals	A shared vision between professionals focused on the content of care.
			Multidisciplinary guidelines and protocols	Multidisciplinary guidelines and protocols are implemented in coherence at the operational level.
			Inter-professional governance	Inter-professional governance focused on openness, integrity and accountability between professionals at the operational level (e.g. joint accountability, appeal on pursued policies and responsibilities).

Meso	Organizational integration	Inter-organizational relationships (e.g. contracting, strategic alliances, knowledge networks, mergers), including common governance mechanisms, to deliver comprehensive services to a defined population.	Interest management	A climate that attempts to bridge the various interests (e.g. social, organizational and personal interests) at the operational, tactical and strategic level.
			Performance management	Collective elaborated performance management between organizations within the collaboration.
			Learning organisations	Collective learning power between the organizations within the collaboration (e.g. joint research and development programs).
			Complaints procedure	
Macro	System integration	A horizontal and vertical integrated system, based on a coherent set of (informal and formal) rules and policies between care providers and external stakeholders for the benefit of people and populations.	Available resources	Available resources in the environment of the collaboration (e.g. usable buildings, (over) capacity, professionals and funding streams).
			Stakeholder management	Engagement of various stakeholders (e.g. municipality, patient organizations and health insurance company).
			Good governance	Creating trust towards external stakeholders (e.g. municipality and health insurance company) due to working method, reputation, management, control and/or supervision.
			Environmental climate	Political, economic and social climate in the environment of the collaboration (e.g. market characteristics, regulatory framework, competition).
Micro, meso, macro	Functional integration	Key support functions and activities (i.e. financial, management and information systems) structured around the primary process of service delivery, to coordinate and support accountability and decision making between organizations and professionals to add overall value to the system.	Information management	Aligned information management systems accessible at operational, tactical and strategic level (e.g. monitoring and benchmarking systems).
			Resource management	Coherent use of resources (e.g. collective real estate and funding).
			Service management	Aligned service management for the client (e.g. collective telephone number, counter assistance and 24-hour access)
			Regular feedback of performance indicators	Regular feedback of performance indicators for professionals at the operational level to enable them to improve their performance.

Micro, meso, macro	Normative integration	The development and maintenance of a common frame of reference (i.e. shared mission, vision, values and culture) between organizations, professional groups and individuals.	Reliable behaviour	The extent to which the agreements and promises within the collaboration are fulfilled at operational, tactical and strategic levels.
			Visionary leadership	Leadership based on a personal vision that inspires and mobilizes people.
			Quality features of the informal collaboration	Effectiveness and efficiency of the informal collaboration at the operational, tactical and strategic levels (e.g. group dynamics and attention to the undercurrent).
			Trust	The extent to which those involved in the collaboration at operational, tactical and strategic levels trusts each other.

Adapted with permission from:"Towards a taxonomy for integrated care; a mixed-methods study"(3)

Table 3. Scores of clusters of birth centres on integration determinants and dimensions of integration

			Total birth centres				Profile A Mono-disciplinary-orientated birth centres (MOBC)				Profile B Mixed-cluster of birth centres (MIBC)				Profile C Multi-disciplinary-orientated birth centres (MUBC)				Subgroup differences F Test
n (%)			23 (100)				10 (43.5)				7 (30.4)				6 (26.1)				* p < 0.05 ** p < 0.01 *** p < 0.001
Dimension	Determinant	Range	M	SD	Min	Max	M	SD	Min	Max	M	SD	Min	Max	M	SD	Min	Max	
Clinical integration (CI)	Case management	1-4	3.08	0.32	2.40	4.00	3.04	0.27	2.40	3.33	3.11	0.40	2.75	4.00	3.13	0.33	2.80	3.75	F(2.20) = 0.17
	Continuity	1-4	2.30	0.49	2.00	3.50	2.00	0.00	2.00	2.00	2.52	0.39	2.00	3.00	2.56	0.74	2.00	3.50	F(2.20) = 4.49*
	Individual multidisciplinary care plan	1-4	2.86	0.82	2.00	4.00	2.22	0.25	2.00	2.67	3.79	0.22	3.50	4.00	2.83	0.86	2.00	4.00	F(2.20) = 21.91***
	Client participation	1-4	1.77	0.44	1.00	2.67	1.58	0.35	1.00	2.00	1.99	0.50	1.00	2.67	1.83	0.42	1.33	2.50	F(2.20) = 2.10
	Total CI	1-4	2.49	0.40	2.00	3.25	2.21	0.15	2.00	2.42	2.85	0.23	2.50	3.25	2.55	0.50	2.00	3.25	F(2.20) = 9.64**
Professional integration (PI)	Inter-professional education	1-4	2.05	0.88	1.00	3.75	1.78	0.79	1.00	3.67	1.80	0.55	1.00	2.67	2.81	0.98	1.00	3.75	F(2.20) = 3.77*
	Shared vision between professionals	1-4	2.59	1.03	1.00	4.00	1.87	0.72	1.00	3.33	2.73	0.98	1.67	4.00	3.65	0.32	3.25	4.00	F(2.20) = 11.06**
	Multidisciplinary guidelines and protocols	1-4	2.76	0.73	1.50	4.00	2.41	0.63	1.50	3.33	2.68	0.55	1.50	3.00	3.46	0.64	2.33	4.00	F(2.20) = 5.70*
	Inter-professional governance	1-4	2.46	0.75	1.00	4.00	1.99	0.49	1.00	2.67	2.45	0.34	2.00	3.00	3.25	0.82	2.00	4.00	F(2.20) = 9.50**
	Total PI	1-4	2.45	0.65	1.38	3.69	2.01	0.42	1.38	2.75	2.41	0.28	2.00	2.75	3.23	0.58	2.17	3.69	F(2.20) = 15.01***

	Interest management	1-4	2.85	0.42	2.00	3.67	2.65	0.48	2.00	3.67	2.81	0.24	2.50	3.00	3.24	0.16	3.00	3.50	F(2.20) = 5.16*
Organizational integration (OI)	Performance management	1-4	2.65	1.01	1.00	4.00	1.97	0.81	1.00	3.33	2.65	0.78	1.67	3.67	3.79	0.33	3.33	4.00	F(2.20) = 12.26***
	Learning organisations	1-4	2.86	0.71	1.80	4.00	2.53	0.57	1.80	3.33	2.69	0.51	2.00	3.33	3.60	0.65	2.33	4.00	F(2.20) = 6.89**
	Complaints procedure	1-4	1.65	0.61	1.00	3.25	1.41	0.44	1.00	2.25	1.42	0.47	1.00	2.25	2.31	0.57	1.67	3.25	F(2.20) = 7.50**
	Total OI	1-4	2.48	0.53	1.50	3.50	2.14	0.40	1.50	2.67	2.39	0.24	1.94	2.58	3.15	0.34	2.71	3.50	F(2.20) = 16.46***
	Available resources	1-4	2.72	0.61	1.17	4.00	2.32	0.47	1.17	2.83	2.70	0.35	2.25	3.33	3.40	0.45	2.75	4.00	F(2.20) = 11.84***
	Stakeholder management	1-4	2.20	0.81	1.00	4.00	1.66	0.47	1.00	2.25	2.10	0.58	1.33	3.00	3.22	0.49	2.67	4.00	F(2.20) = 17.89***
System integration (SI)	Good governance	1-4	2.71	0.55	2.00	4.00	2.38	0.25	2.00	2.67	2.67	0.40	2.00	3.00	3.31	0.60	2.50	4.00	F(2.20) = 9.67**
	Environmental climate	1-4	2.03	0.77	1.00	3.25	2.18	0.73	1.00	3.20	1.80	0.76	1.00	3.00	2.06	0.91	1.00	3.25	F(2.20) = 0.48
	Total SI	1-4	2.07	0.61	1.38	3.35	1.55	0.16	1.38	1.88	2.21	0.27	1.88	2.67	2.78	0.57	2.00	3.35	F(2.20) = 25.19***

Functional integration (FI)	Information management	1-4	1.74	0.51	1.00	3.00	1.43	0.23	1.00	1.67	1.86	0.48	1.33	2.67	2.11	0.62	1.50	3.00	F(2.20) = 5.07*
	Resource management	1-4	2.31	1.07	1.00	4.00	1.65	0.60	1.00	2.50	2.68	1.03	1.00	4.00	3.00	1.22	1.00	4.00	F(2.20) = 4.84*
	Service management	1-4	2.39	0.75	1.00	3.75	1.77	0.44	1.00	2.50	2.57	0.53	2.00	3.00	3.22	0.37	2.75	3.75	F(2.20) = 20.06***
	Regular feedback of performance indicators	1-4	1.77	0.86	1.00	4.00	1.35	0.58	1.00	2.50	1.74	0.56	1.00	2.50	2.53	1.10	1.00	4.00	F(2.20) = 4.72*
	Total FI	1-4	2.46	0.43	1.80	3.43	2.17	0.24	1.80	2.65	2.39	0.19	2.05	2.60	3.03	0.30	2.65	3.43	F(2.20) = 23.49***
Normative integration (NI)	Reliable behaviour	1-4	3.52	0.40	3.00	4.00	3.55	0.42	3.00	4.00	3.43	0.46	3.00	4.00	3.60	0.33	3.25	4.00	F(2.20) = 0.30
	Visionary leadership	1-4	3.27	0.55	2.00	4.00	3.01	0.59	2.00	3.67	3.35	0.53	2.50	4.00	3.63	0.21	3.50	4.00	F(2.20) = 2.95
	Quality features of the informal collaboration	1-4	2.80	0.56	1.67	3.50	2.65	0.71	1.67	3.50	2.82	0.47	2.00	3.33	3.01	0.33	2.50	3.33	F(2.20) = 0.79
	Trust	1-4	3.48	0.39	2.67	4.00	3.26	0.34	2.67	3.67	3.56	0.37	3.00	4.00	3.75	0.32	3.25	4.00	F(2.20) = 4.06*
	Total NI	1-4	3.27	0.31	2.67	3.75	3.12	0.31	2.67	3.63	3.29	0.27	2.88	3.58	3.50	0.25	3.19	3.75	F(2.20) = 3.37
Total Integration	Total	1-4	2.54	0.39	2.04	3.42	2.20	0.13	2.04	2.45	2.59	0.13	2.43	2.77	3.04	0.30	2.66	3.42	F(2.20) = 38.0 ***

References

(1) Goodwin N, Peck E, Freeman T, Posaner R. Managing across diverse networks of care: Lessons from other sectors. Report to the NHS SDO R&D Programme.Birmingham: Health Services Management Centre, University of Birmingham. 2004.

(2) Kodner DL. All together now: A conceptual exploration of integrated care. Healthc Q. 2009;13 Spec No:6-15.

(3) Valentijn PP, Boesveld IC, Van der Klauw, Denise M, et al. Towards a taxonomy for integrated care: A mixed-methods study. International journal of integrated care. 2015;15.

(4) D'Amour D, Goulet L, Labadie JF, Martin-Rodriguez LS, Pineault R. A model and typology of collaboration between professionals in healthcare organizations. BMC Health Serv Res. 2008;8:188-6963-8-188.

(5) Stuurgroep zwangerschap en geboorte. A good start, safe birth care care (in Dutch: Een goed begin, veilige zorg rond zwangerschap en geboorte. Advies Stuurgroep Zwangerschap en Geboorte). Utrecht Stuurgroep Zwangerschap en Geboorte. 2009.

(6) Hermus MA, Wiegers TA, Hitzert MF, et al. The dutch birth centre study: Study design of a programmatic evaluation of the effect of birth centre care in the netherlands. BMC pregnancy and childbirth. 2015;15(1):148.

(7) American Association of Birth Centers. Definition of Birth Center. Available at: http://c.ymcdn.com/sites/www.birthcenters.org/resource/resmgr/About_AABC_-_Documents/AABC_Position_Statement_-_DE.pdf. Accessed July, 23, 2016.

(8) Laws PJ, Lim C, Tracy S, Sullivan EA. Characteristics and practices of birth centres in Australia. Australian and New Zealand Journal of Obstetrics and Gynaecology 2009;49(3):290-295.

(9) Stewart M, McCandlish R, Henderson J, Brocklehurst P. Review of evidence about clinical, psychosocial and economic outcomes for women with straightforward pregnancies who plan to give birth in a midwife-led birth centre, and outcomes for their babies. 2004.

(10) Zeitlin J, Mohangoo A, Cuttini M. The European Perinatal Health Report: comparing the health and care of pregnant women and newborn babies in Europe. J Epidemiol Community Health 2009;63(9):681-682.

(11) Evers AC, Brouwers HA, Hukkelhoven CW, Nikkels PG, Boon J, van Egmond-Linden A, et al. Perinatal mortality and severe morbidity in low and high risk term pregnancies in the Netherlands: prospective cohort study. BMJ 2010;341.

(12) Tuffnell D. Place of delivery and adverse outcomes. BMJ 2010;341.

(13) van der Kooy J, Poeran J, de Graaf JP, Birnie E, Denktas S, Steegers EA, et al. Planned home compared with planned hospital births in the Netherlands: intrapartum and early neonatal death in low-risk pregnancies. Obstetrics & Gynecology 2011;118(5):1037-1046.

(14) Shortell, S. M., Wu, F. M., Lewis, V. A., Colla, C. H., & Fisher, E. S. (2014). A taxonomy of accountable care organizations for policy and practice. Health services research, 49(6), 1883-1899

(15) Valentijn PP, Ruwaard D, Vrijhoef HJ, de Bont A, Arends RY, Bruijnzeels MA. Collaboration processes and perceived effectiveness of integrated care projects in primary care: A longitudinal mixed-methods study. BMC Health Services Research. 2015;15(1):463

(16) Afrite A, Mousques J. Forms of primary care teams - A typology of multidisciplinary group practices, health care networks and health care centers participating in the Experiments of New Mechanisms of Remuneration (ENMR). Health Economics (Questions d'économie de la santé). 2014; 09

(17) Valentijn PP, Schepman SM, Opheij W, Bruijnzeels MA. Understanding integrated care: A comprehensive conceptual framework based on the integrative functions of primary care. International Journal of Integrated Care. 2013;13.

(18) Valentijn PP, Vrijhoef HJ, Ruwaard D, de Bont A, Arends RY, Bruijnzeels MA. Exploring the success of an integrated primary care partnership: A longitudinal study of collaboration processes. BMC health services research. 2015;15(1):32.

(19) Green J, Thorogood N. Qualitative methods for health research. : Sage; 2013.

(20) Ivankova NV, Creswell JW, Stick SL. Using mixed-methods sequential explanatory design: From theory to practice. Field methods 2006;18(1):3-20.

(21) Wiegers T, de Graaf H, van der Pal K. The rise of birth centres and their role in health care (in dutch: De opkomst van geboortecentra en hun rol in de zorg). Tijdschrift voor gezondheidswetenschappen. 2012;90(8):475-478.

(22) Pope C, Ziebland S, Mays N. Qualitative research in health care. Analysing qualitative data. BMJ 2000 Jan 8;320(7227):114-116.

(23) Cho J, Trent A. Validity in qualitative research revisited. Qualitative research 2006;6(3):319-340.

(24) Koelsch LE. Reconceptualizing the member check interview. International Journal of Qualitative Methods 2013;12(1):168-179.

(25) Punj G, Stewart DW. Cluster analysis in marketing research: Review and suggestions for application. J Market Res. 1983:134-148.

(26) Grimm LG, Yarnold PR. Reading and understanding MORE multivariate statistics. American psychological association; 2000.

(27) Cohen J. A coefficient of agreement for nominal scales. Educ Psychol Meas 1960;20 1(27-46).

(28) McHugh ML. Interrater reliability: the kappa statistic. Biochemia medica 2012;22(3):276-282.

(29) Berwick DM, Nolan TW, Whittington J. The triple aim: care, health, and cost. Health Aff (Millwood) 2008 May-Jun;27(3):759-769.

CHAPTER 8

INTEGRATED BIRTH CARE IN MATERNITY CARE NETWORKS. RESULTS OF MATERNITY CARE NETWORK STUDY

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Boesveld IC, Annegarn AMA, IJsseldijk JM, Veldhuyzen DC, Winkel L, Annot F, Bruijnzeels MD, Franx A, Wiegers, TA.

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Abstract

Over a quarter of all Maternity Care Networks participated in the "VSV-Carousel" and the Maternity Care Networks Integration Questionnaire was carried out during these sessions. This newly-developed questionnaire served as a 'mirror' to gain insight into the (level of) performance of the networks in relation to integrated birth care. The results of the Maternity Care Network Study get an inside view of the (organization) of integrated birth care: it makes manifest the differences and the similarities between the networks.

Introduction

For more than 55 years, government and health insurance companies have promoted collaboration between primary and secondary maternity caregivers. Throughout this process, one objective has been top of mind: quality improvement. Various reports and recommendations have appeared since the initial publication of the Kloosterman List in 1958 (1-9). Since the publication of the Euro-Peristat study in 2009, government and politics more intensively are engaged with the maternity care system to achieve more nationwide control (10).

Based on the recommendations in the steering group report entitled "A good start" 9), Maternity Care Networks (in Dutch: Verloskundige Samenwerkingsverbanden: VSVs) in various regions have embarked on a professionalization process to offer better and integrated birth care in which the pregnant women takes centre stage. This process is based on the hypothesis that more integration leads to better perinatal outcomes. The "VSV-Carousel" was established to support Maternity Care Networks in this process (11). During these meetings, information was shared about integrated care and the financial and organizational consequences of that care. The function of the Maternity Care Networks in relation to integrated birth care was also discussed, based on the Maternity Care Networks Integration Questionnaire (MCN-IQ). This article describes the results of the networks who participated in this "Maternity Care Network Study".

Rainbow Model of Integrated Care

The Rainbow Model of Integrated Care was developed by the Jan van Es Institute based on a literature review within and outside the healthcare sector to better understand integrated healthcare from the a primary caregiver perspective (12) (see Fig. 1). The model comprises six integration dimensions: 1) clinical integration in the relationship between client and caregiver; 2) professional integration in the cooperation between caregivers themselves; 3) organizational integration, as in the cooperation between organizations themselves; 4) functional integration, in which the support functions take center stage; 5) system integration in the healthcare system of which the Maternity Care Network is part; and 6) normative integration as to the 'soft side' of cooperation

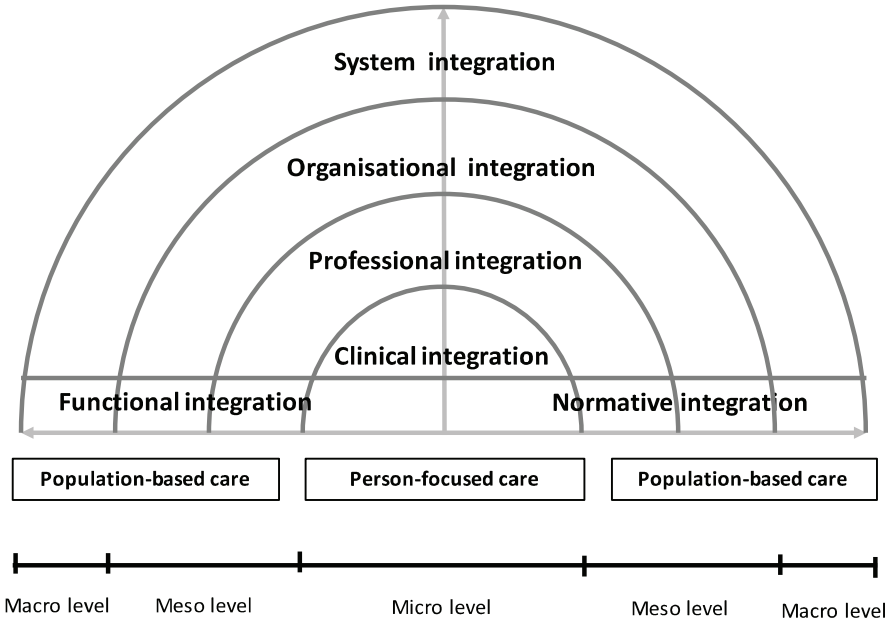
(13). This model has been refined in a classification (taxonomy) consisting of 59 key terms, based on literature study and a Delphi study among Dutch experts (14).

Method

Development of the Maternity Care Networks Integration Questionnaire (MCN-IQ)

Key terms known as determinants have been identified for each integration dimension. The inclusion procedure is based on the following criteria: the highest median score generated by the Delphi method (14) and applicability in the Maternity Care Networks. Two to four multiple choice questions have been developed for each dimension. The answers correspond with various integration phases: totally segregated (1), linked (2), coordinated (3) and fully integrated (4). They form a nominal scale with identical steps between the response categories. Statements that correspond with a particular integration phase are formulated on the basis of a questionnaire compiled for primary care organizations and the day-to-day reality of Maternity Care Networks (12-15). The MCN-IQ consists of 20 questions.

Figure 1 JVEI Rainbow Model of Integrated Care (12)



Study population and analysis

As of 2013, all Maternity Care Networks in the Netherlands were invited to participate in the "VSV-Carousel" in their region. Three weeks before that meeting, the MCN-IQ was emailed to all members of a Maternity Care Network, whose contact details are provided by the Maternity Care Networks themselves. If necessary, a reminder was sent 10 days later. For data analysis purposes, only those questionnaires were included if more than 70% of the questions were answered. Average integration

scores were calculated for each dimension, initially for each respondent (range 1-4) and subsequently for each Maternity Care Network, by calculating the average score of all respondents. We also determined the total integration score for each Maternity Care Network by calculating the average of the six domains jointly. The various scores achieved at each integration dimension together form the "integration profile" of that Maternity Care Network. In order to determine if the networks differ from each other relative to the different domains, a one-way ANOVA test was utilised. All data analyses were performed with the help of SPSS version 22 (IBM Statistics).

Results

A total of 24 Maternity Care Networks completed the MCN-IQ and participated in the "VSV-Carousel" between August 2013 and January 2015. These networks were located all over the Netherlands, in both urban and rural areas (see Fig. 2).

A total of 1.523 questionnaires were send (20-125 for each Maternity Care Network) and 813 were completed (response rate 53.4%, that is 39-74% for each network). Some 179 respondents (22%) failed to complete more than 30% of the questionnaire, resulting in 634 questionnaires to be analysed.

Figure 2 Locations participating VSVs

Participants, management board and formalisation

Table 1 discloses a number of Maternity Care Networks characteristics.

Primary maternity caregivers - midwives, obstetricians, paediatricians and maternity care organisations – participate in 18 Maternity Care Networks (that is 75% of the total). In 16 of these, clinical midwives participate as well. Clients hardly participate in the networks at

all. Four of the networks (17%) do not have a management board. In 14 Maternity Care Networks (58%) primary care midwives, obstetricians and clinical midwives are represented on the board. Three-quarters of the Maternity Care Networks work together on the basis of a cooperation agreement and one network has established a separate entity for certain activities. Six Maternity Care Networks have not signed a cooperation agreement, or the terms of that agreement are unclear. Some networks indicated that they were working on the wording of a cooperation agreement.

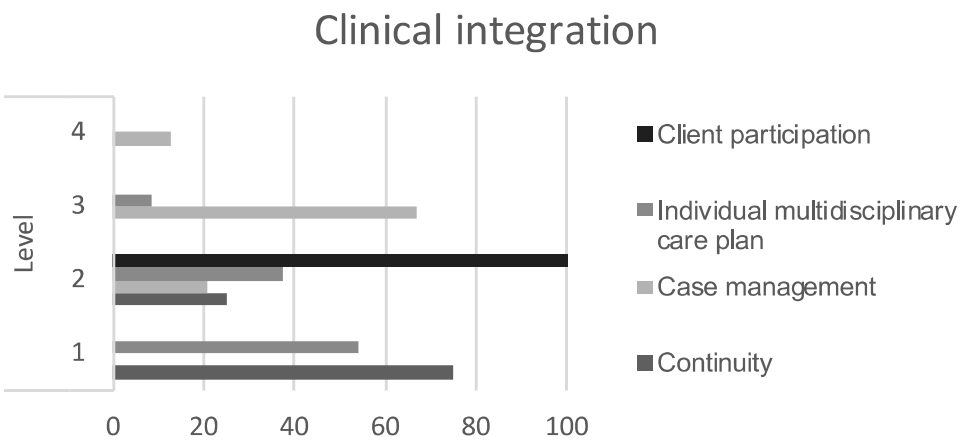
Dimensions of integration

Table 2 contains the results of all Maternity Care Networks with regard to the key terms and integration dimensions with descriptions at all levels.

Clinical integration (Figure 3)

Evaluation of client experience was not addressed jointly by any of the Maternity Care Networks: each discipline organises this itself. A birth plan format has been developed in just under half of all networks, but in none of them is it actively used by the various disciplines. In two-thirds of the networks, high-risk clients are regularly discussed in multi-disciplinary meetings, during which policy agreements are made. In three Maternity Care Networks, new clients are discussed every week. In a quarter of the networks, pregnancy data is shared digitally by mail in the event of referral. In other cases, this is handled by telephone or on paper.

Figure 3: Clinical integration: level of integration per key term



Professional integration (Figure 4)

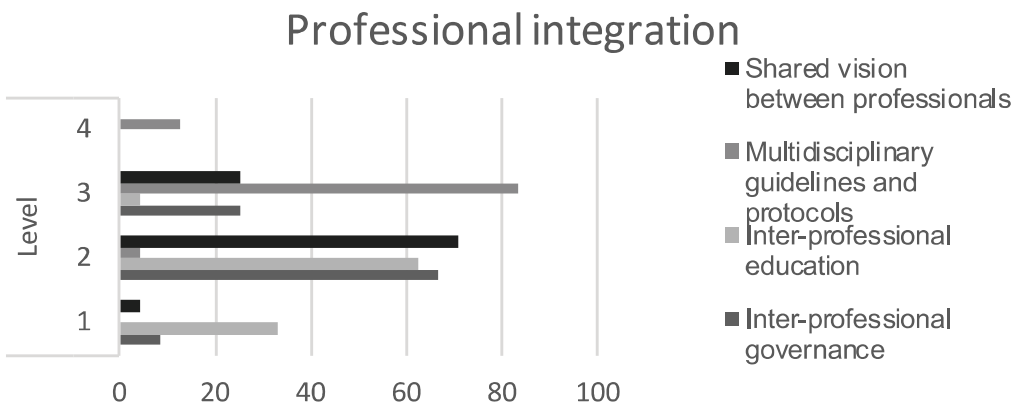
Almost all Maternity Care Networks have a shared vision on birth care, and a quarter of these actually promote this vision throughout all disciplines. Multi-disciplinary

Table 1 Characteristics Maternity Care Networks

Participants	**n (%)**
Community midwives	24 (100)
Gynaecologists	24 (100)
Clinical midwives	22 (92)
Paediatrician	22 (92)
Maternity Care Organization	17 (83)
Obstetric and Gynaecology Nurses	13 (54)
Representative Hospital	2 (8)
Birth Centre	1 (4)
Other participants	
General practitioners (obstetric active)	10 (42)
Manager Unit obstetric care	15 (63)
JGZ	7 (24)
Client	3 (13)
Anaesthetist	8 (33)
Echoscopist	2 (24)
Neonatology nurses	1 (4)
Ambulance	1 (4)
Chairman	3 (33)
Management board	
No management board/ unclear	4 (17)
Community midwives	18 (75)
Gynaecologists	19 (79)
Clinical midwives	14 (58)
Paediatrics	1 (4)
Maternity Care Organization	1 (4)
Formalisation	
No formal cooperation agreements	3 (13)
Formal cooperation agreements	17 (70)
Legal form	1 (4)
Unclear	3 (13)

protocols and guidelines are used in almost all networks, in the majority (87%) of which care professionals are not called to account when is departed from the protocol. In two-thirds of the networks, multi-disciplinary training is offered in all disciplines. In one case, it is mandatory to take an array of training courses. None of the Maternity Care Networks wish to shoulder the responsibility for the entire care process. Disclosure of and transparency into each other's results speaks for itself. In a quarter of the networks, the results of the entire care process are discussed regularly with each other. In two-thirds of the networks, agreements have been made about how each of them informs the other about statistics relating to the quality of care delivered.

Figure 4: Professional integration: level of integration per key term



Organisational integration (Figure 5)

Almost all Maternity Care Networks have formulated joint targets. In five of them (22%), active steps are taken to achieve these goals. These are measured and monitored in all five. If required, almost all networks develop improvement plans on the basis of results from perinatal audits. None of the Maternity Care Networks evaluate or monitor if improvements arising from the audit are actually implemented.

Functional integration (Figure 6)

In almost half of the Maternity Care Networks information systems belonging to care professionals can be fully or partially accessed by the various disciplines. None of the networks offer this facility to clients. Approximately half of the networks do not share, or hardly share, information with regard to client service management – a joint website or telephone number, for example. In one of the Maternity Care Networks, a lot of work is undertaken jointly, but each discipline also conducts its own activities.

System integration (Figure 7)

Half of the Maternity Care Networks are located in a clearly-structured region comprising a number of midwifery practices and maternity care organisations as well as a hospital. Most networks in a more unstructured region indicate that location in itself does not impact cooperation in any way. In just under half the networks (46%), the various disciplines talk to stakeholders such as health insurance companies or the municipality themselves. The other Maternity Care Networks share stakeholder information. In no network whatsoever does alignment take place or are stakeholders approached in a coordinated manner.

Figure 5 Organisational integration: level of integration per key term

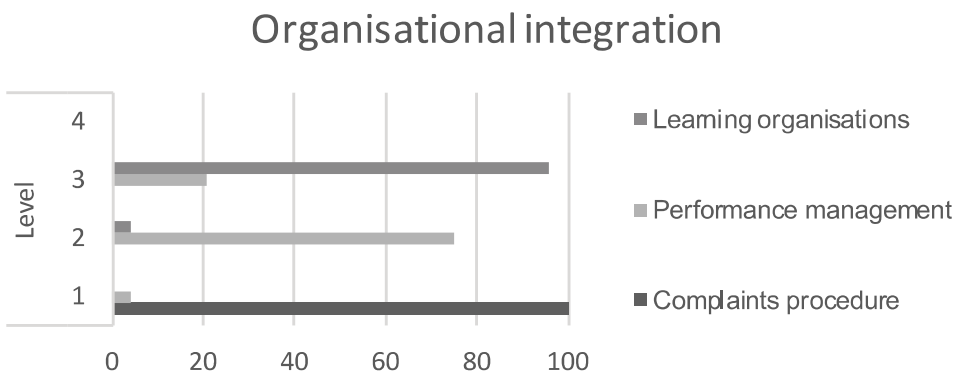


Figure 6 Functional integration: level of integration per key term

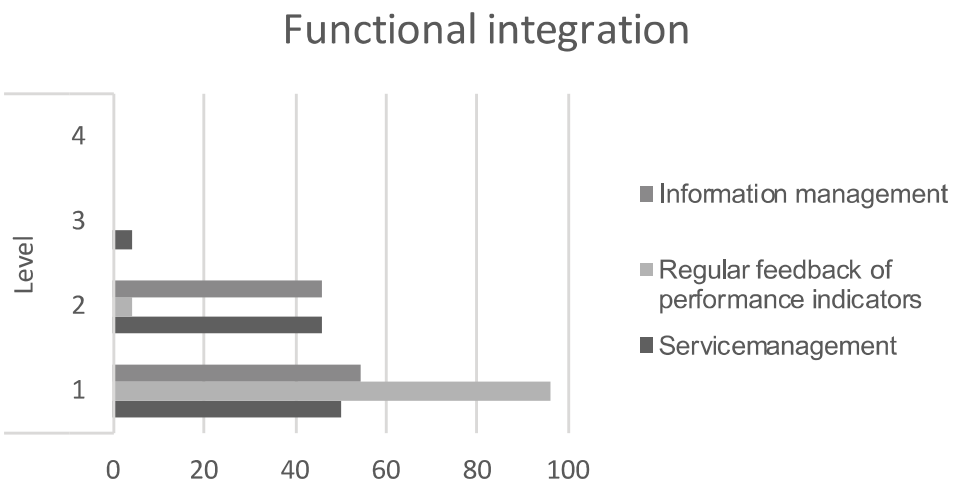
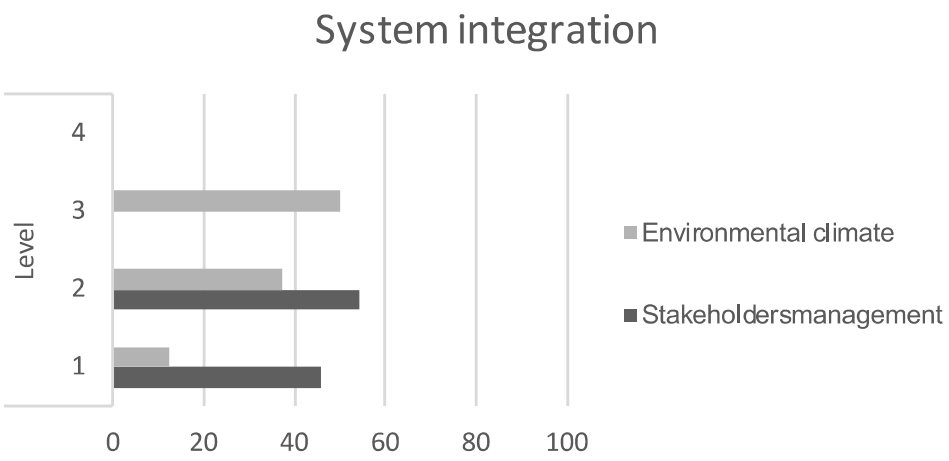


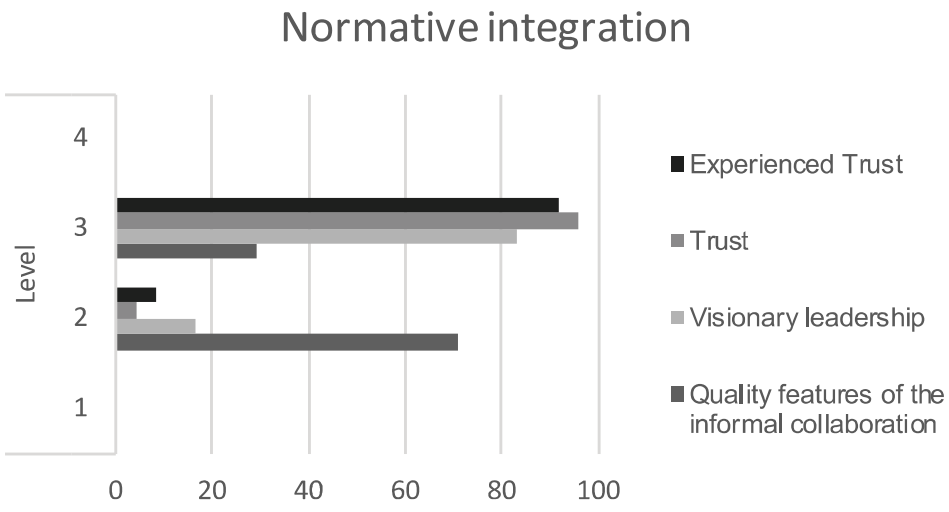
Figure 7 System integration: level of integration per key term



Normative integration (Figure 8)

In 92% of the Maternity Care Networks, the various partners experience a varying degree of trust. In two networks, care professionals have little trust in each other. In one Maternity Care Network, care professionals express little confidence in its supply chain partners, although in the rest of the networks they do: those involved know and trust each other. In all networks, there are care professionals with a specific perspective on cooperation: the majority are inspired and motivated to join forces. None of the Maternity Care Networks are familiar with the concept of a shared culture. In most of the networks (71%), each discipline has its own culture and activities are consciously developed to get to know each other better.

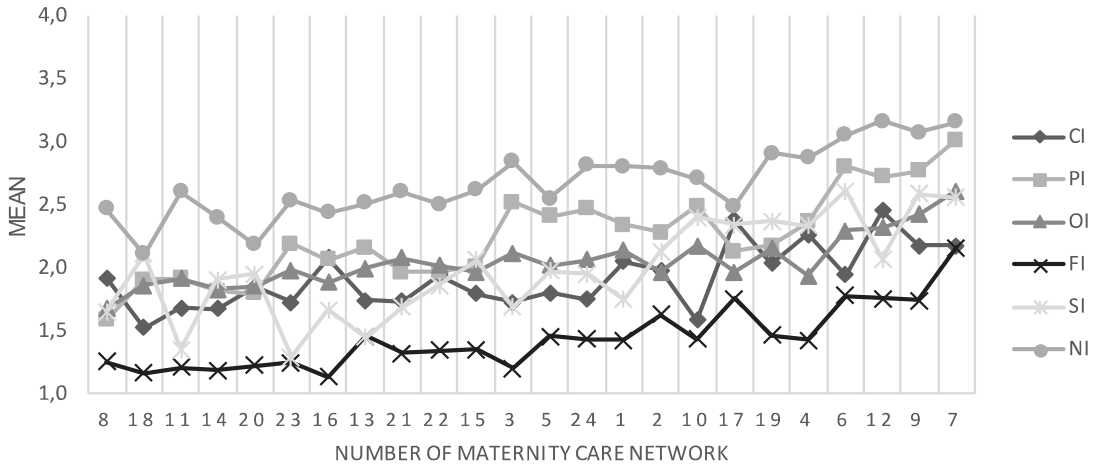
Figure 8 Normative integration: level of integration per key term



Integration profiles

Table 3 contains the average scores of each Maternity Care Network in both the integration dimensions and the total integration score. The ANOVA test indicates the statistically significant variances between the networks related to each of the key terms, dimensions and the total integration score. The highest and lowest Maternity Care Network scores differed by more than one point related to the professional, functional, system and normative dimension (on a scale from 1 to 4). The greatest variance can be seen in professional integration (1.44). The average scores for normative integration are the highest at all networks, and for most of them (63%), professional integration is a close runner-up. For almost all the Maternity Care Networks (96%), the lowest scores were for functional integration (see Figure 9).

Figure 9. Integration scores for each dimension by Maternity Care Network (ordered based on increasing integration total score)*



Discussion

The "VSV-Carousel" made it possible to compare Maternity Care Networks in relation to where they are in their integrated care process. The MCN-IQ shows statistically significant variances between the integration profiles of the Maternity Care Networks. The variance between the networks is relatively small: the Maternity Care Networks with the highest and lowest total integration scores differ only 0.9 point from each other. This could potentially be caused by selection bias. A select group of participating Maternity Care Networks, namely those networks already interested in integrated birth care and wishing to learn more about this concept by the "VSV-Carousel". It is possible that more integrated networks were less interested in the meetings, because they have already retrieved or gained access to the information they require. Less integrated Maternity Care Networks may also have had little interest in the meetings. In addition, it is not inconceivable that Maternity Care Networks which completed the questionnaire find themselves in a relatively similar position within the integration process.

Table 3. Integration profiles of Maternity Care Networks

			Clinical		Profes-sional		Organisa-tional		Functional		System		Normative		Total integration	
MCN	N	Range	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
1	32	1-4	2.05	0.46	2.35	0.67	2.14	0.55	1.43	0.37	1.75	0.71	2.80	0.51	2.09	0.38
2	30	1-4	1.98	0.53	2.29	0.59	1.97	0.39	1.63	0.52	2.13	0.56	2.79	0.45	2.13	0.33
3	13	1-4	1.73	0.31	2.53	0.60	2.12	0.43	1.21	0.29	1.69	0.60	2.85	0.55	2.02	0.33
4	27	1-4	2.27	0.53	2.37	0.59	1.94	0.37	1.43	0.45	2.33	0.65	2.88	0.48	2.20	0.30
5	23	1-4	1.80	0.31	2.41	0.58	2.02	0.25	1.46	0.44	1.98	0.80	2.55	0.61	2.04	0.36
6	18	1-4	1.95	0.47	2.81	0.59	2.30	0.27	1.78	0.44	2.61	0.37	3.06	0.36	2.42	0.21
7	24	1-4	2.18	0.47	3.02	0.77	2.61	0.46	2.17	0.48	2.56	0.66	3.16	0.56	2.62	0.40
8	13	1-4	1.92	0.48	1.58	0.44	1.67	0.70	1.26	0.31	1.65	0.66	2.47	0.46	1.76	0.33
9	27	1-4	2.18	0.35	2.77	0.49	2.43	0.43	1.74	0.52	2.59	0.64	3.07	0.50	2.46	0.34
10	35	1-4	1.59	0.42	2.50	0.49	2.18	0.37	1.44	0.38	2.40	0.71	2.71	0.53	2.13	0.26
11	35	1-4	1.69	0.38	1.92	0.51	1.92	0.40	1.21	0.28	1.36	0.51	2.60	0.59	1.78	0.29
12	28	1-4	2.46	0.57	2.73	0.63	2.32	0.51	1.76	0.57	2.07	0.73	3.17	0.51	2.42	0.42
13	50	1-4	1.74	0.33	2.17	0.57	2.00	0.39	1.46	0.42	1.45	0.52	2.52	0.47	1.89	0.29
14	32	1-4	1.67	0.36	1.82	0.47	1.83	0.50	1.19	0.26	1.91	0.50	2.41	0.52	1.81	0.27
15	15	1-4	1.79	0.43	2.02	0.71	1.97	0.56	1.36	0.50	2.07	0.56	2.62	0.43	1.97	0.35
16	12	1-4	2.08	0.50	2.07	0.62	1.89	0.23	1.14	0.17	1.67	0.44	2.44	0.57	1.88	0.27
17	32	1-4	2.38	0.53	2.13	0.59	1.97	0.55	1.76	0.44	2.34	0.57	2.49	0.64	2.18	0.38
18	22	1-4	1.53	0.23	1.91	0.25	1.86	0.25	1.17	0.22	2.11	0.49	2.11	0.38	1.78	0.14
19	20	1-4	2.04	0.50	2.18	0.77	2.16	0.46	1.47	0.40	2.38	0.58	2.91	0.66	2.19	0.45
20	44	1-4	1.85	0.41	1.80	0.41	1.86	0.50	1.23	0.21	1.95	0.63	2.19	0.58	1.81	0.28
21	31	1-4	1.74	0.39	1.97	0.48	2.08	0.58	1.32	0.30	1.69	0.53	2.61	0.56	1.90	0.31
22	22	1-4	1.95	0.41	1.97	0.54	2.02	0.62	1.35	0.44	1.86	0.64	2.51	0.51	1.94	0.38
23	29	1-4	1.73	0.40	2.20	0.50	1.98	0.49	1.25	0.27	1.29	0.47	2.54	0.58	1.83	0.30
24	20	1-4	1.75	0.46	2.47	0.50	2.07	0.28	1.43	0.39	1.95	0.39	2.82	0.37	2.08	0.24
Total	634	1-4	1.91	0.49	2.23	0.64	2.05	0.49	1.45	0.45	1.97	0.70	2.66	0.59	2.05	0.39
			F(23,610) = 9.29***		F(23,610) = 10.11***		F(23,610) = 4.93***		F(23,610) = 10.10***		F(23,610) = 11.52***		F(23,610) = 7.56***		F(23,610) = 14.31***	

Comparable studies amongst birth centres indicates that the differences between them are a little larger (1.1 between the birth centres with the highest and lowest total integration scores). But they can be compared. The results of this study as sub-study of the “Dutch Birth Centre Study” (16) are submitted for publication [Chapter 7].

It is yet unclear how the differences should be interpreted in a day-to-day context. The quantitative nominal scale has been compiled with the help of qualitative statements that correspond with the various integration phases based on literature review. The steps between the integration phases are exactly the same. It is not known if the statements that belong to the various integration phases are truly aligned with

those integration phases. More research is needed (for instance in combination with qualitative research methods) to refine this conclusion.

Another limitation to this study is a potential response bias: the response varied from 39-75% depending on the Maternity Care Network in question. More than one-fifth of the respondents failed to answer more than 30% of the questions. This may influence the results because the non-responders are unknown. It is also unknown why some respondents chose not to complete the entire questionnaire. In addition, the questionnaires were exclusively completed by the participants in the Maternity Care Networks, implying there could be a bias as a consequence of giving politically-correct replies .A bias of this nature is not necessarily serious for the evaluation of the goals of the questionnaire – supporting Maternity Care Networks on their way towards integrated birth care by mirroring the results: it paints a picture of how each network views itself. It does call for all due caution when comparing the results of the various Maternity Care Networks.

The integration profiles of the networks provide patterns that are comparable with theories about organisational development. Integration is largely based on professional behaviour and attitude. Informal coordination mechanisms based on culture, shared values and vision are essential preconditions to realise integration at a professional and organisational level (12,17). Normative integration needs to be at the required level before integration at professional and organisational level can be pursued. Integration profiles indicate that normative integration within Maternity Care Networks is the most developed, most often followed by professional and organisational integration.

The lowest score amongst the participating Maternity Care Networks was almost exclusively reserved for functional integration. This is an important focal point, because a good information management structure is a prerequisite for successful integrated care. An important characteristic of integrated birth care is putting client needs and wishes at centre stage. The very principle of the client at the heart of our business requires more attention in many of the Maternity Care Networks, simply because this proposition still needs to be more fully expanded. Half the networks have developed a birth plan format together, but the plan is never actively used by all the various disciplines (18).

Meanwhile, the MCN-IQ has been validated and a corresponding article has been accepted for scientific publication [Chapter 9]. Validation results indicate that the questionnaire can be used to evaluate the status of integration. Maternity Care Networks can use the questionnaire as a resource to monitor their own process of integral birth care and to implement their own quality policy, potentially by joint benchmarking amongst the Maternity Care Networks. The questionnaire can also be used to examine the hypothesis that more integrated birth care leads to a better quality of care. The integration profiles of the networks can then be combined with both perinatal outcomes, experienced quality of care by clients, and costs. In connection with the limitations of a questionnaire with

exclusively self-reporting answers, the measuring tool could be used together with a qualitative research method such as interviews. The consequences of a survey of this nature can then be used as input for formulating government policy related to the way in which birth care is the Netherlands takes shape going forward.

Knowledge about inter-disciplinary integration in the healthcare sector in general and in birth care in particular is scarce. An instrument to measure this is still in its infancy and comparable tools in other sectors are hardly available and rarely used. The Rainbow Model of Integrated Care is currently being prospectively validated in Singapore (19). We therefore consider the instrument unsuitable for steering purposes by both the authorities and for the procurement policies in place at health insurance companies. It is as yet unknown if the instrument can be used prospectively: could developments related to integration within a Maternity Care Network be visible in the results of an MCN-IQ? More research needs to be conducted to provide clarity on this point, and we invite Maternity Care Networks to complete the MCN-IQ to enlarge the body of knowledge in this respect. A number of Maternity Care Networks have already come forward.

Conclusion

The Maternity Care Network Study illustrates the differences between Maternity Care Networks with regard to the various integration dimensions developed within the Jan van Es Institute's Rainbow Model of Integrated Care. Most of the Maternity Care Networks taking part in the "VSV-Carousel" are at the stage of linkage between the various professionals and organisations. Not a lot is actually shared. The Maternity Care Network Integration Questionnaire is likely a useful instrument to monitor the integration process. The instrument, combined with outcome indicators, can gain insight whether integrated birth care leads to better quality of care.

Table 2 Results key terms per dimension of integration

Dimension	Determinant	Level	Description	n (%)
Clinical Integration	Client participation	1	In organizing the care process around an individual client, client experiences are not used	24 (100)
		2	In organizing the care process around an individual client, every discipline decides for themselves whether client experiences are evaluated	0
		3	In organizing the care process around an individual client, it is ensured together that results of client evaluations are used to improve the care process	0
		4	In organizing the care process around an individual client, clients are actively involved, (also in decisions)	0
	Individual multidisciplinary care plan	1	There is no drawn up common format for a birth plan	13 (54)
		2	There is a jointly drawn up format for a birth plan and every discipline invites pregnant women to fill in the plan	9 (38)
		3	They use the jointly drawn up birth plan, but agreements are often not complied in case of a referral	2 (8)
		4	It is ensured that the birth plan is actively used by the various disciplines. We endeavour as much as possible to respect clients wishes	0
	Case management	1	In case of a referral, a referral letter is given and there will be ad hoc telephone contact with other professionals	0
		2	Medical policies agreements are made occasionally about high-risk clients	5 (21)
		3	Regularly high-risk clients are discussed in multidisciplinary consultations where agreements on the medical policy are made	16 (67)
		4	Weekly all new clients are discussed in multidisciplinary consultations, in which agreements are made on policies for high-risk clients	3 (13)
	Continuity	1	In order to ensure the continuity of the care process for a client, professionals from my practice (sometimes) receive telephone or written information from other professionals	18 (75)
		2	In order to ensure the continuity of the care process for a client, in case of a referral, pregnancy data are transmitted digitally by email	6 (25)
		3	Parts of the pregnancy dossier are shared with other disciplines (e.g through the use of a web-based health record)	0
		4	They use one IT system with a joint health record for the entire care process	0

Professional Integration	Shared vision between professionals	1	There is no shared vision with other disciplines	1 (4)
		2	There is a shared vision with other disciplines, but not everyone do propagate the vision	17 (83)
		3	There is a shared vision with other disciplines, which is propagated by all disciplines	6 (25)
		4	There is a shared vision with other disciplines, including for long term, in which parties be held responsible for realizing the vision	0
	Multidisciplinary guidelines and protocols	1	Only monodisciplinary guidelines and protocols are used	0
		2	Professionals are aware of guidelines and protocols for professionals from other disciplines	1 (4)
		3	Multidisciplinary guidelines and protocols are used, but professionals do not call each other to account when from the protocol is departed	20 (71)
		4	Multidisciplinary guidelines and protocols are used. When is departed from the protocol, professionals (grounded) account to each other why is departed from the protocol	3 (13)
	Inter-professional education	1	Each discipline / organization organise its own education	8 (33)
		2	Multidisciplinary education is offered to all disciplines, but not compulsoried	15 (63)
		3	Multidisciplinary education is offered to all disciplines. Some of them are compulsorily (such as acting in emergency situations)	1 (4)
		4	Multidisciplinary education regarding emergency situations (such as CPR) is regularly compulsorily attended by all disciplines, as a regular feature of a common policy	0
	Inter-professional governance	1	Each discipline is solely responsible for the quality of his or her own care provided	2 (8)
		2	Agreements are made how to inform each other about statistics of quality of care	16 (67)
		3	Results of the care process are regularly considered with each other	6 (25)
		4	They feel jointly responsible for the entire care process. Openness and transparency of each other's results and policy is a matter of course	0

Organizational Integration	Learning organisations	1	Perinatal audit discussions are attended when the partner is involved in the discussed case	0
		2	The results of perinatal audit are evaluated structurally	1 (4)
		3	Based on results of the audit, if necessary, points for improvement are formulated	23 (96)
		4	In the context of audit results formulated points for improvement are regularly evaluated and it is monitored whether the improvements also are implemented.	0
	Performance management	1	No joint targets are formulated	1 (4)
		2	Joint targets are formulated, but no determined steps are taken to achieve the targets	18 (75)
		4	Joint targets are formulated, which are measured and evaluated	5 (21)
		3	Joint targets are formulated, which are regularly be measured and evaluated. Everyone feels responsible for achieving the targets	0
	Complaints procedure	1	Each discipline has its own complaints procedure	24 (100)
		2	In case of a complaint, the total care process is reviewed	0
		4	Complaints are jointly taken up and processed	0
		3	There is one complaints procedure for the total care process	0
System Integration	Environmental climate	1	In the region are many community midwifery practices, maternity care organizations and multiple Maternity Care Networks which inhibits the co-operation	3 (13)
		2	In the region are many community midwifery practices, maternity care organizations and multiple Maternity Care Networks, but this dos not inhibit the co-operation	9 (38)
		3	In the region are some community midwifery practices and maternity care organizations and one hospital.	12 (50)
		4	In the region the Maternity Care Network as one organization (consisting of multiple disciplines) is the only provider in the region	0
	Stakeholder management	1	In the relationship with stakeholders (e.g. health insurance company) each organization speaks only on behalf of itself	11 (46)
		2	In the relationship with stakeholders (e.g. health insurance company) information received from the stakeholders is shared with each other	13 (54)
		3	In the relationship with stakeholders (e.g. health insurance company) coordination take place between different professionals or organizations	0
		4	In the relationship with stakeholders (e.g. health insurance company) stakeholders are approached coordinated (or there is policy)	0

Functional Integration	Information management	1	The ICT systems of the various disciplines/ organizations in our Maternity Care Network are not integrated (the client tells her story again and again at every health care provider)	13 (54)
		2	The ICT systems of the various disciplines/ organizations in our Maternity Care Network be (partially) shared between professionals or phrase open to different caregivers	11 (46)
		4	The ICT systems of the various disciplines/ organizations in our Maternity Care Network form one system	0
		3	The ICT systems of the various disciplines/ organizations in our Maternity Care Network form one system and is accessed by the client (has access to its own health record)	0
	Regular feedback of performance indicators	1	Health care providers from various disciplines only receive information about their own quality indicators (e.g. Zizo indicators)	23 (96)
		2	Health care providers from different disciplines inform each other about their performance (results delivered quality indicators)	1 (4)
		4	Health care providers from different disciplines discuss each performance (results delivered quality indicators)	0
		3	Health care provides from different disciplines share common quality indicators for the total care process	0
	Service management	1	On aspects of client service management (e.g. shared phone number, website, ICT accessibility, in our Maternity Care Network little or nothing is shared by health care providers from different disciplines	12 (50)
		2	On aspects of client service management (e.g. shared phone number, website, ICT accessibility, there are some shared facilities (such as a joint information brochure)	11 (46)
		3	On aspects of client service management (e.g. shared phone number, website, ICT accessibility many things are shared, but each discipline also has its own activities (e.g. we have a joint website, but all of us also has our own website)	1 (4)
		4	On aspects of client service management (e.g. shared phone number, website, ICT accessibility they present themselves as one organization (for example, we have one phone number and one website)	0

Normative Integration	Experienced Trust	1	Regularly mutual distrust is experienced	0
		2	Insufficient mutual trust is experienced	2 (8)
		3	Varying degrees of confidence with different partners is experienced	22 (92)
		4	They trust each other completely	0
	Trust	1	There is no confidence in the health care providers of other disciplines with whom they collaborate	0
		2	There is little confidence in the health care providers of other disciplines with whom they collaborate	1 (4)
		3	There is confidence in health care providers of other disciplines with whom they collaborate; they know them well and can trust anyone	23 (96)
		4	there is confidence in health care providers of other disciplines with whom they collaborate, they pay attention to keep good confidence by making it a subject of discussion	0
	Visionary leadership	1	There are no people with a vision who encourage me to collaboration	0
		2	There are some people with a vision on collaboration that appeal to me	4 (17)
		3	There are some people with a vision on collaboration that inspire and enthuse me to collaborate	20 (83)
		4	There are some people with a vision on collaboration that inspire and enthuse me to collaborate and encourage me to take action	0
	Quality features of the informal collaboration	1	Each discipline has its own culture and informal contacts remain within their own discipline	0
		2	Each discipline has its own culture and regular activities are undertaken consciously to get to know each other	17 (71)
		3	Various disciplines have good mutual informal relations but cultural differences are still noticeable	7 (29)
		4	There is one's own (shared) culture in which mutual informal relations between all disciplines are fine	0

References

(1) Kloostermanlijst WB. De verloskundige indicatielijst. Eindrapport.Deel 1987;1:29.

(2) Sikkel A. De verloskundige organisatie in Nederland. Leidschendam: Ministerie van Volksgezondheid en Milieuhygiëne 1979.

(3) Verloskunde A. Verloskundige organisatie in Nederland: uniek, bewonderd en verguisd: eindrapport. : Ministerie van Welzijn, Volksgezondheid en Cultuur; 1987.

(4) Ziekenfondsraad. De Verloskundige Indicatielijst. Amstelveen. Ziekenfondsraad. 1987.

(5) Ministerie van WVC. Regeringsstandpunt Adviescommissie Kloosterman. Rijswijk. Ministerie van WVC. 1989.

(6) Ziekenfondsraad. Verloskundig Vademecum. Amstelveen. Ziekenfondsraad. 1999.

(7) Verloskunde SM. Eindrapport: meerjarenvisie op de verloskundige zorgverlening in de 21e eeuw. Stuurgroep Modernisering Verloskunde, augustus 2000.

(8) College voor Zorgverzekeringen. Verloskundig Vademecum. 2003.

(9) Stuurgroep Zwangerschap en geboorte. Een goed begin, veilige zorg rond zwangerschap en geboorte. Advies Stuurgroep Zwangerschap en Geboorte.Utrecht Stuurgroep Zwangerschap en Geboorte 2009.

(10) Zeitlin J, Mohangoo A, Cuttini M. The European Perinatal Health Report: comparing the health and care of pregnant women and newborn babies in Europe. J Epidemiol Community Health 2009;63(9):681-682.

(11) Son Nv. VSV's aan de slag met ontwikkelingen rondom integrale geboortezorg. TvV KNOV 2014;2.

(12) Valentijn PP, Schepman SM, Opheij W, Bruijnzeels MA. Understanding integrated care: a comprehensive conceptual framework based on the integrative functions of primary care. International Journal of Integrated Care 2013;13.

(13) Dimensies van geïntegreerde eerstelijnszorg. http://www.jvei.nl/wp-content/uploads/Dimensies-Van-Ge%C3%AFntegreerde-Eerstelijnszorg-II.pdf .Verschenen in De Eerstelijns, maart 2012. (verkregen 5 augustus 2016).

(14) Valentijn PP, Boesveld IC, Van der Klauw, Denise M, Ruwaard D, Struijs JN, Molema JJ, et al. Towards a taxonomy for integrated care: a mixed-methods study. International journal of integrated care 2015;15.

(15) Valentijn PP, Vrijhoef HJ, Ruwaard D, de Bont A, Arends RY, Bruijnzeels MA. Exploring the success of an integrated primary care partnership: a longitudinal study of collaboration processes. BMC health services research 2015;15(1):32.

(16) Hermus MA, Wiegers TA, Hitzert MF, Boesveld IC, van den Akker-van Marle ME, et al. The Dutch Birth Centre study: study design of a programmatic evaluation of the effect of birth centre care in the Netherlands. BMC Pregnancy and Childbirth. 2015;15(1):148.

(17) Goodwin N, Peck E, Freeman T, Posaner R. Managing across diverse networks of care: lessons from other sectors. Report to the NHS SDO R&D Programme.Birmingham: Health Services Management Centre, University of Birmingham 2004.

(18) Berwick DM, Nolan TW, Whittington J. The triple aim: care, health, and cost. Health Aff (Millwood) 2008 May-Jun;27(3):759-769.

(19) Nurjono M, Valentijn P, Bautista MA, Lim YW, Vrijhoef H. A prospective validation study of a rainbow model of integrated care measurement tool in Singapore. International Journal of Integrated Care 2016;16(1).

CHAPTER 9

AN APPROACH TO MEASURING INTEGRATED CARE WITHIN A MATERNITY CARE SYSTEM: EXPERIENCES FROM THE MATERNITY CARE NETWORK STUDY AND THE DUTCH BIRTH CENTRE STUDY

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Abstract

Introduction

Integrated care is considered to be a means to reduce costs, improve the quality of care and generate better patient outcomes. At present, little is known about integrated care in maternity care systems. We developed questionnaires to examine integrated care in two different settings, using the taxonomy of the Rainbow Model of Integrated Care. The aim of this study was to explore the validity of these questionnaires.

Methods

We used data collected between 2013 and 2015 from two studies: the Maternity Care Network Study (634 respondents) and the Dutch Birth Centre Study (56 respondents). We assessed the feasibility, discriminative validity, and reliability of the questionnaires.

Results

Both questionnaires showed good feasibility (overall missing rate < 20 %) and reliability (Cronbach's Alpha coefficient > 0.70). Between-subgroups post-hoc comparisons showed statistically significant differences on integration profiles between regional networks (on all items, dimensions of integration and total integration score) and birth centres (on 50 % of the items and dimensions of integration).

Discussion

Both questionnaires are feasible and can discriminate between sites with different integration profiles in the Netherlands. They offer an opportunity to better understand integrated care as one step in understanding the complexity of the concept.

Introduction

Integrated care is increasingly promoted for people with complex needs in high-income countries. Their health care systems are facing a variety of inter-related challenges, including: the growing demand for health services; fragmentation of services; changing health needs; and the increasing influence of economic, political, and social factors on health care delivery. Based on evidence, policymakers facing these challenges are turning to "integrated care" as a way to reduce costs, improve the quality of care, and generate better patient outcomes (1-4). Integrated care is also increasingly promoted in the Dutch maternity care system (5,6). A better understanding of integration in perinatal care is, therefore, desirable.

There are many variations in how to organize perinatal care throughout the industrialized world. In the Netherlands, an important feature of the maternity care system is a clear distinction between the first echelon (midwife-led, community based) and second echelon (obstetrician-led, hospital based) (7,8). The Dutch system is founded on the notion that pregnancy, birth and puerperium are primarily physiological processes. Most pregnant women are considered to be healthy ('low risk') and, therefore, receive antenatal care from a community midwife from the beginning of their pregnancy (9). When complications arise or become threatening, or pharmacological pain relief is requested, referral to secondary or tertiary specialist care (i.e. obstetricians) is necessary (7,8). Community midwives are independently operating professionals, working in their own midwifery practices in the community. Their position in the health system is comparable to that of general practitioners as gatekeepers to specialist care (10). Secondary and tertiary obstetricians are mostly organized by partnerships and are working in hospitals. Professionals at all care levels work autonomously and play complementary roles (11).

In recent years, the Dutch maternity care system has come under pressure as a result of the Euro-Peristat studies, which concluded that the perinatal mortality rates in the Netherlands were relatively high as compared to other European countries (5). In spite of questions about the comparability of the data, concerns about the Dutch maternity care system have been high on the political agenda, with outcomes being linked directly to the organization of this system.

In 2009, a ministerial steering committee installed by the Ministry of Health published a report suggesting improvements in the Dutch maternity care system. Their report stated that the system needs to be 'effective', 'safe' and 'patient-centred' (6). Based on the assumption that more integrated care could provide higher quality of care, the committee suggested that a possible way to achieve this is by improving collaboration between primary and secondary care through increased integration in both birth centres and existing regional Maternity care Collaboration and Consultation Groups, called Maternity Care Networks in this paper. Members of these networks include community midwives and obstetricians along with (depending on the regional situation) clinical midwives,

paediatricians, managers of maternity care assistance organizations, obstetrics and gynaecology nurse specialists, and general practitioners (12).

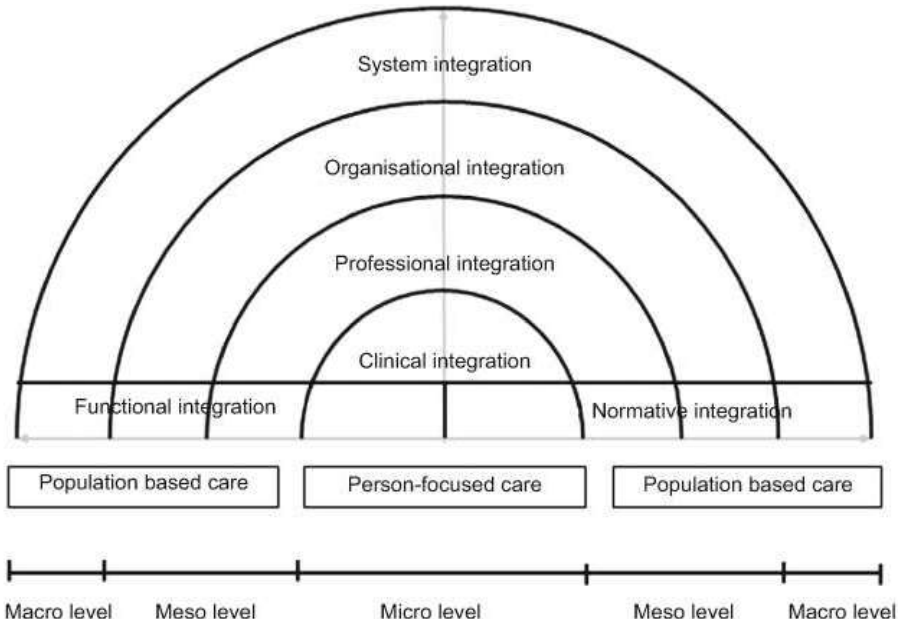
Integrated care refers to a co-ordinated and coherent set of services that are planned, managed, and delivered to individual service users across several organizations and co-operating professionals (13,14). The essence of integrated care is a continuum of care for service users, which crosses the boundaries of public health, primary, secondary, and tertiary care (3,15,16). At present, little is known about integrated care in the Dutch maternity care system, and no evidence exists supporting the assumption that integrated care improves the quality of birth care. While many evaluations of collaboration in these systems have been conducted (e.g.,(17-25), most of these evaluations solely focus on collaboration between professionals and lacks a focus on collaboration between organizations. In 2013, based on the Rainbow Model of Integrated Care (10), an instrument was developed to describe levels of integration in birth care settings, resulting in questionnaires to explore integrated care in birth centres and in Maternity Care Networks. These questionnaires were used in the Dutch Birth Centre Study (9) and the Maternity Care Network Study (26). The aim of the present study is to explore the validity of the Dutch Birth Centre Integration Questionnaire (DBC-IQ) and the Maternity Care Networks Integration Questionnaire (MCN-IQ), in order to determine whether the questionnaires are useful to measure integration in a maternity care system.

Theory and methods

Theoretical background

The Rainbow Model of Integrated Care was developed to obtain a better understanding of the concept of integrated care from a primary care perspective (10) (see Figure 1). This conceptual framework combines dimensions of integrated care with the organization and functions of primary care. The model includes multiple dimensions of integration that play complementary roles. It distinguishes four dimensions on the micro, meso and macro levels (clinical, professional, organizational and system integration) to deliver comprehensive services that address the needs of individual people and the population. It also distinguishes two dimensions – functional and normative integration – to ensure connectivity between the levels. The Rainbow Model of Integrated Care is considered useful to understand the complex and multidimensional nature of integrated care (27). The model is specified in a taxonomy consisting of 59 determinants, based on a literature review and a Delphi study among Dutch experts, validated by expert panels in international conferences held in Singapore and Brussels (16,28). Due to the characteristics of the Dutch maternity care system, the Rainbow Model of Integrated Care can be used to evaluate birth care in different settings. Therefore, the taxonomy afforded by the model (16) was used to develop two questionnaires to ascertain a better understanding of integrated care birth care settings.

Figure 1 Rainbow Model of Integrated Care



Adopted with permission from:"Understanding integrated care: a comprehensive conceptual framework based on the integrative functions of primary care"(10)

Methods

Development of the questionnaires

The starting point for creating our questionnaires was a survey used to examine integrated care in primary care organizations (29). For each dimension of integration in the Rainbow Model of Integrated Care, we identified determinants of integration (items). The inclusion procedure for these items was based on the following conditions: highest panel median in a Delphi study (16) and applicability in birth (centre) care. For each item, we formulated answer categories that corresponded with stages of integration: from one (not integrated) to four (fully integrated), forming a nominal scale, with equal weight between the answer categories. The equal weighting was an assumption because we had no way of knowing whether the distances between the answers were regarded as equal by the respondents. Statements corresponding to each stage were derived from the primary care questionnaire and birth centre practice (29). The questionnaires were tested in a pilot study by three community midwives familiar with birth (centre) care and we adapted some questions/statements based on their comments.

We first constructed the MCN-IQ, which consisted of 20 questions with two to four questions for each dimension. The aim of this questionnaire was to present professionals of Maternity Care Networks a way to reflect on their level of network integration in order to support their efforts to improve collaboration. Based on our experiences of using this questionnaire, we then constructed the DBC-IQ. The aim of this questionnaire was to

classify birth centres in groups with similar integration profiles, as a necessary first sept for outcome evaluation. To create a balanced questionnaire, we formulated the same number of questions for each dimension of integration. Therefore, this questionnaire consisted of 24 questions, and 19 items are the same in both questionnaires. Formulations of the questions were adapted to the settings.
Table 1 reports the items and dimensions of integration used in both questionnaires.

Study population

Maternity Care Network Study: MCN-IQ

In 2013 and 2014, information meetings about models of integrated birth care and related finance were organized for regional Maternity Care Networks in the Netherlands. These meetings aimed to: 1) inform professionals about proposed changes in the organization of birth care by the Dutch government and about implications of these changes for their organizations and 2) allow professionals to reflect upon the level of their network integration, based on the MCN-IQ. The aim of this reflection was to support the networks to improve their collaboration. All over the country, these networks were invited to hold one of these information meetings in their region. Three weeks before the meeting, the MCN-IQ was send by e-mail to the members of the Maternity Care Networks. The number of questionnaires varied from 20 to 125 per network, depending on the network's size. Overall 813 participants returned the list (a response rate of 53 %). Most of the respondents were community midwives (48 %), followed by clinical midwives (14 %), obstetricians (12 %), managers of maternity care assistance organizations (8 %) and paediatricians (5 %). 179 respondents (22 %) did not complete more than 30 % of the items and were excluded, resulting in 634 questionnaires being suitable for analysis.

Dutch Birth Centre Study: DBC-IQ

The Dutch Birth Centre Study was designed to present evidence-based recommendations for the organization and functioning of future birth centres in the Netherlands, based on the careful assessment of existing birth centres (9). Based on the definition of birth centres, 23 birth centres were identified at the reference date (September 2013) [Chapter 3]. These centres included relatively new birth centres and those with a longer history, mono-disciplinary- and multidisciplinary-orientated birth centres, and birth centres with different histories of development. All 23 centres were included in our study and invited to participate, and all the managers gave their permission for their birth centre to participate. Subsequently, we asked managers of birth centres to select two or three care providers from different professions working within or with the birth centre to be interviewed. Depending on the local situation, those invited to be interviewed included: community midwives, maternity care assistants, clinical midwives, obstetric nurse specialists and obstetricians. The researcher (IB) contacted all participants to explain the

study. Two weeks before the visits and interviews, the DBC-IQ was sent to the manager and professionals of each birth centre by e-mail. One week later a reminder was sent to any non-responders. Between January 2014 and April 2015, all 23 birth centres participated in this study. These birth centres were located throughout the Netherlands in both urban and rural areas. We sent 73 questionnaires to managers and professionals of birth centres (range 2-5) and 61 of them opened the online questionnaire (a response rate of 84 %). Five respondents (8 %) failed to complete more than 30 % of the items and these responses were excluded, resulting in 56 questionnaires suitable for the analyses,

Data analysis

We evaluated the following psychometric properties of the MCN-IQ and DBC-IQ: feasibility, discriminatory validity and reliability. To determine the feasibility of both questionnaires, we calculated the missing item rates per dimension of integration and the maximum rate per item. While we found few recommendations in the literature for a cut off point for acceptable response rates for surveys, we determined that missing item rates below 20 % were acceptable (30,31). To assess the discriminative validity of the questionnaires, we took two steps to calculate the integration scores per Maternity Care Network and birth centre. First we calculated the mean scores on the items and per dimension for each respondent (range 1-4). Secondly, we calculated the mean scores of all respondents per item and on the six dimensions of integration for each Maternity Care Network and birth centre (range 1-4). In addition, we computed the total integration score in both settings using the mean score over the six dimensions (range 1-4). To examine the differences between Maternity Care Networks and birth centres on the items and dimensions of integration and the total integration score, we performed a between-subgroup post-hoc test, using a one-way analysis of variance (ANOVA).

To verify in a qualitative way the ability of the MCN-IQ to discriminate between organizations, we asked persons familiar with Maternity Care Networks to nominate the most and least integrated groups for the first eight Maternity Care Networks that participated in the study. We made sure that they did not know the results of the MCN-IQ when ranking the Maternity Care Networks. When presenting the results during the information meetings about models of integrated birth care and related finance, we asked the participants of the Maternity Care Networks the extent to which they recognised the results of the assessments.

To assess the reliability of both questionnaires, we calculated the internal consistency by using Cronbach's alpha coefficient for both the total questionnaires and the six dimensions of integration. Alpha coefficients above 0.70 were considered an adequate indication of internal consistency (31). To examine the consistency of the answers given by the respondents of each Maternity Care Network, we calculated the range of mean scores on the integration dimensions. We also determined the difference in mean scores

of primary care () and secondary care professionals in each Maternity Care Network. To do so, we classified community midwives, general practitioners and (managers of) maternity care assistants as “primary care professionals” and clinical midwives, obstetricians, obstetrics and gynaecology nurse specialists, managers of hospitals as “secondary care professionals”. This consistency analysis was not possible for the DBC-IQ because of the small number of questionnaires. All data analyses were performed using SPSS version 22 (IBM Statistics).

Results

Maternity Care Network Study: MCN-IQ

The average item missing rate of the MCN-IQ was 9 % (1180 of 12960 items). Maximum item missing rates per dimension ranged from 8.8 to 11.6 %. The highest missing rate was on the functional dimension. All missing rates were below the predefined threshold of 20 % (see Table 2).

Table 2 Missing item values and the maximum percentage missing per item for each dimension of integration for MCN-IQ and DBC-IQ

	MCN-IQ (n=707)				DBC-IQ (n=58)			
Dimension	Total items	Missing items (n)	Missing per domain (%)	Missing per item; maximum (%)	Total items	Missing items (n)	Missing per domain (%)	Missing per item; maximum (%)
Clinical integration	2532	296	12	11.1	222	10	5	6.9
Professional integration	2659	169	6	8.8	223	9	4	6.9
Organizational integration	1943	178	9	10.9	223	9	4	6.9
Functional integration	1923	198	10	11.6	220	12	5	13.8
System integration	1317	97	7	10.9	214	18	8	12.1
Normative integration	2586	242	9	9.3	224	8	4	5.2
Total	12960	1180	9	10.4	1326	66	5	8.6

Table 3 presents the mean scores for each Maternity Care Network on the dimensions of integration and the total integration scores.

Between-subgroup post-hoc comparisons showed statistically significant differences between Maternity Care Networks for all items, dimensions and the total integration scores. The highest scores and the lowest scores differ more than one point on the professional, functional, system and normative dimensions of integration (on a scale of one to four). The largest differences are on the professional dimension (1.44). For all Maternity Care Networks the mean scores on normative integration are the highest and on functional integration the lowest of all dimensions. For most of the networks (63 %) professional integration is second highest (see Figure 2).

Table 3 Integration characteristics of Maternity Care Networks

			Maternity Care Network Study													
			CI		PI		OI		FI		SI		NI		TI	
MCN	N	Range	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
1	32	1-4	2.05	0.46	2.35	0.67	2.14	0.55	1.43	0.37	1.75	0.71	2.80	0.51	2.09	0.38
2	30	1-4	1.98	0.53	2.29	0.59	1.97	0.39	1.63	0.52	2.13	0.56	2.79	0.45	2.13	0.33
3	13	1-4	1.73	0.31	2.53	0.60	2.12	0.43	1.21	0.29	1.69	0.60	2.85	0.55	2.02	0.33
4	27	1-4	2.27	0.53	2.37	0.59	1.94	0.37	1.43	0.45	2.33	0.65	2.88	0.48	2.20	0.30
5	23	1-4	1.80	0.31	2.41	0.58	2.02	0.25	1.46	0.44	1.98	0.80	2.55	0.61	2.04	0.36
6	18	1-4	1.95	0.47	2.81	0.59	2.30	0.27	1.78	0.44	2.61	0.37	3.06	0.36	2.42	0.21
7	24	1-4	2.18	0.47	3.02	0.77	2.61	0.46	2.17	0.48	2.56	0.66	3.16	0.56	2.62	0.40
8	13	1-4	1.92	0.48	1.58	0.44	1.67	0.70	1.26	0.31	1.65	0.66	2.47	0.46	1.76	0.33
9	27	1-4	2.18	0.35	2.77	0.49	2.43	0.43	1.74	0.52	2.59	0.64	3.07	0.50	2.46	0.34
10	35	1-4	1.59	0.42	2.50	0.49	2.18	0.37	1.44	0.38	2.40	0.71	2.71	0.53	2.13	0.26
11	35	1-4	1.69	0.38	1.92	0.51	1.92	0.40	1.21	0.28	1.36	0.51	2.60	0.59	1.78	0.29
12	28	1-4	2.46	0.57	2.73	0.63	2.32	0.51	1.76	0.57	2.07	0.73	3.17	0.51	2.42	0.42
13	50	1-4	1.74	0.33	2.17	0.57	2.00	0.39	1.46	0.42	1.45	0.52	2.52	0.47	1.89	0.29
14	32	1-4	1.67	0.36	1.82	0.47	1.83	0.50	1.19	0.26	1.91	0.50	2.41	0.52	1.81	0.27
15	15	1-4	1.79	0.43	2.02	0.71	1.97	0.56	1.36	0.50	2.07	0.56	2.62	0.43	1.97	0.35
16	12	1-4	2.08	0.50	2.07	0.62	1.89	0.23	1.14	0.17	1.67	0.44	2.44	0.57	1.88	0.27
17	32	1-4	2.38	0.53	2.13	0.59	1.97	0.55	1.76	0.44	2.34	0.57	2.49	0.64	2.18	0.38
18	22	1-4	1.53	0.23	1.91	0.25	1.86	0.25	1.17	0.22	2.11	0.49	2.11	0.38	1.78	0.14
19	20	1-4	2.04	0.50	2.18	0.77	2.16	0.46	1.47	0.40	2.38	0.58	2.91	0.66	2.19	0.45
20	44	1-4	1.85	0.41	1.80	0.41	1.86	0.50	1.23	0.21	1.95	0.63	2.19	0.58	1.81	0.28
21	31	1-4	1.74	0.39	1.97	0.48	2.08	0.58	1.32	0.30	1.69	0.53	2.61	0.56	1.90	0.31
22	22	1-4	1.95	0.41	1.97	0.54	2.02	0.62	1.35	0.44	1.86	0.64	2.51	0.51	1.94	0.38
23	29	1-4	1.73	0.40	2.20	0.50	1.98	0.49	1.25	0.27	1.29	0.47	2.54	0.58	1.83	0.30
24	20	1-4	1.75	0.46	2.47	0.50	2.07	0.28	1.43	0.39	1.95	0.39	2.82	0.37	2.08	0.24
Total	634	1-4	1.91	0.49	2.23	0.64	2.05	0.49	1.45	0.45	1.97	0.70	2.66	0.59	2.05	0.39
			F(23,610) = 9.29***		F(23,610) = 10.11***		F(23,610) = 4.93***		F(23,610) = 10.10***		F(23,610) = 11.52***		F(23,610) = 7.56***		F(23,610) = 14.31***	

^ * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

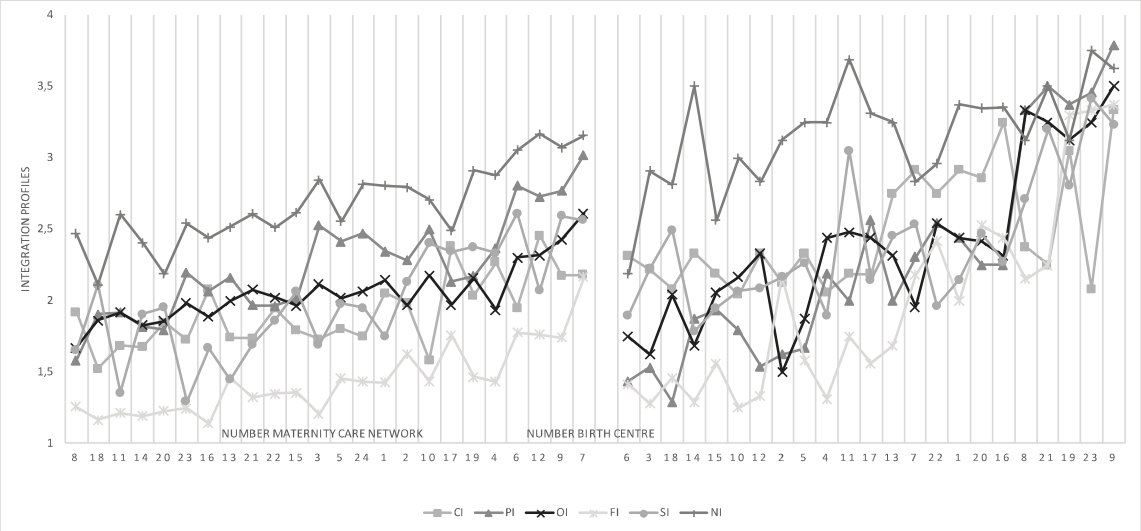
CI: Clinical Integration, PI: Professional Integration, OI: Organizational Integration, FI: Functional Integration, SI: System Integration, NI: Normative Integration, TI: Total Integration

The advisors working with organizations familiar with the Maternity Care Networks nominated Maternity Care Network 7 as the most integrated network and Maternity Care Networks 5 and 8 were described as the least integrated. Their evaluation is in line with our analysis: Maternity Care Network 7 had the highest mean total integration score and Maternity Care Network 8 the lowest. The score of Maternity Care Network 5 was only slightly higher. During the information meetings, participants usually recognised their own results. If not, the networks discussed their results during the meetings. It turned out

that while some community midwives are involved in one Maternity Care Network others participate in more than one because they are practicing in a region with more than one hospital and the Maternity Care Networks are formed around hospitals. Community midwives who are actively participating in a particular network are usually more familiar with the organization of that network than community midwives who are more distant from its daily practise.

The reliability of the total MCN-IQ showed a Cronbach's alpha of 0.82, showing good internal consistency (see Table 4). Within each dimension, Cronbach's alpha ranged from 0.14 – 0.66, suggesting there is low internal consistency between items within the dimensions. Furthermore, we observed that in some Maternity Care Networks the range of mean scores on the integration dimensions varied more than two points, caused mostly by a difference in answers given by community and clinical midwives. The differences on the mean scores of all dimensions between primary and secondary care professionals were relatively small.

*Figure 2 Integration profiles of Maternity Care Networks and birth centres (sorted by total integration score)**



Dutch Birth Centre Study: DBC-IQ

The average item missing rate of the DBC-IQ was 5 % (66 of 1326 items). Maximum item missing rates per dimension ranged from 5.2 to 13.8 %. The highest missing rates were on the functional and system dimensions (see Table 2).

Table 5 reports the mean scores for each of the dimensions of integration and the total integration scores.

Post-hoc comparisons identified statistically significant differences between birth centres for the professional, organizational and functional dimensions of integration and on 50 % of the items. The highest scores and the lowest scores of birth centres differed by two or more points on the professional and organizational dimensions of

integration and by more than one point on the other dimensions (on a scale from one to four). The largest differences between these birth centres were on the professional dimension (2.21). For 82 % of the centres, the mean scores on the normative dimension were the highest of all dimensions. The functional dimension had the lowest scores for 48 % of centres, and system integration had the lowest scores for 26 % of the centres (see Figure 2).

The reliability of the total DBC-IQ showed a Cronbach's alpha of 0.86, showing good internal consistency (see Table 4). Within the dimensions, Cronbach's alpha ranged from 0.28– 0.63, suggesting there is low internal consistency between items within one dimension. The lowest alpha was on the system dimension, the highest on the organizational dimension. In two birth centres (8 %), the range of mean scores between respondents was larger than two points on one dimension of integration. For eight other birth centres (35 %), we found the range of mean scores to be between one and two points.

Table 4 Mean, SD, Range and Cronbach's α for each dimension of integration for MCN-IQ and DBC-IQ

	MCN-IQ (n=634)					DBC-IQ (n=56)				
Dimension	**Number of items**	**Mean**	**SD**	**Range**	**Cronbach's a**	**Number of items**	**Mean**	**SD**	**Range**	**Cronbach's a**
Clinical integration	4	1.91	0.49	2.50	0.44	4	2.59	0.47	1.75	0.53
Professional integration	4	2.23	0.64	3.00	0.55	4	2.82	0.77	3.00	0.53
Organizational integration	3	2.05	0.49	2.50	0.36	4	2.68	0.70	2.75	0.63
Functional integration	3	1.45	0.45	2.33	0.40	4	2.31	0.76	2.75	0.62
System integration	2	1.97	0.70	3.00	0.14	4	2.54	0.47	2.00	0.28
Normative integration	4	2.66	0.59	2.75	0.66	4	3.41	0.48	1.75	0.62
Total					0.82					0.86

Discussion

This study examined the feasibility, discriminative validity, and reliability of the Maternity Care Network and Dutch Birth Centre Integration Questionnaires. We have shown that both questionnaires are feasible for the evaluation of integration in Maternity Care Networks or birth centres. The questionnaires show acceptable average missing rates according to the literature (30,31).These rates are higher for the MCN-IQ than for the DBC-IQ, just like the mean percentage of maximum missing items. For both questionnaires, highest missing rates were assessed at the functional dimension, which may have been caused by the diversity of the respondents. In the Dutch Birth Centre

Study, only respondents who were very familiar with the birth centre were invited to participate. In contrast, in the Maternity Care Network Study, all participants who were in some way connected to the Maternity Care Network were invited. Even professionals hardly involved and, therefore, unfamiliar with the organization of the network filled in the questionnaire. This also could explain the relatively high percentage of respondents with more than 30 % missing answers. For future use of the questionnaire, we recommend that only respondents who are at least moderately familiar with the organization of birth care in the region are invited to complete the questionnaire.

Both questionnaires are able to discriminate between Maternity Care Networks and birth centres based on the level of integration. We observed statistically significant differences between Maternity Care Networks on all items and dimensions of integration and the total integration score. Between birth centres, we only observed statistically significant differences on the professional, organizational and functional dimensions of integration. The distinctive integration profiles of Maternity Care Networks and birth centres as presented showed similar patterns with highest scores on normative integration followed by professional and organizational integration, and lowest scores on clinical and functional integration (see Figure 2). This pattern is particularly noticeable in the Maternity Care Network profiles, but also recognizable in the birth centres. These findings are consistent with theories about the development of collaborative groups. Integration is to a large extent based on professional behaviour and attitude. Informal coordination mechanisms based on culture, shared values and vision are essential primary conditions towards integration on a professional and organizational level (10,32). Normative integration has to be implemented first before realizing better integration at the professional and organizational levels. Patient-centred care (clinical integration) is a key concept of integrated care but it demands a change in focus in organizations that are traditionally more physician-centred (2).

We did observe differences between the MCN-IQ and DBC-IQ in distinctiveness. This may be caused by the dissimilarity in the number of respondents that completed in the questionnaire, because significance depends on the size of the differences and the sample size. We also noticed a dissimilarity in the differences between the highest and lowest scoring Maternity Care Networks and birth centres on the dimensions of integration. In the Maternity Care Network study, these differences were smaller than in the Dutch Birth Centre Study. A possible explanation for this dissimilarity is selection bias in the Maternity Care Network Study. We included a self-selected group of Maternity Care Networks, namely those who were already interested in the issue and requested meetings to learn more about integrated birth care. It is possible that more integrated Maternity Care Networks were less interested in such information meetings, because they already had their own information about integrated birth care. Maternity Care Networks that were less integrated were probably also not interested in these meetings,

Table 5 Integration characteristics of birth centres

			Dutch Birth Centre Study													
			CI		PI		OI		FI		SI		NI		TI	
BC	N	Range	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
1	2	1-4	2.83	0.24	3.38	0.18	2.88	0.18	2.50	0.35	2.70	0.14	4.00	0.00	3.05	0.07
2	1	1-4	2.25		2.00		1.50		3.33		2.33		3.50		2.49	
3	4	1-4	2.19	0.38	2.06	0.72	2.00	0.41	1.56	0.38	2.65	0.47	3.31	0.77	2.30	0.45
4	2	1-4	2.13	0.18	3.13	0.53	3.13	0.18	1.63	0.18	2.40	0.28	4.00	0.00	2.73	0.16
5	3	1-4	2.67	0.29	2.33	0.95	2.50	1.09	2.17	0.63	2.73	0.46	3.75	0.43	2.69	0.62
6	1	1-4	2.75		2.75		2.50		2.00		2.60		3.75		2.73	
7	3	1-4	2.83	0.29	2.36	0.13	1.92	0.38	2.11	0.54	2.47	0.31	2.92	0.38	2.43	0.09
8	3	1-4	2.50	0.25	3.42	0.14	3.42	0.29	2.56	0.51	2.62	0.20	3.25	0.50	2.96	0.21
9	3	1-4	3.17	0.58	3.58	0.72	3.50	0.66	3.25	0.43	3.07	0.58	3.50	0.43	3.34	0.57
10	3	1-4	2.08	0.58	2.58	0.29	2.58	0.38	1.50	0.66	2.33	0.12	3.25	0.66	2.39	0.34
11	2	1-4	2.13	0.18	2.50	1.06	2.71	1.47	2.13	0.53	2.70	0.99	3.88	0.18	2.67	0.68
12	3	1-4	2.42	0.29	2.08	0.14	2.92	0.63	1.42	0.52	2.18	0.55	3.17	0.29	2.36	0.30
13	2	1-4	2.75	0.00	3.00	0.94	3.13	0.18	2.38	0.53	2.71	0.06	3.50	0.35	2.91	0.34
14	2	1-4	2.50	0.35	2.50	0.71	1.88	0.18	1.88	0.88	1.98	0.32	4.00	0.00	2.45	0.18
15	2	1-4	2.13	0.18	2.88	0.88	2.63	0.88	1.88	1.24	2.10	0.71	2.88	0.53	2.41	0.74
16	2	1-4	3.00	0.00	3.25	0.71	2.63	0.88	3.13	0.53	2.35	0.21	3.46	0.29	2.97	0.44
17	2	1-4	2.38	0.88	3.13	0.53	2.63	0.53	1.88	0.18	2.30	0.14	3.38	0.18	2.61	0.06
18	2	1-4	2.25	0.35	1.54	0.29	2.00	0.35	2.38	0.88	2.88	0.18	3.13	0.53	2.36	0.10
19	5	1-4	3.10	0.14	3.75	0.31	3.25	0.56	3.35	0.29	2.61	0.56	3.25	0.40	3.22	0.19
20	3	1-4	2.97	0.46	2.50	0.66	2.33	0.29	2.56	0.10	2.34	0.59	3.44	0.27	2.69	0.31
21	1	1-4	2.00		3.00		2.75		2.50		3.00		3.50		2.79	
22	3	1-4	2.75	0.50	2.83	0.88	2.58	0.52	2.08	0.88	2.13	0.31	2.92	0.63	2.55	0.57
23	2	1-4	2.75	0.35	3.75	0.00	3.38	0.18	3.13	0.18	3.40	0.28	3.75	0.00	3.36	0.07
To-tal	56	1-4	2.59	0.47	2.82	0.77	2.68	0.70	2.31	0.76	2.54	0.47	3.41	0.48	2.73	0.45
			F(22,35) = 1.80		F(22,35) = 2.13*		F(22,35) = 2,08*		F(22,35) = 5.58***		F(22,35) = 1.38		F(222,35) = 1.21		F(22,35) = 1.81	

^ * p < 0.05; ** p < 0.01; *** p < 0.001

CI: Clinical Integration, PI: Professional Integration, OI: Organizational Integration, FI: Functional Integration, SI: System Integration, NI: Normative Integration, TI: Total Integration

perhaps because they did not see the added value of such meetings. It is conceivable that networks that participated in this study were all, more or less, at the same stage of their integration process, which could explain the small differences. This possibility of our having included only a select group of Maternity Care Networks in the study is in contrast to the Dutch Birth Centre Study, where all birth centres participated.

We determined that for both questionnaires the internal consistency was good. This indicates that the items and dimensions as a whole are coherent; they all contribute to the same overall concept of integration. However, we observed a low internal consistency between items within each dimension for both questionnaires, especially for the MCN-IQ, indicating that items within each dimension are not, or are only weakly, correlated with each other. In this questionnaire, only the normative dimension showed a reasonable internal consistency. These findings indicate that there is no psychometric consistency within the items of one dimension. It confirms the basic principle of the development of the taxonomy. In our view this finding confirms the underlying key feature of the six dimensions of integration – a range of partly unrelated determinants within one dimension, all contributing to that dimension. The separate dimensions may be regarded as clinimetric scales, often used to describe the clinical condition of a patient (for example the Apgar Score, consisting of predictors of a neonatal condition that are uncorrelated with one another (33). Further research is necessary to investigate whether our findings can be confirmed in other settings (both in the Netherlands and in other countries).

We observed that in some Maternity Care Networks the mean scores on the integration dimensions varied between respondents within one network. The explanation for this variation may be that community midwives are the largest number of professionals within the Maternity Care Networks, making differences within one group more plausible. However, it is also conceivable that community midwives are involved in the Maternity Care Networks in varying degrees, depending on their local situation. Despite the wide range in answers, we found that the differences on the mean scores of all dimensions between primary and secondary care professionals in the Maternity Care Networks were relatively small. This indicates that the range in answers is rather similar in those groups of professionals. In the Dutch Birth Centre Study, respondents not only were smaller in number, they were also from similar disciplines (community midwives, managers of birth centres and maternity care assistants).

Limitations

By interpreting the results, limitations of the study should be considered. First, the psychometric properties of the questionnaires are examined only in the Netherlands. Because of the specific key features of the Dutch maternity care system (for example independent practicing community midwives and community midwives as gatekeepers

to secondary obstetric care), it is yet unclear whether the questionnaires can be used in other maternity care systems. We assume that the questionnaires can be used in other countries with a different maternity care system. Using and testing the questionnaires in other countries could contribute to a higher external validity. Also, the number of respondents that filled in the questionnaires in the Dutch Birth Centre Study is too small to perform a valuable validation. Using and testing the DBC-IQ in more birth centres also in other countries, will improve its validity. Another limitation relates to the respondents who filled in the questionnaires. In our study, only data from a health care provider and manager perspective are collected. Reflections from a client's perspective are lacking. Because the multidimensional aspects of integration in which patient centeredness (clinical integration) is an important key feature, this perspective should also be included in an assessment to get a multidimensional view of integration. At last, we only tested the validity of the questionnaires for assessment of the level of integration between different sites. A next step will be to explore the relation between level of integration, outcomes of care, client experiences, and costs. Further research is necessary to test whether the questionnaires are able to assess changes in levels of integration over time.

Implications for practice and research

This study tested a newly developed instrument to assess aspects of integration in a maternity care system and contributes to a better understanding of integrated care in these settings. Using the instruments gives us an opportunity to compare relative levels of integration (between different sites and from different perspectives), but we do not know if the instrument is also usable to measure the absolute degree of integration. Professionals could have different interpretations of integration and its levels. The complexity of integrated care makes it difficult to test this: there is no 'golden standard' of levels of integration. Therefore, the instrument might be useful by comparing outcomes of care, related to differences in levels of integration, in different sites, but less useful in judging the levels of integration of an individual site. In the Dutch Birth Centre Study we tried to tackle the problem of different interpretations of integration by combining the questionnaires with personal interviews, conducted by one researcher. Further research is necessary to explore whether this solution solves this problem.

Although evidence is available on the effectiveness of integrated care in chronic care, until now, there is no evidence for this assumption in birth care, even while current government policy in the Netherlands is based on it. For example, beginning in 2017, the payment system for maternity care will allow the bundling of payments for both primary and secondary birth care providers, a change that will require more integration between both echelons. Using the questionnaires might be a valuable contribution to examine the assumption that integrated birth care improves quality of care by combining integration profiles and perinatal outcomes, client experiences and costs. When using them in

further research, these data could be used to explore the effectiveness of integrated birth care. Also these data can be used to explore whether the integration questionnaires are able to predict effectiveness of a birth care setting.

In our view, the instrument can also be used to support health care professionals, managers, policymakers and health insurance companies involved in the organization of integrated birth care, allowing them to better understand its concepts, which might, in turn, help the political debate. However, based on present studies, we find the instrument unsuitable as management tool for, for example, health insurance companies. Further research is necessary to explore this application.

Conclusion

The MCN-IQ and DBC-IQ are feasible and can discriminate between Maternity Care Networks and birth centres with different integration profiles in the Netherlands. The questionnaires offer an opportunity to better understand integrated care as an approach to the delivery of health services in different models of integrated birth care. Further research is necessary to explore whether the instruments can be applied in other countries and whether they can be used to assess changes in levels of integration over time, to measure absolute levels of integration and to predict outcome of a birth care setting. The development of the questionnaires is one more step in building knowledge of the complexity of integrated care.

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*Table 1 Integrated care dimensions and used items of the Rainbow Model of Integrated Care in the MCN-IQ and DBC-IQ**

Level	Dimension	Description dimension	Determinant MCN-IQ	Determinant DBC-IQ	Description determinant
Micro	Clinical integration	The coordination of person-focused care in a single process across time, place and discipline.	Case management	Case management	Coordination of care for clients' with a high-risk profile (e.g. identifying risks, developing policies and guidance).
			Continuity	Continuity	The organization of care is aimed to provide fluid care delivery for an individual client.
			Individual multidisciplinary care plan	Individual multidisciplinary care plan	Implementation of a multidisciplinary care plan at the individual client level.
			Client participation	Client participation	Clients are (pro) actively involved in the design, organization and provision of care at the operational level.
Meso	Professional integration	Inter-professional partnerships based on shared competences, roles, responsibilities and accountability to deliver a comprehensive continuum of care to a defined population.	Inter-professional education	Inter-professional education	Inter-professional education for professionals focused on interdisciplinary collaboration.
			Shared vision between professionals	Shared vision between professionals	A shared vision between professionals focused on the content of care.
			Multidisciplinary guidelines and protocols	Multidisciplinary guidelines and protocols	Multidisciplinary guidelines and protocols are implemented coherently at the operational level.
			Inter-professional governance	Inter-professional governance	Inter-professional governance focused on openness, integrity and accountability between professionals at the operational level (e.g. joint accountability, appeal on pursued policies and responsibilities).

Meso	Organizational integration	Inter-organizational relationships (e.g. contracting, strategic alliances, knowledge networks, mergers), including common governance mechanisms, to deliver comprehensive services to a defined population.	Performance management	Performance management	Collective elaborated performance management between organizations within the collaboration.
			Learning organisations	Learning organisations	Collective learning power between the organizations within the collaboration (e.g. joint research and development programs).
			Complaints procedure	Complaints procedure	Existing complaints procedure for the partnership
				Interest management	A climate that attempts to bridge the various interests (e.g. social, organizational and personal interests) at the operational, tactical and strategic level.
Macro	System integration	A horizontal and vertical integrated system, based on a coherent set of (informal and formal) rules and policies between care providers and external stakeholders for the benefit of people and populations.	Stakeholder management	Stakeholder management	Engagement of various stakeholders (e.g. municipality, patient organizations and health insurance company).
			Environmental climate	Environmental climate	Political, economic and social climate in the environment of the collaboration (e.g. market characteristics, regulatory framework, competition).
				Available resources	Available resources in the environment of the collaboration (e.g. usable buildings, (over) capacity, professionals and funding streams).
				Good governance	Creating trust towards external stakeholders (e.g. municipality and health insurance company) due to working method, reputation, management, control and/or supervision.

Micro, meso, macro	Functional integration	Key support functions and activities (i.e. financial, management and information systems) structured around the primary process of service delivery, to coordinate and support accountability and decision making between organizations and professionals to add overall value to the system.	Information management	Information management	Aligned information management systems accessible at operational, tactical and strategic levels (e.g. monitoring and benchmarking systems).
			Service management	Service management	Aligned service management for the client (e.g. collective telephone number, counter assistance and 24-hour access).
			Regular feedback of performance indicators	Regular feedback of performance indicators	Regular feedback of performance indicators for professionals at the operational level to enable them to improve their performance.
				Resource management	Coherent use of resources (e.g. collective real estate and funding).
Micro, meso, macro	Normative integration	The development and maintenance of a common frame of reference (i.e. shared mission, vision, values and culture) between organizations, professional groups and individuals.	Experienced trust		The extent to which those involved in the collaboration at operational, tactical and strategic levels experience trust from their partners.
			Visionary leadership	Visionary leadership	Leadership based on a personal vision that inspires and mobilizes people.
			Quality features of the informal collaboration	Quality features of the informal collaboration	Effectiveness and efficiency of the informal collaboration at the operational, tactical and strategic levels (e.g. group dynamics and attention to the undercurrent).
			Trust	Trust	The extent to which those involved in the collaboration at operational, tactical and strategic levels trust each other.
				Reliable behaviour	The extent to which the agreements and promises within the collaboration are fulfilled at operational, tactical and strategic levels.

Adapted with permission from:"Towards a taxonomy for integrated care; a mixed-methods study"(30).

References

(1) Grone O, Garcia-Barbero M, WHO European Office for Integrated Health Care Services. Integrated care: a position paper of the WHO European Office for Integrated Health Care Services. Int J Integr Care 2001;1:e21.

(2) Berwick DM, Nolan TW, Whittington J. The triple aim: care, health, and cost. Health Aff (Millwood) 2008 May-Jun;27(3):759-769.

(3) Kodner DL. All together now: a conceptual exploration of integrated care. Healthc Q 2009;13 Spec No:6-15.

(4) Coleman K, Austin BT, Brach C, Wagner EH. Evidence on the Chronic Care Model in the new millennium. Health Aff (Millwood) 2009 Jan-Feb;28(1):75-85.

(5) Zeitlin J, Mohangoo A, Cuttini M. The European Perinatal Health Report: comparing the health and care of pregnant women and newborn babies in Europe. J Epidemiol Community Health 2009;63(9):681-682.

(6) Stuurgroep Zwangerschap en geboorte. A good start, safe birth care (In Dutch: Een goed begin, veilige zorg rond zwangerschap en geboorte). Advies Stuurgroep Zwangerschap en Geboorte.Utrecht Stuurgroep Zwangerschap en Geboorte 2009.

(7) Pieters A, van Oirschot C, Akkermans H. No cure for all evils: Dutch obstetric care and limits to the applicability of the focused factory concept in health care. International Journal of Operations & Production Management 2010;30(11):1112-1139.

(8) Amelink-Verburg M, Rijnders M, Buitendijk S. A trend analysis in referrals during pregnancy and labour in Dutch midwifery care 1988–2004. BJOG: An International Journal of Obstetrics & Gynaecology 2009;116(7):923-932.

(9) Hermus MA, Wiegers TA, Hitzert MF, Boesveld IC, van den Akker-van, M Elske, Akkermans HA, et al. The Dutch Birth Centre Study: study design of a programmatic evaluation of the effect of birth centre care in the Netherlands. BMC pregnancy and childbirth 2015;15(1):148.

(10) Valentijn PP, Schepman SM, Opheij W, Bruijnzeels MA. Understanding integrated care: a comprehensive conceptual framework based on the integrative functions of primary care. International Journal of Integrated Care 2013;13.

(11) Posthumus A, Schölmerich V, Waelput A, Vos A, De Jong-Potjer L, Bakker R, et al. Bridging between professionals in perinatal care: towards shared care in the Netherlands. Matern Child Health J 2013;17(10):1981-1989.

(12) Boesveld-Haitjema I, Waelput A, Eskes M, Wiegers T. State of local materinty care consultation and cooperation groups (in Dutch: Stand van zaken verloskundige samenwerkingsverbanden). Nederlands Tijdschrift voor Obstetrie & Gynaecologie 2008;121:25-29.

(13) Minkman M, Ahaus K, Fabbricotti I, Nabitz U, Huijsman R. A quality management model for integrated care: results of a Delphi and Concept Mapping study. Int J Qual Health Care 2009 Feb;21(1):66-75.

(14) Fabbricotti I. Integrated care in Europe: description and comparison of integrated care in six EU countries 2003.

(15) Goodwin N, Peck E, Freeman T, Posaner R. Managing across diverse networks of care: lessons from other sectors. Report to the NHS SDO R&D Programme.Birmingham: Health Services Management Centre, University of Birmingham 2004.

(16) Valentijn PP, Boesveld IC, Van der Klauw, Denise M, Ruwaard D, Struijs JN, Molema JJ, et al. Towards a taxonomy for integrated care: a mixed-methods study. International journal of integrated care 2015;15.
(17) Beasley S, Ford N, Tracy SK, Welsh AW. Collaboration in maternity care is achievable and practical. Australian and New Zealand Journal of Obstetrics and Gynaecology 2012;52(6):576-581.
(18) D'Amour D, Goulet L, Labadie JF, Martin-Rodriguez LS, Pineault R. A model and typology of collaboration between professionals in healthcare organizations. BMC Health Serv Res 2008 Sep 21;8:188-6963-8-188.
(19) Darlington A, McBroom K, Warwick S. A northwest collaborative practice model. Obstet Gynecol 2011 Sep;118(3):673-677.
(20) Harris SJ, Janssen PA, Saxell L, Carty EA, MacRae GS, Petersen KL. Effect of a collaborative interdisciplinary maternity care program on perinatal outcomes. CMAJ 2012 Nov 20;184(17):1885-1892.
(21) Morgan L, Carson G, Gagnon A, Blake J. Collaborative practice among obstetricians, family physicians and midwives. CMAJ 2014 Nov 18;186(17):1279-1280.
(22) Ogburn JAT, Espey E, Pierce-Bulger M, Waxman A, Allee L, Haffner WH, et al. Midwives and obstetrician-gynecologists collaborating for Native American women's health. Obstet Gynecol Clin North Am 2012;39(3):359-366.
(23) Perdok H, Mokkink L, Dillen J, Westerneng M, Jans S, Mol BW, et al. Opinions of maternity care professionals about integration of care during labor for "moderate risk" indications: a Delphi study in the Netherlands. Birth 2014;41(2):195-205.
(24) Schölmerich V, Posthumus A, Ghorashi H, Steegers E, Waelput A, Groenewegen P, et al. Improving interprofessional coordination in Dutch midwifery and obstetrics. The European Journal of Public Health 2013;23(suppl 1):ckt123. 161.
(25) Stevens JR, Witmer TL, Grant RL, Cammarano DJ. Description of a successful collaborative birth center practice among midwives and an obstetrician. Obstet Gynecol Clin North Am 2012;39(3):347-357.
(26) Boesveld IC, Annegarn AMA, Ijsseldijk JM, Veldhuyzen DC, Winkel L, Annot F, et al. Integrated birth care. Results of the Materinity Care Collaboration and Consultation Groups Integration Questionnaires. (in Dutch: Geïntegreerde geboortezorg. Resultaten van de VSV-Integratiemeter). NTOG 2016;10:500-508.
(27) Goodwin N. Understanding integrated care: a complex process, a fundamental principle. International Journal of Integrated Care [serial online] 2013;22:13.
(28) Valentijn PP, Vrijhoef HJ, Ruwaard D, Boesveld I, Arends RY, Bruijnzeels MA. Towards an international taxonomy of integrated primary care: a Delphi consensus approach. BMC family practice 2015;16(1):64.
(29) Valentijn PP, Vrijhoef HJ, Ruwaard D, de Bont A, Arends RY, Bruijnzeels MA. Exploring the success of an integrated primary care partnership: a longitudinal study of collaboration processes. BMC health services research 2015;15(1):32.
(30) van der Kooy J, Valentine NB, Birnie E, Vujkovic M, de Graaf JP, Denkta S, et al. Validity of a questionnaire measuring the world health organization concept of health system responsiveness with respect to perinatal services in the Dutch obstetric care system. BMC health services research 2014;14(1):1.
(31) Valentine N, Bonsel G, Murray C. Measuring quality of health care from the user's

perspective in 41 countries: psychometric properties of WHO's questions on health systems responsiveness. Quality of Life Research 2007;16(7):1107-1125.

(32) Goodwin N, Peck E, Freeman T, Posaner R. Managing across diverse networks of care: lessons from other sectors. Report to the NHS SDO R&D Programme.Birmingham: Health Services Management Centre, University of Birmingham 2004.

(33) Kianifard F. Evaluation of clinimetric scales: basic principles and methods. The Statistician 1994:475-482.

CHAPTER 10

EXPLORING THE TRIPLE AIM IN INTEGRATED PERINATAL CARE: EXPERIENCED QUALITY OF CARE, PERINATAL OUTCOMES AND COSTS OF BIRTH CENTRES IN THE NETHERLANDS

Boesveld IC, Hitzert M, Hermus MA, Wiegers T.A, van den Akker-van Marle ME, de Vries RD, Franx A, Bruijnzeels MA.

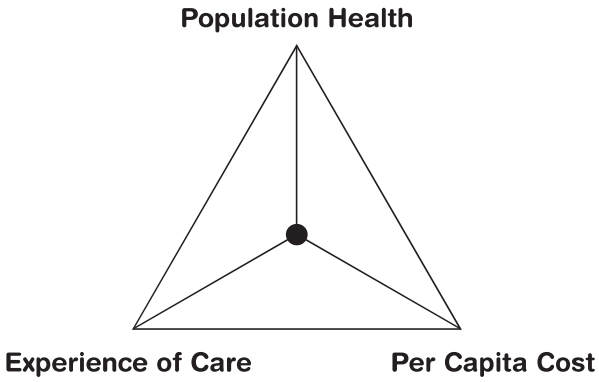
Abstract

Like other forms of care, perinatal care stands to benefit from the 'Triple Aim' approach: improving the individual experience of care, improving the health of populations and reducing the per capita costs of care. In the Dutch Birth Centre Study, we collected data about these Triple Aim components and integration profiles offered in birth centres. This information provides the opportunity to explore the Triple Aim components, contributing to the knowledge about pursuing the Triple Aim. It also provides the opportunity to explore whether integration profiles are related to the Triple Aim. When we combined these data we found correlations between the components of the Triple Aim, but not between these components and integration profiles. We conclude that integrated birth care as provided in birth centres to low risk births does not improve experienced quality of care, perinatal outcomes and costs. Further research in other settings that provide the total range of perinatal care may help us to understand the possible relation between the Triple Aim components and integrated perinatal care.

Introduction

Improvement of a health care system requires the simultaneous pursuit of three linked aims: "improving the individual experience of care, improving the health of populations and reducing the per capita costs of care, called the Triple Aim" (1) (see figure 1).

Figure 1 Triple Aim



Source: Institute of Healthcare Improvement

Researchers at the Institute of Healthcare Improvement (IHI) exposed the founding principles to achieve the Triple Aim: to pursue the Triple Aim simultaneously, to identify a population of concern, and to designate an "integrator" with specific functions and roles. The Triple Aim has been adopted by health care systems and organizations around the world as a guiding framework for improvement (2). A Triple Aim approach can support improvements in perinatal care. The IHI's collaborative effort to improve perinatal

care (the Perinatal Improvement Community) is an example of work that pursues all three Triple Aim dimensions (3, 4). Improvement in care experience and reduction in complications are assumed to benefit both neonatal and maternal health and to reduce costs. Furthermore, improvement for neonates will produce healthier adults who will, in turn, help to reduce health spending given the broad longitudinal impact of early health interventions and outcomes (3). Because of the novelty of the concept and despite the large uptake of this philosophy in health care recently, there is limited empirical evidence with the Triple Aim yet.

In the Netherlands, improvement of perinatal care appeared high on the political agenda as a result of a publication of the Euro-Peristat studies. The perinatal mortality rates in the Netherlands were found to be relatively high compared to other European countries (5). In 2009 a steering committee installed by the Ministry of Health, Welfare and Sports published a report with recommendations for improvement of Dutch perinatal care (6). One of these recommendations was to investigate whether an increase in the number of birth centres would improve perinatal outcomes, because of the assumption that birth centres could provide higher quality of care since they may offer a better setting for inter-professional collaboration than the existing system. At present, there is no evidence to support this assumption. The Dutch system includes primary as well as secondary (and tertiary) health care and is founded on the notion that pregnancy, birth and puerperium are primarily physiological processes. Most pregnant women are healthy ('low risk') and therefore antenatal care starts with a community midwife (7). Women at low risk for complications can choose where they would like to give birth, either at home, in a hospital or in a birth centre. Birth centres are settings where low-risk women can give birth in a homelike environment. When complications arise or threaten the birth, or pharmacological pain relief is requested, referral to an obstetric unit in a hospital is indicated (8-10). Birth centres in the Netherlands show a large variation in service delivery, characteristics and philosophies (11, 12). Due to a lack of national standards for birth centre care, each centre developed its own version based on local preferences, available space and mutual trust. The Dutch Birth Centre Study was designed to present evidence based recommendations of functioning and organization of birth centres in the Netherlands (7). This study provides information amongst others of client experiences, perinatal outcomes and costs of birth centres. It also provides knowledge about integrated care in birth centres. This information provides the opportunity to explore the Triple Aim components in a birth care setting, contributing to building knowledge about pursuing the Triple Aim, as "prove of concept". With these data, we are able to explore the hypothesis of interdependency of the Triple Aim components. It also provides the opportunity to explore whether the component of integration (assessed as levels of integrated birth care) is related to the Triple Aim. Therefore, the aim of this study is to contribute to building knowledge about the Triple Aim concept. Two research questions were formulated:

1) Are the triple aim components (experienced quality of care, perinatal outcome and costs) of women who planned to give birth in a birth centre interrelated?
2) Is the integration profile of birth centres related to the Triple Aim?

Method

Data collection procedure

This explorative study is based on data from the Dutch Birth Centre Study conducted between August 2013 and April 2015 among all 23 identified birth centres in the Netherlands: 1) client experiences of women who planned to give birth in a birth centre; 2) perinatal outcome of women who planned to give birth in a birth centre; 3) costs of a planned birth in a birth centre; 4) classification of birth centres on integration aspects.

Client experiences

To assess experiences with maternity care of women who planned to give birth in a birth centre, a cross-sectional study was performed between 1 August and 31 December 2013, using the ReproQ questionnaire (13). The questionnaire consists of several questions on eight domains of the World Health Organization (WHO) concept of responsiveness (14): dignity, autonomy, confidentiality, communication, prompt attention, social consideration, basic amenities, and choice and continuity. The questions could be answered on a four point scale (range 1-4). Women were recruited by community midwives of 82 practices in the Netherlands. 2162 women gave permission and received the ReproQ questionnaire by email, post or interview by phone. 1181 respondents completed the questionnaire (response 55 %), of which 1134 could be analysed. 263 of these respondents planned to give birth in a birth centre and their questionnaires were used in the present study (range 1-63 per birth centre). For this study, average scores and total score were computed for each birth centre (range 1-4).

Perinatal outcomes

To assess perinatal outcomes of women who planned to give birth in a birth centre, a prospective cohort study was performed between 1 July and 31 December 2013. To evaluate perinatal outcomes in the low risk population of birth centres, the Optimality Index, adapted to the Dutch situation (OI-NL2015) and the Composite Adverse Outcome score (CAO) were used. The OI-NL2015 is a tool to measure 'maximum outcome with minimal intervention', based on a principle of optimality. A sum score of all 31 items (zero or one) per woman was calculated. The CAO is a percentage based on the presence of at least one of the following six adverse outcomes: maternal mortality within 42 days after birth, (sub) total rupture, blood loss of more than one litre, perinatal mortality within 7 days after birth, Apgar score below 7 at 5 minutes after birth, and admission to the neonatal intensive care unit within 48 hours after birth. Data were prospectively collected

from the Netherlands Perinatal Registry (PRN), complemented with a case record form. We included 3455 term low risk women under care of a community midwife at the start of labour, recruited from 110 midwifery practises in the Netherlands. In the present study, data were used of 1668 women who planned to give birth in a birth centre (range 5-497 per birth centre). Average scores for OI-NL2015 and CAO were computed for each birth centre (respectively range 1-31 and 0-1).

Costs

To determine costs per woman who planned to give birth in a birth centre, an economic evaluation was performed from a health care perspective. The time horizon of this evaluation was from start of labour until seven days after birth. Costs were in 2015 euro, cost prices from earlier years were converted to 2015 euro using the consumer price index. Volume of health care resource use was collected prospectively by community midwives through a case record form, complement to data from the Netherlands Perinatal Registry (17). Costs of a birth and a postpartum day in a birth centre were calculated using top-down calculation. Total costs per birth were calculated after multiplying resource use with their cost prices. For this study, average costs per birth were computed for each birth centre.

Classification of birth centres on integration aspects

To classify birth centres based on characteristics of integrated care, integration profiles were determined using a survey combined with qualitative interviews. This study was performed between January 2014 and August 2015 in all birth centres in the Netherlands (n=23).The study was based on the Rainbow Model of Integrated Care (14). This model distinguishes six dimensions on integration (clinical, professional, organizational, functional, system, and normative integration). Based on a taxonomy (15), for each dimension of integration four determinants were identified, on which the Dutch Birth Centre Integration Questionnaire (DBC-IQ) was developed. To determine integration profiles of each birth centre, all birth centres were visited. During these visits 69 (managerial) representatives and professionals working within or with a birth centre were interviewed (range 2-5 per birth centre). Before the visits and interviews, the DBC-IQ was sent to 73 managers and professionals, of which 61 completed the list (response 84%). The aim of the interviews was to get an additional qualitative view of integration in birth centres. After the interviews, the researcher also filled in the DBC-IQ. In total 84 questionnaires were analysed (2-6 per birth centre). Mean scores on the determinants and dimensions of integration were calculated per birth centre (range 1-4). A total integration score was computed by calculating the mean score over the six dimensions (range 1-4). The integration profile of a birth centre consist of the score on total integration and the dimensions of integration.

Dataset

The characteristics of respondents, the exclusion criteria, development of questionnaires and analyses have been reported in more detail elsewhere (13), [Hermus et al. submitted 2017, Hitzert et al. submitted 2017, Chapter 7].

In this study, we used data derived from three different datasets: 1) data received from women, used to determine client experiences; 2) data received from community midwives and the Netherlands Perinatal Registry, used to determine perinatal outcomes and costs, derived from the same dataset; 3) data from professionals working in birth centres, used to determine their integration profiles.

Data analysis

To answer the first research question we examined the inter-relationship between the Triple Aim components (experienced quality of care, perinatal outcomes and costs) of women who planned to give birth in a birth centre by calculating Spearman's rank order correlation coefficients between these ingredients: 1) between mean client experiences and mean perinatal outcomes (for both OI-NL2015 and CAO); 2) between client experiences and costs;) 3) between perinatal outcomes and costs.

To answer the second research question, three steps were taken: 1) we examined the inter-relationship between the Triple Aim components and the integration profiles calculating Spearman's rank order correlation coefficients; 2) we calculated a Triple Aim Composite Score by ranking 'best', 'middle' and 'worst' birth centres on the Triple Aim components. To calculate this score, we gave the six best scoring birth centres three points, the seven middle scoring two points and the six worst scoring birth centres 1 point for each Triple Aim component. The Triple Aim Composite Score is determined by calculating the sum of the three Triple Aim component scores per birth centre (range 3-9); 3) we examined the correlation between the Triple Aim Composite Score and the integration profile, using Spearman's rank order correlations coefficients.

All data analyses were performed using SPSS version 22 (IBM Statistics).

Results

We only included birth centres with data on all four variables, therefore we excluded four birth centres, leaving 19 birth centres for analysis. The mean scores per birth centre on client experiences, perinatal outcomes, costs and Triple Aim Composite Score for women who planned to give birth in a birth centre, and integration profiles of the birth centres, are presented in Table 1.

Spearman's ranking correlation coefficients between client experiences, perinatal outcomes and costs for women who planned to give birth in a birth centre are presented in Table 2. We found moderate correlations between total client experiences and OI-NL2015 (Spearman's rank order correlation coefficient 0.52, $P < 0.05$), between total

client experiences and costs (Spearman's rank order correlation coefficient -0.42. ns) and between OI-NL2015 and costs (Spearman's rank order correlation coefficient -0.43, ns).
Table 2 also shows Spearman's ranking correlation coefficients between the Triple Aim components of women who planned to give birth in a birth centre and the integration profiles. We found a weak correlation between client experiences and total integration score and the organizational and normative dimensions of integration (Spearman's rank order correlations coefficient respectively -0.20, -0,23 and -0,25, ns). We also found a weak correlation between OI-NL2015 and professional integration (Spearman's rank order correlations coefficient 0.20, ns) and between costs and normative integration (Spearman's rank order correlations coefficient 0.20, ns). No correlations or very weak correlations were found between CAO and integration profiles.
Spearman's rank order correlation coefficients between the Triple Aim Composite Score of women who planned to give birth in a birth centre and the integration profiles are presented in Table 3. We found no correlation between the Triple Aim Composite Score and total integration (Spearman's rank order correlations coefficient -0,12, ns). We found a weak correlation between the Triple Aim Composite Score and normative integration (Spearman's rank order correlations coefficient -0.24). No or very weak correlations were found between the Triple Aim Composite Score and the other dimensions of integration.

Discussion

In this study we explored the components of the Triple Aim in a perinatal care setting in the Netherlands. We found the Triple Aim components to be correlated with each other for women who planned to give birth in a birth centre. Positive perinatal outcomes and lower costs were associated with the reported quality of care. We also determined that better perinatal outcomes are correlated with lower costs. Furthermore, we found a weak or very weak correlation using Spearman's rank order correlation coefficients between the Triple Aim components and the integration profiles of the birth centres. This indicates that in a birth centre setting, the integration profiles are not related to the Triple Aim. We also found a weak or very weak correlation between the Triple Aim Composite Score and the birth centre integration profiles. This indicates that the integration profile of a birth centre does not determine its success in achieving the Triple Aim.
Our findings contribute to the building of knowledge of the Triple Aim concept. In our case study in birth centres, we found that the Triple Aim components are interrelated: better experienced care occurs simultaneously with better perinatal outcome and lower costs. These findings confirm the assumption of interdependency of the Triple Aim, as stated by the IHI: it is possible to reduce costs and improving health outcome, focussing on reaching better experienced care (1). However, we could not confirm the assumption that integrated care improves the Triple Aim. The researchers of the IHI postulated that "integrators" can improve the Triple Aim outcome (1).

*Table 1 Mean scores client experiences, perinatal outcome, cost,total integration and dimensions of integration **

Birth Centre	Client Experiences	Perinatal Outcomes: OI-NL2015	Perinatal Outcomes: CAO	Cost	Triple Aim Composite Score	Total Integration	CI**	PI	OI	FI	SI	NI
	n=263	n=1668	n=1668	n=1668			n= 84					
	range 1-4	range 1-31	range 0-1	€	range 3-9		range 1-4					
2	3.86	27.9	0.38	3355	8	2.04	2.13	1.63	1.50	1.88	2.00	3.13
6	3.79	26.9	0.07	3312	6	2.08	2.42	1.67	1.88	1.63	2.17	2.71
3	3.90	27.9	0.02	3531	7	2.16	2.20	1.85	1.85	1.45	2.48	3.15
15	3.90	27.7	0.07	3040	9	2.17	2.17	2.25	2.25	1.67	2.00	2.67
14	3.70	26.7	0.05	3648	3	2.21	2.42	2.08	1.75	1.58	1.80	3.63
10	3.79	27.0	0.14	3079	7	2.22	2.06	2.19	2.38	1.38	2.20	3.13
12	3.77	26.2	0.09	3413	4	2.23	2.38	1.81	2.63	1.38	2.17	3.00
4	3.74	26.8	0.08	3405	5	2.37	2.08	2.50	2.67	1.42	2.07	3.50
5	3.82	26.8	0.12	3205	5	2.43	2.50	2.00	2.19	1.88	2.50	3.50
7	3.82	26.7	0.12	3431	4	2.44	2.88	2.33	1.94	2.13	2.50	2.88
22	3.91	27.2	0.10	3019	9	2.54	2.75	2.69	2.56	2.25	2.05	2.94
13	3.83	26.6	0.16	3393	5	2.57	2.75	2.17	2.58	1.96	2.60	3.33
20	3.79	27.0	0.13	3079	7	2.68	2.92	2.38	2.48	2.44	2.50	3.38
1	3.92	28.6	0.00	3239	8	2.72	2.92	2.75	2.58	2.17	2.33	3.58
16	3.76	26.0	0.21	3600	3	2.77	3.25	2.58	2.42	2.67	2.27	3.42
21	3.77	26.9	0.07	3264	5	2.79	2.00	3.00	2.75	2.50	3.00	3.50
8	3.74	27.5	0.03	3100	7	2.91	2.44	3.38	3.38	2.33	2.73	3.19
19	3.75	27.0	0.12	3683	4	3.20	3.08	3.61	3.31	3.35	2.65	3.21
9	3.89	27.0	0.08	3142	8	3.42	3.25	3.69	3.50	3.31	3.15	3.63

** sorted by total integration score;*

** CI: Clinical Integration, PI: Professional Integration, OI: Organizational Integration, FI: Functional Integration, SI: System Integration, NI: Normative Integration, TI: Total Integration

Table 2 Spearman's correlation rank coefficient between Triple Aim components and integration profiles of birth centres

Variable	Client experiences	Perinatal Outcomes: OI_NL2015	Perinatal Outcomes: CAO	Cost
Client experiences	1			
Perinatal Outcomes: OI_NL2015	0 .52*	1		
Perinatal Outcomes: CAO	-0.02	-0.41	1	
Cost	-0.42	-0.43	0.01	1
Total Integration	-0.20	-0.05	-0.01	-0.05
Clinical Integration	0.11	-0.11	0.19	0.13
Professional Integration	-0.14	0.20	-0.21	-0.18
Organizational Integration	-0.23	0.03	-0.18	-0.17
Functional Integration	-0.02	0.12	0.12	-0.05
System Integration	-0.08	-0.01	-0.03	-0.02
Normative Integration	-0.25	-0.10	-0.17	0.20

** Correlation is significant at the 0.05 level*

They define integrators as entities that link health care organizations, whose missions overlap across the spectrum of health care delivery. These integrators can recognize and respond to patients' individual care needs and preferences, to health needs and opportunities of populations, and to the total costs of care. They consider integrators to induce coordinative behaviour among health servicer suppliers to work as a system for a defined population. Birth centres in the Netherlands are specific/specialized locations were healthy, low risk women, with uncomplicated pregnancies can give birth in a homelike environment (7). Risk selection during pregnancy ensures that women with an increased risk of complications during labour do not give birth in a birth centre (18).

Table 3 Spearman's correlation rank coefficient between Triple Aim Composite Score and integration profiles of birth centres

Variable	Triple Aim Composite Score
Triple Aim-Composite Score	1
Total Integration	-0.11
Clinical Integration	-0.12
Professional Integration	0.10
Organizational Integration	0.03
Functional Integration	0.03
System Integration	-0.11
Normative Integration	-0.24

Therefore, our study included only part of the population and the perinatal care chain, which may explain we found only very weak correlations between integration profiles and the Triple Aim. Considering the total range of perinatal care (from preconception until puerperium) and all pregnancies and births, including high risk ones, it is conceivable that integrated care *does* improve client experiences, perinatal outcomes and costs. Further research may elucidate the possible correlation between integration in the total perinatal care system and the Triple Aim components. Maternity Care Networks (in Dutch "Verloskundige Samenwerkingsverbanden" (VSV's)) in the Netherlands could be the focus for such a study. These networks are organised around hospitals and consist of multidisciplinary professionals working in both primary and secondary care. The objective of Maternity Care Networks is, in addition to providing birth care in collaboration and synergy, to define maternity care policy at a regional level, to discuss specific problems, and to find joint solutions for identified problems (19). As a result of recent government policy in the Netherlands, these groups more and more turn into integrated birth care organizations (20). This presents an opportunity to compare these organizations with those of networks that are less integrated. Transparency on the Triple Aim and knowledge whether integrated care can support the Triple Aim, will contribute to the Dutch debate about the maternity care system and how to improve it.

Strengths and limitations

This is the first study exploring the Triple Aim in birth care. All birth centres in the Netherlands participated in this study, which is a strength of this study. Also we used a prospective study design, using mixed methods to quantify experiences of care, perinatal outcomes and costs. However, in our study the number of respondents per birth centre was very small, which could have influenced our results. Also, the analyses were performed according to the women's planned place of birth, one month before birth. For women who were referred to secondary care after the 36th week or during labour, the actual place of birth is not the planned place of birth (i.e. in a birth centre). According to the 'intention to treat'-principle of the total study, these women were not excluded from the analyses. Finally, to examine correlations between integration profiles and the Triple Aim components, we calculated the Triple Aim Composite Score, a scale that was developed for this study and is not yet validated. We used this score, to examine the correlations between the three Triple Aim components and the integration profiles of birth centres.. Further study is necessary to determine if the Triple Aim Composite Score is a reliable and useful measure.

Conclusion

This study contributes to building knowledge of the Triple Aim concept. For women who planned to give birth in a birth centre, we confirmed the assumption that the Triple Aim components are interrelated: better experienced care occurs simultaneously with better perinatal outcomes and lower costs. In our low risk population, focusing on physiological birth in a birth centre, we did not find a relationship of integration profiles of birth centres with the Triple Aim components. Therefore, our study does not confirm the hypothesis that integrated birth centre care can improve quality of care. Further research across the full range of the pregnancy and birth care cycle, the full range of risk for adverse outcomes and all care settings is needed to explore the relationship of integration with the Triple Aim in perinatal care.

References

(1) Berwick DM, Nolan TW, Whittington J. The triple aim: Care, health, and cost. Health Aff (Millwood). 2008 May-Jun;27(3):759-69.

(2) Whittington JW, Nolan K, Lewis N, Torres T. Pursuing the triple aim: The first 7 years. Milbank Q. 2015;93(2):263-300.

(3) Bisognano M, Cherouny PH, Gullo S. Applying a science-based method to improve perinatal care: The institute for healthcare improvement perinatal improvement community. Obstet Gynecol. 2014 Oct;124(4):810-4.

(4) The Maternity Medical Home: The Chassis for a More Holistic Model of Pregnancy Care?. Http://Www.ihi.org/communities/blogs/_layouts/ihi/community/blog/itemview.aspx?List=-7d1126ec-8f63-4a3b-9926-c44ea3036813&ID=222 (accessed 28/7/16).

(5) Zeitlin J, Mohangoo A, Cuttini M. The european perinatal health report: Comparing the health and care of pregnant women and newborn babies in europe. J Epidemiol Community Health. 2009;63(9):681-2.

(6) Stuurgroep Zwangerschap en geboorte. A good start, safe birth care (in dutch: Een goed begin, veilige zorg rond zwangerschap en geboorte). Den Haag: 2009.

(7) Hermus MA, Wiegers TA, Hitzert MF, Boesveld IC, van den Akker-van, M Elske, Akkermans HA, et al. The dutch birth centre study: Study design of a programmatic evaluation of the effect of birth centre care in the Netherlands. BMC pregnancy and childbirth. 2015;15(1):148.

(8) Definition of birth center.[homepage on the Internet]. . Available from: http://c.ymcdn.com/sites/www.birthcenters.org/resource/resmgr/About_AABC_-_Documents/AABC_Position_Statement_-_DE.pdf.

(9) Laws PJ, Lim C, Tracy S, Sullivan EA. Characteristics and practices of birth centres in australia. Australian and New Zealand Journal of Obstetrics and Gynaecology. 2009;49(3):290-5.

(10) Stewart M, McCandlish R, Henderson J, Brocklehurst P. Review of evidence about clinical, psychosocial and economic outcomes for women with straightforward pregnancies who plan to give birth in a midwife-led birth centre, and outcomes for their babies. . 2004.

(11) Denktas S, Bonsel G, Van der Weg E, Voorham A, Torij H, De Graaf J, et al. An urban perinatal health programme of strategies to improve perinatal health. Matern Child Health J. 2012;16(8):1553-8.

(12) Wiegers T, de Graaf H, van der Pal K. The establishment of birth centres and their role in maternity care. [in dutch: De opkomst van geboortecentra en hun rol in de zorg]. Tijdschrift voor gezondheidswetenschappen. 2012;90(8):475-8.

(13) Hitzert M, Hermus MA, Scheerhagen M, Boesveld IC, Wiegers TA, van den Akker-van, M Elske, et al. Experiences of women who planned birth in a birth centre compared to alternative planned places of birth. results of the dutch birth centre study. Midwifery. 2016.

(14) Valentijn PP, Schepman SM, Opheij W, Bruijnzeels MA. Understanding integrated care: A comprehensive conceptual framework based on the integrative functions of primary care. International Journal of Integrated Care. 2013;13.

(15) Valentijn PP, Boesveld IC, Van der Klauw, Denise M, Ruwaard D, Struijs JN, Molema JJ, et al. Towards a taxonomy for integrated care: A mixed-methods study. International journal of integrated care. 2015;15.

(16) Scheerhagen M, Van Stel HF, Birnie E, Franx A, Bonsel GJ. Measuring client experiences in maternity care under change: Development of a questionnaire based on the WHO responsiveness model. PloS one. 2015;10(2):e0117031.
(17) Nederland SPR. Perinatal care in the Netherlands 2014 [perinatale zorg in Nederland 2014]. stichting perinatale registratie nederland. . 2015.
(18) College voor Zorgverzekeringen. Verloskundig vademecum. . 2003.
(19) Pieters A, van Oirschot C, Akkermans H. No cure for all evils: Dutch obstetric care and limits to the applicability of the focused factory concept in health care. International Journal of Operations & Production Management. 2010;30(11):1112-39.
(20) Vaststelling beleidsregel integrale geboortezorg 2017. Https://Www.nza.nl/1048076/1048107/CI_16_27c__Vaststelling_beleidsregel_Integrale_geboortezorg_2017.pdf (accessed 8/1/16).

CHAPTER 11

GENERAL DISCUSSION

Introduction

Growing demand for health services, fragmentation of services, changing health needs, and increasing influence of economic, political and social factors on health care delivery are steering policymakers to "integrated care" as a way to reduce costs, improve quality of care, and generate better patient outcomes (1-4). Birth centres are considered to be ideal settings for the realization of integrated care in the Dutch maternity care system and are assumed to offer better quality of care (5). Although evidence is available on the effectiveness of integrated care in chronic care, until now, there is no evidence for this assumption in birth care, even while current government policy in the Netherlands is based on it. Because birth centres are a relatively new phenomenon in Dutch maternity care, up until now there were no studies of the nature and degree of integration of birth centres in the Netherlands or data about their quality of care. The Dutch Birth Centre Study was designed to evaluate the performance of birth centres and their possible added value to the quality of Dutch maternity care. It presents evidence-based recommendations for organization and functioning of future birth centres. The study provided three theses which are closely connected but focusing on different aspects of birth centre care.

The aim of this thesis was to describe the development and use of structure and process quality indicators for birth centres in the Netherlands and their level of integration, and to explore the assumption that more integrated birth centres can provide higher quality of care.

Main findings

Definition of a birth centre

In the Netherlands a clear definition of a birth centre was lacking. The term is used in different situations e.g. for homelike settings where women with uncomplicated pregnancies can give birth or for community midwifery practices. If birth centres are to play a role in improving maternity care, first a clear definition should be constructed. Therefore, our first research question was: What is the definition of birth centres in the Netherlands and how can identified birth centres, based on this definition, be characterised? We constructed the following definition of a birth centre: *"Birth centres are midwifery-managed locations that offer care to low risk women during labour and birth. They have a homelike environment and provide facilities to support physiological birth. Independent community midwives take primary professional responsibility for care. In case of referral the secondary caregiver (obstetrician or paediatrician) takes over the professional responsibility of care"* (Chapter 3). We identified three types of birth centres based on their location in relation to the nearest obstetric unit: freestanding (n=3), alongside (n=14) and on-site (n=6). Transfer in case of referral is necessary for all freestanding and alongside birth centres. Based on this definition, 23 birth centres were identified at the reference date (September 2013). We observed that birth centres differ in their reasons for establishment, their facilities, philosophies, staffing and service delivery.

Quality of birth centres

Quality of care is usually measured in three dimensions: structure, process and outcome. A number of outcome indicators is available to assess birth centre care (e.g. perinatal and maternal mortality and morbidity, Optimality Index, Composite Adverse Outcome Index), but structure and process indicators for birth centres are scarce. Therefore, a comprehensive set of these indicators needed to be developed. Our second research question was: What indicators can be identified to assess structure and process quality aspects of birth centres in the Netherlands? Based on literature and a Delphi study, we identified 30 quality indicators concerning birth centre care (Chapter 4). Next, we determined the usability of these set indicators to answer our third research question: Are the identified structure and process birth centre quality indicators usable to assess quality of birth centre care? We found that 28 of the 30 quality indicators are usable to assess structure and process quality of birth centres. At last, we applied the set of 28 usable structure and process indicators, to answer our fourth research question: Can differences between birth centres in the quality of birth centres care in the Netherlands be determined, using the newly developed set of structure and process birth centre quality indicators? We observed differences between birth centres: the scores on 28 indicators ranged from 7 to 22 (Chapter 5).

Integrated care in birth centres and Maternity Care Networks

Integrated care is increasingly promoted as a means to improve accessibility, affordability and quality of care (6,7). Theoretical foundations of integrated service models are described by the Rainbow Model of Integrated Care, which distinguishes six dimensions of integration. To develop a better understanding of integrated care in birth centres, we first formulated our fifth research question: What are key features of the Rainbow Model of Integrated Care? Based on literature and a Delphi study among Dutch experts, we developed a taxonomy consisting 59 key features across the six integration dimensions of the Rainbow Model (Chapter 6).

Because the number of births in most birth centres is very small and the number varies greatly between centres, we decided the necessary first step to evaluate the performance of birth centres and their possible added value to the quality of Dutch maternity care, was to find a reliable way to classify the centres. Our sixth research question was: How can birth centres in the Netherlands be classified, based on the dimensions of integration of the Rainbow Model of Integrated Care? We classified birth centres into three clusters: *"Mono-disciplinary-oriented birth centres"* (n=10), *"Multi-disciplinary-oriented birth centres"*(n=6): and a *"Mixed Cluster of birth centres"* (n=7): (Chapter 7).

To support our findings using a self-constructed questionnaire, we wanted to validate the questionnaire with a comparable questionnaire, developed to determine integration profiles of Maternity Care Networks (in Dutch Verloskundige Samenwerkingsverbanden

(VSVs)). These networks are organised around hospitals. Members of these groups in all regions include community midwives and obstetricians along with (depending on the regional situation) clinical midwives, paediatricians, managers of maternity care assistance organizations, obstetrics and gynaecology nurse specialists, and general practitioners. The objective of Maternity Care Networks is, in addition to providing birth care in collaboration and synergy, to define maternity care policy at a regional level, to discuss specific problems, and to find joint solutions for identified problems.

For the validation of the questionnaire, first we assessed integration in Maternity Care Networks, answering our seventh question: How can Maternity Care Networks be described using the dimensions of integration of the Rainbow Model of Integrated Care? (Chapter 8). We found statistical significant differences between integration profiles of Maternity Care Networks, showing patterns with highest integration on the normative dimension for all networks, followed by professional integration for most of them. For almost all Maternity Care Networks lowest scores are determined on the functional dimension. Most of the networks who participated in this study gear activities with each other, the "linkage" stage in continuum of inter-organisational integration (8). We observed that less is being shared between the organizations.

With the data of both questionnaires, we answered research question eight: Are integration questionnaires for birth centres and Maternity Care Networks usable to evaluate integrated birth care? We found both questionnaires feasible to evaluate integrated care (Chapter 9). They are able to discriminate between birth centres and Maternity Care Networks with different integration profiles in the Netherlands. We concluded that the instruments provide an opportunity to better understand integrated care as an approach to the delivery of health services in different models of integrated birth care. Further research is necessary to explore whether the instruments can be applied in other countries and whether they can be used to assess changes in levels of integration over time, to measure absolute levels of integration and to predict outcome of a birth care setting. The development of the questionnaires is one more step in building knowledge of the complexity of integrated care.

Integrated care in birth centres and Triple Aim

A Triple Aim approach is assumed to support improving perinatal care. A Triple Aim approach requires simultaneous pursuit of three linked aims: "improving the individual experience of care, improving the health of populations and reducing the per capita costs of care" (9). Because of the novelty of the concept of Triple Aim and despite the large uptake of this philosophy in health care recently, there is limited empirical evidence about the Triple Aim yet. The Dutch Birth Centre Study provided both information of client experiences, perinatal outcomes, costs of birth centres and levels of integration. Our last research questions in this were: Are the Triple Aim components (experienced quality of

care, perinatal outcomes and costs) interrelated for women who planned to give birth in a birth centre (Q9) and is the integration profile of birth centres related to the Triple Aim? (Q10). Our findings support the hypothesis of interdependence of the Triple Aim: for women who planned to give birth in a birth centre we confirmed the assumption that the Triple Aim components are interrelated: better experienced care occurs simultaneously with better perinatal outcomes and lower costs. We found no correlation between the Triple Aim components and levels of integration of birth centres. We concluded that the available data from the Dutch Birth Centre Study do could not confirm the assumption that integrated birth centre care can improve quality of care. This finding however should be interpreted with caution and in the context of the study. The Dutch Birth Centre Study only focused on care during labour and birth to low-risk women. Thus, no conclusions can be drawn on the contribution of integrated peri-conceptional and antenatal care, and for integrated care to women with increased risk for adverse outcomes.

Strengths and limitations

Most of the presented studies contribute to the evaluation of birth centres in the Dutch Birth Centre Study, providing evidence based recommendations of functioning and organization of these centres. To make these recommendations, results of all sub-studies of the Dutch Birth Centre Study (so all three theses based on this study) should be taken into account. This thesis focusses on the quality and integration aspects of birth centre care and does not present overall conclusions about quality of birth centre care.

Two of the presented studies in this thesis refer to the quality of birth centre care (Chapter 4 and 5). A strength of the study describing the development of structure and process quality indicators is the participation of all parties involved in birth centre care. Consensus among professionals in the field is important to achieve acceptance of this set of indicators. Selection bias in the Delphi-study was limited to a minimum. However, we have shown that the set of indicators needs improvement before wide implementation. To fully assess quality of care both structure, process and outcome indicators are needed, preferably combined with experienced quality of care by the customers. In this thesis, studies concerning perinatal outcomes and women's experiences with birth centres are not presented. These components of quality are only reported in exploring the Triple Aim concept. This thesis focusses on structure and process aspects and not on outcome aspects of care, which means we cannot formulate conclusions about the quality of birth centre care.

Four of the presented studies in this thesis refer to integrated care (Chapter 6 - 9). Our studies are based on a newly developed framework of integrated care: the Rainbow Model of Integrated Care. This model was developed to improve our understanding of integrated care from a primary care perspective. The model was not validated at the time our study started. Yet, we used this model because an appropriate validated model was

lacking. We assumed that features of the Dutch maternity care system are comparable with those of the health system this model is based on, although the populations differ. Maternity care is aimed at a defined population: pregnant women, women giving birth and mothers in the first 6 weeks after the baby is born. Several professionals and organizations are involved in giving care to women at different times during this process, which demands for coordination of care and collaboration between the caregivers and organizations. Integrated care has been shown to be useful for populations with patients with complex need (e.g. chronic diseases) when different disciplines and organizations are involved in giving care to one patient (10).

Using a non- validated model (and questionnaires based on this model) introduces some problems in the validity of the results of our study. To minimize these problems in the assessment of birth centres we developed a study design that used a standardised questionnaire combined with personal interviews. All interviews were conducted by the same researcher, who afterwards also completed the questionnaire. In this way, quantitative data derived from a non-validated questionnaire were complemented with qualitative data, increasing reliability. Results of the classification of birth centres based on this model, were comparable with observations in other integrated care organization (11,12). For Maternity Care Networks, we verified in a qualitative way the ability of the questionnaire to discriminate between organizations, by asking persons familiar with Maternity Care Networks to nominate the most and least integrated groups according to their experience in a sample. We made sure that they did not know the results of the questionnaire when ranking the Maternity Care Network. Their ranking was in line with the ranking based on the results of the questionnaire. Also, when presenting the results during the information meetings about models of integrated birth care and related finance, we asked the participants of the Maternity Care Network the extent to which they recognised the results of the assessments. They usually recognised their own results. It turned out that large differences often were caused by a differently composed Maternity Care Network. The patterns of integration profiles in both studies show that they are consistent with theories about the development of collaborative groups. Therefore we think we have done well using this model, but some caution should be taken interpreting the results. Our studies contribute to further improvement and refining of the Rainbow Model of Integrated Care. At the moment the Rainbow Model of Integrated Care measurement tool is validated in Singapore (13).

Furthermore, in both studies assessing levels of integration, selection bias could have appeared: in birth centres because managers selected the respondents and in Maternity Care Networks because we included a self-selected group of networks. To counter this for birth centres, the researcher also filled in the questionnaire complementing quantitative data with qualitative data. For the aim of the questionnaire for Maternity Care Networks (to support their process towards integration) occurrence of this kind

of bias is not a problem because it presents results of their own assessment. When comparing data of the networks these results should be interpreted carefully.

Reflections on findings

The findings presented in this thesis are based on data collected between 2013 and 2015. A repeated assessment of birth centres on both quality indicators and levels of integration in birth centres and Maternity Care Networks will most likely yield different results, independent of the validity of our studies. For example, changes in funding possibilities have forced several birth centres to close. Also, national policy to stimulate collaboration and integration in the maternity care system, has accelerated the integration process. Conditions for Integrated Birth Care Organizations, set by insurance companies to allow for bundle payment, are efforts to focus on client needs and preferences. Jointly evaluating client experiences and using jointly developed individual birth plans are some of the possibilities and requirements to focus on these needs and preferences. At the time of our study, birth centres and Maternity Care Networks hardly paid attention to these aspects. When repeating the assessments, we expect these aspects of clinical integration to show higher levels of integration. We assume this this process will also appear on the other dimensions of integration.

In addition, quality indicators may change as well, based on new evidence or new consensus. Standards for birth centres are not available in the Netherlands yet. Results of our study support the development of such standards. Both the United States and England developed standards for birth centres (14,15). Realizing the importance of these quality instruments by (managers of) birth centres may already change their view on quality of care, as mentioned by the respondents during the interviews.

Levels of integration in birth centres

We identified three clusters of birth centres with distinctive integration profiles. When observing other features of the birth centres within each cluster, we did not identify overall characteristics, especially for the mixed cluster of birth centres, but identifiable in all three groups. Our study confirmed that birth centres differ in their reason for establishment, facilities, philosophies, staffing and service delivery. It is difficult to identify two birth centres with identical characteristics. Clustering of the birth centres was necessary to be able to evaluate the centres on experienced care, perinatal outcomes and costs. The assumption that birth centres might provide higher quality care because they offer a better opportunity for more integrated care, led us to classify birth centres based on integration profiles. When interpreting the results of our studies it should be kept in mind that, although clustered by common integration characteristics, birth centres within these clusters differ from each other on several other aspects.

Correlation integration and Triple Aim components

The assumption that birth centres could provide higher quality of care since they may offer better conditions for inter professional collaboration than the existing system cannot be confirmed by our study. We found no (or a very weak) correlation between the Triple Aim components (experienced quality of care, perinatal outcomes and costs) and levels of integration, in contrast to what researchers at the Institute of Healthcare Improvement posited(9). Birth centres in the Netherlands are specific locations were healthy, low risk women, with uncomplicated pregnancies can give birth in a homelike environment (16). Risk selection during pregnancy ensures that women with an increased risk of complications during labour are not admitted to a birth centre (17). Observing correlations between levels of integration and Triple Aim components in birth centres, only includes a small segment of the maternity care population and of the perinatal care chain (planned place of birth in a birth centre for a low risk population). When considering the total maternity care system, it is possible that correlation between levels of integration and the Triple Aim components will be present. Because integrated care is promoted for people with complex needs (e.g. multiple chronic diseases), we assume more integrated birth care could improve quality of care for pregnant women with complex needs. Living in a deprived neighborhood, low socio-economic status, domestic violence and psychosocial morbidity are examples of evidence-based non-clinical risk factors which add to adverse perinatal outcomes (18, 19). More integrated care delivered by different disciplines involved by these women could improve perinatal outcomes.

Implications for practice and research

Added value of birth centres for quality of the Dutch maternity care system

Overall conclusions of the added value of birth centres for the quality of the Dutch maternity care system cannot be made based on the results of the studies presented in this thesis. To formulate these conclusions, combining results of the studies presented in all three theses based on the results of the Dutch Birth Centre Study should be taken into account. Exploring the Triple Am and their correlations with levels of integration in birth centres suggests that the way birth centres are organized from an integrated care perspective does not influence perinatal outcomes, client experiences and costs. This suggest that birth centres could be organized in a way that fits to their local situation, needs and preferences. Stimulating integrated care in birth centres does probably not improves quality of birth care. It is more plausible that stimulating integrated care in Maternity Care Networks, considering the total range of perinatal care (from preconception until puerperium), integrated care will be important to improve client experiences, perinatal outcomes and costs, especially for women with complex needs.

Using integration measurement tool

This study has produced a measurement tool to assess levels of integrated birth care in both birth centres and Maternity Care Networks. The questionnaires can be used as a tool for birth care organizations to monitor their own process to integrated birth care and to arrange their own quality system (for example in combination with benchmark between birth centres or Maternity Care Networks). The questionnaire used for Maternity Care Networks (Chapter 8) was developed for this aim. It supports the networks in their region to improve their collaboration. The results allow professionals to reflect upon the level of their network integration.

The instrument can also be used to support health care professionals, managers, policymakers and health insurance companies involved in the organization of integrated birth care, allowing them to better understand its concepts, which might, in turn, help the political debate in the Netherlands. However, the measurement instruments are inappropriate yet to be used as management tool for government or for supporting insurance companies to their purchasing policy. Knowledge is also lacking to what extent the instrument can be used prospectively: can developments in the integration process of birth centres or Maternity Care Networks be made visible by using the instruments? Using data collected through the instruments can improve and refine the questionnaires so that they can be used for this purpose. At the moment, it is also unclear how differences between birth centres and Maternity Care Networks in integration levels should be interpreted for practice. The quantitative scale is set up by qualitative statements corresponding stages of integration, with equal weighting between the answer categories, according to literature. Until now it is unknown if statements by the different stages fit the stages of integration in practice. (Prospective) data should be gathered in order to validate the questionnaires in birth care settings. The Rainbow Model of Integrated Care is currently prospectively being validated in Singapore (13). Results of this validation can also support the development of the instrument for birth care settings.

Building a database on integrated birth care

Using the measurement tool might also be a valuable contribution to examine the assumption that integrated birth care improves quality of care by combining integration profiles and perinatal outcomes, client experiences and costs. To realise this, it is necessary to build a database consisting both data of the Triple Aim components and integration profiles of Maternity Care Networks (including birth centres). In the Netherlands individual baseline characteristics and perinatal outcomes of data of all births are collected in one national database: the Netherlands Perinatal Registry (Perined) (20). In the future, this database should be extended with data about client experiences, costs of births and integration profiles of Maternity Care Networks. These

data will allow national studies of the performance of Maternity Care Networks (and birth centres). As a result of the recent government policy several networks, and in the end maybe all turn into integrated birth care organizations (21). This presents an opportunity to use data on this new national database to compare the quality of care and costs of these organizations with those of Maternity Care Networks that are less integrated (and for which population this gives best outcomes). Results of these studies can feed into formulating policy about how to organize the Dutch maternity care system in the future. If evidence about the assumption that more integrated care improves quality of care is available, professionals in birth care will be more motivated to arrange integrated birth care organizations.

The database should also be available in an easy way for birth care professionals to feed their information management. Regular feedback on results of their quality of care (on all Triple Aim components) can be used by birth care organizations to improve their performance as part of their quality system.

Adapting the Dutch maternity care system

For several decades, the Dutch government and health insurance companies have attempted to promote closer collaboration between maternity care providers in hopes of improving the quality of maternity care. The Euro-Peristat report, published in 2009 (22), showed Dutch maternity care to be performing poorly in comparison to other European countries. Although there were questions about the comparability of data from disparate countries, the report created great concern in the Netherlands and led to efforts to further regulate the maternity care system. In 2016, the "Standard for Integrated Birth Care" ("Zorgstandaard Integrale Geboortezorg") was developed in consultation with professional and client organizations. The Standard describes the necessary care for pregnant women, outlining the content and organization of birth care ranging from preconception until the first six weeks after birth 23). The Dutch Care Institute ("Zorginstituut Nederland"), set up by the Dutch Government, monitors the implementation of the Standard. In 2017, all Maternity Care Networks in the Netherlands are to have formulated how to implement this standard. This means that professionals must work together to organize the way their regional team will provide care for pregnant women. In the future it is likely that insurance companies will make these agreements obligatory for caregivers.

Beginning in 2017, the payment system for maternity care allows the bundling of payments for both primary and secondary birth care providers, a change that will require more integration between both echelons (24). To arrange this, integrated birth care organizations should be established, as only these organizations can invoice bundling payment. However, evidence on the effectiveness of integrated birth care is not available. Our study shows no (or a very weak) correlation between levels of integrated birth care

in birth centres and perinatal outcomes and experienced quality of care. Although this study only includes a small segment of the maternity care population and of the perinatal care chain (only a low-risk population and only care during labour and birth for women who planned to give birth at a birth centre), based on these results, we recommend that incentives demanding for a major change in health system should be considered carefully. Forcing professionals into a system with only integrated birth care organizations is not desirable if evidence is lacking of their contribution to the improvement of quality of care. Bundled payment can be a possibility for already more integrated Maternity Care Networks to solve problems when encountering limits of the current payment system. For example, realizing substitution of care from secondary to primary care in the current payment system is difficult to achieve, because there are hardly payment possibilities. When bundled payment is available, these organizations can decide for themselves how to arrange this. Besides, results of the national integrated primary care programme Op één Lijn (25) shows that integrated primary care partnerships who were more positive about mutual gains and process management had higher level of perceived success. Partnerships that demonstrated an increase in relationship during the collaboration process also had higher levels of perceived success (26). This indicates that, to stimulate Maternity Care Networks in their collaboration process in order to improve quality of care, it is probably important to focus on supporting realizing these aspects instead of financial incentives. Before arranging a major change in the funding of the maternity care system, more evidence should be available about the correlation between levels of integration in the total maternity care system and the Triple Aim components. Also more evidence should be available of which population of pregnant women benefit most of integrated birth care.

Using structure and process birth centre quality indicators

This study produced a set of 30 structure and process quality indicators to be used for birth centres to assess quality of care. This set defines important quality aspects for birth centres transparent for consumers, payers, health care professionals and policy makers. Minimal standards of quality of care in birth centres can be formulated based on this set of quality indicators. Our study therefore contributes to the development of a quality system for birth centres. However, we also concluded that the constructed set of quality indicators should be improved: some quality indicators are only applicable for some types of birth centres (e.g. only for freestanding or alongside birth centres). A number of indicators can be combined or specified so that they are easier to assess. Further research is necessary to formulate standards or minimum quality requirements and to improve the set of birth centre quality indicators. This should be performed in cooperation with all parties involved in birth centre care in order to achieve acceptance. This set should regularly be evaluated, because indicators never will be static. Changes in evidence or clinical relevance, a

consistently high performance or a low variation in achievement, new developments, and demographic changes in the population of childbearing women may be criteria for removing, adding or adapting indicators in a future list of birth centre quality indicators.

Concluding remarks

This thesis contributes to building knowledge about integrated care in the Dutch maternity care system by the development of a measurement instrument to determine integration profiles in birth care settings. When considering the total perinatal care chain, collecting data using this instrument in combination with Triple Aim components (experienced quality of care, perinatal outcomes and costs), will contribute to the Dutch debate about the maternity care system. It offers an opportunity to better understand integrated care as an approach to the delivery of health services in different models of integrated birth care. As long as evidence is lacking about the assumption that integrated birth care can improve quality of care, we recommend that incentives demanding for a major change in health system (such as bundle payments) should be considered carefully, and ideally, evaluated in small-scale experiments before wide implementation.

This thesis also contributes to the improvement of quality of birth centre care by developing an instrument to assess structure and process quality of birth centres. The developed set of structure and process birth centre quality indicators, although needed to be improved, can contribute to the development of a quality system for birth centres. Based on these indicators, standards or minimal quality requirements for birth centres can be formulated.
A national database should be arranged, consisting of both data of birth care organizations about experienced quality of care, perinatal outcomes including patient-reported outcomes, costs of birth, and data about levels of integrated care. This database will support individual birth care professionals to improve their quality of care, by regularly generating and evaluating data about their performance on the Triple Aim components. Such a database is also a very important necessary step in order to be able to evaluate the assumption that more integrated birth care will improve quality of care. Once evidence about this assumption is available, professionals in birth care will be more motivated to arrange integrated birth care.

References

(1) Grone O, Garcia-Barbero M, WHO European Office for Integrated Health Care Services. Integrated care: a position paper of the WHO European Office for Integrated Health Care Services. Int J Integr Care 2001;1:e21.

(2) Berwick DM, Nolan TW, Whittington J. The triple aim: care, health, and cost. Health Aff (Millwood) 2008 May-Jun;27(3):759-769.

(3) Kodner DL. All together now: a conceptual exploration of integrated care. Healthc Q 2009;13 Spec No:6-15.

(4) Coleman K, Austin BT, Brach C, Wagner EH. Evidence on the Chronic Care Model in the new millennium. Health Aff (Millwood) 2009 Jan-Feb;28(1):75-85.

(5) Stuurgroep Zwangerschap en geboorte. Een goed begin, veilige zorg rond zwangerschap en geboorte. Advies Stuurgroep Zwangerschap en Geboorte.Utrecht Stuurgroep Zwangerschap en Geboorte 2009.

(6) Gröne O, Garcia-Barbero M. Integrated care. International journal of integrated care 2001;1(2).

(7) Kodner DL. All together now: a conceptual exploration of integrated care. Healthc Q 2009;13 Spec No:6-15.

(8) Valentijn PP, Schepman SM, Opheij W, Bruijnzeels MA. Understanding integrated care: a comprehensive conceptual framework based on the integrative functions of primary care. International Journal of Integrated Care 2013;13.

(9) Berwick DM, Nolan TW, Whittington J. The triple aim: care, health, and cost. Health Aff (Millwood) 2008 May-Jun;27(3):759-769.

(10) Valentijn PP, Boesveld IC, Van der Klauw, Denise M, Ruwaard D, Struijs JN, Molema JJ, et al. Towards a taxonomy for integrated care: a mixed-methods study. International journal of integrated care 2015;15.

(11) Shortell SM, Wu FM, Lewis VA, Colla CH, Fisher ES. A taxonomy of accountable care organizations for policy and practice. Health Serv Res 2014;49(6):1883-1899.

(12) Afrite A, Mousques J. Formes du regroupement pluriprofessionnel en soins de premiers recours.Une typologie des maisons, pôles et centres de santé participant aux Expérimentations des nouveaux modes de rémunération (ENMR) 2014.

(13) Nurjono M, Valentijn P, Bautista MA, Lim YW, Vrijhoef H. A prospective validation study of a rainbow model of integrated care measurement tool in Singapore. International Journal of Integrated Care 2016;16(1).

(14) American Association of Birth Centers. Definition of Birth Center. Available at: http://c.ymcdn.com/sites/www.birthcenters.org/resource/resmgr/About_AABC_-_Documents/AABC_Position_Statement_-_DE.pdf. Accessed July, 23, 2016.

(15) Ackerman B, Cooke P, Hutcherson A. Standards for birth centres in England: a standards document. RCM, London 2009.

(16) Hermus MA, Wiegers TA, Hitzert MF, Boesveld IC, van den Akker-van, M Elske, Akkermans HA, et al. The Dutch Birth Centre Study: study design of a programmatic evaluation of the effect of birth centre care in the Netherlands. BMC pregnancy and childbirth 2015;15(1):148.

(17) College voor Zorgverzekeringen. Verloskundig Vademecum. 2003.

(18) Goedhart G, Van Eijsden M, Van Der Wal, Marcel F, Bonsel GJ. Ethnic differences in preterm birth and its subtypes: the effect of a cumulative risk profile. BJOG: An International Journal

of Obstetrics & Gynaecology 2008;115(6):710-719.
(19) de Graaf JP, Ravelli AC, de Haan MA, Steegers EA, Bonsel GJ. Living in deprived urban districts increases perinatal health inequalities. The Journal of Maternal-Fetal & Neonatal Medicine 2013;26(5):473-481.
(20) Perined. https://www.perined.nl/ (Accessed 2 Dec2016).
(21) Vaststelling beleidsregel integrale geboortezorg 2017. https://www.nza.nl/1048076/1048107/CI_16_27c__Vaststelling_beleidsregel_Integrale_geboortezorg_2017.pd f(accessed 8/1/16).
(22) Zeitlin J, Mohangoo A, Cuttini M. The European Perinatal Health Report: comparing the health and care of pregnant women and newborn babies in Europe. J Epidemiol Community Health 2009;63(9):681-682.
(23) Zorginstituut Nederland. Zorgstandaard Integrale Geboortezorg. Available at https://www.zorginstituutnederland.nl/binaries/content/documents/zinl-www/kwaliteit/kwaliteit-geboortezorg/kwaliteit-geboortezorg/kwaliteit-geboortezorg/zinl%3Adocuments/zorgstandaard-integrale-geboortezorg-versie-1-1/Zorgstandaard+Integrale+Geboortezorg+versie+1+1.pdf (Accessed 5 Dec2016).
(24) Rijksoverheid. www.rijksoverheid.nl (accessed 28 August2016).
(25) The Netherlands Organization for Health Research and Development (ZOnMw). Primary focus programme. http://www.zonmw.nl/nl/projecten/project-detail/samenwerkingsmonitor-op-een-lijn/samenvatting/ (Acccessed on: 2016, 09/03).
(26) Valentijn PP, Vrijhoef HJ, Ruwaard D, de Bont A, Arends RY, Bruijnzeels MA. Exploring the success of an integrated primary care partnership: a longitudinal study of collaboration processes. BMC health services research 2015;15(1):32.

SUMMARY

Chapter 1 describes the rationale, the aim and the outline of this thesis. The Dutch maternity care system is founded on the notion that pregnancy, childbirth and puerperium are physiological processes. Primary care midwives in the community are responsible for care for women at low risk, having a physiological pregnancy, labour and post-partum period. In some, mostly rural, areas general practitioners provide this care. When complications arise or threaten or pharmacological pain relief is requested, responsibility will have to shift to secondary or tertiary obstetric care. Professionals in both echelons work autonomously and play complementary roles.
Growing demand for health services, fragmentation of services, changing health needs, and increasing influence of economic, political and social factors on health care delivery are turning policymakers to "integrated care" as a way to reduce costs, improve quality of care, and generate better patient outcomes. Birth centres are considered to be ideal settings for the realization of integrated care in the Dutch maternity care system. There were no studies of the nature and degree of integration of birth centres in the Netherlands and there were no data on the effects of integration on quality of care. Therefore a better understanding of the organization of birth centres in the Netherlands is essential.
The Dutch Birth Centre Study is designed to evaluate the performance of birth centres and their possible added value to the quality of the Dutch maternity care. It presents evidence-based recommendations for organization and functioning of future birth centres. The research in this thesis describes several sub-studies of the Dutch Birth Centre Study. It describes the development and use of structure and process quality indicators for birth centres in the Netherlands and their level of integration. It also explores the assumption that more integrated birth centres can provide higher quality of care. Overall conclusions of the Birth Centre Study are not described in this thesis. The study provided three theses which are closely connected but focusing on different aspects of birth centre care. The present thesis is focused on the organization of birth centres and related aspects on quality and integrated care.

Chapter 2 describes the study design of the Dutch Birth Centre Study, on which most of the studies in this thesis are based. In the last decade up to 20 different birth centres have been instituted in the Netherlands. This increase in birth centres is attributed to various reasons such as a safe and easy accessible place of birth, organizational efficiency in integration of care and direct access to obstetric hospital care if needed, and better use of maternity care assistance. Birth centres are assumed to offer increased integration and quality of care and thus to contribute to better perinatal and maternal outcomes. So far there is no evidence for this assumption as no previous studies of birth centres have been carried out in the Netherlands.
The aims of the study described in this chapter are: 1) identification of birth centres and

measuring integration of organization and care; 2) measuring the quality of birth centre care; 3) effects of introducing a birth centre on regional quality and provision of care; 4) cost-effectiveness analysis; 5) in depth longitudinal analysis of the organization and processes in birth centres. Different qualitative and quantitative methods were be used in the different sub studies. The design is a multi-centre, multi-method study, including surveys, interviews, observations, and analysis of registration data and documents.

Chapter 3 describes the development of a definition of birth centres in the Netherlands. Also the identification and description of their characteristics are described. The research question answered in this chapter is: What is the definition of birth centres in the Netherlands and how can identified birth centres, based on this definition, be characterised? In the Netherlands a clear definition of a birth centre is lacking. If birth centres could play a role in improving maternity care, first a clear definition should be constructed. We analysed international definitions of birth centres to find recurring elements. In July 2013 we send the Dutch Birth Centre Questionnaire to 46 selected Dutch birth locations that might qualify as birth centre. Questions included: location, reason for establishment, women served, philosophies, facilities that support physiological birth, hotel-facilities, management, environment and transfer procedures in case of referral. We visited the birth centres to confirm the findings from the Dutch Birth Centre Questionnaire and to measure distance and time in case of referral to obstetric care. We received the questionnaires from all 46 birth locations. Based on this information we constructed a Dutch definition of a birth centre. We defined birth centres as midwifery-managed locations that offer care to low risk women during labour and birth. They have a homelike environment and provide facilities to support physiological birth. Community midwives take primary professional responsibility for care. In case of referral the obstetric caregiver takes over the professional responsibility of care. Of the 46 birth locations 23 fulfilled this definition. We distinguished three types of birth centres based on their location in relation to the nearest obstetric unit: freestanding (n=3), alongside (n=14) and on-site (n=6). Transfer in case of referral is necessary for all freestanding and alongside birth centres. Birth centres vary in their reason for establishment and their characteristics.

Chapter 4 describes the development process of structure and process birth centre quality indicators. Quality of care is usually measured in three dimensions: structure, process and outcome. A number of outcome indicators is available to assess birth centre care (e.g. perinatal and maternal mortality and morbidity, Optimality Index, Composite Adverse Outcome Index), but structure and process indicators for birth centres are scarce. Therefore, a comprehensive set of these indicators should be developed. The research question answered in this chapter is: What indicators can

be identified to assess structure and process quality aspects of birth centres in the Netherlands? We used mixed methods to answer the research question. Beginning with a literature review, we developed an exhaustive list of determinants. We then used a Delphi study to narrow this list, calling on experts to rate the determinants for relevance and feasibility. A multidisciplinary expert panel of 63 experts, directly or indirectly involved with birth centre care, was invited to participate. A panel of 42 experts completed two Delphi rounds rating determinants of the quality of birth centre care based on their relevance (to the setting) and feasibility (of use). A set of 30 structure and process quality indicators was identified to assess the quality of birth centre care in the Netherlands.

Chapter 5 describes the process of determination of the usability of this set structure and process birth centre quality indicators and the assessment of the birth centres, using these indicators. We formulated the research questions answered in this chapter as: 1) Are the identified structure and process birth centre quality indicators usable to assess quality of birth centre care and 2) Can the newly developed set of structure and process birth centre quality indicators be used to determine differences between birth centres in the quality of care? We first described the indicators in detail. Information on the operationalization of the indicators was searched in Dutch quality reports, literature, interviews and the experience of the research group of the Dutch Birth Centre Study. Next we assessed all birth centres in the Netherlands using these indicators using data derived from the Dutch Birth Centre Questionnaire, the Dutch Birth Centre Integration Questionnaire, interviews, and policy documents. We found that 28 indicators could be used to assess birth centres in the Netherlands. Differences between birth centres were shown: the scores on 28 indicators ranged from 7 to 22. Scientific evidence for the specific content of quality indicators is scarce. A number of these indicators can be combined or specified so that they are easier to assess. Some quality indicators are only applicable for some birth centres (e.g. only for freestanding or alongside birth centres). This set of quality indicators can contribute to the development of a quality system for birth centres.

Chapter 6 describes the development of a taxonomy that specifies key features of integrated primary care based on the Rainbow Model of Integrated Care. The research question answered in this chapter is: What are key features of the Rainbow Model of Integrated Care? Building integrated services in a primary care setting is considered an essential important strategy for establishing a high quality and affordable health care system. The theoretical foundations of such integrated service models are described by the Rainbow Model of Integrated Care, which distinguishes six integration dimensions (clinical, professional, organizational, system, functional and normative integration).

We developed the taxonomy based upon a literature review and a qualitative procedure. First, we conducted a literature review to identify features for achieving integrated service delivery. Second, we used a thematic analysis method to develop a taxonomy of key features organized into the dimensions of the Rainbow Model of Integrated Care. Finally, we tested the appropriateness of the key features in a Delphi study among Dutch experts. The taxonomy consists of 59 key features distributed across the six integration dimensions of the Rainbow Model of Integrated Care. Key features associated with the clinical, professional, organizational and normative dimensions were considered appropriate by the experts. Key features linked to the functional and system dimensions were considered less appropriate. This study contributes to the ongoing debate of defining the concept and typology of integrated care. The taxonomy provides a development agenda for establishing an accepted scientific framework of integrated care from an end-user, professional, managerial and policy perspective.

Chapter 7 describes the assessment of integration profiles of birth centres, resulting in a classification of these centres, based on their integration profiles. The research question answered in this chapter is: How can birth centres in the Netherlands be classified, based on the dimensions of integration of the Rainbow Model of Integrated Care? Birth centres are assumed to provide higher quality care because they offer a better opportunity for more integrated care. The goal of integrated care is to offer a continuum of care that crosses the boundaries of public health, primary, secondary, and tertiary care. Because the number of births in most birth centres is very small and the number varies greatly between centres, to be able to evaluate birth centres and their contribution to the Dutch maternity care system, we decided to develop reproducible way to classify the centres based on common characteristics. Besides location, we considered that this classification should be based on characteristics of integration of care given the assumption that birth centres offer an opportunity for more integrated care. This study is based on the Rainbow Model of Integrated Care. We used a survey followed by qualitative interviews in 23 birth centres in the Netherlands to determine which integration profiles can be distinguished and to describe their discriminating characteristics. Cluster analysis was used to classify the birth centres. We classified the Dutch birth centres into three clusters: 1)“Mono-disciplinary-oriented birth centres” (n=10): which are mainly owned by primary care organizations and established as physical facilities to provide an alternative birthplace for low risk births; 2) “Multi-disciplinary-oriented birth centres” (n=6): which are mainly multi-disciplinary oriented and can be regarded as facilities to give birth, with a focus on integrated birth care; 3) “Mixed Cluster of birth centres” (n=7): which have a range of organizational forms that differentiate them from centres in the other clusters. The results of this study can be used to relate integration profiles of birth centres to quality of care, costs, and perinatal outcomes.

Chapter 8 describes the assessment of integration profiles of Maternity Care Networks using the dimensions of integration of the Rainbow Model of Integrated Care. The research question answered in this chapter is: How can Maternity Care Networks be described using the dimensions of integration of the Rainbow Model of Integrated Care? More than a quarter of all Maternity Care Networks in the Netherlands have attended the "VSV-Carrousel", in which the Maternity Care Networks Integration Questionnaire was used. This questionnaire was used as a 'mirror' for the networks to gain insight into the (level of) performance of the network in relation to integrated birth care. The results of the Maternity Care Network Integration Questionnaire get an inside view of (the organization) of integrated birth care: it makes manifest the differences and similarities between the networks. Most Maternity Care Networks who participated in the VSV-Carousel are in the stage of linkage between the various professionals and organizations. The Maternity Care Network Integration questionnaire is likely a useful questionnaire to monitor the integration process. Combined with outcome indicators it can gain insight whether integrated birth care leads to better quality of care.

Chapter 9 describes the process of validation of the Integration Questionnaire for birth centres and Maternity Care Networks. The research question answered in this chapter is: Are integration questionnaires for birth centres and Maternity Care Networks usable to evaluate integrated birth care? We developed questionnaires to examine integrated care in two different settings, using the taxonomy of the Rainbow Model of Integrated Care. We used data collected between 2013 and 2015 from two studies: the Maternity Care Network Study (634 respondents) and the Dutch Birth Centre Study (56 respondents) to explore the usability of these questionnaires. We assessed the feasibility, discriminative validity, and reliability of the questionnaires. We found both questionnaires showing good feasibility (with an overall missing rate < 20 %) and reliability (Cronbach's Alpha coefficient > 0.70). Between-subgroup post-hoc comparisons we determined statistically significant differences on integration profiles between Maternity Care Networks (on all items, dimensions of integration and total integration score) and birth centres (on 50 % of the items and dimensions of integration). We concluded that both questionnaires are feasible and can discriminate between Maternity Care Networks and birth centres with different integration profiles in the Netherlands. The questionnaires offer an opportunity to better understand integrated care as an approach to the delivery of health services in different models of integrated birth care. Further research is necessary to explore whether the instruments can be applied in other countries and whether they can be used to assess changes in levels of integration over time, to measure absolute levels of integration and to predict outcome of a birth care setting. The development of the questionnaires is one more step in building knowledge of the complexity of integrated care.

Chapter 10 describes the exploration of the hypothesis of interdependence of the Triple Aim components and whether they are related to the integration profiles of birth centres. A Triple Aim approach is assumed to support improving perinatal care and requires simultaneous pursuit of three linked aims: "improving the individual experience of care, improving the health of populations and reducing the per capita costs of care". Because of the novelty of the concept of Triple Aim and despite the large uptake of this philosophy in health care recently, there is limited empirical evidence about the Triple Aim yet. The Dutch Birth Centre Study provided information of client experiences as well as perinatal outcomes and costs of birth centres. Using these data gave us the opportunity to explore the Triple Aim components in a birth care setting. In addition, our data on integration of birth centres provided us with the opportunity to correlate Triple Aim to integration profiles. The research questions answered in this chapter are: 1) Are the Triple Aim components (experienced quality of care, perinatal outcomes and costs) interrelated for women who planned to give birth in a birth centre?; 2) Is the integration profile of birth centres related to the Triple Aim? We used data from the Dutch Birth Study conducted between August 2013 and April 2015 among 19 birth centres in the Netherlands: 1) client experiences of women who planned to give birth in a birth centre; 2) perinatal outcomes of women who planned to give birth in a birth centre; 3) costs of a planned birth in a birth centre; 4) classification of birth centres on integration aspects. We used the mean integration scores per birth centre (both total score and per dimension), client experiences, perinatal outcomes (both OI-NL2015 and CAO) and costs as calculated in the sub studies. We concluded that for women who planned to give birth in a birth centre we could confirm the assumption that the Triple Aim components are interrelated: better experienced care occurs simultaneously with better perinatal outcomes and lower costs. In our low risk population, focusing on physiological birth in a birth centre, we did not find a relationship of integration profiles of birth centres with the Triple Aim components. Therefore, our study does not confirm the hypothesis that integrated birth centre care can improve quality of care. Further research across the full range of the pregnancy and birth care cycle, the full range of risk for adverse outcomes and all care settings is needed to explore the relationship of integration with the Triple Aim in perinatal care.

Chapter 11 represents an overview of the main findings of this thesis and a reflection on these findings. It also describes its strengths and limitations and discusses the implications for practice and research.

SAMENVATTING

Hoofdstuk 1 beschrijft de probleemstelling, het doel en de opzet van dit proefschrift. Het Nederlandse verloskundig systeem is gebaseerd op de gedachte dat zwangerschap, bevalling en kraambed fysiologische processen zijn. Eerstelijns verloskundigen in de wijk zijn verantwoordelijk voor de zorg voor vrouwen met een laag risico, die een fysiologische zwangerschap, bevalling en kraambed doormaken. In sommige regio's, meestal op het platteland, zorgen verloskundig actieve huisartsen voor deze vrouwen. Als zich complicaties voordoen of dreigen te ontstaan of farmacologische pijnbestrijding nodig is, wordt de verantwoordelijkheid overgedragen aan de tweede- of derdelijns obstetrische zorg. Zorgverleners in de verschillende echelons werken autonoom en spelen complementaire rollen.
Een groeiende zorgvraag, toenemende versnippering van zorg, veranderende behoeften van patiënten en een toenemende invloed van economische, politieke en sociale factoren op de zorg, maken dat beleidsmakers steeds meer "geïntegreerde zorg" stimuleren als een manier om kosten te verlagen, kwaliteit te verbeteren en betere uitkomsten te realiseren. Binnen het Nederlandse verloskundig systeem worden geboortecentra gezien als ideale settings waarin geïntegreerde zorg gerealiseerd zou kunnen worden. In Nederland is geen onderzoek naar de aard en mate van integratie in geboortecentra verricht en er waren geen gegevens over het effect van integratie op de kwaliteit van de zorg. Daarom is meer kennis over de organisatie van geboortecentra in Nederland belangrijk.
Het Geboortecentrum Onderzoek is opgezet om de resultaten van geboortecentra en hun mogelijke toegevoegde waarde voor de kwaliteit van het Nederlandse verloskundig systeem te evalueren. Het presenteert evidence-based aanbevelingen voor de organisatie en het functioneren van geboortecentra voor de toekomst. Dit proefschrift bevat studies van verschillende deelonderzoeken van het Geboortecentrum Onderzoek. Het beschrijft de ontwikkeling en het gebruik van structuur- en proces kwaliteitsindicatoren voor geboortecentra in Nederland en de mate van integratie in de centra. Het onderzoekt ook de aanname dat meer geïntegreerde geboortecentra een hogere kwaliteit van zorg kunnen leveren. Algemene conclusies van het Geboortecentrum Onderzoek worden in dit proefschrift niet beschreven. Het totale onderzoek levert drie proefschriften op die nauw met elkaar verbonden zijn, maar elk gericht op verschillende aspecten van zorg in een geboortecentrum. Dit proefschrift richt zich op de organisatie van geboortecentra en daarmee samenhangende aspecten van kwaliteit en geïntegreerde zorg.

Hoofdstuk 2 beschrijft het studie-design van het Geboortecentrum Onderzoek, waar het merendeel van de studies in dit proefschrift op zijn gebaseerd. In het afgelopen decennium zijn in Nederland ongeveer twintig verschillende geboortecentra opgericht. Deze toename van geboortecentra wordt toegeschreven aan verschillende redenen

zoals een veilige en gemakkelijk toegankelijke plaats om te bevallen, organisatorische efficiëntie in integratie van zorg, directe toegang tot verloskundige ziekenhuiszorg als dat nodig is en een beter gebruik van kraamzorg. Aangenomen wordt dat geboortecentra meer integratie en betere kwaliteit van zorg kunnen leveren en zo kunnen bijdragen aan betere perinatale en maternale uitkomsten. Tot nu toe is er geen bewijs voor deze aanname omdat er geen eerdere onderzoeken naar geboortecentra in Nederland zijn uitgevoerd.
De doelstellingen van het Geboortecentrum Onderzoek zijn: 1) identificatie van geboortecentra en het meten van integratie van organisatie en zorg; 2) het meten van kwaliteit van zorg in een geboortecentrum; 3) het effect van de start van een geboortecentrum op de zorg rondom de bevalling in een regio; 4) kosteneffectiviteitsanalyse; en 5) in depth longitudinale analyse van organisatie en werkwijzen in geboortecentra. In de deelonderzoeken zullen verschillende kwalitatieve en kwantitatieve onderzoeksmethoden gebruikt worden. Het ontwerp is een multi-center, multi-methods studie, waaronder vragenlijsten, interviews, observaties en analyse van geregistreerde data en documenten.

Hoofdstuk 3 beschrijft de ontwikkeling van de definitie van een geboortecentrum in Nederland, het proces van identificatie van geboortecentra en geeft een beschrijving van hun kenmerken. De onderzoeksvraag die in dit hoofdstuk beantwoord wordt, luidt: Wat is de definitie van een geboortecentrum in Nederland en hoe kunnen geboortecentra, die op basis van deze definitie geïdentificeerd zijn, worden gekarakteriseerd? In Nederland ontbrak een duidelijke definitie van een geboortecentrum. Als geboortecentra een rol zouden kunnen spelen bij het verbeteren van de verloskundige zorg moest allereerst een duidelijke definitie geformuleerd worden. We analyseerden internationale definities van geboortecentra om terugkerende elementen te vinden. In juli 2013 stuurden we 46 geselecteerde Nederlandse bevallocaties, die als geboortecentrum in aanmerking zouden kunnen komen, de Nederlandse Geboortecentrum vragenlijst toe. Vragen hadden betrekking op: locatie, reden voor oprichting, doelgroep, filosofieën, faciliteiten om een fysiologische geboorte te ondersteunen, hotelfaciliteiten, management, omgeving en overdrachtprocedures in geval van verwijzing. We bezochten de geboortecentra om de bevindingen uit de vragenlijst te bevestigen en om de benodigde afstand en tijd te meten in geval van verwijzing naar de tweede lijn.
Alle managers of afdelingshoofden van de 46 bevallocaties stuurden de vragenlijst terug. Op basis van deze informatie formuleerden we een Nederlandse definitie van een geboortecentrum. We definieerden een geboortecentrum als een “midwifery-managed’ bevallocatie anders dan thuis, waar laag risico zwangeren kunnen bevallen onder verantwoordelijkheid van een eerstelijns verloskundig professional. Het geboortecentrum heeft een huiselijke sfeer en inrichting met daarbij faciliteiten die het

fysiologisch verloop van de baring kunnen ondersteunen. Wanneer er reden is voor overdracht neemt de tweede lijn (gynaecoloog of kinderarts) de verantwoordelijkheid van de zorg over van de eerste lijn (verloskundige of huisarts)'. Van de 46 bevallocaties voldeden 23 aan deze definitie. We onderscheidden drie soorten geboortecentra op basis van hun ligging ten opzichte van de dichtstbijzijnde klinische verloskamers: vrijstaand (n = 3) aanpalend (n = 14) en intern (n = 6). In geval van verwijzing is verplaatsing noodzakelijk voor alle vrijstaande en aanpalende geboortecentra. Geboortecentra variëren in hun reden voor ontstaan en hun kenmerken.

Hoofdstuk 4 beschrijft de ontwikkeling van structuur- en proces kwaliteitsindicatoren voor geboortecentra. Kwaliteit van zorg wordt meestal bepaald op drie niveaus: structuur, proces en uitkomst. Een aantal uitkomstindicatoren was beschikbaar om uitkomsten van zorg in geboortecentra te bepalen (bijvoorbeeld perinatale en maternale mortaliteit en morbiditeit, de Optimality Index en de Composite Adverse Outcome Index), maar structuur- en procesindicatoren om de centra te beoordelen waren er nauwelijks. Daarom moest een uitgebreide set van deze indicatoren ontwikkeld worden. De onderzoeksvraag die in dit hoofdstuk beantwoord wordt, luidt: Welke indicatoren kunnen geïdentificeerd worden om structuur- en proces kwaliteitsaspecten van geboortecentra in Nederland te kunnen beoordelen? We gebruikten zowel kwantitatieve - als kwalitatieve onderzoeksmethoden om de onderzoeksvraag te beantwoorden. Op basis van literatuurstudie ontwikkelden we een uitgebreide lijst van determinanten. Vervolgens hebben we, met behulp van een online Delphi-procedure, de lijst ingekort door aan experts te vragen de mate van relevantie en haalbaarheid van de determinanten aan te geven. Een multidisciplinair expert panel van 63 experts, direct of indirect betrokken bij de geboortezorg in geboortecentra, werd uitgenodigd om deel te nemen. Een panel van 42 experts voltooide twee Delphi-rondes en beoordeelden de determinanten op basis van hun relevantie (voor een geboortecentrum) en de haalbaarheid (het gebruik). Een set van 30 structuur- en proces kwaliteitsindicatoren werd geïdentificeerd om de kwaliteit van zorg in een geboortecentrum in Nederland te evalueren.

Hoofdstuk 5 beschrijft het proces om de bruikbaarheid van de set structuur- en proces kwaliteitsindicatoren voor geboortecentra vast te stellen. Ook bevat het de beoordeling van de kwaliteit van de centra, aan de hand van deze indicatoren. De onderzoeksvragen die in dit hoofdstuk beantwoord worden, waren: 1) Zijn de geïdentificeerde structuur- en proces kwaliteitsindicatoren voor geboortecentra bruikbaar om de kwaliteit van zorg in een geboortecentrum te beoordelen en 2) Kan de nieuw ontwikkelde set structuur- en proces kwaliteitsindicatoren voor geboortecentra worden gebruikt om verschillen tussen de geboortecentra in de kwaliteit van zorg te bepalen? Allereerst zijn de indicatoren gedetailleerd

uitgeschreven. Informatie over de operationalisatie werd gezocht in Nederlandse kwaliteitsrapporten, literatuur, interviews en op basis van ervaring van de projectgroep van het Geboortecentrum Onderzoek. Vervolgens beoordeelden we alle geboortecentra in Nederland aan de hand van de indicatoren op basis van gegevens uit de Nederlandse Geboortecentrum vragenlijst, de Geboortecentrum Integratie vragenlijst, interviews en beleidsdocumenten. 28 Indicatoren konden gebruikt worden om geboortecentra in Nederland te beoordelen. We vonden verschillen tussen geboortecentra: de scores op de indicatoren varieerden van 7 tot en met 22. Wetenschappelijk bewijs voor de specifieke inhoud van kwaliteitsindicatoren was weinig aanwezig. Een aantal van de indicatoren kan worden gecombineerd of gespecificeerd zodat ze beter kunnen differentiëren. Sommige kwaliteitsindicatoren zijn alleen van toepassing voor sommige geboortecentra (bijv. alleen voor vrijstaande of aanpalende geboortecentra). De set van kwaliteitsindicatoren kan bijdragen aan de ontwikkeling van een kwaliteitssysteem voor geboortecentra.

Hoofdstuk 6 beschrijft de ontwikkeling van een classificatie (taxonomie) die, op basis van het Regenboogmodel voor geïntegreerde zorg, de belangrijkste kenmerken van geïntegreerde zorg in de context van de eerstelijnsgezondheidszorg specificeert. De onderzoeksvraag die in dit hoofdstuk beantwoord wordt, luidt: Wat zijn de belangrijkste kenmerken van het Regenboogmodel voor geïntegreerde zorg? De ontwikkeling van geïntegreerde eerstelijnsorganisaties wordt beschouwd als een belangrijke strategie voor het organiseren van een kwalitatief hoogwaardig en betaalbaar gezondheidszorgsysteem. De theoretische basis voor dergelijke geïntegreerde organisatiemodellen wordt beschreven door het Regenboogmodel, dat zes dimensies van integratie onderscheidt: klinische-, professionele-, organisatorische-, systeem-, functionele- en normatieve integratie. We ontwikkelden de taxonomie op basis van literatuuronderzoek en een kwalitatieve onderzoeksmethode. We startten met een literatuurstudie om kenmerken te identificeren die van belang zijn voor een geïntegreerde eerstelijnsorganisatie. Vervolgens gebruikten we een thematische analysemethode om de taxonomie te ontwikkelen. Tenslotte werd met behulp van een Delphi studie onder Nederlandse praktijk- en onderzoek experts op het gebied van geïntegreerde eerstelijnszorg bepaald welke kenmerken belangrijk zijn bij de ontwikkeling van geïntegreerde eerstelijnszorg. 59 Kenmerken, verdeeld over de zes dimensies van het Regenboogmodel, werden geïdentificeerd. Het onderzoek liet zien dat voornamelijk kenmerken die zijn gerelateerd aan de klinische, professionele, organisatorische en normatieve dimensies belangrijk gevonden werden door de deskundigen. Functionele- en systeem kenmerken werden minder relevant gevonden voor het stimuleren van geïntegreerde zorg. Dit onderzoek draagt bij aan de verdere ontwikkeling van het concept en de typologie van geïntegreerde zorg. De taxonomie biedt een ontwikkelingsagenda voor een geaccepteerd wetenschappelijk kader voor geïntegreerde zorg vanuit het perspectief van gebruiker, professional, bestuurder en beleidsmaker.

Hoofdstuk 7 beschrijft het proces van vaststellen van integratieprofielen van geboortecentra, op basis waarvan een typologie van geboortecentra is opgesteld. De onderzoeksvraag die in dit hoofdstuk beantwoord wordt, luidt:: Hoe kunnen, op basis van de dimensies van integratie van het Regenboogmodel van geïntegreerde zorg, geboortecentra in Nederland ingedeeld worden? Er wordt aangenomen dat geboortecentra betere kwaliteit van zorg kunnen leveren omdat ze betere mogelijkheden bieden om geïntegreerde zorg te organiseren. Het doel van geïntegreerde zorg is het realiseren van een continuüm van zorg die de grenzen van de public health, eerste- tweede- en derdelijnszorg doorkruist. Om geboortecentra te kunnen evalueren en hun toegevoegde waarde voor het Nederlands verloskundig systeem te kunnen bepalen, hebben we de geboortecentra geclusterd aan de hand van gemeenschappelijke kenmerken, omdat het aantal geboorten in de meeste geboortecentra zeer klein is en het aantal sterkt varieert tussen de centra.. Naast locatie hebben we de indeling ook gemaakt op basis van kenmerken van integratie van zorg, gezien de veronderstelling dat de geboortecentra een betere kans op meer geïntegreerde zorg bieden. Deze studie is gebaseerd op het Regenboogmodel van geïntegreerde zorg. Aan de hand van een vragenlijst en kwalitatieve interviews bepaalden we de integratieprofielen en beschreven we de onderscheidende kenmerken van de 23 geboortecentra in Nederland. Met behulp van een clusteranalyse techniek werden de geboortecentra geclassificeerd.

We konden de Nederlandse geboortecentra in drie groepen indelen: 1) “Monodisciplinair gerichte geboortecentra” (n = 10): deze centra zijn voornamelijk in eigendom van eerstelijnsorganisaties en worden primair gezien als een faciliteit om te bevallen, als alternatief voor laag risico vrouwen die niet thuis willen bevallen; 2) “Multidisciplinair gerichte geboortecentra” (n = 6): deze centra zijn voornamelijk multidisciplinair georganiseerd en worden gezien als een faciliteit om te bevallen, met een focus op geïntegreerde geboortezorg; 3) “Gemengde groep geboortecentra” (n = 7): deze centra kennen een scala aan organisatievormen die hen onderscheidt van de centra in de andere groepen. De resultaten van dit onderzoek kunnen gebruikt worden om integratieprofielen van de geboortecentra te koppelen aan kwaliteit van zorg, kosten en perinatale uitkomsten.

Hoofdstuk 8 beschrijft het proces van vaststellen van integratieprofielen van Verloskundige Samenwerkingsverbanden (VSV’s) op basis van het Regenboogmodel. De onderzoeksvraag die in dit hoofdstuk beantwoord wordt, luidt:: Hoe kunnen VSV’s beschreven worden aan de hand van de dimensies van integratie van het Regenboogmodel van geïntegreerde zorg? Meer dan een kwart van alle VSV’s in Nederland heeft deelgenomen aan de “VSV-Carrousel”, waarbij de VSV-

Integratiemeter is afgenomen. Deze vragenlijst werd gebruikt als een 'spiegel' voor VSV's om inzicht te geven in het (niveau van) functioneren van het VSV in relatie tot integrale geboortezorg. De resultaten van de VSV-Integratiemeter geven een kijkje in de keuken van de (organisatie van) geïntegreerde geboortezorg. Het maakt verschillen en overeenkomsten tussen VSV's zichtbaar. De meeste VSV's die hebben deelgenomen aan de VSV-carrousel bevinden zich in het stadium van afstemming tussen de verschillende professionals en organisaties. De VSV-Integratiemeter is waarschijnlijk een geschikte vragenlijst om het proces tot integrale geboortezorg te kunnen monitoren. In combinatie met uitkomstindicatoren kan het instrument inzicht geven of integrale geboortezorg leidt tot betere kwaliteit van zorg.

Hoofdstuk 9 beschrijft het proces van validatie van de integratievragenlijst voor geboortecentra en VSV's. De onderzoeksvraag die in dit hoofdstuk beantwoord wordt, luidt:: Zijn de integratievragenlijsten voor geboortecentra en VSV's bruikbaar om geïntegreerde geboortezorg te evalueren? We ontwikkelden vragenlijsten op basis van de taxonomie van het Regenboogmodel om geïntegreerde zorg te kunnen onderzoeken in twee verschillende settingen binnen de geboortezorg. Voor de validatie gebruikten we gegevens die zijn verzameld tussen 2013 en 2015 uit twee studies: resultaten van de VSV-Integratiemeter (634 respondenten) en het Geboortecentrum Onderzoek (56 respondenten). We beoordeelden de haalbaarheid, het discriminerend vermogen en de betrouwbaarheid van de vragenlijsten. We constateerden dat beide vragenlijsten goed in te vullen waren (met een overall percentage van niet ingevulde vragen van onder de 20%) en een goede betrouwbaarheid kenden (Cronbach's Alpha-coëfficiënt boven de 0,70). Between-subgroep post-hoc vergelijkingen gaven statistisch significante verschillen aan op de integratieprofielen tussen zowel de VSV's (op alle kernbegrippen, dimensies van integratie en de totale score integratie) als geboortecentra (op 50% van de kernbegrippen en dimensies van integratie). We concludeerden dat beide vragenlijsten bruikbaar zijn en onderscheid kunnen maken tussen VSV's en geboortecentra in Nederland met verschillende integratieprofielen. De vragenlijsten bieden een mogelijkheid om geïntegreerde zorg als aanpak voor de organisatie van geboortezorg in verschillende settingen beter te begrijpen. Verder onderzoek is nodig om vast te stellen of de instrumenten ook in andere landen kunnen worden toegepast en of ze ook kunnen worden gebruikt om veranderingen in de niveaus van integratie op langere termijn te kunnen beoordelen, om absolute niveaus van integratie te kunnen meten en aan de hand van de integratieprofielen uitkomsten van een geboortezorg setting te voorspellen. De ontwikkeling van de vragenlijsten is een stap in de opbouw van kennis over de complexiteit van geïntegreerde zorg.

Hoofdstuk 10 beschrijft een exploratie van de hypothese van inter-afhankelijkheid van de Triple Aim componenten en in hoeverre er een relatie is met integratieprofielen van geboortecentra. Er wordt aangenomen dat een Triple Aim aanpak perinatale zorg kan verbeteren. Een dergelijke aanpak vereist het gelijktijdig nastreven van drie doelen die met elkaar verbonden zijn: "verbetering van individuele ervaren zorg, verbetering van de gezondheid van de bevolking en de vermindering van zorgkosten per hoofd van de bevolking". Vanwege het vernieuwende concept en ondanks dat deze filosofie breed opgepakt wordt in de gezondheidszorg, is er nog weinig empirisch bewijs over de Triple Aim. Het Geboortecentrum Onderzoek verstrekte informatie over zowel cliëntervaringen, perinatale uitkomsten als kosten van geboortecentra. Door deze gegevens te gebruiken hebben we de mogelijkheid gehad om de Triple Aim-componenten te onderzoeken in een geboortezorg setting. Daarnaast hebben onze gegevens over integratie van geboortecentra ons de mogelijkheid gegeven om de Triple Aim te correleren aan integratieprofielen. De in dit hoofdstuk beantwoorde onderzoeksvragen luiden: 1) Is er een onderlinge relatie tussen de Triple Aim componenten (ervaren kwaliteit van de zorg, perinatale uitkomst en kosten) bij vrouwen die van plan waren in een geboortecentrum te bevallen?; 2) Is er een relatie tussen het integratieprofiel van geboortecentra en de Triple Aim?

We hebben gebruik gemaakt van gegevens uit het Geboortecentrum Onderzoek, dat uitgevoerd is tussen augustus 2013 en april 2015 onder 19 geboortecentra in Nederland: 1) cliëntervaringen van vrouwen die van plan waren om in een geboortecentrum te bevallen; 2) perinatale uitkomsten van vrouwen die die van plan waren om in een geboortecentrum te bevallen; 3) kosten van een geplande bevalling in een geboortecentrum; 4) classificatie van geboortecentra op integratie aspecten. We hebben de gemiddelde integratie scores per geboortecentrum gebruikt (zowel de totale score als de score per dimensie), cliëntervaringen, perinatale uitkomsten (zowel OI-NL2015 als CAO) en kosten zoals berekend in de sub studies. We concludeerden dat voor vrouwen die van plan waren in een geboortecentrum te bevallen we de hypothese konden bevestigen dat de Triple Aim componenten onderling verbonden zijn: betere ervaren zorg komt tegelijkertijd voor met betere perinatale uitkomsten en lagere kosten. In onze laag-risico populatie, gericht op een fysiologische bevalling in een geboortecentrum, vonden we geen relatie tussen integratieprofielen van geboortecentra en de Triple Aim componenten. Daarom konden we de hypothese dat meer geïntegreerde geboortecentra de kwaliteit van zorg kan verbeteren niet bevestigen. Verder onderzoek is nodig in settingen die de volledige range van de zwangerschaps- en geboortecyclus omvat (en dus de volledige range van risico's op slechte uitkomsten) om de relatie tussen integratie en de Triple Aim componenten in perinatale zorg vast te kunnen stellen.

Hoofdstuk 11 bevat een overzicht van de belangrijkste bevindingen van dit proefschrift en een reflectie hierop. Het beschrijft ook de sterke en zwakke aspecten en bespreekt de implicaties voor praktijk en wetenschap.

CURRICULUM VITAE

Inge Boesveld is born in 'frank breech presentation with fundus expression' on March 17th 1966 in Amsterdam, the first child of Dick Boesveld and Ank Tabak. She received her secondary education (VWO) in 1984 at the Christian Comprehensive School Pascal in Amsterdam. After one year studying HBO-V and another year physiotherapy she was could start her education at Midwifery School in Amsterdam in 1986. After graduating in 1989, she worked as an independent midwife in a primary care midwife practice in Castricum until 2001; initially with one colleague, a few years later in a trio practice. In these years, she gave birth to four boys, from whom the oldest died one day after his birth from the consequences of immaturity. Between 2004 and 2010 she worked as an advisor to a Regional Support Organization Line 1 in The Hague, where she assisted to establish and supported various partnerships in birth care. From 2005 she studied part-time for her Master of Science Midwifery at the University of Amsterdam. She completed her Master's degree in 2007. For her Master thesis, she examined Maternity Care Networks in the Netherlands on the authority of the RIVM: an inventory of the progress of the establishment of Maternity Care Networks in the context of the implementation of the perinatal audit. Since 2010 she works at Jan van Es Institute, the Netherlands Expert Centre Integrated Primary Care. Her main focus is on integrated birth care. For example, she supported various Maternity Care Networks with the implementation and evaluation of integrated birth care, using a method based on continuous quality improvement using the Plan-do-Check Act Cycle (PDCA cycle). In 2012, the Jan van Es Institute was asked to participate in the Dutch Birth Centre Study. In this way she got involved in this process of getting her doctoral degree. Inge is married to Theo Haitjema and lives in The Hague. Her sons are studying at Amsterdam and Enschede.

Inge Boesveld is geboren als ‘onvolkomen stuit met fundus expressie’ op 17 maart 1966 in Amsterdam, als eerste kind van Dick Boesveld en Ank Tabak. Zij behaalde haar VWO diploma in 1984 aan de Christelijke Scholengemeenschap Pascal in Amsterdam. Na een jaar HBO-V en een jaar Fysiotherapie gestudeerd te hebben kon zij in 1986 haar verloskunde opleiding starten aan de Kweekschool voor Vroedvrouwen in Amsterdam. Na haar afstuderen in 1989 werkte ze tot 2001 als zelfstandige verloskundige in een eerstelijns verloskundigenpraktijk in Castricum; aanvankelijk in een duo praktijk, later in een trio praktijk. In deze jaren baarde zij vier jongens van wie de oudste één dag na z’n geboorte is overleden aan de gevolgen van immaturiteit. Tussen 2004 en 2010 werkte zij als adviseur bij de Regionale Ondersteuningsorganisatie Lijn 1 in Den Haag waar zij verschillende samenwerkingsverbanden in de ouder- en kindzorgketen heeft helpen opzetten en ondersteund. Vanaf 2005 volgde ze parttime de Masteropleiding Verloskunde aan de Universiteit van Amsterdam. Ze behaalde haar universitaire diploma in 2007. Voor haar Masterscriptie deed ze onderzoek naar Verloskundige Samenwerkingsverbanden in Nederland in opdracht van het RIVM: een inventarisatie naar de stand van zaken wat betreft de realisatie van VSV’s in het kader van de implementatie van de perinatal audit. Sinds 2010 is zij werkzaam bij het Jan van Es Instituut, het Kennisinstituut voor geïntegreerde eerstelijnszorg in Nederland. Hier richt zij zich voornamelijk op integratie binnen de geboortezorg. Zo is ze betrokken (geweest) bij de ondersteuning van verschillende VSV’s bij de implementatie en evaluatie van integrale geboortezorg. Hierbij maakt ze veelal gebruik van een methode die is gebaseerd op continue kwaliteitsverbetering aan de hand van de Plan-do-Check- Act-Cyclus (PDCA-cyclus). In 2012 werd het Jan van Es Instituut gevraagd om te participeren in het Geboortecentrum Onderzoek. Zo rolde ze in dit promotie-traject. Inge is getrouwd met Theo Haitjema en woont in Den Haag. Haar zoons studeren in Amsterdam en Enschede.

DANKWOORD

Wat is dit een bijzonder traject geweest. Zonder ooit een ambitie in die richting gehad te hebben, kwam dit promotieproces op mijn weg. Toch ben ik blij dat ik dit gedaan heb. Ik voel me zeer bevoorrecht dat ik nu dit proefschrift kan presenteren en ben er heel trots op. Dit was niet mogelijk geweest als ik niet het vertrouwen en de ruimte had gekregen om het op mijn manier te doen.

Het eindresultaat is het gevolg van zowel een wetenschappelijk als een persoonlijk ontwikkelingsproces. Het waren inspirerende maar ook heftige jaren. Ik ben iedereen die me ondersteund heeft dan ook heel erg dankbaar: promotoren, copromotoren, promotiecommissie, mede-onderzoekers, (ex) collega's, projectgroepleden, zorgverleners en cliënten die aan het Geboortecentrum Onderzoek hebben meegedaan, medeauteurs en reviewers van artikelen, ontwerper van het boekje, familie, vrienden, (het Koor van) de Haagse Dominicus, zorgverleners, zowel reguliere als die vanuit de acupunctuur, bio-resonantie en regressie- en reïncarnatie therapie: allen hebben jullie je onmisbare steentje bijgedragen. Het noemen van namen zal onvermijdelijk onvolledig zijn en woorden schieten ongetwijfeld te kort. Jullie zijn in mijn hart.

Een bijzonder dankwoord heb ik voor de grootvader van mijn lief. Ik heb hem helaas niet persoonlijk gekend, maar hij heeft de afgelopen jaren in zijn professorale toga over mijn schouder meegekeken als ik achter mijn bureau aan het schrijven was. Op cruciale momenten gaf hij me nét het zetje in mijn rug dat ik op dat moment nodig had. Hoe bijzonder is het om op zijn geboortedag mijn proefschrift te mogen verdedigen in de zaal waar hij precies honderd jaar geleden zelf gepromoveerd is.