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An approach to assessing the quality of birth centres results of the Dutch birth centre study

INGE C. BOESVELD^A, MARIEKE A.A. HERMUS^{BCD}, ELINE C. VAN DER VELDEN-BOLLEMAAT^E, MARIT HITZERT^F, HANNEKE J. DE GRAAF^F, ARIE FRANX^G, THERESE A. WIEGERS^H

ABSTRACT

Objective: to determine the usability of a recently developed set of 30 structure and process birth centre quality indicators.

Design: 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. Next, we assessed the birth centres in the Netherlands according to 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 of the 30 quality indicators could be used to assess birth centres in the Netherlands, one had no optimal value defined, another could not be scored because the information was not available. Each quality indicator could be scored 0 or 1. Differences between birth centres were shown: the scores ranged from 7 to 22. Some of the quality indicators can be combined or made more specific so that they are easier to assess. Some quality indicators need adaptation because they 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. With the findings of this study the set of structure and process quality indicators for birth centres in the Netherlands can be reduced to 22 indicators. This 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 defined as midwifery-managed settings, providing care for 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 (American Association of Birth Centres, Hermus et al., 2017, Laws et al., 2009, Stewart et al., 2004). Compared to obstetric units, birth centres are more focused on childbirth being a family event and provide more personal continuity of midwifery care. The centres also differ from obstetric units because they do not arrange for continuous foetal monitoring, pharmacological pain relief, induction of labour and instrumental birth. In some countries, birth centres have developed specifically to counter medicalization of childbirth, based on the philosophy that childbirth is a physiological event (Gottvall et al., 2011, Laws et al., 2009). In the Netherlands birth centres have developed for several reasons (see below), and women with uncomplicated pregnancies can choose where they want to give birth: at home, in a birth centre or in a hospital (Wieggers et al., 2012). At any location, community midwives are responsible for care during labour and birth. Only 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 care professionals is based on a list of obstetric indications (College voor Zorgverzekeringen, 2003).

During the last decades, several birth centres have been established in the Netherlands for a number of reasons: (1) as an alternative for home birth in regions where the nearest hospital obstetric unit is too far away for speedy transfer as result of concentration of hospital care; (2) as a means to reduce the pressure on hospital maternity wards, resulting from a substantial increase in hospital births because of 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 birth environment than the current hospital rooms (Amelink-Verburg et al., 2009, De Vries et al., 2013, Nederland, 2015, Offerhaus et al., 2013, Zeitlin et al., 2009). Furthermore, in 2009 a ministerial steering committee published a report, suggesting ways for Dutch maternity caregivers to improve quality of care (Stuurgroep Zwangerschap en geboorte, 2009). One of the recommendations was to increase the number of birth centres, based on the assumption that birth centres will provide higher quality of care since they offer a better opportunity for more integrated care (Bonsel et al., 2010). 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 (Hermus et al., 2015). To evaluate the quality of birth centres, both structure, process, and outcome indicators are needed. 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) (Hermus et al., 2015). However, in the Netherlands structure and process quality indicators for birth centres are lacking. Internationally, standards for birth centres are available and can provide a tool for measuring quality of service provided in birth centres (Ackerman et al., 2009, College Perinatale Zorg).

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 determinants for structure and process quality indicators for birth centres was developed, based on literature and a Delphi study (Boesveld et al., 2017a). The set was developed for the seven domains of quality identified by the Institute of Medicine (IOM): effectiveness, safety, timeliness, efficiency, equity, accessibility and patient-centeredness (Institute of Medicine, 2001). The aim of the present study, part of the Dutch Birth Centre Study, is to evaluate the usability of the constructed structure and process birth centre quality indicators and 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 (Hermus et al., 2017). Our starting point was the set of 30 constructed structure and process birth centre quality indicators, based on literature and a Delphi study (Boesveld et al., 2017). To evaluate whether the 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. The study consisted of two phases: (1) determining measurability of birth centre quality indicators, (2) assessing birth centres on these indicators. Table 1 presents the set of indicators.

Determining measurability of the birth centre quality indicators

[TABLE 1]

The 30 quality indicators were described in detail following a format used in earlier studies on quality of maternity care in the Netherlands (Kooistra et al., 2009, Zorginstituut Nederland 2012) (see Table 2). Dutch quality reports, literature, interviews and the experience of the Dutch Birth Centre Study research group were used to find information about the operationalisation of the indicators. We first examined Dutch quality reports, because they include descriptions and definitions of quality indicators in primary or secondary birth care in the Netherlands. If no relevant information was available in these reports, we searched other literature, mainly Dutch articles. We also screened guidelines or 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 (see below). The suggestions were discussed in the Dutch Birth Centre Study research group. 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.

Assessing birth centres using the birth centre quality indicators

To assess birth centres with the birth centre quality indicators, several data sources were used: the Dutch Birth Centre General Questionnaire (DBC-GQ), interviews, observations, the Dutch Birth Centre Integration Questionnaire (DBC-IQ) and policy documents. The DBC-GQ is based on the questionnaire of Laws et al. to characterize Australian birth centres (Laws et al., 2009). This questionnaire included questions about management, services and facilities at the birth setting, location, size, philosophy, financial structure and staffing. With permission of the author we adapted this questionnaire and added questions that are typical for birth centre care in the Netherlands to create the DBC-GQ. The additional questions included questions about management, initiators and motivation for establishment, need for transfer in case of urgent referrals, judicial status and questions about quality, related to the quality indicators. The total questionnaire included 150 questions. The Dutch Birth Centre Integration Questionnaire (DBC-IQ) was developed specifically for the Dutch Birth Centre Study and included 25 questions about 6 domains of integration: clinical, professional, organisation, functional, system and normative integration (Boesveld et al., 2017b).

The DBC-GQ was sent to the managers of all birth centres in the Netherlands and they all responded (Hermus et al., 2017). One researcher (IB) visited all but one of the birth centres between January 2014 and April 2015. We asked the managers to select two or three care providers from different professions to be interviewed. Depending on the local situation that could be community midwives, maternity care assistants, clinical midwives, obstetric nurse specialists or gynaecologists. Two weeks before the visits and interviews, the DBC-IQ was sent to all participants by e-mail. One week later a reminder was sent to the non-responders. For each visit a topic list was made to structure the interviews, based on the received responses to the DBC-GQ and DBC-IQ. During the visits semi-structured interviews were held with the management representatives of the centres and the selected professionals, and observations were made. Managers were asked to show available policy documents, agreements and folders to the researcher. The aim of the interviews and visits was to collect additional information about elements that were missing or unclear from the responses to the questionnaires. During this visit time and distance to travel from the birth centre to the obstetric unit was measured: depending on the local situation the distance 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 indicators were scored, based on the responses to the DBC-GQ and DBC-IQ, notes made during observations and the transcriptions of the interviews. Additionally, policy documents were consulted to retrieve missing data.

The indicators were scored as 'yes', 'no', 'not applicable' or 'no data available' by a second 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).

FINDINGS

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. Table 3 contains the specifications of birth centre quality indicators.

[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 not be scored, only described. The 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 km for one of the freestanding birth centres. All freestanding birth centres are located more than 1 km from a hospital with obstetric 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.

Assessing birth centres using the birth centre quality indicators

To assess birth centres with 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 included in the standard registration. Therefore, we scored birth centres on 28 indicators. Indicator 16 (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. Fig. 1 shows the results of the assessment of the 28 indicators.

[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. Fig. 2 shows the result of this assessment.

[FIGURE 2]

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%. 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 other. Indicator 2 is only applicable for alongside and on-site birth centres. If a birth centre does not have such a connection, agreements with the 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. 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 (Laws et al., 2009). In their study, the distance from the birth centre to a hospital varied from 2 to 15 km. In our study, the variation is much larger (from no distance to more than 30 km). 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. National guidelines state that a woman should be in a hospital within 45 min when specialist care is needed. The steering committee on pregnancy and childbirth (2009) recommended that every woman should receive care and treatment by an obstetric professional within 15 min after referral in case of acute complications regardless of day or night (Beleidsregels ex artikel 4 Wet toelating zorginstellingen 2006, Stuurgroep Zwangerschap en geboorte 2009). Laws et al. (2009) 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 min 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 (Ravelli et al., 2011). Therefore, we conclude that, at this moment, it is not possible to formulate a general criterion for a maximum distance from birth centre to hospital. Further research is needed 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, evidence in literature that these quality indicators are associated with (perinatal) outcomes is scarce. Only for six quality indicators some scientific basis is available from international literature (indicator 3, 10, 15, 20, 22 and 30). (Amelink-Verburg et al., 2011, Brown and Lumley, 1998, de Vries et al., 2007, Donabedian, 1980, Eskes et al., 2014, Hingstman and Boon, 1988, Hodnett et al., 2005a, Hodnett et al., 2005b, KNOV, a, KNOV, c 2008, KNOV, d, KNOV, e, Kuo et al., 2010, Laws et al., 2009, Lundgren et al., 2003, Mancey-Jones and Brugha, 1997, Minkman, 2012, Ravelli et al., 2011, Schee et al., 2005, Schrijvers et al., 2010, Swinkels et al., 2014, Valentijn et al., 2015, Van Lonkhuijzen et al., 2010, Vanhaecht et al., 2007, Zorginstituut Nederland 2012, Zuidgeest et al., 2012)

We found differences between birth centres: the scores varied from 7 to 22, but these are not yet proof of actual differences in quality of care. Quality indicators are developed to provide an indication of the quality. When quality indicators are not met, additional information is needed to understand why that is the case. However, because we have found considerable differences between birth centres, the chance is that this reflects a real difference in quality of care, but assessment of outcome indicators is needed to complement the picture,

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 state of birth centre care in the Netherlands. Until this study, 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 be noticed. 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. To further develop this set of quality indicators more attention needs to be given to standard and criteria development.

Based on the present study it is not possible to formulate general standards.

Implications for practice and research

The presented set of indicators is constructed and tested to make important quality aspects of birth centres transparent for consumers, financiers, health care professionals and policy makers. Based on this set of quality indicators minimal standards of quality of care in birth centres can be formulated. Our study therefore contributes to the development of a quality system for birth centres.

We conclude that the constructed set of quality indicators can be improved at several points. Some of the indicators are very general and could be 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 to determine minimum requirements for this indicator.

Three of the indicators can be combined with other indicators. We found indicator 13, 14 and 15 (written agreements on care aspects, protocol on care aspects and care pathways formulated with chain partners) to be strongly overlapping. 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” (Schrijvers et al., 2010, Vanhaecht et al., 2007). 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*” (Swinkels et al., 2014). 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 into one with a clear definition.

Some indicators are found to partly overlap or complement each other, for example the two indicators having to do with evaluation of care (indicator 22 and 30). At the time of the data collection none of the birth centres 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) (Donabedian, 1980), but a standard or guideline for such a system is not yet nationwide available. We therefore 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 therefore 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 (KNOV, b), indicator 5 was formulated by the Delphi panel (Boesveld et al., 2017). Based on the assumption that the amount of traffic does not differ for clients and professionals (Schee et al., 2005), 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. With these adaptations we will have reduced the set to 22 structure and process quality indicators.

CONCLUSION

We found that 28 of the 30 quality indicators, constructed by an expert panel in a Delphi study, can be used to assess the structure and process quality of birth centres in the Netherlands, but that further improvement is possible. Scientific evidence for minimum requirements or standards is scarcely available. Some quality indicators were found to be only applicable for some birth centres (e.g. only for freestanding or alongside birth centres). Other indicators can be combined or specified so that they are easier to assess. With the findings of this study the set of structure and process quality indicators for birth centres in the Netherlands can be reduced to 22 indicators. 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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Conflict of interest

None declared.

Ethical approval

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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Clinical trial registry

Not applicable

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TABLES AND FIGURES

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 birth centre for clients (i.e. parking)	Accessibility	Structure
5	Physical access to birth 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 (i.e. CPR resuscitation)	Safety	Structure
8	Facilities at a birth centre in relation to pain management (i.e. 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 partners in the care chain	Equity	Structure
12	Participation birth centre in a maternity care consultation and cooperation group (VSV)	Efficiency	Process
13	Written agreements on care aspects (i.e. 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 care provided in the birth centre	Effectiveness	Structure
23	Focusing on the patients (i.e. 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) IT system with hospital and midwife practices	Effectiveness	Structure
28	Participation and representation of clients in organisation (i.e. 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 (i.e. accreditation)	Efficiency	Structure

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 has 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.

Table 3. Key specifications of birth centre quality indicators.

No	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)

No	Indicator	Relation to quality	Definition	Operationalization	Yes/No	Data collection	Based on
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	(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?...	Birth centres answering option 1, 2 or 3.	DBCQ	(2)
8	Facilities at a birth centre in	Birth centres have access to resources	Pain relief in a birth centre is defined as: bath, shower,	Are there facilities for pain relief present in the birth	Birth centres who report	DBCQ	(2)

No	Indicator	Relation to quality	Definition	Operationalization	Yes/No	Data collection	Based on
	relation to pain management (e.g. nitrous oxide)	for pain management if desired.	sterile water injections, nitrous oxide for use by primary care professionals	centre?Method of questioningWhat 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, pethidine / prazine, remifentanil, epidural anaesthesia, none of the options mentioned, otherwise)	having any of the following facilities: bath, shower, sterile water injections or nitrous oxide for use by primary care professionals.		
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 midwives 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, obstetricians 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, obstetricians 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, obstetricians, 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	Birth centres participating in a regional maternity care network.	Does the birth centre participate at the maternity care network of the collaborative hospital?	Birth centres answering the question positively.	DBCQ	(12,50)

No	Indicator	Relation to quality	Definition	Operationalization	Yes/No	Data collection	Based on
		obstetricians 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.					
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, obstetricians, 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.	Policies 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, obstetricians, 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 accessibility and responsible access to	The accessibility and responsible access to the	Has the birth centre agreements with the nearest	Birth centres answering the	DBCQ	(54)

No	Indicator	Relation to quality	Definition	Operationalization	Yes/No	Data collection	Based on
	the birth centre durante partu: guaranteed access to the hospital with which agreement were made	the 2elijnsvoorziening must be guaranteed at all times in case of intrapartum reference.	obstetric unit is always guaranteed.	hospital ton guaranteed access in case of emergency situations?	question positively.		
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 specialised 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 organization2. External maternity care assistant of always the same maternity care organization3. External maternity care assistant of different maternity care organizations4. Bstetric and gynaecology nurse specialist5. 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, to full dilatation of the cervix start medical responsibility and is the women supervised continuously. The medical professional determines this moment. Not left alone: not left	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)

No	Indicator	Relation to quality	Definition	Operationalization	Yes/No	Data collection	Based on
			alone by midwives, obstetric active General practitioner, maternity care assistant, or obstetrics and gynaecology nurse specialist. Active phase: the active phase begins at five centimetres dilatation and good in partu				
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 of care can lead to actions to improve patient care 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?	Birth centres answering both questions positively.	DBCQ	(19,51,65)
				2. Has the birth centre agreements with interpreters, immigrant care consultants etcetera, for with whom no communication is possible without support guide?			
24	Structurally research on client	Several instruments have been developed	Witch research on client experiences, professionals	Does the birth centre evaluate mothers'	Birth centres answering the	DBCQ	(19, 51)

No	Indicator	Relation to quality	Definition	Operationalization	Yes/No	Data collection	Based on
	experiences	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	can measure the experience of clients structurally. Several customer surveys are available such as ReproQ questionnaire and client survey of the KNOV.	experiences?	question positively.		
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	Involvement and participation is defined as take part of sitting on the board of the government of the organization, evaluating	Are mothers involved in (shaping) the organization of the birth centre? Method of questioning: DBCQ: Who forms the	Birth centres that mentioned 'clients' are presented in	DBCQ and interview DBC_IQ (prior to the	Delphi panel

No	Indicator	Relation to quality	Definition	Operationalization	Yes/No	Data collection	Based on
		client's needs.	client experiences or organize a client panel.	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	the management/board in the DBCQ or answered option 3 or 4 in the DBC_IQ	interviews)	
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 cover 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)

Fig. 1: Scored indicators per birerh centre (sorted)*

* Number = number of birerh centre

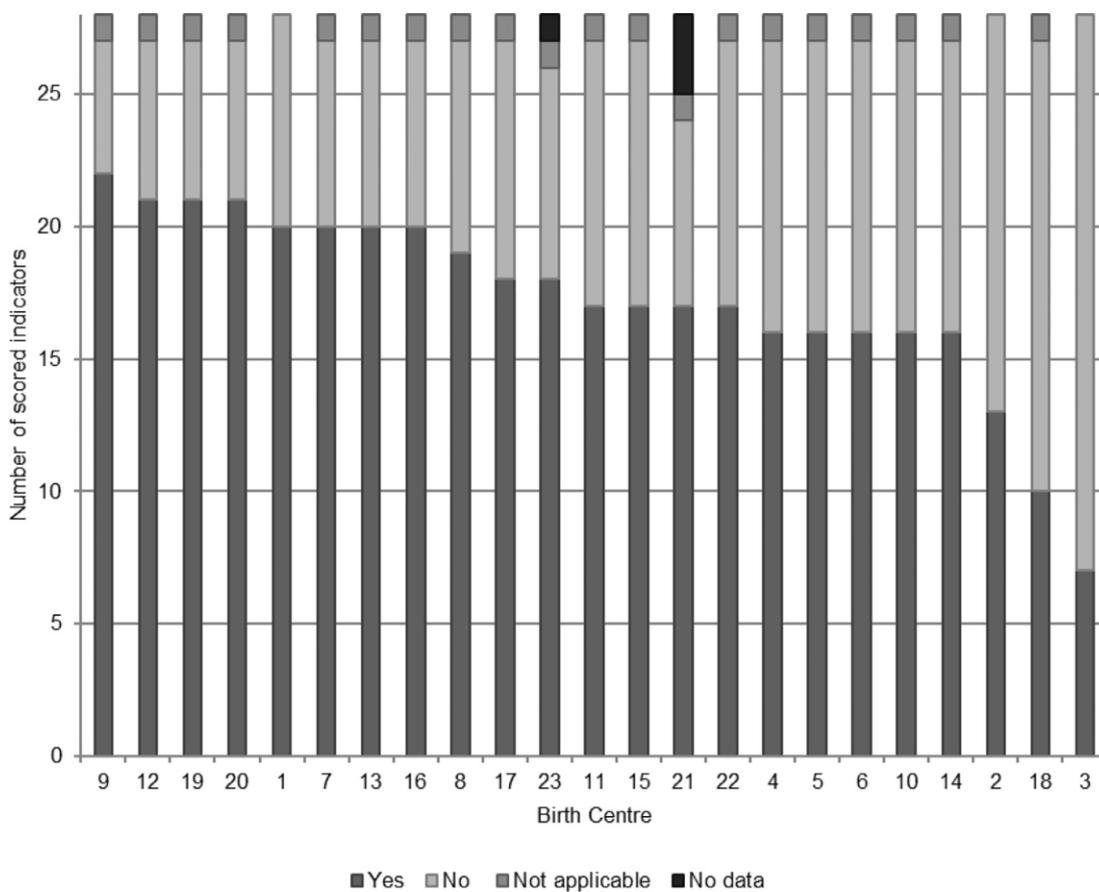


Fig. 2: Number of birth centres scored per indicator (sorted)

