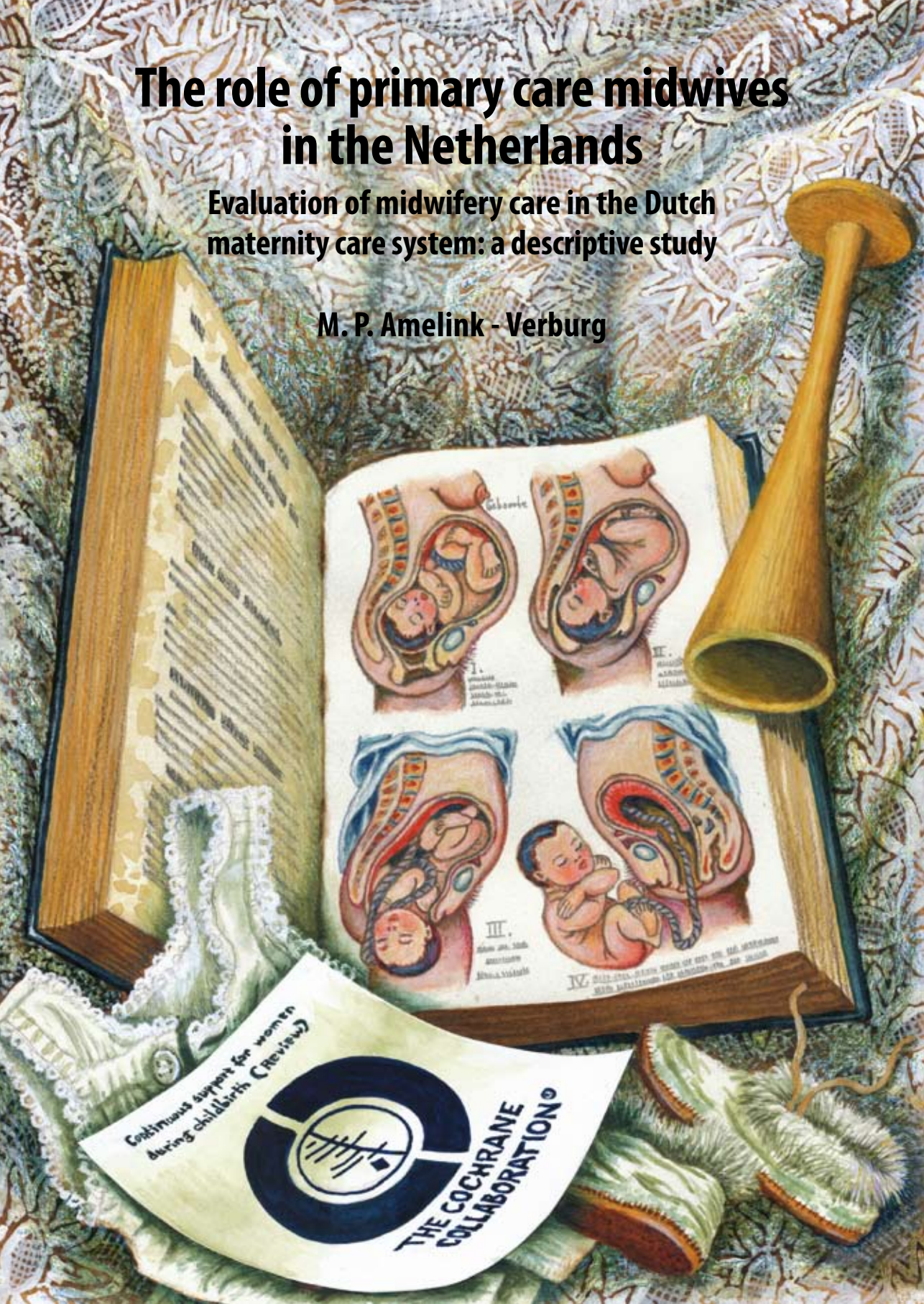
# The role of primary care midwives in the Netherlands

## Evaluation of midwifery care in the Dutch maternity care system: a descriptive study

M. P. Amelink - Verburg



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# The role of primary care midwives in the Netherlands

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geboren te Groningen

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CHAPTER 1

# General introduction

## Introduction

Midwifery has officially been legislated as a medical speciality in the Netherlands by the Dutch Practice of Medicine Act of 1 June 1865. It outlined the midwife's competencies as well as the physician's and the pharmacist's.[1] Other medical professions, such as the dentistry, were not recognised under this act.[2] Since that first official description of the midwife's competencies, the midwife's field of work has been the subject of many debates.[2;3] The scope of the midwife's duties has since been defined as related to 'normal pregnancy and childbirth'. However, the midwife's exact competencies and tasks have been redefined many times over the course of time, which in turn has brought about considerable changes to the student midwife's curriculum (*refer to Table A in Appendix 1*).

The midwife's world has changed, as well. Our knowledge of medical science in general and of obstetrics in particular has increased significantly and countless technological advances have changed diagnostic methods and medication for ever. In addition, society has made many advances in hygiene, demographics, public health and prevention, all of which has resulted in a drastically reduced perinatal mortality rate (Figure 1.1).[4-7]

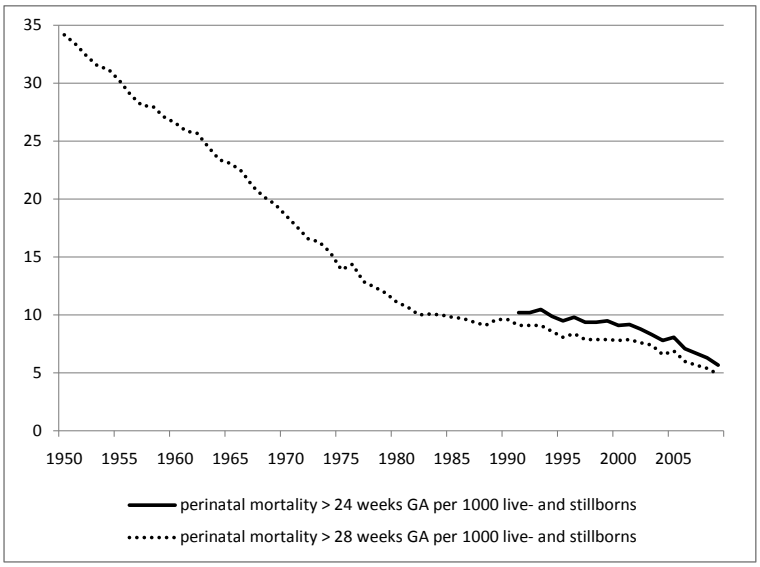


**Figure 1.1 -** Perinatal mortality (stillbirth and first week mortality, after 24 weeks GA and 28 weeks GA, respectively) per 1000 live- and stillborns, 1950-2009.
Based on data presented by Statistics Netherlands [8]

However, recent European comparisons (PERISTAT) have shown that perinatal mortality has been reduced to a lesser degree in the Netherlands than in other European countries.[9;10] The PERISTAT data (relating to the years 1999 and 2004) were published in 2003 and 2008, respectively, and profoundly shocked the Dutch medical world, even though there had been earlier signs suggesting that Dutch perinatal care was lagging behind. As Kloosterman wrote back in 1966, 'Judging from perinatal and maternal mortality rates, we have lost our edge in maternity care and have had to concede defeat to other countries.'[11] Hoogendoorn demonstrated in 1986 that the reduction of perinatal mortality in the Netherlands was not up to the reduction rates achieved by other European countries.[12] Hoogendoorn's study caused quite a stir, not so much because of the reported rates themselves, but because Hoogendoorn suggested there may be a correlation between the Dutch predilection for home birth and the perinatal mortality rate.[13] Publications presenting the results of the 2003 EuroNatal study also showed Dutch perinatal mortality rates to be among the highest in Europe.[14;15]

Much discussion ensued about the reliability and comparability of the data presented in the PERISTAT reports.[16] The relatively high Dutch mortality rates were attributed to risk factors which are more common in the Netherlands than elsewhere and to policies with regard to ethical choice in matters of prenatal screening and end-of-life decisions in prematurity.[17-19] However, since these factors did not entirely explain the mortality rates, further explanations were sought in matters which make the Netherlands unique. In maternity care, the most obvious differences from common European practice is the high prevalence of home birth, the division of responsibilities between primary-care midwives and secondary-care obstetricians, and the 'risk screening' which forms the basis of the division of responsibilities. These aspects of Dutch perinatal care became the main focus of attention in the debate about perinatal mortality sparked by the PERISTAT study. The debate was carried out both in the Netherlands and abroad, by medical professionals from the birth care field – often publicly and in the media. The role played in the system by midwives, as well as these midwives' performance, were a main focus of the debate.

## Evaluations of Dutch midwifery care in the (inter)national literature

The discussion about perinatal mortality may be old, but so is the debate about the Dutch midwife. Over the last few centuries, historians and sociologists have written many books about the midwife's position, education and performance.[2;20] As an example, on the one hand, Geijl passed a harsh judgement on seventeenth- and eighteenth-century Dutch midwives, whom he called 'intellectually inferior and morally possibly even more inferior, and so rough and crass as to be almost irresponsible'.[2] On the other hand, seventeenth-century midwife Catharina Schrader received an honourable mention in the 2009 Great Book of Dutch History, in recognition of her knowledge of and competence in delivering babies, as well as the way in which she gave account of her efforts in her so-called '*Memorijboeck van de Vrouwens*'.[21;22]

In order to gain an insight into the discussion on the role of the midwife in the Dutch maternity-care system since World War II, we identified all studies investigating the performance of Dutch midwives published in peer-reviewed medical journals in the fifty years preceding 2005. Since our study was limited to peer-reviewed journals, we did not include so-called 'grey literature', such as articles published in *Tijdschrift voor Verloskundigen* and its predecessors, nor doctoral theses and reports issued by government agencies and regulatory authorities.[23-25]

Firstly, we searched the entire PubMed database, entering the following (truncated) keywords in the title and/or abstract fields: *midwi*, maternity care, maternity services, perinat*, home (child) birth, home delivery, Netherlands, Dutch*, with the following limits: English, German, Dutch, 'Undetermined' and 'from 1956 up to and including 2005'. In addition, the keyword *midwi** was used again, now searching 'all fields' (with the same limits), after which both databases were aggregated.
Next, we searched the 'research' category of the database of *Nederlands Tijdschrift voor Geneeskunde*, entering the following (truncated) keywords in the text and/or title fields: *verlosk*, vroedvrouw*, beval*, perinat**, with the limits 'from 1956 up to and including 2005'. We then hand-searched the reference lists of the papers selected in the previous steps for more useful articles.

We only selected articles which presented original data. Follow-up articles on previously obtained data were only included if the articles in question had a different scope than the original article and only if that scope was relevant to the study at hand. Articles first published abroad and subsequently in a Dutch-language journal were only counted once.

Studies investigating the Dutch 'maternity-care system' were included if the midwives' performance was either the direct or indirect subject of the study, or if data on the midwives' performance could be gleaned from the study. Studies investigating (the quality of) maternity care in the Netherlands in general, without mention of the role played in the care system by midwives, were excluded from our study. Among the studies excluded were studies investigating the reliability of Dutch perinatal mortality rates[26;27] and international comparative studies[9]. Opinion pieces and reviews of articles which mentioned figures without providing sources or methods of investigation were also excluded. This explains why Kloosterman's articles, which caused quite a stir at the time of publication and helped change policies, were not included in our selection.[11;28] Some of the older articles we found were difficult to classify as it was hard to determine whether they were evaluations or opinion pieces.[29] If we could not determine an 'outcome measure', such articles were categorised as opinion pieces and were thus excluded from our study.

Our international search resulted in 457 hits, while the Dutch search yielded 277 hits, several of which turned out to be identical to articles previously found in the international search. One reviewer (MPAV) was then appointed to read the abstracts of all the hits so as to select the relevant publications. The studies were then classified into two subcategories: studies investigating the evaluation of the quality of Dutch primary midwifery care and studies investigating the scope of the Dutch primary-care midwife's duties.

**Studies assessing the quality of Dutch midwifery care**

A total of 36 relevant papers were divided into the first subcategory, i.e. the evaluation of the quality of Dutch midwifery care. The 36 studies in question were quite diverse in terms of research hypothesis, design, method and study population. Some of the studies we analysed were not described in sufficient detail to judge whether they were scientifically valid. This was especially true for the less recent studies. The key data and conclusions of the selected studies can be found summarised in Table B in Appendix 2. The studies (which we have put in chronological order for the sake of convenience) provide good insight into the midwifery-related debates conducted between 1956 and 2005 and into the trends they either set or followed.

Table 1.1 provides a summary of these data. To determine the extent to which various kinds of obstetric professionals were involved in the selected studies, we counted the number of midwives represented in each research team (the so-called

MR-factor) as well as the number of obstetricians represented in each research team (the OR-factor) *.

We found that the less recent studies referred to in Table 1.1 tended to focus on the place of delivery. As a result, they shed relatively little light on the performance of primary-care midwives, since until the nineteen eighties a substantial part of all maternity care was delivered by general practitioners. This being the case, these older studies in the 'home births' category reflect the GPs' performance as well as the midwives'.

The first attempt to describe midwives' performance was not made until 1982. The outcome of deliveries conducted by midwives was measured by pH, $pCO_2$ and base deficit in arterial cord blood (early morbidity) and by neurological examination with Prechtl's method (late morbidity).[31] It bears mention that the results of this attempt (less favourable than the results of deliveries conducted by obstetricians) were criticised on methodological grounds (selection bias and non-optimal standardisation of blood sampling and storage).[32;33] An attempt by a different research team to repeat this study using sounder methodology saw the results of the original study negated totally.[34;35]
Particularly explicit and thorough descriptions of the quality of midwives' efforts were provided in the Wormerveer and Gelderland studies.[33;36;37] Thanks to the growing number of data available in the *Landelijke Verloskunde Registratie* (The Perinatal Registry), since the nineties more studies could be conducted which specifically outlined midwives' involvement in deliveries, thus allowing for investigations of the 'maternity-care system' rather than the 'place of delivery'.

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* We assumed that the first-listed author for each study was the principal researcher. He/she was awarded four author points. The second- and the last-listed author each received two points, while all other authors listed were each awarded one author point.
The midwives' involvement in the research team, the MR-factor (denoting the extent to which midwives were represented in the research team) was calculated as the quotient of the number of author points for midwives, in relation to the available number of author points * 100.
In the same way the obstetricians' involvement in the research team (the OR-factor) was calculated (denoting the extent to which obstetricians were represented in the research team)

As an example: The paper 'The hour of birth: comparisons of circadian pattern between women cared for by midwives and obstetricians' (2000) had 5 authors.[30] The third author was a midwife (=1 author points for midwives); the first, second and fourth author were obstetricians (4+2+1=7 author points for obstetricians) and the last author was neither midwife nor obstetrician (2 author points). Thus, the total number of author points available was 10. The MR-factor resulted in 1 : 10 * 100 = 10; the OR-factor resulted in 7 : 10 * 100 = 70.

**Table 1.1** - Studies investigating the quality of midwifery care, published in peer-reviewed journals in the 1956-2005 period. (Refer to Table B in Appendix 2 for a descriptive summary of the selected studies.)

| | 1956-1965 | 1966-1975 | 1976-1985 | 1986-1995 | 1996-2005 |
|---|---|---|---|---|---|
| Total number of papers selected | 0 | 1 | 11 | 12 | 12 |
| Number of papers published internationally | - | - | 3 | 7 | 10 |
| Number of papers published in Dutch | - | 1 | 8 | 5 | 2 |
| MR-factor (Midwives' involvement in the research team)* | - | Mean = 0 | Mean = 0 | Mean = 2<br>Range<br>0 - 25 | Mean = 13<br>Range<br>0 - 50 |
| OR-factor (Obstetricians' involvement in the research team)* | - | Mean = 33 | Mean = 70<br>Range<br>0 - 100 | Mean = 62<br>Range<br>0 - 100 | Mean = 46<br>Range<br>0 - 100 |
| **Subject of the study** | | | | | |
| midwifery care | - | - | 1 | 3 | 2 |
| place of delivery | - | - | 8 | 5 | 3 |
| primary vs secondary care | - | - | 1 | 3 | 1 |
| maternity care system | - | 1 | 1 | 1 | 6 |
| **Outcome measures #** | | | | | |
| perinatal mortality | - | 1 [38] | 8 [39-46] | 7 [12;36;47-51] | 6 [37,52-55] |
| neonatal morbidity | - | - | 5 [31;43;46;56;57] | 4 [34;35;48;58] | 3 [37;55;59] |
| maternal mortality | - | - | - | - | 1 [60] |
| maternal morbidity | - | - | - | - | 1 [37] |
| referral | - | - | 3 [43;45;46] | 1 [61] | - |
| interventions | - | - | 2 [41;46] | 2 [48;58] | 2 [30 62] |
| women's experiences | - | - | - | 1 [63] | 2 [62;64] |
| substandard care factors | - | - | 2 [42;44] | 1 [36] | 5 [52;53;65,66] |

* See page 15 for explanation of MR-factor and OR-factor
\# The sum of numbers exceeds the number of papers since more than one outcome measure could be used

The majority (57 %) of the studies we included in our study used perinatal mortality as an outcome measure. This is somewhat understandable, since perinatal mortality is a concrete outcome which is regarded as an indicator for the quality of the care delivered.[67] On the other hand, this outcome measure is far too imprecise to be used as a measure of quality care, since perinatal mortality is relatively rare, especially in the low-risk population treated by primary-care midwives. Moreover, we have learned from experience that the interpretation of perinatal mortality rates tends to

generate much discussion (mainly with regard to the methodology used) and thus tends to confuse matters rather than clarify them.

As mentioned above, several attempts to use neonatal morbidity as an outcome measure were found to be methodologically or practically unsatisfactory.[31;32;57;68;69] Here, too, it is true that neonatal morbidity does not occur sufficiently frequently to be employed as a measure of the quality of a care system in general.

What is remarkable is that the evident importance of maternal outcomes, in the primary-care setting as elsewhere, is not reflected in the number of studies devoted to them. We found only one paper in which maternal outcomes in primary care were discussed to some extent[37], plus one other paper which explicitly focused on maternal mortality.[60] It appears that the maternal experience and maternal satisfaction were not recognised as outcome measures for primary-care midwifery until 1995.[63]

The number of midwives contributing to studies investigating midwives' performance is remarkably limited. Over the 1956-2005 period, obstetricians obtained mean scores of 33, 70, 62 and 46 for their involvement in midwifery-related studies (average score per decade), whereas midwives averaged a mere 0, 0, 2 and 13.

**Studies concerning the scope and content of primary-care midwives' duties**

A total of 35 articles met the selection criteria for inclusion in the second subcategory of papers, which was devoted to the scope and content of primary-care midwives' duties. Refer to Table 1.2 for a list of subjects discussed in the selected articles.

Remarkably, the number of studies dealing with the scope of Dutch midwives' duties has increased significantly since the mid-1990s (70 per cent of all studies conducted over the fifty-year period covered in our study were conducted in the 1995-2005 period). The 1995-2005 period is also notable for the relatively high number of articles devoted to women's wishes and expectations[70-74] and for the realisation that both the person receiving the care and the person delivering the care contribute to the outcome of that care.[75-83]

As with the studies outlined in Table 1.1, the majority of studies investigating the scope of primary-care midwives' duties were not conducted by midwives themselves (Table 1.2, third row).

**Table 1.2** - Studies investigating the scope of primary-care midwives' duties

| **Subject of the study** | **1956-1965** | **1965-1975** | **1976-1985** | **1986-1995** | **1996-2005** |
|---|---|---|---|---|---|
| *Number of papers* | *0* | *0* | *2* | *8* | *25* |
| *Mean MR-factor** | - | - | *50* | *3* | *18* |
| **Pregnancy** | | | | | |
| counselling and advice (nutrition, smoking cessation, prenatal screening) | - | - | - | 1 [84] | 3 [85-87] |
| use of medication | - | - | - | 1 [88] | 1 [89] |
| diagnostics, tests and interventions | - | - | - | - | 2 [90;91] |
| social make-up of clientele (socioeconomic status, elderly women, immigrants) | - | - | 1 [75] | 1 [76] | 1 [77] |
| **Delivery** | | | | | |
| management of labour and interventions | - | - | - | 2 [92;93] | 3 [94-96] |
| neonatal condition after home birth | - | - | 1 [97] | - | - |
| **Women's attitudes, expectations and evaluations** | | | | | |
| decision-making process in making choices | - | - | - | 1 [70] | 2 [71;72] |
| expectations and preferences for certain types of care | - | - | - | - | 3 [73;74;80] |
| **Preferences and attitudes of midwives** | | | | | |
| midwifery-related factors influencing expectant mothers' choices | - | - | - | - | 3 [78-80] |
| influence of birth location on midwife's performance | - | - | - | - | 1 [81] |
| adherence to guidelines (miscarriage, anaemia, vitamin K policy) | - | - | - | - | 3 [82;83;98] |
| **Care management** | | | | | |
| primary-care midwives' workload | - | - | - | - | 1 [99] |
| costs of birth | - | - | - | - | - |
| co-operation between primary- and secondary-care professionals | - | - | - | 1 [100] | 1 [101] |
| transport of obstetric patients | - | - | - | 1 [102] | - |
| **Care assessment** | | | | | |
| small peer-group evaluation | - | - | - | - | 1 [103] |
| feasibility and effects of (perinatal) audit | - | - | - | - | 1 [104] |

*See page 15 for explanation of the MR-factor

One may conclude from the literature produced prior to 2006, that until quite recently, midwives' performance was assessed primarily by people who were not midwives themselves, especially by obstetricians. Analyses of the scope of midwives' duties have nearly always been linked to the place where their clients gave birth. They were focused primarily on the midwives' intrapartum duties and hardly any mention was made of the antepartum and postpartum care the midwives delivered. Midwives' performance was generally defined in terms of mortality or morbidity, focusing on the condition of the neonate rather than the mother. An early development towards an evidence base for the content of the midwife's work can be seen from 1996 onwards.

The results of the studies conducted over the last fifty years provided sufficient grounds for maintaining the current maternity-care system, in which primary and secondary maternity care are two distinct fields, and in which the primary-care midwife plays an important role. However, it would appear that the results of these studies did not by no means close the discussion about the system and the midwife's role in it once and for all.

## Evaluation, an essential part of care

All health-care providers are morally and legally obliged to assess their own performance. Under the Individual Health-Care Providers Act (*Wet op de Beroepen in de Individuele Gezondheidszorg*), registered care providers must ensure that they can perform their professional duties in a way 'which results, or can reasonably be expected to result, in the delivery of proper medical care'.[105] Among other methods, this is achieved by 'systematic monitoring, control and improvement of the quality of care' (Art. 40: 1,2).

The profession of midwives, being one of the eight professions listed in Article 3 of the said Act, is subject to this mandatory systematic monitoring, control and improvement. The importance of assessment is underscored by the regulation pertaining to the Act (*Besluit opleidingseisen en deskundigheidsgebied verloskundige)*, which identifies the midwife's educational requirements and competencies.[106] Official registration as a midwife is contingent upon a candidate meeting all the educational requirements stipulated in the regulation (refer to Table A in Appendix 1). It is interesting to note that there are at least 13 mentions of care assessment in this regulation. For instance, a midwife must be able to reflect on her own personal and professional performance (Art. 4:6b) as well as others' (Art. 4:4h), must

actively request feedback (Art. 4:4i) and must provide feedback to colleagues (Art. 4:6d). She must also be able to systematically collate and analyse complaints related to the performance of her duties (Art. 4:12i), identify and record aspects of her work which can be improved (Art. 4: 6c), and initiate and stimulate work-related improvements (Art. 4: 12b). In addition, she must be able to give account of her personal, social and scientific abilities and limitations (Art. 4:6f), and, where necessary, be able to look beyond the limitations of her own profession, team and practice (Art. 4: 10d).

All of the above concerns the evaluation of the individual midwife's performance. Under the Quality Assurance at Medical Facilities Act (*Kwaliteitswet Zorginstellingen, 'Quality Act'*), the midwifery practice, too, is subject to mandatory 'systematic monitoring, control and improvement of the quality of care'. Since a 'medical facility' is defined in this law as 'any organisation in which multiple persons work together to provide care', any midwifery practice which employs more than one midwife is subject to this law.[107] The Quality Act provides a slightly more abstract definition of evaluation of care than the regulation pertaining to the Individual Health-Care Providers Act, describing it as the systematic collation and registration of data relating to the quality of the care delivered at the facility (Art. 4:2a), systematic assessment of the quality of the care delivered at the facility on the basis of the aforementioned data (Art. 4:2b), and, where necessary, a reorganisation of the facility's care system, depending on the results of the aforementioned assessment (Art. 4:2c).

As the above demonstrates, Dutch health care legislation has made registration and analysis of the medical care delivered, as well as the provision and acceptance of feedback, prerequisites for the delivery of proper medical care. There have been no randomised trials investigating the degree to which audit and feedback contribute to a reduction of perinatal and maternal mortality and morbidity.[108] However, it has been demonstrated that audit and feedback can be effective in improving professional practice, although the most effective mechanisms for this are still unknown.[109-111] Such feedback may be more effective when it is provided by relevant health professionals actively involved in care provision, when it is delivered more intensively, and when it is not an occasional occurrence, but rather an ongoing process.[109;112]

## Research questions

Both legislation and literature (refer to Tables 1.1 and 2.1) have shown that it is high time midwives took it upon themselves to assess their own performance. They themselves need to establish the outcome measures for their tasks, showing exactly what midwifery care is, how their services rate, and which aspects of their performance leave room for improvement. It is high time that they were open about the quality of their performance, both to themselves and to others, and that they published the results of their evaluations.

This thesis presents several methods for the assessment of midwifery care, ranging from general types of evaluation to specific evaluation aimed at individual care providers. The thesis seeks to answer the following questions:

1. Dutch midwives' core business is the care of women who are expected to have a normal pregnancy and delivery. But what is considered 'normal', how stable is the concept of 'normality', and which changes in midwifery practice can be attributed to changes in our understanding of 'normality'?

2. The primary-care midwife examines pregnant women for risk factors. If complications occur or threaten to occur, she will refer the patient to an obstetrician in secondary care.
   a. Which trends can be identified in referrals from primary care to secondary care?
   b. What are the causes contributing to such trends in referrals?
   c. What is the nature of intrapartum referrals?
   d. What are the outcomes of intrapartum referrals?

3. A professional midwife must be transparent about the quality of the care she can be expected to deliver and has to be prepared to give account of it. Which raises the following questions:
   a. Is it possible to identify a set of indicators for monitoring the quality of maternity care for low-risk women?
   b. In the event of an adverse outcome, the quality of the care delivered will be subject of evaluation by outsiders. Do care providers object to external evaluators giving feedback on such cases?
   c. Which sorts of critical incidents with adverse outcomes are reported to the Dutch Health Care Inspectorate, and what factors contributing to the delivery of substandard care have been found to play a role in these incidents?

## Guide to this thesis

**Chapter 2** outlines the development of evidence-based midwifery in the Netherlands, as well as the introduction of a quality management policy involving standards to be met in midwifery and the practical contribution midwives can make to research into maternity care.

**Chapter 3** addresses Research Question No. 1 by analysing the division of responsibilities between midwives and obstetricians, which is closely related to the question of what is considered 'normal'. The purpose of this chapter is to define the scope of midwives' work.

Chapters 4 and 5 address Research Question No. 2.
**Chapter 4** outlines trends in referrals from midwifery care to obstetric care spotted over the course of a seventeen-year period, as well as the factors contributing to these trends. The purpose of this analysis is to provide a means of *internal* evaluation, as well as to provide insight into the quality of primary midwifery care at the *national* level.

**Chapter 5** analyses intrapartum referrals to secondary care. The purpose of this analysis is to provide a means of *internal* evaluation, as well as an insight into the quality of primary midwifery care at *the national* level.

Chapters 6 to 8 deal with Research Question No. 3.
**Chapter 6** outlines the search for indicators of midwives' performance. Such indicators are designed to provide a means of *internal* evaluation, i.e. an insight into the quality of maternity care at the level of the *individual practice*, in order to enable midwifery practices to be accountable to external parties.

**Chapter 7** discusses the evaluation of perinatal mortality through perinatal audit. It also analyses the degree to which the care providers involved in the incidents accept feedback from external parties. The purpose of perinatal audit is to provide a *multi-disciplinary* evaluation and to gain insight into the *individual practitioners'* performance.

**Chapter 8** presents an assessment of critical incidents in maternity care reported to the Dutch Health Care Inspectorate over the 2006-2008 period as well as of the factors contributing to the delivery of substandard care which may have played a role in these incidents. The purpose of critical incident reporting is to provide a means of

both *internal* and *external* evaluation, so as to enable *medical facilities* or *individual health-care providers* to make structural improvements to their care systems.

**Chapter 9** ties all the above subjects together, discusses current developments in maternity care and presents some final conclusions and recommendations.

**Chapter 10** provides a summary in both English and Dutch.

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CHAPTER 2

# The Development of Evidence Based Midwifery in the Netherlands

## *The Journey from Midwifery Knowledge to Midwifery Research to Midwifery Standards of Practice*

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## Introduction

This chapter describes Evidence Based Midwifery as seen from the Dutch perspective. After an introduction and a discussion of evidence based midwifery, we look at the way midwifery care is organised in the Netherlands, including the current referral system between the levels of care. The background and methodology of midwifery guideline development are then addressed and illustrated with a description of the midwifery standard that addresses anaemia in (first-line) midwifery practice. In the conclusion section, we describe the status of midwifery research in the Netherlands, addressing the main obstacles and challenges it faces.

## Evidence, experience and expertise

The diary of Catharina Schrader is an important milestone in the history of Dutch midwifery. Schrader was a midwife who worked in the northern province of Friesland between 1669 and 1745. She kept a diary which documented all the 3060 births she attended. While some births received only a short note in the diary, special cases were written up as case reports.[1] She describes how she was called on 4 August 1712 to help a woman who had been in labour for two days.

> *When I came there, I found no people but her husband standing before the door. The labouring woman was on a wet bundle of straw and was stiff with cold. Water and flooding, it had all flowed out of her. She lay unconscious. I was angry with the man, saying how could people live with a woman vomiting to her death. He said two midwives, also a man-midwife, had already been there with her, who had all left her with the women of the neighbourhood. I said he should immediately call the women of the neighbourhood again, which came to pass and I scolded those people who would give someone up to a miserable death without assistance or pity. Immediately the people got fire from the neighbours and I threw away the wet straw and made her a place to lie, put a cap on her. She lay stark naked. I positioned her, and examined how it was with the case. Found that the child lay with its stomach before the birth canal. It was dead. I turned it and delivered it by the feet in half of a quarter of an hour. The woman got so much strength again, sat up and wanted to kiss my hand. I comforted her, helped her to bed, where I revived her with some drops of warm beer, because there was nothing else to give*
>
> (Case number 1975 of the Memory Book).

This old story illustrates a number of aspects of the work of a midwife. It depicts typical midwifery skills: making the woman comfortable, giving her emotional support and comforting her. It also depicts the midwife's attitude towards the woman: the vision that a woman giving birth is not a case, but a person who deserves care and attention and dignity. The story demonstrates the expertise of a good midwife. Catharina succeeds where others, even nature, had failed: she got the baby out in a few minutes.

It is most unlikely that in those days any study had been carried out looking neither at the influence of wet straw on the progress of labour nor on the influence of wearing a cap. We now know that the woman's sense of well-being is an important factor in determining the critical release of a balance of hormones necessary to facilitate the birth process.[2] There is compelling evidence for the benefits of 'continuous

support for women during childbirth' as well.[3] Catharina's practice was rooted in common sense, experience, vision and skilled tradesmanship, traits still considered to be essential in modern-day midwifery as the chararcteristics that identify the uniqueness of the profession today.[4,5]These aspects form the basis for the claim that midwifery differs from other professional groups, including obstetricians who have a more medical-technical approach to the field of obstetrics/midwifery *.

Many of the underlying principles and values of midwifery practice as demonstrated by Catherina Schrader now have an evidence base and although she was not aware of it at the time, in many ways she carried out evidence-based practice 'avant la lettre'.

**Evidence Based Medicine**

In all health-care professions, the implementation of new evidence has proven to be a tedious and slow process.[6] Much resistance to change is seen, especially when the evidence calls for an unsolicited change in practice. In the 1990s, when the term 'evidence based medicine' (EBM) spread to all areas of medicine, and thus also to obstetrics and midwifery, serious discussions took place. People worried that EBM would limit the care providers in their professional autonomy, would lead to cook-book medicine, would provide insufficient attention to individual variations, could be used as a basis for funding cuts, could be misused for liability claims and that it was imposed from ivory towers.[7] Some examples of the practical problems of EBM implementation for the care provider are as follows: you must learn new skills and practices, you are not allowed to carry out certain practices, you must discard some of the knowledge previously learned, and you must accept the fact that, in hindsight, you may have carried out suboptimal or even harmful practices. In fact, the implementation of new interventions and practices is generally more easily accepted by care providers and patients than the de-implementation of interventions proven to be ineffective. When one has been used to shaving the perineum or massaging the perineum during the second stage of labour, it is difficult to suddenly have to refrain from carrying out these practices because of new research findings that suggest this should not be done.[8-10]

There is also an an additional bottleneck to the implementation of EBM in midwifery. According to the midwifery scope of practice, midwives use an individual

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*Although the Dutch language has two words for midwife (vroedvrouw and verloskundige) there is no word for midwifery. The word 'verloskunde' refers to the broader discipline of obstetrics including midwifery and refers to the work domain of midwives and obstetricians. In this chapter, we have chosen to translate the broader term *verloskunde* into 'obstetrics/midwifery' when used in general, using midwifery only when specifically referring to the work domain of midwives.

approach with respect to the women in their care. Is it possible to develop general rules for such individual processes as pregnancy and childbirth? Munro and Spiby have eloquently said *Midwifery care recognises that for a woman, labour is not 'just normal' but actually extraordinary.*[10]
Besides this is the fear that the emphasis on evidence will override the specific midwifery characteristics that were demonstrated in Catharina Schrader's case report. The fear is that the foundation of evidence will take preference over pillars of experience and that this will eventually undermine the midwifery profession.

EBM requires a change in attitude: one must be prepared to assess clinical practice in light of scientific developments and to follow those developments critically. This calls for education in the methodology of critical reading and in the interpretation of research results.[11,12]
In 1993, the development of EBM led to the expansion of the midwifery programme in the Netherlands (a higher vocational direct-entry programme offered in four schools throughout the country) from a 3-year to a 4-year programme.[13] One of the motives for the expansion of the educational programme was stated as: 'The midwifery profession itself shall critically evaluate first-line obstetrical and midwifery practice and shall play a central role in carrying out scientific research in obstetrics/midwifery, especially first-line midwifery. The preparation for this is based in the pre-service educational programme and therefore the curriculum must contain research methodology and interpretation of scientific research'.[14]

## Evidence Based Medicine versus Evidence Based Midwifery

Generally speaking, it appears that the implementation of EBM in professional practice is especially difficult for midwives. This sentiment was reinforced by the initial strong emphasis on a medical-technical and epidemiological approach in EBM as indicated in Walsh's definition (1995): *Moving away from decisions based on opinion, past practice and precedent towards making more use of science, research and evidence to guide decision-making*.[15,16]

This definition does not take the significance of expertise in care giving into consideration. The suggestion that 'real' evidence can only be found through epidemiology, and preferably with randomised controlled trials (RCTs) or meta-analysis, emphasised the medical approach. Besides midwifery-technical practice, 'relational care giving' is an equally important part of the midwife's work. This term introduced by the Dutch midwife/sociologist Leonie van der Hulst is defined as 'the professional

and systematic carrying out of directed activities directed towards the creation of a trusting relationship between care provider and care seeker, in which equality, self motivation and open communication are important elements'.[17] An RCT studying this 'soft' aspect of care provision is more difficult to carry out than one that studies a 'hard' outcome measure such as routine perineal shaving on admission during labour.[9] It has, however, been accepted more recently that 'soft' aspects can be studied in a trial design. This trend is confirmed by systematic reviews such as Continuous support during childbirth [3] and Psychological interventions for preventing postpartum depression,[18] both available in the Cochrane Library.

The definition of EBM has evolved rapidly. In his 1996 article, Evidence Based Medicine: what it is and what it isn't, David Sackett, the 'EBM-godfather,' defined EBM as: *The conscious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients*.[7] In his clarification, he placed emphasis on the integration of expertise and evidence: *Good doctors use both individual clinical expertise and the best available external evidence, and neither alone is enough*.[7]
The evolution of the term EBM is ongoing. In recent years, there has been increasing recognition of the fact that the view of the client must also be taken into consideration.[15,19,20] In addition to this, there is a growing realisation that, when translating research findings into clinical practice, organisational, social and financial implications could also be considered. In other words, one must consider the applicability of the findings to the practice setting.[21]

Another important development is the realisation that there is a difference between 'statistical significance' and 'clinical relevance'. The comparison of one intervention to another can result in a statistical difference but if that difference is considered to have little or no clinical consequences, it can be difficult defending the need for the implementation of these results into clinical practice.[22]
Interestingly enough, because of these realisations, the possibility and need for the inclusion of profession-specific elements into the definition of 'evidence' as an addition to the general principle of EBM have been addressed.

The specific characteristics and values of the midwifery profession are a good starting point for defining Evidence Based Midwifery as a specific area of EMB. By incorporating the vision of professional midwifery services, the 'midwifery values' of the profession and the views of childbearing women into the evidence found in scientific literature, EBM then becomes a valuable and indispensable concept for midwives, which justifies the use of the term 'Evidence Based Midwifery'. This concept still

has not taken definite shape, and a generally accepted definition of Evidence Based Midwifery has not yet been developed. This book may contribute towards this development. In light of the continuous evolution of the concept of EBM, it can be assumed that Evidence Based Midwifery will also be a continuously evolving concept.

## Levels of care provision

The health-care system in the Netherlands distinguishes between three levels (or lines) of care provision: first, second and third. First-line care is based outside of hospital institutions and characterised by autonomous practice. Examples of first-line care providers are general practitioners, dentists and midwives*.
In general, second-line care is provided in peripheral hospitals and third-line care in academic hospitals. First-line care is always the entry point into the health-care system and all insured persons have free access to this. The first-line care provider is seen as the 'gatekeeper' for second- and third-line care and only in cases where a health problem cannot be treated or cured in the first line, will a patient be referred to a higher level of care.

**Table 2.1** - Index data of Dutch midwives as of 1 January 2008

| | | |
|---|---|---|
| **Total number of practicing midwives** | **2315** | |
| Number of male midwives | 50 | (2 %) |
| Midwives in first-line practice | 1763 | (76 %) |
| Midwives working in hospital | 552 | (24 %) |
| **Age** | | |
| < 40 | 1416 | (61 %) |
| 40-50 | 538 | (23 %) |
| > 50 | 361 | (16 %) |
| **Number of first-line midwifery practices** | **490** | |
| one-person practice | 78 | (16 %) |
| two-persons practice | 94 | (19 %) |
| group practice | 318 | (65 %) |
| **Midwifery density (one first-line midwife per number of women in the age of 15-39)** | | |
| average for the Netherlands | 1 : 1.639 | |
| maximum (province of Gelderland) | 1 : 1.439 | |
| minimum (province of Zeeland) | 1 : 2.949 | |

Source: NIVEL[23]

* Midwives in the Netherlands follow a 4-year direct-entry educational programme after which they are qualified to practice as independent care providers in first-line care. They can practice alone or in partnership with other midwives (Table 2.1). In this chapter, the word midwife refers to the independent, self-employed practicing midwife.

In obstetrics/midwifery, the division in the levels of care described above means that at the beginning of her pregnancy, a woman books with a first-line midwife for care provision during pregnancy, birth and puerperium. (In areas, where no midwifery practice is established, the care is provided by a general practitioner [GP]). When no problems have occurred during the course of pregnancy, the women can choose between home, birth clinic or hospital birth. In all three scenarios, she will be cared for by her own midwife without an obstetrician becoming involved.

In the event of complications or the threat of complications, the midwife refers the woman to second-line care. The obstetrician (and in some cases second-line midwife * subsequently assumes care for the woman as long as necessary and can refer the woman back to first-line care if the condition has subsided or has adequately been treated. In the event of very serious complications, the woman may be referred to third-line care.

The division of tasks and responsibilities implies that one of the most important aspects of midwifery care is risk selection. After all, in the Dutch obstetric/midwifery system, it is the midwife in her role as gatekeeper who determines which cases of pregnancy and birth are considered 'normal', remaining under her care and supervision, and which cases are not, therefore needing referral to another level of care provision.

The organisation of obstetrics/midwifery care as described requires well-functioning collaboration between the various care professionals (midwives, obstetricians, GPs, neonatologists, etc.). The *Obstetric Handbook (Verloskundig Vademecum*) is a guideline that has been ratified by all the organisations of professionals involved with care provision for mothers and newborns. It contains rules of conduct for collaboration and also agreements pertaining to the quality and efficiency of obstetric care.[25,26] In order to facilitate a streamlined risk selection and referral process, the handbook contains a list of referral indications, the Obstetric Indication List (VIL). A decision analysis based on the highest possible level of scientific evidence was developed for 143 obstetric and medical indications.[27] These medical indicatons are classified into one of four categories that reflect the responsible care provider (Table 2.2).

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* There are a growing number of midwives who choose, either directly after finishing their programme or after a number of years of first-line practice, to take employment in a hospital (either second or third line care). We refer to these as clinically employed midwives, see table 2.1. Clinically employed midwives often train resident doctors and sometimes carry out research. They see themselves as a bridge between first- and second-line obstetrical care.[4;24]

The basic underlying assumption for the classification procedure is that the childbearing woman must receive optimal care while there is also optimal use of the specific knowledge and skills of the various obstetric care providers.

**Table 2.2** - Explanation of the codes in the Obstetric Indication List, indicating the most appropriate care provider in relation to the indication[27]

| Code | Description | Care provider |
|---|---|---|
| **A** Primary obstetric care | The responsibility for obstetric care in the situation described is with the primary obstetric care provider. | Midwife/GP |
| **B** Consultation situation | This is a case of evaluation involving both primary and secondary care. Under the item concerned, the individual situation of the pregnant woman will be evaluated and agreements will be made about the responsibility for obstetric care. | Depending on agreements |
| **C** Secondary obstetric care | This is a situation requiring obstetric care by an obstetrician at secondary level for as long as the disorder continues to exist. | Obstetrician |
| **D** Transferred primary obstetric care | Obstetric responsibility remains with the primary care provider, but in this situation it is necessary that birth takes place in a hospital in order to avoid possible transport risk during birth. | Midwife/GP |

## Standards for first-line midwifery care

The Obstetric Indication List described above has the status of a professional guideline. The list has its limitations as it concentrates mainly on collaboration in obstetrics/midwifery and does not go into detail about the content of care.
It is becoming increasingly evident that midwives need explicit criteria to assess the content of the care they provide. One way to achieve this is by drafting standards that are based on evidence in which clear statements are provided about practices that are well founded and can be either recommended or discouraged. A 'standard' has been defined as a compilation of evidence based guidelines, each concerning a different aspect of a central problem or condition. This strong evidence base to the guideline implies that it is a standard for practice. Nevertheless, it is understood that, in providing best practice, the midwife is obliged to take into careful consideration the individual circumstances and preferences of those whom she provides care for. It is also understood that this may lead to a different course of actions that may deviate from the standard.

The drafting of standards is actually a part of the process of professionalisation within midwifery. The process of finding reasons for and consciously thinking about one's own practice gives a professional body more insight, knowledge and voice concerning their own area of work and, because of this, more confidence. A good standard results in transparent choices in care, also for the client, and leads to clear policy making. Through standards, the professional group profiles itself not only internally but also externally to clients, insurers and other care providers.[28]

It was this need for professionalisation and profiling of the midwifery vision that influenced the decision made by the Royal Dutch Organisation of Midwives (KNOV) to begin with the development of KNOV-standards. These are called 'KNOV-standards', after the Dutch Professional Association of Midwives (KNOV). Initially, these were mono-disciplinary but the KNOV is currently developing multidisciplinary guidelines and standards as well

In 1998, the Dutch midwives formulated 'Basic principles for carrying out first-line midwifery care'.[5] One of these reads, 'The midwife will consistently and carefully take into consideration whether or not to perform an obstetric procedure (or let one be performed) and/or whether or not to perform an examination (or let one be performed)". This assumption was utilised as the basic philosophy during the development of the KNOV-standards. It is our opinion that this is also a basic philosophy in the concept of Evidence Based Midwifery.

The methodology used in developing the standards contains six steps. These are summarised in Table 2.3.

**Table 2.3 Steps taken in the development of KNOV-standards**

1. **Preparatory:** prioritisation; forming a working group; formulating research questions; determining search terms
2. **Draft standard:** structured literature search including allocation of level of evidence to the studies used; writing the draft version; formulating 'other considerations' that will play a role in the conclusions; formulating the conclusions and recommendations
3. **Comments round:** present draft version to experts both within and outside of the profession; testing of practical feasibility
4. **Final standard:** incorporation of comments; finalising final text into standard with three publication formats: a report with extensive scientific underpinning, the actual standard (= a short summary, with concrete recommendations) and a practice card in A-4 format containing a step-by-step plan
5. **Implementation into practice**
6. **Actualisation:** in principle after 5 years

Source: Methodology for the development of KNOV-standards[28]

An important starting point of the KNOV standards is that they are written 'by midwives for midwives'. The professional field is highly involved in the process of standard development: there is a field consultation regarding prioritisation of possible topics for standard development; the project group is made up of a substantial number of midwives; the translation of evidence into practice is developed in consultation with a working group of practicing midwives and midwife educators; during the commentary round, the concept is presented to a number of midwifery practices. Attention is paid to ensuring an easy-to-read style of writing. The standard is published in three different documents (Table 2.3, final standard). A standard and practice card are sent to all midwifery practices and the scientific evidence is available upon request. The publication of the standard is accompanied by articles in the Dutch Midwifery Journal (*Tijdschrift voor Verloskundigen*) and an educational trajectory has been developed.
These measures are meant to create optimal and wide support of the standard by midwives.

## The standard 'Anaemia in first-line midwifery practice'

An example of a standard that was developed in accordance with the methodology described previously is the KNOV-standard 'Anaemia in first-line midwifery practice'. In this section, a summary of the most important results is given.
The standard 'Anaemia in first-line midwifery practice' was published in December 2000 and was the first KNOV-standard.[29,30] *

Routine iron supplementation is not standard practice in the Netherlands. Dutch midwives periodically test hemoglobin (Hb) during the antenatal period and prescribe iron medication in cases of diagnosed anemia.[31] Despite this, research shows that 72% of pregnant women in first-line midwifery care reported using iron supplementation even though 20-40% of these women reported having experienced adverse side effects. The anaemia in pregnancy standard was developed to find an evidence base to the prevalence of anaemia as indicated by the reported use of iron medication.

**Physiology or pathology?**
In the literature, the term *anaemia* is often used as a synonym for a 'low Hb level' and represents a group of conditions that cannot be compared with one other. A low Hb during pregnancy could indicate iron shortage or other disorders in the produc-

* The standard is based on a large amount of literature and it is not possible to cite all the references used. With a few exceptions, we refer to the scientific evidence part of the standard in this section.[29]

tion of blood, but it can also be caused by a completely normal physiological adaptation mechanism by the body to pregnancy.
There is no global consensus on the definition of anaemia and Hb level cut-off points vary: the WHO has determined a cut-off point of 6.8 mmol/l [32] while other cut-off points are found in the international literature. In the Netherlands, a range was found from 7.5 to 6.8 mmol/l with 7.0 mmol/l being the most frequently used value.[31] *

The standard's literature study concentrated on the question how to differentiate between 'physiological' and 'pathological' anaemia.
There is strong evidence to substantiate the phenomenon of haemodilution during pregnancy as means of meeting the greater need for oxygen during this period. This concept is essential when interpreting the Hb and other blood parameters, and implies that during pregnancy another set of values for blood parameters should be considered as normal.
On the basis of the data from two Dutch study populations of pregnant women (and in compliance with results from previously carried out international studies ), one could conclude that there is no one fixed cut-off point for 'low Hb level' during pregnancy but that it is related to the length of the pregnancy.[33,34] It appeared that the value - until then - most commonly used as the cut-off point in the Netherlands for diagnosing anaemia corresponded with the lowest value of the P50 in the U-shaped curve of Hb levels. Using a cut-off point that would result in half of the pregnant women being considered anaemic implies a high number of false positive cases.
On the basis of these results, it was decided to use pregnancy related cut-off points in the standard. This resulted in considerably lower cut-off points compared to what was being practiced at that time.

The standard further describes the different steps in the screening and diagnostic process and attention is paid to differential diagnosis and treatment policies.
The standard also addresses the pregnant body's capability to absorb more iron from food in order to build up a 'buffer supply' to compensate the loss of erythrocytes that occurs during birth.
A plasticized job-aid in A-4 format was developed using bright colours to create diagrams of the various steps and cut-off points thereby creating an organised overview for use in the clinical setting.[35]

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* In the Netherlands, mmol/l is the measure normally used for hemoglobin level. The formula to convert millimole per litre value to gram per litre is cut-off point (mmol/l) / 0.062 (e.g. 6.8 mmol/l=110g/l ; 7.5 mmol/=120 g/l; 7.0 mmol/l=112 g/l;).

**The sum of the parts: one plus one is greater than two**

The results of the literature, brought together in the standard on ' anaemia' have led to recommendations that would require a number of policy changes in midwifery practice relating to diagnosis, treatment and nutritional advice regarding anaemia. Despite this, the standard was well-received, although midwives mentioned barriers to specific aspects of it, such as alternative iron supplementation and not prescribing iron supplementation if haemoglobin was low but mean corpuscular volume was normal.[36,37]

One can only question how it is possible that such a large gap existed between practice and evidence concerning a subject as seemingly straightforward as anaemia. Noticeably, the standard's recommendations were not the result of new research findings, knowledge or opinions, but quite the reverse. The experts and midwives who evaluated the draft version of the standard were already very much aware of phenomena such as haemodilution and increased iron re-absorption, and yet, the diagnosis, cut-off points, and nutrition and medication advice formulated in the standard are very different from those used at that time by midwives as well as GPs and obstetricians and in laboratories.

There appears to be only one explanation for this gap between knowledge and implementation. Research is often narrow in scope and addresses a specific question or hypothesis. Singular research findings often seem to be left hanging as loose ends that do not sufficiently, or do not at all, lead to the integration of knowledge into practice. The development of a standard entails an extensive literature review that includes information from a large variety of sources. It brings together all the available information and evidence relating to one subject area, presenting a total overview of what is known and believed at that moment. The information is organised and singular results are woven together creating a strong evidence base that is sufficient to substantiate and facilitate change.

A standard is not only an aid in daily practice and a means of bringing all the information about a certain topic together. Besides this, it has the added value that could be called the 'sum of the parts'. Combining the loose ends forms a strong thread: one plus one is greater than two.

The development of this first KNOV-standard resulted in another eye opener. Midwives throughout the world share a common vision that pregnancy and birth are, in principle, natural processes that do not need intervention as long as this is not called for, and there is growing movement towards using research, literature and discussion to prove and strengthen this vision.

Just the opposite process took place while writing the standard. The topic 'anaemia in pregnancy' seemed to be very suitable for a first standard because it addressed a common condition; one that was not expected to raise controversies. Initially, some voices were raised against using this topic for the first midwifery standard. It was argued that it would involve primarily technical and biological aspects and it would not address a typical midwifery topic (as for example, failure to progress in labour, the topic of a subsequently published standard). Once all the research findings were reviewed, it appeared that this certainly was not the case. It became increasingly clear that the problem of anaemia in pregnancy was actually not so common in the developed world. It only appeared so because there was not enough understanding of the ability of the body to adapt during pregnancy.

The main conclusion of the Anaemia Standard is that there is no reason to assume that pregnancy by definition leads to an iron deficiency and it must be acknowledged that a healthy and well-fed pregnant body is capable of physiological adaptation to the change. This conclusion was not anticipated at the beginning. On the basis of the literature, however, it is the only conclusion that could be made and one which complies perfectly with the core philosophy of midwifery. The seemingly uninspiring topic 'anaemia' unexpectedly turned out to be a true midwifery subject.

## Evidence Based Midwifery in the Netherlands: bottlenecks and challenges

As previously mentioned, standards can be seen as the implementation of that which is already known about effective care provision and adequate practice. Standards are therefore an appropriate EBM instrument that summarise the current scientific evidence and interprets this in light of clinical practice where it will be implemented. But there is still a long way to go before midwifery care can be adequately based on scientific evidence, whether or not it is incorporated into official guidelines. There are large knowledge gaps in the field of obstetrics/midwifery. Furthermore, because of its unique system of obstetrics/midwifery care, the Netherlands is confronted with specific bottlenecks and challenges. Some of these will be discussed further.

**Not enough relevant research available**

The first challenge is the little available research that can be generalized to the specific Dutch system. One can identify several reasons for this.

Firstly, by definition, women in midwifery care in the Netherlands have a low obstetric risk profile. Women with obstetric complications or suspected pathological conditions are referred to second-line care. In contrast, study populations outside of the Netherlands often have a mixed risk profile and there is often also a different birth culture (in terms of use of pain medication, active management, interventions, caesareans and home birth). This implies that research results from studies carried out outside of the Netherlands cannot be generalized to the Dutch situation.

Secondly, following the concepts of epidemiology, the composition of a study group is very important for testing and screening in obstetrics/midwifery. The positive predictive value of a test is in fact dependent on the prevalence of the concerned abnormality in a population. This implies that a test deemed useful in a mixed risk population (second-line care in the example of the Netherlands) cannot in fact be extrapolated to a first-line population in which the abnormality or condition occurs less frequently.[8]

Finally, some aspects of Dutch midwifery cannot be incorporated into studies carried out outside of the Netherlands because they hardly, or totally do not, play a role in other obstetric systems. Some examples of these are home birth and the system of risk selection; although this last mentioned example is increasingly found on the agenda of free-standing midwifery-led birth centres.
The difficulty with this is that some subjects are not easy to research. The safety of home birth, for example, provides a constant source of controversy. This is also true for the Netherlands despite the multitude of observational and descriptive studies that have been carried out.[38] The relatively high position of the Netherlands on the PERISTAT perinatal mortality ranking list has rekindled this discussion recently.[39]
An RCT would be the ideal design for this but it is hard to imagine randomisation of women to home or (not medically indicated) hospital birth.[40] Women make a motivated choice for the place of birth where they feel most comfortable and this can positively influence the birth process.[41,42] The process of randomisation would 'force' some of the women to give birth in a setting where they do not feel at home. Furthermore, in this low-risk group, the number of participating women would have to be very large in order to show a difference in perinatal mortality between the study groups.[38]

These methodological limitations, however, should not prevent further research into and evaluation of the Dutch system. Innovative methods will need to be found to overcome this.

**Development of standards: a long term process**
The second limitation to developing standards in the Netherlands is the very lengthy time frame which accompanies it. Undoubtedly, this phenomenon has been internationally acknowledged by all those who have been involved with standards.

This is primarily caused by the choice to begin at the beginning, carrying out a literature search from the physiological perspective. After all, the need to find scientific evidence for the practice of physiological obstetrics (midwifery practice) in a population of healthy pregnant women was identified. Because of this, it is not possible to quickly put together a number of meta-analyses (even if they are available). One could argue that this process involves 'fundamental research'.

Another explanation is that the KNOV-standards contain information on all the various aspects pertaining to the chosen topic. This makes the standard a collection of guidelines. The Anaemia standard actually contains a guideline on – among others – diagnostics, treatment and nutrition.

The most important reason is that almost by definition, a standard addresses a difficult topic. There is less need to develop a standard to make a certain theme or topic more explicit when there is already sufficient unequivocal evidence to be found or when consensus has already been reached. Those topics considered unclear or those where there is a strong opposing opinion are precisely the ones that were prioritised by midwives as themes for a standard.

**The challenges to first-line midwifery research**
Carrying our first-line midwifery research involves addressing many bottlenecks that are undoubtedly similar to those encountered outside of the Netherlands.

First, the dramatic cutback in the funding of health research is an important obstacle that Evidence Based Midwifery is facing. Within the limited funding streams in the Netherlands and European subsidy programmes, there is a growing emphasis placed on cost-effectiveness and the savings that this will yield. This is difficult to demonstrate in studies with a low-risk population and is even more difficult when the studies address prevention measures or psycho-social outcomes with long-term effects. One can show a positive birth experience but translating that into terms of health gains, with a costing element, is asking for the impossible.

Organisational aspects may form an obstacle as well. The distinction of levels of care provision is one of the pillars of Dutch midwifery/obstetrics, but it can some-

times be a constraint to the development of the discipline. Research and the resulting evidence in this area need input from both midwifery and obstetrics. An understanding of both pathology and physiology is important and best practice (for the childbearing woman) involves a good understanding of interventions and their utilisation in both levels of care. It is not always the case of shared vision and sometimes it is a case of territory conflict or competition. A prerequisite to a multidisciplinary approach is good collaboration based on mutual respect with a shared vision. This is not always achievable.[43]
Although the decentralised organisation of first-line midwifery results in a large number of advantages for the client, it does have its drawbacks when carrying out research; in order to achieve a large study population, contact must be made and maintained with a substantial number of midwifery practices throughout the country. This demands a good deal of organisation, time and ingenuity on the part of the researcher.

Another challenge is the relatively young research tradition of studies looking at the effectiveness of existing and innovative practices in first-line midwifery.[44] Compared to Great Britain, Dutch midwifery research is in its infancy. Research in the area of obstetrics/midwifery was traditionally developed and carried out by other health-care providers, most often obstetricians. This resulted in defining the discipline midwifery/obstetrics from the obstetrics viewpoint and not from the midwifery viewpoint and for a long time this fact determined the subjects and scope of research in the field. It was not until the 1990s that research studies were developed and carried out by midwives. The Dutch research institute TNO (Institute for Applied Scientific Research) established a research group that flourished in first-line midwifery. The first Dutch midwifery-led RCT studying active management of the third stage of labour (LENTE study) was developed from within this group. Using data from the National Obstetrics/Midwifery Registration (LVR), first line-midwifery care was monitored and reported on. The course 'Methods and techniques for scientific research' developed for midwives has been followed by a large number of midwives throughout the country. The KNOV, until that time primarily an organisation representing the interests of midwives as practitioners, established a division of 'Quality and Best Practice' employing primarily midwives. The first midwife received a PhD in Utrecht in the same period (in 1996).[45]

In 2009, seven more midwives have successfully defended their dissertations and earned a PhD and more are in the final stages of their doctoral studies and some have made the first steps on the path towards a PhD. A Masters of Science in Midwifery programme was established in 2003 and about 60 midwives have successfully com-

pleted this to date. The 'Midwifery Student Research Collaborative Amsterdam' (MSRCA) supervised by TNO, studies midwifery-specific and practice-related topics and offers midwifery students the opportunity to participate in the entire research process.[44] The KNOV has expanded its Quality Division and has initiated and participated in research studies and has carried out its own research projects. TNO has broadened its scope of work and is carrying out a number of qualitative studies besides epidemiological studies. Recently, several papers were published e.g. about the referral system[46], the home delivery[47], the experience of women[48] and the content of midwifery care.[49] Thus, there has been considerable development in Dutch first-line midwifery in a short period, but there is still a great need for an evidence base for midwifery practice in the Netherlands.

## The area of 'physiological obstetrics/midwifery'

'Evidence Based Midwifery research' addresses the effectiveness of midwifery practice. However, it not only encompasses research carried out by midwives, but also relates to the entire area of 'physiological obstetrics/midwifery'.

There are various distinguished research streams in Evidence Based Midwifery: for example, the scope of physiology and pathology, determinants and applications that promote the normal process, and the epidemiology of obstetric problems in a low-risk population. Also, a part of the research agenda focuses on health promotion and the long-term health of mothers and children.[50] Moreover, the quality and effectiveness of the health-care system is an important area of research especially in the Dutch situation.

Especially, in relation to the last subject, the triad 'monitoring, evaluation and feedback' is essential. After all, a robust and accurate registration of care provision is an essential resource for Evidence Based Midwifery as it provides core data of current practice, which can be used for quality improvement programmes and for research agenda setting for the future.[30,51] Research within the area of Evidence Based Midwifery does not necessarily need to be carried out by midwives themselves. Both in and outside of the Netherlands, we see research that is of utmost relevance to first-line midwifery being carried out by those other than midwives.

However, it must not be forgotten that the vision behind the design of a study can influence the research questions and subsequent results. Commitment from midwives and a professional and academic tradition in midwifery are very important for Evidence Based Midwifery.

It is up to the professional group to put the concept of Evidence Based Midwifery into practice. In order to do so, Dutch midwifery must define its own scientific

domain, formulate the relevant questions within this domain and follow up by compiling a research agenda. Midwives must initiate or carry out monodisciplinary as well as multidisciplinary research. They must take part in studies undertaken by other professionals; not only as data suppliers but also in the development phase when formulating research questions and outcome measures and basic principles for a literature search. The example of the Anaemia standard shows that a search carried out with a physiological perspective can result in unexpected findings.

## Conclusion

Dutch obstetrics/midwifery is an outstanding example of the conception and development of 'Evidence Based Midwifery'.
The first condition for this is the realisation of the importance of this scientific domain throughout the entire profession including individual midwives, as they are the ones to argue the case to researchers and funding agencies. In this, there is no lack of enthusiasm, but that alone is not sufficient. It will need knowledge, daring and assertiveness. The midwifery educational programmes fulfil a crucial role in this realisation as they shape the midwives of the future in knowledge, as well as in attitude.

The second condition is a funding increase for research in the area of physiological obstetrics/midwifery. Although much progress has been made in the last decade, it has gone too slowly and is still not sufficient. In the Netherlands, most of the midwife-researchers have no choice but to carry out their research activities in their own time, combining it with their regular employment or work. Because of this, the research process is slow and it takes more time to achieve results. Many research questions are not incorporated into grant programmes because they do not conform to the strict programme criteria. Midwives should be more involved in defining the criteria of grant programmes.

The third condition is visibility. The midwifery profession is still struggling with gender issues. This is caused by both the gender composition of the profession (98% women) as well as the (still) existing hierarchical relationship with obstetricians. Midwives must stand up and deliver. They should publish and present. They need to manifest their knowledge and quality. This demands a daring that too often is not present, and the midwifery educational programmes could play an important role in this area. It does not stop with the midwifery schools: lifelong learning is essential because "the person who stops improving, stops excelling".[52]

The overarching condition is the combining of strengths. Only when this is achieved can the other conditions be met and this should have the highest priority. The previously mentioned developments and initiatives are important and promising, but these are still too fragmented and without enough sustenance for Dutch midwifery to 'make a fist'. It is high time for a Centre of Expertise for physiological obstetrics/midwifery, with a dedicated chair position for a professor in Evidence Based Midwifery. In 2009, preparations are being made in three Dutch universities to realize such a chair. Within this dedicated place, groups of researchers could combine expertise and vision and stimulate and motivate each other. It could facilitate structured contact and exchange with similar research groups from abroad. It could be the place where Evidence Based Midwifery could really develop and take shape. Here applies the same principle of joining together loose ends to make one strong thematic thread; one plus one is greater than two.

**In closing**

The Dutch midwifery profession still has a long way to go on its journey towards Evidence Based Midwifery. The Dutch midwives can find motivation for this journey in the vision of their profession: the conviction that pregnancy and birth are, in principle, physiological events in which unnecessary interventions must be prevented.[4]

On this journey, Dutch midwives can (and should) look for support from to their colleagues abroad. Despite the immense differences in the circumstances of midwives throughout the world, they are all united in the international definition of the midwife as formulated by the International Confederation of Midwives.[53]

> *The midwife is recognised as a responsible and accountable professional who works in partnership with women to give the necessary support, care and advice during pregnancy, labour and the postpartum period, to conduct births on the midwife's own responsibility and to provide care for the newborn and the infant*

This definition unites Dutch midwives with their international colleagues. It unites the midwives of today with Catharina Schraders from the past and reinforced with Evidence Based Midwifery, it will hopefully be a source of inspiration for the midwives in the future.

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CHAPTER 3

# Pregnancy and Labour in the Dutch Maternity Care System: what is normal?

## *The role division between midwives and obstetricians*

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## Abstract

**Introduction.** In the Dutch maternity care system, the role division between independently practicing midwives (who take care of normal pregnancy and childbirth) and obstetricians (who care for pathological pregnancy and childbirth) has been established in the so-called 'List of Obstetric Indications' (LOI). The LOI designates the most appropriate care provider for women with defined medical or obstetrical conditions.

**Methods.** This descriptive study analysed the evolution of the concept of 'normality', by comparing the development and the contents of the consecutive versions of the LOI from 1958 onwards. The results were related to data from available Dutch national databases concerning maternity care.

**Results.** The number of conditions defined in the successive lists from 39 in 1958 to 143 in 2003. In the course of time, the nature and the content of many indications changed, as did the assignment to the most appropriate care provider.
The basic assumptions of the Dutch maternity care system remained stable: the conviction that pregnancy and childbirth fundamentally are physiological processes, the strong position of the independently practicing midwife, and the choice between home or hospital delivery for low-risk women. Nevertheless, the odds of the obstetrician being involved in the delivery process increased from 24.7 % in 1964 to 59.4 % in 2002, whereas the role of the primary care provider decreased correspondingly.

**Discussion.** Multidisciplinary research is urgently needed to better determine the risk status and the optimal type of care and care provider for each individual woman in her specific situation, taking into account the risk of both under- and overtreatment. Safely keeping women in primary care could be considered one of a midwife's interventions, just as a referral to secondary care may be. The art of midwifery and risk selection is to balance both interventions, in order to end up with the optimal result for mother and child.


*Key words (MeSH terms)*
Delivery of health care; midwifery; Netherlands; perinatal care; referral and consultation

## Introduction

Depending on a country's organisational model of obstetric care, several professionals may be involved in the care of a mother during pregnancy and labor. The organisational model determines which professionals will be the woman's attendants during these processes. In addition, each country has a more or less specified division of roles between the professionals, which determines the responsibilities of each of them in the care provision. In this respect large differences exist between countries.[1]
One factor, however, seems to be consistent within all maternity care systems: the role of the midwife in attending and promoting normal pregnancy and delivery. According to the 'Definition of the Midwife', adopted by the International Confederation of Midwives' Council in 2005, the midwife's care includes preventative measures, the promotion of normal birth, and the detection of complications.[2] The World Health Organization finds "the skills in assisting normal pregnancy and childbirth" to be core midwifery competencies.[3] Worldwide, the midwife has been recognized as a 'women-centred care giver'[4] who views her task as 'keeping women healthy throughout normal stages of reproductive life'[5] and aims to be ' an instrument of care by the low-technology use of her presence'.[6]

In the Netherlands, the care of women with normal pregnancy and labor is the Dutch midwives' core business as well. The initial 'Law of Medical Practice', passed in 1865, restricted the midwife's authority to "providing obstetrical assistance or advice, only in case of an uncomplicated, natural course of labor" without the use of "obstetrical instruments".[7] Subsequent laws, although less restrictive in an explicit manner, emphasize "promoting and surveying the natural course of pregnancy, labor and postpartum period" as the aim of the midwife's care. [8-10]
Maternity care in the Netherlands is based on the principle that pregnancy, delivery and the puerperium are fundamentally physiologic processes [11]. Therefore, the midwife plays an important role in Dutch maternity care. In 2006, 77.3 % of all pregnant women started pregnancy care with an independently practicing midwife.[12] If pregnancy, childbirth, and the postpartum period are uncomplicated, the woman remains under the care of her primary midwife. She can make the choice of a home or a short stayhospital delivery, both under supervision of her own midwife. If complications occur or threaten to occur, the midwife will refer the woman to the obstetrician who will take over the care for as long as deemed necessary. Women with a high-risk profile because of their medical or obstetric history will be cared for by the obstetrician from the start of pregnancy. They no longer have the choice of a home delivery, although the postpartum period at home will be supervised by amidwife.

In areas where no midwifery practice is established, the primary obstetric care is provided by a general practitioner.
Thus, within this primary level of care, the Dutch midwife is responsible for the pregnant woman as long as the pregnancy, labor, or postpartum period are normal. Within secondary or tertiary levels of care, the obstetrician is responsible for women with initial pathology and for women in whom pathology occurs during the pregnancy, labor, or postpartum period.
This role division in the Netherlands has been established in the so-called 'List of Obstetric Indications' (LOI). The LOI (the current version is dated 2003) is considered an instrument for required risk identification and a guideline for determining who will be the most appropriate care provider for each individual pregnant woman, depending on her specific situation.[13] The LOI provides the foundation for the agreements and protocols that pertain to local collaborations of midwives, general practitioners, and obstetricians.

Although the focus on 'normality' seems to be an international common aspect of midwifery care, one could ask what is considered 'normal' in pregnancy and labor and the postpartum period. Questions can be raised as to how stable the concept of 'normality' is in pregnancy and labor, and which changes in practice may be the result of changes in this concept. This study addressed these questions through an examination of the history of the successive Dutch Lists of Obstetric Indications, with an analysis of the changes in these lists over several revisions, and finally, an illustration of conclusions using data on maternity care in the Netherlands.

## Methods

### The Lists of Obstetric Indications

The first official LOI was published in 1973 in the Dutch Textbook of Obstetrics and Gynecology.[14] Three updates have been published since - in 1987, 1999 and 2003 respectively.[11;13;15] These four LOIs were analyzed by comparing the development of the lists and the involvement of the professional groups in that process, the indications addressed, the definition of the conditions leading to the indications, and the assignment of the indications to the appropriate care provider. Two predecessors of the first official LOI were also included in this analysis: a circular of the National Health Insurance Board dating from 1958[16] and a paper published in the Dutch Journal of Medicine in 1966.[17]
The first author was a participant in the working groups of the last two LOIs.

In order to gain more insight into the history of the LOI, a number of the professionals involved in the development of the former LOIs were interviewed about the processes and the discussions concerning the development of the LOIs and their reception by the professional groups. Documentation about the development of the process that preceded the first LOI was found in the archives of the National Health Insurance Board.

**Sources of Data on Professional Role Divisions in Obstetric Care**

From 1964 up until 1993 Statistics Netherlands (*Centraal Bureau voor de Statistiek*) published annual reports titled 'Births by nature of obstetric assistance and place of delivery'.[18] The data were derived from the civil register of births, which contained the parents' information. The database distinguishes between midwife and physician, but does not make a distinction between general practitioner and obstetrician. We used these data for the purpose of this analysis. We assumed a physician attending a birth at home to be a general practitioner and a physician attending a birth in the hospital to be an obstetrician, thereby likely underrating the general practitioner's contribution and overrating the obstetrician's part to some extent.

For data concerning the years after 1993, we used the National Perinatal Registry (*Landelijke Verloskunde Registratie, LVR)*. Dutch obstetricians have recorded information about mothers, newborns, and their care provision in secondary and tertiary care in the National Perinatal Registry *(LVR2)* since 1982. Midwives have recorded their primary care provision in a separate database (*LVR1*) since 1985. The coverage of all births in the LVR2 and LVR1 is high; 99 % of all hospitals and 99 % of all midwifery practices record their data in these registries.[12] Data from the general practitioners' obstetric care, however, are not included in the LVR.

Given these separate databases, there is no readily accessible comprehensive national data source about care provision. In two previous projects, the data of both sub-registers were combined in order to create a national database. The first, concerning trends in place of delivery, covered the period from 1995 to 2002. In that study, researchers calculated the contribution of the general practitioner to obstetric care provision by extrapolation.[19] The second project resulted in annual reports on Dutch obstetric care from 2001 onwards.[20] However, these reports do not provide data concerning the contribution of general practitioners to the obstetric care. Therefore, we did not use the latter data for the purpose of this article.

**Sources of Data on Indications for Referral**

The changes in indications for referral that appeared in the analysis of the LOIs were illustrated with data that originate from two separate Dutch midwifery databases. The first is a data set from the Wormerveer study. In Wormerveer - a city that in the late 1960s and the 1970s was considered a reference for the Dutch obstetric model - the first large-scale study analyzing the risk selection system was carried out. A group of 7980 pregnant women, booked consecutively at one midwifery practice between 1969 and 1983, was monitored from the start of pregnancy to 6 weeks postpartum.[21;22] By aggregating the results of the published tables, some of the data from the Wormerveer study could be used for this study.

The second dataset contained data from the LVR1 (the midwives' perinatal registry) from 1988 until 2004. These data have previously been reported within the framework of a study of trends in referral from midwife to obstetrician.[23] The original data were recomputed for the present study in order to end up with the required 4 years' periods.

For the period from 1958 until 1968 there are no available data on risk selection in midwifery care.

## Results

**History of the List of Obstetric Indications**

On February 12, 1958, the Chair of the National Health Insurance Board (Ziekenfondsraad, ZFR) mailed a circular to his medical controllers.[16] The controllers' responsibility was to prevent needless expenses by assessing the necessity of a hospital admission on the base of general guidelines. Referring to the recently published Dutch Obstetric Textbook, the circular stated that in the area of maternity care, indications for hospital admission can be specified. In the textbook's chapter titled `Guidance of labor´, a list of 39 conditions was specified in which difficulties in labor might be expected. The authors suggested that these conditions could be considered a medical indication for admission to hospital.[24] The ZFR's circular recommended that controllers use the textbook's list in their assessment of requests for obstetric admission. This recommendation essentially established the first LOI. Of note, the circular concluded that not all indications listed would be used nor would have to be used in practice: admission was allowed but not obligatory. The percentage of admissions necessary was calculated to be 8.5 % of all births.

Before publishing this circular, the ZFR had consulted Professor Gerrit Jan Kloosterman, the former Headmaster of the Amsterdam Midwifery School and a dedicated advocate of natural childbirth. As newly appointed professor in obstetrics, he commented on the indications, putting the list in practical context. Starting from the basic principle that the natural birth had to be guided by a midwife or a general practitioner, he emphasized that in case of an indication for hospital admission, assistance of the obstetrician had to be indicated.[25] In effect, in his comments, Kloosterman introduced the role division between primary and secondary care providers that still exists in the Dutch maternity care system. His comments, however, were not incorporated in the ZFR's circular .

Kloosterman further developed his ideas on risk selection and role division in maternity care, and in 1966, published an extended LOI in the *Dutch Journal of Medicine*.[17] This LOI was empirically based and was already in use in his Amsterdam Academic Hospital. In Kloosterman's opinion every deviation from the perfectly normal course should be accepted as an indication for a hospital delivery (and therefore as an indication for specialist care). Care by an obstetrician should not be applied only to severe pathology. At the same time he advocated the home as the best place for delivery for low-risk women, introducing the paradox that home deliveries are possible only with a strict and ample use of indications for hospital admission.[17]

The charismatic Kloosterman achieved consensus on his List from all professors of obstetrics of that time. Therefore, with only slight adaptations, the Amsterdam's LOI was published in the 1973's Dutch Textbook for Obstetrics as 'the Dutch LOI'.[14] A copy of this so-called 'Kloostermanlijst' was subsequently disseminated among practicing midwives and general practitioners, confirming its official status.

In 1983, the ZFR initiated a study group of all professional organizations involved in order to update the 'Kloostermanlijst'. In contrast with the former LOIs, this version not only defined the indications for referral but also defined conditions for which no referral was deemed necessary. The definitions were based on decisive criteria: the nature and severity of potential complications, the possibility of detection, and the potential gain of preventive measures or interventions by an obstetrician. In order to add a scientific basis to the indications, results from the Wormerveer study were used to determine the most appropriate care provider for the conditions concerned. In addition, the midwife and the general practitioner were designated as the care provider who would determine whether referral was indicated.[15]

The publication of this LOI, in 1987, initiated a heated debate within the professional group of obstetricians. The main obstacle appeared to be the role of the primary care provider as the primarily responsible person for the risk selection.[26] The Dutch Society of Obstetrics and Gynecology decided not to acknowledge the LOI, and the relationship between the midwives' and the obstetricians' national organizations became quite cool for years. Nevertheless, an evaluation study showed that these differences in opinion at the level of the national Boards did not negatively influence practical collaboration between midwives and obstetricians at the local level.[27]

In 1999, a study group of professional experts succeeded in reaching agreement on an update of the LOI. This revision was acceptable to all professional groups involved, although the basic assumptions of the previous list were in fact reestablished. The LOI was embedded in an Obstetric Manual that also addressed themes such as obstetric collaboration, quality requirements for professional groups, and the intention to develop a national system for perinatal audit.[13] The aim of this embedding was to optimize collaboration and the quality of care. The indications defined were considered 'authoritative' because they were based as much as possible on the actual scientific evidence and on consensus between the professional groups. For that purpose, the decisive criteria were adapted and it was agreed the focus should be on optimal care for the individual women rather than on the care process from the perspective of the provider.

In 2003, all chapters of the 1999's Obstetric Manual were updated. Ten indications in the LOI were redefined. This revision used evidence-based methods: after a systematic review of literature focused on patient, intervention, comparison, and outcome (PICO) indicators, the identified publications were selected on quality and applicability to the Dutch situation with its distinction between primary and secondary care. Results from the selected papers were translated into recommendations, based on their assigned level of evidence. The methodology and rationale of the adaptations were also published in the Obstetric Manual.[11]

At present, preparations are being made for an update of the LOI, which is expected in 2010, and will be coupled with the development of a method for a continuous (modular) updating procedure of the LOI. In this project, all relevant professional groups involved are actively participating (obstetricians, midwives, neonatologists and general practitioners), assisted by epidemiologists.

**Content of the List of Obstetric Indications**

In 1958, only indications for referral to secondary care were listed in the LOI - all other indications were assigned to the primary care provider. In 1973, indications were added for which consultation between primary and secondary care provider was advised. In 1987, indications for primary care were defined for conditions for which the choice of care provider depends on the severity of the condition. In addition, there were changed opinions about some conditions that previously were considered indications for secondary care (Table 3.1). The largest number of indications for primary care are defined in the 'obstetrical history' section (15 out of 28 indications in 2003's LOI). Table 3.2 provides some examples of these indications together with the rationale, such as 'There is no added value in conducting pregnancy and birth at secondary level'.

The total number of indications defined increased from 39 in 1958 to 143 in 2003. Over time, a large number of indications were added, deleted, or were put in another category (Table 3.1).

The content of the indications also changed. Table 3.3 provides some examples of changing opinions. For some conditions, such as preexistent diabetes, the risk had been long recognized, whereas other conditions (such as hard drug use) were identified or newly defined only in later years. In other cases, the assessment of the condition's risk status, such as breech presentation, evolved from a normal to a pathological condition. Conversely, the assessment of some conditions went from pathological to normal, such as a maternal age of 35 or older. Failure to progress in labor has only been listed since 1987, since in Kloosterman's opinion failure to progress reflected the impatience of the midwife concerned (personal communication P.E. Treffers). Some conditions such as pelvic abnormalities, were originally considered to need detailed categorization but were aggregated in later LOIs, whereas other conditions such as 'infections' show an increasing itemization.

**Professional Role Division**

In 1964, 24.7 % of all women in the Netherlands completed the birth process under the supervision of an obstetrician, whereas the midwife and the general practitioner attended almost equal proportions of births (35.5 % and 39.7 %, respectively). The contribution of the general practitioner has substantially diminished since, to 8.0 % in 1993 and an estimated 7.2 % in 2002 (Figure 3.1). The contribution of midwifery care at birth is decreasing slowly to 33.4 % in 2002, after a slow increase up until 1993 - in 1993, 46.3 % of all deliveries were supervised by a midwife. The role of the obstetrician is increasing continuously, to 45.6 % in 1993 and 59.4 % in 2002 (Figure 3.1).

**Table 3.1 -** Changes in the number of risk conditions addressed in the successive Lists of Obstetric Indications (LOI) [a]

| Level of Care | Conditions diagnosed, developing, or occurring | No. of conditions named | No. of conditions named (+ no. of conditions added; – no. of conditions removed in relation to the respective previous List) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1958 LOI | 1973 LOI[b] | | 1987 LOI | | 1999 LOI | | 2003 LOI | |
| **Primary obstetric care** | Medical history | –[c] | – | | 8 | (+ 8; –0) | 6 | (+4; –6) | 9 | (+3; –0) |
| | Obstetric history | – | – | | 15 | (+15; –0) | 11 | (+3; –7) | 15 | (+4; –0) |
| | Pregnancy | – | – | | 10 | (+10; –0) | 7 | (+5; –8) | 9 | (+3; –1) |
| | Delivery | – | – | | – | | – | | – | |
| | *Total primary care* | *0* | *0* | | *33 (+33; –0)* | | *24 (+12; –21)* | | *33 (+10; –1)* | |
| **Secondary obstetric care** | Medical history | 12 | 21 | (+15; –6) | 14 | (+10; –17) | 17 | (+8; –5) | 16 | (+2; –3) |
| | Obstetric history | 12 | 17 | (+10; –5) | 4 | (+0; –13) | 5 | (+1; –0) | 7 | (+2; –0) |
| | Pregnancy | 15 | 25 | (+18; –8) | 10 | (+6; –21) | 28 | (+20; –2) | 26 | (+1; –3) |
| | Delivery | – | 12 | (+12; –0) | 13 | (+2; –1) | 14 | (+5; –4) | 14 | (+0; –0) |
| | *Total secondary care* | *39* | *75 (+55; –19)* | | *41 (+18; –52)* | | *64 (+34; –11)* | | *63 (+5; –6)* | |
| **Consultation primary/ secondary care** | Medical history | – | 6 | (+6; –0) | 16 | (+14; –4) | 17 | (+8; –7) | 17 | (+2; –2) |
| | Obstetric history | – | – | | 8 | (+8; –0) | 10 | (+5; –3) | 6 | (+0; –4) |
| | Pregnancy | – | – | | 21 | (+21; –0) | 20 | (+8; –9) | 21 | (+2; –1) |
| | Delivery | – | – | | – | | 3 | (+3; –0) | 3 | (+0; –0) |
| | *Total Consultation* | *0* | *6* | | *45 (+43; –4)* | | *50 (+24; –19)* | | *47 (+4; –7)* | |
| **Total of conditions defined in LOI** | | **39** | **81** | | **119** | | **138** | | **143** | |

LOI = List of Obstetric Indications.

[a] The LOI designates the most appropriate level of care provision in case of medical or obstetric conditions

[b] Given the large similarity with the indications listed in 1973, the list of 1966 is not shown in the Table

[c] An em dash indicates that these items were not mentioned in the LOI for that year.

**Indications for Referral**

Table 3.4 illustrates the most common indications for referral from the midwife to the obstetrician, shown within four time periods, using data from Dutch midwifery databases. In both nulliparous and multiparous women, the indications have changed in ranking and in volume. For example, in the first period (1969 to 1973), 3.1 % of all primiparous women were referred because of a hypertensive disorder, and 3.0 % because of failure to progress in the second stage. In the last period (2000 to 2003) these indications occurred in 6.2 % and 6.7 % of women respectively. In multiparous women, the medical and obstetrical history and fetal distress took the place of intrauterine growth restriction and abnormal presentation as most common indications for referral (Table 3.4).

## Discussion

The history of the successive LOIs shows a continuous evolution. The LOI evolved from a directive for insurance companies to an instrument for risk selection and professional cooperation. In addition, the LOI evolved from monodisciplinary, empirically-based opinions to multidisciplinary, evidence-based consensus. The development process of the LOI on the one hand explains the origin of the current Dutch maternity care system, and on the other hand reveals the changing opinions over time regarding normality, collaboration between the professional groups, and the role of the midwife. The LOI also reflects societal trends. For example, the decreasing numbers of indications for pelvic problems suggest an improvement of the general maternal health condition, and the addition of conditions such as Female Genital Mutilation, HIV, and haemoglobinopathies reflect changes in the characteristics of the population served.

Despite the continuous changes, the basic assumptions of the Dutch maternity care system have remained stable. All LOIs explicitly confirm that pregnancy, birth, and the puerperium in principle are physiological processes, and that medicalisation of obstetric care should be avoided and actively opposed. The consequence of that assumption – namely, that delivery can take place at home if no complications are expected - was also established. The important statement that the primary care provider (primarily the midwife) is designated the responsible person for risk selection was added in 1987. The small number of conditions with an explicit indication for a primary care provider (Table 3.1) indicates the basic principle of the LOI: care will be provided by the midwife in primary care, unless explicitly stated otherwise.

**Table 3.2 -** Some examples of Risk Conditions, defined in the obstetrical history section of the List of Obstetric Indications (LOI) 2003[a]

| Condition | Level of Obstetric Care Provision | Comments |
|---|---|---|
| History of ABO incompatibility | Primary [b] | Pregnancy and labour can be conducted in primary obstetric care, but vigilance of neonatal problems is needed |
| History of active blood group incompatibility (Rhesus, Kell, Duffy, or Kidd) | Secondary [c] | None |
| Habitual abortion | Primary | When pregnancy continues, care is conducted at primary level |
| Preterm birth (< 33 weeks) in the previous pregnancy | Secondary | In case of a normal pregnancy following the preterm birth, the next pregnancy can be conducted by primary care |
| Preterm birth ( ≥ 33 weeks) in the previous pregnancy | Primary | None |
| Postterm pregnancy in history | Primary | Previous postterm pregnancy has no predictive value for the course of the current pregnancy and birth |
| Forceps or vacuum-assisted birth in history | Primary | Evaluation of information from documentation of the obstetric history is important |
| Postpartum hemorrhage in history: | | |
| - Because of episiotomy | Primary | None |
| - Because of cervix rupture (clinically demonstrated) | Primary obstetric care, but delivery in hospital | Pregnancy and birth can be conducted at primary care level. Delivery has to take place in hospital because of the (assumed) chance of recurrence |
| - Because of other causes (> 1000 cc) | Primary obstetric care, but delivery in hospital | Pregnancy and birth can be conducted at primary care level. Delivery has to take place in hospital because of the(assumed) chance of recurrence |
| Perinatal death in history | Consultation primary / secondary care | Such an obstetrical history requires consultation. It is also important to know whether there was a normal pregnancy following the perinatal death. Pregnancy and birth then can be conducted at primary level |
| Grand multiparity | Primary | Defined as parity > 5. There is no added value to conducting pregnancy and birth at secondary care level |

[a] Source: Commissie Verloskunde CVZ, 2003 [11]. The entire LOI has been translated to English and published in *Recent Advances in Obstetrics and Gynaecology (vol 23)*.[41]
[b] Primary obstetric care: Midwife or general practitioner
[c] Secondary obstetric care: Obstetrician Care

Given the continuity in the basic assumptions of the system, the changes in practice as shown in Figure 3.1 and Table 3.4 are striking. Despite the limitations of the data, it is clear that the odds of the obstetrician being involved in the delivery process have more than doubled, whereas the role of the primary care provider decreased accordingly.

A number of reasons may account for this trend. First, scientific knowledge has increased to a large degree since the 1950s, especially concerning physiology and pathology in pregnancy. This has resulted in an improved understanding of the processes and risk factors of pregnancy and labor. Further, the options for monitoring, diagnosing, prevention, and treatment have increased explosively. The adoption of diagnostic technologies for surveillance of the fetus (such as ultrasound and electronic fetal monitoring) has expanded the focus from solely on the mother to inclusion of the fetus as 'second patient', simultaneously changing 'obstetrics' into 'perinatology'.[28] This trend is reflected in the LOI: whereas the 1958's LOI consisted of maternal risk indications only, in 2003, 22 % of the risk indications were concerning fetal conditions.

Modern options for surveillance and treatment have also caused a shift in the focus from 'survival' to 'optimal outcome' of mother and child. Technologies for intervention in the birth process, such as the augmentation of labor, caesarean delivery, and analgesia are safer and more easily available than in the past. As a consequence, the weighing of the risks and benefits of an intervention more easily result in the choice to intervene. In addition, the availability of technology has diminished the readiness of a woman (and her partner) to endure long-lasting labor and/or labor pain.

Population characteristics that influence the risk profile of childbearing women have also changed considerably. Family size, for instance, declined from 3.1 children in 1960 to 1.8 children in 2006, resulting in relatively more nulliparous women.[18] Maternal age in the Netherlands has increased to one of the highest in Europe (about 22% of women who give birth are 35 years of age or older).[12] More than 19 % of the childbearing women are of non-Dutch origin.[12] All of these demographic changes also contribute to an increased risk profile.
Finally, the shift in main indications for referral and the large increase of the respective indications, shown in Table 3.4, suggest that the worldwide trend of lexicalization of the birth process, resulting in ever more and never fewer interventions, may play also a role. This may in turn affect Dutch midwives in their risk perception and in their assessment of 'normality'.[29]

**Table 3.3** - Examples of changing opinions about Recommended Care Provider for Selected Obstetrical Risk Conditions 1958 - 2003

| Conditions listed in respective Lists of Obstetric Indications (LOI) | | 1958 LOI | 1966 LOI | 1973 LOI | 1987 LOI | 1999 LOI | 2003 LOI |
|---|---|---|---|---|---|---|---|
| **I** | Diabetes mellitus (preexistent) | S | S | S | S | S | S |
| **II** | Use of hard drugs<br>Syphilis<br>DES daughter<br>FGM | -[a]<br>S<br>-<br>- | -<br>-<br>-<br>- | -<br>-<br>-<br>- | S<br>-<br>P<br>- | S<br>S<br>CPS<br>P | S<br>S<br>CPS<br>P |
| **III** | Breech presentation | S (nulliparous women, "if version was unsuccessful") | S (diagnosed in pregnancy);<br>P (discovered during labor) | S (diagnosed in pregnancy);<br>P (discovered during labor) | S | S | S |
| **IV** | Gestational age<br>- Nulliparous women<br>- Multiparous women | <br>-<br>- | <br>S: > 297 days GA<br>S: > 308 days GA | <br>S: > 294 days GA<br>S: > 301 days GA | <br>S: > 294 days GA<br>S: > 294 days GA | <br>S: > 294 days GA<br>S: > 294 days GA | <br>S: > 294 days GA<br>S: > 294 days GA |
| **Va** | Maternal age, nulliparous women | S: > 40 years<br>S: < 15 years | S: ≥ 35 years<br>S: < 16 years | S: ≥ 35 years<br>- | PH: >35 years<br>P: < 15 years | - | - |
| **Vb** | Maternal age, multiparous women | - | S: ≥ 45 years | S: ≥ 45 years | PH: >40 years | - | - |
| **VI** | Failure to progress 1st stage | - | - | - | S: No progress for a period of 4 hours | CPS: No progress for a period of 4 hours, in active phase of labor | CPS (without definition of 'failure of progress') |
| **VII** | Pelvic abnormalities | 5 conditions specified (5 x S) | 11 conditions specified (11 x S) | 11 conditions specified (11 x S) | 7 conditions specified (5 x CPS, 2 x P) | 5 conditions specified (3 x CPS, 2 x P) | 5 conditions specified (3 x CPS, 2 x P) |
| **VIII** | Infectious diseases | 2 conditions specified (2 x S) | 2 conditions specified (2 x S) | 2 conditions specified (2 x S) | 6 conditions specified (1 x S, 1 x CPS, 4 x P) | 17 conditions specified (9 x S, 4 x CPS, 4 x P) | 19 conditions specified (9 x S, 6 x CPS, 4 x P) |

S = Secondary obstetric care provided by the obstetrician; P = Primary obstetric care provided by the midwife or general practitioner; CPS = Consultation for primary or secondary care; PH = Primary obstetric care, but delivery in Hospital; DES = diethylstilbestrol; FGM = female genital mutilation; GA = gestational age.

[a] An em dash indicates these items are not mentioned in the LOI for that year

The data in Figure 3.1, showing the responsible care provider at the completion of birth, indicate a decreasing but still considerable role for the primary-level midwife. In addition, the midwife's role in pregnancy and postnatal care is stable and her preventive activities such as prenatal screening and preconceptional advice are increasing steadily. In 2007, 77.7 % of all pregnant women started pregnancy care with the primary level midwife.[12] Almost half of these women finished pregnancy and delivery under the exclusive attendance of her midwife, without any involvement of an obstetrician. Within the group of women being referred at any moment during pregnancy or labor, the primary level midwife was responsible until the very moment of referral and most often again resumed responsibility in the postpartum period.

The data displayed in Figure 3.1 may suggest that the basic assumptions of Dutch maternity care are becoming obsolete. Nevertheless, in 2006, 75% of all women in the Netherlands gave birth spontaneously.[12] With a 15 % Caesarean section rate and 9.8 % forceps or vacuum-assisted delivery rate, the Netherlands is among the countries with the highest rate of spontaneous birth[30]. In addition, about 70 % of the women who were assessed low risk at start of labor (and, as a consequence, were allowed to choose between home- and hospital delivery) chose a home delivery, resulting in a national rate for home birth of about 30%.[19]

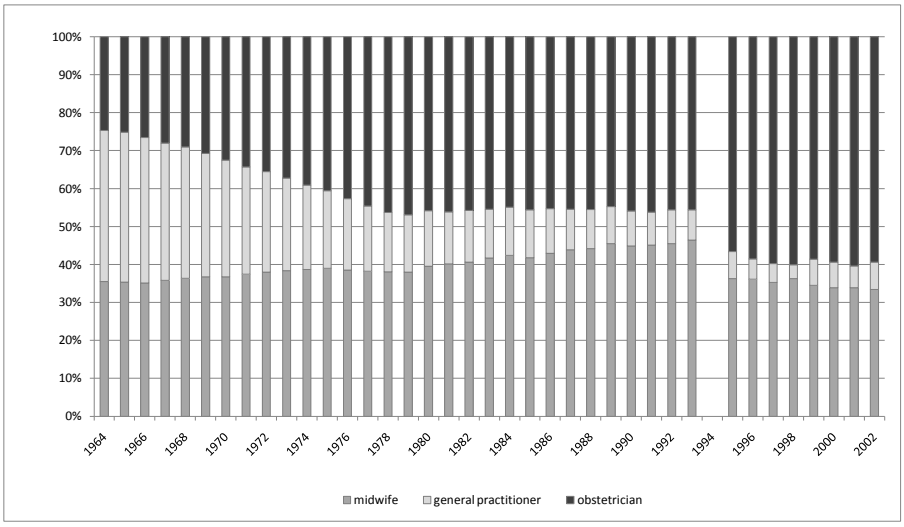


**Figure 3.1** - The responsible care provider at completion of birth in the Netherlands, 1964 to 2002.

Statistics from 1964 to 1993 are based on data of Statistic Netherlands ('Births by nature of obstetric assistance and place of delivery').[18] Statistics from 1995 to 2002 are based on data of the National Perinatal Registry.[19] There is a break between 1993 and 1995 that reflects the difference in sources for the data. See text.

**Table 3.4** - Five most common indications for referral during pregnancy or labor, in primiparous and multiparous women, with percentage referred for each condition

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Births to Primiparous Women** | | | | | | | | |
| | **1969 – 1973** (*N= 1648 )* [a] | | **1980 – 1983** (*N=765)* [a] | | **1990 – 1993** (*N=196,994)* [b] | | **2000 – 2003** (*N=265,179)* [b] | |
| **1** | abnormal presentation | 6.1 | abnormal presentation | 9.0 | fetal distress | 7.6 | fetal distress | 9.7 |
| **2** | hypertensive disorder | 3.1 | hypertensive disorder | 8.2 | failure to progress second stage of labor | 7.1 | failure to progress 1st stage/ need for pain relief | 8.9 |
| **3** | (suspected) intra uterine growth restriction | 3.1 | failure to progress second stage of labor | 6.5 | failure to progress first stage of labor / need for pain relief | 6.6 | failure to progress second stage of labor | 6.7 |
| **4** | postterm pregnancy | 3.1 | fetal distress | 4.8 | abnormal presentation | 5.2 | hypertensive disorder | 6.2 |
| **5** | failure to progress second stage of labor | 3.0 | preterm birth | 4.7 | hypertensive disorder | 5.2 | post term pregnancy | 5.2 |
| **Births to Multiparous Women** | | | | | | | | |
| | **1969 – 1973** (*N= 1563 )* [a] | | **1980 – 1983** (*N=781)* [a] | | **1990 – 1993** (*N=207,303)* [b] | | **2000 – 2003** (*N=277,051)* [b] | |
| **1** | (suspected) intra uterine growth restriction | 2.5 | preterm birth | 2.9 | fetal distress | 3.2 | medical and obstetrical history | 7.2 |
| **2** | abnormal presentation | 1.7 | hypertensive disorder | 2.4 | abnormal presentation | 2.3 | fetal distress | 5.1 |
| **3** | large for gestational age | 1.3 | (suspected) intra uterine growth restriction | 2.3 | medical and obstetrical history | 2.3 | postterm pregnancy | 3.3 |
| **4** | postterm pregnancy | 1.2 | postterm pregnancy | 2.2 | postterm pregnancy | 2.2 | abnormal presentation | 2.4 |
| **5** | preterm birth | 0.9 | abnormal presentation | 2.1 | prelabor rupture of membranes | 2.1 | failure to progress first stage of labor / need for pain relief | 2.1 |

[a] Data from the regional database of midwifery care, Wormerveer: All women considered low risk at 20 weeks of gestational age.[21]
[b] Data from the national database of midwifery care, the Netherlands: All women considered low risk after the first booking visit.[23]

Nevertheless, the high percentage of obstetrician-led deliveries seems to conflict with the principle that pregnancy and labor are physiological processes. In our opinion, this discrepancy is mainly caused by the changing perception of normality. After all, in practice the difference between low and high risk is a continuous scale. In 1966, however, Kloosterman introduced the principle that "every deviation from the perfectly normal course will be an indication for specialist care". By adopting this principle, Dutch maternity care has chosen a dichotomous scale of low versus high risk. Because of the developments discussed above, the proportion of low risk is shrinking , and the proportion of high risk is increasing, varying from mild conditions, such as prelabor rupture of membranes or need for pain relief, to serious pathology such as HELLP syndrome or severe fetal distress. It might be expected that this trend will continue in the future: the greater number of diagnostic tools and technologies are available, the more easily women will be considered 'deviating from the perfectly normal' and therefore in need of being referred to specialist care.

On the other hand, this dichotomization has proven to be helpful to define the responsibilities of the various care providers. Several studies have shown that for women who were labeled low risk, primary obstetric care has the advantages of a reduced risk of medical interventions, a decreased likelihood of perineal tears and episiotomy, an increased odds of spontaneous vaginal birth, high maternal satisfaction, the choice between home- or hospital delivery, more mobility, an increased likelihood of breastfeeding, together with a highly satisfactory level of neonatal morbidity and mortality.[31-40] From this point of view, safely keeping women in primary care could be considered one of a midwife's interventions, just as a referral to secondary care may be. The art of midwifery and risk selection is to balance both interventions, in order to end up with the optimal result for mother and child.

The history of the LOI shows that the concept of normality has evolved in the course of time and will probably continue to evolve in the near future. On average, it is evolving in the direction of labeling fewer pregnancies and deliveries as normal and more pregnancies and deliveries as abnormal. Furthermore, it shows that the considerable changes in the consecutive LOIs were influenced by empirical and societal developments and only partially by clear evidence. Therefore, the present lack of clear evidence to identify normal pregnancy and labor is worrying because it will almost inevitably push the development of the referral pattern into erring on the side of caution. In order to avoid a relatively small percentage of minor complications, more and more women will be referred, which will in turn increase the odds of interventions during labor and of potential adverse effects on their health. In

other words: the 'numbers needed to refer' to avoid a problem are likely to increase. Continuation of this evolution will threaten the position of the independently practicing midwife in the Netherlands.

Maintaining a system cannot be an objective in itself, and the focus should therefore continue to be on achieving an optimal outcome for mother and newborn. An increasing body of evidence, however, reveals the significance of midwife-led care for low risk women, in maintaining their access to a normal pregnancy and labor.[31;32;36;38-40] A recent Cochrane review states that all women should be offered midwife-led models of care.[31] Therefore, more research is urgently needed to better identify the true risk status and the optimal type of care and care provider for each individual woman in her specific situation. In doing so, the risk of both under- and over-treatment should be taken into account. A multidisciplinary approach to such research is imperative, including not only the professional groups involved, but also scientists in the fields of public health, health services research, and social sciences. Given their focus on normality, midwives can play an important role in this process by contributing from their salutogenetic perspective: offering their focus on health and well-being rather than on pathology and factors that cause disease.

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CHAPTER 4

# A Trend Analysis in Referrals during Pregnancy and Labour in Dutch Midwifery Care 1988 – 2004

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## Abstract

**Objective.** To assess the trends and patterns of referral from midwives to obstetricians within the Dutch maternity care system from 1988 to 2004 and the differences in referral patterns between nulliparous and parous women.

**Design.** A descriptive study.

**Setting.** The Dutch midwifery database (LVR1), which monitored 74% (1988) to 94% (2004) of all midwifery care in the Netherlands between 1988 and 2004.

**Population.** A total of 1 977 006 pregnancies, attended by a primary care level midwife.

**Methods.** The indications for referral from midwifery to obstetric care were classified into fifteen groups (eight antepartum, six intrapartum and one postpartum). The trends in referrals of these indications were analysed by general linear models.

**Main outcome measures.** Trends in the percentage of antepartum, intrapartum and postpartum referrals from. midwifery care to obstetric care; trends in the specific indications for referral; contribution of different groups of the indications to the trend.

**Results.** From 1988 to 2004 an increase of 14,5% (from 36.9% to 51.4%) occurred in referrals from primary midwifery care to secondary obstetric care either during pregnancy, childbirth or in the postpartum period. The timing of the referrals was as follows: antepartum + 9.0%, intrapartum + 5.2% and postpartum + 0.3%. In parous women, the increase in referrals was greater (+ 16.6%) than in nulliparous women (+ 12.3%) ($P = 0.001$).
The commonest indications for referrals in nulliparous women were anticipated or evident complications due to 'failure to progress in the first or second stage' and 'fetal distress'. Parous women were most commonly referred for anticipated or evident complications due to 'medical history' and 'fetal distress'.
In nulliparous women, 52% of the increase in referrals was related to the need of pain relief and occurrence of meconium stained amniotic fluid; in parous women, 54% of the increase in referrals was related to the general medical and obstetrical history of the women involved, especially Caesarean Section in a previous delivery and the occurrence of meconium-stained amniotic fluid.

**Conclusions.** During a 17-year period, there was a continuous increase in the referral rate from midwives to obstetricians. Previous caesarean section, requirement for pain relief and the presence of meconium-stained fluid were the main contributors to the changes in referral rate. Primary prevention of caesarean section and antenatal preparation for childbirth are important interventions in the maintainance of primary obstetric care for low-risk pregnant women.


*Keywords*
Maternity care, midwife, obstetric care, primary care, referral, risk assessment, the Netherlands.

## Introduction

One of the key elements of the healthcare system in the Netherlands is the clear distinction between the three levels of care provision: primary, secondary and tertiary care. General medical practitioners and independently practising midwives are examples of primary care professionals. Secondary care is provided in general hospitals, and tertiary care in academic hospitals. Primary care generally is the entry point into the health care system and all insured persons have free access to this form of care.[1;2]

Maternity care in the Netherlands is founded on the principal that pregnancy, delivery and the puerperium are physiological processes.[3] Pregnant women are initially considered 'low risk' and so book with a midwife for care provision during pregnancy, birth and the puerperium. In some rural areas this care is provided by a general medical practitioner.

If no problems occur during the course of pregnancy, the woman can choose to give birth at home, in a birth clinic or in a hospital. In all three settings, she will be cared for by her own midwife without an obstetrician being involved. In the event of an anticipated risk or evident complications, the midwife refers the woman to the secondary or tertiary care provider, namely the obstetrician..

To ensure that referral takes place in an optimal fashion, guidelines for consultation and collaboration between midwives and obstetricians have been formulated in the Obstetric Manual and in the so-called List of Obstetric Indications.[3;4] In this document, all professional groups involved in maternity care reach general agreement on the indications for consultation and referral. The list forms the foundation for agreements and protocols in individual consultations between midwives and obstetricians. Approximately, 80% of pregnant women begin their antenatal care with an independent midwife, 5% with a general practitioner, and 15% with a secondary or tertiary care obstetrician.[5] The last group of women characteristically have a history medical or obstetrical problems.

This division of tasks and responsibilities implies that one of the most important aspects of midwifery care is risk selection. This pivotal role of the midwife in the identification of risk in the Dutch maternity care system has relevance to systems in other countries as well, given the increasing number of midwife-led birth centres (both alongside and freestanding) in other Western countries.[6;7] This study provides evidence of trends in risks and referral rates from midwife to obstetrician and their relationship with the indications for referral.

## Material and methods

### Midwifery database (LVR1)

Since 1985 the midwives and 1982, the obstetricians have recorded information about mothers, newborns and care provision in the Netherlands Perinatal Registry, *LVR*. There are two databases, the LVR1 for midwives and the LVR2 for obstetricians. To gain insight into the referral practice of the caregivers responsible for the risk selection, we decided to analyse the LVR1. The LVR1 records all cases of care provided by independently practising midwives, with no lower limit of gestational age.

The percentage of midwifery practices participating in the LVR1 increased from 74% in 1988 to 94% in 2004. The LVR1 presently covers a large majority of pregnancies in the Netherlands. The coverage, excluding cases of midwifery care in the postpartum period only, increased from 42% in 1988 to 72% in 2004 (Figure 4.1).[8]

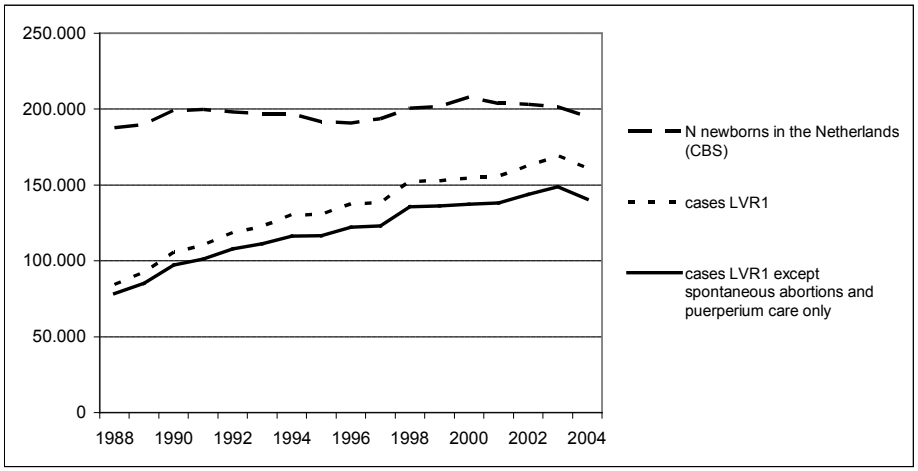



**Figure 4.1** - Coverage data LVR1, in relation to numbers of newborns in the Netherlands 1988 – 2004

During the registered years the ratio of nulliparous to parous women in the database remained almost equal at about 50% : 50%. This implies a slight overrepresentation of nulliparous women in the LVR1, as the national ratio of nulliparous and parous women is 45% : 55%.[8]

The first 3 years of registration (1985 – 1987) were excluded from the analysis, since a renewed List of Obstetric Indications, differing significantly from previous lists, was launched in 1987.[9] Cases in which primary care was limited to the postpartum period only, and spontaneous abortions (< 16 weeks) were excluded as well. One million nine-hundred and sventy-seven thousand, and six (1,977,006) cases of women under midwifery care at the start of pregnancy in the period 1988 to 2004 were included in the analysis.

**Indications for referral**

When a referral to secondary care occurs, the LVR1 records at least one and at a maximum three indications for referral, in any random order. In 11% of the cases, more than one indication for referral was recorded. The LVR1 lists 152 different indications for referral. For problems which are not covered by these indications, a 'remaining' category can be chosen. This category is recorded as 'not otherwise specified' (NOS).

To identify how often indications for referral were being used, all three positions in the form were searched and counted. A decision-tree was developed to perform a hierarchy in indications, to end up with a total of a 100% with one 'main indication'. This decision-tree based on clinical experience takes into account the emergency of the indication and the time in pregnancy or delivery the indication occurred, which resulted in 15 main indications. As an example, in the case of a referral with the two indications 'preterm birth' and 'breech presentation', the main indication was 'preterm birth' whereas in the combination of 'pre-labour rupture of membranes' and 'meconium stained amniotic fluid' the latter was identified as main indication. 'Need for pain relief' and 'slow progress during first stage of labour' were combined in the main indication 'failure to progress first stage', whereas 'haemorrhage post partum' and 'retained placenta' were combined in the main indication 'postpartum indications', etcetera. The rationale of this decision-tree has been described in a previous publication.[10] (*see Chapter 5 of this thesis)*

In line with previous studies, referrals for prematurity or post maturity were considered as referrals antepartum.[10-13]

All analyses were conducted with the statistical software package SPSS 15.0 (SPSS, Chicago, IL, USA). The analyses were carried out for all cases registered, and stratified by nulliparous and parous women. General linear models were performed to test the difference in trend per main indication, and between the nulliparous and parous women. *P*-values < 0.01 were considered significant.

## Results

During the course of the study period, referral from primary to secondary care increased by 14.5% from 36.9 to 51.4%, of which 9.0% were for antepartum indications and 5.2% for intrapartum indications, while the proportion of referrals during the puerperium (directly postpartum and during first week) remained small (+ 0.3%) (Table 4.1).

The most common indications for antepartum referral were, successively, medical history (including obstetrical history) and pregnancy indications-NOS. The commonest indications for intrapartum referral were fetal distress and failure to progress during the first stage (Table 4.2).

Comparing the first and the last year of the study period, it turns out that the percentages per indication changed (Figure 4.2). Four indications are particularly noteworthy because of their increase: failure to progress first stage, fetal distress, medical history and pregnancy indications-NOS. The other indications increased to a smaller degree or even decreased (Figure 4.2).
In Table 4.3, the indications for referral are ranked for nulliparous and parous women separately. In 2004, 63.3% of all nulliparous women were referred to secondary care, at any time during pregnancy, childbirth or postpartum. This is a signif-

**Table 4.1** - Number and percentages of recorded cases and referrals, LVR1* 1988 – 2004

| Year | N of cases ** | % referral antepartum | % referral intrapartum | % referral postpartum | % referral (total) | % without referral |
|---|---|---|---|---|---|---|
| 1988 | 77 040 | 18.4 | 18.3 | 0.2 | 36.9 | 63.1 |
| 1989 | 83 576 | 19.2 | 18.6 | 0.2 | 38.0 | 62.0 |
| 1990 | 95 343 | 19.2 | 19.0 | 0.2 | 38.4 | 61.6 |
| 1991 | 98 933 | 19.4 | 20.3 | 0.2 | 39.9 | 60.1 |
| 1992 | 105 281 | 19.0 | 20.3 | 0.2 | 39.5 | 60.5 |
| 1993 | 108 515 | 20.5 | 20.8 | 0.2 | 41.5 | 58.5 |
| 1994 | 112 811 | 22,3 | 20.5 | 0.2 | 43.0 | 57.0 |
| 1995 | 113 131 | 23.1 | 21.2 | 0.2 | 44.5 | 55.5 |
| 1996 | 118 168 | 23.8 | 21.7 | 0.2 | 45.7 | 54.3 |
| 1997 | 119 022 | 24.9 | 21.9 | 0.2 | 47.0 | 53.0 |
| 1998 | 131 125 | 25.5 | 22.6 | 0.2 | 48.3 | 51.7 |
| 1999 | 131 722 | 25.4 | 22.8 | 0.2 | 48.4 | 51.6 |
| 2000 | 132 505 | 26.1 | 23.3 | 0.2 | 49.6 | 50.4 |
| 2001 | 133 227 | 28.7 | 21.9 | 0.2 | 50.8 | 49.2 |
| 2002 | 138 410 | 26.2 | 23.3 | 0.4 | 49.9 | 50.1 |
| 2003 | 143 288 | 27.1 | 22.1 | 0.5 | 49.7 | 50.3 |
| 2004 | 134 909 | 27.4 | 23.5 | 0.5 | 51.4 | 48.6 |

* LVR1 selected data (see Material and methods): all cases in LVR1 except spontaneous abortions (< 16 weeks gestational age), and except cases with postpartum care only.
** All cases admitted to midwifery care at start pregnancy, before any risk assessment.

icant increase of 12.3% from 1988. Amongst parous women, 40.4% were referred in 2004, a marked increase of 16.6% compared to 1988 (Table 4.3). The trend in referrals in parous women is more pronounced compared to nulliparous women ($P = 0.001$; Figure 4.3).

An analysis of the four most increased indications for referral (Figure 4.2) is shown in figure 4.4 A-D, for nulliparous women and parous women, respectively.
The increase in the indication 'failure to progress first stage' (+2.8%) was related to an increase in nulliparous women requiring pain relief (from 0.7% in 1988 to 3.8% in 2004) and in 'slow progress first stage' (from 5.9 to 7.3%) (Figure 4A). In parous women the need for pain relief increased from 0.1% in 1988 to 0.6% in 2004, whereas 'slow progress first stage' increased from 1.1 to 1.9% (Figure 4A).
The main indication 'fetal distress' (+ 3.0%) was related to an increase in referral for meconium-stained amniotic fluid, both in nulliparous women (from 4.5% in 1988 to 7.8% in 2004) and in parous women (2.0 to 4.7%). During the same period, referral for fetal heart irregularities remained stable at around 2.0% in nulliparous women and 0.5% in parous women (Figure 4B).
The rise in the main indication 'medical history' (+3.6%) was mainly due to an increased number of women with a history of caesarean section (Figure 4C). In parous women, the percentage of referrals for this indication increased from 0.9% in 1988 to 6.1% in 2004, whereas referrals for 'other obstetrical history reasons' and 'general medical reasons' showed a smaller increase as well (1.3 to 1.6% and 0.6 to 1.3%, respectively). In nulliparous women the percentages of referrals due to general medical history and obstetrical history remained small (0.2 to 0.4% and 1.3 to 1.5%, respectively) (Figure 4C).
By definition, the database does not provide information about the category 'pregnancy indications-NOS' (Figure 4D, + 3.7%). Informal evidence from practising midwives reports that this category is used for 'rare pathological conditions' (e.g. breast cancer), 'new guidance' (e.g. a new policy for the management of Group B Streptococcal carrier) and 'new conditions' (e.g. haemoglobinopathies).[14] Figure 4D shows a marked increase in this unspecified reason for referral from the year 2000 onwards, both for nulliparous women (from 1.4% in 1988 to 1.2% in 2000 to 4.4% in 2004) and parous women (from 1.2% in 1988 to 1.8% in 2000 to 5.4% in 2004).

The proportion of non-Dutch pregnant women in the study population increased with 6.1% from 13.0% in 1988 to 19.1% in 2004. The mean maternal age at childbirth in the LVR1 increased with 2.3 years from 27.9 in 1988 to 30.2 in 2004. The mean maternal age in nulliparous women increased with 2.2 years, from 26.4 to 28.6.

**Table 4.2 -** Referrals per main indication as percentage of all cases, LVR1 1988 – 2004*

| Ranking ** | Main indications | period | 1988 | 1992 | 1996 | 2000 | 2004 |
|---|---|---|---|---|---|---|---|
| | No referral +++ | | 63.1 | 60.4 | 54.2 | 50.4 | 48.6 |
| 1 | Fetal distress +++<br>*Including: meconium-stained amniotic fluid; fetal heart rate irregularities* | labour | 4.3 | 5.4 | 6.4 | 7.3 | 7.3 |
| 2 | Failure to progress 1st stage +++<br>*Including: slow progress first stage; need for sedatives; need for pain relief* | labour | 3.2 | 4.0 | 4.8 | 5.3 | 6.0 |
| 3 | Medical history +++<br>*Including: general medical history; obstetrical history (incl. C section in history); social risk factors* | pregn | 1.8 | 1.7 | 3.1 | 4.2 | 5.4 |
| 4 | Pregnancy indications - not otherwise specified (NOS) ++ | pregn | 1.3 | 1.3 | 1.1 | 1.5 | 5.0 |
| 5 | Post-term pregnancy +++ | pregn | 2.3 | 2.9 | 3.6 | 4.3 | 3.8 |
| 6 | Hypertensive disorder +++<br>*Including: pregnancy induced hypertension; pre-eclampsia; HELLP-syndrome. proteïnuria* | pregn | 2.8 | 2.9 | 4.1 | 4.1 | 3.6 |
| 7 | Failure to progress second stage | labour | 3.9 | 3.9 | 4.0 | 4.0 | 3.3 |
| 8 | Abnormal presentation<br>*Including: non-engaged head at term; breech presentation, transverse presentation* | pregn | 3.5 | 3.7 | 4.1 | 3.9 | 3.0 |
| 9 | PROM at term (> 24 hours) | labour | 3.2 | 3.3 | 3.0 | 3.3 | 2.9 |
| 10 | Preterm birth<br>*Including threat of or actual preterm labour; premature prelabour ROM* | pregn | 2.9 | 2.9 | 3.2 | 3.2 | 2.6 |
| 11 | Pregnancy indications with small numbers<br>*Including: diabetes; LGA; blood loss ante partum; solutio placentae; fetal death; placenta previa; (suspection of) fetal anomalities* | pregn | 2.6 | 2.1 | 2.8 | 2.7 | 2.3 |
| 12 | Post partum indications +<br>*Including: HPP > 1000 cc; retentio placentae; complicated rupture; puerperium problems* | post-partum | 2.3 | 2.4 | 2.4 | 2.4 | 2.1 |
| 13 | Labour indications - not otherwise specified (NOS) +++ | labour | 0.6 | 0.5 | 0.6 | 0.8 | 2.1 |
| 14 | (Suspected) intrauterine growth retardation<br>*Including: SGA; insufficient fetal movements* | pregn | 1.5 | 1.8 | 1.8 | 1.6 | 1.4 |
| 15 | Multiple pregnancy | pregn | 0.7 | 0.8 | 0.9 | 0.8 | 0.7 |

Significance of trends per main indication, tested by linear regression. +++ $P \leq 0.005$; ++ $P < 0.01$; + $P < 0.05$

* LVR1 selected data (see methods): all cases in LVR1 except spontaneous abortions (< 16 weeks gestational age), and except cases with postpartum care only

** Main indications in order of proportion as in 2004

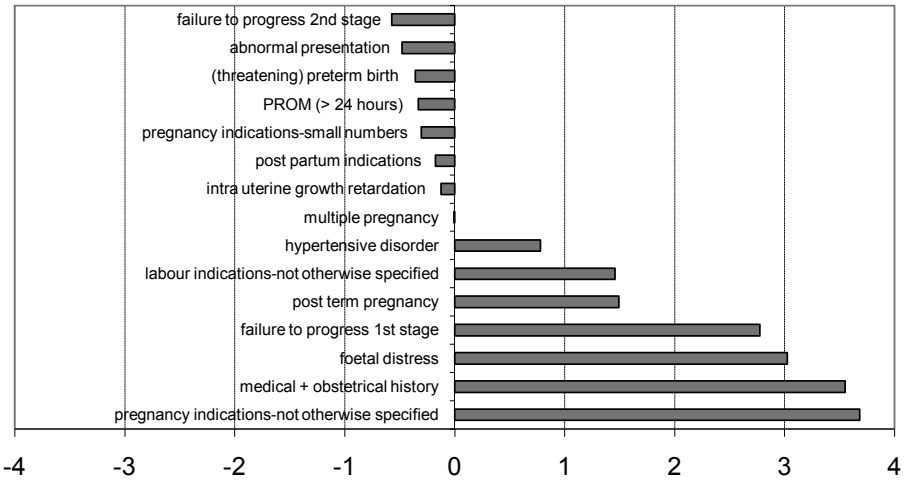



**Figure 4.2** - Increase (%) of referrals by main indication; differences between 1988 and 2004 (all cases)

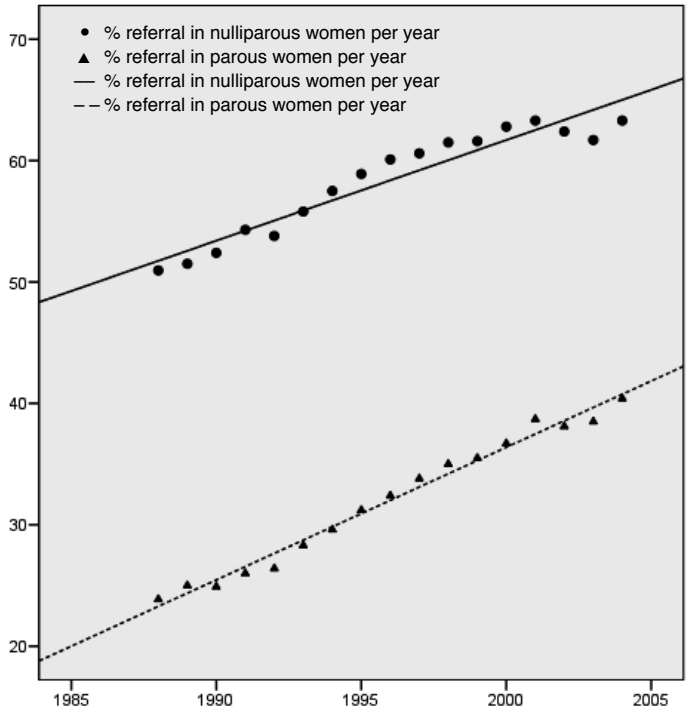



**Figure 4.3** - Trends in referrals by parity as % of all midwifery cases 1988 - 2004

**Table 4.3** - Referrals per main indication in nulliparous and parous women, respectively, as percentage of all cases of nulliparous and parous women, respectively. LVR1 1988-2004*

| **Main indications **** | **% of all nulliparous women** | | | **Ranking***** | **Main indications **** | **% of all parous women** | | |
|---|---|---|---|---|---|---|---|---|
| **Nulliparous** | 1988 | mean | 2004 | | **Parous** | 1988 | mean | 2004 |
| No referral | 49.0 | 41.6 | 36.7 | | No referral | 76.1 | 68.0 | 59.6 |
| Failure to progress first stage | 5.5 | 7.6 | 9.9 | 1 | Medical history | 2.4 | 5.0 | 8.7 |
| Fetal distress | 6.3 | 8.5 | 9.7 | 2 | Pregnancy indications - not otherwise specified (NOS) | 1.2 | 2.0 | 5.4 |
| Failure to progress second stage | 7.1 | 7.0 | 6.0 | 3 | Fetal distress | 2.4 | 4.1 | 5.2 |
| Hypertensive disorder | 4.6 | 5.8 | 5.5 | 4 | Post-term pregnancy | 1.5 | 2.7 | 3.0 |
| Post-term pregnancy | 3.2 | 4.6 | 4.7 | 5 | Pregnancy indications with small numbers | 2.6 | 2.6 | 2.4 |
| Pregnancy indications - not otherwise specified (NOS) | 1.4 | 1.6 | 4.4 | 6 | Failure to progress first stage | 1.0 | 1.7 | 2.4 |
| Abnormal presentation | 4.8 | 5.1 | 4.2 | 7 | Postpartum indications | 2.0 | 2.2 | 2.0 |
| PROM at term (> 24 hours) | 4.4 | 4.3 | 4.1 | 8 | Abnormal presentation | 2.3 | 2.4 | 2.0 |
| (Threatening) preterm birth | 3.8 | 3.9 | 3.6 | 9 | PROM at term (> 24 hours) | 2.1 | 2.0 | 1.8 |
| Labour indications - not otherwise specified (NOS) | 0.7 | 1.0 | 2.6 | 10 | Hypertensive disorder | 1.1 | 1.6 | 1.7 |
| Postpartum indications | 2.7 | 2.5 | 2.2 | 11 | (Threatening) preterm birth | 2.1 | 1.9 | 1.6 |
| Pregnancy indications with small numbers | 2.6 | 2.5 | 2.1 | 12 | Labour indications - not otherwise specified (NOS) | 0.6 | 0.7 | 1.6 |
| (Suspected) intrauterine growth retardation | 2.2 | 2.2 | 1.7 | 13 | (Suspected) intrauterine growth retardation | 0.9 | 1.2 | 1.1 |
| Medical history | 1.2 | 1.2 | 1.7 | 14 | Failure to progress second stage | 0.9 | 1.0 | 0.8 |
| Multiple pregnancy | 0.6 | 0.7 | 0.6 | 15 | Multiple pregnancy | 0.8 | 0.0 | 0.7 |

* LVR1 selected data (see methods): all cases in LVR1 except spontaneous abortions (< 16 weeks gestational age), and except cases with postpartum care only

** For content of main indications: see table 4.2.

*** Main indications in order of proportion as in 2004, nulliparous and parous women, respectively

## Discussion

Our study showed that an increasing percentage of women in the Netherlands who started pregnancy under midwifery care were referred to secondary care. The increase in referrals between 1988 and 2004 was significantly larger in parous women than in nulliparous women.

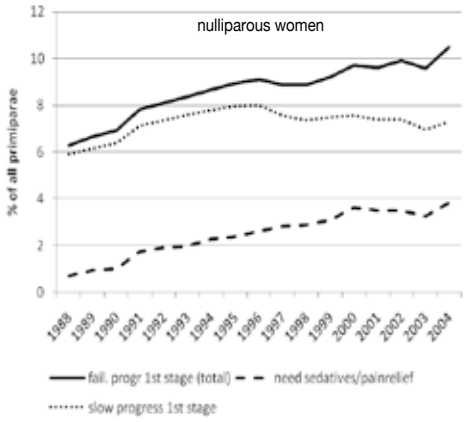
The strength of this study lies in the longitudinal approach, based on data provided by the care providers themselves. The fact that the LVR1 database covers the national primary care population enables an analysis of trends in midwifery care and facilitates an exploration of the trends. We found that population characteristics and the histories of the women attending midwifery practices are likely to have had an important influence on the changing referral rate. Firstly, for example in parous women, 38% of the total increase in referrals was due to the medical or obstetrical history, particularly that of caesarean section. This could be explained by a changing risk profile of the population in midwifery practices in the course of the study period. Secondly, in nulliparous women, the growing demand for pain relief accounted for 25% of the increase in referrals, suggesting a more active role of the patient.[15] Thirdly, the increase in referrals due to meconium-stained amniotic fluid is striking. It explains 27% of the increase in referrals in nulliparous women and 16% of the increase in parous women. Several studies have shown an association between ethnicity and the prevalence of meconium stained amniotic fluid.[16-18] In our study this condition was an indication for referral in 4.8% of Dutch women and in 7.0% of non-Dutch women ($P < 0.001$). As the proportion of non-Dutch pregnant women in LVR1 increased by 6.1% during the study period, it is likely that the increasing prevalence could, at least in part, be attributable to a change in population. Lastly, the mean maternal age in the study group increased by 2.3 years. A high maternal age is related to significantly elevated risks of pregnancy complications such as hypertensive disorders, and prolonged- or dysfunctional labour.[19-21]

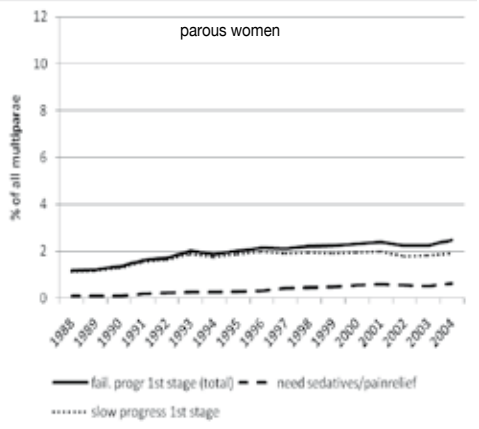
We can only speculate about additional explanations, if any, for the increasing trend in referrals as described in our study. Medical claims and litigation are still exceptional in Dutch midwifery. 'Defensive medicine' and litigation as an explicit incentive for referral is therefore unlikely to play a large role.[22] Nevertheless, it appears that on a global level the birth process is becoming more medicalised..[23;24] It is conceivable that this trend affects both the attitude of Dutch women in their demands, and of Dutch midwives in their assessment of 'normality'.[24-28]

Our study has some limitations. Firstly, the LVR1 database covered 74% (1988) to

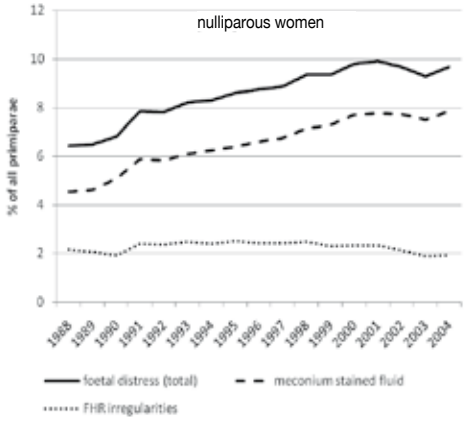
**Figure 4.4** - Trends in indications for referral 1988 – 2004, shown as % of all nulliparous and parous women with the indication concerned.
(A) Failure to progress first stage.
(B) Fetal distress.
(C) Medical + obstetrical history.
(D) Pregnancy indications not otherwise specified

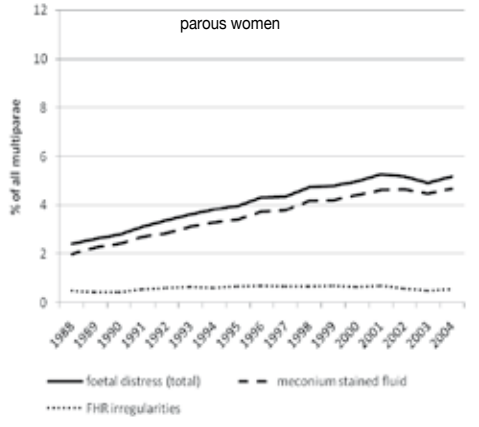
**A**



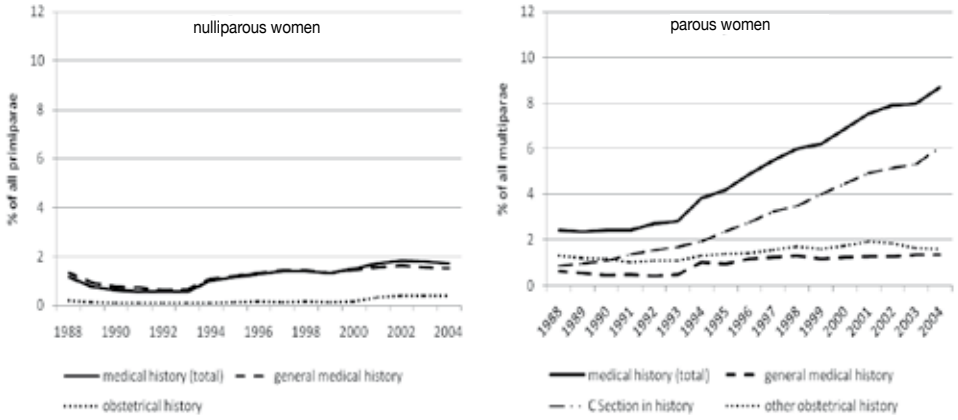




**B**



**C**


nulliparous women
% of all primiparae
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medical history (total)
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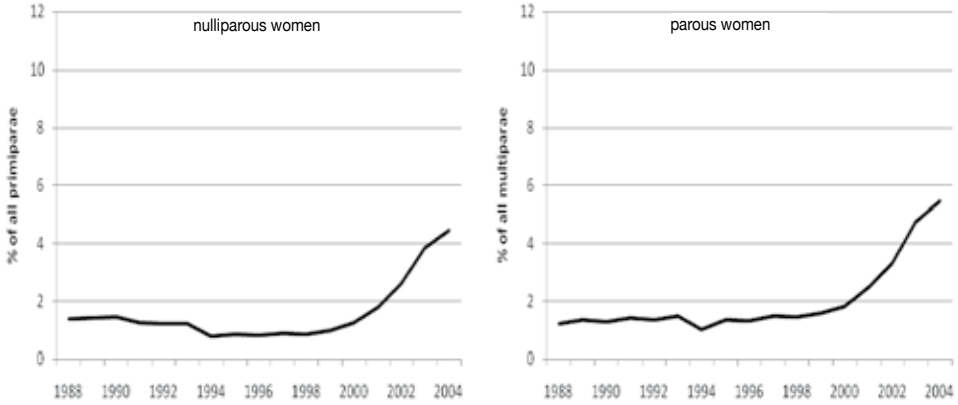
**D**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parous women
% of all multiparae

94% (2004) of all midwifery practices. It is unknown whether the missing data represent a random selection of midwifery practices or a biased selection. Secondly, the LVR1 does not represent the Dutch national data on maternity care, as the obstetric data are being recorded in a separate database (LVR2) and the data from general practitioners involved in maternity care are lacking. Further, the ultimate objectives of maternity care are to achieve good outcomes for mother and child. Within the framework of this study it is not possible to analyse whether these objectives are being achieved, since outcome data of cases referred during pregnancy are lacking in LVR1 (since these are recorded in LVR2). However, other Dutch studies have reported good outcomes and low perinatal mortality in midwifery practices, even in case of intrapartum referral.[10;11;13;29] Whether improvement of these outcomes in midwifery care may be possible, will be one of the issues addressed in the perinatal audit system being implemented on national level in 2009.[30]

The Dutch maternity care system, with its high percentage of planned home-deliveries (about 30%)[5] and its specific role for the independently practising midwife, cannot easily be compared with systems in other countries. However, the growing number of midwife-led birth centres in a number of Western countries allows for a cautious international comparison. Recent studies in the UK, Sweden and Australia describe referral rates during pregnancy and childbirth in birth centres ranging from 32% to 54%.[31-38] In one Australian study of 18 birth centres the average transfer rate within a 5-year period was 40%; during the study period (1991-1995) the rate increased by 8%.[37] These studies indicate that the trends apparent from our data apply not only to the Netherlands, but also to other countries.

Referral during labor has been shown to lead to more negative perceptions of birth experiences in the short and long term compared to not being referred.[39-42] Further research is required to address women's expectations and attitudes towards birth, birthplace and caregiver. Furthermore, it has to be explored whether the antenatal criteria for the assessment 'low risk at start labour' can be improved, to decrease the referral rate during delivery.

There is a large body of published evidence that primary obstetric care for low-risk patients is associated with a reduced risk of medical interventions, increased odds of high maternal satisfaction, one-to-one midwifery care, the choice between home- or hospital birth, low use of medication, more mobility, decreased likelihood of episiotomy and perineal tears, increased likelihood of breastfeeding initiation and continuation, and a low level of neonatal morbidity or mortality.[10;32-34;38; 42-51] If the trend, shown in Figure 3, continues at this pace in the Netherlands, the availability

of primary obstetric care will be at risk, resulting in an increase in referrals which may not necessarily benefit the woman or the baby.[41;42]
Therefore, it is a challenge for Dutch midwives, obstetricians and policymakers to examine critically the increase in referrals and to work together in order to maintain primary obstetric care for low-risk pregnant women. This challenge can be met with preventive measures at a public health level (e.g. preconception counselling and education)[52], at the pregnant women's level (e.g. improved utilization of the advantages of continuous support during labour)[53;54], and at the caregiver's level (e.g. awareness and multidisciplinary cooperation).[3;14;55]
In view of the comparable trend in other industrialised countries, we recommend that this challenge be taken up as an international collaborative effort.

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CHAPTER 5

# Evaluation of 280,000 Cases in Midwifery Practices: a descriptive Study

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## Abstract

**Objective.** To assess the nature and outcome of intrapartum referrals from primary to secondary care within the Dutch obstetric system.

**Design.** Descriptive study.

**Setting.** Dutch midwifery database (LVR1), covering 95% of all midwifery care and 80% of all Dutch pregnancies (2001 – 2003).

**Population.** Low-risk women (280 097) under exclusive care of a primary level midwife at the start of labour either with intention to deliver at home or with a personal preference to deliver in hospital under care of a primary level midwife.

**Methods.** Women were classified into three categories (no referral, urgent referral, referral without urgency) and were related to maternal characteristics and to neonatal outcomes.

**Main Outcome Measures.** Distribution of referral categories, main reasons for urgent referral, Apgar score at 5 minutes, perinatal death within 24 hours and referral to a paediatrician within 24 hours.

**Results.** In our study, 68.1% of the women completed childbirth under exclusive care of a midwife, 3.6% were referred on an urgency basis and 28.3% were referred without urgency. Of all referrals, 11.2% were on an urgency basis. The main reasons for urgent referrals were fetal distress and postpartum haemorrhage. The non-urgent referrals predominantly took place during the first stage of labour (73.6% of all referrals). Women who had planned a home delivery were referred less frequently than women who had planned a hospital delivery: 29.3% and 37.2% respectively ($P < 0.001$). On average, the mean Apgar score at 5 minutes was high (9.72) and the peripartum neonatal mortality was low (0.05%) in the total study group. No maternal deaths occurred. Adverse neonatal outcomes occurred most frequently in the urgent referral group, followed by the group of referrals without urgency and the non-referred group.

**Conclusions.** Risk selection is a crucial element of the Dutch obstetrical system and continues into the postpartum period. The system results in a relatively small percentage of intrapartum urgent referrals and in overall satisfactory neonatal outcomes in deliveries led by primary level midwives.


*Keywords*
Midwifery, neonatal outcome, perinatal registry, planned home birth, referral.

## Introduction

The Dutch obstetric system is well known for its relatively large percentage of planned home deliveries. Approximately thirty per cent of Dutch babies are born at home. This percentage has remained stable over the past ten years.[1]
The possibility of giving birth at home stems from the organisational model of midwifery care in the Netherlands. A distinction is being made between women with a low risk of pathology and those with a high risk. Early in pregnancy, women enter into the system at the primary care level. Early pregnancy care is primarily being delivered by an independently practising midwife (4.2% of Dutch deliveries are being attended by a GP, especially in rural areas).[2;3] If pregnancy, childbirth and the postpartum period are uncomplicated, the woman remains under the care of the primary level midwife. She can make the choice of a home or a hospital delivery - both under supervision of her own midwife. If complications occur or threaten to occur, the midwife refers the woman to an obstetrician at the secondary or tertiary care level. Therefore, the woman no longer has the choice of a home birth. In about 15 % of all pregnancies a high-risk profile can be defined at the start of pregnancy based on the medical or obstetric history of the woman.[1] In such cases the obstetric care starts at the secondary or tertiary care level.
The agreements for collaboration between the professional groups have been specified in the *Verloskundig Vademecum* (Obstetric Manual).[4] This document includes a list of obstetric indications for referral from primary to secondary care, based on best evidence or on consensus.[5]
A number of studies have indicated that the Dutch maternity care system works well: the number of obstetric interventions is low compared with neighbouring countries, women like the freedom of choice and risk selection appears to be performed adequately.[6-12] The system does have its critics, especially among obstetricians. Some expect that home delivery will soon be a phenomenon of the past as care will be increasingly concentrated in specialized perinatal centres, which in turn increases the distance from home to hospital.[13;14] Others see the relatively high percentage of referrals during labour, especially in nulliparous women, as a sign that adequate selection of women with low risk of complications during labour is not feasible.[15]

The number of women referred to a higher level of care during childbirth has been increasing slowly but steadily in recent years.[1;6;13;16;17] There is a wide range in both the nature and the severity of the indications for referrals: a delay in onset of labour after rupture of membranes or slow progress of first stage of labour is of a different order of magnitude than fetal distress or severe blood loss. The medical urgency of the referrals varies accordingly. The relative burden of the transfer process for the

woman in labour also varies according to the nature of the complication and the urgency with which it has to be treated. A nonurgent referral during the dilatation period, where the woman can reach the hospital using her own family's means of transport, is quite different from a complication that necessitates an urgent transport by ambulance.
Assessing the Dutch obstetric care system, therefore, requires insight into the types of referrals that take place during labour and immediately postpartum and into the corresponding neonatal outcomes.
A distinction between the obstetric care provided to low-risk and high-risk women is increasingly being made in other Western countries as well, as can be concluded from the many recent publications on home delivery and midwife-led birth centres in Europe, USA, Canada and Australia.[18-30] Evaluation of the pattern of referrals in the Netherlands may, therefore, also have international relevance.

This article presents a classification of referrals based on the literature and clinical insights, using data from the Dutch Midwifery Perinatal Database (LVR1). Approximately 95 % of all midwifery practices in the Netherlands participate in this voluntary registration system.[31] Data from the 3 years 2001 to 2003 have been used to determine during which of the different stages of childbirth referrals have been made and how many of these referrals may be classified as urgent.

## Methods

### Data analysed

Data from the LVR1 2001, 2002 and 2003 databases were obtained from the Netherlands Perinatal Registry and were analysed with aid of SPSS software 11.0 (SPSS, Chicago, IL, USA). The chi-square test was used to test for any significant difference in categories, with $P = 0.001$ considered significant. If a comparison in pairs was expedient, the categories were tested separately. Analysis of variance (ANOVA) and *post hoc* Tukey tests were used to compare means.

LVR1 has a large coverage of all births in the Netherlands (80 %). In the study period 487,615 cases were registered in the LVR1. After exclusion of women with spontaneous abortions and women attended by the midwife in the postpartum period only, 414,817 cases remained for analysis.
Women who were referred during pregnancy were excluded as was a small group of cases with agreed shared care. In line with previous Dutch studies, a referral due to prematurity was regarded as a referral during pregnancy[6;11;32], as were referrals due

to postdate pregnancies or caesarean section in the obstetric history. Defined in this way, a group remained of 280,097 women who were under the care of a midwife at the start of labour (67,5 % of the initial cases for analysis). This group will be further referred to as the 'start of labour under midwifery care' (SLMC). Of these women, 62% intended to give birth at home and 29% in hospital. No information on intended place of delivery was available for the remaining 9%.

**Referral categories**

The referrals were classified by stage of labour and urgency status.

*Category 0* comprises all women who were under care of a midwife at the start of labour and who completed delivery under exclusive care of the midwife.

An urgent referral (*category 1*) was defined as 'a referral for a complication that cannot be treated at the primary care level and that requires immediate diagnostics or treatment at the secondary care level'. Referrals in this category may occur during first or second or third stage, or immediately postpartum (within 2 hours after the birth of the placenta). They may potentially affect either the mother or the neonate.

*Category 2* is for referrals during all stages and immediately postpartum (within 2 hours after the birth of the placenta) which require expedient diagnostics or treatment at the secondary care level, but not immediately. This category includes maternal as well as neonatal referrals.

**Classification of maternal indications**

The LVR database allows up to three reasons for referral to be recorded. In most cases (91.5%), only one reason was mentioned, in 8% of the cases two reasons were mentioned, and in 0.5% three reasons were mentioned. By creating a hierarchic sequence of indications (based on the level of severity and time of occurrence), we ensured that each woman was counted only once. Category 1 (no delay accepted) was given precedence over any other category.

The classification was either based on a single indication or on combinations of indications. For example, referral due to failure to progress in the second stage was classified as category 2. If, however, fetal distress was recorded as a reason for referral as well, the case was placed in category 1. Referral due to a complicated rupture was assigned to category 2, unless blood loss of more than 1000 cc was observed as well. The case then became an urgent referral, category 1.

The classification of (combinations of) indications is summarized in Table 5.1.

**Table 5.1** - Classification of intrapartum referral categories

**Category 0 – no referral**
Labour and delivery exclusively under care and responsibility of primary level independently practising midwife

**Category 1 – urgent referrals**
*Mother*
Fetal distress; placental problems; abnormal presentation together with ruptured membranes; postpartum haemorrhage > 1000 cc; intrapartum fetal death
*Neonate early postnatal*
Apgar Score <7 at 5 min; respiratory problems including meconium aspiration; congenital malformations with need of immediate care

**Category 2 – referral without urgency**
*a) Mother first stage*
Ruptured membranes without labour; abnormal presentation together with intact membranes; meconium-stained fluid; failure to progress first stage; need of analgesia
*b) Mother second stage*
Abnormal presentation; meconium-stained fluid; failure to progress second stage
*c) Mother direct postpartum* (within 2 hours after the birth of the placenta)
Retentio placentae without HPP; complicated perineal laceration
*d) Neonate early postnatal* (within 2 hours after the birth of the placenta)
Birthweight; birth trauma; evaluation neonatal condition; congenital malformations not in need of immediate care

## Classification of neonatal indications

In the Netherlands, neonates are examined by the midwife after birth. They will only be referred to the paediatrician if problems occur during labour or if the midwife observes a problem in the postnatal period.
All cases with neonatal referral 'immediately after birth' according to the LVR, were assigned category 1 or 2 (Table 5.1). In case the mother had been referred during labour, the referral was labelled as based on maternal indication. If both mother and child were referred after birth, the referral was labelled neonatal unless the mother was the subject of an urgent referral (category 1).

## Results

Of the women who were under the care of a midwife at the start of labour during the study period 2001-03, 68.1% were not referred, 3.6% were referred on an urgency basis and 28.3% were referred without urgency (Table 5.2). Of all referrals, 11.2% were on an urgency basis. Table 5.3 shows characteristics of the women in relation to the referral categories to which they were assigned. In the group of women who had planned to give birth in hospital without underlying medical reasons and only for reasons of personal preference, a higher percentage of referrals occurred than in the group with a similar risk profile who intended to give birth at home: 37.2% compared to 29.3%. Likewise, the percentage of urgent referrals was larger in the intended hospital group (4.1%) than in the intended home group (3.4%). A higher percentage of referrals were found in nulliparous compared to multiparous women in all categories (Table 5.3, second row). Ethnic minority women were referred more often than Dutch women for nonurgent reasons. Referrals, both urgent and non-urgent, occurred less frequently in rural areas. All differences mentioned above were significant ($P < 0.001$).
Of the non-urgent referrals the majority (73.6%) took place during the first stage of labour. Of the urgent referrals, the majority (42.1%) took place in the postpartum period (Table 5.4).

**Table 5.2 -** Intrapartum and postpartum referrals per category (LVR1 2001- 03). All women at start of labour under the care of a primary level practising midwife (SLMC) *

| | | Category 0 No referral | Category 1 Urgent referral** | Category 2 Referral without urgency*** | Total |
|---|---|---|---|---|---|
| N | 2001 | 60 523 | 3454 | 24 443 | 88 420 |
| | 2002 | 63 728 | 3408 | 27 266 | 94 402 |
| | 2003 | 66 591 | 3123 | 27 561 | 97 275 |
| | ***total 2001-2003*** | ***190 842*** | ***9985*** | ***79 270*** | ***280 097*** |
| % of all | 2001 | 68.4 | 3.9 | 27.6 | 100 |
| women | 2002 | 67.5 | 3.6 | 28.9 | 100 |
| SLMC | 2003 | 68.5 | 3.2 | 28.3 | 100 |
| | ***total 2001-2003*** | ***68.1*** | ***3.6*** | ***28.3*** | ***100*** |
| % of all | 2001 | NA | 12.4 | 87.6 | 100 |
| intrapartum | 2002 | . | 11.1 | 88.9 | 100 |
| referrals | 2003 | | 10.2 | 89.8 | 100 |
| | ***total 2001-2003*** | | ***11.2*** | ***88.8*** | ***100*** |

NA not applicable.
* See Methods section.
** Including 990 referrals due to neonatal indications, Table 5.5.
*** Including 820 referrals due to neonatal indications.

**Table 5.3 -** Characteristics of women in relation to referral categories (LVR1* 2001-2003)

| **Characteristic (distribution of characteristics of all women SLMC in %)** | **Cat. 0: no referral (%)** | **Cat. 1: urgent referral (%)** | **Cat. 2: referral without urgency (%)** | | | **Total (%)*** |
|---|---|---|---|---|---|---|
| Total (Table 5.2) | **68.1%** | **3.6%** | **28.3 %** | | | **100 %** |
| | | | **Cat. 2a: referral first stage** | **Cat. 2b: referral second stage** | **Cat. 2c: referral early post-partum **** | |
| ***Intended place of delivery*** | | | | | | |
| At home (60.2) | 70.7 | 3.4 | 18.5 | 5.6 | 1.9 | 100 |
| In hospital (31.0) | 62.8 | 4.1 | 25.5 | 5.7 | 1.9 | 100 |
| Unknown (8.9) | 69.4 | 3.0 | 20.7 | 5.2 | 1.7 | 100 |
| ***Parity*** | | | | | | |
| Nullipara (46.2) | 51.1 | 4.8 | 31.5 | 10.4 | 2.2 | 100 |
| Para (53.8) | 82.8 | 2.5 | 11.7 | 1.4 | 1.6 | 100 |
| ***Ethnicity*** | | | | | | |
| Dutch (82.6) | 68.7 | 3.7 | 19.6 | 6.0 | 2.0 | 100 |
| Non-Dutch (17.4) | 64.9 | 3.2 | 26.6 | 3.9 | 1.4 | 100 |
| ***Level of urbanisation*** | | | | | | |
| (Very) urban (41.3) | 66.9 | 3.6 | 22.3 | 5.5 | 1.7 | 100 |
| Medium urban (21.7) | 67.2 | 3.7 | 21.2 | 5.8 | 2.1 | 100 |
| Rural (36.9) | 70.1 | 3.4 | 19.0 | 5.5 | 2.0 | 100 |

LVR1: Dutch midwifery database

* All differences between and within categories are significant ($P$ <0.001)

** Within 2 hours after the birth of the placenta

During the 3 year study period 1.1% (n=2978) of children needed some form of medical assistance immediately postnatal. In 39% of these cases, the mother had already been referred before the birth. Of the remaining children, 990 (0.4% of all SLMC) were assigned to category 1 (urgent) and 820 (0.3% of all SLMC) to category 2 (nonurgent).

A more detailed breakdown of the data on urgent referrals (category 1) is provided in Table 5.5. Fetal distress (alone or in combination with other indications) was the reason for 50.2% of the urgent referrals, while 33% can be ascribed to haemorrhage postpartum (alone or in combination with other indications) and 9.9% to neonatal factors. No significant difference was found between home and hospital delivery in connection with any of the indications.

**Table 5.4 -** Referrals with and without urgency, related to stage of labour at the moment of referral

| | First stage of labour | Second stage of labour | Direct postpartum ***** | Total category 1 (Table 5.2) |
|---|---|---|---|---|
| **Category 1. Urgent referral** | | | | |
| n | 2946 | 2840 | 4199 | **9985** |
| % of all cases within category 1 | 29.5 | 28.4 | 42.1 | 100 |
| % of all cases SLMC | 1.1 | 1.0 | 1.5 | 3.6 |
| % of all intrapartum referrals | 3.3 | 3.2 | 4.7 | 11.2 |
| | **First stage of labour** | **Second stage of labour** | **Direct postpartum ******* | **Total category 1 (Table 5.2)** |
| **Category 2. Referral without urgency** | | | | |
| n | 58 371 | 15 656 | 5243 | **79 270** |
| % of all cases within category 2 | 73.6 | 19.8 | 6.6 | 100 |
| % of all cases SLMC | 20.8 | 5.6 | 1.9 | 28.3 |
| % of all intrapartum referrals | 65.4 | 17.5 | 5.9 | 88.8 |

* Including 990 referrals due to neonatal indications, Table 5.5.
** Including 820 referrals due to neonatal indications.
*** Within 2 hours after the birth of the placenta.

Of all women who started labour under the care of a midwife, 1.8% were referred due to fetal distress, 1.2% due to postpartum blood loss and 0.4% due to neonatal factors.

Maternal outcomes can be deduced from the indications for referral (Table 5.5). Further, LVR1 does provide information on perineal lacerations and blood loss (in categories). In the group of women completing home birth, blood loss was < 500 cc in 88.8% and > 1000 cc in 1.7%. In the hospital group these percentages were 85.6% and 3.6%, respectively ($P < 0.001$). In the home birth group, 40.5% of women's perineal areas were intact and 15.0 % of women received an episiotomy; in the hospital group these percentages were 33.3% and 35.1%, respectively ($P < 0.001$). No cases of maternal mortality were observed in the total SLMC group.

**Table 5.5** - Intrapartum referrals within urgency category 1, per indication (LVR1 2001-03)

| | N 2001-2003 | | % of category 1 | | % of all cases SLMC** |
|---|---|---|---|---|---|
| Fetal distress (single indication) | 4144 | | 41,5 | | |
| Meconium-stained fluid and fetal distress | 304 | | 3,0 | | |
| Failure progress first stage and fetal distress | 173 | | 1,7 | | |
| Failure progress second stage and fetal distress | 393 | | 3,9 | | |
| ***Fetal distress (total)*** | | ***5014*** | | ***50,2*** | ***1,8*** |
| Haemorrhage > 1000 ml (HPP) | 2030 | | 20,3 | | |
| Retentio placentae and HPP | 1242 | | 12,4 | | |
| Perineal laceration and HPP | 24 | | 0,2 | | |
| ***Haemorrhage postpartum > 1000 cc (total)*** | | ***3296*** | | ***33,0*** | ***1,2*** |
| Haemorrhage durante partu | 517 | | 5,2 | | |
| Solutio placentae | 64 | | 0,6 | | |
| Placenta / vasa previa | 30 | | 0,3 | | |
| ***Placental problems durante partu (total)*** | | ***611*** | | ***6,1*** | ***0,2*** |
| Abnormal presentation + ruptured membranes | | *74* | | *0,7* | *0,0* |
| | | | | | |
| 'Asphyxia' (Apgar < 7 at 5 min) | 375 | | 3,8 | | |
| Respiratory problems incl. meconium | 473 | | 4,7 | | |
| aspiration | 87 | | 0,9 | | |
| Congenital malformation | 55 | | 0,5 | | |
| Remaining problems neonate | | | | | |
| ***Indication for urgent referral neonate (total)*** | | ***990*** | | ***9,9*** | ***0,4*** |
| | | | | | |
| **Total mother and neonate, 3 years** | | **9985** | | **100** | **3,6** |

LVR1: Dutch midwifery database.

Table 5.6 shows the available data on neonatal outcomes associated with the different referral categories. The mean 5 minute Apgar score was 9.7 in the total group. The mean 5 minute Apgar score was 9.8 in the non-referred group, 9.6 in the non-urgent referral group and 9.2 in the urgent referral group. A 5 minute Apgar score of less than 7 was observed in 0.7% of all children. It occurred in 0.3% of non-referred cases, in 1.2% of cases referred without urgency and in 5.3% of cases referred on an urgency basis. Intrapartum fetal death was 0.04% in the SLMC group as a whole (it was 0.0% in the non-referred group as well as in the group referred without urgency and 0.8% in the category of urgent referrals). Neonatal mortality within 24 hours

occurred in 0.02% in the SLMC group as a whole. It was 0.0% in the non-referred group as well as in the group referred without urgency, and 0.3% in the category of urgent referrals. All differences between categories aforementioned were significant ($P < 0.001$). Four of the cases of intrapartum fetal death and 19 of the cases of neonatal mortality were associated with congenital defects (4.6 and 31.7% respectively; data not shown in table).

**Table 5.6** - Neonatal outcome per referral category; LVR1 2001-03

| | **Category 0: no referral** | **Category 1: urgent referral** | **Category 2: referral without urgency** | **Total** |
|---|---|---|---|---|
| ***n*** | ***190 842*** | ***9 985*** | ***79 270*** | ***280 097*** |
| Mean Apgar score at 5 minutes | 9.82 | 9.24 | 9.57 | 9.72 |
| Apgar Score < 7 at 5 minutes, % (n) | 0.3 (522) | 5.3 (528) | 1,2 (969) | 0.7 (2019) |
| Intrapartum fetal death, % (n) | 0.00 (4) | 0.83 (83) | 0.00 (0) | 0.04* (87) |
| Neonatal death < 24 hours, % (n) | 0.00 (7) | 0.26 (26) | 0.03 (27) | 0.02** (60) |
| Referral to paediatrician < 24 hours, % (n) | 0.3 (511) | 12.5 (1250) | 2.5 (1998) | 1.3 (3759) |

LVR1: Dutch midwifery database

* Comparison to national data not possible due to the difference in definition between 'perinatal mortality' and the 'intrapartum mortality' in the present study

** In the period 2001-03, the national neonatal mortality rate within 24 hours was 0.05%[31;52;53]

## Discussion and conclusions

Midwives and obstetricians in the Netherlands record their activities in separate databases. While it has proved possible to combine these databases,[31;33;34] we decided to use only the Midwifery Database (LVR1) for the purposes of the present study. The choice is based on the fact that the midwife bears the initial responsibility for risk selection and records her reasons for referral in the LVR1, as well as on the fact that LVR1 has a high coverage of 95% of all midwifery practices and of 80 % of all pregnancies in the Netherlands.
The rather broad definitions used in the database sometimes make interpretation of the severity of the problems in question difficult. For example, the indication 'fetal distress' may refer to a life-threatening situation or to a relatively mild irregularity in cardiac rhythm. An abnormal head presentation together with ruptured membranes will not usually lead to complications, but can be associated with a dangerous prolapse of the umbilical cord. A further limitation is that data in the LVR are recorded retrospectively and do not include information on the time line. Hence, it cannot be determined whether a complication such as blood loss is the result or the cause of the policy followed. For example, it is conceivable that a case of 'fetal distress' entered into the database was not the reason for referral because it occurred hours after referral of the mother due to failure to progress in labour. Postpartum blood loss can be a reason for referral or can occur only after referral for removal of a retained placenta. All such cases were still regarded as urgent referrals and assigned to category 1. This strict application of the classification rules may have led to overestimation of the number of cases in category 1 and, therefore, to underestimation of cases in category 2.

Nearly a third of the SLMC group women, 49% of the nulliparous and 17% of the multiparous, were referred to the secondary care level during labour. It is noteworthy that 89% of these referrals did not involve urgency. The percentage of urgent referrals in the entire SLMC group women is only 3.6 %. We consider this evidence of adequate risk selection by Dutch midwives, especially in light of the possible overestimation of category 1 cases mentioned above.
Neonatal indications led to urgent referral in 0.4% of the SLMC group. It remains unclear whether the consequences of the problem, such as a low Apgar score or referral to the paediatrician, could have been avoided if the mother had been referred earlier. A dossier based study (audit) would be needed to gain more insight into this question.

The ultimate objective of obstetrical care is to achieve good outcomes for mother and child. A number of neonatal outcomes are presented in Table 5.6. As might be expected, the outcomes are worst in category 1 and best in category 0.
The Apgar score 5 minutes after birth is generally regarded as a good indication of the condition of the neonate, although it is only one of the elements needed for a diagnosis of asphyxia and is not a good predictor of neurological damage.[35;36] The relatively high number of neonates with a low Apgar score in category 1 is partly determined by the definitions used in classifying since a postpartum referral because of an Apgar score below 7 was considered an urgent referral. The same applies to the neonatal referrals, which are both outcome and criterion as well.

Given the descriptive nature of this study, and given the lacking information about the time lines aforementioned, it is not possible to draw firm conclusions about the effectiveness of the Dutch system of risk selection in relation to neonatal outcomes. However, it is striking that the perinatal mortality rate (i.e., intrapartum and first-day mortality) is low in the entire group (0.05%) in spite of the comparatively high mortality rate in the urgency group (1.07%). Since the database does not provide data about cause of death, it is not possible to say if and how many of these deaths might have been avoided with earlier referral. In this context it has to be mentioned that in the Netherlands all perinatal deaths (in primary and secondary level care) are a subject of evaluation within local obstetric collaboration groups. On behalf of the Ministry of Health Care, in 2008 a national program of perinatal audit will be implemented to achieve a more standardised evaluation of perinatal deaths. The purpose is to provide national data with which obstetric care may be further improved.[37]
In the group of women who had planned to give birth at home, a significantly lower percentage of referrals occurred than in the group who planned to give birth in hospital for reasons of personal preference (29.3% versus 37.2%). This finding is in agreement with those of previous studies and underlines the advantage of a planned home delivery in a selected population as far as 'normal birth' is concerned.[7;38-40]
A possible disadvantage of referral during home delivery is the time lost in travel to the hospital. The Netherlands is a very densely populated country where the average distance to hospital is relatively short. The national standard for ambulance services is 45 minutes from the moment of reporting to the moment of arrival in hospital [41;42]. National data for the actual transportation time to hospital are not available. A local study (Amsterdam) showed that 85 % of the urgent obstetric referrals arrived in the hospital within half an hour after the reporting.[43] We estimate that the time it takes a woman to get to the hospital from her home is, in the majority of cases, roughly equal to the time it takes to mobilize the necessary specialists in the hospital [41;44] In emergencies at home, the midwife will be able to apply certain remedies herself, such as the administration of an intravenous infusion or the provision of basic life support.[45;46]

Nevertheless, urgent referral does involve the need for immediate help or intervention and may be associated with a life-threatening situation in which loss of even small amounts of time can lead to suboptimal care. Future studies should determine whether the quality of the risk selection process can be improved in this respect.

Another possible disadvantage of transport to the hospital from home is the discomfort it may cause to the mother. However, two-thirds of the referrals took place during the dilatation period. In the case of a planned hospital delivery (by choice or for medical reasons) also, women go to the hospital when they are in active labour. The inconvenience of transfer to the hospital due to referral during dilatation will generally be comparable to the inconvenience during a planned trip to the hospital. An urgent referral or referral during the second stage (in 3.4% and 5.6% of planned home deliveries, respectively) may be more stressful for the mother.
Evaluative studies have shown that referral during home delivery does not adversely affect women's perception of the birth process and that 72 % of women would again opt for home delivery in a subsequent birth.[18;47;48] It is nevertheless important that women (and, given their high referral rate, nulliparous women in particular) should be informed that risk selection continues up to and during the puerperium, with the ensuing probability of referral even during labour.

The findings of this study suggest that the Dutch obstetric care system with risk selection by the midwife works well. The neonatal outcome is good, even in the group of women referred during labour. Since this is a descriptive study, we cannot determine whether the outcomes may improve with earlier referrals, or, conversely, whether some of the referrals were unnecessary. More insight into these questions could be gained by dossier-based studies followed by a formal audit. This procedure, in which all care providers involved subject the case to joint, systematic evaluation, is currently used mainly to evaluate perinatal deaths.[49;50;51] The classification presented in this paper provides a framework for the further evaluation of specific referral categories. Use of this framework to perform perinatal audits of urgency referrals would seem to be particularly valuable. In view of the current interest in home birth and stand-alone midwife-led birth centres in an increasing number of industrialised countries, the results presented here may be of interest outside the Netherlands as well.

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CHAPTER 6

# Finding the right indicators for assessing Quality Midwifery Care

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## Abstract

**Objective**. To identify a set of indicators for monitoring the quality of maternity care for low risk women, provided by primary care midwives and by general practitioners in the Netherlands.

**Methods**. A Project Group was established consisting of midwives, a general practitioner, a neonatologist, policy makers, public health officers and researchers. On the basis of the clinical literature, guidelines and expert opinion the Project Group defined the diverse domains of quality of midwifery care, including a long-list of potential indicators. The long-list's content was assessed based on the criteria of the AIRE-instrument (Appraisal of Indicators through Research and Evaluation), resulting in a short-list of draft indicators. In a two-round Delphi survey a multidisciplinary group of stakeholders reviewed the elaborated draft indicators, rating both the relationship between indicator and quality of care and the feasibility of collecting the necessary data.

**Results.** The Project Group generated a list of 115 potential indicators which were reduced to 35 by using the AIRE-criteria. The 35 draft indicators were discussed by a Delphi panel of 28 midwives, two general practitioners, three obstetricians and three maternity assistants. In total 26 indicators were prioritized by the participants as relevant indicators of midwifery care: eight structure indicators, 12 process indicators and six outcome indicators, addressing the various phases of midwifery care (from the start of pregnancy until and including the post partum period).

**Conclusions**. Our project shows that it is possible to identify a set of quality indicators concerning care provision in a low risk population. Practicing maternity care providers adopted the large majority (83%) of the draft indicators proposed as a feasible set of indicators, describing the structure, process and outcome of their practice in a valid way. The input from multidisciplinary experts (care providers, policy makers and researchers) in the process of identifying the right indicators showed to be essential in all phases of development.


*Keywords:* quality indicators, outcome and process assessment (health care), midwifery, maternity care, Delphi method, the Netherlands.

## Introduction

The quality of clinical care can vary widely, both between and within countries. Hence, there is a growing interest in having objective quality and safety information.[1,2] A valid quality monitoring system is essential to optimise the quality of health care effectively.

One of the key elements of a quality system are indicators to monitor the quality of care. They can enable health professionals and policy makers to prioritise and improve care provision.[3-5] A quality indicator can be defined as a measurable element of practice performance for which there is evidence or consensus that it can be used to assess quality.[6] Indicators may focus on either structure, or process, or outcome.[3-5]

Quality indicators provide the opportunity to measure the initial situation in order to assess the needs, to set realistic goals, and to provide a baseline for assessing changes to achieve the same or better outcomes. Continuous monitoring of quality indicators might reveal trends in practice and patient care and could lead to steps and initiatives to improve care.[2-4] Receiving a feedback report based on indicator data can trigger professionals and practices to improve their care.[7,8] Indicators may produce benchmarking information on the level of professional, practice, region or country and may be used in the increasing public demand for transparency.

Lastly, indicators can be used for supervision. In the Netherlands, the Dutch Health Care Inspectorate (DHCI) uses indicators to identify deviating practices (or institutions), while focussing on effectiveness and safety. In case of a substantial deviation, the practice concerned will be visited by the DHCI, to assess whether the indicator's risk signal reflects the real situation. If that is the case, the care provider will be asked to take measures for improvement within a certain timeframe. This so-called 'phased supervision' is one of the Inspectorates' instruments to perform its legally established supervisory tasks.

Indicators have already been applied to many branches of medicine. In maternity care, indicators for international comparison were developed in the so-called EURO-PERISTAT studies, resulting in benchmarks of maternity care provided in 1999 and 2004 in 15 and 25 European countries, respectively.[9,10] The indicator 'perinatal mortality' turned out to be the most talked-about indicator, especially in the Netherlands with its unexpected relatively high perinatal mortality. The signalling function of this indicator appeared to be a catalyst for a structured evaluation of Dutch maternity care.[11]

Indeed, the perinatal mortality rate is considered to be a valid outcome indicator for the quality of obstetric care.[12] However, perinatal mortality has a relatively low incidence and is a crude measure revealing little about the underlying processes of

care.[9,13] This applies especially to the low risk population attended by midwives. Around the world large differences exist between the organizational model of maternity care.[14] One factor, however, seems to be consistent within all maternity care systems: the role of the midwife in attending and promoting normal pregnancy and birth.[15] As an example, in the Dutch obstetric system independently practicing midwives at primary care level are responsible for maternity care as long as they assess the woman's pregnancy and labour normal. In the event of complications or the threat of complications, the midwife refers the woman to the obstetrician.[16] In areas where no midwifery practice is established, the 'midwifery care' is provided by a general practitioner. Due to this role division the monitoring of the safety and quality of Dutch midwifery care requires indicators tailored to the midwife's low risk population. However, the relatively few existing international indicators on maternity care turn out to be applicable for low risk populations only partially.[9,13]
This paper describes the identification process of a set of indicators for midwifery care, using existing data as much as possible.

## Methods

The set of quality indicators was developed in four steps: 1) The formation of a multidisciplinary Project Group, which identified domains of quality in midwifery care; 2) a literature search to identify and select a long-list of potential quality indicators; 3) the selection of a short-list of detailed draft indicators 4) the assessment of the draft indicators by means of a two-round Delphi procedure.

### 1. Domains of quality in midwifery care

The Project Group consisted of midwives, a general practitioner, a neonatologist, policymakers, public health officers and researchers. They represented the Royal Dutch Organization of Midwives (KNOV), the Association of General Practitioners (VVAH), the Dutch Health Care Inspectorate (DHCI), and the National Institute for Public Health and the Environment (RIVM). Six of the eleven members were practicing in maternity care or used to do so.
By following the potential pathway of a pregnant woman from start of pregnancy until the end of maternity care, the Project Group identified critical domains of quality in midwifery care.

### 2. Potential quality indicators

In the next step indicators were identified per critical domain defined, using various sources. The first source were the known sets of quality indicators in the national and international field of midwifery care. Secondly, the national guidelines and pro-

tocols of the professional groups involved were scrutinized. Additional potential quality indicators were identified by a review of the international scientific literature, searching Pubmed with the keywords quality management, midwifery care, outcome indicator, process indicator, and structure indicator (limits: publication date 1998-2008; language English and Dutch). At last, the Project Group suggested additional indicators based on their expertise. In this way a long-list of potential indicators was generated.

**3. Draft indicators**

By means of the AIRE-instrument (Appraisal of Indicators through Research and Evaluation) the indicators of the long-list were assessed, using the AIRE-criteria as far as applicable at this stage of the process (Table 6.1). (The AIRE-instrument has been based on the AGREE-instrument (www.agreetrust.org).[17] Additional criteria were (A) the plausibility of a relationship between process and outcome of care, (B) the perceived room for improvement as a result of efforts and interventions by the care providers, (C) the variability between midwifery practices, in order to enable benchmarking, and (D) the feasibility of the data needed to build the indicator, i.e. whether the data can be collected accurately, reliably and with reasonable costs.

The indicators meeting the criteria remained on a short-list and were expanded with definitions, numerator and denominator, background information and references to literature.

In addition they were classified into the three categories that are generally distinguished in indicators: structure, process or outcome.[3] *Structure indicators* include the human, physical and financial resources that are available to provide health care. A *process indicator* covers the set of activities that take place between the provider and the receiver of care. It refers to the actual transaction in which the provider of care makes use of the available structural elements to manage the technical and personal aspects of health.[3] *Outcome indicators* refer either to the direct impact on the current or future health of mother or newborn, or to the indirect impact on her satisfaction with the services offered.[3]

**4. Delphi consultation**

A two round Delphi consultation was used to elicit consensus on the importance of each indicator in relation to the quality of midwifery care. The Delphi technique is a method for systematically collecting informed judgments from a group of experts on specific questions or issues.[18]

Potential participants were recruited via the website of the KNOV. The refined list of indicators, designed as a postal questionnaire, was distributed along with a stamped return envelope.

**Table 6.1** - Criteria for assessment of the long-list of potential indicators

| | |
|---|---|
| **Criteria based on the Appraisal of Indicators through Research and Evaluation (AIRE-instrument)**[17] | |
| 1. | The purpose of the indicator is described clearly |
| 2. | The criteria for selecting the topic of the indicator are described in detail |
| 3. | The organizational context of the indicator is described in detail |
| 4. | The quality domain the indicator addresses is described in detail |
| 5. | The health care process covered by the indicator is described and defined in detail |
| 6. | The group developing the indicator includes individuals from all relevant professional groups |
| 7. | Considering the purpose of the indicator, all relevant stakeholders have been involved at some stage of the development process |
| 8. | The indicator has been formally endorsed * |
| 9. | Systematic methods were used to search for scientific evidence |
| 10. | The indicator is based on recommendations from an evidence based guideline or studies published in peer-reviewed scientific journals |
| 11. | The supporting evidence has been critically appraised |
| 12. | The numerator and denominator are described in detail |
| 13. | The target patient population of the indicator is defined clearly |
| 14. | A strategy for risk adjustment has been considered and described * |
| 15. | The indicator measures what it is intended to measure (validity) * |
| 16. | The indicator measures accurately and consistently (reliability) * |
| 17. | The indicator has sufficient discriminative power * |
| 18. | The indicator has been piloted in practice * |
| 19. | The efforts needed for data collection have been considered |
| 20. | Specific instructions for presenting and interpreting results * |
| **Additional criteria used by the Project Group** | |
| A. | There is a plausible causal relationship between process and outcome of care |
| B. | The indicator points to aspects of care with perceived room for improvement |
| C. | Variability between midwifery practices is expected, in order to enable benchmarking |
| D. | Preferably the data for building the indicator are already existing and easily accessible |

* Not applicable at this stage of the process of development

In March 2008, the first questionnaire of the Delphi survey was sent out to a panel of 28 midwives, five general practitioners, three obstetricians, and two maternity assistants (in total n=38). The participants were asked to judge the draft indicators in a continuous 9-point rating scale (ranging from 1=strongly disagree to 9=strongly agree). The indicators were judged on the basis of two review criteria: 1) relevance to clinical practice, and 2) the feasibility to derive the necessary data from routinely collected data, taking into account the workload for the professional. Panel members were invited to add additional indicators or written comments. An email reminder was sent two weeks later.

After entering the responses of the first round into an Excel database, the median scores were calculated and the comments were summarised. Analyses were based on the Rand Appropriateness Method.[18] In the first round, indicators with a median score ≥ 8 without disagreement were considered relevant and feasible, and accepted instantly. Disagreement was defined as 30% or more of the ratings in both the 1st–3rd tertile and the 7th–9th tertile. Indicators scored with a median <= 3 without disagreement were rejected. Median scores >3 and <8 were considered unclear consensus and put into the second Delphi round. In the second round a median score ≥ 7 without disagreement was needed for acceptation of the indicator.

In June 2008 the second round was conducted. The participants received the first round's anonymous median scores of the other respondents including the frequency distribution and a summary of written comments gathered. Figure 6.2 shows an example of an indicator which was discussed twice.

On the base of the responses of the second round the median scores were calculated again, resulting in a final list of indicators.

## Results

Figure 6.1 shows the processes that led to the selection of the quality indicators, and the numbers of indicators 'on the list' at each step. The Project Group identified 10 critical domains of quality: 1) accreditation of the practice involved; 2) accessibility and continuity of care; 3) intra- and inter-disciplinary collaboration; 4) data transmission between the care providers involved; 5) the woman's freedom of choice; 6) ante partum care; 7) intra partum care; 8) neonatal outcome; 9) post partum care and 10) evaluation of care.

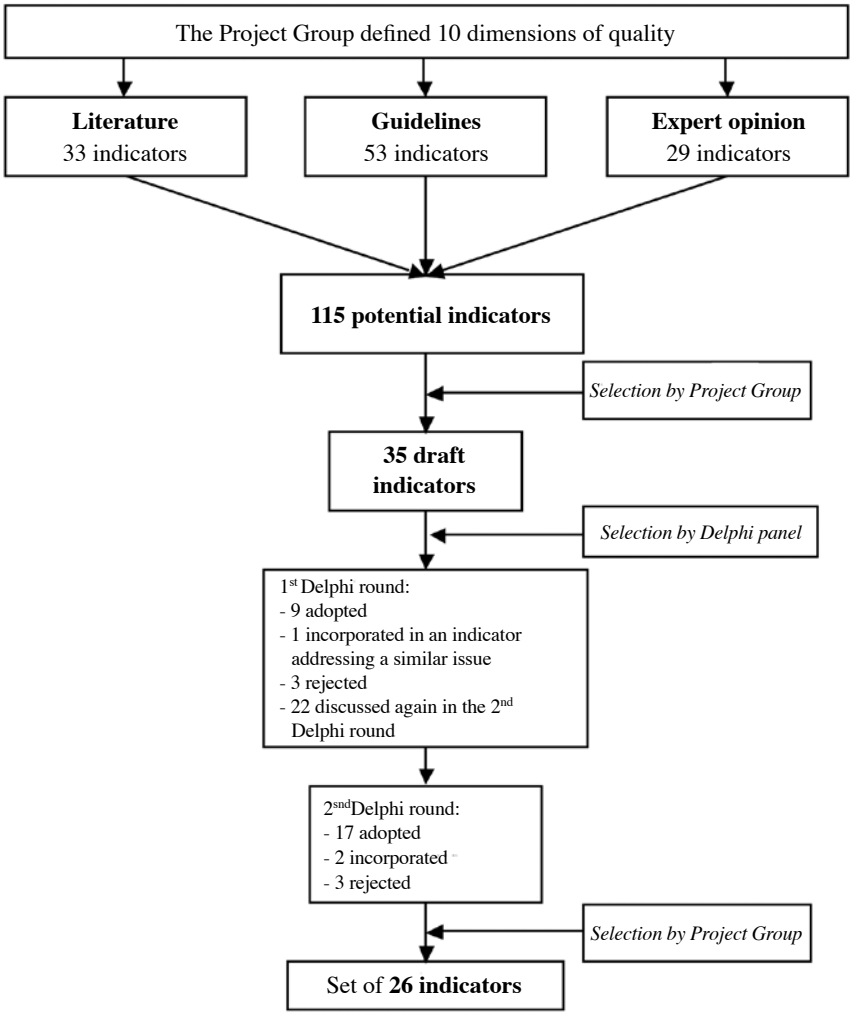


**Figure 6.1** - Flow chart of the selection process of quality indicators for midwifery care.

**Figure 6.2** - The format of indicators presented to the Delphi panel members in the second round's questionnaire*

| | Median | |
|---|---|---|
| Indicator 11: Percentage of unassisted births by too late arrival of the attending midwife or GP | Relation to quality | Feasibility |
| Relation to quality: *0 2 2 1 4 5 6 5 7* / **1 2 3 4 5 6 7 8 9**; Feasibility: *0 2 2 0 3 1 5 13 6* / **1 2 3 4 5 6 7 8 9** | 6,5 | 8 |
| disagreement | no | no |

Summary of comments of responders first round:
- Partially depending on factors beyond the care provider's influence (very fast multiparous birth, very late telephone call from mother-to-be, large distances)
- The reasons behind are most important
- May be an indication of a (dis)functioning back up procedure for 24 /7 accessibility
- May be an indication of how patients are counseled and instructed about calling the midwife

Comments of Project Group:
- The Project Group is aware that an unintended unassisted birth can happen incidentally.
- An indicator is a signal. In spite of the relatively limited influence of the care provider, a more than incidental number of unassisted births may be a signal of substandard (organization of) care.
- A deviating result may prompt examination of the underlying factors

* The indicator has been adopted in the second round

Within the scope of these domains 33 potential indicators were derived from literature, 53 from practice guidelines, and another 29 were suggested by expert opinion. By means of the AIRE-criteria (Table 6.1) the Project Group selected 35 draft indicators out of this long-list, which were proposed to the Delphi panel.

The first Delphi round was completed by 32 participants (response rate of 84 %) of whom 27 completed the second round (response rate 84 %). During the first round nine indicators were adopted unanimously and three were rejected. As a result of the responders' comments one indicator was incorporated to another indicator which addressed a similar issue, and five indicators were reworded. The remaining 22 draft indicators were discussed again in the second Delphi round, which resulted in the acceptance of 17 indicators and the rejection of another three indicators.

Considering the responders' comments two draft indicators were combined with another indicator which addressed a similar issue (e.g.: at first the indicator concerning intrapartum referrals (number 14) was split up into two separate indicators for nulliparous and multiparous women). The reasons for the rejection of the six draft indicators were an unsatisfactory rate for relation to quality (n=1) or for feasibility (n=2) or for both quality and feasibility (n=3). In total, 26 out of the 35 proposed draft indicators were adopted (Table 6.2). Since three draft indicators were incorporated to a single indicator, the number of rejected indicators was six (17 %).

Eight selected indicators can be defined as *structure indicators*. Examples are the accessibility for urgent and non-urgent matters (indicator 4 and 5) and the compliance to the minimum standards of quality, set by the professional groups and the national laws (indicator 1 and 2). Twelve selected indicators may be considered a *process indicator.* For example, indicator 12 concerns the monitoring and recording of parameters during the process of labour in a partogram. The significance of using a partogram is emphasized by the World Health Organisation as well as in the guidelines of the Dutch professional groups.[19,20] So, the rate of indicator 12 reveals both the percentage of deliveries in which the monitoring has been recorded adequately, as well as the adherence to the guideline of the own professional group. The same principle applies to indicator 10. There is a large body of evidence that unnecessary cesarean sections should be avoided and that, hence, an attempt should be made at external cephalic version (ECV) in case of breech presentation.[21] Therefore the percentage breech deliveries in which ECV has been attempted reflects both the performance in the care process as well as the degree to which the protocol has been adhered to.

Six selected indicators may be defined as an *outcome indicator.* For example, a high rate of neonates with a low birth weight (indicator 25) may be an indication that intra uterine growth retardation (IUGR) either is not diagnosed or that timely referral has not taken place. The detection of IUGR is difficult, even with ultrasound examination.[22] Benchmarking will point out whether the rate of small-for-date neonates in a certain practice exceeds the average.

Table 6.3 shows the specifications of some selected indicators (one example per critical domain), including their background information and rationale.

**Table 2** - The selected quality indicators for monitoring and evaluating midwifery care.

| | |
|---|---|
| **Structure indicators** | |
| 1. | Accreditation of the midwifery practice |
| 2. | Number of midwives (GPs) registered in the quality register of the professional group |
| 3. | Availability of a quality system in the midwifery practice (GP's practice) |
| 4. | A procedure for backup duty 7 x 24 hours a week |
| 5. | Accessibility to midwifery advice and information for non-urgent matters |
| 6. | Active participation in the regional organization of midwives ('midwifery circle') |
| 7. | Active participation in the regional Obstetric Collaboration Group of professionals involved in obstetrics (OCG) |
| 8. | Availability of a protocol for referral to the Child Health Centre |
| **Process indicators** | |
| 9. | The percentage of women accessing midwifery care at 8-10 weeks of gestational age |
| 10. | Percentage of breech pregnancies with an attempt to external cephalic version (ECV) |
| 11. | Percentage of home deliveries with attendance of a maternity assistant |
| 12. | Percentage of deliveries in midwifery care, recorded by means of a partogram |
| 13. | Percentage of referrals due to slow progress of labour or need for pain relief |
| 14. | Percentage of intrapartum referral |
| 15. | Percentage of unassisted births by too late arrival of the attending midwife or GP |
| 16. | Percentage of women receiving control 6 weeks postpartum |
| 17. | Number of perinatal deaths reported to the multidisciplinary perinatal mortality audit |
| 18. | Evaluation of midwifery care in case of (near) accidents |
| 19. | Methods of complaint regulation |
| 20. | Percentage received filled-in questionnaires to explore client experiences of midwifery care |
| **Outcome indicators** | |
| 21. | Percentage of pregnant women who smoked at start pregnancy and are still smoking in the third trimester of pregnancy |
| 22. | Percentage of women with an episiotomy |
| 23. | Percentage of neonates with an Apgar score < 7 at 5 minutes |
| 24. | Number of perinatal deaths in women starting labour in primary care |
| 25. | Percentage of neonates small for gestational age |
| 26. | Percentage of breastfed babies at the end of the midwifery care |

**Table 6.3 -** Specifications of the selected indicators, one example per critical domain *

| Critical domain | nr of indicator | Indicator | Numerator | Denominator |
|---|---|---|---|---|
| Accreditation | 2 | Number of midwives (GP's) registered in the quality register of the professional group | Number of midwives (GP's) working in the practice concerned and registered in the quality register | Number of midwives (GP's) working in the practice concerned |
| Accessibility and continuity of care | 5 | Accessibility to midwifery advice and information for non-urgent matters | Number of hours per week accessible on the phone for non-urgent matters | 7 x 24 hours |
| Intra- and inter-disciplinary collaboration | 7 | Active participation in the regional Obstetric Collaboration Group of professionals involved in obstetrics (OCG) | Yes/no (frequency of attendance) | Not applicable |
| Data transmission between the care providers involved | 8 | Availability of a protocol for referral to the Child Health Centre | Yes/no (if yes, the date of the protocol) | Not applicable |
| The woman's freedom of choice | 11 | Percentage of home deliveries with attendance of a maternity assistant | The number of home deliveries under the supervision of a midwife or a GP, attended by a maternity assistant | Total number of home deliveries under the supervision of the midwifery practice concerned |
| Antepartum care | 9 | The percentage of women accessing midwifery care at 8-10 weeks of gestational age | The number of women accessing midwifery care at 8-10 weeks of gestational age | The total number of women who had a first consultation in this pregnancy in the midwifery practice concerned |
| Intrapartum care | 13 | Percentage of referrals due to slow progress of labour or need for pain relief | The number of women giving birth under the supervision of a midwife or a GP who were referred to the obstetrician due to slow progress of labour or need for pain relief | Total number of women under the supervision of the midwifery practice concerned, at the start of labour |
| Neonatal outcome | 25 | Percentage of neonates small for gestational age | The number of neonates with birth weight < P 2.3 or < P 10 born under the supervision of a midwife or a GP. | Total number of babies born under the supervision of the midwifery practice concerned |
| Postpartum care | 26 | Percentage of neonates breastfed | The number of women breast feeding at the end of the midwifery care period | The number of women intending to breast feeding |
| Evaluation of care | 18 | Evaluation of midwifery care in case of (near) accidents | The number of evaluated incidents | Total number of (near) incidents |

* The specifications of the total set of indicators can be obtained from the authors

| Background | Rationale |
|---|---|
| The professional groups of midwives and general practitioners, respectively, keep a register containing minimum requirements to the individual care provider (concerning adherence to guidelines, education and continuing education, affiliation with complaints committee, etcetera). The register is accessible for consumers on the internet | Registration implies that the quality requirements of the own professional group are met. In absence of registration the quality of the individual provider may be questionable to consumer and supervisor |
| For urgent matters a midwifery practice should be accessible and available 7 x 24 hours a week. For continuity of care easy accessibility in case of non-urgent matters is necessary. | Easy accessibility is a signal of quality since prevention, counseling and advice are important issues in primary (midwifery) care. |
| An OCG, organized around a hospital, consists of midwives, G.P.'s, obstetricians and neonatologists. They make agreements about organization, obstetric collaboration, evaluation and regional aspects of maternity care.[29] | The Dutch obstetric system requires intensive collaboration of professionals involved, in order to provide optimal care for the individual woman. Absence of agreements and participation may be a sign of risk. |
| At the end of the postpartum period, the care for the newborn will be taken over by a Child Health Physician. Risk signals or 'gut feelings' received during midwifery care may be important input for Child Health care providers for prevention of medical or psychosocial problems | Stimulating indicator: questioning the issue is a signal of its importance from the point of view of the professional groups and of the supervisory health care inspection |
| After an uncomplicated pregnancy, a woman can make the choice of a home or a hospital delivery, both under the supervision of her own midwife or GP. In case of a home birth, the support of a maternity assistant is needed especially in the last phases of labour. | Indicator for cooperation between midwifery practice and the regional organization of maternity care assistants |
| For an efficient and effective risk assessment, counseling and prenatal screening, is it preferable to access maternity care in an early stage so that antenatal care can be performed optimally. | Reflects both public health issues such as awareness of the benefits of antenatal care (especially for vulnerable groups), as well as the accessibility of the midwifery practice (correct information and no 'waiting lists') |
| The need for pain relief increasingly is an indication for referral intrapartum and often together with a slow progress of labour.[16] Continuous support for women during childbirth is an evidence based intervention resulting in a shorter labour and less intrapartum analgesia.[30] | A high percentage of referrals due to need for pain relief or to slow progress of labour may indicate inadequate support in supporting women during labour, whereas a low percentage may indicate a best practice. |
| Intrauterine growth restriction (IUGR) and small for gestational age (SGA) are associated with increased morbidity and mortality of the fetus and newborn.[11] When IUGR is suspected, timely referral to secondary care is recommended for further diagnostic evaluation. The detection of IUGR is difficult, even with ultrasound examination.[22,31] Benchmarking will point out whether the rate of small-for-date neonates in a certain practice exceeds the average. | An unusually high number of neonates with a birth weight low for gestational age may indicate that intra uterine growth restriction either is not diagnosed or that timely action has not taken place. |
| There is a large body of evidence of the beneficial effects of breast feeding for the health of both neonate and mother.[32] | A low percentage of breast feeding may indicate inadequate support, whereas a high percentage may indicate a best practice in supporting women during start and continuation of breast feeding |
| Evaluation of care in case of (near) accidents and complaints is an important instrument to improve the quality of care and to prevent recurrence. | Stimulating indicator: questioning the issue is a signal of its importance from the point of view of the professional groups as well as of the supervisory health care inspection |

## Discussion

Our project shows that it is feasible to define, for the first time, a set of indicators for the specific field of low risk maternity care. A set of indicators was developed and subsequently adopted by care providers practicing in primary maternity care.
Valid, accepted indicators provide insight into the state of the quality of care and enable comparison of the results of individual practices with regional or national results. In addition, the indicators provide insight into best practice and can be used for reflection and benchmarking. Most importantly, an indicator may act as a stimulus to improve care on the individual, regional and national level.
Indicators can be used to gain objective insight, but they can never give a comprehensive view on quality of care. As implied by the term, an indicator just indicates the issue in question, implying that its signal is not always a direct measure of quality. Further, a well chosen indicator can mirror positive and negative aspects of care: on the one hand a signal of quality in case of good performance, and on the other hand an alarm for the supervisor if minimum standards are not met or if the rating is deviating from average practice strongly.

In the development of the set of indicators for midwifery care we tried to exploit these various characteristics of an indicator. We concluded that the input from multidisciplinary experts (care providers, policy makers and researchers) is essential in all phases of the development of indicators, but especially in the phase of preparation.

We are aware that the set of indicators presented has its limitations. Firstly, the core element of midwifery care (literally: 'being with women') is hard to define and therefore hard to catch in indicator data. Next, some issues considered important appeared to be difficult to translate into feasible indicators (such as communication, or the prevalence of domestic violence). These issues should be explored in future research. Thirdly, indicators addressing women's perceptions are lacking, since its development is addressed by a separate study.[23] In the future, these issues have to be incorporated as it has been demonstrated that provider's and women's perceptions may differ.[24] Next, the set is defined for internal use (by the care providers themselves) and for supervision only. If the set of indicators was extended to external users (i.e. pregnant women, or health insurance companies), a further consideration of the indicators would be required. In addition, the validity and reliability of the set should be evaluated in a pilot study in midwifery practices in the Netherlands with specific attention to case mix and the small volume of some midwifery practices.

Finally, indicators are part of an ongoing cycle of quality improvement so an indicator set would never be static. Changes in evidence or clinical relevance, a consistently high performance or a low variation in achievement may be criteria for removing selected indicators in the future.[25]

Maternity care is an explicit example of outcome-oriented clinical care, given its ultimate purposes of a healthy mother and a healthy neonate. Therefore, outcome indicators might be considered more significant than structure- or process indicators. From this point of view, the relatively small number of outcome indicators (6 out of 26) may at first sight appear disappointing. However, good outcomes can only be achieved when the care provision is embedded in a sound structure within a quality system, and when it is performed in accordance to (evidence or practice based) processes and protocols agreed on. For example, the Apgar score is a well-established measure of neonatal outcome. In a range from 0 to 10, a score below 7 (five minutes after birth) is considered an adverse outcome, possibly related to substandard care.[26] Therefore, the Apgar score was selected as one of the outcome indicators (indicator 23). In order to prevent this adverse outcome, the pregnant woman needs to access maternity care in an early stage of pregnancy so that antenatal care can be performed optimally (process indicator 9). In order to allow the midwife to assess the risk status of the woman concerned she needs to be qualified (structure indicator 2) and to organize continuity of care 24 hours seven days a week (structure indicator 4) in order to prevent unassisted births (process indicator 15). In case of need for referral (process indicator 14) a solid system of collaboration is essential (structure indicator 6 and 7). Thus, in our opinion there is not necessarily a hierarchical difference between the categories of indicators, provided that these are well chosen.

Our study was focussing on Dutch midwifery care. Nevertheless, we expect that the set defined will at least partially be applicable for international use in midwifery care as well, in view of the internationally shared professional values and competencies.[27;28]
Basically, in a low risk population a low rate of interventions and adverse outcomes may be expected, which forms an obstacle for defining valid and feasible outcome indicators. The results of our study, showing the relatively limited value of the distinction between structure-, process- and outcome indicators, therefore may be relevant for other projects aiming at the development of indicators concerning care provision in a low risk population.

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CHAPTER 7

# Evaluating and Validating a Perinatal Mortality Audit through Feedback to the Health Care Providers Involved

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## Abstract

**Objective .** To evaluate a perinatal mortality audit by providing the health care providers involved with the results of the audit, so as to establish whether or not feedback may improve perinatal care and whether the auditing procedure employed was adequate.

**Design.** Descriptive study.

**Method.** For privacy reasons, the results of the previously conducted regional perinatal mortality audit were published in a generic report which did not identify any of the parties involved. At their own request, two participating hospitals received panel assessment reports of their own cases. The auditing procedure, the 77 panel assessments and the care provided in the 77 cases at hand were then evaluated with the health care providers involved at closed meetings.

**Results.** Five panel assessments of audited cases of mortality were found by the health care professionals involved to be 'too lenient', whereas one panel assessment was found to be 'too harsh' (Cohen's $\varkappa$: 0.98). The extensive case descriptions submitted as part of the auditing procedure turned out to be of vital importance. While generic reporting of audit results provides an insight into factors contributing to substandard care, feedback of results on a patient-by-patient basis was found to result in concrete suggestions for improvements in the fields of medical care, the relationship between the patient and the care provider, and collaboration between the various types of care providers themselves. None of the parties involved objected to being identified as the care provider in a given case in the discussions of the feedback.

**Conclusion.** The provision of feedback on the results of the perinatal audit to the care providers involved and the subsequent discussions of these results led to concrete suggestions being made for improvements in the fields of collaboration, reporting and policy-making, both at the level of the hospitals involved and on the individual level.

## Introduction

Within the framework of an European perinatal audit study in various European regions (the EuroNatal study), in 1999 a large population-based audit was conducted in the Netherlands.[1-5] The study, including all levels of perinatal care, focussed on the relationship between perinatal mortality and shortcomings in the care provided (hereinafter referred to as 'substandard factors'). The so-called NederNatal study included 332 perinatal deaths which had occurred in the Northern South-Holland district in the years 1996 and 1997. The audit panel, comprised of care providers who were not personally involved in any of the cases at hand, issued a score to each of the reported deaths (Table 7.1). For confidentiality reasons, these scores were only communicated in a generic paper which did not identify any of the parties involved.[6] This method had its disadvantages, the main one being the fact that individual care providers had no means of finding out how their own cases had been assessed. Therefore, two of the twelve audited hospitals requested feedback on the panel's assessments of their own cases on a patient-by-patient basis.

Such feedback is useful for several reasons. Firstly, because a care provider has the right to know what other parties have done with the data he/she has provided. Secondly, because feedback enables those involved to assess the auditing procedure itself: is it possible to perform an auditing procedure in which case descriptions and the subsequent evaluations adequately reflect clinical reality as perceived by those involved? Does feedback result in suggestions for improved care? Such questions are vital now that perinatal audits are becoming increasingly popular[7;8] and the professional groups are establishing a nationwide system for perinatal auditing, as described in the Obstetric Manual, a document published by the Dutch Health Insurance Board.[9]

In cases of perinatal mortality in which more than one obstetric- or neonatal care provider was involved, no feedback could be provided without breaching the anonymity which the care providers had been guaranteed beforehand, because inspection of one particular hospital's results would inevitably give readers access to assessments of the quality of care provided by other care providers involved in the cases at hand. Therefore, we established a method for providing certain care providers with the requested feedback in a way which would not identify other care providers. In this paper we describe this method and its results.

The feedback primarily focussed on the following questions:

(a) Do the care providers agree with the audit panel's assessments of their cases, and will feedback on the cases concerned result in (proposed) improvements to the perinatal care?
(b) Will the care providers' response to this feedback give rise to changes in the auditing procedure?

## Method

### Participants

Two hospitals, Leiden University Medical Centre (LUMC) and Zoetermeer Lange Land Hospital (ZLL), requested detailed feedback on their audit scores. All cases pertaining to these two hospitals (77 cases in total) were extracted from the NederNatal database and examined, after which all the care providers involved in these cases were requested to consent to their identities being disclosed, and invited to a closed meeting at their own hospital.

### Cases

To prepare for the meeting, all participants received the anonymised case descriptions previously submitted to the audit panel, plus the scores issued to these cases by said panel. In addition, all participants received copies of the panel discussions concerning the cases in which they had been involved, plus the personal details of the patients involved. All documented ZLL cases were discussed at the Zoetermeer meeting. Since the LUMC cases were too numerous to discuss at one meeting, an obstetrician and a researcher each selected a number of cases which they felt might lead to discussion, e.g. because they had provoked much discussion among the audit panel. All case descriptions deemed relevant by either one or both of the meeting conveners were put on the agenda. The remaining files were submitted to the care providers involved. If they felt that the audit panel had made an incorrect assessment of their case, or if they were of the opinion that the case merited special attention, these cases were put on the agenda alongside the cases selected by the meeting conveners.

### Meeting

At the meetings convened to discuss the selected cases, the care providers involved in said cases were granted the opportunity to reflect on the events of each case and on the panel's assessment. This reflection was followed by a plenary discussion. All parties involved in each case were asked whether they agreed with the panel's

assessment. At the end of the evening, the attendees participated in a written anonymous survey of the auditing procedure employed and of the meeting itself, and attendees were encouraged to express their opinion on perinatal audit in general.

## Results

### Participants

In addition to the two hospitals mentioned above, sixteen midwifery practices and two general practices participated in the feedback project. All care providers involved consented to their cases being discussed. The meetings were attended by six obstetricians, sixteen primary-care midwives, three clinical midwives, and one resident. If more than one care provider was involved in a case, at least one of them attended the meeting.

### Cases

All 23 cases previously submitted to the audit panel by ZLL were put on the agenda for the Zoetermeer meeting, while 18 of the 54 cases previously submitted by LUMC were put on the agenda for the Leiden meeting. Since in the LUMC, in its function as a tertiary centre, many serious medical conditions associated with pregnancy are concentrated, the inevitability of many of the perinatal deaths reported at this hospital was beyond debate, irrespective of the quality of care. Therefore, the care providers involved in the 36 cases which were *not* selected for discussion did not attempt to have these cases put on the agenda, stating explicitly that they agreed with the scores issued by the audit panel.

All 41 cases put on the agendas for the two meetings were discussed. Each evaluation looked into the appropriateness of the referral or diagnosis, the quality of the care provided, and suggestions for improvements. Attendees disagreed with seven scores issued by the audit panel. In five cases the care providers felt that the audit panel had been too lenient. In one case the score remained the same but the care providers expressed doubt as to how that score had been arrived at, and in one case the panel's assessment was felt to be too harsh (see Table 7.1).

**Table 7.1 -** Scores issued to cases of perinatal mortality reported in 1996 en 1997, classified as to the degree in which the fatal outcome was assessed to be related to substandard care. The numbers in the table reflect the numbers (percentages) of the cases.

| Score* | All cases in the district (n = 332) [1;6] | | All cases at Leiden University Medical Centre and Zoetermeer Lange Land Hospital (n = 77) | | | |
|---|---|---|---|---|---|---|
| | Assessment by audit panel | | Assessment by audit panel | | Assessment by care providers involved, as compared with panel assessments | |
| | | | | | In agreement | Not in agreement |
| Consensus | | | | | | |
| 0 | 147 | (45) | 40 | (52) | 37 | 3† |
| 1 | 88 | (27) | 18 | (23) | 18 | 0 |
| 2 | 63 | (19) | 12 | (16) | 8 | 4‡ |
| 3 | 20 | (6) | 4 | (5) | 4 | 0 |
| No score issued due to insufficient data | 11 | (3) | 3 | (4) | 3 | 0 |
| No consensus | 3 | (1) | 0 | | 0 | 0 |

* No substandard factors identified by the panel (score of 0); one or more substandard factors identified, which were unlikely to be related to the perinatal death (score of 1), which were possibly related to the perinatal death (score of 2), or which were probably related to the perinatal death (score of 3).

† Score of 0 raised to score of 1 (once) or to score of 2 (twice).

‡ Score of 2 lowered to score of 1 (once); score of 2 raised to score of 3 (twice). In one case the causes contributing to a fatal outcome were redefined, while the score remained unchanged.

## Evaluation of the auditing procedure

Generally speaking, the care providers who attended the meetings felt that the case descriptions matched clinical reality, judging from the discussions held at the meetings and the responses provided in the survey. In some cases relevant data were found to be missing from the case descriptions, usually due to vague record-keeping or missing details in the patient's records. In some cases the audit panel was found to have been given incomplete information, since the panel's records did not include details on the patients' diagnoses. The care providers who attended the meetings felt that this had led to an unjust assessment in two cases (see Table 7.1). In one of these cases, the panel had attached great importance to the words 'abnormal blood glucose values' in the case description. Since the blood glucose values in question were in fact only slightly abnormal, the care providers involved were of the opinion that the case should have received a score of 1 rather than 2. In the second case, cardiotocography (CTG) results were described as 'good' in the patient's records and copied

as such in the description of the case, which was issued a score of 2. According to the care providers involved, who later found that the CTG results showed in fact a terminal condition, this case should have been issued a score of 3.

The lack of information about the patients' social backgrounds in the case descriptions was generally deplored but found to be more or less inevitable. When such subjective information was volunteered at the meetings, it often helped those discussing the cases gain a greater insight into the reasons for the occurrence of substandard factors. However, in no case did this information alter a score, which shows that it was not vital to the assessment-making process.

**Feedback meetings**

The survey results show that all respondents found the discussions of the audit results useful, even though the cases concerned were none too recent (Table 7.2). Table 7.2 also shows how the respondents evaluated the meetings in their own words. Inevitably, the care providers were identified as having been involved in certain cases during the meetings. The survey results show that none of the attendees objected to being identified, or had noticed colleagues finding hard to take being identified, even when their cases had been issued a score of 2 or 3. This was because 'the discussion was very objective' and 'the atmosphere of the meeting was pleasant', and also because the cases in question had been discussed intra-disciplinary before (see Table 7.2).

**Nationwide perinatal audit**

All respondents indicated that they felt the establishment of a nationwide perinatal auditing system, as described in the Obstetric Manual[9], would be useful. Likewise, all respondents indicated that they felt that the panel members should be involved in perinatal care. Nearly all respondents felt that it was important, for the sake of objectivity, that the panel members not engage in auditing activities in their own working districts (see Table 7.2).

**Table 7.2 -** Opinions expressed in written survey by health care providers who attended feedback meetings to discuss selected cases of perinatal mortality (n = 24)

| Structured questions | Responses | | | |
|---|---|---|---|---|
| | Yes | Sometimes | No | Uncertain |
| Discussion of results of external audit – useful or not? | 22 | | | |
| Results of perinatal audit | | | | |
| - Increase 'awareness of quality' ? | 22 | | | |
| - Did discussion led to reflect on your practice? | 23 | | | |
| - Did discussion cause you to change your habits and ways of doing things? | 13 | 3 | 4 | |
| - Discussion caused you to change the way you record things? | 15 | | 7 | |
| - Discussion made you feel insecure? | 1 | 2 | 19 | |
| The health care providers' anonymity is lifted at feedback meetings | | | | |
| - Was this a problem for you? | | | 23 | |
| - Did you think this was a problem for other attendees? | | | 18 | 5 |
| Would establishing a nationwide perinatal auditing system be useful? | 24 | | | |
| Was the composition of the audit panel adequate? (Obstetrician, gynaecologist and paediatrician, chaired by a general practitioner) | 20* | 3* | | |
| Should perinatal audits only be conducted by panel members who do not practise in the audited district? | 20 | | 3 | |

**Comments volunteered by attendees**

With regard to the various echelons:
- Discussion leads to better communication and greater understanding of the other party's reasons
- Interdisciplinary auditing improves communication
- Interdisciplinary discussion and/or discussion with outsiders leads to new points of view
- Substandard care may be delivered at primary and secondary and tertiary level. It may occur under many circumstances.

With regard to 'evaluation of health care provided':
- Evaluation helps one understand that medical care can always be improved
- Looking back on a case which occurred a long time ago enables evaluation at a more abstract level
- Discussion gives rise to making of new policies and policy revision
- Evaluation shows clearly that medical records should contain sufficient detail for others to be able to interpret them correctly

With regard to the feedback meetings:
- The meetings helped attendees understand how the perinatal audit was conducted, and what it achieved
- The audit panel's occasional leniency encouraged attendees to take part in discussions
- Attendees found it 'exciting' to be able to discuss their own medical practice so openly
- Fear that outsiders would be judgemental turned out to be unfounded
- Open atmosphere, no reproachful vibe
- Audit panel's and investigators' objectivity was pleasant and important
- A feedback option should be offered to other audited hospitals, as well

* Suggestions included: give the general practitioner a larger say in the proceedings, and in some cases add a psychologist, anaesthetist or pathologist to the panel.

## Discussion

Perinatal audit is a process aimed at providing an insight into which parts of the care system require structural improvements, e.g. regulated collaboration, adjustments in protocols, new ways of forming a diagnosis, etc.[2;3;10;11] The previously published generic report outlining the NederNatal audit results provided such an insight at a general level.[6] The high percentage of cases which were found to have involved substandard factors in the care provided led to commotion among perinatal care providers, mostly due to incorrect quotations on the subject in the Dutch media.[12] However, care providers turned out to have considerable difficulty drawing up concrete plans for improvement based on the generic results. Judging from the surveys completed by the care providers who attended the feedback meetings, the care professionals needed feedback on their own work in order to draw up concrete steps for improvement, both in terms of medical aspects (e.g. 'being alert on the signal of recurrent cystitis') and in terms of the relationship with the client (e.g. 'better instructions to the pregnant woman as to which complaints warrant contacting the midwife or the doctor'). The sessions were most successful in producing concrete suggestions for improvements with regard to collaboration of the various professionals, e.g. recording findings more clearly, and ensuring that there are clear agreements in place as to who is to take the lead in cases involving patients with multi-morbidity (where treatments administered by different specialists may mask obstetric problems). Whether or not these changes will actually be implemented remains unclear; it is outside the scope of this study. However, the first steps have obviously been taken, because awareness and reflection are important aspects of quality medical care.

The audit panel used a scoring system under which 0 or 1 means that there is no direct relationship between the delivered care and the recorded death; 2 means that there is a possible relationship, while 3 means that there is a probable relationship. In other words, the difference between a score of 1 and a score of 2 is clinically relevant. From this point of view, the care providers who attended the feedback sessions felt that two of the scores issued by the audit panel were too lenient, whereas one score was deemed to be overly harsh. This implies that the collated auditing results presented in the generic report differed from the care providers' perceptions by a mere 1.2 per cent (Cohen's $\varkappa$: 0.98), which means that the auditing procedure employed by NederNatal largely reflects clinical reality.[6]
The accuracy of the auditing procedure, in which detailed case descriptions were found to play a vital part, could be improved by making all diagnostic data (as well as other objectifiable data) available to the auditing panel.

The meetings showed that perinatal mortality is a sore subject. Five to six years had passed since the cases discussed at the meetings took place. Even so, several persons involved in the cases got emotional when discussing them, saying things like, 'I still regret not performing a Caesarean one day earlier' or 'I feel bad about the care delivered to that lady'. The attendees' emotional responses were not always directly related to the scores their respective cases had received. Of course, any retrospective assessment of a case will inevitably be affected by an awareness of an adverse outcome, which will make care providers more likely to focus on what *more* they could have done, or what they could have done *differently*, rather than on whether it might have been beneficial to do *less*. The care providers attending the meetings were remarkably hard on themselves. In seven cases, care professionals disagreed with the panel's verdicts on their cases. In five of these cases, the parties involved felt that the panel's assessment had been too lenient. In none of these cases did the care providers in question allow themselves to be 'reassured' by the panel's mild verdict; instead they all opined in the survey that the panel had been wrong.

When care providers are given an opportunity to discuss their affairs in an atmosphere where the word 'substandard' is not automatically interpreted to mean 'avoidable' or 'culpable', loss of anonymity appears not to be much of an issue: none of the attendees seemed to object to being identified as a care provider involved in a given case, even if the case in question had received a harsh score. Moreover, the participants indicated that guidance by objective outsiders led to the cases being analysed at a more abstract level, with greater attention being paid to care provision in general. It is hard to gauge to what extent proper collaboration between primary- and secondary/tertiary-care providers at LUMC and ZLL contributed to the success of the feedback meetings. However, the participating parties felt that, if their own experiences were anything to go by, hospitals plagued by poor communication between primary-care and secondary-care could benefit from feedback meetings, as well.

Our conclusion is that perinatal audit, if defined and performed carefully, is not perceived by care providers as a threat, but rather as something which will motivate them to focus on high-quality care. Feedback on a patient-by-patient basis is an essential part of this process. Therefore, we feel that feedback on and discussion of certain (selected) cases assessed by an audit panel should be incorporated into the nationwide perinatal audit which is currently being developed.

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CHAPTER 8

# Evaluation of Critical Incidents in Dutch Maternity Care

## *The Role of the Health Care Inspectorate*

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## Abstract

**Objective.** To gain insight into the number and nature of critical incidents in perinatal care reported to the Dutch Health Care Inspectorate and into the way in which the evaluation of these reported incidents may contribute to a more effective care system.

**Design.** Descriptive

**Method.** We researched the Dutch Health Care Inspectorate's database and identified all critical incidents concerning maternity care reported between September 1st 2006 and September 1st 2008. Where cases were classified as calamities (i.e. involving death or serious damage to either mother or child), we analysed the case files to determine which factors contributed to the incidents, paying particular attention to care involving multiple caregivers ('chain care') and care delivered after office hours. At the same time, we recorded actions and measures taken to prevent repeat occurrence.
The ultimate purpose of incident reporting is to identify (structural) factors contributing to said incidents, so as to be able to take measures to prevent recurrence.

**Results.** We labelled 70 of the 165 maternity cases reported to the Dutch Health Care Inspectorate as critical incidents. Together, these incidents resulted in 47 perinatal deaths and 8 maternal deaths. Our results showed that the incidents were diverse in character, and in most cases an accumulation of adverse factors contributed to the outcome.

The main factors contributing to substandard care identified in the study were inadequate treatment (54% of all critical incidents), failure to recognise pathology (47%), lack of clarity about who should take the lead (39%) and inadequate communication (39%). In 19 cases (27%) substandard multidisciplinary co-operation ('chain care') was found to have played a part in the incident, as was the time of day in 18 cases (26%). Both during office hours and after hours, major gains may be achieved through minor improvements in basic aspects of care, e.g. adequate communication and co-operation, clear assignment of responsibilities and attentiveness in maternal and fetal monitoring.


*Keywords:* incident reporting, process assessment, maternity care, pregnancy outcome, the Netherlands

## Introduction

Perinatal mortality is showing a downward trend in the Netherlands. According to the Netherlands Perinatal Registry (PRN), the perinatal mortality rate (PMR) was 9.7‰ in 2007, down from 12.2‰ in 2001.[1] However, many other European countries have reported a more impressive decline in perinatal mortality rates. According to the EURO-PERISTAT studies, based on 1999 and 2004 data respectively, the Dutch PMR ranks amongst the highest in Europe.[2;3]
This rather unexpected finding hit the Dutch health-care system hard, resulting in heated debates on the nature of the Dutch maternity care system.[4;5]

Studying the literature on the subject, one finds that certain determinants of perinatal mortality (such as pregnancy at a later age, smoking and carrying more than one child) occur relatively often in the Netherlands. The country also used to have its own, rather conservative policies with regard to prenatal screening and very premature births, which also contributed to the relatively high mortality rate. However, these aspects only partially explain the discrepancies in mortality rates[6-8], which calls for a thorough assessment of the way in which Dutch maternity care is being structured.

To determine how to optimise Dutch perinatal care, the Minister of Health established a multidisciplinary committee in 2008, the so-called Steering Committee on Pregnancy and Child Birth. The Committee's advisory report, entitled *A Good Start* and published in January 2010, approaches the subject from two different perspectives – clinical care and public health.[9] Preparations for the implementation of the Committee's recommendations are being made. However, the subject can also be approached from an epidemiological angle. Recent examples of this include studies of regional and local discrepancies in PMR[10;11], the impact of the place of delivery on perinatal morbidity and mortality[12;13] and the classification of intrapartum referrals (urgent versus non-urgent).[14] Women's own accounts of their birthing experience can also be an important input for evaluation and improvement, both for care providers and for policy-makers.[15;16] Perinatal audit, a multidisciplinary qualitative in-depth analysis of individual cases, can help evaluate the relationship between care provision, process factors and outcomes.[17]

In addition to the above-mentioned initiatives, the Dutch Health Care Inspectorate (DHI) has its own supervisory focus. The supervision performed by the DHI is based on legislation and regulations (altogether comprising 23 acts) as well as on 'field standards' set by professional associations themselves.[18] A significant approach for supervision is the evaluation of critical incidents in hospitals or primary-care practices. Under

the Quality Assurance at Medical Facilities Act of 2005 (Quality Act) (*Kwaliteitswet Zorginstellingen)*, care providers have a statutory duty to report to the DHI critical incidents, defined as 'any unintended or unexpected quality-of-care-related event which has resulted in the death of or serious permanent injury to a patient or client of the medical facility'.[19] Basically, the act asks the following question: Would different care have prevented the death or serious injury in question? If the answer to this question is positive, the critical incident must be reported to the DHI. Using a standard decision protocol, the DHI then decides whether the case needs to be investigated, and if so, how, depending on the nature and gravity of the incident.[20]

Given the current interest in the quality of maternity care in the Netherlands, we decided to analyse the DHI-registered obstetric-care case files. The objective of the analysis was to gain insight into the number and nature of the reports, the way in which the reported calamities were being treated and in the ways in which calamity analysis may contribute to better care.

In performing our analysis, we paid special attention to the way in which the various medical professionals involved in maternity care co-operate. In the Dutch obstetric care system, maternity care is primarily delivered by an independent primary-care midwife (or sometimes a general practitioner qualified to deal with deliveries), provided that the pregnancy and childbirth are expected to be free from complications. In the event of (suspected) onset of pathology an obstetrician will step in.[21] The number of women being referred from primary care to secondary care, antepartum or intrapartum, is increasing steadily.[22] Postpartum care continues to be delivered in primary care in the majority of cases.[1] In case of comorbidity, non-obstetric specialists may be involved. This being the case, 'chain care' i.e. care involving more than one caregiver is a vital aspect of Dutch maternity care, a point which we felt deserved special attention in our study. We also focused on after-hours mortality, due to the increased perinatal mortality rates at night time and on weekends.[23]

## Method

### Database

In September 2006 the DHI established a central register of incidents reported by healthcare providers and hospital managers or obtained from the Disciplinary Court.[20] We classified 70 of the 165 cases related to fertility treatment, pregnancy, delivery or the neonatal period (up to 28 days) as critical incidents as defined by the Quality Act.[19]

Two investigators independently used the database to analyse how the reported cases had been investigated and which risk factors had played a role. (CW and SL each analysed half of the cases, with MA analyzing all of them.) They developed a questionnaire in which both care factors and specific points of interest could be indicated and subsequently then compared all the assessments. Where the investigators disagreed with each other or insufficient information was available, they approached the inspector who had dealt with the case at the time and adopted his or her point of view.

**Definitions**

For the purposes of our study, daytime hours were defined as 'Monday to Friday between 8am and 6pm' (DT hours). The remaining hours (including national holidays) were considered to be evening, night or weekend hours (ENW hours). The assignment to DT hours or ENW hours was determined by the timing of the substandard care that resulted in the inevitable adverse event (the 'fatal moment')[24] rather than the actual moment of birth. In cases where there was a possible relationship between the adverse outcome and the timing of the 'fatal moment' in ENW hours, the cases were branded 'ENW calamities'.

We are using the definition 'chain incident' to refer to a possible relationship between the adverse outcome and the involvement of various medical disciplines in the case concerned. Assuming that the tasks and responsibilities of the various obstetric care providers working in one hospital will be clearly delineated, we considered obstetricians, obstetricians in training and clinical midwives one link of the chain. Other intramural disciplines (such as internists, neonatologists and anaesthetists) were considered separate 'links', just like extramural disciplines (primary-care midwives, general practitioners and maternity assistants).

## Results

**Number of Calamities**

This article is based on DHI-registered reports of 70 calamities, which took place in general hospitals (54), academic medical centres (4), midwifery practices (7), general practices (3), a maternity-assistants organisation (1) and a mental-health centre (1). In all, 55 medical facilities were involved – ten facilities reported two cases each, while three facilities reported three each. The cases were reported by the facilities' managers or Boards of Directors (43), the medical professionals themselves (9), the patients or their families (10), or other individuals (3). In five cases the report was constituted by a disciplinary tribunal's judgement.

Forty-five cases involved perinatal mortality. In two cases, newborn twins died, due to prematurity and an enterovirus infection, respectively. This brings the total perinatal mortality reported to 47. Maternal mortality occurred eight times. The remaining cases were characterised by severe damage to either mother or child (Table 8.1).

**The Dutch Health Care Inspectorate's Investigations**

Root cause analyses of the critical incidents and improvement measures show a wide variety. In ten cases the reports were complete and no further investigation was necessary. In 41 cases the DHI made further inquiries into the cases' analyses, circumstances or measurements. In 19 cases the DHI conducted an investigation of its own, checking files and interviewing medical professionals, patients, patients' next of kin, managers, Boards of Directors, etc.

**Main Conditions in the Reported Incidents**

Table 8.1 lists the main conditions of the reported incidents by the time of their occurrence. It also lists the outcomes of the incidents and the echelons in which the incidents occurred.

In 19 cases (27%) the critical incident occurred ante partum. The most frequently reported pathology was preeclampsia and HELLP diagnosis and management (n=5). The HELLP syndrome also developed twice post partum.

In 32 cases (46%) the calamity occurred intra partum. The most common problem here was the interpretation of the fetal heart rate or the cardiotocographic recording (CTG), or the fetal distress management: 13 times by secondary-care providers, and twice in shared care (Table 8.1).

Nineteen calamities occurred in the post-partum period (27%). In two cases a hospitalised neonate was given the wrong medication. In four cases primary-care providers failed to recognise a bad neonatal condition (Table 8.1).

**Intra- and Transmural Chain**

In 19 cases (27% of all calamities reported to the DHI) the reported calamity was at least partially due to unclear assignment of duties between chain partners. These 'chain calamities' are listed in Table 8.2. The chains concerned were the primary-care chain (cases Nos. 1-3, n=3), the chain where patients were referred from primary care to secondary care (cases Nos. 4-7, n=4) or from secondary care to primary care (cases Nos. 8-12, n=5), and the intramural chain (cases Nos. 13-19, n=7). In accor-

dance with the above-mentioned definition of 'chain', we did not list in Table 8.2 those calamities which occurred entirely in a primary-care midwifery practice (n = 6) or general practice (n= 1), or at a hospital's maternity ward (n = 44).

**ENW Hours**

For the purposes of this study, we define a week as having 50 office hours (30% of all hours of the week) as well as 118 ENW hours (70% of all hours of the week). We found that 26 (37%) of the calamities analysed as part of this study occurred during office hours, versus 44 calamities (63%) taking place during ENW hours.

In 15 cases the incident might have had a different outcome if it had occurred during office hours (the so-called 'ENW calamities'). This constitutes 21% of all cases analysed as part of this study, as well as 34% of the ENW cases on file. On the other hand, we also found three calamities which occurred during office hours and might have had a better outcome if they had taken place at a less hectic time of the day (the so-called 'reverse ENW calamities'). This constitutes 4% of all cases analysed as part of this study, as well as 12% of all day-time incidents on file. Please refer to Table 8.3 for a brief introduction to the ENW calamities.

**Factors Contributing to Substandard Care**

Table 8.4 shows the factors contributing to substandard care (FSS) which could be identified. In most cases more than one FSS was involved. In 38 cases (54%) the treatment administered was inadequate; in 33 cases (47%) the care providers involved failed to recognise pathology, which resulted in a delay of the treatment required. In 27 cases (39%) the incident was partially due to a lack of clarity about the division of responsibilities of the care providers involved and about who should take the lead. Inadequate communication played a part in 27 cases (39%), as did poor co-operation (24 %), either intramurally (within the hospital) or transmurally (between primary- and secondary-care providers). Other FSS identified in the study were failed communication to the parents (14%) and from the parents themselves, who, for instance, disregarded alarm signals (10%). Twelve incidents turned out to be unavoidable complications (17%).

**Table 8.1** - Main Conditions in the Critical Incidents Reported to the DHI, in Relation to the Outcome and to the Echelon in Which the Critical Incident Occurred

| Occurrence of condition | Main condition | Number of cases | Perinatal and maternal outcome | | | | Echelon in which the critical incident occurred | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Perinatal mortality | Perinatal morbidity | Maternal mortality | Maternal morbidity | 1st care level | Both 1st and 2nd care level | 2nd and 3rd care level |
| Ante partum (n=19) | HELLP syndrome/hypertensive disorder | 5 | 2 | 1 | | 4 | 2 | 1 | 2 |
| | Multi-morbidity | 3 | 1 | 2 | 1 | 2 | – | – | 3 |
| | Diabetes | 2 | 1 | 1 | | | – | – | 2 |
| | Vasa praevia, abruptio placentae | 3 | 3 | | | 1 | – | 1 | 2 |
| | Fetal congenital malformation | 2 | 2 | | | 1 | | – | 2 |
| | Maternal alloimmunization | 2 | 2 | | | | – | – | 2 |
| | Fetal death, cause undetermined | 2 | 2 | | | | 2 | | |
| | **Total antepartum conditions** | **19** | **13[A]** 9apd, 2 ipd, 2 ppd | **4[B]** | **1** | **8[C]** | **4** | **2** | **13** |
| Intrapartum (n-32) | Fetal distress | 15 | 12 | 3 | | 2 | – | 2 | 13 |
| | Multiple pregnancy | 2 | 2 | | | | 2 | | 2 |
| | Shoulder dystocia | 3 | 2 | 1 | | | 1 | 1 | 2 |
| | Scarred uterus | 2 | 1 | 1 | | 1 | | | 2 |
| | Premature birth | 4 | 4 | | | | 1 | | 3 |
| | Breech presentation; umbilical cord prolapse | 3 | 2 | 1 | | | | | 3 |
| | Fetal death, cause undetermined | 3 | 3 | | | 1 | 2 | | 1 |
| | **Total intrapartum conditions** | **32** | **26** 2 apd, 9 ipd, 15 ppd | **6** | **0** | **4[D]** | **3** | **3** | **26** |

| Occurrence of condition | Main condition | Number of cases | Perinatal and maternal outcome | | | | Echelon in which the critical incident occurred | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Perinatal mortality | Perinatal morbidity | Maternal mortality | Maternal morbidity | 1st care level | Both 1st and 2nd care level | 2nd and 3rd care level |
| Post partum (n=19) | HELLP syndrome | 2 | | | | | | | 2 |
| | Postpartum haemorrhage (PPH) | 3 | | | 2 | 1 | | 1 | 2 |
| | Embolism | 2 | | | 2 | | | 1 | 1 |
| | Other maternal complications (subdural haematoma, aortic dissection, gauze left behind) | 3 | | | 1 | 2 | 1 | | 2 |
| | Neonatal pathology (MAS, hypoglycaemia) | 4 | 3 | 1 | | | 2 | 2 | |
| | Neonatal infection | 2 | 2 | | | | | | 2 |
| | Medication error | 3 | 1 | 2 | | | | | 3 |
| | **Total post partum conditions** | **19** | **6**<br>6 ppd | **3** | **7** | **3** | **3** | **4** | **12** |
| **Total** | | **70** | **45**[E]<br>11 apd, 11 ipd<br>23 ppd | **13** | **8** | **15** | **10*** | **9**** | **51***** |
| % | | | | | | | 14.3% | 12.9% | 72.9% |

apd = antepartum death; ipd = intrapartum death; ppd = postpartum death

A In addition: 2 spontaneous abortions

B Combined perinatal morbidity and maternal mortality in 1 case, and combined perinatal and maternal morbidity in 1 case

C Combined maternal morbidity and perinatal mortality in 5 cases

D Combined maternal morbidity and perinatal mortality in 3 cases, and combined maternal morbidity and perinatal morbidity in 1 case

E 47 children (2 twins)

* Primary-level midwife (n=7); general practitioner (n = 2); maternity-care assistant (n=1)

** Description of these cases in Table 8.2 (cases 4–12)

*** 47 in secondary care (general hospital) and 4 in tertiary care (academic medical centre)

**Table 8.2** - Critical Incidents with a Possible Relationship between Outcome and 'Chain Care' ('Chain Calamities')

Obstetricians, obstetricians in training and clinical midwives are considered one link of the chain. Other intramural disciplines (e.g. anaesthetist, internist) are considered separate links, just like extramural disciplines (e.g. general practitioner, primary-level midwife). Incidents which occurred entirely in a primary-care midwifery practice (n=6) or general practice (n=1), or at a hospital's maternity ward (n=44), are not listed in this table.

| Case No. | Outcome | Summary |
|---|---|---|
| ***Within the chain of primary-care providers*** | | |
| 1 | Intrapartum mortality | Symptoms of imminent preterm delivery (25 weeks GA) not recognized by general practitioner. No referral to midwife or obstetrician in attendance. Unassisted preterm delivery at home several hours later. |
| 2 | Induced preterm birth | Symptoms of preeclampsia (28 weeks GA) not recognized by general practitioner. No referral to midwife or obstetrician in attendance. One week's delay in diagnosis and treatment of HELLP syndrome. |
| 3 | Admission to neonatal care unit | Maternity-care assistant does not act upon the midwife's advice for the neonate's nutrition, and does not inform the midwife of the (icteric) neonate's worsening condition. |
| ***Chain from primary-care midwife to secondary-care obstetrician*** | | |
| 4 | Serious neonatal injury | Antepartum referral (need for pain relief). Severe shoulder dystocia during labour. The shoulder dystocia could be deduced from the anamnesis in retrospect, but remained undetected due to insufficient data transmission and a language barrier on the mother's part. |
| 5* | Antepartum mortality | Antepartum referral (abruptio placentae). Evening. The obstetrician, not yet present in hospital, indicates a wish to reassess the diagnosis before calling the operation team. Intrauterine death before start of Caesarean section. |
| 6* | Intrapartum mortality | Intrapartum referral (meconium-stained fluid). Severe fetal distress. Weekend. Operation team on the spot soon; obstetrician arrives late due to traffic problems. Intrauterine death one hour after admission. |
| 7 | Maternal mortality | Planned hospital delivery. Midwife advises the woman in labour (who is far from fluent in Dutch) to go to hospital. The woman goes to the wrong hospital, which does not have an obstetric department. Delivery without expert assistance on arrival, immediately followed by PPH and coagulation disorder. Irreversible condition on arrival in the right hospital. |
| ***Chain from secondary-care obstetrician to primary-care midwife*** | | |
| 8 | Neonatal mortality | Antepartum referral by general practitioner (signs of preeclampsia, with normal blood pressure). Obstetrician refers expectant woman back to the general practitioner. At term, the woman has eclamptic convulsions at home, immediately followed by the birth of a hypoxic neonate. |

| Case No. | Outcome | Summary |
|---|---|---|
| 9 | Neonatal mortality | Intrapartum referral by primary-level midwife (need for pain relief). Experienced obstetrician in training blames the use of pethidin for a suboptimal CTG, disconnects the CTG and refers back to primary-care midwife for attending second stage of labour. Renewed referral due to failure to progress second stage. CTG shows severe fetal distress. |
| 10* | Neonatal mortality | Delivery in secondary care. Vacuum extraction, good neonatal start. Neonate has high temperature on first night in hospital. Discharged without examination by paediatrician. High temperature goes unreported. Primary-care midwife fails to recognize symptoms of neonatal sepsis on second night. |
| 11 | Neonatal mortality | Delivery in secondary care. Vacuum extraction, good neonatal start. Neonate has very low temperature in first night in hospital. Discharged without examination by paediatrician. Low temperature goes unreported. No supplementary feeding because of strict adherence to breast-feeding protocol. Symptoms of hypoglycaemia not recognized by primary-care midwife. |
| 12 | Maternal mortality | Delivery in secondary care. Symptoms of embolism not recognized by the obstetrician in the hospital nor by the general practitioner at home. |
| ***Within chain of secondary-care providers*** | | |
| 13 | Admission to neonatal intensive care unit | Neonate's condition worsens after exchange transfusion. The laboratory, believing the highly abnormal blood values to be erroneous, does not report the results of the blood test. The mistake is not detected until the next day. Mistake was due to unclear labelling of the exchange blood. |
| 14 | Antepartum mortality | A blood test taken during pregnancy suggests active rhesus incompatibility, which was added in medical records but not noticed by those responsible. No action undertaken. The absence of the test results is not noticed until weeks afterwards. |
| 15 | Antepartum mortality | Glucose test performed in preparation for elective section shows highly abnormal values. Anaesthetist fails to report results to obstetrician. |
| 16* | Neonatal mortality | Intrapartum fetal distress. Operation team on the spot but otherwise engaged. Delay in carrying out Caesarian section due to lack of clarity on urgency of situation. Uncertainty as to who is to take the lead during resuscitation attempt. |
| 17 | Serious maternal injury | Metabolic disorder in expectant woman not recognized, resulting in a coma followed by spontaneous abortion. A large number of specialists is involved. Lack of clarity about to who is to take the lead. |
| 18 | Maternal mortality | Cardiologic disorder in expectant woman. Lack of adequate consultation between specialists. Lack of clarity about who is to take the lead. |
| 19* | Maternal mortality | Unrecognized HELLP syndrome at second day post partum, in hospital. Lack of clarity about who is to take the lead. |

* This case is also included in the 'ENW Calamity' table (Table 8.3)

**Table 8.3** - Critical Incidents with a Possible Relationship between Outcome and Time of Occurrence ('ENW Calamities')

| Case No. | Outcome | Time of occurrence | Short summary |
|---|---|---|---|
| 20 | Antepartum mortality | EN | Sleeping expectant woman, hospitalized for observation of blood loss. Undiagnosed vasa praevia. |
| 21 | Antepartum mortality | W-EN | Sleeping expectant woman, hospitalized for observation of HELLP syndrome. Unobserved fetal distress and intrauterine death. |
| 22 | Serious neonatal injury | EN | Sleeping woman in labour with epidural analgesia. Unobserved oxytocin overdose. Fetal distress not recognized by inexperienced obstetrician in training. |
| 23 | Perinatal mortality | EN | Schizophrenic woman in mental institution. Unobserved preterm delivery at night. Time of death (fetal or neonatal) unknown. |
| 24 | Maternal mortality | EN | Unrecognized HELLP syndrome on fourth day after Caesarean section, in hospital. |
| 19* | Maternal mortality | EN | Unrecognized HELLP syndrome at second day post partum, in hospital. Lack of clarity about who is to take the lead. |
| 5* | Antepartum mortality | EN | Antepartum referral (abruptio placentae). Evening. The obstetrician, not yet present in hospital, indicates a wish to reassess the diagnosis before calling the operation team. Intrauterine death before start of Caesarean section. |
| 25 | Serious neonatal injury | W-DT | Antepartum referral (decreased fetal movements). Suboptimal CTG. Delayed Caesarian section due to communication problems between clinical midwife in hospital and obstetrician at home. |
| 6* | Intrapartum mortality | W-DT | Intrapartum referral (meconium-stained fluid). Severe fetal distress. Weekend. Operation team on the spot soon; obstetrician arrives late due to traffic problems. Intrauterine death one hour after admission. |
| 26 | Neonatal mortality | EN | Breech delivery. Inexperienced obstetrician in training with unclear authorization in attendance. Obstetrician cannot be reached due to telephone service interruptions. |
| 27 | Neonatal mortality | W-EN | Intrapartum fetal distress in preterm twins. Inexperienced obstetrician in training in attendance. Operation team on the spot but otherwise engaged. Caesarian section delayed due to waiting for obstetrician and second operation team. |
| 28 | Neonatal mortality | EN | Intrapartum fetal distress, not recognized by OB/GYN nurse. Responsible obstetrician absent the whole night. |

| Case No. | Outcome | Time of occurrence | Short summary |
|---|---|---|---|
| 29 | Intrapartum mortality | EN | Intrapartum fetal distress, not recognized by clinical midwife. Responsible obstetrician absent the whole night. |
| 16* | Neonatal mortality | W-DT | Intrapartum fetal distress. Operation team on the spot but otherwise engaged. Delay in carrying out Caesarian section due to lack of clarity on urgency of situation. Uncertainty as to who is to take the lead during resuscitation attempt. |
| 10* | Neonatal mortality | | Delivery in secondary care. Vacuum extraction, good neonatal start. Neonate has high temperature on first night in hospital. Discharged without examination by paediatrician. High temperature goes unreported. Primary-care midwife fails to recognize symptoms of neonatal sepsis on second night. |
| ***'Reverse ENW calamities' during office hours*** | | | |
| 30 | Neonatal mortality | DT | All delivery rooms occupied. Woman in labour admitted to nursing ward. Fast breech delivery attended to too late, resulting in complications in delivery of the head. |
| 31 | Intrapartum mortality | DT | Antepartum referral (blood loss at term). Induction of labour. Fetal distress. Caesarian section delayed due to obstetrician's absence due to busyness in clinic and delivery rooms. |
| 32 | Neonatal mortality | DT | Vacuum extraction due to fetal distress. Unsuccessful. Obstetrician stops intervention because fetal heart rate seems improved, leaves care to clinical midwife and leaves the delivery department. Heart rate turns out to be maternal. |

* This case is also included in the 'Chain Calamities' table (Table 8.2).

EN Evening / night
DT Daytime
W Weekend

## Discussion

Over the last decade, all over the world a growing emphasis on 'patient safety' can be recognised. Health care is now focussed on 'freedom from accidental injury due to medical care or from medical error'.[25] Health care is provided by human beings, and since 'to err is human'[25], the reduction of substandard care resulting in adverse outcomes will be an everlasting challenge. An effective and efficient organisational structure is a necessary condition. This includes well-trained and competent medical professionals, as well as a safety net to avoid or mediate errors to the largest extent. In addition, it is vital that critical incidents and near-misses be reported and analysed, and that those involved learn from these and implement solutions in order to minimise the risk of recurrence.[19;26]

Primarily, the responsibility to construct such a quality system belongs to the care providers themselves. However, as the Competent Authority in these matters, the Dutch Health Care Inspectorate (DHI) must monitor whether hospitals and individual care providers actually do take this responsibility. In assessing whether this is the case, the DHI considers reporting of critical incidents, their evaluation and the actions taken afterwards important quality indicators. Generally speaking, a hospital reporting critical incidents on a regular basis will be assessed more favourably by the DHI than a hospital which never reports incidents.

When an incident is reported to the DHI, the Inspectorate first invites the care provider or his employer to investigate the incident himself and to report the results of this investigation. The DHI's first point of interest is to determine whether the incident is due to an incidental occurrence, a structural problem either within the medical centre or even nationwide, a dysfunctional system, or individual incompetence. In this respect, reporting to the DHI is similar to reporting to an auditing organisation. In audits, three levels are recognised, each adding to the depth of the audit: firstly, a simple recording of the number of deaths; secondly, a mapping of the causes of death; and thirdly, an identification of potentially avoidable factors.[27] The implementation of a national perinatal audit system in the Netherlands is in progress.[28] However, the DHI adds a fourth level in that it considers the (evaluation of a) critical incident an indicator for the medical centre's quality system. As the Competent Authority in health related matters, the DHI may impose measures, depending on the nature of the findings. Such measures may vary from adjusting protocols on local or national level, to organisational adjustments or disciplinary actions (see Table 8.5). In addition, the DHI supervises the implementation of such measures. The system of mandatory reporting to DHI and its effects on health-care delivery are the subject of a current study.[18]

The more satisfactory a medical facility's initial evaluation and actions, the more distant the DHI will remain. Fourteen per cent of the cases reported in the period covered by this study were closed after satisfactory initial reports, while another 59% were closed after the DHI received adequate replies to its additional queries. Only 27% of cases required a thorough inquiry. This indicates how seriously care providers take their obligation to evaluate the incidents they report.

The representativeness of the incidents reported is unknown. As an example, the number of incidents involving maternal and perinatal mortality and morbidity is lower than might be expected on the base of the literature.[13;17;24;29-32] In addition, it is striking that the majority (59,6%) of reported perinatal mortality cases concern intra- or postpartum death in term pregnancies. According to the national database, only 12.6% of perinatal mortality cases occurs in this group.[33] Obviously, a term death is more likely to be recognised as a critical incident than a preterm or antepartum death. However, 82% of all perinatal deaths in the Netherlands are caused by the so-called Big 3 (congenital malformations, prematurity and intrauterine growth retardation, or a combination of these)[8], which implies that the focus in the evaluation of Dutch maternity care should not be narrowed to (term) deliveries alone.

Therefore, we would like to emphasise that the cases covered by the current study cannot be considered representative of Dutch obstetric care in general, the more so because the outcome of critical incidents will be adverse by definition. Nevertheless, it is possible to draw some universal conclusions from the findings. Tables 8.2 and 8.3, summarizing 32 cases (46% of all reported incidents), provide an introduction to the nature of the reported incidents. They show the diversity of cases to be large, and also show that the adverse outcomes were caused in nearly all cases by an accumulation of risk factors, events and factors contributing to substandard care. This underlines the obvious complexity of the problem of perinatal mortality, which will require more than quick and easy solutions.

Likewise, the factors contributing to substandard care identified in this study are very diverse. Nevertheless, certain frequently occurring aspects can be identified (Table 8.4) and recommendations for improvements can be made (Table 8.5).

*Inadequate communication and co-operation* particularly pose a risk in hospitals, where many care providers are likely to be involved in a patient's care over the course of a pregnancy: the obstetrician, the obstetrician in training, the assistant physician (who may still be a student), the clinical midwife, the OB/GYN nurse, general-duty nurses and maternity assistants (all of whom work changing shifts)

**Table 8.4** - Factors Contributing to Substandard Care Identified in the Critical Incidents Reported to the DHI

| Factors Contributing to Substandard Care (FSS) | No. of cases* | N (%) of cases with identified FSS * | N of cases at daytime (% of all cases at daytime, n=26)* | N of cases in ENW hours (% of all cases in ENW hours, n=44)* | N of cases in primary care (% of all cases in primary care, n=10)* | N of cases in shared care (% of all cases in shared care, n=9)* | N of cases in 2nd/3rd care (% of all cases in 2nd / 3rd care, n=51)* |
|---|---|---|---|---|---|---|---|
| FSS in care provision | 55 | | | | | | |
| *Inadequate treatment or intervention* | | **38 (54%)** | 12 (46%) | 26 (59%) | 7 (70%) | 4 (44%) | 27 (53%) |
| *Failure of recognition of pathology* | | **33 (47%)** | 13 (50%) | 20 (46%) | 8 (80%) | 5 (56%) | 20 (39%) |
| *Intra- and intermural communication and data transfer* | | **27 (39%)** | 12 (46%) | 15 (34%) | 1 (10%) | 2 (22%) | 24 (47%) |
| *Lack of clarity about who is taking the lead, organization of (acute) care* | | **27 (39%)** | 11 (42%) | 16 (36%) | 0 (0%) | 4 (44%) | 23 (45%) |
| *Intra- and interdisciplinary co-operation* | | **17 (24%)** | 6 (23%) | 11 (25%) | 1 (10%) | 3 (33%) | 13 (26%) |
| *Delay due to absence of a care provider with the required expertise* | | **6 (9%)** | 0 (0 %) | 6 (14%) | 0 (0%) | 2 (22%) | 4 (8%) |
| *Miscommunication with the patient* | | **10 (14%)** | 4 (15%) | 6 (14%) | 4 (40%) | 2 (22%) | 4 (8%) |
| *Failure of product* | | **5 (7%)** | 1 (4%) | 4 (9%) | 0 (0%) | 0 (0%) | 5 (7%) |
| Maternal factors (language barrier, neglecting alarm signals) | 7 | **7 (10%)** | 3 (12%) | 4 (9%) | 2 (20%) | 2 (22%) | 3 (6%) |
| No FSS identified, unavoidable complication | 12 | **12 (17%)** | 4 (15%) | 8 (18%) | 2 (20%) | 0 (0%) | 10 (20%) |

FSS Factors contributing to substandard care
ENW hours Evening, night and weekend hours
* The sum of numbers exceeds the denominator since more than one substandard factor could be identified

(Table 8.4). In cases involving multimorbidity or medical intervention, non-obstetric specialists may be added to the team, and in cases where the patient is referred from primary care, a midwife or a GP will be involved as well ('chain care', Table 8.2). In such circumstances, unambiguous communication and clear agreements on the division of responsibilities, treatment plans and management of medical records are required to guarantee responsible care and continuity.

Communication and continuity of care are less of an issue in primary care, where pregnant women are cared for only by their own midwives or general practitioners. The main risk factor here is *lack of acknowledgement* that a seemingly normal pregnancy, labour or puerperium suddenly can turn into severe pathology (Tables 8.2 and 8.4).

In the delivery of direct care, especially in hospitals, we noted a lack of attention for *accumulation of risks*, which sometimes resulted in a rather passive approach. On a related note, we found inadequate fetal monitoring being a substandard factor, especially the misinterpretation of the CTG (a substandard factor also observed in other studies).[34]

Recently, a large registry-based study showed an increased adverse perinatal outcome of night-time deliveries in Dutch hospitals.[23] In the current study, the time of the day does not seem to play a role in most cases (79%). However, in 15 cases (36% of all cases reported to have taken place in ENW hours), the outcome possibly could have been better if the event had occurred during the day (Table 8.3). Reduced monitoring of sleeping hospitalised women, a failure to recognise pathology due to insufficient expertise, or a delay in suitable treatment due to the absence of the medical professional with the required expertise contributed to these incidents, which look like they should be filed under 'typical ENW incidents' at first sight. Remarkably enough, though, it turns out that the percentages associated with the various factors contributing to substandard care during ENW hours equalise those identified in day-time hours (Table 8.4). Apparently, unambiguous agreements on plans of treatment, authorisation and indications for consultation will have a larger impact in ENW hours if the supervising obstetrician is not in the hospital. In addition, inadequate communication, resulting in divergent interpretations of 'sender' and 'receiver', will result in delayed treatment especially during ENW hours.

Over the next few years, the recommendations issued by the Steering Committee on Pregnancy and Child Birth will likely lead to more debate on the structure of Dutch obstetric system. However, our findings prove that we should not wait for the results

**Table 8.5** - Assessment, Actions and Measures Following the Reported Critical Incidents

| **Analysis and assessment of the critical incident by the DHI** | **No. of cases** |
|---|---|
| 1. The information provided was considered sufficient. The analysis and the plan of action drawn up to prevent recurrence were considered thorough and effective. Case closed. | 10 |
| 2. The information provided resulted in supplementary inquiries being made with the institution or care providers. Either the case needed a further exploration (by the care providers themselves or by independent investigators), or the plan of action drawn up to prevent recurrence was found to be unsatisfactory. The case was not closed until after the DHI had received adequate supplementary information. | 41 |
| 3. The information provided led to a thorough investigation in which the DHI inspected files and interviewed the medical professionals involved, as well as the patients or their next of kin. | 19 |
| ***Total number of cases*** | ***70*** |

| **Concrete action items, formulated by the institution or care provider as part of an action plan or local protocol, concerning** | |
|---|---|
| - Diagnosing and medical treatment | 25 |
| - Organization of (emergency) care | 20 |
| - Clear definition/demarcation of duties, clarity about who should take the lead | 17 |
| - File-keeping | 12 |
| - Communication, referral, continuity of care | 26 |
| - (Ongoing) continuing education | 15 |
| - Multidisciplinary evaluation, peer review, system of evaluation of complaints and (critical) incidents | 14 |
| ***Total number of cases*** | ***59 **** |

| **Specific measures** | |
|---|---|
| - Case brought to disciplinary court | 4 |
| - Dismissal | 4 |
| - Compulsory supervision | 1 |
| - Writing a case report for a medical journal | 3 |
| ***Total number of cases*** | ***12*** |

* Numbers add up to more than 59 since more than one action was undertaken per case

of this debate. Improvements in the basic factors aforementioned are likely to result in major gains. Individual medical professionals should focus on improving these issues, which are within their own grasp and which play a major part in whatever care system. Which is not a non-committal conclusion. The numbers and percentages presented in the tables appended to this article each represent heart-breaking tragedies which will have an impact on the patients' next of kin for the rest of their life – tragedies which call for every medical professional to assess and improve his own performance to the utmost extent, irrespective of the Netherlands' position in the PERISTAT rankings.

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CHAPTER 9

# General discussion

The Dutch health care legislation has made systematic evaluation of the quality of care a prerequisite for the delivery of medical care and for the performance of both the individual midwife and the midwifery practice *(Chapter 1)*. According to the Quality Assurance at Medical Facilities Act (*Kwaliteitswet Zorginstellingen*)[1], evaluation comprises

1. the systematic collation and registration of data relating to the quality of the care delivered (Art. 4:2a)
2. systematic assessment of the quality of the care delivered on the basis of the aforementioned data (Art. 4:2b)
3. where necessary, a reorganisation of the facility's care system, depending on the results of the aforementioned assessment (Art. 4:2c).

Within the framework of this definition we studied the role of the midwife in the Dutch maternity care system.

The midwife's work has changed considerably over the last few decades. On the one hand, her tasks and competences have become more extensive, especially in matters of antepartum care *(Chapter 1 and Table A in Appendix 1)*. Furthermore, the number of diagnostic and screenings methods has increased, even in primary-care midwifery. Midwifery training has changed significantly, a national quality management policy has been established and practice management is becoming increasingly professional *(Chapter 2)*. In addition, general practitioners' involvement in childbirths has declined drastically *(Chapter 3)* and 84% of pregnant women in the Netherlands now receive their first maternity care from a primary-care midwife (Netherlands Perinatal Registry, 2008 data).[2]

On the other hand, the number of patients referred to secondary care by their primary-care midwives has risen dramatically, to 50.1% in 2004, from 36.4% in 1988 *(Chapter 4)*. Since 2004, this number has risen even further to 61.1%, according to the latest Netherlands Perinatal Registry yearbook * (2008).[2] This does not necessarily mean that primary-care-midwife-supervised deliveries have been marginalised. In 2008 nearly 58,000 Dutch women gave birth under the supervision of a primary-care midwife, with 37.078 doing so at home.[2] This figure represents nearly one-third of all childbirths reported in the Netherlands in that year.

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* Assuming that the PRN's method of data analysis did not change since 2004, the only year overlapping our analysis. The percentages of antepartum and intrapartum referrals in the PRN-data differed from our analysis (probably by different choices in the assignment of indications to pregnancy or labour), but they ended up with a comparable percentage of 'births completed under the supervision of the primary-care midwife' (49.1% in our analysis and 49.4% in the PRN-analysis).[3]

Kloosterman reported that even in 1978, one-third of all childbirths were completed under the responsibility of a midwife.[4] Figures issued by Statistics Netherlands and the Netherlands Perinatal Registry show that the increase in the number of women referred to secondary care is roughly equal to the decrease in the number of women whose childbirths used to be supervised by GPs *(Chapter 3)*. Therefore, midwives' net involvement in childbirths has not actually decreased that much; it still accounts for approximately one-third of all childbirths in the Netherlands (Figure 9.1).

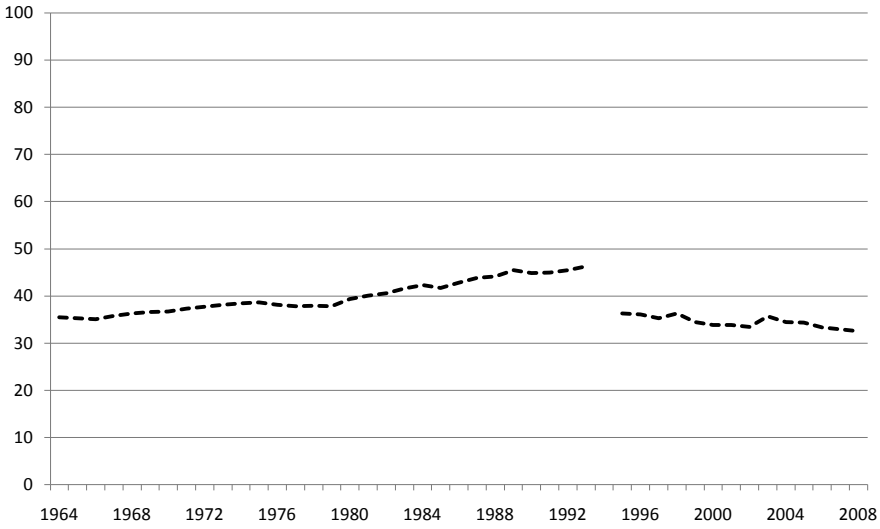


**Figure 9.1** - The percentage of deliveries in the Netherlands, completed under the supervision of the primary care midwife, 1964 – 2008

Statistics from 1964 to 1993 are based on data presented by Statistics Netherlands.[5] Statistics from 1995 to 2008 are based on data from the Netherlands Perinatal Registry.[6;7]

**Research question no. 1: What is 'normal'?**

Amidst all these changes, the core of the midwife's duties has not changed all that much. She is still charged with the supervision of normal pregnancies, deliveries and post partum period. The general philosophy of the Dutch maternity-care system continues to be that 'pregnancy and childbirth generally are physiological processes', and that 'medicalisation of obstetric care should be avoided, i.e. actively opposed'[8] - from the point of view that care must be provided 'in primary care setting as long as it suffices and in secondary care if necessary'. '[9]

The current discrepancy between the general philosophy and the increasing number of pregnant women being referred to specialist care is due to the fact that our understanding of normality has changed significantly, due to new diagnostic methods and technological advances, new epidemiologic insights and changes in society *(Chapter 3)*. The basic tenet of the Dutch maternity-care system, i.e. 'to give birth at home under the supervision of a midwife and a GP in the event of a normal pregnancy; to give birth in hospital in the event of a pathological pregnancy', was held before the first lists of indications for referral to specialist care were introduced.[10;11] Kloosterman highlighted this dichotomy as long ago as 1966 when he said that 'every deviation from a perfect physiological course of events justifies a hospital birth.'[11] This has been the basic tenet of the Dutch maternity-care system ever since.

In reality, the distinction between 'normal pregnancy' and 'pathology' is not a dichotomy, but rather a sliding scale. The narrowing scope of conditions accepted as 'normal' has made the conditions which are still considered normal more homogeneous, while making the increased scope of 'pathological pregnancy' increasingly heterogeneous. 'Pathological pregnancy' now ranges from a situation with need for resources in an otherwise normal delivery (e.g. anaesthesia) to pregnancy with mildly deviant symptoms (e.g. prelabour rupture of membranes) to one with severe pathology (e.g. HELLP syndrome). However, when a pregnant woman is referred to a specialist to *prevent* the onset of pathology (requiring resources which are not available to primary-care midwives, such as analgesics or antibiotic infusions), she will receive the same 'high risk'-label as a woman with previously diagnosed or suspected complications.

Back in 1966, the 'high-risk'-versus-'low-risk' dichotomy made sense. Breech births and multiple births were supervised in primary care. In the event of a failure to progress first stage of labour, the midwife or GP would administer intramuscular oxytocin, and in the event of a failure to progress second stage an obstetrician would come to perform a forceps delivery at home. These conditions were considered to belong to the 'normal area' at the time. The few conditions which were actually considered complications were indeed severely pathological. Nearly half a century onwards, the above-mentioned treatments are not administered in the primary-care setting any more, and rightly so. Therefore, a two-level classification 'high risk' versus 'low risk' seems obsolete now. A classification in more categories (e.g. 'low risk', 'additional diagnostics required', 'additional resources required', 'threatening or occurring pathology') seems to better fit the present day reality.

Differentiating between the various types of indications for referral is useful in evaluating, understanding and describing the maternity-care system's performance.

For instance, data analysts who continue to interpret comparisons of primary-care and secondary-care outcomes as comparisons of low-risk populations versus high-risk populations are losing sight of the fact that the population of women referred to specialist care is startlingly heterogeneous. Depending on what point a study is trying to prove, either primary-care or secondary-care results will be interpreted as being more favourable than they really are.

**Research question no. 2: Evaluation of risk-screening methods and referral to specialist care at the national level**

Differentiating between the various types of referral can also help a pregnant woman make a decision on where she would like to give birth and can help the care provider in his counselling. *Chapter 5* shows that almost the half of all first-time mothers who started labour under the supervision of a primary-care midwife ends up being referred to a specialist intrapartum. The recent Netherlands Perinatal Registry yearbooks confirm this development[2], which is often referred to in the current debate on the Dutch maternity-care system. 'Referral to specialist care' is thus often interpreted to indicate 'complications', 'primary care' is interpreted to indicate 'home birth' and no distinction is made between first-time mothers and women who have given birth before. This, in turn, results in one-liners such as 'Half the women who choose to give birth at home end up having to go to the hospital due to complications', accompanied by an image of an ambulance.[12-14] Our analyses show this picture to be erroneous. Judging from our figures, only 3.4 per cent of all home births involved emergency referrals (Chapter 5, Table 3). A recent NIVEL study on ambulance transports confirm this figure.[15] Next, pregnant women should know that three-quarters of all intrapartum referrals are being made during the first stage of labour, when being transported to a hospital on medical grounds is no greater burden than being transported to a hospital for a planned hospital delivery.

A more detailed classification of the indications for referral may also enable a new model of care with continued supervision by a primary-care midwife in the event of a referral. In the current system, primary-care midwives generally stop looking after their patients the moment said patients are handed over to secondary care, even if they are in labour. This may seem logical from the dichotomy high-risk-versus-low-risk and the current 'demarcation-of-responsibilities' perspective, but as far as the woman herself is concerned, discontinuing care at such a crucial moment may well be very undesirable. Rijnders et al. have shown that women who were referred to a specialist intrapartum were much less happy with their birth experiences than women who completed a home birth or planned to give birth in hospital from the start.[16] This was largely due to the lack of continuity in the care they received.[17] One could argue that it

might be better to make the transition from one medical practitioner to the next more smooth by allowing the 'own' trusted primary-care midwife to continue to play a role in the proceedings even after the referral. The midwife then could, for instance, continue her 'relational care' [18], and – depending on the nature of the complication – also (a part of) the medical care, thus ensuring continuity of care in a 'case manager'-like capacity.

Last but not least, a smoother transition from primary care to secondary care as described above could create room for care organised in accordance with the standards proposed by the *Stuurgroep Zwangerschap en Geboorte* (*A Good Start,* published in January 2010).[9] This report, written by the professional groups involved, proposes a patient-to-Ob-Gyn-nurse-or-maternity-assistant ratio of 1:1, plus a patient-to-obstetric-professional (obstetrician, midwife or resident) ratio of 1:2. This standard will be hard to attain with obstetric professionals and Ob-Gyn nurses continuing to be in short supply, unless hospitals tap into new forms of collaboration, for instance by making good use of the expertise and capacities of primary-care midwives.

Needless to say, such a vast overhaul of the maternity-care system would have to meet certain preconditions. Harmonious co-operation between all medical professionals involved would be a prerequisite, as would shared files, registration and continuous evaluation. Serious incidents reported to the Dutch Health Care Inspectorate have taught us that a lack of clarity as to the division of responsibilities, authorisation and direction puts both mother and child at risk *(Chapter 8)*. Therefore, a reshuffle of responsibilities is only safe and justified if very strict protocols and agreements on the nature of the collaborative effort and the division of responsibilities are in place, and if each care provider does only what he or she is sufficiently competent and legally qualified to.[19;20]

All this requires a thorough re-evaluation of the way in which maternity care is currently organised. The specific expertise and capacities of primary- and secondary-care providers should not be equalised, but rather made much more explicit, so that the two groups of medical practitioners complement each other rather than become rivals. Midwives are no 'HBO-obstetricians'[21], nor should they aspire to be, not even if midwifery courses were to become an academic course.[22;23]
This being the case, redefining the scope of the primary-care midwife's duties would not constitute an extension of that scope, but rather a re-evaluation of her current duties, which would benefit the pregnant women, who, being be at the centre of care[24], would receive the made-to-measure care they require. Such an individual approach to the delivery of care would be in keeping with 'proper care' as defined in the Quality

Assurance at Medical Facilities Act (*Kwaliteitswet Zorginstellingen)*: high-quality care which is provided to the patient in an effective, efficient and patient-friendly way and meets the patient's individual needs.[1]

**Research question no. 3: Evaluation of individual care**
Have care and perinatal and maternal outcomes improved since the big shifts described above took place and the scope of 'normality' was narrowed? This is the key question, which, if answered affirmatively, would justify all the changes within rhe role division in the Dutch obstetric system over the years.

It is impossible to answer this question with the data currently available, since no causal relations can be inferred from the perinatal databases. Many parties, however, appear to believe this is possible. The media have played an important role in drawing far reaching conclusions from these flawed inferences.[12;25-31] GP/epidemiologist Hoogendoorn provoked a lively debate when he first suggested there is a correlation between perinatal mortality and home birth in 1986.[32] It is worth mentioning in this regard that recent publications have shown that the highest perinatal mortality rates are found in areas with a low incidence of home births.[33-35] However, it would be equally unjust to attribute the Netherlands' failure to reduce its perinatal mortality rates to the level of other European countries to the increased involvement of secondary-care providers.

Once it becomes available, the Dutch Perinatal Registry's improved data set will provide researchers with a greater insight into the relationship between care delivery and outcome in primary, secondary and tertiary care, respectively.[36-38] However, even this relatively sophisticated registry will not generate more than hypotheses and trends which will have to be tested in more thorough studies.[39] Moreover, the secondary-care data generated by the Registry will in all likelihood prove difficult to interpret since the indications for referral are so heterogeneous (as stated above) and because a substantial percentage of women in secondary care are in fact low-risk women.[40-42]

Perinatal audit is an important analytical instrument which can be used to identify both substandard factors and best practices, and may detect both undertreatment and overtreatment. The results of the first nation-wide audit are expected to be released at the end of 2011.[43;44] However, perinatal audit is especially useful at the local level, since a multi-disciplinary discussion of cases with adverse outcomes inevitably results in greater openness and actions geared towards improvement. The multidisciplinary approach and the collaboration during the audit meetings improves the co-operation between perinatal care providers in the patients' care as well, not the least because by

knowing each other better than before.[45] At the moment the instrument is mainly used for assessment of perinatal mortality, but it has also proven useful in assessing other outcomes, such as postpartum haemorrhage, and interventions such as Caesarean section and episiotomy.[46-48]

As we showed in *Chapter 7*, care providers generally accept feedback given by external parties in the perinatal audit procedure. Among the more unexpected findings of our study was the fact that the care providers involved generally judged themselves more harshly than the audit panel did. This being the case, we suspect that audit meetings could help medical professionals to deal with their grief over their personally professional failure as well.

Perinatal mortality audit involves a selection of certain cases. Therefore, the results of an audit may not be translated in interventions or new policies conducted in the population at large, without considering the full impact on the population. As a consequence, the instrument of audit should always be combined with other quantitative and qualitative quality assessment activities, such as intervention studies.[49;50] The same is true for the results of the Inspectorate's own study investigating critical incidents. Those, too, reflect a select number of cases rather than the population at large.

Nevertheless, certain structural aspects can be inferred from the analysis described in *Chapter 8*. It appears that significant improvements could be made by improving basic preconditions for proper care, such as good communication, explicit patient handovers, unceasing alertness and a clear demarcation of duties and responsibilities. This goes for all echelons and all disciplines. This is an important finding which may help us reorganise the Dutch maternity-care system. Good care is not delivered by 'bricks and buildings', but rather by the care providers working inside those buildings, irrespective of whether these buildings are hospitals or people's homes.[51] The effectiveness of care largely depends on how well such medical professionals – primary-, secondary- and tertiary-care providers alike – co-operate. Several of the indicators described in *Chapter 6* correspond to these preconditions for proper care, which goes to show that quality, or a lack thereof, does not have to be defined in terms of adverse outcomes only. A well chosen indicator is on the one hand an alarm, if minimum standards are not met or if the rating is deviating from average practice strongly, but on the other hand a sign of quality in case of good performance. By using the indicators for reflection and benchmarking, these may act as a stimulus to improve care on the individual, regional and national level.

**Evaluations of Dutch midwifery care in the (inter)national literature**

In Chapter 1 we presented an overview of scientific, peer-reviewed literature assessing the work of the primary care midwife within the Dutch maternity-care system in the 1956-2005 period. One of the conclusions we drew was that in the study period Dutch midwives' performance was assessed primarily by people who were not midwives themselves, most notably by obstetricians. Another conclusion we drew was that the quality of Dutch maternity care was defined largely in terms of mortality or morbidity, focusing on the condition of the neonate rather than the mother. An early stage development of an evidence base for the content of the midwife's work was recognised from 1996 onwards.

We performed another literature search for the 2006-2011 period (cut-off date: June 1st 2011), using the same key words and selection criteria as before (see page 13). The international search resulted in 259 additional hits, while the Dutch search resulted in 53 hits. Again, we divided the studies into two subcategories: 'Assessment of the quality of Dutch midwifery care' and 'The scope of Dutch primary-care midwives' duties'.

**Studies assessing the quality of Dutch midwifery care**

The key data and conclusions of the studies thus selected are presented in the second part of Table B in Appendix 2. Once again, we analysed the composition of each research team, coming up with two figures: the MR-factor (the extent to which midwives were represented in each research team) and the OR factor (the extent to which obstetricians were represented in each team).*

Table 9.1 (page 174) presents a summary of all the findings of Table B. The bolded data in the end column cover a five-year period, whereas the columns to the left each cover a ten-year period.

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* We assumed that the first-listed author for each study was the principal researcher. He/she was awarded 4 author points. The second- and the last-listed author each received 2 points, while all other authors listed were each awarded 1 author point.
The midwives' involvement in the research team, the MR-factor (denoting the extent to which midwives were represented in the research team) was calculated as the quotient of the number of author points for midwives, in relation to the available number of author points * 100.
In the same way the obstetricians' involvement in the research team (the OR-factor) was calculated (denoting the extent to which obstetricians were represented in the research team)

As an example: The paper 'Perinatal mortality and morbidity in a nationwide cohort of 529,688 low-risk planned home and hospital births'(2009) had 8 authors.[52] The first, second and fourth author were midwives (4+2+1=7 author points for midwives); the fifth, sixth and seventh author were obstetricians (3 * 1 =3 author points) and the third and last author were neither midwife nor obstetrician(1+2 author points). Thus, the total number of authorpoints available was 13. The MR-factor resulted in 7 : 13 * 100 = 54; the OR-factor resulted in 3 : 13 * 100 = 23.

The most striking thing about the 2006-2011 period is the large increase in the number of midwifery-related studies: 25 studies met the criteria for inclusion. Thus, the number of studies published in the 2006-2011 period is twice that of the preceding ten years and makes up two-thirds of the total number of studies devoted to Dutch midwifery care of the preceding fifty years combined. Furthermore, more diverse outcome measures were used in the 2006-2011 period, and more studies were devoted to maternal outcomes. Twenty-five% of the 2006-2011 studies used the maternal experience as either the primary or a secondary outcome measure, with another 12.5% focusing on maternal mortality or morbidity (Figure 9.2). In addition, since the mid-1990s, a significant number of studies discussed the maternity-care system as a whole, rather than just the place of delivery, which is no more than a consequence of the system (Figure 9.3).

The mean Midwives' Research factor (MR-factor) increased significantly in the 2006-2011 period, achieving the same level as the mean Obstetricians' Research Factor (OR-factor). The decrease in the OR-factor may also be due to the increasing number of epidemiologists and other non-obstetric researchers studying the field. No fewer than 83% of the papers published in this period were published in foreign journals, which reflects international interest in the Dutch maternity-care system.

**Studies concerning the scope of primary-care midwives' duties**

A total of 36 papers published in the 2006-2011 period met the criteria for inclusion in the second subcategory (i.e. the scope of primary-care midwives' duties), which almost equals the number of papers published in the preceding fifty years. Table 9.2, which summarised the subjects of the studies, shows that pregnancy and mothers' expectations were popular subjects in this period (page 176).

The mean MR-factor in this subcategory was 19, showing the participation of midwives since the nineties. Many more papers are expected to be published over the next few years, since quite a number of studies investigating primary-care midwifery in the Netherlands are currently being conducted, e.g. the Deliver Study (conducted by the Amsterdam/Groningen Midwifery Academy)[174] and VECAS (a study conducted by the Maastricht Midwifery Academy).[175] Furthermore, the Primary-Care Midwifery Consortium, which is currently being established, will likely produce studies and research papers.

**Conclusions from the literature**

The obvious conclusion to be drawn from the recent literature produced on the subject is that our understanding of the Dutch obstetric system, and the role played therein by midwives, has improved considerably over the last five years. It is also

**Table 9.1** - Studies investigating the quality of midwifery care, published in peer-reviewed journals in the 1956-2011 period. (Refer to Table B in Appendix 2 for a descriptive summary of the selected studies.)

| | 1956-1965 | 1966-1975 | 1976-1985 | 1986-1995 | 1996-2005 | **2006-2011** |
|---|---|---|---|---|---|---|
| Total number of papers selected | 0 | 1 | 11 | 12 | 12 | **25** |
| Number of papers published internationally | – | – | 3 | 7 | 10 | **21** |
| Number of papers published in Dutch | – | 1 | 8 | 5 | 2 | **4** |
| MR-factor (Midwives' involvement in the research team) † | – | Mean = 0 | Mean = 0 | Mean = 2<br>Range<br>0 - 25 | Mean = 13<br>Range<br>0 - 50 | **Mean = 25**<br>Range<br>0 - 100 |
| OR-factor (Obstetricians' involvement in the research team) † | – | Mean = 33 | Mean = 70<br>Range<br>0 - 100 | Mean = 62<br>Range<br>0 - 100 | Mean = 46<br>Range<br>0 - 100 | **Mean = 25**<br>Range<br>0 - 100 |
| ***Subject of the study*** | | | | | | |
| midwifery care | – | – | 1 | 3 | 2 | **4** |
| place of delivery | – | – | 8 | 5 | 3 | **6** |
| primary vs secondary care | – | – | 1 | 3 | 1 | **2** |
| maternity care system | – | 1 | 1 | 1 | 6 | **13** |
| ***Outcome measures **** | | | | | | |
| perinatal mortality | – | 1 [53] | 8 [32;40;54-59] | 7 [39;60-65] | 6 [66-71] | **10** [33;35;52;72-78] |
| neonatal morbidity | – | – | 5 [40;59;79-81] | 4 [62;82-84] | 3 [66;71;85] | **5** [52;72;75;77;86] |
| maternal mortality | – | – | – | – | 1 [87] | **1** [88] |
| maternal morbidity | – | – | – | – | 1 [66] | **2** [46;89] |
| referral | – | – | 3 [40;58;59] | 1 [90] | – | **5** [72;91-94] |
| interventions | – | – | 2 [55;59] | 2 [62;84] | 2 [95 96] | **3** [42;94;97] |
| women's experiences | – | – | – | 1 [98] | 2 [96;99] | **7** [16;94;100-104] |
| substandard care factors | – | – | 2 [56;57] | 1 [64] | 5 [67-70;105] | **4** [46;76;88;89] |

† See page 172 for explanation of MR-factor and OR-factor
* the sum of numbers exceeds the number of papers since more than one outcome measure could be used

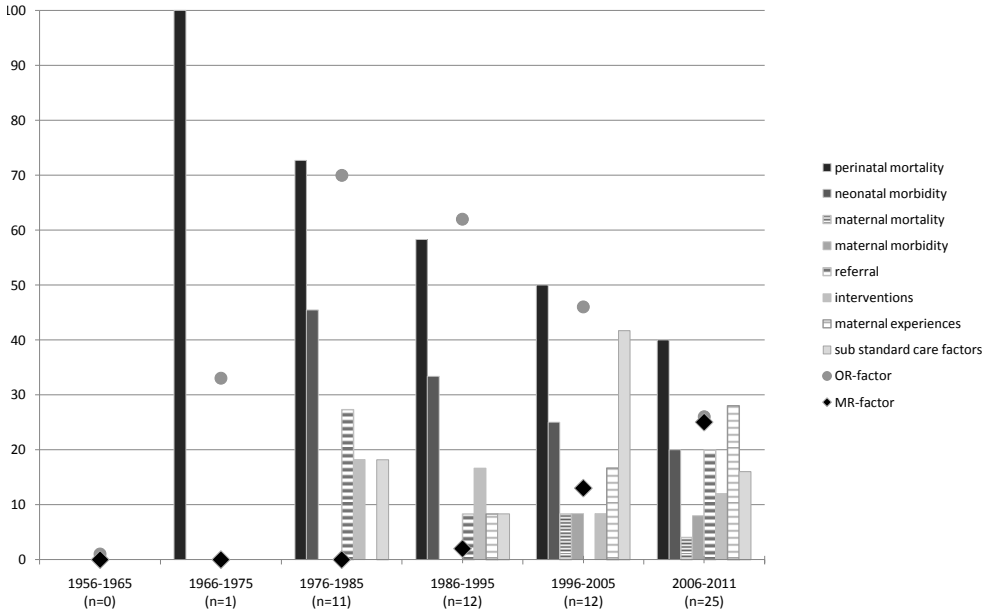


**Figure 9.2** - Outcome measures in studies assessing the quality of Dutch midwifery care 1956-2011, as a percentage of the number of studies published per decade

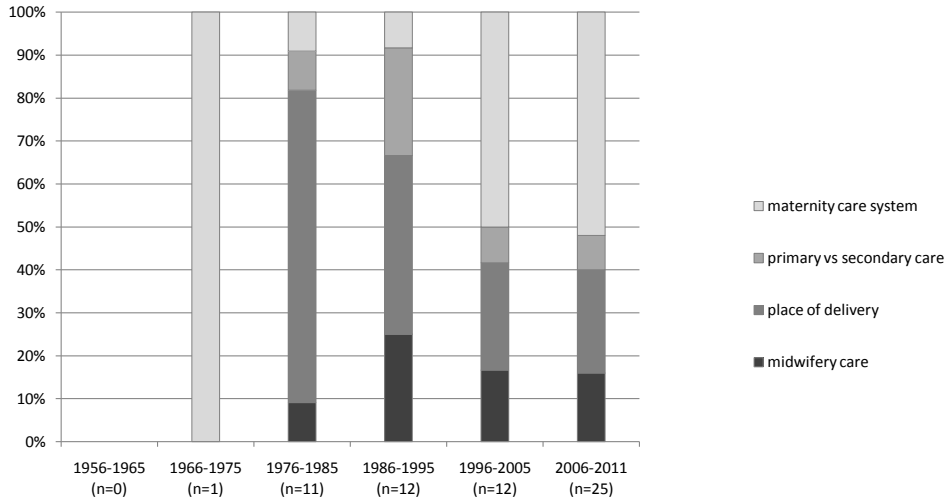


**Figure 9.3** - Subject of the studies assessing the quality of Dutch midwifery care 1956-2011, as a % of the number of studies published per decade.

**Table 9.2** - Studies Investigating the Scope of Primary-Care Midwives' Duties

| Subject of study | 1956-1985 | 1986-1995 | 1996-2005 | 2006-2011 |
|---|---|---|---|---|
| *Total number of papers* | *2* | *7* | *23* | ***36*** |
| *Mean MR-factor* | *50*<br>*Range*<br>*0 - 100* | *3*<br>*Range*<br>*0 - 22* | *18*<br>*Range*<br>*0 - 100* | ***19***<br>*Range*<br>*0 - 70* |
| ***Pregnancy*** | | | | |
| counselling and advice (pre-conception, nutrition, smoking cessation, prenatal screening, breastfeeding) | – | 1 [106] | 3 [107-109] | **8** [110-117] |
| use of medication | – | 1 [118] | 1 [119] | **–** |
| diagnostics, tests and interventions | – | – | 2 [120;121] | **3** [122-124] |
| social make-up of clientele (socioeconomic status, elderly women, women with a history of sexual abuse, immigrants) | 1 [125] | 1 [126] | 1 [127] | **2** [128;129] |
| ***Delivery*** | | | | |
| management of labour and interventions | – | 2 [130;131] | 3 [78;132;133] | **2** [134;135] |
| neonatal condition after home birth | 1 [136] | – | – | **–** |
| ***Women's attitudes and expectations*** | | | | |
| decision-making process in making choices | – | 1 [137] | 2 [138;139] | **5** [140-144] |
| expectations and preferences for certain types of care | – | – | 2 [145;146] | **3** [147-149] |
| ***Preferences and attitudes of midwives*** | | | | |
| midwifery-related factors influencing expectant mothers' choices | – | – | 3 [150-152] | **2** [153;154] |
| influence of birth location on midwife's performance | – | – | 1 [18] | **–** |
| adherence to guidelines (miscarriage, anaemia, vitamin K policy, smoking cessation procedure) | – | – | 3 [155-157] | **1** [158] |
| ***Care management*** | | | | |
| primary-care midwives' workload | – | – | 1 [159] | **1** [160] |
| costs of birth | – | – | – | **1** [161] |
| co-operation between primary- and secondary-care professionals | – | 1 [162] | 1 [163] | **–** |
| transport of obstetric patients | – | 1 [164] | – | **–** |
| ***Evaluation*** | | | | |
| small peer-group evaluation | – | – | 1 [165] | **-** |
| feasibility and effects of (perinatal) audit | – | – | 1 [166] | **2** [167;168] |
| Education and knowledge (genetics, medication, Hb-pathy) | | | | **5** [169-173] |

obvious that midwives are increasingly taking responsibility for the evaluation of their own performance and are publishing their evaluations. This finding is an indication of the midwives' developing professional attitude towards their work *(Chapter 2)*.

Perinatal mortality continues to be the most commonly used outcome measure in studies investigating the assessment of the Dutch obstetric system and the role of the midwife therein (42 per cent of all studies published between 2006 and 2011, down from 57 per cent in the preceding fifty years). In addition, a large number of papers on the subject of perinatal mortality in the Netherlands were published in the 2006-2011 period which were not included in this study because they paid scant attention to the role played in the proceedings by midwives.[34;35;45;73;74;176-180]

So far, this large body of evidence has not resulted in a generally accepted conclusion on the most effective way to run the Dutch maternity-care system. On the contrary, in Keirse's words, 'Any new home birth study, whether it exposes the hazards or the merits of home birth, is guaranteed to fuel the fires of controversy, keeping both opponents and proponents nicely warm while shedding more heat than light on the subject.'[51]

**Causal relation?**

One of the reasons why the discussion cannot seem to be satisfactorily concluded is because we do not have enough information to assume that there is a causal relation between the care provided and the outcome. When we juxtapose these two elements in a 2x2 table, it may seem at first glance that the assessments in the situations represented by Sections A, C and D are correct (Figure 9.4a): a healthy child was born in primary care (Section A), or the pathology was remedied successfully, resulting in a healthy mother and child (Section C), or complications arose despite the secondary care givers employed all technical possibilities (Section D). Section B shows mortality or morbidity in a primary-care setting, so, the patient was not referred to specialist care despite suffering complications, which seems to lead to the inevitable conclusion that the risk selection failed.

**Figure 9.4a** - Evaluation of relationship between care and outcome, at first appearance

| | **Good outcome child/mother** | **Adverse outcome child/mother** |
|---|---|---|
| **Delivery in primary care** | 'Rightly' in primary care<br>A | 'Wrongly' in primary care<br>B |
| **Delivery in secondary care** | 'Rightly' in secondary care<br>C | 'Rightly' in secondary care<br>D |

This way of thinking generally results in conclusions like the one Lievaart drew in a 1982 study investigating neonatal morbidity: 'In pregnancies and deliveries considered normal by midwives, only neonates with a condition that is virtually optimal should be born.'[80] Reijnders concluded in 1987 from a data analysis of intra-uterine death in Dutch hospitals, 40% of which had been referred to the obstetrician by primary-care midwives: 'The avoidability of the cases of intra-uterine death in primary care has to be analysed.'[60]

In reality, only Section A is truely useful for evaluative purposes, its outcome being a healthy mother and a healthy baby in primary care (Figure 9.4b). Section B raises the question of whether the pathology could have been detected and treated if the woman had been under secondary supervision, and if so, whether the outcome would

**Figure 9.4b** - Evaluation of relationship between care and outcome, in reality

| | **Good outcome child/mother** | **Adverse outcome child/mother** |
|---|---|---|
| **Delivery in primary care** | 'Rightly' in primary care<br>A | 'Wrongly' in primary care<br>→ ***Unless the outcome was unavoidable and would have been the same in secondary care***<br>B |
| **Delivery in secondary care** | 'Rightly' in secondary care<br>→ ***Post or propter?***<br>C | 'Rightly' in secondary care<br>→ ***Post or propter?***<br>D |

have been different. As an example: an acute abruption of the placenta, a preterm delivery at home or on the way to the hospital, or a foetus with a non-identifiable congenital disorder or an undetermined cause of death.[181;182] Section C raises questions as to whether, given the division of responsibilities between the various levels of care, this patient was rightly referred to secondary care, or whether this was really a low-risk pregnancy which should have been entered in section A.[40-42] In the case of Section D, it is unclear whether the adverse outcome occurred despite proper care or whether it was due to substandard care delivered in secondary care, and/or in primary care in case of a referral. As far as Section D is concerned, the critical incidents described in Chapter 8 demonstrate a large room for improvements in just basic aspects of care, e.g. adequate communication and co-operation, clear assignment of responsibilities and attentiveness in maternal and fetal surveillance.[77]

The understanding of this common way of thinking may be used to gain insight into the historical debates and to be able to ask the right research questions for the future. The Sections B and D contain the spearheads of further evaluative research concerning adverse outcomes. However, the Sections A and C will be of the utmost importance to gain insight into the still unrevealed physiological processes of pregnancy and labour and into possibilities to prevent adverse outcomes. The obvious conclusion to be drawn from Figure 9.4b is that all four sections need attention, and that all four sections concern both primary and secondary care.

Perinatal audit or observational studies can play an important part in helping us complete the above 2x2 table. Bais' study investigating the detection of intrauterine growth restriction (IUGR) is a good example. Bais found the diagnostic performance of abdominal palpation as a screening test for IUGR performed by midwives disappointing, but also found that various stratagems, such as routine ultrasound, did not improve detection rate, nor perinatal morbidity and mortality.[71] In addition, this example demonstrates the complexity of the problems in health care in general and in maternity care specifically. The result of the sole research question on the diagnostic performance of abdominal palpation in detecting IUGR detection will in itself not be sufficient to improve care. It has to be followed by questions concerning the efficiency and efficacy of alternative screening methods: would these methods improve the detection rate, and if so, are efficient treatments available, and if so, will these treatments result in the desired outcome? This way of thinking is crucial in preventing ineffective interventions with 'more harm than good' and will help us learn which field specifically requires innovative research aimed at eradicating the current problems.

**Research Agenda**

It is high time that all obstetric professionals, regardless of their positions, look at all the material gathered so far with scientific detachment and an open mind, and determine what all this may mean in practice.

At first, we owe it to the pregnant women and the society to show that Dutch care providers are working together to ensure the best results. The reputation of the Dutch maternity-care system has been badly affected by the continued focus on the Netherlands' high PERISTAT ranking and the heated, frequently public, debates on this subject conducted over the last few years by the professionals groups involved. Headlines such as, 'In hospitals the number of babies dying at night is a quarter more than at daytime'[183;184] or 'Primary-care deliveries are 2.5 times more likely to result in death than secondary-care deliveries'[28;77], without any mention of the a priori hazard (6 in 10,000) cause a great deal of uncertainty in pregnant women who seem to have to make a choice between two dangerous options[185;186] and so compromise patient safety indirectly. Which is not to say that studies which publish such results do not warrant a thorough in-depth analysis by all obstetric professionals involved.[77;184;187-189]

Convincing pregnant women that their faith in the Dutch maternity-care system is justified will require continuous assessment of obstetric professionals' performance and its outcomes, as well as openness about these things, at three levels: the multi-disciplinary level, the level of each specific obstetric profession and the individual care provider's level. This will allow both internal and external evaluation and accountability.

Secondly, now that we have obtained knowledge about the prevalence of perinatal mortality, it is important to broaden the focus. The last years' studies and public debates have been focussing mainly at the intrapartum mortality of children at term (both in primary and secondary care). According to the Netherlands Perinatal Registry, in 2008 91.5% of all pregnant women delivered in the term period (≥ 37 weeks GA). Of all perinatal mortality, 27.4% took place in this group at term.[2] This implies that 72.6% of all perinatal mortality occurred in the 8.5% of the pregnancies *not* at term. Besides, within the perinatal mortality in pregnancies at term, 60% occurred in the antepartum period (see Figure 9.5).

These figures suggest that the ongoing debate on the place of delivery shifts the focus away from questions that urgently need to be addressed. The largest gains may be achieved in prevention of antepartum mortality, especially in the preterm period. This is all the more a matter of importance since preterm birth, intrauter-

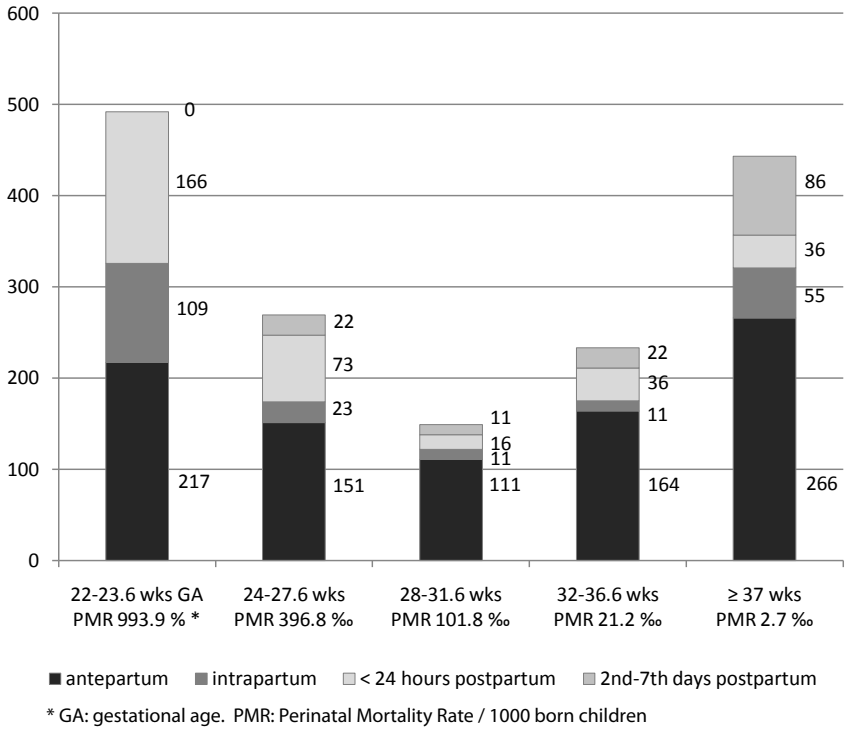


**Figure 9.5 -** Perinatal deaths in absolute numbers per gestational age (GA) and per period (antepartum, intrapartum, postpartum) according to the Netherlands Perinatal Registry 2008 [2]

ine growth retardation and congenital malformations constitute the most significant causes of perinatal mortality. Together, these so-called BIG-3 causes are responsible for 82% of all perinatal mortalities.[9;182] The prevention of these conditions request an approach both on a Public Health level and on a individual level.[9;190]

We need more insight into the determinants of these pathological conditions and we should focus on the improvements which can be made concerning primary prevention, early risk-detection and prediction models, to be used in all levels of care. Next, much more emphasis should be put on implementing evidence based preventive measures, such as supporting women in smoking cessation and in the use of folic acid. Given her easy accessibility, the primary-care midwife may play an important role in these health promotional activities.[191;192]

Thirdly, the attention to the remaining 99.1% of pregnancies in which no perinatal mortality occurred, has diminished as a result of the emphasis on mortality. What is

the best care for these babies and their mothers, and how can it be improved in order to prevent morbidity and to increase maternal / parental satisfaction? How can we stimulate a normal progress of pregnancy and childbirth? What do expectant mothers themselves think important, and how can we stimulate them to help themselves have a healthy baby? All these issues must be examined together, using the specific expertise of obstetric professionals in primary, secondary and tertiary care alike. The current (2011-2015) ZonMw *Zwangerschap en Geboorte* Programme requires that study proposals only be authorised if the studies in question are conducted by a Consortium consisting of zero-, primary-, secondary- and tertiary-care providers. This attempt at stimulating the various obstetric professionals to work together certainly is a step in the right direction.

Midwives can make an essential contribution to such multidisciplinary projects, having gained expertise and knowledge of their field of work. By contributing to such projects, they would satisfy their legal requirement, which is to stimulate and monitor the natural progress of pregnancy, delivery and post partum period, all with the goal of reaching the best possible outcomes.[193]

## Conclusions and recommendations

- Normal is not what it used to be. The proportion of conditions in maternity care considered normal ('low-risk') is shrinking and the proportion of conditions considered not normal ('high-risk') is increasing, and so do the number of referrals from primary- to secondary care.
- The low-risk-versus-high-risk dichotomy has become obsolete. The heterogeneity of the 'high-risk'-group of women hampers the assessment of the effectiveness of the Dutch maternity care system, is inefficient and results in discontinuity of care.

  – *The dichotomy low-risk-versus-high-risk should be substituted by a classification in accordance to real practice, e.g. prevention of pathology / additional diagnostics required / additional resources required / threatening pathology / occurring pathology.*
  – *Multidisciplinary research is urgently needed to better determine the risk status and the optimal type of care and care provider for each individual woman in her specific situation.*
  – *Given the evidence-based advantages of continuity of care, the transition from primary- to secondary care should be made smoother by allowing the own, trusted primary-care midwife to continue her relational care, and – depending on the nature of the complication – also (a part of) the medical care in a case manager-like capacity even after the referral.*
  – *A review of the way the Dutch maternity-care system is organised is required. The specific expertise and capacities of primary- and secondary-care providers should made much more explicit, in order not to compete but to complement each other.*

- Two-thirds of the women starting labour in primary care completed childbirth under the exclusive supervision of the primary-care midwife (83% of the parous women and 51% of the nulliparous women).
- Three-quarters of all intrapartum referrals from primary to secondary care are being made during the first stage of labour; the commonest indications being failure to progress first stage and need for pain relief.
- 3.6% of the women who were classified as low-risk when their deliveries began were referred on an urgency basis. The neonatal outcome was worst in the group of emergency referrals and the best in the non-referred group.

  – *It has to be explored whether the antenatal criteria for the assessment 'low risk at start labour' can be improved.*
  – *The classification presented in chapter 5 provides a framework for the further evaluation of intrapartum referrals.*
  – *Safely keeping women in primary care could be considered one of a midwife's*

*interventions, just as a referral to secondary care may be. The art of midwifery is to balance both interventions, in order to achieve the optimal result for mother and child.*

– *Given the evidence-based advantages of primary care for low-risk women, it is a challenge for midwives, obstetricians and policymakers to maintain this opportunity with preventive measures at a public health level (e.g. preconception counselling and education), at the pregnant women's level (e.g. improve utilisation of the advantages of continuous support during labour) and at the caregiver's level (e.g. awareness and multidisciplinary co-operation).*

- In 2008 91.5% of all pregnant women delivered in the term period (≥ 37 weeks GA). 72.6% of all perinatal mortality occurred in the 8.5% of the pregnancies *not* at term.
- Perinatal audit is a powerful tool for analysing the relationship between care and outcomes and to improve co-operation between perinatal care providers, not the least because by getting to know each other better than before.
- Perinatal audit meetings, if defined and performed carefully, are not perceived by care providers as a threat. The meetings could help medical professionals to deal with their grief over their personally professional failure.
- It turns out to be possible to specify a set of midwifery indicators, in spite of the difficulty to define valid outcome indicators for care in a low-risk population, given the low incidence of both interventions and adverse outcomes.
- Significant improvements could be made by improving preconditions for proper care, e.g. proper communication, explicit handovers, continuous evaluation and a clear division of responsibilities in both the primary- and secondary-care settings.
- Midwives are increasingly describing and assessing their own field of study.

– *Considerations to improve the perinatal mortality rate, by means of changing policies or interventions or maternity care system, should always take into account the consequences for the total number of pregnant women and their children.*

– *In view of the BIG-3 causes of perinatal mortality (preterm birth, intrauterine growth retardation and congenital malformations) much more emphasis should be placed on evidence based preventive and health promoting activities, both on a Public Health level and on a individual level (such as supporting women in smoking cessation and in the use of folic acid). Given her easy accessibility, the primary-care midwife may play an important role in these health promotional activities.*

– *The system of audit should be used also for assessment of care without adverse outcome, in order to optimise outcomes.*

– *An understanding of the natural progress of pregnancy and childbirth is essential for the prevention of complications and should therefore be put high on the research agenda.*

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CHAPTER 10

# Summary
# Samenvatting

## Summary

The primary-care midwife holds a special position in the Dutch maternity-care system. The midwife's competencies were outlined in the Dutch Practice of Medicine Act of 1865 (*Wet Uitoefening Geneeskunst)*. Ever since then, the scope of the midwife's duties has been 'normal pregnancy and delivery'. The midwife plays a crucial role in looking after pregnant women (antepartum, intrapartum and postpartum) and in performing risk assessment. Contrary to her colleagues in other Western countries, the Dutch midwife has maintained considerable professional independence.

**Chapter 1** outlines how the Dutch midwife's remarkably independent position has always evoked much discussion, and provides an insight into the assessment of primary-care midwives' performance, based on an overview of post-war scientific peer-reviewed literature published until the year 2005.

We found that such assessments were usually conducted by non-midwives, generally obstetricians. Until 1994, no midwives were involved in research on evaluation of midwives' performance. In the fifteen years which followed, they did contribute to such studies, but only marginally. We also found that descriptions of midwives' work tended to focus on the place of delivery, and that they were generally defined in terms of mortality or morbidity, with the emphasis usually being on neonatal outcomes rather than maternal outcomes. However, perinatal mortality is too imprecise an outcome measure to measure quality and differences in quality, especially in the low-risk population that is managed by primary-care midwives.

Having reviewed the scientific literature on the subject, we feel that it is high time midwives took it upon themselves to assess their own performance. Furthermore, we feel that they need outcome measures to show what exactly midwifery care is, how their services rate and which aspects of their services leave room for improvement. Like all health-care professionals, they have a moral and legal obligation to evaluate the care they deliver.

**Chapter 2** provides an overview of the development of evidence based midwifery in the Netherlands. It also focuses on the implementation of a quality management policy involving standards to be met in midwifery, and the practical contribution midwives can make to research on the Dutch midwifery-care system, using their professional expertise.

This thesis aims to present several methods for the assessment of primary midwifery care, ranging from general types of evaluation to more specific evaluation methods geared towards individual health-care providers. It seeks to answer the following questions:

1. Dutch midwives' core business is the care of women who are expected to have a normal pregnancy and delivery. But what is considered 'normal', how stable is the concept of 'normality', and which changes in midwifery practice can be attributed to changes in our understanding of 'normality'?

2. The primary-care midwife examines pregnant women for risk factors. If complications occur or threaten to occur, she will refer the patient to an obstetrician in secondary care.
   a. Which trends can be identified in referrals from primary care to secondary care?
   b. What are the causes contributing to such trends in referrals?
   c. What is the nature of intrapartum referrals?
   d. What are the outcomes of intrapartum referrals?

3. A professional midwife must be transparent about the quality of the care she can be expected to deliver and has to be prepared to give account of it. Which raises the following questions:
   a. Is it possible to identify a set of indicators for monitoring the quality of maternity care for low-risk women?
   b. In the event of an adverse outcome, the quality of the care delivered will be subject of evaluation by outsiders. Do care providers object to external evaluators giving feedback on such cases?
   c. Which sorts of critical incidents with adverse outcomes are reported to the Dutch Health Care Inspectorate, and what factors contributing to the delivery of substandard care have been found to play a role in these incidents?

**Chapter 3** addresses the **first research question**: If the scope of Dutch midwives' field of work is defined as 'the normal pregnancy and delivery', then what is considered normal, and how stable is the concept of 'normality'? Which changes in midwifery practice can be attributed to changes in our understanding of 'normality'? We addressed this question by analysing the various Lists of Obstetric Indications issued over the years, a guideline, which outlines the role division between primary-care midwives and obstetricians.

The first List of Obstetric Indications, dating from 1958, listed 39 indications for a hospital birth; all other conditions were attended to by primary-care midwives or general practitioners. Over the years, the number of conditions defined in the successive lists increased to 143 in 2003. In the course of time, the nature and the content of many indications changed thanks to new insights, new diagnostic methods, new treatments and social developments. For instance, breech presentation, which used to be considered normal, is now considered a pathological abnormality which requires secondary care. On the other hand, advanced maternal age (35+) used to be considered a pathological condition, but is now considered normal. With the change of risk-status, the assignment to the most appropriate care provider often changed as well. The available data sources show that in the same period the percentage of women who were referred to hospital for secondary care more than doubled from 24.7% in 1964, up to 59.5% in 2002. The most common indications for referral also changed over the decades, both in ranking and in absolute numbers.

Analysis of the lists and data shows that our perception of what is 'normal' has changed considerably over the years, in that the scope of what is considered normal, low risk, is decreasing, while the scope of what is considered abnormal, high risk, is increasing. This also means that the area of conditions which are considered normal is becoming increasingly homogeneous, whereas the area of conditions which are considered abnormal are becoming increasingly heterogeneous. In addition, the 'number needed to refer' to prevent complications is going up all the time. The conclusion drawn at the end of Chapter 3 was that the Dutch maternity care system really needs to look into new ways of determining each woman's real risk status, individually and in the context of her specific situation, so as to be able to find her the optimal type of care and care provider.

Chapters 4 and 5 focus on the risk screening performed by midwives in order to address the **second research question**: What are the trends in referrals from midwifery care to obstetric care, what types of referrals take place during labour, and what are the outcomes of those deliveries? Chapters 4 and 5 aim to assess the performance of primary-care midwives at the national level, with an eye to an internal evaluation by the midwives themselves.

**Chapter 4** analyses trends in referrals on the basis of data from LVR-1 (*Landelijke Verloskunde Registratie eerste lijn**). Nearly two million pregnancies were registered with LVR-1 in the 1988-2004 period, of women who were under midwifery

* LVR-1 has been incorporated into the Netherlands Perinatal Registry

care at the start of pregnancy. Our analysis covered all women registered with LVR-1, including those who were referred to specialist care after their first antenatal appointment, or after they had given birth.
The number of referrals from primary care to secondary care increased by 14.5% over the seventeen-year period covered by the analysis, to 51.4% in 2004, up from 36.9% in 1988. The greatest increase was related to antenatal referrals (+ 9%). The overall increase was larger among parous women (+16.6%) than among nulliparous women (+12,3%) (*P = 0.001)*.
The most common indications for referral to obstetric care among nulliparae were failure to progress first stage or secondary stage, and fetal distress (defined as meconium-stained amniotic fluid or fetal heart rate irregularities). Half of the increase in the number of referrals can be attributed to an increased need for pain relief and the presence of meconium in the amniotic fluid. Among parous women the most common indications for referral were medical and obstetrical anamnesis and fetal distress. Altogether, these indications constituted half of the increase in referrals in multiparae.

Our findings seem to indicate that population characteristics play an important part in the changing trends for referral. The 1988-2004 period saw increased numbers of women with a complicated obstetric anamnesis (notably previous Caesarean sections), increased requests for pain relief, a marked increase in the prevalence of meconium-stained amniotic fluid (higher prevalence among women of non-Dutch descent) and advanced maternal age, with all the attendant risks of complications (the average maternal age went up by 2.3 years in the period of study).

The conclusion drawn in Chapter 4 is that antenatal counselling of pregnant women in preparation for the delivery, increased commitment to continuity of care during labour and primary prevention of Caesarean section are important interventions which may increase women's chances of giving normal birth in a primary care setting.

**Chapter 5** takes an in-depth look at risk screening by focusing on partus data. We analysed the data of 280,000 women who were classified as low-risk when their deliveries began in the 2001-2003 period, and who had planned to give birth either at home or in a hospital, under the supervision of a primary-care midwife. We found that 68.1% of these women did indeed give birth under the supervision of a primary-care midwife: 70.7% of women who had planned to give birth at home, and 62.8% of women who had planned to give birth in hospital (*P < 0.001)*. Parous women more often gave birth under the supervision of a primary-care midwife than nulliparous women (82.8% versus 51.1%, *P < 0.001)*.

28.3% of the women covered in the study were referred to obstetric care intrapartum or postpartum, for reasons which did not constitute an emergency. Three-quarters of these non-urgent referrals were made during the first stage of labour. An emergency referral was indicated in 3.6% of all deliveries, for fetal distress, HPP, AS <7 and congenital malformations. Nearly half of these emergency referrals were made postpartum. In women who were *not* referred to secondary care, the mean Apgar score was 9.82, with a peripartum mortality rate of 0.005%. In women who were referred to obstetric care for non-urgent reasons, the scores were 9.57 and 0.03%, respectively. The worst results were obtained in the population of women with emergency referrals: a mean Apgar score of 9.24 and a mean peripartum mortality rate of 1.09%. No maternal deaths were reported in either group.

Chapter 5 arrived at the conclusion that risk selection should be continued into the postpartum period and that pregnant women must be prepared for the possibility that this may result in intrapartum or postpartum referrals to specialist care. The percentage of emergency referrals within the referral category is relatively low (3.6% of all women whose deliveries started in primary midwifery care; i.e. 11.2% of all intrapartum referrals). This is an important finding, considering the fact that many people seem to believe that 'referral' equals 'emergency referral'. We found that the emergency-referral deliveries had the worst neonatal health outcomes. However, the available data do not tell us whether these adverse outcomes could have been prevented if the patient had been referred to specialist care earlier or if the delivery had been scheduled to take place in secondary care from the beginning. We will have to inspect the medical records (e.g. by means of perinatal audit) to answer that question. It is important to gain a greater insight into how to predict the likelihood of complications requiring a referral to specialist care.
Perinatal audit procedures are currently mainly used to evaluate perinatal deaths. The classification presented in chapter 5 provides a framework for the further evaluation of specific referral categories. Use of this framework to audit urgency referrals would seem to be particularly valuable.

Whereas Chapters 4 and 5 dealt with evaluations at the national level, Chapters 6 to 8 discuss the evaluation of individual health care professionals' performance with an eye to helping them give an account of themselves to external parties **(the third research question)**.

**Chapter 6** outlines the development of a set of performance indicators for monitoring the quality of maternity care for low-risk women and make these visible to third parties. A Project Group comprised of health-care professionals involved in pri-

mary maternity care drew up a long-list of potential indicators, based on literature, guidelines and expert opinions. They then used the AIRE instrument (Appraisal of Indicators through Research and Evaluation) to select a set of draft indicators, which they presented in a two-round Delphi survey to a multidisciplinary group of stakeholders, rating both the relation between indicator and quality of care and the feasibility of collecting the necessary data. This resulted in a set of 26 indicators which were prioritised by the Project Group and the Delphi panel as indicators of the quality of midwifery care from the early stages of pregnancy to postpartum check-ups. The 26 indicators fall into three categories: eight structural indicators, twelve process indicators and six outcome indicators.

It is difficult to define valid outcome indicators for care in a low-risk population, given the low incidence of both interventions and adverse outcomes. However, good care provision is embedded in a sound structure within a quality system, and has to be performed in accordance to (evidence or practice based) processes and protocols agreed on. Our study found a strong correlation between structural, process and outcome indicators, so it seems that a well-chosen set of indicators can compensate for the lack of outcome indicators.

Chapter 6 arrived at the conclusion that it is apparently possible to come up with midwifery indicators which are endorsed by the midwives themselves. The set of indicators described above was initially intended for use by midwives (for self-analysis) and the Dutch Health Care Inspectorate (for monitoring purposes), but it is currently being adapted for use by third parties (such as clients and the health care insurers) by the *Zichtbare Zorg* ('Transparent Care') organisation.

**Chapter 7** outlines an evaluation of the degree to which perinatal mortality audit is accepted. At the time of the study (2002), such audits were a relatively unknown phenomenon, and many preconditions were established to safeguard the anonymity of patients and health-care professionals alike. The selected cases were assessed by a panel of health-care providers who were not professionally involved in these cases. A generic report was then produced in which the results and assessments of the audit were all lumped together, without any mention of where each individual case had taken place and without identifying the care providers involved. Two participating hospitals then requested feedback on a patient-by-patient basis, which was given at two meetings attended by the primary- , secondary- and tertiary care professionals involved in the cases which had been selected for discussion. The study was designed to investigate whether the health-care professionals whose performance had been assessed agreed with the audit panel's verdicts, how they

felt about the plenary discussions, and whether they felt that the feedback they had received was useful in helping them improve their perinatal care policies. To this end the participants in the feedback sessions completed an anonymous survey at the end of their meetings.

At the two meetings, 77 panel assessments were documented and discussed in a multi-disciplinary setting. Each case was analysed for the appropriateness of the referrals made and/or diagnostic methods used, to assess the care professionals' performance, and to identify aspects which could be changed so as to improve matters in future. It turned out that the detailed case descriptions provided by the audited hospitals were vital to the correctness of the audit panel's verdicts. In the end, the attendees took issue with seven panel verdicts. Five assessments were found to be too lenient, one was found to be too harsh, and in one case the reason for a particular score was felt to be incorrect, without this affecting the final score (Cohen's K: 0.98). The provision of feedback on a patient-by-patient basis resulted in concrete suggestions for improved care, mostly in terms of medical aspects, the relationship between the patient and the health-care provider, and successful co-operation between different types of health-care providers. The investigators found that the care providers involved did not object to having their identities disclosed at the meetings, since the general atmosphere at the meetings was so constructive that no one made the mistake of interpreting 'substandard' to mean 'avoidable' or 'culpable'.

Chapter 7's conclusion is that perinatal audit, if defined and performed carefully, is not perceived by care providers as a threat, but rather as something which will motivate them to focus on high-quality care. In addition, Chapter 7 shows that feedback on and discussion of audited cases should be incorporated into the nationwide perinatal audit which was developed a while ago, and which was finally implemented in 2010. (It is worth mentioning that case descriptions are a vital part of the newly implemented auditing system, and that audit panels are no longer comprised of external evaluators but rather of care professionals affiliated to obstetric group practices.)

**Chapter 8** provides a description of an analysis of the critical incidents in maternity care reported to the Dutch Health Care Inspectorate in accordance with the requirements of the Quality Assurance at Medical Facilities Act (*Kwaliteitswet Zorginstellingen)*. The purpose of critical-incident reporting is to identify (structural) lapses which may have contributed to the adverse outcomes, and to make changes to one's care system so as to prevent future recurrence. The Health Care Inspectorate considers critical incidents, assessments of reported cases and steps

taken to prevent recurrence, indicators for a medical facility's quality management system.

To perform this analysis, we searched the Inspectorate's database for all the maternity-care-related cases registered between 1 September 2006 and 1 September 2008. We identified all the critical incidents (maternal or perinatal mortality or morbidity), then analysed the files for factors which might have contributed to the outcomes, paying special attention to care involving multiple caregivers ('chain-care') and care delivered after hours. We found 165 maternity-care-related reports. Seventy of these involved critical incidents, with 47 perinatal and eight maternal deaths. In ten cases, the perinatal deaths occurred in primary care, and in nine cases the women had been referred from primary care to secondary care previously. The remaining critical incidents occurred in secondary or tertiary care (47 and four cases, respectively).

We found that there was seldom a single factor contributing to the delivery of substandard care; in the great majority of cases a string of events led to the adverse outcomes. In addition, we found that the reported cases turned out to be very heterogeneous. The main factors contributing to substandard care identified in the study were medical errors (54% of all cases), failure to recognise pathology in time (47%), lack of clarity as to which care provider was to take the lead (39%), and inadequate communication, referral and record-keeping (39%). In 19 cases (27%), substandard multidisciplinary co-operation ('chain care') was found to have contributed to the adverse outcomes, and in 18 cases (26%), the time of day was found to have played a part (fifteen critical incidents occurred after hours, while three occurred during business hours).

Chapter 8 arrived at the conclusion that perinatal mortality is a complex issue and that there is no easy, one-size-fits-all solution which will reduce the number of critical incidents or lower perinatal and maternal mortality and morbidity rates. Basic prerequisites for proper care, such as adequate communication and co-operation, a clear assignment of responsibilities, concrete treatment plans and attentiveness in fetal and maternal monitoring may yield great results in this respect.

**Chapter 9** ties all the above subjects together, discusses current developments in maternity care and presents some final conclusions and recommendations.

# Samenvatting

In het verloskundig systeem in Nederland neemt de eerstelijns verloskundige een bijzondere positie in. In 1865 werden de bevoegdheden van ‘de vroedvrouw’ vastgelegd in de *Wet regelende de Uitoefening van de Geneeskunst*. Sinds die tijd is 'de normale zwangerschap en baring’ haar werkterrein en speelt ze een essentiële rol in de begeleiding en de risicoselectie van zwangeren en barenden. Daarbij heeft de verloskundige, in tegenstelling tot andere westerse landen, een zelfstandige beroepsverantwoordelijkheid behouden.

**Hoofdstuk 1** beschrijft hoe deze bijzondere positie altijd tot discussie heeft geleid. Aan de hand van een overzicht van de naoorlogse wetenschappelijke literatuur tot 2005, wordt een beeld gegeven van de evaluatie van de kwaliteit van zorg door eerstelijns verloskundigen.
Deze bleek voornamelijk door anderen te zijn uitgevoerd, met name door gynaecologen. Het aandeel van verloskundigen in het onderzoek naar hun eigen zorgverlening was nihil (tot 1994) tot zeer gering (in het decennium daarna). De omschrijving van het vakgebied bleek voornamelijk gerelateerd aan de plaats van bevalling, en voornamelijk gedefinieerd in termen van sterfte of ziekte. De focus lag daarbij op de uitkomsten bij het kind, niet op de maternale uitkomsten. Perinatale sterfte is echter een te grove uitkomstmaat om kwaliteit en kwaliteitsverschillen te meten, zeker in de laagrisicopopulatie van de eerste lijn.
Op basis van het literatuuroverzicht wordt geconcludeerd dat de tijd rijp was dat verloskundigen zelf de evaluatie van hun handelen ter hand namen. Voorts dat uitkomstmaten nodig zijn om zichtbaar te maken wat *midwifery care* inhoudt, wat de kwaliteit van die zorg is en waar verbeteringen mogelijk zijn. Aan de hand van wetgeving wordt vervolgens beschreven dat het evalueren van de verleende zorg niet alleen een morele, maar ook een wettelijke verplichting is voor zorgverleners.

**Hoofdstuk 2** geeft vervolgens een overzicht van de ontwikkeling van ‘Evidence based midwifery’ in Nederland, de start van het kwaliteitsbeleid van de beroepsgroep, onder andere door het ontwikkelen van standaarden, en de bijdrage die verloskundigen vanuit hun beroepsspecifieke invalshoek aan onderzoek in de verloskunde kunnen geven.

Het doel van dit proefschrift was een aantal methoden voor evaluatie van de zorgverlening van eerstelijns verloskundigen te beschrijven, van algemene tot steeds meer op de individuele zorgverlening toegespitste evaluatie.
Daartoe werden de volgende vragen geformuleerd:

1. De kern van het werk van de Nederlandse verloskundige is de zorg voor vrouwen met een normale zwangerschap en baring. Maar wat is 'normaal', hoe stabiel is dat begrip? Welke gevolgen hebben eventuele wijzigingen in dit concept voor de praktijk?

2. Op grond van haar risicoselectie verwijst de eerstelijns verloskundige de vrouw naar de gynaecoloog indien zij afwijkingen constateert of verwacht.
   a. Welke trends zijn er in de verwijzing van eerstelijns verloskundige naar gynaecoloog?
   b. Wat zijn de verklarende factoren in die trends?
   c. Wat is de aard van verwijzingen tijdens de baring?
   d. Wat zijn de uitkomsten van verwijzingen tijdens de baring?

3. Als professional heeft de verloskundige de morele en wettelijke verplichting transparant te zijn over de individueel verleende zorg en daarvan verantwoording af te leggen.
   a. Is het mogelijk om indicatoren te ontwikkelen om de kwaliteit van de zorgverlening aan laagrisico vrouwen te monitoren?
   b. In geval van ongewenste uitkomst wordt de verleende zorg onderwerp van evaluatie door anderen. Is de feedback van externe beoordelaars acceptabel voor zorgverleners?
   c. Welke calamiteiten worden bij de Inspectie voor de Gezondheidszorg gemeld, en welke substandaard factoren spelen daarin een rol?

**Hoofdstuk 3** behandelt de **eerste onderzoeksvraag**: als de begrenzing van het vakgebied van verloskundigen is 'de normale zwangerschap en geboorte', wat is dan 'normaal'? Is dat een stabiel begrip en zo niet, wat heeft dat voor consequenties in de praktijk? Dit onderzochten we door middel van een analyse van de opeenvolgende versies van de Verloskundige Indicatielijst, een richtlijn waarin de rolverdeling tussen gynaecologen en verloskundigen is vastgelegd.
De eerste lijst, die uit 1958 dateert, beschreef 39 indicaties voor een ziekenhuisbevalling; alle andere situaties werden toebedeeld aan de eerstelijns zorgverlener. In de loop van de jaren werd in de successievelijke lijsten een groot aantal condities toegevoegd of juist verwijderd, wat resulteerde in 143 beschreven condities in de lijst van 2003. Indicaties wijzigden ook qua inhoud, onder invloed van nieuwe inzichten, nieuwe diagnostische en behandeltechnieken of maatschappelijke ontwikkelingen. Dit betrof enerzijds veranderingen in risicostatus van 'normaal' naar 'pathologisch' (bijvoorbeeld stuitligging), en anderzijds van 'pathologisch' naar 'normaal' (bijvoorbeeld maternale leeftijd > 35 jaar). Daarmee werd een indicatie vaak ook in een andere zorgverleners-categorie geplaatst.

Uit de beschikbare databronnen blijkt dat in dezelfde periode het percentage vrouwen met een medische indicatie voor specialistische hulp steeg van 24.7% (1964) tot 59.5% (2002). De meest voorkomende indicaties voor de specialistische hulp wijzigden in de loop van de tijd zowel in volgorde als in omvang.

De analyses van de lijsten en de data tonen aan dat het concept 'normaal' in de loop van de tijd geëvolueerd is in die zin dat het gebied van wat als normaal, laag risico, wordt beschouwd steeds verder inkrimpt en het gebied van wat als afwijkend, hoog risico, wordt beschouwd steeds verder uitbreidt. Daarmee wordt het normale gebied steeds homogener, en het afwijkende gebied steeds heterogener, en het 'number needed to refer' om pathologie te voorkomen steeds hoger. De conclusie van hoofdstuk 3 is dat er dringend onderzoek nodig is om de werkelijke risicostatus van iedere individuele vrouw, in haar specifieke situatie, te kunnen bepalen om daar vervolgens het optimale type zorg en zorgverlener bij te kunnen kiezen.

Hoofdstuk 4 en 5 zoomen in op de risicoselectie van de verloskundige, om de **tweede onderzoeksvraag** te beantwoorden: wat zijn de trends in verwijzingen van de verloskundige naar de gynaecoloog en wat is de aard en de uitkomst van de baringen die onder leiding van de verloskundige plaatsvonden? Het doel van deze hoofdstukken was een evaluatie van de kwaliteit van de eerstelijns verloskunde op *landelijk* niveau, ter *interne* evaluatie door de beroepsgroep.

**Hoofdstuk 4** analyseert de trend in verwijzingen aan de hand van data uit de LVR-1 (de Landelijke Verloskunde Registratie- eerste lijn *). In de periode 1988-2004 werden hierin bijna twee miljoen zwangerschappen geregistreerd van vrouwen die zich aan het begin van de zwangerschap meldden bij een verloskundige. De analyse had betrekking op alle vrouwen in de LVR-1, ook als ze reeds bij de eerste zwangerschapcontrole of pas in het kraambed verwezen werden.
In de onderzoeksperiode van 17 jaar steeg het aantal verwijzingen van eerste- naar tweede lijn met 14.5%, van 36.9% tot 51.4%. De grootste stijging was in de zwangerschap (+ 9%). De totale toename was groter bij multiparae (+16.6%) dan bij nulliparae (+12,3%) (*P = 0.001)*.
Bij nulliparae waren de meest voorkomende verwijsindicaties: niet-vorderende ontsluiting, niet-vorderende uitdrijving en foetale nood (gedefinieerd als: meconiumhoudend vruchtwater of afwijkende foetale hartslag). De helft van de toename in het aantal verwijzingen kon worden toegeschreven aan de stijging in de behoefte aan pijnbehandeling en in de aanwezigheid van meconiumhoudend vruchtwater.

* LVR-1, tegenwoordig onderdeel van de Perinatale Registratie Nederland

Bij multiparae waren de medisch/obstetrische anamnese en foetale nood de meest voorkomende verwijsindicaties. Deze indicaties verklaarden samen tevens de helft van de toename in verwijzingen.
De bevindingen maken aannemelijk dat populatiekenmerken een belangrijke rol spelen in het veranderende verwijzingspatroon: het hoge aantal vrouwen met een belaste medisch/obstetrische voorgeschiedenis (met name: een sectio caesarea in anamnese), de toenemend actieve rol van de zwangere (vraag om pijnbehandeling), de opvallende stijging in het voorkomen van meconiumhoudend vruchtwater (hogere prevalentie bij niet-Nederlandse vrouwen) en een gestegen maternale leeftijd (die gerelateerd is aan een verhoogd risico op complicaties; +2,3 jaar in de studieperiode).

De conclusie van hoofdstuk 4 is dat het voorlichten van zwangeren ter voorbereiding op de baring, meer aandacht voor continue begeleiding tijdens de baring en primaire preventie van een sectio caesarea, belangrijke interventies zijn om de kansen op een normale, eerstelijns baring voor vrouwen te behouden.

**Hoofdstuk 5** zoomt dieper in op de risicoselectie door de baring onder de loep te nemen. Hiervoor werden de gegevens geanalyseerd van 280.000 vrouwen die (in de periode 2001-2003) aan het begin van de baring als laag-risico waren beoordeeld , en die onder de begeleiding van de eerstelijns verloskundige thuis dan wel poliklinisch in het ziekenhuis wilden bevallen.
68,1% van deze vrouwen voltooide de bevalling ook daadwerkelijk onder de begeleiding van de eerstelijns verloskundige: 70,7% van de vrouwen met een geplande thuisbevalling en 62,8% van de vrouwen met een geplande ziekenhuisbevalling (*P < 0.001)*. Multiparae voltooiden vaker de bevalling in de eerstelijn dan nulliparae (82,8% vs 51,1%, *P < 0.001)*.
28,3% van de vrouwen werd tijdens of na de baring verwezen, maar zonder spoed. Driekwart van deze niet-acute verwijzingen was tijdens de ontsluiting.
Een spoed verwijzing was geïndiceerd bij 3,6% van alle vrouwen die aan het begin van de baring onder begeleiding van de eerstelijns verloskundige waren (vanwege o.a.foetale nood, HPP, AS <7, congenitale afwijkingen). Bijna de helft van deze spoedverwijzingen was postpartum.
In de niet-verwezen groep was de gemiddelde Apgarscore 9.82 en de peripartumsterfte 0,005%; in de niet-acuut verwezen groep was dit respectievelijk 9.57 en 0,03%. De ongunstigste uitkomsten waren in de spoedverwijzingsgroep (gemiddelde Apgarscore 9.24 en peripartumsterfte 1,09%). Er waren geen maternale sterftes.

De conclusie van hoofdstuk 5 is dat de risicoselectie moet worden gecontinueerd tot in de postpartum periode en dat zwangere vrouwen erop moeten zijn voorbereid dat dit in een verwijzing durante partu of postpartum kan resulteren.
Het aantal spoedverwijzingen binnen het totale aantal verwijzingen is relatief gering (3,6% van alle vrouwen die in de eerstelijn aan de baring beginnen; 11,2% van alle verwijzingen durante partu). Dit is een belangrijke bevinding, gezien de beeldvorming dat alle verwijzingen spoed zouden zijn. Wel heeft de spoed-groep de relatief slechtste neonatale gezondheidsuitkomsten. De data geven geen inzicht of de ongewenste uitkomsten hadden kunnen worden voorkomen bij een eerdere verwijzing of bij een bevalling in de tweede lijn. Voor dat inzicht is een dossier onderzoek zoals een perinatale audit noodzakelijk (zie hoofdstuk 7). Het systeem van perinatale audit wordt momenteel vooral gebruikt om perinatale sterfte te evalueren. De classificatie die in hoofdstuk 5 wordt gepresenteerd, biedt een structuur om specifieke verwijzingscategorieën in een multidisciplinaire audit te evalueren, waarbij vooral de analyse van spoedverwijzingen waardevolle informatie zal opleveren.

Hoofdstuk 4 en 5 betroffen een evaluatie op landelijk niveau. Hoofdstuk 6 tot en met 8 gaan in op de evaluatie van zorg van een *individuele* zorgverlener, ten behoeve van *externe* verantwoording (**derde onderzoeksvraag)**.

**Hoofdstuk 6** beschrijft de ontwikkeling van een indicatorenset. Indicatoren zijn bedoeld om een aanwijzing te geven over risico's of over kwaliteit, en deze inzichtelijk te maken voor andere partijen.
Een werkgroep van bij de eerstelijns verloskunde betrokken beroepsgroepen stelde op basis van de literatuur, richtlijnen en expert-opinie een longlist op van potentiële indicatoren. Met behulp van het AIRE-instrument werd hieruit een set van conceptindicatoren geselecteerd die via een Delphi-procedure in twee rondes aan het verloskundige veld werd voorgelegd.
Het resultaat was een set van 26 indicatoren die door de werkgroep en het Delphipanel werden geprioriteerd als indicatoren voor kwaliteit van zorgverlening in de eerstelijns verloskunde, van het begin van de zwangerschap tot de postpartum controle. Het betreft acht structuur-, twaalf proces-en zes uitkomst-indicatoren.
Voor de zorgverlening in een laagrisico populatie is het moeilijk valide uitkomstindicatoren te definiëren, gegeven de lage incidentie van interventies en ongewenste uitkomsten. Goede zorgverlening vraagt echter om een gedegen structuur en om inbedding in een kwaliteitssysteem, zodat ze kan worden uitgevoerd volgens de *best evidence*. Onze studie toonde een sterke samenhang tussen structuur-, proces- en uitkomstindicatoren. Een goed samengestelde set kan het gebrek aan uitkomstindicatoren zo compenseren.

De conclusie van hoofdstuk 6 is dat het mogelijk blijkt om voor het specifieke veld van de eerstelijns verloskunde indicatoren te ontwikkelen die door het veld worden onderschreven.
De ontwikkelde en beschreven set was aanvankelijk bedoeld voor intern gebruik (door de beroepsgroep) en toezichtdoeleinden (door de inspectie). Inmiddels vindt een nadere uitwerking plaats die de indicatoren ook voor extern gebruik geschikt maken (Zichtbare Zorg).

In **hoofdstuk 7** wordt de evaluatie beschreven van de acceptatie van perinatale sterfte audit. Een dergelijke audit was op het moment van de studie (2002) een nog vrij onbekend fenomeen en er waren veel randvoorwaarden geschapen om de anonimiteit van patiënt en zorgverleners te waarborgen. De beoordeling van de cases werd uitgevoerd door een panel van (niet-betrokken) zorgverleners en de resultaten waren uit privacy-overwegingen uitsluitend op geaggregeerd niveau gepubliceerd. Op hun verzoek ontvingen twee deelnemende ziekenhuizen terugkoppeling van de panelbeoordelingen op patiënt niveau, in aanwezigheid van de betrokken zorgverleners uit eerste-, tweede en derdelijn. Doel van de beschreven studie was te evalueren of de zorgverleners de beoordeling van het auditpanel correct achtten, hoe zij de plenaire bespreking ervoeren, en of de terugkoppeling leidde tot mogelijkheden voor verbetering van perinataal beleid. Hiertoe vulden de deelnemers na de bijeenkomst een schriftelijke anonieme enquete in.

In twee bijeenkomsten werden 77 panelbeoordelingen gedocumenteerd teruggekoppeld en multidisciplinair besproken. Per casus kwamen de doelmatigheid van de verwijzing of diagnostiek, de ‘kwaliteit van zorg’ in ruimere zin en de mogelijke verbeteringen aan de orde. In de auditprocedure bleek de gebruikte uitgebreide casusbeschrijving essentieel.
In 7 gevallen waren de aanwezigen het niet eens met de panelscore (5 maal te licht, 1 maal te zwaar, en 1 maal vond men de reden voor de score onjuist) (Cohens K: 0,98). Door de terugkoppeling op individueel patiëntniveau ontstonden concrete aanknopingspunten voor verbetering van zorg (betreffende medisch-inhoudelijke aspecten, relatie patiënt-zorgverlener, en samenwerking tussen zorgverleners). De anonimiteit van de betreffende zorgverleners bleek niet meer belangrijk omdat het bespreken van ongewenste uitkomsten plaatsvond in een sfeer waarin ‘substandaard’ niet werd verward met ‘vermijdbaar’ of ‘verwijtbaar’.

De conclusie van hoofdstuk 7 is dat zorgverleners, bij een zorgvuldige opzet en uitvoering, de perinatale audit niet als bedreiging maar als motiverend ervaren. En dat terugkoppeling en bespreking van de beoordeelde cases een plaats behoort te

krijgen in de systematiek voor het landelijke systeem van perinatale audit dat op dat moment ontwikkeld werd.
(Naschrift: In 2010 is deze landelijke audit ook daadwerkelijk landelijk geïmplementeerd; de casusbeschrijving is daarin een belangrijk onderdeel; het panel wordt niet meer gevormd door externe beoordelaars maar door de deelnemers uit het verloskundig samenwerkingsverband).

**Hoofdstuk 8** beschrijft een analyse van de calamiteiten op het gebied van perinatale zorg die bij de Inspectie voor de Gezondheidszorg gemeld werden conform de verplichting in de Kwaliteitswet Zorginstellingen. Doel van de calamiteitenmelding is te detecteren welke (structurele) aspecten een rol speelden, om de zorgverlening op die punten aan te passen ter preventie van herhaling. De inspectie beschouwt een melding, de evaluatie en de genomen acties als indicatoren voor het kwaliteitssysteem van de zorgverlener.

Uit de meldingen-database van de Inspectie voor de Gezondheidszorg werden alle meldingen op het gebied van verloskundige zorg geïdentificeerd die in de periode 1 september 2006 tot 1 september 2008 bij de inspectie werden geregistreerd. Wanneer het een calamiteit betrof (sterfte of ernstige schade bij moeder of kind) werd op basis van de onderzoekdossiers geanalyseerd welke factoren in de cases een rol speelden, met specifieke aandacht voor ketenzorg en zorgverlening buiten kantooruren.
Van de 165 meldingen op het gebied van verloskundige zorg betroffen 70 een calamiteit, met 47 perinatale en 8 maternale sterftes. Tien daarvan betroffen de zorgverlening in de eerstelijn en in negen gevallen was er sprake van een overdracht van eerste- naar tweedelijn; de overige calamiteiten vonden plaats in de tweede- (47) of derdelijn (4).

Er bleek zelden slechts één substandaard factor per casus: vrijwel altijd was er sprake van een aaneenschakeling of stapeling van gebeurtenissen die uiteindelijk tot de ongewenste uitkomst leidden. Daarnaast toonden de beschreven cases een grote variëteit.
Belangrijkste substandaard factoren waren onjuist medisch handelen (54% van de cases); niet (tijdig) ontdekken van pathologie (47%), onduidelijkheid over de verantwoordelijkheidstoedeling (39%), en communicatie, overdracht en dossiervoering (39%). In 19 gevallen (27%) speelde de afstemming tussen ketenpartners een rol in de calamiteit en in 18 gevallen (26%) het tijdstip van de dag (15x buiten kantooruren en 3x binnen kantooruren).

De conclusie van hoofdstuk 8 is dat de problematiek van perinatale sterfte complex is en dat er geen simpele en algemeen effectieve oplossingen zijn om het aantal calamiteiten te verminderen en de perinatale en maternale sterfte en schade te verlagen. Grote winst in gezondheidsuitkomsten kan worden behaald door verbetering van basale factoren voor verantwoorde zorg zoals adequate communicatie, duidelijke verantwoordelijkheidstoedeling, concreet behandelplan en alertheid bij foetale en maternale bewaking.

**Hoofdstuk 9** brengt een synthese aan, behandelt actuele ontwikkelingen in de verloskunde en sluit af met conclusies.

APPENDIX 1

# Regulations of the Dutch midwife's competencies, 1865 - 2011

*De wettelijke bevoegdheden van de verloskundige in Nederland, 1865 – 2011*

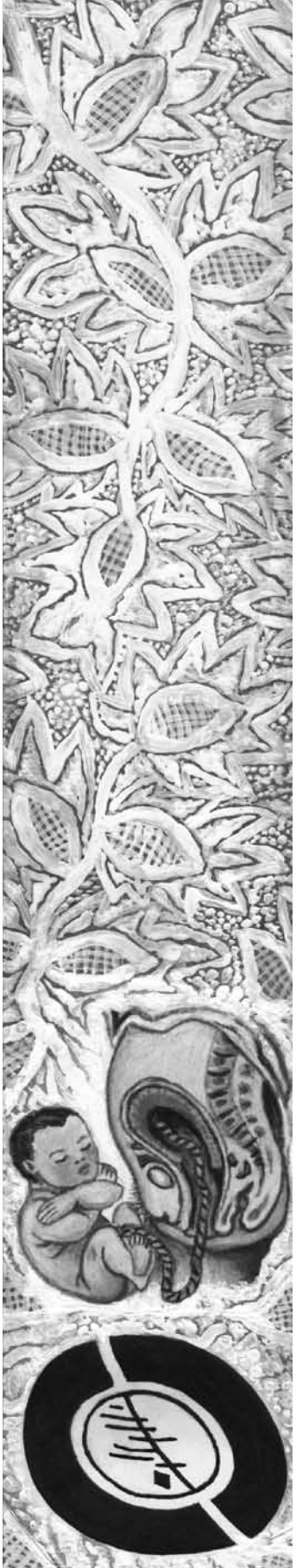

**Table A. Regulations of the Dutch midwife's competencies, 1865 - 2011**

De wettelijke bevoegdheden van de verloskundige in Nederland, 1865 – 2011
*Tabel in het Nederlands om een citatie van de originele teksten mogelijk te maken*

| | | |
|---|---|---|
| **1 juni 1865.**<br>**Wet regelende de uitoefening der geneeskunst** | *Artikel 15*<br>De vroedvrouwen zijn bevoegd tot het verleenen van verloskundigen bijstand of raad alleen bij ongestoord natuurlijk verloop der baring. In alle andere gevallen roepen zij de hulp in van een tot de uitoefening der verloskunst bevoegden geneeskundige.<br>Bij ontstentenis van dezen roepen zij de bijstand in van eenen anderen geneeskundige, des noods van eene andere vroedvrouw, en ingeval de vereischte kunstbewerking geen uitstel kan lijden, gaan zij zelve daartoe over.<br>Daarbij is het gebruik van verloskundige werktuigen uitgesloten, en de vroedvrouw verpligt tot kennisgeving aan den inspecteur binnen vier en twintig uren na afloop der verlossing.<br><br>*Artikel 16*<br>Zij zijn bevoegd tot het zetten van lavementen en het aanwenden van den katheter bij barenden. Op voorschrift van een geneeskundige mogen zij ook bij niet-barenden den katheter aanwenden, en lavementen en bloedzuigers zetten. | *Deze wet van Thorbecke bepaalt dat de uitoefening der geneeskunst alleen geoorloofd is aan degenen, aan wie de bevoegdheid daartoe volgens de wet is toegekend: geneeskundigen en vroedvrouwen.* |
| **8 juli 1924.**<br>**Wet tot wijziging van de artikelen 15 en 16 van de Wet van 1 juni 1865** | *Artikel 15*<br>Behoudens het bepaalde in artikel 16 zijn de vroedvrouwen alleen bevoegd tot het verleenen van verloskundigen bijstand of raad, hieronder begrepen het aanwenden van den katheter, bij ongestoord verloopende baringen.<br><br>*Artikel 16*<br>Zoodra de vroedvrouw bemerkt, dat het verrichten van eenige verloskundige kunstbewerking bij of het toedienen van eenig geneesmiddel aan degenen, aan wie zij bijstand verleent, noodig is of zal worden, draagt zij zorg, dat ten spoedigste geneeskundige hulp wordt ingeroepen. Onze met de uitvoering van deze Wet belaste Minister wijst de gevallen aan, waarin de door hem aangewezen geneesmiddelen mogen worden toegediend.<br>Indien de geneeskundige hulp niet aanwezig is op het tijdstip, waarop naar hare meening een verloskundige kunstbewerking, welke zonder gebruikmaking van instrumenten kan geschieden, of de toediening van een der door Onzen met de uitvoering van dezen wet belasten Minister aan te wijzen geneesmiddelen niet langer uitgesteld kan worden, gaat de vroedvrouw zelver tot de kunstbewerking of de toediening van het geneesmiddel over.<br>Van het verrichten van een kunstbewerking, bedoeld in het voorafgaande lid, geeft zij binnen vier en twintig uur schriftelijk kennis aan den inspecteur, belast met de handhaving van de bepalingen dezer wet, binnen wiens ambtsgebied de kunstbewerking is verricht. | *Na een jarenlange discussie en vele rapporten wordt, op basis van een advies van de Gezondheidsraad, het toedienen van een geneesmiddel toegestaan – slechts als een te hulp geroepen arts niet op tijd kan zijn en slechts bij ernstige noodzaak.*<br><br>*De bevoegdheid om lavementen en bloedzuigers te zetten is verwijderd,* |

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|---|---|---|
| ***29 september 1924. Beschikking van den Minister van Arbeid, Handel en Nijverheid*** | 1. Gevallen waarin geneesmiddelen door vroedvrouwen mogen worden toegediend: bloedingen na de geboorte der placenta, veroorzaakt door onvoldoende samentrekking der baarmoeder (atonia uteri post partum)<br>2. Geneesmiddelen, tot welker toediening vroedvrouwen mogen overgaan in de onder 1 bedoelde gevallen: moederkoren (secale cornutum) en de praeparaten uit moederkoren bereid | *evenals het katheteriseren van niet-barenden* |
| **17 maart 1932. Wet tot wijziging van de artikelen 15 -17 van de Wet van 1 juni 1865** | *Artikel 15*<br>De vroedvrouwen zijn bevoegd aan zwangeren in de tweede helft van de zwangerschap raad en bijstand te geven met betrekking tot de zwangerschap.<br>Bij het waarnemen van afwijkingen zijn zij bevoegd tot het nemen van maatregelen, indien en voorzoover deze door Onzen met de uitvoering van deze wet belasten Minister zijn aangegeven.<br>In alle andere gevallen zijn zij verplicht de waargenomen afwijkingen ter kennis te brengen van een door belanghebbende aan te wijzen geneesheer.<br><br>*Artikel 16*<br>De vroedvrouwen zijn bevoegd tot het verleenen van verloskundigen raad of bijstand, het aanwenden van den katheter hieronder begrepen, bij ongestoord verlopende baringen . Zoodra de vroedvrouw bemerkt (….ongewijzigd )<br><br>*Artikel 16 b*<br>De vroedvrouwen zijn bevoegd de kraamvrouw gedurende tien dagen of zooveel langer als voor het herstel noodig is te behandelen, zoolang zich geen afwijkingen voordoen. Bij het waarnemen van afwijkingen zijn zij verplicht de hulp van een geneeskundige in te roepen.<br><br>*Artikel 17*<br>De vroedvrouwen (…) houden van al hare verrichtingen een dagboek bij, waarvan de inrichting nader zal worden bepaald door Onzen met de uitvoering van deze wet belasten Minister. | *De bestaande bevoegdheden worden uitgebreid met de zorg voor de zwangere vanaf een zwangerschapsduur van 30 weken, en gedurende het kraambed.*<br><br>*De vroedvrouw moet een dagboek bij houden over de zorgverlening. Volgens de Memorie van Toelichting "om het uitoefenen van toezicht door den Inspecteur van het Staatstoezicht op de Volksgezondheid te vergemakkelijken".* |
| ***30 maart 1932. Ministeriële Beschikking van de Minister van Arbeid, Handel en Nijverheid*** | 1. Maatregelen, die de vroedvrouw bij het waarnemen van afwijkingen gedurende de zwangerschap mag nemen:<br>a. Het opheffen van liggingsafwijkingen, indien dit door uitwendige handgrepen kan geschieden;<br>b. Het bestrijden van zwangerschapsziekten, zulks echter naar de aanwijzing en onder toezicht van een geneeskundige<br>2. Gevallen waarin de in lid 3 bedoelde geneesmiddelen door vroedvrouwen mogen worden toegediend: | *Op basis van een advies van de Gezondheidsraad wordt ook de uitbreiding van de voorschrijfbevoegdheid verantwoord geacht, gezien de hoge eisen waaraan de oplei-* |

a. Weeënzwakte bij normaal baringskanaal, wanneer de vliezen gebroken zijn, de schedel geheel is ingedaald, er volkomen ontsluiting is, de spildraai geheel is volbracht en het hoofd in achterhoofdsligging staat, een en ander indien deze toestand drie uur heeft geduurd of er levensgevaar voor het kind bestaat;
b. Bloedingen in het nageboortetijdperk;
c. Bloedingen na de geboorte der placenta, veroorzaakt door onvoldoende samentrekking der baarmoeder (atonia uteri post partum)
d. Dreigende dood door hartzwakte (collaps)

3. Geneesmiddelen tot welker toediening vroedvrouwen mogen overgaan:
- in gevallen van 2 a en 2 b: preparaten, bereid uit de achterkwab van de glandula pituitaria
- In gevallen van 2 c: behalve de voor a en b aan gegeven preparaten, moeder koren (secale cornutum) en de preparaten uit moederkoren bereid
- in gevallen van 2 d: middelen, die in staat zijn de hartwerking te verbeteren, campher of cafeïne-oplossing in ampullen

De toediening dezer geneesmiddelen mag niet langs den weg van de aderen geschieden.

*ding voldoet – maar alleen onder aanwijzing en toezicht van een geneeskundige.*

**1 juni 1951. Wet tot nadere wijziging van de Wet van 1 juni 1865**

*Artikel 15*
De vroedvrouw is bevoegd aan zwangeren raad of bijstand te geven met betrekking tot de zwangerschap, met dien verstande, dat zij bevoegd is tot het nemen van maatregelen ter voorkoming van afwijkingen, daaronder begrepen het door middel van de aderprik afnemen van bloed voor onderzoek, (....ongewijzigd)

*Uitbreiding van de zwangerschapszorg met venapunctie en controles vanaf 18 weken. Deze grens wordt gesteld om te voorkomen dat vroedvrouwen zich met (dreigende) abortus zouden bezig houden.*

*Artikel 16*
De vroedvrouw is bevoegd tot het verlenen van verloskundige raad of bijstand bij ongestoord verlopende baringen. Onder baring wordt verstaan de uitstoting van het ei na een zwangerschap van tenminste 18 weken. Zoodra de vroedvrouw bemerkt (…..ongewijzigd)

*Artikel 16 b*
De vroedvrouw is verplicht van iedere baring kennis te geven aan de huisarts van de kraamvrouw, volgens door Onze met de uitvoering van deze wet belaste Minister te stellen regelen.

*Na iedere baring berichtgeving aan de huisarts van de vrouw.*

*Artikel 16 c*
De vroedvrouw is bevoegd tot het hechten van inscheuringen van beperkte omvang volgens door Onze met de uitvoering van deze wet belaste Minister te stellen regelen, en voorts de kraamvrouw tien dagen of zoveel langer als voor het herstel nodig is te behandelen, zolang zich geen afwijkingen voordoen. Bij het waarnemen van afwijkingen

*Bij afwijkingen in het kraambed mag de kraamvrouw de te raad-*

is zij verplicht de hulp van een door de kraamvrouw aangewezen geneeskundige in te roepen.
*Artikel 17*
De vroedvrouw maakt van haar verrichtingen schriftelijk verslag op in een vorm nader vast te stellen door Onze met de uitvoering van deze wet belaste Minister. (…) Zij zendt jaarlijks voor de Maand April de door haar in het afgelopen jaar gemaakte verslagen, echter zonder vermelding van namen en adressen der kraamvrouwen, aan de geneeskundige hoofdinspecteur van het Staatstoezicht op de Volksgezondheid, die de verslagen na kennisneming aan haar terugzendt.

*plegen arts aanwijzen.*

*Hechten van eenvoudige rupturen, met omschrijving van de minister.*

*Bij een niet-vorderende uitdrijving is de tijd om pituitrine te mogen spuiten van drie naar anderhalf uur teruggebracht.*

*Medicatie voor dreigende dood door hartzwakte verwijderd.*

*De geneesmiddelen zijn gemoderniseerd en van maximale hoeveelheden voorzien.*

*De uitgebreide omschrijving van welke verwondingen wel en niet gehecht mogen worden biedt impliciet ruimte voor het zetten van een episiotomie door vroedvrouwen.*

***12 juli 1951. Ministeriële beschikking***

1. Maatregelen, die de vroedvrouw bij het waarnemen van afwijkingen gedurende de zwangerschap mag nemen: (….ongewijzigd)

2. Gevallen waarin de in lid 3 bedoelde geneesmiddelen door vroedvrouwen mogen worden toegediend:
   a. Weeënzwakte bij normaal baringskanaal, wanneer de vliezen gebroken zijn, de schedel geheel is ingedaald, er volkomen ontsluiting is, de spildraai geheel is volbracht en het hoofd in achterhoofdsligging staat, een en ander indien deze toestand anderhalf uur heeft geduurd;
   b. (…ongewijzigd)
   c. (…ongewijzigd)

3. Geneesmiddelen tot welker toediening vroedvrouwen mogen overgaan (… ongewijzigd)

4. De vroedvrouw is bevoegd de onder 3 genoemde geneesmiddelen voor te schrijven in een hoeveelheid, die voor een vrouw ten hoogste mag bedragen:
   wat betreft de preparaten, bereid uit de achterkwab van de glandula pituitaria: twee ampullen van drie internationale eenheden; wat betreft de preparaten, bevattende de alkaloïden ergometrine (ergobasine) en/of ergotamine:
   a. voor onderhuidse toediening: ampullen tot een totale hoeveelheid van ten hoogste 1 mg van een ergometrine- of ergotaminezout;
   b. voor toediening door de mond: tabletten, bevattende de bovengenoemde alkaloïden of een der gebruikelijke preparaten van moederkoren; de totale hoeveelheid van deze middelen mag niet groter zijn dan het dubbele van de maximale dosis per etmaal (volgens de Nederlandse pharmacopee).

5. De vroedvrouw is bevoegd tot het zelfstandig hechten van eenvoudige onvolledige inscheuringen van de bilnaad. Hieronder worden verstaan inscheuringen, die ten hoogste bestaan uit een onvertakte verwonding in het slijmvlies van de achterwand van de schede en/of in de huid van de bilnaad en daaronder liggende weefsels. Deze bevoegdheid geldt niet voor inscheuringen, die reiken tot in de kringspier van de endeldarm of tot in de

| | | |
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| | endeldarm zelf, noch voor verwondingen, die bij het slijmvlies der schede een vertakte of dubbele of kringvormige inscheuring vertonen, noch voor verwondingen, die reiken tot in de kleine of grote schaamlippen of zich bevinden in de zij- of voorwand van de schede. Deze bevoegdheid geldt uitsluitend voor verwondingen, die onopzettelijk zijn ontstaan, en niet voor verwondingen, die kunstmatig zijn toegebracht door inknippen van de bekkenbodem. | *De beroepstitel wordt gewijzigd in verloskundige.* |
| **1 september 1978. Wet houdende wijziging van de Wet van 1 juni 1865** | *Artikel 15*<br>De verloskundige is bevoegd aan zwangeren raad of bijstand te geven met betrekking tot de zwangerschap, met dien verstande, dat hij bevoegd is (….ongewijzigd)<br><br>*Artikel 15a*<br>Voorts is de verloskundige bevoegd om materiaal van cytologische preparaten af te nemen volgens Onze met de uitvoering van deze wet belaste Minister te stellen regelen.<br><br>*Artikel 16*<br>De verloskundige is bevoegd tot het verlenen van verloskundige raad of bijstand bij normale bevallingen. Onder bevalling wordt verstaan de uitstoting van het ei na een zwangerschap van tenminste achttien weken.<br>De verloskundige is bevoegd tot het verrichten van episiotomieën en het hechten daarvan, al dan niet gepaard gaande met het toebrengen van plaatselijke verdoving met behulp van door Onze met de uitvoering van deze wet belaste Minister aangewezen middelen, mits de ter zake door die Minister gestelde regelen in acht worden genomen. Hij is bevoegd de kraamvrouw te behandelen zolang het in verband met haar toestand nodig is, en toe te zien op de toestand van het kind, een en ander zolang zich geen afwijkingen voordoen. Hij is bevoegd tot het afnemen van bloed van het kind voor onderzoek.<br>Bij het waarnemen van afwijkingen bij kraamvrouw of kind is hij verplicht de hulp van een door de kraamvrouw aangewezen geneeskundige in te roepen.<br><br>*Artikel 16b*<br>Tot het toedienen van geneesmiddelen anders dan ingevolge voorschrift van een geneeskundige is de verloskundige bevoegd voor zover die middelen daartoe door Onze met de uitvoering van deze wet belaste Minister zijn aangewezen en de ter zake door die Minister gestelde regelen in acht worden genomen. Zodra de verloskundige bemerkt dat toediening van een geneesmiddel nodig is of zal worden, en hij daartoe niet bevoegd is, draagt hij zorg dat ten spoedigste de hulp van een geneeskundige wordt ingeroepen.<br><br>*(… verder ongewijzigd)* | *Uitbreiding met het maken van uitstrijkjes, het geven van voedingsadviezen, het zetten van een episiotomie (nu expliciet) evenals het hechten daarvan, en het toepassen van lokale verdoving bij het hechten van episiotomie of ruptuur.*<br><br>*De zorg in het kraambed duurt zolang het nodig is, en omvat nu ook toezicht op het kind, inclusief bloedafname.*<br><br>*Het assortiment geneesmiddelen is uitgebreid, en bevat ook middelen ook ter preventie van problemen. Een aantal middelen mag nu onder eigen verantwoordelijkheid worden voorgeschreven of toegediend.* |

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| ***23 april 1979. Besluit bij de Wetswijziging van 1 september 1978*** | 1. De verloskundige is bevoegd om bij het waarnemen van afwijkingen tijdens de zwangerschap;<br>a. liggingsafwijkingen op te heffen door uitwendige handgrepen;<br>b. te adviseren ten aanzien van de te volgen voeding.<br><br>2. De verloskundige is bevoegd om na de bevalling de volgende middelen toe te dienen:<br>a. ter voorkoming van ernstige bloedingen, voor of na de geboorte van de placenta: oxytocine. De toediening geschiedt in de spieren;<br>b. bij bloedingen na de geboorte van de placenta: moederkoorn-alkaloïden en hiervan afgeleide verbindingen. De toediening geschiedt door de mond of in de spieren;<br>c. bij het hechten van inscheuringen en episiotomieën: middelen die ter plaatse gevoelloosheid veroorzaken, voor zover zij geen adrenaline bevatten;<br>d. indien een rhesus-incomptabiliteit bestaat: anti-D-rhesus immunoglobuline. De toediening geschiedt in de spieren.<br><br>3. De verloskundige is bevoegd tot het hechten van inscheuringen van de bilnaad, die niet meer dan het onderste één derde deel van de vagina omvatten en/of de bekkenbodem tot de sfincter ani.<br><br>4. De verloskundige die materiaal heeft afgenomen voor het maken van een cytologisch preparaat, doet de uitslag van het onderzoek ten spoedigste aan de huisarts van de vrouw toekomen. | *Het hechten wordt nog slechts in algemene termen omschreven.*<br><br>*Uitslagen moeten ook naar de huisarts.*<br><br>*Deelnemers aan de Landelijke Verloskunde Registratie krijgen eind jaren tachtig van de Geneeskundig Hoofdinspecteur ontheffing van de verplichting tot het inzenden van dagboek kaarten.* |
| ***12 juli 1988. Wijziging besluit voorschriften verloskundigen van 23 april 1979*** | Aan artikel 1 wordt toegevoegd:<br>c. ijzerpreparaten aan zwangeren voor te schrijven indien ijzerdeficiënte anaemie geconstateerd wordt. Indien binnen zes weken bij Hb-controle geen positieve reactie vastgesteld kan worden dient verwezen te worden naar een arts.<br><br>Aan artikel 2 wordt toegevoegd:<br>e. indien bij de zwangere hepatitis B antigeen is geconstateerd: immunoglobuline. De toediening geschiedt intramusculair. | *Uitbreiding met zelfstandig voor te schrijven en toe te dienen medicatie voor de moeder* |
| ***3 mei 1989. Wijziging besluit voorschriften verloskundigen van 23 april 1979*** | Artikel 2, onderdeel e, komt te luiden:<br>Indien bij de zwangere hepatitis B antigeen is geconstateerd,<br>- hepatitis B immunoglobuline en<br>- hepatitis B vaccinatie aan de pasgeborene<br>De toediening geschiedt in de spieren. | *Uitbreiding zelfstandig voor te schrijven en toe te dienen medicatie voor het kind* |

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| | Aan artikel 2 wordt toegevoegd:<br>f. ter voorkoming van bloedingen bij de pasgeborenen: vitamine K. De toediening geschiedt door de mond, onderhuids of in de spieren. | |
| **11 november 1993. Wet houdende regelen inzake beroepen op het gebied van de individuele gezondheidszorg (Wet BIG)** | *Artikel 30*<br>Om in het desbetreffende register als verloskundige te kunnen worden ingeschreven, wordt vereist het bezit van een getuigschrift waaruit blijkt dat de betrokkene voldoet aan de daartoe bij algemene maatregel van bestuur gestelde opleidingseisen.<br><br>*Artikel 31*<br>Tot het gebied van deskundigheid van de verloskundige wordt gerekend het verrichten van bij algemene maatregel van bestuur te omschrijven handelingen op het gebied van de verloskunst alsmede het verrichten van bij de maatregel te omschrijven andere handelingen, een en ander met inachtneming van de beperkingen, bij de maatregel te stellen.<br><br>*Artikel 36*<br>Verloskundigen zijn bevoegd (uitsluitend voor zover het betreft handelingen, die worden gerekend tot hun gebied van deskundigheid) tot<br>1. Het verrichten van heelkundige handelingen - waaronder worden verstaan handelingen, liggende op het gebied van de geneeskunst, waarbij de samenhang der lichaamsweefsels wordt verstoord en deze zich niet direct herstelt<br>2. het verrichten van verloskundige handelingen<br>4. het verrichten van catheterisaties<br>5. het geven van injekties<br>6. het verrichten van punkties<br>14. het voorschrijven van UR-geneesmiddelen | *De Wet BIG vervangt de Wet regelende de Uitoefening der Geneeskunst.*<br><br>*Verloskundigen zijn een van de acht artikel-3 beroepen, die voorbehouden handelingen mogen verrichten* |
| ***19 november 1997. Besluit opleidingseisen en deskundigheidsgebied verloskundige*** | *Artikel 19*<br>1. Tot het gebied van deskundigheid van de verloskundige wordt gerekend het verrichten van handelingen op het gebied van de verloskunst en andere handelingen, gericht op het bevorderen en bewaken van het natuurlijke verloop van de zwangerschap, de bevalling en de kraambedperiode, alsmede op het voorkomen van afwijkingen bij de vrouw of het kind, door het inschatten van het verloskundige risico bij een vrouw gedurende haar zwangerschap, bevalling en kraambedperiode, het vertalen van het verloskundige risico in verloskundig beleid en het op basis daarvan verlenen van raad en bijstand, alsmede het waar nodig consulteren van dan wel verwijzen naar een arts. | *Het Besluit opleidingseisen en deskundigheidsgebied geeft invulling aan artikel 30 en 31 van de Wet BIG.* |

2. Tot de handelingen op het gebied van de verloskunst, bedoeld in het eerste lid, behoren het:
   a. medisch begeleiden van de zwangerschap en de bevalling, van de geboorte van de placenta, van de eerste ontwikkelingen van het kind en van het herstel van de vrouw gedurende de kraambedperiode;
   b. verrichten van vaginaal onderzoek zonder apparatuur dan wel met behulp van door Onze Minister aan te wijzen apparatuur;
   c. opheffen van liggingsafwijkingen door uitwendige handgrepen;
   d. verrichten van amniotomie tijdens de bevalling.

3. Tot de andere handelingen, bedoeld in het eerste lid, behoren het:
   a. psychologisch begeleiden van de vrouw gedurende haar zwangerschap, bevalling en kraambedperiode;
   b. aan de vrouw of het kind voorschrijven dan wel voorschrijven en oraal of door middel van een intramusculaire injectie toedienen van door Onze Minister aangewezen geneesmiddelen;
   c. verrichten van episiotomieën of het hechten van laesie van perineum of labium, al dan niet gepaard gaand met het toepassen van lokale anesthesie door middel van een injectie, met door Onze Minister aangewezen middelen;
   d. ten behoeve van onderzoek bij de vrouw afnemen van bloed al dan niet door middel van een punctie;
   e. ten behoeve van onderzoek bij de vrouw afnemen van materiaal van de baarmoedermond voor het maken van een cytologisch preparaat;
   f. ten behoeve van onderzoek bij het kind afnemen van bloed door middel van een punctie in de hiel;
   g. bij de vrouw afnemen van urine door middel van catheterisatie;
   h. verrichten of laten verrichten van laboratoriumonderzoek;
   i. adviseren van de vrouw over haar levenswijze gedurende de zwangerschap;
   j. geven van voedingsadviezen aan de vrouw of ten behoeve van het kind, waaronder het adviseren over borstvoeding;
   k. geven van voorlichting aan de vrouw en, in voorkomende gevallen, haar partner, over en het stellen van de indicatie voor prenatale diagnostiek;
   l. adviseren van de vrouw en, in voorkomende gevallen, haar partner, met betrekking tot anticonceptie en gezinsplanning;
   m. reanimatie van de pasgeborene;
   n. optreden bij acute shock of fluxus postpartum, waaronder wordt begrepen het intraveneus inbrengen van een infuus en het door middel van een infuus danwel door middel van een intraveneuze injectie toedienen van door Onze Minister aangewezen geneesmiddelen.

*Aantal aspecten van de dagelijkse praktijk worden nu geëxpliciteerd: psychologische begeleiding, adviseren over levenswijze, vaginaal onderzoek, amniotomie, aanvragen laboratoriumonderzoek.*

*Uitbreiding met vaginale echoscopie, counseling mbt prenatale diagnostiek, advisering over anticonceptie, reanimatie pasgeborene, inbrengen van een infuus.*

*Uitbreiding van zelfstandig voor te schrijven medicatie met plasma(vervangende middelen)*

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| ***27 maart 1998. Regeling nadere uitwerking deskundigheidsgebied verloskundigen*** | - Als apparatuur, bedoeld in artikel 19, tweede lid, onder b, van het Besluit worden aangewezen het speculum en de vaginale transducer.<br>- Als geneesmiddelen, bedoeld in artikel 19, derde lid, onder b, van het Besluit worden aangewezen: ijzerpreparaten, oxytocine, moederkoornalkaloïden en hiervan afgeleide verbindingen, anti-D-rhesus immunoglobuline, hepatitis B immunoglobuline, hepatitis B vaccin, alsmede vitamine K.<br>- Als geneesmiddelen, bedoeld in artikel 19, derde lid, onder c, van het Besluit worden aangewezen: lokale anesthetica, voor zover zij geen epinefrine bevatten.<br>- Als geneesmiddelen, bedoeld in artikel 19, derde lid, onder n, van het Besluit worden aangewezen: plasma of plasmavervangende middelen, oxytocine, alsmede moederkoornalkaloïden en hiervan afgeleide verbindingen. | |
| ***3 juli 2008. Besluit opleidingseisen en deskundigheidsgebied verloskundige 2008*** | *Artikel 5.*<br>1. Tot het gebied van deskundigheid van de verloskundige wordt gerekend het verrichten van handelingen op het gebied van de verloskunst en andere handelingen, gericht op een optimale uitkomst van de zwangerschap, het bevorderen en bewaken van het natuurlijke verloop van de zwangerschap, de bevalling en het kraambed, alsmede op het voorkomen van afwijkingen bij de vrouw of het kind, door het inschatten van het verloskundige risico bij een vrouw gedurende haar zwangerschap, bevalling en kraambed, het vertalen van het verloskundige risico in verloskundig beleid en het op basis daarvan verlenen van raad en bijstand, alsmede het daar waar nodig consulteren van dan wel verwijzen naar een arts.<br>*(…. ongewijzigd)* | *Vervanging van het Besluit van 1997 omdat de opleiding verloskunde onder de werking van de Wet op het hoger onderwijs en wetenschappelijk onderzoek (WHV) wordt gebracht. Andere bewoordingen en begrippen, maar geen uitbreiding.* |
| ***Regeling nadere uitwerking deskundigheidsgebied verloskundige 2008*** | Medicinale zuurstof toegevoegd als geneesmiddel aan de vrouw of het kind voor te schrijven.<br>*(… verder inhoudelijk ongewijzigd)* | *In deskundigheidsgebied toegevoegd "gericht op een optimale uitkomst van de zwangerschap".* |

**Bronnen:**

- www.overheid.nl
- J. Klomp. Wat wilden ze, wat mochten ze en … wat mochten ze niet. De ontwikkeling van de bevoegdheid van vroedvrouwen onder de Wet regelende de uitoefening van de geneeskunst 1865-1993. Klomp Cahier. Bilthoven, Catharina Schrader Stichting, 1996
- A. Crébas. Beroepsomschrijving Verloskundigen. Nederlandse Organisatie van Verloskundigen. Bilthoven, 1990

APPENDIX 2

# Evaluation of the quality of midwifery care in the Dutch maternity care system

*Summary of publications in peer reviewed medical Journals 1956-2011*

## Table B. Evaluation of the quality of midwifery care in the Dutch maternity care system.

***Summary of publications in peer reviewed medical Journals 1956-2011***

### Search strategy:

1. PubMed was searched, using the following (truncated) keywords in *Title and/or abstract*: (midwi* OR "maternity care" OR "maternity services" OR perinatal OR childbirth OR "home birth" OR homebirth OR "home delivery" OR "home deliveries") AND (Dutch OR Netherlands) NOT letter[pt] NOT editorial[pt] NOT comment[pt]. Limits: English, German, Dutch, Undetermined.
2. PubMed was searched again, now using the following (truncated) keywords in *All fields*: midwi* AND (Dutch OR Netherlands) NOT letter[pt] NOT editorial[pt] NOT comment[pt]. Limits: English, German, Dutch, Undetermined.
3. Aggregation of the results of search 1 and 2
4. The Dutch medical journal *Nederlands Tijdschrift voor Geneeskunde* was searched, using the following (truncated) keywords: Verloskund*, Vroedvrouw*, Beval*, Perinat*, within the category *onderzoek* (research).
5. Hand searching of the reference lists of the papers selected in step 3 and 4.
6. Selection criteria: see pages 13 and 14.

The first search procedure concerned the years 1956 up to 2005 and resulted in 36 relevant papers concerning Evaluation of midwifery care and in 35 relevant papers concerning the content of midwifery care.
The search procedure was repeated for the years 2006 up to June 1st 2011 and resulted in 25 and 36 relevant papers, respectively.

### Explanation of the table's content:

The conclusions about the midwifery care or the maternity care system are extracted from the paper concerned, following the verbatim text as far as possible.

**MR-factor**: The midwives' involvement in the research team.
**OR-factor**: The obstetricians' involvement in the research team.
We assumed that the first-listed author for each study was the principal researcher. He/she was awarded 4 author points. The second- and the last-listed author each received 2 points, while all other authors listed were each awarded 1 author point.
The midwives' involvement in the research team, the MR-factor (denoting the extent to which midwives were represented in the research team) was calculated as the quotient of the number of author points for midwives, in relation to the available number of author points * 100.
In the same way the obstetricians' involvement in the research team (the OR-factor) was calculated (denoting the extent to which obstetricians were represented in the research team)

As an example: The paper 'Perinatal mortality and morbidity in a nationwide cohort of 529,688 low-risk planned home and hospital births' (2009) had 8 authors[1]. The first, second and fourth author were midwives (4+2+1=7 author points for midwives); the fifth, sixth and seventh author were obstetricians (3*1 =3 author points) and the third and last author were neither midwife nor obstetrician ( 1 + 2 author points). Thus, the total number of author points available was 13. The MR-factor resulted in 7 : 13 * 100 = 54; the OR-factor resulted in 3 : 13 * 100 = 23.

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| **1971** | **Enkele beschouwingen naar aanleiding van een onderzoek over doodgeboorte in het jaar 1961 in Nederland [Considerations concerning a study of stillbirths in the year 1961 in the Netherlands]**<br>Breijer HBG, Stolk JG [2]<br>*MR-factor 0; OR-factor 33*<br>*Scope: maternity care system*<br>*Outcome measure: perinatal mortality* | |
| | Objective | To study factors concerning stillbirth in the Netherlands. |
| | Study design and methods | Data analysis |
| | Coverage<br>Year(s) of the study<br>Number of women/cases included | National, all stillbirths registered in Statistics Netherlands<br>1961<br>3724 stillbirths (> 28 weeks GA) out of 250.733 births (14.9 ‰) |
| | Main results of the study | • Medical reasons for primary hospitalization existed in 57% of all cases. However, in 29% of these cases confinement took place at home.<br>• 38% of all stillbirth was attended by general practitioners, and a "remarkably low percentage" of 7.9% of all stillbirths by midwives, whereas their contribution to maternity care was 44% and 35% respectively.<br>• The high percentage of stillbirths in hospitals (54% of cases) maybe due to late referral by general practitioner or midwife. |
| | Conclusion about the maternity care system | *"Medical causes are thought to be deficient prenatal care and insufficient or actual absence of essential hospital facilities."* |

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| **1978** | **Regionale perinatale sterfte en regionale hospitalisatie bij de bevalling in Nederland [Regional perinatal mortality and regional hospitalization for childbirth in the Netherlands]**<br>Treffers PE [3]<br>*MR-factor 0; OR-factor 100*<br>*Scope: place of delivery*<br>*Outcome measure: perinatal mortality* | |
| | Objective | To establish a correlation between the regional perinatal mortality rate and the regional rate of hospitalization for childbirth. |
| | Study design and methods | Data analysis |
| | Coverage<br>Year(s) of the study<br>Number of women/cases included | Nationwide (Statistics Netherlands)<br>1956-1974<br>Not reported |
| | Main results of the study | • There is little if any correlation between the regional perinatal mortality rate and the rate of hospitalization for childbirth. |
| | Conclusion about the maternity care system | *"There is room for increased hospitalisation for women with high-risk pregnancies, but only in hospitals which are better prepared to the care for these women than they are now."* |

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| **1978** | **De relatie tussen de hoogte van de perinatale sterfte en de plaats van bevalling: thuis, dan wel in het ziekenhuis [The correlation between the perinatal mortality figures and the place of delivery: at home or in the hospital]**<br>Hoogendoorn D [4]<br>*MR-factor 0; OR-factor 0*<br>*Scope: place of delivery*<br>*Outcome measure: perinatal mortality* | |
| | Objective | To study the correlation between perinatal mortality and place of delivery per province. |
| | Study design and methods | Data analysis |
| | Coverage<br>Year(s) of the study<br>Number of women/cases included | Nationwide (Statistics Netherlands)<br>1952-1975<br>Unknown |
| | Main results of the study | • A very high (negative) correlation between the percentages of women who delivered in an institution/ hospital and the perinatal mortality rate.<br>• The higher the hospitalization rate within a province, the lower the perinatal mortality rate (in general). |
| | Conclusion about the maternity care system | *"Since normality can only be concluded in retrospect, the available data do not allow conclusions about whether a baby can be born at home as safely as in hospital if no increased risk had been identified."* |

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| **1978** | **Thuisgeboorten [Childbirth at home]**<br>Van Alten D [5]<br>*MR-factor 0; OR-factor 100*<br>*Scope: place of delivery*<br>*Outcome measure: neonatal morbidity* | |
| | Objective | To gain insight into the reasons for hospitalization during the puerperal period of neonates, born at home. |
| | Study design and methods | Data analysis, using regional data to interpret the national data |
| | Coverage<br>Year(s) of the study<br>Number of women/cases included | Regional (Wormerveer)<br>1975<br>2378 women delivered at home or in a midwife-led Birth Centre, giving birth to 2383 children |
| | Main results of the study | • 3,0% neonatal admissions to hospital.<br>• Regional percentage consistent with the national database (comprising 81% of all deliveries at home) = 2,9%.<br>• Main reasons for referral: preterm (0,8%), SGA (0,7%), AS 10' <9 (0,8%), neonatal jaundice (0,4%).<br>• Follow-up study is needed in order to know whether the delay due to the postnatal referral has influenced the perinatal outcome. |
| | Conclusion about the maternity care system | *"For the time it seems safe to conclude from this study that giving birth at home or in a maternity clinic is not an irresponsible thing to do, provided that the mother has not been diagnosed with risk factors in her carefully conducted antenatal examinations."* |

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| **1980** | **Eerste indrukken over het functioneren van het instituut "poliklinische bevallingen" [First impressions of the functioning of the service for outpatient childbirth]**<br>Hoogendoorn D [6]<br>*MR-factor 0; OR-factor 0*<br>*Scope: place of delivery*<br>*Outcome measure: perinatal mortality, interventions* | |
| | Objective | To describe the number and results of short-stay hospital deliveries. |
| | Study design and methods | Data analysis Stichting Medische Registratie Nederland |
| | Coverage<br>Year(s) of the study<br>Number of women/cases included | Short-stay deliveries in 58 hospitals<br>1978<br>8777 |
| | Main results of the study | • Short-stay hospital delivery in 91% of cases attended by primary care (midwife or general practitioner).<br>• Prenatal care: 75% by midwife, 21% by general practitioner, 4% by obstetrician.<br>• In 92% of the deliveries no complications reported<br>• "Extremely low perinatal mortality" of 2,2‰ versus 12.4‰ nationally. |
| | Conclusion about maternity care system | *"If abnormalities of any significance are diagnosed in the course of the parturition, the woman is admitted to the obstetrician. This will influence the number of perinatal mortality."* |

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| **1980** | **Vermijdbare aspecten van perinatale sterfte; consequenties voor scholing en nascholing [Avoidable aspects of perinatal mortality; consequences for education and postgraduate education]**<br>Eskes TKAB, Krakers RPhM, Evers JLH [7]<br>*MR-factor 0; OR-factor 100*<br>*Scope: primary versus secondary care*<br>*Outcome measure: perinatal mortality; factors contributing to substandard care* | |
| | Objective | To investigate the degree to which perinatal death was avoidable. |
| | Study design and method | Retrospective assessment of the medical records by two researchers |
| | Coverage<br><br>Year(s) of the study<br>Number of women/cases included | Perinatal deaths in all births taking place in the St.Radboud hospital Nijmegen<br>1976-1977<br>3602 births, with 71 perinatal deaths |
| | Main results of the study | • Perinatal mortality was 15 per 1000 (n = 46) in women cared for by the obstetrician from start pregnancy (group A), and 59 per 1000 (n = 25) in women who were referred to the hospital by general practitioner or midwife during pregnancy (group B).<br>• Perinatal death was classified as avoidable in 11% of cases in group A and 44% of cases in group B, respectively. |

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| | Conclusion about the maternity care system | "*If these data for the avoidability of perinatal death are representative for The Netherlands, it would mean that perinatal death could be reduced with 23%.*"<br>*"Improvement in group B would only be possible by improving education and postgraduate education."* |

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| **1981** | **De doeltreffendheid van het selectiesysteem binnen de verloskundige zorg [The effectiveness of the selection system in maternity care]**<br>Smits F [8]<br>*MR-factor 0; OR-factor 100*<br>*Scope: maternity care system*<br>*Outcome measure: perinatal mortality, neonatal morbidity, referral* | |
| | Objective | To determine to what extent women are referred to specialist care on medical grounds, how the various medical grounds for referral rate as risk factors, and whether pregnancies are divided into the right risk categories. |
| | Study design and methods | Prospective cohort study |
| | Coverage<br>Year(s) of the study<br>Number of women/cases included | 91% of all children, born in the region of Enschede<br>1974<br>2035 pregnancies |
| | Main results of the study | • 19% of the pregnant women attended in primary care had a primary medical indication.<br>22% of the women with primary medical indication had no (valid) indication for specialist care.<br>• Pregnancies were often divided into the wrong categories. Perinatal mortality, SGA and prematurity were as common in the population of women with previous complications as in the population of women without previous complications.<br>• The grounds for referral listed in the List of Indications for Obstetric Care generally serve as adequate risk factors.<br>• The added value of a once-only risk screening performed by an obstetrician at the 32-week point was questionable. |
| | Conclusion about the maternity care system | *"Maintaining a risk screening system is necessary, but the current screening system is inadequate because it is not applied consistently and because it divided pregnancies into a mere two categories. Improved risk screening will require multidisciplinary maternity co-operations in which midwives, GPs and gynaecologists all play an important part."* |

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| **1981** | **De verloskundige zorg en de plaats van de bevalling [Obstetric care and the location of delivery]**<br>van Alten D [9]<br>*MR-factor 0; OR-factor 100*<br>*Scope: place of delivery*<br>*Outcome measure: perinatal mortality; factors contributing to substandard care* | |

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| | Objective | To compare national data with the results of an investigation conducted in Wormerveer. |
| | Study design and methods | Data analysis |
| | Coverage<br><br>Year(s) of the study<br>Number of women/cases included | Regional: independent midwifery practice and GP practices in Wormerveer<br>1978<br>4804 women giving birth to 4835 children |
| | Main results of the study | • 15.7% of all women were referred to secondary care during pregnancy and 6.6% intrapartum.<br>• In women under supervision of primary care (midwife or GP) at the start of labour the PMR was 3.0 ‰ (n = 12). In 6 cases the avoidability of the perinatal death may be discussed; 4 regarding primary care provider and 2 regarding secondary care provider.<br>• In the total group 1.0% of the women was delivered by Caesarean Section and 3.9% by artificial vaginal delivery. In women under supervision of primary care at the start of labour these percentages were 0.4% and 2.8%, respectively. |
| | Conclusion about maternity care system | *"It appears to be possible, using relatively basic examination methods, to select women who will later have a (mostly) normal delivery. It has not been conclusively demonstrated that advanced monitoring methods are useful when such women give birth."* |

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| **1981** | **Umbilical cord gases in home deliveries versus hospital-based deliveries**<br>Eskes TK, Jongsma HW, Houx PC [10]<br>*MR-factor 0; OR-factor 100*<br>*Scope: place of delivery*<br>*Outcome measure: neonatal morbidity* | |
| | Objective | To gain more insight in home deliveries. |
| | Study design and methods | Assessment of neonatal outcome by the value of umbilical cord gases. |
| | Coverage<br><br>Year(s) of the study<br>Number of women/cases included | Region of Nijmegen: 6 midwives, 1 GP, 1 academic hospital<br>Not reported<br>85 home deliveries under supervision of primary care, matched with 85 hospital deliveries without medical reason, under supervision of secondary care and continuous monitoring (CTG, MBO) |
| | Main results of the study | • The median values for pH in the umbilical artery (7.19) and base excess (-9.9 mmol/litre) in home deliveries differed significantly ($P < 10^{-4}$ from those of matched controls (7.25 and -7.7, respectively) delivered in the hospital. Similar differences were noted for umbilical venous blood values. |
| | Conclusion about the maternity care system | *"We conclude by indirect evidence that continuous fetal surveillance and monitoring results in less acidotic gas valves of umbilical cord blood in hospital deliveries as compared to home delivery. The consequence of this finding for these mature newborns is not yet known."* |

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| **1982** | **Ervaringen met poliklinische bevallingen in een algemeen ziekenhuis [Experiences with outpatient deliveries in a general hospital]**<br>Vasen LC [11]<br>*MR-factor 0; OR-factor 100*<br>*Scope: place of delivery*<br>*Outcome measure: perinatal mortality; referral* | |
| | Objective | To describe the experience and development of childbirth on an outpatient basis at a general hospital. |
| | Study design and methods | Descriptive; retrospective data analysis. |
| | Coverage<br>Year(s) of the study<br>Number of women/cases included | One hospital in Haarlem<br>1970-1980<br>7083 deliveries |
| | Main results of the study | • The percentage of hospital births supervised by primary-care midwives or GPs increased. In 1980 61 per cent of all hospital births were supervised by primary-care midwives, up from 36 per cent in 1970.<br>• 17.0% of all women under supervision of primary care (midwife or GP) at the start of labour were referred intrapartum or post partum (26% of the primiparas and 9% of the multiparas, respectively).<br>• In the period 1978-1980, in women under supervision of primary care (midwife or GP) at the start of labour the PMR was 2.9 ‰ (including the women referred intra partum or post partum). In 25% the PMR was caused by severe congenital malformations. |
| | Conclusion about maternity care system | *"There is a demand for normal deliveries in non-specialist hospitals, preferably supervised by midwives and GPs."*<br>*'Primiparae are better off giving birth in hospital."* |

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| **1982** | **Neonatal morbidity in deliveries conducted by midwives and gynecologists. A study of the system of obstetric care prevailing in The Netherlands.**<br>Lievaart M, De Jong PA [12]<br>*MR-factor 0; OR-factor 67*<br>*Scope: midwifery care*<br>*Outcome measures: neonatal morbidity* | |
| | Objective | To investigate whether midwives can diagnose adequately which cases should be referred to the gynecologist, and whether midwives are capable of maintaining normalcy in the course of delivery. |
| | Study design and methods | Assessment of neonatal outcome by pH, $pCO_2$ and BE in arterial cord blood (early morbidity) and by neurological examination with Prechtl's method between 5$^{th}$ and 10$^{th}$ day of life (late morbidity) |
| | Coverage<br>Year(s) of the study<br>Number of women/cases included | The region of Eindhoven<br>1979-1980 (10 months)<br>First born neonates > 38 weeks GA of supposedly normal pregnancies and deliveries that were solely cared for by midwives (n= 85) or by gynecologists (n=27). |

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| | Main results of the study | • The pH and BE values were less favourable in the midwife group than in the gynecologist group ($P$=0.01 and $P$=0.008, respectively); no significant difference in $pCO_2$.<br>• 10 neurologically nonoptimal neonates in the midwife group vs. 0 in the gynecologist group.<br>• Neurological nonoptimality in the midwife group was related to acidosis. |
| | Conclusion about maternity care system | *"The obstetric system prevailing in The Netherlands, although concomitant with satisfying neonatal mortality figures, is not adequate from the point of view of neonatal morbidity. The better outcome of the infants born under the care of the gynecologist is most probably (also) due to the tools of surveillance used in the supervision of the deliveries."* |

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| **1984** | **Home confinement: the positive results in Holland**<br>Damstra-Wijmenga SMI [13]<br>*MR-factor 0; OR-factor 0*<br>*Scope: place of delivery*<br>*Outcome measures: referral; interventions; neonatal morbidity; perinatal mortality* | |
| | Objective | To find out how pregnancy, delivery and childbed period had progressed in relation to the place the women had opted for at start of pregnancy, and to obtain facts about neonatal outcomes. |
| | Study design and methods | Structured interviews three weeks after delivery |
| | Coverage<br><br>Year(s) of the study<br>Number of women/cases included | Local: 99,3% of all women giving birth in the city of Groningen (and its surroundings ) in one year<br>1981<br>1470 women, at start pregnancy under the care of a midwife (67%) or the general practitioner (33%), divided in 3 groups: opting for home birth (27%), for hospital birth with 24-hours stay (37%), and for hospital birth with 7-day stay (37%), respectively . |
| | Main results of the study | • Among women who had opted for home confinement significantly fewer complications occurred during pregnancy, delivery and puerperium than among those who had their babies in hospital followed by a 24-hour stay there or followed by a seven-day stay in a maternity ward.<br>• Intrapartum referral to the obstetrician for reason of 'poor progress' occurred in 4.6% of women still at home and in 11.7% of women already in hospital; no other significant differences in indications for referral.<br>• Morbidity was lower among babies born at home than among those born in hospital (admission to special infant care unit in 2.8%, 8.2% and 10.8% of the neonates in the separate groups, respectively).<br>• No perinatal mortality in neonates born at home. |

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| | Conclusion about maternity care system | *"The study suggests that it is a responsible decision for a normal healthy woman, given the right kind of antenatal supervision, to have her baby at home with the least risk of complications."* |

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| **1986** | **Intra-uteriene vruchtdood [Intra-uterine deaths]**<br>Reijnders FJL, Meuwissen JHJM [14]<br>*MR-factor 0; OR-factor 100*<br>*Scope: primary versus secondary care*<br>*Outcome measure: perinatal mortality* | |
| | Objective | To determine to which extent the perinatal mortality rate in the hospitals was influenced by intra-uterine deaths, referred by primary care provider (midwife or general practitioner) after the death occurred. |
| | Study design and methods | Data analysis: Dutch perinatal registry of obstetricians |
| | Coverage<br>Year(s) of the study<br>Number of women/cases included | 50% of all hospital deliveries (n = 58.619)<br>1983<br>578 intra-uterine deaths |
| | Main results of the study | • 213 of the women were referred by primary care after the intra-uterine death had occurred (36,9%).<br>• The perinatal death figures in hospitals are influenced by referred intra-uterine deaths. |
| | Conclusion about maternity care system | *"The perinatal mortality rate does not serve as a criterion for comparison of the quality of primary care at home and secondary care in the hospital."*<br>*"The avoidability of the cases of intra-uterine death in primary care has to be analysed."* |

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| **1986** | **Regional perinatal mortality and regional hospitalization at delivery in The Netherlands**<br>Treffers PE, Laan R [15]<br>*MR-factor 0 ; OR-factor 100*<br>*Scope: place of delivery*<br>*Outcome measure: perinatal mortality* | |
| | Objective | To study the relation between the PMR and the percentage of hospital deliveries. |
| | Study design and methods | Data analysis (Statistics Netherlands), investigating different groups: the 11 provinces of The Netherlands, municipalities divided into groups according to the number of inhabitants, and the 17 cities with > 100,000 inhabitants. |
| | Coverage<br>Year(s) of the study<br>Number of women/cases included | National<br>1980-1983<br>Not reported |

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| | Main results of the study | • Hospitalization at delivery varied betweens provinces from 49.2% to 75.5%.<br>• Hospitalization at delivery was clearly correlated with the degree of urbanization.<br>No relation between the degree of hospitalization at delivery in the cities and the PMR |
| | Conclusion about maternity care system | *"The proportion of hospital delivery appears not to be a major factor determining the regional PMR in the current system of obstetric care in The Netherlands".*<br>*"The question whether an obstetric system comprising home deliveries is justified cannot be answered by perinatal mortality figures alone; other criteria, including infant morbidity, must also be taken into account".* |

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| **1986** | **Indrukwekkende en tegelijk teleurstellende daling van perinatale sterfte in Nederland [Impressive but still disappointing decline in perinatal mortality in The Netherlands]**<br>Hoogendoorn D [16]<br>*MR-factor 0 ; OR-factor 0*<br>*Scope: place of delivery*<br>*Outcome measure: perinatal mortality* | |
| | Objective | To describe the trend in perinatal mortality related to place of delivery. |
| | Study design and methods | Comparison of data collected by international organizations (e.g. WHO, EEC) |
| | Coverage<br>Year(s) of the study<br>Number of women/cases included | All births in The Netherlands ? (not reported)<br>1970 – 1984<br>Not reported |
| | Main results of the study | • After 1940 the PMR has shown a remarkable decrease: the PMR for 1982 (10,0‰) was 1/4 of the PMR for 1940.<br>• Stagnation of the decline of PMR since 1982; by that The Netherlands have lost their internationally favourable position.<br>• The proportion of home deliveries decreased progressively between 1950 and 1978 and remained stable since then.<br>• The relationship between the home birth and the stagnation of decline in PMR must be discussed. |
| | Conclusion about the maternity care system | *"Reconsideration of the problems of obstetrical care and particularly also of the desirability of home vs. clinical delivery appears necessary."* |

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| **1987** | **De pH van het arteriële navelstrengbloed van pasgeborenen bij door vroedvrouwen geleide bevallingen [The pH of umbilical artery blood in neonates in deliveries managed by midwives]**<br>Knuist M, Eskes M, van Alten D [17]<br>*MR-factor 0; OR-factor 100*<br>*Scope: midwifery care*<br>*Outcome measure: neonatal morbidity* | |

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| | Objective | Standardized measurement of the arterial umbilical pH value of neonates, as a parameter of neonatal morbidity. |
| | Study design and methods | Prospective cohort study |
| | Coverage<br><br>Year(s) of the study<br>Number of women/cases included | All pregnant women who booked for antenatal care in a midwifery practice in the Zaanstreek<br>1982-1983<br>175 women: 91 nulliparous and 84 multiparous |
| | Main results of the study | • Significant higher pH values of the neonates of nulliparous women delivered by midwives than those of the neonates of nulliparous women delivered by the obstetrician after referral during pregnancy. No difference between the first group and the nulliparous women who were referred intrapartum.<br>• No significant differences in the pH values of the neonates of multiparous women delivered by midwives, or delivered by the obstetrician after referral during pregnancy or after referral intrapartum. |
| | Conclusion about maternity care system | *"This study shows with respect to umbilical pH values, that there is no cause for concern about the Dutch obstetric system in which midwives take care of pregnant women and deliveries."* |

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| **1987** | **Neurologisch onderzoek bij pasgeborenen in een verloskundigenpraktijk [Neurologic examination of newborn infants in an obstetrics practice]**<br>Eskes M, Knuist M, van Alten D [18]<br>*MR-factor 0 ; OR-factor 100*<br>*Scope: midwifery care*<br>*Outcome measure: neonatal morbidity* | |
| | Objective | To investigate the effectiveness of the selection system in maternity care. |
| | Study design and methods | Assessment of neonatal outcome by the arterial umbilical pH and by neurological examination with Prechtl's method in the 2nd week postnatal |
| | Coverage<br><br>Year(s) of the study<br>Number of women/cases included | All pregnant women who booked for antenatal care in a midwifery practice in the Zaanstreek.<br>1982-1983<br>177 neonates born under supervision of a midwife (n=116) or born under supervision of an obstetrician after referral during pregnancy (n = 26) or after intrapartum referral (n=35). |
| | Main results of the study | • Significant higher neurological optimality scores of the neonates born under sole care of the midwife than the scores of the neonates born under care of the obstetrician after referral during pregnancy. No difference between the first group and the neonates born under care of the obstetrician after intrapartum referral.<br>• No relationship between the neonatal neurological optimality score and the arterial umbilical pH. |
| | Conclusion about maternity care system | *"There is no need for concern about the Dutch obstetrical system in which midwives take care of pregnancies and deliveries, as the results of this study shows."* |

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| **1989** | **Midwifery in the Netherlands. The Wormerveer study; selection, mode of delivery, perinatal mortality and infant morbidity**<br>Van Alten D, Eskes M, Treffers PE [19]<br>*MR-factor 0; OR-factor 100*<br>*Scope: midwifery care*<br>*Outcome measures: perinatal mortality, neonatal morbidity, interventions* | |
| | Objective | To investigate the procedures used for selecting maternity care, and their results. |
| | Study design and methods | Prospective cohort study |
| | Coverage<br>Year(s) of the study<br>Number of women/cases included | Regional: independent midwifery practice in Wormerveer<br>1969 – 1983<br>7980 women from 20 weeks onwards, booked at the midwifery practice, giving birth to 8055 children |
| | Main results of the study | • Perinatal mortality 11.1 ‰ versus national 14.5 ‰.<br>• The highest mortality (51.7 ‰) in the group of infants born after maternal referral during pregnancy.<br>• Perinatal mortality in the group selected during pregnancy as low-risk was very low (2.3 ‰), with a low rate of intervention (caesarean sections 0,4%).<br>• Of the infants born alive under sole care of a midwife, 3.8% were admitted to hospital.<br>• Emergency admission because of birth asphyxia occurred in 0.4%. |
| | Conclusion about maternity care system | *"Selection of pregnant women into groups with high and with low risk is possible with the relatively modest means available to the midwife."*<br>*"Within the scope of the Dutch system of obstetric care it is possible to achieve very good results with midwifery care for selected women."* |

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| **1989** | **Regionale verschillen in perinatale sterfte: het verband met enkele aspecten van de zorg rond de geboorte [Regional differences in perinatal mortality: associations with some aspects of perinatal care]**<br>Mackenbach JP, van Leengoed PLM [20]<br>*MR-factor 0 ; OR-factor 0*<br>*Scope: place of delivery*<br>*Outcome measure: perinatal mortality* | |
| | Objective | To investigate regional differences in perinatal mortality in relation to aspects of perinatal care (home deliveries, deliveries supervised by obstetrician; the presence of a hospital level 2 or 3). |
| | Study design and methods | Data analysis, controlling for a number of possible confounding variables |
| | Coverage<br>Year(s) of the study<br>Number of women/cases included | Nationwide (Statistics Netherlands)<br>1980-1984<br>9.163 perinatal deaths (5375 stillbirths and 3788 first-week mortality) |

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| | Main results of the study | • Large regional differences in PMR and place of birth.<br>• A positive association for the percentage of home deliveries and stillbirth.<br>• A positive association for the percentage of deliveries supervised by an obstetrician and first-week mortality due to other causes than congenital malformations or birth trauma. |
| | Conclusion about the maternity care system | *"There is no statistically significant evidence that Hoogendoorn was right about a possible correlation between the number of home births not decreasing any longer and reduced perinatal mortality rates.*[16] *It is unknown whether there is a causal relation between the stillbirth rate and home births, and if so, which aspect of care leaves room for improvement. We will need perinatal audit of individual cases to determine whether care and mortality are related."* |

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| **1991** | **Place of delivery in The Netherlands: actual location of confinement**<br>Kleiverda G, Steen AM, Andersen I, Treffers PE, Everaerd W [21]<br>*MR-factor 0; OR-factor 50*<br>*Scope: place of delivery*<br>*Outcome measure: referral* | |
| | Objective | To compare preferences for either home or hospital confinement with the actual locations. |
| | Study design and methods | Interviews at 18 and 34 weeks GA as well as 10 days postpartum |
| | Coverage<br><br>Year(s) of the study<br>Number of women/cases included | 8 independent midwifery practices in Amsterdam and Haarlem<br>1985<br>170 women receiving prenatal care from midwives at the beginning of their pregnancies |
| | Main results of the study | • 59% of the women were referred to the obstetrician ante, intra or post partum.<br>• Fewer referrals in women with an initial preference for home confinement than in those who preferred a hospital confinement (53% versus 64%, not statistically significant).<br>• Positive attitudes towards a hospital confinement, more traditional attitudes towards female social roles and better overall psychological well-being showed predictive capacity for chances of referral. |
| | Conclusion about maternity care system | *"Partly the same variables that predicted a preference for hospital confinement were also able to predict the chance of a referral".* |

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| **1991** | **Safest birth attendants: recent Dutch evidence**<br>Tew M, Damstra-Wijmenga SM [22]<br>*MR-factor 0; OR-factor 0*<br>*Scope: primary versus secondary care*<br>*Outcome measure: perinatal mortality* | |
| | Objective | To examine how far the excess in predicted risk in women directed to obstetricians' care for delivery in hospital, explains the eventual excess of mortality. |
| | Study design and methods | Data analysis, based on Statistics Netherlands and Perinatal Registration Netherlands |
| | Coverage<br>Year(s) of the study<br>Number of women/cases included | All registered births<br>1986<br>162.901 births |
| | Main results of the study | • For all births > 32 weeks GA the PMR is much lower under the non-interventionist care of midwives than under the interventionist management of obstetricians at all levels of predicted risk. |
| | Conclusion about maternity care system | *"Birth at home is the safer option and, despite all technological innovations, the claim for the greater safety of birth in hospital cannot be sustained."* |

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| **1993** | **The Wormerveer study: perinatal mortality and non-optimal management in a practice of independent midwives**<br>Eskes M, Van Alten D, Treffers PE [23]<br>*MR-factor 0; OR-factor 100*<br>*Scope: maternity care system*<br>*Outcome measure: Perinatal mortality; factors contributing to substandard care* | |
| | Objective | To assess non-optimal management in cases of perinatal mortality. |
| | Study design and methods | Perinatal audit by a panel of independent experts |
| | Coverage<br>Year(s) of the study<br>Number of women/cases included | Regional: independent midwifery practice in Wormerveer<br>1969 – 1983<br>7980 women from 20 weeks onwards, booked at the midwifery practice, giving birth to 8055 children with 89 cases of perinatal mortality |
| | Main results of the study | • Preventable factors in 29 out of 66 cases of perinatal mortality, concerning the skill of the obstetrician (41%), the pediatrician (24%), the midwife (24%), the general practitioner (3%) and the behaviour of the patient (7%).<br>• Within the group of term pregnancies, preventable factors in 9 out of 20 cases of perinatal mortality: 4 cases within the hospital, 4 cases outside the hospital, and in 1 case both in and outside the hospital.<br>• Within the group referred to the obstetrician after intra-uterine death (n=13), in 2 cases non-optimal care by the midwife and in 1 case by the obstetrician. |

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| | Conclusion about maternity care system | *"Preventable factors are mainly present in decisions made during the prenatal period by the midwife and the obstetrician, and in care during labour, delivery and postnatal period by the obstetrician and the pediatrician." "The care of the midwife during labour and delivery and the place of delivery (in or outside the hospital) had little influence on preventable perinatal morbidity."* |

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| **1995** | **Blues and depression during early puerperium: home versus hospital deliveries**<br>Pop VJ, Wijnen HA, van Montfort M, Essed GG, de Geus CA, van Son MM, Komproe IH [24]<br>*MR-factor25 ; OR-factor 8*<br>*Scope: place of delivery*<br>*Outcome measure: maternal experiences* | |
| | Objective | To investigate whether women who give birth at home are less prone to mood disturbances during the early puerperium than those who give birth in hospital. |
| | Study design and methods | Prospective study |
| | Coverage<br><br>Year(s) of the study<br>Number of women/cases included | 5 midwifery practices and 1 hospital antenatal clinic in Veldhoven<br>1988-1989<br>293 pregnant women (133 nulliparous and 160 multiparous women) |
| | Main results of the study | • 52% of the women gave birth at home.<br>• Parturition occurred where it had been planned in 77% of women; referral occurred later on in pregnancy in 11% and during labour in 12%. Nullipara ehad to be referred significantly more often than multiparae.<br>• In general, there was no difference in the incidence of blues and depression between women who gave birth at home and those who gave birth in hospital.<br>• Obstetric factors were not related to the occurrence of blues or depression in the early puerperium. |
| | Conclusion about maternity care system | *"Women who gave birth in hospital are no more prone to postpartum mood disturbances, such as blues and depression, than women who give birth at home."* |

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| **1995** | **Neonatal neurological outcome after low-risk pregnancies**<br>Berghs G, Spanjaards E, Driessen L, Doesburg W, Eskes T [25]<br>*MR-factor 0 ; OR-factor 90*<br>*Scope: primary versus secondary care*<br>*Outcome measure: neonatal morbidity, intervention* | |
| | Objective | To study neonatal neurological outcome and obstetrical interventions in a low-risk population. |
| | Study design and methods | A prospective non-randomised study; neurological examination of the full term neonate according to Prechtl |
| | Coverage<br><br><br>Year(s) of the study<br>Number of women/cases included | 6 midwifery practices, 9 general practices in and around the city of Nijmegen and the obstetrical service at the Nijmegen University Hospital.<br>1984-1985<br>1034 low risk deliveries: 638 guided by midwives, 128 by general practitioners, and 268 by obstetricians using electronic fetal monitoring. 49% of the women delivered at home. |

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| | Main results of the study | • The deliveries directed by the obstetricians showed higher complication and intervention rates for both nulliparous and parous women.<br>• There were no differences in neonatal neurological outcome between groups attended by midwives, general practitioners or obstetricians despite the lower social profile of the hospital group, and despite the higher intervention rate in the latter group.<br>• After normal pregnancy the course of delivery does not determine neonatal outcome as much as bystanders may expect, calamities not foreseen. This emphasizes the importance of the prenatal period for the newborn. |
| | Conclusion about maternity care system | *"For the outcome of low-risk pregnancy, the place of birth in the Nijmegen area is irrelevant."* |

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| **1996** | **Outcome of planned home and planned hospital births in low risk pregnancies: prospective study in midwifery practices in The Netherlands**<br>Wiegers TA, Keirse MJ, van der Zee J, Berghs GAH [26].<br>*MR-factor 0; OR-factor 11*<br>*Scope: place of delivery*<br>*Outcome measure: perinatal mortality, neonatal morbidity, maternal morbidity* | |
| | Objective | To investigate the relation between the intended place of birth and perinatal outcome in women with low risk pregnancies receiving midwifery care. |
| | Study design and methods | Analysis of prospective data, controlling for parity and social, medical and obstetric background by means of a 'perinatal background index', consisting of 31 items. For measuring 'outcome' a 'perinatal outcome index' was composed incorporating 22 items on childbirth, 9 on the neonatal condition and 5 on maternal conditions post partum. |
| | Coverage<br>Year(s) of the study<br>Number of women/cases included | 54 midwifery practices in the province of Gelderland<br>1990 - 1993<br>97 midwives and 1836 women with low risk pregnancies |
| | Main results of the study | • In nulliparous women, no relation was found between the planned place of birth and perinatal outcome after controlling for a favourable or less favourable background. Without control for this background, the perinatal outcome was significantly better for planned home births than for planned hospital births.<br>• In multiparous women, perinatal outcome was significantly better for planned home births than for planned hospital births, with or without control for background variables. |
| | Conclusion about maternity care system | *"The outcome of planned home births is at least as good as that of planned hospital births in women at low risk receiving midwifery care in the Netherlands."* |

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| **1998** | **Transfer from home to hospital: what is its effect on the experience of childbirth?**<br>Wiegers TA, van der Zee J, Keirse MJ [27]<br>*MR-factor 0; OR-factor 25*<br>*Scope: place of delivery*<br>*Outcome measure: maternal experiences* | |
| | Objective | To measure the experience of childbirth, e.g. the appropriateness of the chosen place of birth and the satisfaction with the midwife's care of women planning to give birth at home (Group A ) or in hospital (Group B). |
| | Study design and methods | Postal questionnaires to pregnant women at 36 weeks GA and 3 weeks after birth |
| | Coverage<br><br>Year(s) of the study<br>Number of women/cases included | Women receiving antenatal care from a midwife in the province of Gelderland<br>1990 – 1992<br>1640 out of 1836 women returned both questionnaires (745 nulliparous and 895 multiparous women) |
| | Main results of the study | • In women who were referred to specialist care during labor, no difference occurred between women in Group A and women in Group B in their experience of the birth, the midwife's care or the postpartum period.<br>• Most women were inclined to make the same choice of birth location next time, whether or not they experienced an unplanned transfer.<br>• Of the women who were not referred, those in the home birth group were more positive about the midwife's care than those in the hospital group: 1.3 and 1.5, respectively ($p<0.01$) ( 1= very positive, 5 = very negative). |
| | Conclusion about maternity care system | *"it seems more important to reduce the fear of unplanned transfer, especially among nulliparas, than to advise women to choose a hospital birth in order to avoid such transfer".* |

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| **1998** | **Confidential enquiry into maternal deaths in The Netherlands 1983-1992**<br>Schuitemaker N, van Roosmalen J, Dekker G, van Dongen P, van Geijn H, BennebroekGravenhorst J [28]<br>*MR-factor 0 ; OR-factor 100*<br>*Scope: maternity care system*<br>*Outcome measure: maternal mortality* | |
| | Objective | To determine the causes of maternal death in The Netherlands. |
| | Study design and methods | Confidential Enquiry into the Causes of Maternal Deaths |
| | Coverage<br>Year(s) of the study<br>Number of women/cases included | Nationwide<br>1983-1992<br>154 direct and indirect maternal deaths (80% of all maternal deaths) |
| | Main results of the study | • The most frequent direct causes were (pre-)eclampsia, thrombo-embolism, obstetrical haemorrhage and sepsis; cerebro- and cardiovascular disorders were the most frequent indirect causes of death. |

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| | | • Age > 35 years and parity ≥ 3 are related to higher maternal mortality. Women from non-caucasian origin are more prone to death in comparison to caucasian women.<br>• In 4 of the 24 women where labour started at home, the place of birth played a significant role in delay. |
| | Conclusion about maternity care system | *" Most women were in good health before pregnancy, were in their 1st pregnancy and had uncomplicated obstetric histories. Early identification of women at risk and prompt referral if necessary is a goal for further improvement. "*<br>*"The relatively high percentage of home births in The Netherlands does not seem notably to have affected the MMR."* |

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| **1999** | **Perinatale sterfte in Delft en omstreken, 1983-1992: verdere reductie mogelijk door gerichte aandacht voor letale congenitale afwijkingen en placenta-insufficiëntie [Perinatal mortality in Delft and surrounds, 1983-1992: further reduction is possible by targeting lethal congenital abnormalities and placental insufficiency]**<br>de Galan-Roosen AEM, Kuijpers JC, Mackenbach JP [29]<br>*MR-factor 0 ; OR-factor 75*<br>*Scope: maternity care system*<br>*Outcome measure: Perinatal mortality; factors contributing to substandard care* | |
| | Objective | To establish the distribution of perinatal mortality over the various levels of obstetrical care, taking into account the various causes of perinatal mortality. |
| | Study design and methods | Prospective, descriptive. Record linkage between regional database and Statistics Netherlands.<br>Assessment of the causes of death in relation to the responsible careprovider and the place of delivery. |
| | Coverage<br><br>Year(s) of the study<br>Number of women/cases included | All parturitions of women living in the region Delft, regardless of the ultimate setting of the parturition.<br>1983-1992<br>28.983 children, 51% born under primary care management. |
| | Main results of the study | • PMR 0.85% (n=247).<br>• In 26% of these, childbirth was under primary care responsibility, in 43% after risk selection from primary to secondary care, in 14% under the exclusive responsibility of secondary care and in 17% after risk selection from secondary to tertiary care.<br>• The most frequent causes of death were progressive placental insufficiency (43% of all deaths) and lethal congenital anomalies (23%). |
| | Conclusion about maternity care system | *"Prevention of perinatal mortality should not be achieved by a shift from 1st to 2nd care, but rather in different forms of co-operation between primary and secondary/tertiary care."*<br>*"The focus should be on the timely detection of serious congenital anomalies and on developing clinically useful devices for detecting progressive placental insuffiency."*<br>*"Further medicalization of childbirth may be expected to contribute only little to a further decrease of the perinatal mortality figures."* |

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| **2000** | **Perinatal audit on avoidable mortality in a Dutch rural region: a retrospective study**<br>De Reu PAOM, Nijhuis JG, Oosterbaan HP, Eskes TK [30]<br>*MR-factor 44 ; OR-factor 56*<br>*Scope: maternity care system*<br>*Outcome measure: Perinatal mortality; factors contributing to substandard care* | |
| | Objective | To analyse the mode and cause of perinatal mortality. |
| | Study design and methods | A perinatal audit group investigated and classified the cause of perinatal death, analyzing who was responsible for the patient at the moment the perinatal death occurred, or became inevitable. |
| | Coverage<br>Year(s) of the study<br>Number of women/cases included | A rural Dutch region<br>1994-1995<br>73 perinatal deaths between the 24th week of pregnancy till the 7th day post-partum |
| | Main results of the study | • 23 cases (32%) were classified as probably or possibly avoidable: 6/32 in the primary care group (19%); 15/35 in the secondary care group (45%) and 1/4 in the tertiary care group (25%).<br>• Intra-uterine growth retardation, congenital malformations and ante partum haemorrhage were the most determinant factors for perinatal mortality. |
| | Conclusion about maternity care system | *"The Dutch obstetrical care system as such, for example home deliveries, did not effect the perinatal mortality rate."* |

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| **2000** | **Regional trend variations in infant mortality due to perinatal conditions in the Netherlands**<br>Treurniet HF, Looman CW, van der Maas PJ, Mackenbach JP [31]<br>*MR-factor 0; OR-factor 0*<br>*Scope: maternity care system*<br>*Outcome measure: neonatal morbidity* | |
| | Objective | To describe and explain regional variations in trends in infant mortality due to perinatal conditions. |
| | Study design and methods | Data analysis (Statistics Netherlands) |
| | Coverage<br>Year(s) of the study<br>Number of women/cases included | Nationwide<br>1984-1994<br>5972 infants <1 year who died from diseases of the neonatal period |
| | Main results of the study | • Statistically significant variations in mortality trends between regions.<br>• No relationship could be demonstrated between mortality and health care factors, i.e.: place of delivery (home/hospital), supervision of delivery (midwife/physician), and the presence of a hospital with specialised neonatal care (NICU). |
| | Conclusion about maternity care system | *"Regional differences in trends in infant mortality due to perinatal conditions in the Netherlands could not be explained by variations in health care factors. This is an important finding as the Dutch system of obstetric care, that includes a considerable number of home deliveries, has been subject to much debate."* |

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| **2000** | **The hour of birth: comparisons of circadian pattern between women cared for by midwives and obstetricians**<br>Heres MH, Pel M, Borkent-Polet M, Treffers PE, Mirmiran M [32]<br>*MR-factor 10; OR-factor 70*<br>*Scope: primary versus secondary care*<br>*Outcome measure: interventions* | |
| | Objective | To examine the difference, if any, between midwives' care and obstetricians' care in the circadian pattern of the hour of birth in spontaneous labour and delivery. |
| | Study design and methods | Descriptive study. Data analysis of the Perinatal Database of the Netherlands (LVR), comprising 83% of all births under midwives' care and 75% of all births under obstetricians' care. |
| | Year(s) of the study<br>Number of women/cases included | 1990<br>57,871 women receiving midwives' care and 31,999 women receiving obstetricians' care with spontaneous labour and spontaneous delivery. |
| | Main results of the study | • There was a difference in the circadian pattern of the hour of birth between midwives' and obstetricians' care.<br>• Peak times differed 5.43 hours (CI 4.23-7.03) for primiparous and 3.34 hours (CI 3.00-4.08) for multiparous women between the midwives' group and the obstetricians' group respectively.<br>• In obstetricians' care the duration of normal labour appears to be prolonged, presumably by an increased level of stress. |
| | Conclusion about maternity care system | *"The care of midwives appears to be the most appropriate care in normal birth."* |

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| **2002** | **Substandard factors in perinatal care in The Netherlands: a regional audit of perinatal deaths**<br>Wolleswinkel-van den Bosch JH, Vredevoogd CB, Borkent-Polet M, van Eyck J, Fetter WPF, Lagro-Jansen TLM, Rosink IH, Treffers PE, Wierenga H, Amelink-Verburg MP, Richardus JH, Verloove-Vanhorick SP, Mackenbach JP [33;34]<br>*MR-factor 17; OR-factor 22*<br>*Scope: maternity care system*<br>*Outcome measure: perinatal mortality; factors contributing to substandard care* | |
| | Objective | To determine whether substandard factors were present in cases of perinatal death, and whether there were differences in the frequency of substandard factors by level of care, particularly between midwives and obstetricians and between home and hospital births. |
| | Study design and methods | Population-based perinatal audit with explicit evidence-based audit criteria |
| | Coverage<br><br>Year(s) of the study<br>Number of women/cases included | Northern part of the province of South-Holland; all levels of care included<br>1996 and 1997<br>332 perinatal deaths |

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| | Main results of the study | • In 25% of the perinatal deaths a substandard factor was identified, possibly (19%) or probably (6%) related to the perinatal death.<br>• Substandard factors were mainly maternal/social (10% of all deaths, most frequently: maternal smoking) and antenatal care factors (10% of all deaths, most frequently: detection of IUGR).<br>• No statistically significant differences were found in scores between midwives and obstetricians or between home and hospital births. |
| | Conclusion about maternity care system | *"There is no evidence that the frequency of substandard factors is related to specific aspects of the perinatal care system in The Netherlands."*<br>*"Further quality improvement of obstetric care is possible by better implementation of guidelines for effective and safe care. It is expected that these improvements could reduce the PMR by between 6% and 25%".* |

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| **2004** | **Does a pregnant woman's intended place of birth influence her attitudes toward and occurrence of obstetric interventions?**<br>van der Hulst LAM, van Teijlingen ER, Bonsel GJ, Eskes M, Bleker OP [35]<br>*MR-factor 40; OR-factor 30*<br>*Scope: place of delivery*<br>*Outcome measure: maternal experiences, interventions* | |
| | Objective | To examine the impact of women's intended place of birth (home or hospital) and the course of pregnancy and labor when attended by midwives. |
| | Study design and methods | Prospective study. The course of labor was measured by the frequency of interventions by midwives and obstetricians |
| | Coverage<br><br>Year(s) of the study<br>Number of women/cases included | Low-risk pregnant women, gestation 20 to 24 weeks, enrolled in 25 random midwifery practices<br>1998-1999<br>625 |
| | Main results of the study | • 70% of all women opted for a home birth.<br>• Technical interventions by midwives (sweeping membranes and amniotomy) were more likely in women opting for a home birth than those who opted for a hospital birth.<br>• Multiparas opting for hospital birth were more likely to experience consultations and referrals.<br>• Within the group of multiparas referred for obstetrician care, women intending to have a home birth experienced fewer interventions (e.g., induction, augmentation, pharmacologic pain relief, assisted delivery, cesarean section) compared with those who had opted for a hospital birth (13.1 and 28.0, respectively). |
| | Conclusion about maternity care system | *"Women opting for a home birth demonstrated a smoother course of the birth process, compared with women who desired to deliver in the hospital, as measured by fewer obstetric interventions."* |

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| **2004** | **Determinanten van hoge Nederlandse perinatale sterfte onderzocht in een complete regionale cohort, 1990-1994 [The determinants of the high Dutch perinatal mortality in a complete regional cohort, 1990-1994]**<br>Bais JM, Eskes M, Bonsel GJ [36]<br>*MR-factor 0; OR-factor 75*<br>*Scope: maternity care system*<br>*Outcome measure: Perinatal mortality; factors contributing to substandard care* | |
| | Objective | To analyse the effects of population-based determinants and of professional and organisational factors on perinatal mortality |
| | Study design and methods | Population-based prospective cohort study; perinatal audit. |
| | Coverage<br><br>Year(s) of the study<br>Number of women/cases included | Regional, 3 midwifery practices and a local hospital in the Zaanstreek<br>1990-1994<br>8031 pregnancies, 92 perinatal deaths > 22 weeks GA until 28 days post partum |
| | Main results of the study | • In 31 of 92 singleton pregnancies followed by perinatal mortality, a relationship to substandard care was established.<br>• In 7 cases (8%) this relationship was probable (6x obstetrician, 1x midwife).<br>• The PMR was significantly affected by parity, multiple pregnancy, maternal age, conservative management in case of early preterm birth and a restrictive screening policy for lethal birth defects. |
| | Conclusion about maternity care system | *"Although clinical policy played a modest role, a negative role of the organisation of obstetric care was unlikely in this cohort."* |

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| **2004** | **Effectiveness of detection of intrauterine growth retardation by abdominal palpation as screening test in a low risk population: an observational study**<br>Bais JM, Eskes M, Pel M, Bonsel GJ, Bleker OP [37]<br>*MR-factor 0 ; OR-factor 90*<br>*Scope: midwifery care*<br>*Outcome measure: perinatal mortality, neonatal morbidity* | |
| | Objective | To evaluate the performance of midwives concerning abdominal palpation as a screening test for detecting IUGR in a low risk population, and ultrasound as a diagnostic test performed by obstetricians in women referred for suspected IUGR. under standard practice conditions. |
| | Study design and methods | Population-based observational study . |
| | Coverage<br><br>Year(s) of the study<br>Number of women/cases included | Regional, 3 midwifery practices and a local hospital in the Zaanstreek<br>1990-1994<br>6318 women from 20 weeks onwards, booked at the midwifery practice and considered low-risk at 20 weeks GA |

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| | Main results of the study | • Abdominal palpation as a screening test for IUGR is of limited value: the observed sensitivities were 28% for SGA ≤ 2,3 and 21% for SGA p ≤ 10, respectively.<br>• After ultrasound in case of sustained suspicion, the sensitivity in detection of SGA was 25% and positive predictive value (PPV) 16%. In detection of SGA p ≤ 10 sensitivity was 15% and PPV 55%, which means 45% were false positives. |
| | Conclusion about the maternity care system | *"The diagnostic performance of abdominal palpation as a screening test for IUGR detection in a low risk population is disappointing."*<br>*"Routine ultrasound does not improve detection rate nor perinatal morbidity and mortality."* |

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| **2005** | **Substandaardfactoren in de verloskundige eerstelijnszorg [Sub-standard factors in primary obstetric care]**<br>Aaldriks AA, Wolleswinkel-van den Bosch JH; Mackenbach JP [38]<br>*MR-factor 50 ; OR-factor 0*<br>*Scope: midwifery care*<br>*Outcome measure: factors contributing to substandard care* | |
| | Objective | To investigate the frequency and nature of sub-standard care factors in non-complicated pregnancies in primary obstetric care. |
| | Study design and methods | Retrospective investigation of medical files, using a checklist containing criteria based on the Obstetrics Indication List, the Cochrane Pregnancy and Childbirth Database, and from an expert panel |
| | Coverage<br><br>Year(s) of the study<br>Number of women/cases included | Data concerning obstetric care in 3 midwifery practices in the Delft area, the Netherlands<br>1998-1999<br>72 pregnancy records |
| | Main results of the study | • In only 1 pregnancy record no sub-standard factors were found.<br>• On average 1.7 sub-standard factors were seen (maximum=7).<br>• Most frequently found were: too few check-ups during the first trimester (39%), no testing for proteinuria at the first visit (26%) and no administration of prophylactic vitamin K1 (43%).<br>• Frequently the circumstances surrounding the departure from the criteria were found to justify the action. |
| | Conclusion about maternity care system | *"Sub-standard care factors were demonstrated in many of the pregnancies investigated. A limited number of these factors gave reason to question whether guidelines for good quality perinatal care are being properly applied."* |

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| **2006** | **A comparison of labour and birth experiences of women delivering in a birthing centre and at home in the Netherlands**<br>Borquez HA, Wiegers TA [39]<br>*MR-factor 0; OR-factor 0*<br>*Scope: place of delivery*<br>*Outcome measure: maternal experiences* | |
| | Objective | To compare the labour and birth experiences of women who delivered at home without complications with the experiences of women who delivered in a birth centre without complications. |
| | Study design and methods | Descriptive study; postal questionnaires at 1-6 months after birth. |
| | Coverage<br><br>Year(s) of the study<br>Number of women/cases included | Women recruited from one birth centre and three midwifery practices in an urban area of the Netherlands<br>2003<br>193 women; 129 delivered at home and 64 delivered in the birth centre |
| | Main results of the study | • The home-birth group perceived less pain, desired less pain-relieving medication, believed they knew their midwife better, and rated their birth setting 'higher' than the birth-centre group.<br>• The birth-centre group emphasised safety, having medical help available, and convenience, whereas the home-birth group placed more importance on the home being trustworthy and dependable, having their own place and belongings, and feeling comfortable and relaxed. |
| | Conclusion about maternity care system | *"Having an understanding of a woman's labour and delivery experience allows health-care providers to continue to improve the quality of maternity care."* |

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| **2007** | **Dutch women's perceptions of childbirth in the Netherlands**<br>Johnson TR, Callister LC, Freeborn DS, Beckstrand RL, Huender K [40]<br>*MR-factor 20; OR-factor 0*<br>*Scope: place of delivery*<br>*Outcome measure: maternal experiences* | |
| | Objective | To explore the lived experience of childbirth in Dutch women who had given birth at home in the Netherlands. |
| | Study design and methods | Qualitative study using audiotaped interviews by a American research team |
| | Coverage<br>Year(s) of the study<br>Number of women/cases included | Midwifery practice Voorburg<br>2004-2005<br>14 |
| | Main results of the study | • Themes included the advantages of giving birth in the home, where the women felt more in control of their environment; the difficulty and normalcy of the pain associated with giving birth; the feelings of fulfilment and empowerment that come with childbirth and motherhood; and the importance of the supportive role of the midwife-caregiver. |

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| | Conclusion about maternity care system | *"Women in a culture different from that of the United States who gave birth at home felt fulfilled and empowered by the experience". "Some of the beneficial attributes of the Dutch maternity care system, as articulated by these women, can and should be implemented into healthcare in the US."* |

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| **2007** | **Does a referral from home to hospital affect satisfaction with childbirth? A cross-national comparison**<br>Christiaens W, Gouwy A, Bracke P [41;42]<br>*MR-factor 0 ; OR-factor 0*<br>*Scope: place of delivery*<br>*Outcome measure: maternal experiences* | |
| | Objective | To compare Dutch and Belgian maternity care systems with regard to the influence of being referred to specialist care during pregnancy or intrapartum while planning for a home birth. |
| | Study design and methods | Retrospective study; two questionnaires were filled out at 30 weeks of pregnancy and within the first two weeks after childbirth, respectively. |
| | Coverage<br>Year(s) of the study<br>Number of women/cases included | Women in Gent (Belgium) and Tilburg (The Netherlands)<br>2004-2005<br>563 women |
| | Main results of the study | • Home births are more satisfying than hospital births.<br>• Belgian women are more satisfied than Dutch women<br>• Women who are referred to the hospital while planning for a home birth are less satisfied than women who planned to give birth in hospital and did.<br>• A referral has a greater negative impact on satisfaction for Dutch women. |
| | Conclusion about maternity care system | *"In the Dutch maternity care system home births lead to higher satisfaction, but once a referral to the hospital is necessary satisfaction drops and ends up lower than satisfaction with hospital births that were planned in advance."* |

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| **2008** | **Evaluation of 280,000 cases in Dutch midwifery practices: a descriptive study**<br>Amelink-Verburg MP, Verloove-Vanhorick SP, Hakkenberg RM, Veldhuijzen IM, Bennebroek Gravenhorst J, Buitendijk SE [43]<br>*MR-factor 55; OR-factor 9*<br>*Scope: midwifery care*<br>*Outcome measure: referral, perinatal mortality, neonatal morbidity* | |
| | Objective | To assess the nature and outcome of intrapartum referrals from primary to secondary care within the Dutch obstetric system. |
| | Study design and methods | Descriptive study; data analysis (the midwives' part of The Netherlands Perinatal Registry) |

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| | Coverage<br><br>Year(s) of study<br>Number of women/cases included | Midwifery database, national data (part of The Netherlands Perinatal Registry)<br>2001-2003<br>280,097 low-risk women under exclusive care of a primary level midwife at the start of labour |
| | Main results of the study | • 68.1% of the women completed childbirth under exclusive care of a midwife.<br>• 3.6% were referred on an urgency basis, with main reasons fetal distress and postpartum haemorrhage.<br>• 28.3% were referred without urgency, predominantly during the first stage of labour (73.6% of all referrals).<br>• Women who had planned a home delivery were referred less frequently than women who had planned a hospital delivery.<br>• On average, the mean Apgar score at 5 minutes was high (9.72%) and the peripartum neonatal mortality was low (0.05%) Adverse neonatal outcomes occurred most frequently in the urgent referral group, followed by the group of referrals without urgency and the nonreferred group. |
| | Conclusion about maternity care system | *"Risk selection is a crucial element of the Dutch obstetric system and continues into the postpartum period. The system results in a relatively small percentage of intrapartum urgent referrals and in overall satisfactory neonatal outcomes in deliveries led by primary level midwives."* |

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| **2008** | **Substandard care in maternal mortality due to hypertensive disease in pregnancy in the Netherlands**<br>Schutte JM, Schuitemaker NW, van Roosmalen J, Steegers EA [44]<br>*MR-factor 0; OR-factor 100*<br>*Scope: maternity care system*<br>*Outcome measure: maternal mortality, factors contributing to substandard care* | |
| | Objective | To review the standard of care in cases of maternal mortality due to hypertensive diseases in pregnancy and to make recommendations for its improvement. |
| | Study design and methods | Confidential enquiry and audit by the Dutch Maternal Mortality Committee, in order to identify factors contributing to substandard care |
| | Coverage<br><br>Year(s) of study<br>Number of women/cases included | All maternal deaths reported to the MMC due to hypertensive disease in pregnancy in the Netherlands<br>2000-2004<br>27 cases of maternal death due to hypertensive disease in pregnancy |

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| | Main results of the study | • In 26 cases (96%), substandard care factors were present, of which in 17 cases (63%)more than five different items.<br>• In community midwifery care, the most frequent substandard care factor was no testing for proteinuria when clearly indicated (41%).<br>• In hospital care, the most frequent substandard care was related to insufficient diagnostic testing when indicated (41%), insufficient management of hypertension by obstetricians (85%), no use or inadequate use of magnesium sulphate (67%), inadequate stabilisation before transport to tertiary care centres and/or delivery (52%) and failure to consider timely delivery (44%). |
| | Conclusion about maternity care system | *"Training of midwives and obstetricians should be improved, guided by clear local protocols."* |

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| **2008** | **Severe maternal morbidity during pregnancy, delivery and puerperium in the Netherlands: a nationwide population-based study of 371,000 pregnancies**<br>Zwart JJ, Richters JM, Ory F, de Vries JI, Bloemenkamp KW, van Roosmalen J [45;46]<br>*MR-factor 0; OR-factor 73*<br>*Scope: maternity care system*<br>*Outcome measure: maternal morbidity; factors contributing to substandard care* | |
| | Objective | To assess incidence, case fatality rate, risk factors and substandard care in severe maternal morbidity in The Netherlands. |
| | Study design and methods | Prospective population-based cohort study |
| | Coverage<br>Year(s) of the study<br>Number of women/cases included | All 98 maternity units in the Netherlands<br>2004-2006<br>2552 women with severe maternal morbidity; , with all pregnant women in The Netherlands in the same period as reference cohort (n = 371,021). In a subset of 63 women (2.5%), the care provision was assessed through clinical audit |
| | Main results of the study | • Severe maternal morbidity complicates at least 71 ‰ of all pregnancies in The Netherlands: major obstetric haemorrhage (4.5 ‰), eclampsia (6.2 ‰), uterine rupture (6.1 ‰) and intensive care unit admission 2.4 ‰.<br>• Non-Western immigrant women had a 1.3-fold increased risk of severe maternal morbidity when compared with Western women.<br>• Substandard care was found in 39 of a subset of 63 women (62%). |
| | Conclusion about maternity care system | *"Since substandard care was found in the majority of assessed cases, reduction of severe maternal morbidity seems a mandatory challenge."*<br>*"Home delivery appeared to be a strong protective factor for severe maternal morbidity in The Netherlands with a RR of 0.1 (95% CI 0.1-0.2). This again demonstrates the proper functioning of the Dutch risk selection system."* |

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| **2008** | **Perinatal factors related to negative or positive recall of birth experience in women 3 years postpartum in the Netherlands**<br>Rijnders M, Baston H, Schonbeck Y, van der Pal K, Prins M, Green J, Buitendijk S [47]<br>*MR-factor 58 ; OR-factor 0*<br>*Scope: maternity care system*<br>*Outcome measure: maternal experiences* | |
| | Objective | To investigate Dutch women's views of their birth experience 3 years after the event. |
| | Study design and methods | Postal questionnaire to women with at least one prenatal, perinatal, or postnatal visit to the participating midwifery practice. |
| | Coverage<br>Year(s) of the study<br>Number of women/cases included | 8 midwifery practices from across The Netherlands<br>2004 (concerning births in 2011)<br>1308 women |
| | Main results of the study | • 96% of all women who gave birth at home and 77% of women who gave birth in hospital felt 'very happy' or 'quite happy' looking back on their birth experience (in total: 83% of all women).<br>• More than one in five primiparas looked back negatively compared with one in nine multiparas<br>• Factors for looking back negatively included e.g.: having had an assisted vaginal delivery or unplanned C section; no home birth; referral during labor; not having had a choice in pain relief |
| | Conclusion about maternity care system | *"Factors associated with negative recall of birth experience 3 years postpartum are linked not to demographic variables but to obstetric interventions and referral during labour."*<br>*"Further research needs to be undertaken to understand women's expectations and experiences of birth within the Dutch maternity system."* |

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| **2008** | **Etnische verschillen in de voorkeur voor thuisbevallingen en het zorgtraject dat zwangeren doorlopen [Ethnic differences in preference for home delivery and in pregnancy care received by pregnant women]**<br>Anthony S, Amelink-Verburg MP, Korfker DG, van Huis AM, van der Pal-de Bruin KM [48]<br>*MR-factor 40; OR-factor 0*<br>*Scope: place of delivery*<br>*Outcome measure: referral* | |
| | Objective | To investigate differences among pregnant women from various ethnic groups in terms of pregnancy care and the place of delivery. |
| | Study design and methods | Descriptive, retrospective data analysis (The Netherlands Perinatal Registry). The ethnic categories defined in the registries were: Dutch, Mediterranean, other European, African, Hindu, Asian and unknown |
| | Coverage<br>Year(s) of the study<br>Number of women/cases included | Nationwide<br>1995-2002<br>1,401,892 pregnancies |

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| | Main results of the study | • Asian and 'other European' women often started pregnancy care and most often completed the delivery under the care of a midwife (44.6% and 45.3%, respectively).<br>• Hindu and African women often started pregnancy care directly with an obstetrician and were least likely to complete their births under the primary care of a midwife (33.1% and 28.0%, respectively).<br>• 39% of the Dutch women completed delivery with a midwife.<br>• Of those women who started the delivery under the care of a midwife, 3 out of 4 Dutch women, 1 out of 3 Mediterranean women and only 1 out of 5 Hindu women ultimately elected for a home birth. |
| | Conclusion about maternity care system | *"Large ethnic differences exist in both pregnancy care and preference for place of delivery and, ultimately, place of birth. This should be taken into account in policy-making and in the provision of information regarding the Dutch midwifery system."* |

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| **2008** | **Perinatale sterfte in Nederland gedurende 2000-2006; risicofactoren en risicoselectie [Perinatal mortality in The Netherlands 2000-2006; risk factors and risk selection]**<br>Ravelli AC, Eskes M, Tromp M, van Huis AM, Steegers EA, Tamminga P, Bonsel GJ [49]<br>*MR-factor 8; OR-factor 12*<br>*Scope: maternity care system*<br>*Outcome measure: perinatal mortality* | |
| | Objective | To gain insight in recent perinatal mortality figures in The Netherlands and their relation with important risk factors, risk groups and risk selection among pregnant women. |
| | Study design and methods | Retrospective cohort study, data analysis (The Netherlands Perinatal Registry) |
| | Coverage<br>Year(s) of study<br>Number of women/cases included | Nationwide<br>2000-2006<br>1.3 million births > 22 weeks GA |
| | Main results of the study | • Maternal age (< 20 or ≥ 40 years) and high multiparity (≥ 4) were risk factors for perinatal mortality but showed low prevalence (< 3%). Non-Western ethnicity and nulliparity were important risk factors (relative risk of both 1.4) with a prevalence of 16% and 46%, respectively.<br>• Full-term births (≥ 37 weeks G) accounted for 26% of all perinatal mortality with a mortality risk of 2.8 per 1000 births.<br>• In the full-term born group perinatal mortality was 0.4 per 1000 births in home births, 2.7 per 1000 births in outpatient clinics and 4.5 per 1000 births when the women were referred to the gynaecologist before start of labour. |
| | Conclusion about maternity care system | *"At a population level, low or high maternal age and high parity are less important risk factors than expected. More detailed research is indicated into the mortality of very preterm births but also of full-term born children."* |

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| **2008** | **Operative deliveries in low-risk pregnancies in The Netherlands: primary versus secondary care**<br>Maassen MS, Hendrix MJ, van Vugt HC, Veersema S, Smits F, Nijhuis JG [50]<br>*MR-factor 0; OR-factor 36*<br>*Scope: primary versus secondary care*<br>*Outcome measure: interventions* | |
| | Objective | To compare planned place of birth and incidence of operative delivery among women at low risk of complications at the time of onset of labor. |
| | Study design and methods | Retrospective data analysis (The Netherlands Perinatal Registry) |
| | Coverage<br>Year(s) of study<br>Number of women/cases included | The Netherlands<br>2003<br>107,667 |
| | Main results of the study | • Women at low risk who planned to give birth in secondary care, had a significantly higher rate of operative deliveries than women who began labor in primary care where they intended to give birth (18% vs. 9%, OR 2.25, 95% CI 2.00-2.52).<br>• For caesarean section, the rates were 12 percent versus 3 percent (OR 3.97, 95% CI 3.15-5.01), irrespective of parity. |
| | Conclusion about maternity care system | *"The rate of operative deliveries was significantly lower for low-risk pregnant women who gave birth in a primary care setting compared with similar women who planned birth in secondary care."*<br>*"These findings clearly demonstrate the need for a prospective study to examine the relationship between planned place of birth and mode of delivery and neonatal and maternal outcomes."* |

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| **2009** | **Regional perinatal mortality differences in the Netherlands; care is the question**<br>Tromp M, Eskes M, Reitsma JB, Erwich JJ, Brouwers HA, Rijninks-van Driel GC, Bonsel GJ, Ravelli AC [51]<br>*MR-factor 8; OR-factor 23*<br>*Scope: maternity care system*<br>*Outcome measure: perinatal mortality* | |
| | Objective | To study regional variation in perinatal mortality within the Netherlands and to identify possible explanatory factors for the found differences. |
| | Study design and methods | Data analysis (The Netherlands Perinatal Registry), calculating differences in perinatal mortality between 4 distinct geographical regions (North-East-South-West) |
| | Coverage<br>Year(s) of study<br>Number of women/cases included | nationwide<br>2000-2004<br>904,003 singleton births > 22 weeks GA |

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| | Main results of the study | • The northern region had the highest PMR (11.2‰ versus 10.1‰ nationally, the lowest number of spontaneous deliveries, the lowest number of women selected as low risk at start of delivery, and the lowest number of home births (19.7% vs. 30.4% in the eastern region).<br>• Among births ≥ 37 weeks GA, regional mortality differences were largest for births in women. transferred from low to high risk during delivery (but only small variations in% of intrapartum transfer).<br>• The excess risk in the northern region accounts for about 19 deaths a year. |
| | Conclusion about maternity care system | *" Regional differences in perinatal mortality exist in the Netherlands. These differences could not be explained by demographic or socio-economic factors, however clinical risk group analysis showed indications for a role of health care factors."* |

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| **2009** | **Decreasing perinatal mortality in The Netherlands, 2000-2006: a record linkage study**<br>Ravelli AC, Tromp M, van Huis M, Steegers EA, Tamminga P, Eskes M, Bonsel GJ [52]<br>*MR-factor 8; OR-factor 17*<br>*Scope: maternity care system*<br>*Outcome measure: perinatal mortality* | |
| | Objective | To analyse the recent trend in Dutch perinatal mortality and the influence of risk factors. |
| | Study design and methods | A retrospective cohort study in The Netherlands. Data analysis (The Netherlands Perinatal Registry), with and without risk adjustment. |
| | Coverage<br>Year(s) of the study<br>Number of women/cases included | Nationwide<br>2000-2006<br>1,246,440 singleton births |
| | Main results of the study | • Perinatal mortality among singletons declined from 10.5 to 9.1 per 1000 total births in the period 2000-2006.<br>• The decline was most prominent among births complicated by congenital anomalies, among premature births (32.0-36.6 weeks) and among term births.<br>• Home births showed the lowest mortality risk |
| | Conclusion about maternity care system | *"Dutch perinatal mortality declined steadily over this period, which could not be explained by changes in known risk factors including high maternal age and non-western ethnicity. The mortality level is still high compared with European standards."*<br>*"The prevalence of home deliveries in term infants (27%) is paired with a very low perinatal mortality risk (0.4 ‰)."* |

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| **2009** | **The quality of maternity care services as experienced by women in the Netherlands**<br>Wiegers TA [53]<br>*MR-factor 0; OR-factor 0*<br>*Scope: maternity care system*<br>*Outcome measure: maternal experiences* | |
| | Objective | To evaluate the quality of care from the perspective of clients. |
| | Study design and methods | Postal survey both in the 3rd trimester and 4 weeks post partum. The 'care path' of the women is described based on care provider and place of birth |
| | Coverage<br>Year(s) of the study<br>Number of women/cases included | Clients of 4 insurance companies<br>2007<br>1248 pregnant clients women |
| | Main results of the study | • 41.5% remained in primary care throughout pregnancy, labor, birth and the postpartum period, receiving care from a midwife or general practitioner, 31.3% of respondents gave birth at home.<br>• 58.5% experienced referral from primary to secondary care or reverse, at least once.<br>• Women, regardless of parity, were very positive about the quality of the maternity care they received. |
| | Conclusion about maternity care system | *"The quality of care as experienced by women is high throughout the care system."*<br>*"With regard to the care during labor and birth the quality of care scores are higher when women know their care provider, when they give birth at home, when they give birth in primary care and when they are assisted by their own midwife."* |

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| **2009** | **A trend analysis in referrals during pregnancy and labour in Dutch midwifery care 1988-2004**<br>Amelink-Verburg MP, Rijnders ME, Buitendijk SE [54]<br>*MR-factor 75 ; OR-factor 0*<br>*Scope: midwifery care*<br>*Outcome measure: referral* | |
| | Objective | To assess the trends and patterns of referral from midwives to obstetricians within the Dutch maternity care system and the differences in referral patterns between nulliparous and parous women. |
| | Study design and methods | Descriptive study; data analysis (the midwives' part of The Netherlands Perinatal Registry) |
| | Coverage<br>Year(s) of study<br>Number of women/cases included | nationwide<br>1988-2004<br>1 977 006 pregnancies, attended by a primary care level midwife |

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| | Main results of the study | • From 1988 to 2004 an increase of 14.5% (from 36.9 to 51.4%) occurred in referrals from primary midwifery care to secondary obstetric care (ante partum +9.0%, intrapartum +5.2% and postpartum +0.3%).<br>• In parous women, the increase in referrals was greater (+16.6%) than in nulliparous women (+12.3%).<br>• Previous caesarean section, requirement for pain relief and the presence of meconium-stained amniotic fluid were the main contributors to the changes in referral rates. |
| | Conclusion about maternity care system | *"During a 17-year period, there was a continuous increase in the referral rate from midwives to obstetricians. Primary prevention of caesarean section and antenatal preparation for childbirth are important interventions in the maintenance of primary obstetric care for low-risk pregnant women."* |

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| **2009** | **Perinatal mortality and morbidity in a nationwide cohort of 529,688 low-risk planned home and hospital births**<br>de Jonge A, van der Goes BY, Ravelli AC, Amelink-Verburg MP, Mol BW, Nijhuis JG, Bennebroek Gravenhorst J, Buitendijk SE [1;55]<br>*MR-factor 54; OR-factor 23*<br>*Scope: place of delivery*<br>*Outcome measure: perinatal mortality, neonatal morbidity* | |
| | Objective | To compare perinatal mortality and severe perinatal morbidity between planned home and planned hospital births, among low-risk women who started their labour in primary care. |
| | Study design and methods | Retrospective cohort study, data analysis (The Netherlands Perinatal Registry) |
| | Coverage<br>Year(s) of study<br>Number of women/cases included | Nationwide<br>2000-2006<br>529,688 low-risk women who were in primary midwife-led care at the onset of labour |
| | Main results of the study | • 60.7% of all women intended to give birth at home, 30.8% planned to give birth in hospital (and 8.5% intended place unknown).<br>• No significant differences were found between planned home and planned hospital birth concerning intrapartum death, neonatal death during the first 24 hours, neonatal death up to 7 days, admission to neonatal intensive care unit. |
| | Conclusion about maternity care system | *"The relative high PMR in The Netherlands cannot be explained by the large number of planned home births." "Planning a home birth does not increase the risks of perinatal mortality and severe perinatal morbidity among low-risk women, provided the maternity care system facilitates this choice through the availability of well-trained midwives and through a good transportation and referral system."* |

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| **2010** | **Mortaliteit en morbiditeit van aterme pasgeborenen op de neonatale intensivecareunit in de regio Utrecht [Mortality and morbidity among full-term neonates in a neonatal intensive care unit in the Utrecht region, the Netherlands]**<br>Evers AC, van Leeuwen J, Kwee A, Brouwers HA, Koopman-Esseboom C, Nikkels PG, Duyn A, Bruinse HW [56]<br>*MR-factor 0; OR-factor 46*<br>*Scope: maternity care system*<br>*Outcome measure: perinatal mortality; neonatal morbidity* | |
| | Objective | To gain an insight into perinatal mortality and morbidity in full-term infants without congenital abnormalities admitted to a neonatal intensive care unit (NICU). |
| | Study design and methods | Retrospective analysis. Information about delivery, NICU-admission and follow-up (until the age of 18 months) obtained from the hospital charts |
| | Coverage<br><br><br>Year(s) of study<br>Number of women/cases included | All term infants admitted to the NICU at the Wilhelmina Children's Hospital in Utrecht, the Netherlands were included.<br>1997-2003<br>597 term neonates without congenital disorders (equivalent to 3-4 per 1,000 full-term neonates in the Utrecht region) |
| | Main results of the study | • 47% of the neonates were admitted on account of asphyxia, 17% with respiratory problems and 12% with infections.<br>• In 79% of all NICU admissions the delivery had taken place under secondary care (of which 29% labour had started under care of a primary level midwife); 21% of the neonates were admitted to the NICU following delivery under exclusive primary care (98 neonates born at home, 18 neonates born in short-stay hospital delivery).<br>• Almost 15% of the infants died in the NICU, in 89% due to asphyxia. Of the surviving infants following perinatal asphyxia, 15% had a permanent disability at the age of 18 months. |
| | Conclusion about maternity care system | *"Post-partum admission of a fundamentally healthy full-term neonate to the NICU is a serious adverse perinatal outcome, and warrants further investigation. The various factors that influence these admissions should be analysed in more detail, for instance by means of perinatal audits."* |

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| **2010** | **Introducing maternal morbidity audit in the Netherlands**<br>van Dillen J, Mesman JAJM, Zwart JJ, Bloemenkamp KWM, van Roosmalen J [57;58]<br>*MR-factor 20; OR-factor 80*<br>*Scope: maternity care system*<br>*Outcome measure: maternal morbidity; factors contributing to substandard care* | |
| | Objective | To identify substandard care in cases of severe acute maternal morbidity in the Netherlands |
| | Study design and methods | Prospective cohort study, assessment by audit panels |

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| | Coverage<br><br>Year(s) of the study<br>Number of women/cases included | Selected women from a nationwide cohort of 2552 women with severe maternal morbidity<br>2005-2008<br>67 women with severe maternal morbidity of which 17 after delivery under primary care (7.5%) |
| | Main results of the study | • The incidence of severe maternal morbidity in The Netherlands was 7.1 ‰. In women delivered under the responsibility of a midwife or GP, the incidence was 1.6 ‰, and in women with completed home birth 1.4 ‰.<br>• Substandard care was identified in 53 of 67 women (79%). |
| | Conclusion about maternity care system | *"The lower risk for severe maternal morbidity after delivery under the responsibility of the primary care giver seems to reflect the proper functioning Dutch system of risk selection. However, also here substandard care was judged to be present in the majority of cases."*<br>*"Ongoing audit of women with severe acute maternal morbidity is promoted both at local and national level"* |

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| **2010** | **Avoidable mortality in small-for-gestational-age children in the Netherlands**<br>De Reu PA, Oosterbaan HP, Smits LJ, Nijhuis JG [59]<br>*MR-factor 44; OR-factor 56*<br>*Scope: maternity care system*<br>*Outcome measure: perinatal mortality, factors contributing to substandard care* | |
| | Objective | To analyze avoidable perinatal mortality in small-for-gestational-age (SGA) children. |
| | Study design and methods | Evaluation of perinatal mortality in SGA newborns by means of perinatal audit. |
| | Coverage<br>Year(s) of study<br>Number of women/cases included | Three regions of the Netherlands<br>2003-2004<br>55 perinatal deaths out of 2,396 SGA-newborns |
| | Main results of the study | • Substandard care factors (SSF) in 22 cases (40%); in 16 of these the relation to the death was possible or (very) probable.<br>• Before referral IUGR was suspected only in 22% of all SGA-cases.<br>• The 'fatal moment' occurred in 22% of all cases during embryogenesis; in 17 29% the responsible caregiver was a midwife and in 39% an obstetrician.<br>• In 2 cases (3%) perinatal death may be the result of inadequacies related to the obstetrical-chain-care. |
| | Conclusion about maternity care system | *"Failure in timely diagnosis of FGR appears to be an important issue in all cases of perinatal mortality in SGA-children."*<br>*"More adequate action by caregivers could decrease perinatal mortality in nearly 1/3 among SGA-children."* |

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| **2010** | **Pregnancy and labour in the Dutch maternity care system: what is normal? The role division between midwives and obstetricians**<br>Amelink-Verburg MP, Buitendijk SE [60]<br>*MR-factor 67; OR-factor 0*<br>*Scope: midwifery care*<br>*Outcome measure: referral* | |
| | Objective | To analyse the evolution of the concept of "normality" in pregnancy and labour. |
| | Study design and methods | Descriptive study. Analysis of the consecutive Lists of Obstetric indications (LOI) from 1958 onwards, in relation to data of the Netherlands Perinatal Registry (the midwives' part of the Registry) |
| | Coverage<br>Year(s) of study<br><br>Number of women/cases included | Nationwide<br>1958-2003 (Lists of Obstetric Indications) and 1988-2004 (data analysis)<br>1 977 006 pregnancies, attended by a primary care level midwife |
| | Main results of the study | • The number of conditions for obstetric care defined in the successive LOIs, increased from 39 in 1958 to 143 in 2003.<br>• In the course of time, the nature and the content of many indications changed, as did the assignment to the most appropriate care provider.<br>• The odds of the obstetrician being involved in the birth process increased from 24.7% in 1964 to 59.4% in 2002. |
| | Conclusion about maternity care system | *"Multidisciplinary research is urgently needed to better determine the risk status and the optimal type of care and care provider for each individual woman in her specific situation, taking into account the risk of both under- and over-treatment."*<br>*"Safely keeping women in primary care could be considered one of a midwife's interventions, just as a referral to secondary care may be. The art of midwifery and risk selection is to balance both interventions, in order to end up with the optimal result for mother and child."* |

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| **2010** | **Pain acceptance and personal control in pain relief in two maternity care models: a cross-national comparison of Belgium and the Netherlands**<br>Christiaens W, Verhaeghe M, Bracke P [61]<br>*MR-factor 0; OR-factor 0*<br>*Scope: maternity care system*<br>*Outcome measure: interventions* | |
| | Objective | To assess the contribution of the Belgian and Dutch care context to the pain acceptance and the medication use during labour. |
| | Study design and methods | Descriptive study using questionnaires at 30 weeks of pregnancy and within the first 2 weeks after childbirth, respectively |

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| | Coverage<br><br>Year(s) of study<br>Number of women/cases included | Two comparable cities in Belgium and The Netherlands (Ghent and Tilburg)<br>2004-2005<br>327 women having a hospital birth without obstetric intervention |
| | Main results of the study | • Dutch women with a normal hospital birth are six times less likely to use pain medication during labour, compared to their Belgian counterparts.<br>• This country difference cannot be explained by labour pain acceptance, since Dutch and Belgian women giving birth in a hospital setting are characterised by a similar labour pain acceptance.<br>• For Dutch women the use of pain medication is lowest if women experience control over the reception of pain medication and have a positive attitude towards labour pain. |
| | Conclusion about maternity care system | *"Apart from individual level determinants, such as length of labour or pain acceptance, our findings suggest that the maternity care context is of major importance in the study of the management of labour pain."* |

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| **2010** | **The comparison of birth outcomes and birth experiences of low-risk women in different sized midwifery practices in the Netherlands**<br>Fontein Y [62]<br>*MR-factor100 ; OR-factor 0*<br>*Scope: midwifery care*<br>*Outcome measure: referral, interventions, maternal experiences* | |
| | Objective | To examine maternal birth outcomes and birth experiences of low-risk women in the Netherlands in different sized midwifery practices. |
| | Study design and methods | Descriptive study using postal questionnaires six weeks after the estimated due date |
| | Coverage<br><br><br>Year(s) of study<br>Number of women/cases included | 143 midwifery practices of small-size (1-2 midwives), medium-size (3-4 midwives) or large-size (5 or more), respectively.<br>2007<br>718 Dutch speaking women with uncomplicated pregnancies |
| | Main results of the study | Women in small-sized practices<br>• were significantly more likely to experience lower rates of referral and lower rates of interventions (e.g. pain relief, CTG registration and unplanned caesarean sections)<br>• were significantly more likely to know their midwife or midwives and were more frequently supported by their own midwife after referral in comparison to women in practices with more than two midwives<br>• had higher levels of a positive birth experience than women in practices with more than two midwives. |
| | Conclusion about maternity care system | *"The support of development of small midwifery practices and financial acknowledgement for continuity of care after referral can play an important role in a change to less referrals and interventions during birth as well as to satisfaction with women's experiences of birth."* |

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| **2010** | **Perinatal mortality and severe morbidity in low and high risk term pregnancies in the Netherlands: prospective cohort study**<br>Evers AC, Brouwers HA, Hukkelhoven CW, Nikkels PG, Boon J, Egmond-Linden A, Hillegersberg J, Snuif YS, Sterken-Hooisma S, Bruinse HW, Kwee A [63]<br>*MR-factor 6; OR-factor 63*<br>*Scope: primary versus secondary care*<br>*Outcome measure: perinatal mortality; neonatal morbidity* | |
| | Objective | To compare incidences of perinatal mortality and severe perinatal morbidity between low risk term pregnancies supervised in primary care by a midwife and high risk pregnancies supervised in secondary care by an obstetrician. |
| | Study design and methods | Cohort study using aggregated data from a national perinatal register |
| | Coverage<br>Year(s) of study<br>Number of women/cases included | Region Utrecht, covering 13% of the Dutch population<br>2007-2008<br>Pregnant women at 37 weeks' gestation or later with a singleton or twin pregnancy without congenital malformations (37.735 newborns) |
| | Main results of the study | • The overall perinatal death rate was 2.62 ‰ (60 ante partum and 22 intrapartum stillbirths, and 210 NICU admissions of which 17 neonates died).<br>• NICU admission rates did not differ between pregnancies supervised by a midwife and those supervised by an obstetrician.<br>• After start of labour in primary care a significant higher risk of delivery related perinatal death than after start of labour in secondary care (RR 2.33).<br>• After intrapartum referral a higher risk of delivery related perinatal death than after start labour in secondary care (RR 3.66) and a higher risk of NICU admission (RR 2.51). |
| | Conclusion about maternity care system | *" The Dutch obstetric care system may not be as effective as once thought."*<br>*"An important limitation of the study is that aggregated data of a large birth registry database were used and adjustment for confounders and clustering was not possible. However, the findings are unexpected and the obstetric care system of the Netherlands needs further evaluation".* |

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| **2011** | **Pregnant women's fear of childbirth in midwife- and obstetrician-led care in Belgium and the Netherlands: test of the medicalization hypothesis**<br>Christiaens , van de Velde S, Bracke P [64]<br>*MR-factor 0; OR-factor 0*<br>*Scope: primary vs. secondary care*<br>*Outcome measure: women's experiences* | |
| | Objective | To propose and test a conceptual model of fear of childbirth, and to explore the relation between fear of childbirth and medicalization. |
| | Study design and methods | Questionnaires at 30 wks GA |

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| | Coverage<br><br>Year(s) of the study<br>Number of women/cases included | City of Ghent (Belgium) and Tilburg (the Netherlands); 5 hospitals and 27 midwifery practices<br>Sept 2004 – Sept 2005<br>790 pregnant Women |
| | Main results of the study | • Belgian women in midwife-led care were more fearful of medical interventions and hospital care than the Dutch.<br>• Both Belgian and Dutch women receiving midwifery care reported less fear compared to those in obstetric antenatal care. |
| | Conclusion about maternity care system | *"Irrespective of the maternity care model, antenatal care providers are crucial in preventing fear of childbirth".* |

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| **2011** | **Provinciale verschillen in perinatale sterfte en reistijd tot ziekenhuis [Differences between Dutch provinces in perinatal mortality and travel time to hospital.]**<br>Ravelli ACJ, Rijninks-van Driel GC, Erwich JJHM, Mol BWJ, Brouwers HAA, Abu-Hanna A, Eskes M [65]<br>*MR-factor 29; OR-factor 33*<br>*Scope: maternity care system*<br>*Outcome measure: perinatal mortality* | |
| | Objective | To investigate differences in perinatal mortality between Dutch provinces and to determine the significance of risk factors including travel time from home to the hospital during labour. |
| | Study design and methods | Population-based cohort study. Data analysis (The Netherlands Perinatal Registry) |
| | Coverage<br>Year(s) of the study<br>Number of women/cases included | Nationwide<br>2000-2006<br>1,242,725 singleton births |
| | Main results of the study | • The PMR in the Netherlands was 9.9 ‰.<br>• The PMR varied between provinces from 11.3 ‰ to 9.2 ‰. Friesland and Groningen had significantly higher PMR.<br>• The provinces with the highest PMR had the lowest planned home births<br>• Starting late with perinatal care (≥ 18 weeks GA) was an important risk factor.<br>• Longer travel time (≥ 20 minutes) was an independent risk factor associated with perinatal mortality, adjusted OR 1.7 |
| | Conclusion about maternity care system | *The differences in PMR per province can be explained by longer travel time to the hospital during labour. Late start of perinatal care and low socio-economic status also affect the mortality rate. These risk factors need to be taken into account during registration, investigation, audit and obstetric policy."* |

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| **2011** | **Travel time from home to hospital and adverse perinatal outcomes in women at term in the Netherlands**<br>Ravelli ACJ, Jager KJ, de Groot MH, Erwich JJHM, Rijninks-van Driel GC, Tromp M, Eskes M, Abu-Hanna A, Mol BWJ [66]<br>*MR-factor 7 ; OR-factor 29*<br>*Scope: maternity care system*<br>*Outcome measure: perinatal mortality; neonatal morbidity* | |
| | Objective | To study the effect of travel time, at the start or during labour, from home to hospital on mortality and adverse outcomes in pregnant women at term in primary and secondary care. |
| | Study design and methods | Population-based cohort study. Data analysis (The Netherlands Perinatal Registry) |
| | Coverage<br>Year(s) of study<br>Number of women/cases included | Nationwide<br>2000-2006<br>751.926 hospital births |
| | Main results of the study | • Women indicated as low risk at start of labour and delivered in a outpatient clinic had the lowest PMR (0.5‰) and lowest adverse neonatal outcome rate (2.4‰) (mortality, Apgar <4 and/or admission to NICU). PMR not increased by travel time.<br>• After intrapartum referral (in 25% of cases) PMR was 1.9‰ and adverse outcome rate 6.5‰. PMR not significantly increased by travel time.<br>• Women indicated as high-risk at start of labour and delivered in a hospital had a PMR of 1.6‰ and adverse outcome rate 6.6‰. Travel time ≥ 20 minutes increased the risk of PMR (OR 1.18) and adverse outcome (OR 1.19). |
| | Conclusion about maternity care system | *"A travel time from home to hospital of 20 minutes or more by car is associated with an increased risk of mortality and adverse outcomes in women at term in the Netherlands. These findings should be considered in plans for the centralisation of obstetric care."* |

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Curriculum vitae
Publicaties
Dankwoord

# Curriculum Vitae

Marianne Paulina Verburg
Geboren te Groningen op 27 december 1953.
Dochter van Jan Marinus Verburg (1914-1997) en
Lolkje Annie van Arkel (1917-2011).
Gehuwd met Herman Amelink in 1974.
Drie kinderen: Maarten (1978), Anneke (1983), Allard (1988).

**Opleiding**

| | |
|---|---|
| 1973 | Diploma Gymnasium β (oude stijl)<br>Baudartius Lyceum Zutphen |
| 1976 | Diploma verloskundige<br>Kweekschool voor Vroedvrouwen Amsterdam |
| 1980-2004 | Scholingen op het gebied van vakinhoud, methodologie, bestuur en beleid, onder meer:<br>Stage Geboorteregeling (Academisch Ziekenhuis Leiden); PAOG-cursus Echografie in de verloskunde en gynaecologie (Academisch Ziekenhuis Utrecht), WOS-cursus I, II en III (TNO Leiden); PAOG-cursus Biostatistiek (Erasmus Universiteit Rotterdam); AIO-cursus Medische Statistiek (Universiteit Leiden); Adviseren over onderzoeksmethoden (EMGO, Amsterdam); NIHES-cursus Maternal and Child Health Epidemiology (Erasmus Universiteit Rotterdam), Kadertraining voor verloskundigen (Kontakt der Kontinenten Soesterberg); TNO in-company programma (Vlerick Leuven Gent Management School) |
| 2006 - 2007 | Inspecteursopleiding.<br>Inspectie academie, Utrecht |

**Werk**

| | |
|---|---|
| 1976 - 1981 | Praktiserend verloskundige in eigen duo-praktijk, Amsterdam Oost |
| 1981 - 1989 | Praktiserend verloskundige als vaste waarnemer in diverse praktijken Hilversum en omgeving |
| 1980 - 1985 | Redacteur Tijdschrift voor Verloskundigen |
| 1990 - 1995 | Hoofdredacteur Tijdschrift voor Verloskundigen |
| 1995 - 2005 | Verloskundige-onderzoeker bij TNO Preventie en Gezondheid Leiden, afd. Voortplanting & Perinatologie |

2006 - heden Inspecteur perinatale zorg bij de Inspectie voor de Gezondheidszorg
Vanuit die functie onder meer lidmaatschap van:
- Taakgroep Transparantie van de Stuurgroep Zwangerschap en Geboorte (2009-2010) (voorzitter)
- Raad van Advies Programma Klaar voor een Kind
- Raad van Advies Deliver studie
- Raad van Advies Stichting Perinatale Registratie Nederland
- Raad van Advies Stichting Perinatale Audit Nederland
- Commissie Registratie Aangeboren afwijkingen
- Stuurgroep Zichtbare Zorg Eerstelijns Verloskunde
- Programmacommissie Zwangerschap en Geboorte ZonMw

**Relevante nevenfuncties**

1981 - 1984 Secretaris Catharina Schrader Stichting;
uitgave en publiciteit Dagboek Catharina Schrader

1987 Lid Organisatiecommissie congres International Confederation of Midwives (Den Haag); publiciteitscampagne

1989 Publicatie 9 maanden dagboek (2010: 23e druk)

1990 Publicatie Dagboek voor de kraamtijd (2000: 11e druk)

1997 - 2005 Bestuurslid Stichting Groep B-streptokokken, Oegstgeest

1997 - 1999 Gecommitteerde (later: 'werkveldeskundige' geheten) bij de dossier-eindexamens aan de Kweekschool voor Vroedvrouwen te Amsterdam

1998 - 2003 Lid Commissie Verloskunde van het College voor Zorgverzekeringen. Als zodanig mede-verantwoordelijk voor de uitgave van het Verloskundig Vademecum (december 1998) en het Verloskundig Vademecum 2003 (december 2003)

2002 - 2005 Lid Registratiecommissie van de Stichting Perinatale Registratie Nederland, Bilthoven

2003 - 2005 Lid Raad van Advies Masters opleiding voor Verloskundigen, AMC Amsterdam

2003 Begeleidingscommissie EU-project Peristat, als vertegenwoordiger van Nederlandse verloskundigen

2004 Lid Scientific Committee 'Normal Labour Conference', Universiteit van Lancaster

2004 Lid WHO-expertpanel Handhygiëne, als vertegenwoordiger van verloskundigen. WHO, Geneve

2004 - 2005 Voorzitter multidisciplinaire Task Force binnen de Registratiecommissie (definiëren dataset voor de nieuwe gezamenlijke Perinatale Registratie Nederland)

2006- 2008 Voorzitter jury Scriptieprijs Verloskunde

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van der Goes BY, Daemers DOA, Kateman H, **Amelink-Verburg MP**. Hygiëne en Infectiepreventie in de eerstelijns verloskundige praktijk. KNOV-standaard. (wetenschappelijke onderbouwing). Bilthoven/Leiden: KNOV en TNO-PG, 2004

van der Goes BY, Daemers DOA, Kateman H, **Amelink-Verburg MP**. Hygiëne en Infectiepreventie in de eerstelijns verloskundige praktijk; samenvatting van de gelijknamige KNOV-standaard. Bilthoven/Leiden: KNOV en TNO-PG, 2004

van der Ploeg CPB, **Amelink-Verburg MP**. Draaiboek hepatitis B-immunisatie bij zuigelingen van hepatitis B-draagsters. TNO KvL/JPB. Leiden, 2005.

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de Boer J, van der Stouwe RA, Daemers DOA, **Amelink-Verburg MP**, Offerhaus PM. Niet-vorderende ontsluiting. KNOV-standaard (wetenschappelijke onderbouwing). Bilthoven, 2006.

# Dankwoord

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Marianne Amelink