The role of primary care midwives in the Netherlands. Evaluation of midwifery care in the Dutch maternity care system: a descriptive study
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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.\textsuperscript{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).\textsuperscript{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.\textsuperscript{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).\textsuperscript{4} This document includes a list of obstetric indications for referral from primary to secondary care, based on best evidence or on consensus.\textsuperscript{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.\textsuperscript{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.\textsuperscript{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.\textsuperscript{15}

The number of women referred to a higher level of care during childbirth has been increasing slowly but steadily in recent years.\textsuperscript{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. 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. 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, 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) *

<table>
<thead>
<tr>
<th>Category 0 No referral</th>
<th>Category 1 Urgent referral**</th>
<th>Category 2 Referral without urgency***</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>N</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>60 523</td>
<td>3454</td>
<td>24 443</td>
</tr>
<tr>
<td>2002</td>
<td>63 728</td>
<td>3408</td>
<td>27 266</td>
</tr>
<tr>
<td>2003</td>
<td>66 591</td>
<td>3123</td>
<td>27 561</td>
</tr>
<tr>
<td>Total 2001-2003</td>
<td>190 842</td>
<td>9985</td>
<td>79 270</td>
</tr>
<tr>
<td>% of all women SLMC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>68.4</td>
<td>3.9</td>
<td>27.6</td>
</tr>
<tr>
<td>2002</td>
<td>67.5</td>
<td>3.6</td>
<td>28.9</td>
</tr>
<tr>
<td>2003</td>
<td>68.5</td>
<td>3.2</td>
<td>28.3</td>
</tr>
<tr>
<td>Total 2001-2003</td>
<td>68.1</td>
<td>3.6</td>
<td>28.3</td>
</tr>
<tr>
<td>% of all intrapartum referrals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>12.4</td>
<td>87.6</td>
<td>100</td>
</tr>
<tr>
<td>2002</td>
<td>11.1</td>
<td>88.9</td>
<td>100</td>
</tr>
<tr>
<td>2003</td>
<td>10.2</td>
<td>89.8</td>
<td>100</td>
</tr>
<tr>
<td>Total 2001-2003</td>
<td>11.2</td>
<td>88.8</td>
<td>100</td>
</tr>
</tbody>
</table>

\[\text{NA not applicable.}\]

\* See Methods section.

\** Including 990 referrals due to neonatal indications, Table 5.5.

\*** Including 820 referrals due to neonatal indications.
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.
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 5.6 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

<table>
<thead>
<tr>
<th></th>
<th>Category 0: no referral</th>
<th>Category 1: urgent referral</th>
<th>Category 2: referral without urgency</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>$n$</td>
<td>190 842</td>
<td>9 985</td>
<td>79 270</td>
<td>280 097</td>
</tr>
<tr>
<td>Mean Apgar score at 5 minutes</td>
<td>9.82</td>
<td>9.24</td>
<td>9.57</td>
<td>9.72</td>
</tr>
<tr>
<td>Apgar Score &lt; 7 at 5 minutes, % (n)</td>
<td>0.3 (522)</td>
<td>5.3 (528)</td>
<td>1.2 (969)</td>
<td>0.7 (2019)</td>
</tr>
<tr>
<td>Intrapartum fetal death, % (n)</td>
<td>0.00 (4)</td>
<td>0.83 (83)</td>
<td>0.00 (0)</td>
<td>0.04* (87)</td>
</tr>
<tr>
<td>Neonatal death &lt; 24 hours, % (n)</td>
<td>0.00 (7)</td>
<td>0.26 (26)</td>
<td>0.03 (27)</td>
<td>0.02** (60)</td>
</tr>
<tr>
<td>Referral to paediatrician &lt; 24 hours, % (n)</td>
<td>0.3 (511)</td>
<td>12.5 (1250)</td>
<td>2.5 (1998)</td>
<td>1.3 (3759)</td>
</tr>
</tbody>
</table>

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, 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 timeline. 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. 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. 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. 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. 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. 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. 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.
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.\textsuperscript{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.\textsuperscript{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.

**Acknowledgement**

We thank all Dutch midwives. Without their continuing data collection (at often inconvenient hours) this study would not have been possible. We thank the Netherlands Perinatal Registry for her permission to use the Perinatal Register.
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Intrapartum and postpartum referrals


