Safe motherhood : severe maternal morbidity in the Netherlands. The LEMMoN study

Zwart, J.J.

CHAPTER 11

Introducing maternal morbidity audit in the Netherlands

van Dillen J, Mesman J, Zwart JJ, Bloemenkamp KWM, van Roosmalen J.

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Abstract

Objective: To identify substandard care in selected cases from a nationwide prospective cohort study into severe acute maternal morbidity (SAMM) in the Netherlands called 'LEMMoN'.

Design: Prospective audit of selected cases of SAMM.

Setting: Nine audit meetings held throughout the Netherlands.

Population: All pregnant women in the Netherlands.

Methods: Before each meeting, SAMM details of selected cases were sent to all panel members for individual assessment by completing an audit form. During a subsequent plenary meeting, findings were discussed and substandard care factors as judged by the majority of assessors were scored.

Main outcome measures: Incidence of substandard care and recommendations for improving the quality of care.

Results: Substandard care was identified in 53 of 67 cases (79%). Specific recommendations were formulated concerning the procedure of audit and concerning local as well as national management guidelines.

Conclusion: Substandard care is present in four out of five cases of SAMM. Ongoing audit of cases is promoted both at national and local level.

Introduction

Maternal mortality has traditionally been used as an important indicator of health care, making comparison over time and between services possible. Detailed assessment of individual cases through audit by the Confidential Enquiry into Maternal Deaths in the United Kingdom has been acknowledged as a major contributor to the decline of maternal deaths in the UK over the past 50 years. Other countries have followed this example among which South Africa and the Netherlands. Nowadays, maternal mortality in high income countries is too rare to be used as a sensitive marker for the quality of services. Therefore, severe acute maternal morbidity (SAMM) has been introduced.[1-6] SAMM complicates at least 0.71% of all pregnancies in the Netherlands, and should be considered as a new indicator of the quality of obstetric care next to maternal mortality.[7] Auditing SAMM in order to identify substandard care has generally been accepted as complementary to maternal death reviews.[8] In this study we describe the introduction of SAMM audits in the Netherlands focusing on substandard care analysis.

Materials and Methods

This study was part of the nationwide prospective cohort study into SAMM in the Netherlands, called 'LEMMoN'. Cases were enrolled between August 1st 2004 and August 1st 2006. SAMM was classified according to disease-specific and management-based criteria and categorised into five groups (Figure 1). All 98 Dutch hospitals participated. Detailed methods are described previously.[7]

Figure 1. Inclusion criteria for SAMM

Group 1: ICU admission
- Admission to intensive care unit or coronary care unit, other than for standard postoperative recovery

Group 2: Uterine rupture
- Clinical symptoms (pain, fetal distress, acute loss of contractions, haemorrhage) that led to an emergency caesarean section, at which the presumed diagnosis of uterine rupture was confirmed
- Peripartum hysterectomy or laparotomy for uterine rupture

Group 3: Eclampsia / HELLP syndrome
- Eclampsia
- HELLP-syndrome only when accompanied by liver haematoma or rupture

Group 4: Major Obstetric Haemorrhage
- Transfusion need of ≥ 4 units of packed cells
- Embolisation or hysterectomy for major obstetric haemorrhage

Group 5: Miscellaneous
- Other cases of severe maternal morbidity to the opinion of the treating obstetrician, not to be included in group 1-4

From 2004 onwards, nine audits have been organised throughout the Netherlands and 71 SAMM cases (2.8% of all cases of SAMM) were assessed (Table 1). Audits included regionally or nationally selected SAMM cases. Some of them had specific topics: eclampsia, major obstetric haemorrhage (MOH) and selected SAMM after delivery under primary care (Table 1).

Table 1. Selected characteristics from seven SAMM audit meetings

Location	Date	Selection	SAMM (n)	Assessors (n)	Substandard care[2] (%)
The Hague	jun 2005	local (pilot: all cases)	14	17	86%
Groningen[1]	mar 2006	regional (severe cases)	12	23	75%
Leiderdorp[1]	sep 2006	regional (severe cases)	12	13	67%
Leeuwarden	sep 2006	local (MOH)	4	16	- [3]
Delft/Zwolle/ Amsterdam[1]	feb 2007	national (eclampsia)	12	8	92%
Utrecht[1]	oct 2008	national (primary care eclampsia)	8	18	63%
	nov 2008	national (primary care MOH)	9	24	89%

MOH=major obstetric haemorrhage; [1]Substandard care items available from five audits; [2]Substandard care by majority of the assessors after group discussion; [3]Recommendations in all four cases, but no consensus (%) on substandard care by majority of the assessors

The first pilot audit included all 23 SAMM cases in two hospitals during the first 10 months of the study, of which 14 were eventually selected for discussion during the panel meeting.[9] Since then, we applied initial selection and discussed all cases during the plenary meetings. During an in-depth MOH audit in Leeuwarden involving all local staff, recommendations were formulated in all four cases, but presence of substandard care by majority of the assessors was not formulated. For calculating the incidence of substandard care these cases were not included. During an in-depth eclampsia audit in Delft, nationally selected cases were discussed without the presence of medical staff (consultants, midwives or registrars) involved in the cases. It was noted that this left many questions unanswered and therefore, two additional audit meetings were held with involved staff present. These three audits are presented here as one. Concerning the MOH in primary care audit, cases were eligible when eight or more units of blood were transfused, and the woman was either admitted to intensive care or had undergone major surgery or arterial embolisation to stop the haemorrhage.

For each audit, panel members were selected from the LEMMoN advisory board and the national Maternal Mortality Committee, as well as local health care workers involved. Panel membership was variable but chosen in such a way that each audit included staff from university as well as non-university hospitals. Furthermore, members from different specialties (mainly obstetricians,

midwives, and internal medicine specialists) were selected with special attention to including members with experience in the audit process.

Each panel meeting considered four to fourteen cases. Anonymised notes from the LEMMoN database, selected by one member of the LEMMoN audit team (JZ), were sent to the panel members and included patient discharge letter, details from delivery, operation notes, laboratory results and a summary of file notes. Each panel member was requested to perform individual assessment of patient notes using a standardized audit form used by the Maternal Mortality Committee (Appendix B). Substandard care was identified at the level of the patient, the care provider or the organisation of health care (15 items). In case of eclampsia or MOH, additional substandard care items concerning management were scored. During the plenary meeting, SAMM cases were discussed and assessed for substandard care. If necessary the involved care provider was requested for additional information from the original patient file which was made available at the plenary meeting. Substandard care was firstly identified if care deviated from national guidelines. If national guidelines were not available, local protocols, best available evidence or expert consensus were used. Substandard care was assumed if the majority of assessors judged this to be the case.

Results

Of 358,874 births during the study period, 2552 SAMM cases were included in LEMMoN (7.1 per 1000 births). Of 67 SAMM cases discussed during the panel meetings, substandard care was judged to be present by the majority of assessors in 53 cases (79.1%). From five of the audits, including 53 cases (74.6%), more detailed scoring of substandard care items was available. From a total of 17,430 possible substandard care items (number of assessors X number of cases X 15 scoring items) 1223 (7.0%) were scored. Only 73 (6.0%) were identified at the level of the patient, 933 (76.3%) at the level of the care providers and 217 (17.7%) at the level of the organisation of health care (Table 2).

Pilot audit

During a pilot audit 23 SAMM cases were selected in two teaching hospitals in The Hague and these were assessed by 17 audit members.[9] Individual assessment of patient notes was judged to be possible in 16 cases (69.6%), with 18 cases classified as true SAMM (78.3%) and identification of substandard care during individual assessment in 10 cases (43.5%). Of five cases not classified as true SAMM, three where included due to MOH with transfusion of four units of red blood cells and two cases were admitted in ICU for observation because of pre-eclampsia and mild peripartum cardiomyopathy. Fourteen cases were subsequently selected by the panel members for plenary discussion with additional information from the original patient file. Of these, 12 cases

were classified as true SAMM (85.7%) and substandard care was judged to be present in 12 cases (85.7%). In one case, lack of information due to poor records was judged to be substandard. In addition to substandard care analysis, recommendations were made concerning future LEMMoN audits (Table 3).

Table 2. Substandard care items and their contribution during five SAMM audit meetings.

	n	%
Patient	**73**	**6.0**
Delay in consulting doctor	43	3.5
Refusal of medical help or advice	15	1.1
Language barrier	15	1.2
GP/Midwife	**367**	**30.0**
Inadequate antenatal care	92	7.5
Delay in recognition of symptoms / signs	113	9.2
Delay in referral to obstetrician	121	9.9
Inadequate risk selection*	41	3.4
Obstetrician	**559**	**45.7**
Inadequate antenatal care	88	7.2
Delay in recognition of symptoms / signs	181	14.8
Delay in treatment after diagnosis	255	20.9
Delay in referral to tertiary care centre	35	2.9
Other consultant	**7**	**0.6**
Delay in consulting obstetrician	7	0.6
Healthcare system	**217**	**17.7**
Home birth influenced outcome	103	8.4
Birth in general hospital influenced outcome	76	6.2
Quality of transport influenced outcome	38	3.1
Total	**1223**	**100.0**

*** only for primary care audits, percentage for total substandard care items**

Primary care audits

Of 358,874 births represented in the LEMMoN study, 145,703 (40,6%) were under the responsibility of primary care givers and 113,404 (31,6% of total) were home births.[7] Of 2552 SAMM cases, 227 (1.6 per 1000) were included after delivery under the responsibility of primary care provider, and 154 (1.4 per 1000) were included after home birth. During two audit sessions (one concerning MOH and one concerning eclampsia), 17 of these cases of SAMM after delivery under primary care (7.5%) were assessed.

From 1606 SAMM inclusions due to MOH, 140 (8.7%) were included after home delivery. Nine cases (6,4%) met the criteria and were assessed by 24 panel members. Substandard care was judged to be present by the majority of the assessors in eight cases (88.9%) and inadequate

risk selection was judged to be present by the majority of the assessors in four cases (44.4%). From a total of 4410 possible substandard care items (number of assessors X number of cases X 21 scoring items), 387 (8.8%) were recorded: 134 (34.6%) were at the level of the primary care provider and 72 (18.6%) concerned the management of MOH irrespective of the level of care. Specific recommendations were made concerning more stringent risk selection, delay in reaching the hospital and timing of referral (Table 3).

Table 3. Recommendations from selected SAMM audit meetings

Audit	Recommendation
General	- Additional information with patient records is often necessary for effective audit - Improve record keeping, especially concerning timing of interventions - Improve treatment guidelines concerning pre-eclampsia and MOH, for primary as well as secondary care
Eclampsia[10]	- Improve adequate treatment of hypertension - Improve adequate seizure prophylaxis
Primary care MOH	- Reduce the delay in reaching the hospital by timely referral (if placenta not delivered after 30 minutes) - Importance of IV access and initiation of resuscitation before transport to hospital - Discussion about the need and feasibility for misoprostol® at primary care level - Discussion concerning emergency transport and acceptance of home delivery in areas where referral to secondary care might result in delay - Need of delivery at ground floor due to regulations for emergency transport employees restricting them to carry patients downstairs - Repeated consultation from secondary care provider for suspected pre-eclampsia should lead to referral and continued secondary care, irrespective if patient classifies criteria
Primary care eclampsia	- Standard measuring of blood pressure is indicated two hours after delivery or before leaving the patient after home delivery

From 239 SAMM inclusions due to eclampsia or severe HELLP, all eight cases (3.3%) where delivery was under primary care were assessed by 18 panel members. Substandard care was judged to be present by the majority of the assessors in five cases (62.5%). Inadequate risk selection was identified by a minority of the assessors in four cases (ranging from 16.7% - 44.4% of assessors). From a total of 2940 possible substandard care items (number of assessors X number of cases X 21 scoring items), 221 (7.5%) were recorded: 69 (31.2%) were at the level of the primary care provider and 62 (28.1%) concerned the management of eclampsia irrespective of the level of care. Specific recommendations were made concerning the diagnosis and management of pre-eclampsia (Table 3).

Discussion

During nine audit meetings in the Netherlands, 67 SAMM cases were assessed and substandard care was identified in almost four out of five cases. Substandard care was judged to be present at the level of the patient and the level of the organisation of health care but mainly at the level of the care provider. For substandard care analysis, additional information from the original patient files was often required. However, even with the complete patient file available for assessment, substandard care analysis was not always possible. The lack of information as a result of inadequate record keeping can also be regarded substandard care. During the panel meetings, with availability of original patient file and discussion among panel members, the identification of substandard care increased. Although this pattern was consistent throughout all audits, the magnitude of the increase in substandard care identification during the pilot audit (from 43% after individual audit to 86% after group audit) has not been seen during successive audits (data not shown). This might reflect a learning curve for audit. The earlier reported lower incidence of substandard care in the LEMMoN study (61.9%) is due to the inclusion of individual audit results in that report compared with incidence after group audit here (79.1%).[7]

The incidence of SAMM due to eclampsia in the Netherlands is markedly increased compared with other Western countries.[10] Substandard care was identified in most cases of SAMM, mainly at the level of the care providers and often due to inadequate treatment of hypertension and inadequate seizure prophylaxis. As for maternal death due to hypertensive disease in pregnancy, in 26 (96%) out of 27 cases occurring in the Netherlands between 2000 and 2004, substandard care factors were present. [11] In 2005, the national guideline "Hypertensive disorders in pregnancy" of the Dutch Society of Obstetrics and Gynaecology has been adjusted and multiple papers and presentations have been given informing obstetricians concerning this issue.[12] However, the guideline and its implementation can still be improved.[11]

Half of all SAMM cases concern MOH.[7] Obstetric haemorrhage is the third direct cause of maternal death in the Netherlands with case fatality rate (CFR) of 1 in 201, compared with CFR of 1 in 53 for all SAMM cases. The relatively low CFR for MOH reflects the quality of blood supply in the Netherlands with patients having received up to 50 units of blood. Hence, half of the SAMM cases due to MOH (n=811) received more than four units of blood. From these figures it is clear that MOH is an important contributor to SAMM and not so much to maternal death. Where this might result in an attitude of acceptance towards morbidity, the risk of blood transfusion especially during the reproductive period should not be neglected. Audit revealed that there is ample room for improvement in the management of MOH. Skills trainings in obstetric emergencies like MOH should be implemented in any unit.[6;13] The Managing Obstetric Emergencies and Trauma course has been introduced in the Netherlands since 2003 and it is encouraged during these national

trainings to initiate regular local multidisciplinary skill trainings. A recent questionnaire indicated that at least 29% of Dutch obstetric units have regular skill trainings and 22% are in the process of organising these trainings [personal communication].

The lower risk for SAMM after delivery under the responsibility of the primary care giver (RR 0.1; 95% CI 0.1–0.2) seems to reflect the proper functioning Dutch system of risk selection.[7] However, also here substandard care was judged to be present in the majority of cases. Furthermore, inadequate risk selection in cases leading to severe MOH was present in almost half of cases. The definition retained placenta is used when the placenta has not been delivered within one hour after the birth of the baby.[14] In the Netherlands, women delivering under the responsibility of primary care givers are referred to secondary care in case of retained placenta and/or in case of severe bleeding (>1000 ml). For term pregnancy (which applies to all deliveries under primary care), however, the duration of the third stage of labour is under 15 minutes for 90% of deliveries.[15] Therefore, we recommend earlier referral to secondary care in case of retained placenta, especially due to delay in reaching secondary care as mentioned in table 3.

Concerning audit in general, although the effect of critical incident audit has not been proven in randomised controlled trials, it is clear that morbidity and mortality reviews do more good than harm.[16] Critical incident audit both monitors the quality of services and is a resource for professional learning.[13;17] The openness in provision of data and participation during these audits in the Netherlands is encouraging. Ongoing local audit of cases of eclampsia and MOH have already been implemented in the national quality assurance program to improve management and local guidelines. In addition to these national initiatives, auditing SAMM at local or regional level should be encouraged to improve the quality of obstetric care. In the Netherlands, however, obstetric audit is relatively new. After the results from Peristat in 2004, which indicated that Dutch perinatal mortality rates ranks unfavourably compared with other European countries, many measures have been taken in order to improve the quality of perinatal care. The most important are the initiation of the nationwide perinatal audit, better prenatal screening and the introduction of preconception care.[18] The national perinatal audit program includes training of audit members at regional and local level. In the near future, more health care workers will be familiar with obstetric audit and it is envisaged that the tradition of audit like in the United Kingdom, will eventually also be reached in Dutch obstetric health care.

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