

Confidential Regional Enquiry into Mature Stillbirths and Neonatal Deaths – A Multi-Disciplinary Peer Panel Perspective of the Perinatal Care of 238 Deaths

K H Tan, M P Wyldes, R Settatree, T Mitchell

ABSTRACT

Aim of Study: To examine the sub-optimal factors relating to the care of stillbirths and neonatal deaths of birthweight 2.5 kg and above.

Design: Regional confidential enquiry into stillbirths and neonatal deaths by multi-disciplinary panel.

Methods: All 238 stillbirths and neonatal deaths of 2.5 kg and above in West Midlands Region, UK in the year 1991 were studied. Documents from each death were peer-reviewed by four assessors, one from each of the 4 disciplines, selected randomly from a pool of 24 senior obstetricians, paediatricians, general practitioners and midwives. Panel consensus for each death was reached to identify relevant factors related to sub-optimal care which might have prevented or would reasonably be expected to prevent an adverse outcome (Grades II & III sub-optimal care).

Results: A total of 149 (62.7%) deaths were considered by the panel to have grade II or III factors. Of these, 151 (68.9%) were found in the antepartum period, 44 (20.1%) in the intrapartum period and 24 (11.0%) in the postpartum period. The majority (78.1%) of these factors involved clinical practice of care providers. Factors related to patient/family, equipment and staffing constituted 19.6%, 1.4% and 0.9% respectively. Important sub-optimal factors identified were lack of appreciation of antenatal and intrapartum risks factors (17.8%), the failure of proper interpretation and management of antepartum and intrapartum cardiotocography (12.8%), failure of adherence to accepted practice or standard care (12.8%), inadequate skills in neonatal resuscitation (4.5%) and adverse patient-related factors (19.6%).

Conclusion: Substantial scope exists for confidential multi-disciplinary peer review audit of current obstetric and neonatal care in the region in formulating a strategy to reduce perinatal mortality.

Keywords: audit, sub-optimal care, obstetric care, neonatal, peer review

INTRODUCTION

In recent years, there has been widespread interest in the role of confidential systematic enquiries into mortalities related to medical care, including stillbirths and neonatal deaths⁽¹⁻³⁾. There is also an understanding that the use of multi-disciplinary panels in such enquiries are essential as optimal obstetric care is multi-disciplinary in nature and that the use of such panels generates better agreement⁽⁴⁾. Confidential inquiry involving intensive study of individual stillbirths and neonatal deaths, however, must be focused or otherwise it can impose an administrative burden on the service^(5,6).

West Midlands has had one of the highest perinatal mortality rates in England and Wales for many years. Although the rates have fallen over the years in parallel with national rates, they have always remained approximately 10% higher⁽⁷⁾. Possible causes of excess mortality in the West Midlands are systematic counting or reporting errors, a true increase in prevalence or incidence of diseases relating to perinatal outcome in the community and poorer quality care by the health care services. There is a wide measure of agreement that stillbirths and neonatal deaths in infants above 2,500 gram birthweight are much influenced by obstetric care and management⁽⁸⁾. This study focused on this weight category particularly in relation to the quality of care provided by the regional obstetric service. The aim was to examine confidentially and systematically possible avoidable factors relating to stillbirths and neonatal deaths of 2.5 kg and above through a multi-disciplinary panel. It was intended to identify sub-optimal practice and to encourage better clinical practice.

METHODS

All stillbirths and all deaths of live born infants up to 28 completed days after birth, of birthweights of 2.5 kg and above, which occurred in all 22 health districts in the West Midlands in the year 1991, were studied in detailed in the regional audit project (Confidential Regional Inquiry into Mature Stillbirth Or Neonatal Death in West Midlands {CRIMSON

Department of Maternal
Fetal Medicine
KK Women's and Children's
Hospital
100 Bukit Timah Road
Singapore 229899

K H Tan, MRCOG, MMed
(O&G), FAMS
Consultant

Department of Obstetrics &
Gynaecology
Birmingham Heartlands
Hospital
Bordsley Green East
Birmingham B9 5SS

M P Wyldes, MRCOG
Consultant

Department of Obstetrics &
Gynaecology
Solihull Hospital
Solihull, West Midlands

R Settatree, FRCOG
Consultant & Director,
Regional Perinatal Audit

T Mitchell
Senior Midwife

Correspondence to:
Dr K H Tan

91}). A total of 238 stillbirths and neonatal deaths of 2.5 kg and above were studied, of which 143 (60%) had a post-mortem.

Six consultant obstetricians, six consultant paediatricians, six senior midwives and six senior general practitioners were recruited to a panel of assessors chaired by the regional perinatal pathologist. Almost all of them have experience in confidential enquiries into perinatal deaths, having derived considerable expertise from participation in a previous similar intensive inquiry on 449 perinatal deaths of 500 grams and above in the region in 1987⁽⁹⁾. Deaths were reviewed by four assessors, one from each discipline, selected randomly from the full panel after ensuring that none received a case from their own district. Care was taken to ensure that no assessor reviewed cases in whose management they had been or cases which they were involved in their management and which they believed they might subsequently be involved in providing an opinion for possible legal proceedings. The study was approved by the Regional Ethical Committee. Safeguards were built in to ensure confidentiality and the anonymity of both the individual women and the units or districts from which they came.

Assessors first worked independently using a structured assessment protocol. After collating the assessment forms, the co-ordinator arranged a meeting of the entire panel for discussion and a panel consensus was reached for each case. A total of 26 meetings assessing 8 to 12 deaths per meeting, were convened.

Factors of sub-optimal care relating to clinical practice, staffing, structure, equipment and patient or her family were identified in each case and were graded as follows:

- Grade 0 No sub-optimal care.
- Grade I Sub-optimal care, but different management would have made no difference to the outcome.
- Grade II Sub-optimal care. Different management might have made a difference to the outcome.
- Grade III Sub-optimal care. Different management would reasonably be expected to have made a difference to the outcome. A clearly avoidable factor implying that any adverse outcome could have been prevented.

The overall sub-optimal grade of each death was based on the highest grade of the relevant factor or factors present in each case.

RESULTS

There were 74,586 births in West Midlands in the year 1991, with 813 (1.1%) stillbirths and infant deaths under 4 weeks. Of these 813 deaths, 238 (29.3%) were of birthweights of more than 2.5 kg. Of the 238 mature perinatal deaths, 77 deaths (32.4%) had Grade 0 care and 12 (5.0%) had Grade I care while 149 (62.7%) deaths were considered by the panel to have Grade II (31.5%) and Grade III (31.1%) sub-optimal care. These were the deaths

where the panel judged that a different management might or would reasonably be expected to avoid the outcome. The maternal, obstetric and fetal characteristics of both Grade II and Grade III groups in comparison with a control population (matched for the place of birth and obtained by taking the next baby born in the same maternity unit excluding stillbirths and neonatal deaths and birthweight < 2.5 kg) is shown in Table I. Almost two-thirds of antepartum stillbirths have Grade II or III factors and this constituted the largest group (52.3%) of the 149 deaths with Grade II or III care. Over 80% of deaths related to antepartum events were assessed to have relevant factors which might influence the outcome with better management and these formed the second largest group of deaths with Grade II or III factors (28.2%) among the 149 deaths (Table II).

Of the 149 deaths with Grade II or III factors, 92 had single factor, 48 deaths had double factors and 9 had triple factors and 1 with quadruple factors contributing to a total of 219 factors. Of these, 151 (68.9%) were found in the antepartum period, 44 (20.1%) in the intrapartum period and 24 (11.0%) in the postpartum period. The majority of these factors involved clinical practice of care providers (78.1%). Factors related to patient/family, equipment and staffing constituted 19.6%, 1.4% and 0.9% respectively. The obstetric medical staff contributed to the majority of the Grade III sub-optimal care (39.3%) amongst the personnel involved (Table III). A higher proportion of junior staff was involved in the sub-optimal care. Important sub-optimal factors identified were lack of appreciation of antenatal and intrapartum risks factors (17.8%), the failure of proper interpretation and management of antepartum and intrapartum cardiotocography (12.8%), failure of adherence to accepted practice or standard care (12.8%), inadequate skills in neonatal resuscitation (4.5%) and adverse patient-related factors (19.6%) (Table IV).

A total of 39 perinatal risk factors neglected or ignored by the staff were considered to contribute to Grade II or III substandard care. These 39 risk factors that were neglected or ignored included significant or persistent weight loss (6), hypertension/preeclampsia (4), decreased fetal movements (3), previous adverse obstetric history like having history of big baby, stillbirth or anomaly (5), abnormal AFP (2), uterine abnormalities leading to possible growth retardation (2), symptoms suggestive of abruption (2) and multiple factors (7). The rest (1 factor each) were antepartum haemorrhage, fetal bradycardia, heavy smoking, history of cardiac anomaly in patient, thick meconium, abnormal GTT, significant anaemia and new consort.

The areas in which deviations from standard care or protocols occurred and which were considered to contribute to the sub-optimal Grade II or III outcome are in antenatal well-being tests (5), ultrasound techniques and protocol (4), intrauterine growth restriction management (3), general antenatal care (2), shoulder dystocia (2), prostaglandin induction (2), hypertension (2), diabetes (2) dating (2), antenatal

Table 1 – Maternal, obstetric and fetal characteristics of perinatal deaths ≥ 2.5 kg

Characteristics	Control population n = 233	Total perinatal deaths n = 238	Perinatal deaths with Grades II & III care n = 149
	Mean SD (range)	Mean SD (range)	Mean SD (range)
Maternal age (years)	25.8 sd 4.6 (16 – 37)	27.4 sd 6.1 (15 – 43)	27.5 sd 6.5 (16 – 43)
Maternal gravidity	2.2 sd 1.3 (1 – 7)	2.8 sd 2.0 (1 – 16)	2.8 sd 2.1 (1 – 16)
Maternal parity	0.9 sd 1.1 (0 – 6)	1.4 sd 1.6 (0 – 9)	1.4 sd 1.7 (0 – 9)
Maternal gestation (weeks)	39.8 sd 1.8 (36.0 – 43.7)*	38.9 sd 2.4 (27.7 – 42.7)**	39.1 sd 2.3 (27.7 – 42.6)**
Maternal height (cm)	161.0 sd 6.0 (143.0 – 177.8)	161.5 sd 6.4 (147 – 188)	161.0 sd 5.9 (148 – 178)
Maternal weight at mid-gestation	63.2 sd 11.7 (39.7 – 115.1)	68.2 sd 13.7 (43.9 – 130.0)	69.5 sd 14.4 (47.0 – 130)
Maternal European ethnicity	189 (n = 221, 85.5%)	185 (77.8%)	118 (79.1%)
Stillbirths	-	146 (61.4%)	88 (53.7%)
Neonatal deaths	-	87 (36.7%)	61 (46.3%)
Baby sex ratio M:F	1.4:1 (n = 217)	1.1:1	1.3:1
Baby weight (g)	3369 sd 496 (2499 – 4800)	3235 sd 531 (2500 – 5050)	3242 sd 569 (2500 – 5050)

* Excluded one case where the gestation was uncertain

** Comprised one case of hydrops weighing > 2.5 kg at 27.7 weeks gestation

majority of substandard care in antenatal period and of patient related factors were Grade II. There were 104 Grade II compared with 47 Grade III factors in the antenatal period and 34 Grade II patient factors compared with 9 Grade III patient factors.

DISCUSSION

A confidential enquiry into a stillbirth and neonatal death, like the well established United Kingdom's national confidential inquiry into maternal deaths⁽¹⁾, is a systematic examination of the events surrounding a stillbirth or neonatal death (including post-mortem findings, if available) by professional peers not involved in the care preceding the death. It is an attempt to determine whether there were any deficiencies in accepted standards of care, and to make a judgement about the likelihood of a different outcome if there had been an alternative management. The deaths under review, and the professionals involved in the care, are unknown to the reviewer. The opinions expressed are confidential and cannot be accessed for legal or public scrutiny. As such, it is not unreasonable to assume that it is likely to be more objective compared to the more common open review of stillbirths and neonatal deaths which are more prone to non-judgmental conclusions and defensiveness in view of the current medico-legal climate.

An important fact highlighted by this study is that one-third of deaths overall of 2.5 kg and above that were peer-assessed had clearly avoidable factors (Grade III factors) and another third had factors (Grade II) which may influence the outcome. Assuming that only Grade III category of deaths are avoided and that the proportion of mature stillbirths and neonatal deaths is 30% of the overall stillbirths and neonatal deaths, a potential reduction in the perinatal mortality rate of more than 10% can be achieved by auditing perinatal care in this category. This study is in agreement with other studies that perinatal mortality could be further reduced by the optimum application of existing methods of antenatal and perinatal care⁽¹⁰⁻¹¹⁾.

However it should be appreciated that as standards of care improve, the standards imposed by peer assessors may also frequently be higher, making the proportion of cases with substandard care the same or even higher, even if the absolute standards of care have improved. Although this peer review study has identified approximately a third of mature perinatal deaths overall and two-thirds of intrapartum-related mature perinatal deaths to be potentially avoidable, the actual number of deaths of 2.5 kg and above from intrapartum events is very low (51 of 74,586 births or about 1 per 1,500 labours), reflecting the high standard of existing perinatal care. This standard has been maintained by the continued use of highly specialised care in labour with well-trained midwives and obstetricians immediately available to evaluate and if necessary, to deliver a baby without undue delay.

From a practical point of view, all professionals (midwives, general practitioners, obstetricians and

Table 2 – Proportion of deaths with Grades II & III sub-optimal care in each category of the New Wigglesworth's Classification

Classification	All perinatal deaths ≥ 2.5 kg n = 238		Perinatal deaths with Grades II & III sub-optimal care n = 149		Proportion of deaths with Grades II & III sub-optimal care
	No	%	No	%	%
Congenital anomalies	47	19.7	16	10.7	34.0
Antepartum stillbirths	122	51.3	78	52.3	63.9
Intrapartum events	51	21.4	42	28.2	82.4
Prematurity	1	0.4	0	0	0
Specific	16	6.7	12	8.1	75.0
Others	1	0.4	1	0.6	100
Total	238	100	149	100	100

screening tests (1), induction (1), intrapartum tests (1) and neonatal septic workout (1).

Delay in reporting decreased fetal movements by patients accounted for more than a third of the patient factors (16 out of 43 factors). Other patient factors contributing to Grade II or III sub-optimal care included defaulting antenatal care (7), refusal to accept management/non-compliance (6), late or inappropriate booking (5), delay in reporting vaginal bleeding or liquor leakage (3), concealment of pregnancy (2), consanguinity (1), persistent and heavy smoking habits (1) and patient not aware of pregnancy (2).

Substandard care involving intrapartum activities such as CTG interpretation were more likely to be considered as Grade III factors by the panel (26 Grade III factors compared to only 2 Grade II factors). The

Table III – Personnel contributing to Grades II & III sub-optimal care

Personnel contributing to Grades II & III sub-optimal care	No	%	Subgroup	No
Obstetric medical staff	86	39.3	SHO	8
			Registrar	32
			Consultant	23
			Combination	23
Neonatal staff	21	9.6	SHO	11
			Registrar	1
			Team	9
General practitioner	20	9.1		
Midwife	16	7.3		
Anaesthetic staff	2	0.9		
Ultrasound imaging staff	5	2.3		
Combination of above	21	9.6		
Equipment/staffing	5	2.3		
Patient	43	19.6		
Total	219	100.0		

Table IV – Relevant factors of sub-optimal care

Relevant factors of sub-optimal care	Ante-partum	Intra-partum	Post-partum	No	%
Risk factor appreciation	37	2	-	39	17.8
Accepted practice/protocol adherence	24	3	1	28	12.8
CTG interpretation	10	18	-	28	12.8
Neonatal resuscitation skills	-	-	10	10	4.5
Poor communication	8	2	-	10	4.6
Management delay	1	5	3	9	4.1
Delivery delay (not CTG related)	3	6	-	9	4.1
Failure of diagnosis or examination	5	1	1	7	3.2
Inappropriate advice given to patient	5	-	-	5	2.3
Other management factors	16	2	8	26	11.9
Patient related factors	40	3	-	43	19.6
Equipment/staffing factors	2	2	1	5	2.3
Total	151	44	24	219	100

paediatricians) involved in perinatal care, manage pregnancy and the neonate on the basis of risk identification⁽¹²⁾. Once a risk factor is known to be associated with an increased risk of adverse outcome, routine perinatal care is modified to anticipate, minimise or prevent the outcome. The failure to appreciate risk factors emerged as the most common factor relating to Grades II and III sub-optimal care in this study. These included ignoring or neglecting significant weight loss, hypertension/pre-eclampsia, decreased fetal movements and the presence of previous adverse obstetric history. Appreciation of the significance of various risk factors in perinatal care is therefore critical in optimal perinatal care. It is important that there be continuity of optimal care between the various members of the perinatal care providers. Some of the hospital based errors were after appropriate referral by the general practitioners and

community midwives. The best way of keeping the confidence of community carers and women, is by ensuring fewer hospital errors.

Another area of substandard care relates to poor management procedures and not following standard patterns of care. The introduction of perinatal protocols and strict adherence to them are important in this respect. Also, guidelines on effective communications especially inter-professionally should be enhanced.

Substandard care involving intrapartum activities such as CTG interpretation were more likely to be considered as Grade III factors by the panel than antenatal and patient related factors, and deaths related to intrapartum events were assessed to be the most potentially salvageable (82.4%). Intrapartum appreciation of risks factors and close intrapartum surveillance supported by facilities for prompt deliveries when required are therefore crucial. Misinterpretation of cardiotocography, including failure to recognise an abnormal cardiotocograph, and interpretation of cardiotocograph in isolation from the clinical setting as well as inappropriate management following an abnormal cardiotocography by junior or inexperienced staff, featured prominently in this study. Education on the proper interpretation of cardiotocography and appropriate management of abnormal or suspicious cardiotocograph traces in relation to clinical setting cannot be over-emphasised. The regional perinatal audit unit has compiled a list of such cases from this confidential enquiry for educational purposes in the hope of preventing similar adverse outcomes. Case discussions and teaching sessions are now held on a regular basis, particularly for new members of medical and midwifery staff.

Neonatal resuscitation skills are of paramount importance in the immediate care related to asphyxiated infants. The panel was extremely concerned by the inexperience of some of the SHO who were involved in the resuscitation of the newborn. This unsatisfactory situation has led to problems of failed or delayed intubation, inadequate lavage in meconium related deaths and failure of early ventilation. It is essential that resuscitation be performed by skilled and experienced staff, to achieve optimal outcome.

This study demonstrates the constant need for supervision of inexperienced staff and the closer involvement of more senior staff in various critical areas of perinatal care. The Obstetric Registrar was the most common person identified to be "at fault" in this study. Although inexperience and the locum status of the Registrar play a significant part, this probably also reflects the crucial and onerous position of the Obstetric Registrar in the provision of perinatal care, being the person most likely to have to make a decision regarding intervention or non-intervention in a clinical setting. The importance of senior support in the labour ward and its effect on the quality of intrapartum care are now being increasingly recognised⁽¹³⁾. The reduction in antenatal work for consultant staff from future re-organisation of maternity services may free skills and experience for

utilisation on the delivery suite and further enhance the quality of intrapartum care.

Patient-related factors form a substantial proportion (almost a fifth) of the substandard care. Some of these factors are concealment of pregnancy, late booking, non-compliance and delay in reporting decreased fetal movements, vaginal bleeding and liquor leakage. Patient education and encouragement of patient co-operation as an active participant of her care are important in reducing these factors. The introduction of the patient held pregnancy health records with prominent incorporation of fetal movement chart and the introduction of a patient page are important steps towards the above objectives⁽¹⁴⁾. Besides encouraging greater maternal involvement and appreciation in care, pregnancy held records can lead to improved communications between care professionals within and outside the hospitals and also encourage them to raise their standards of care.

Factors relating to the general practitioners, community midwives and patient contribute about a third of the Grades II and III sub-optimal care. It is clear that more effort must be directed into antenatal care in the community, especially with the current trends towards moving care into the community. Proper integration of general practitioners, community midwives and hospital based care professional is vital if we are to seek a reduction in the number of avoidable deaths and improve the delivery of obstetric services in the future.

Many clinicians have been cautious about participating in any enquiry process which involves judgements about the avoidability of individual perinatal deaths. Reasons include fear of possible repercussions and the reservations about inferring causality by reference either to individual cases or uncontrolled cases series^(3,15). It must also be recognised that judgements even within a confidential multidisciplinary setting, as to whether a particular death could have been prevented, can often be difficult and contentious. Consistent application of well-defined and explicit criteria, and the continual testing of conclusions by experienced professionals, measured against feasible standards of care, are crucial for the fair assessment of each perinatal death. If conducted properly with the right professional spirit and with the overriding aim to improve perinatal care, we believe that confidential enquiry can make critical contributions and is an important step in the audit cycle geared towards reducing perinatal mortality.

CONCLUSIONS

Ample scope exists for confidential multidisciplinary peer panel review of current perinatal care. When performed systematically and with focus, it can identify and shed valuable light on areas of perinatal practice which are particularly vulnerable to management errors and sub-optimal care. Education in the proper interpretation of cardiotocography, training in the skills of neonatal resuscitation, heightened appreciation of antenatal and intrapartum risk factors, development and strict use of

management protocols together with enhanced patient education, are the key issues identified for closing the perinatal audit loop. Focussed and properly conducted confidential enquiries on perinatal mortality are vital to the formulation of a regional or national strategy in striving towards the further reduction of perinatal mortality.

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