



trauma, antepartum haemorrhage, complications of hypertension in pregnancy, and spontaneous preterm labour account for more than 80% of the primary obstetric causes of death.

This article has been written on behalf of the all PPIP users in South Africa. Without their hard, dedicated work, none of this would have been possible. Collation of the data and co-ordination of the sites was expertly done by Roz Prinsloo. The study was partly funded by Save the Children USA through a grant from the Bill and Melinda Gates Foundation. The contents are solely the responsibility of the authors and do not necessarily reflect the views of Save the Children USA or the Bill and Melinda Gates Foundation. We are thankful for other funding from the Medical Research Council, the World Health Organisation and the National Department of Health.

References

1. De Brouwere V, Tonglet R, Van Lerberghe W. Strategies for reducing maternal mortality in developing countries: what can we learn from the history of the industrialised West? *Trop Med Int Health* 1998; **3**: 771-782.
2. Pattinson RC, Makin JD, Shaw A, Delport SD. The value of incorporating avoidable factors into perinatal audits. *S Afr Med J* 1995; **85**: 145-147.
3. Baird D, Thompson AM. The survey of perinatal deaths re-classified by special clinicopathological assessment. In: Butler NR, Alberman ED, eds. *Perinatal Problems: the Second Report of the 1958 British Perinatal Mortality Survey*. Edinburgh: Churchill Livingstone, 1969: 200-210.
4. Whitfield CR, Smith NC, Cockburn F, Gibson AAM. Perinatally related wastage — a proposed classification of primary obstetric factors. *Br J Obstet Gynaecol* 1986; **93**: 694-703.
5. Pattinson RC, De Jonge G, Theron GB. Primary causes of total perinatally related wastage at Tygerberg Hospital. *S Afr Med J* 1989; **75**: 50-53.
6. Pattinson RC. Population based data. In: Pattinson RC, ed. *Saving Babies: A Perinatal Care Survey of South Africa 2000*. Pretoria: Government Printer, 2000: 31-35.
7. Pattinson RC. On-site screening for syphilis — the time has come. *S Afr Med J* 1998; **88**: 780.
8. Brocklehurst P, French R. The association between maternal HIV infection and perinatal outcome: a systematic review of the literature and meta-analysis. *Br J Obstet Gynaecol* 1998; **105**: 836-848.

Challenges in saving babies — avoidable factors, missed opportunities and substandard care in perinatal deaths in South Africa

R C Pattinson, for the PPIP sentinel sites

Objective. To identify the most common avoidable factors, missed opportunities and substandard care in perinatal care in South Africa.

Setting. Seventy-three state hospitals throughout South Africa representing metropolitan areas, cities and towns, and rural areas.

Method. Users of the Perinatal Problem Identification Programme (PPIP) amalgamated their data to provide descriptive information on the causes of perinatal death and the avoidable factors, missed opportunities and substandard care in South Africa.

Results. A total of 8 085 perinatal deaths among babies weighing 1 000 g or more were reported from 232 718 births at the PPIP sentinel sites. Avoidable factors, missed opportunities and substandard care were reported to be patient-related (between 31.5% and 47.5% of deaths), due to administrative problems (between 10.1% and 31.1% of deaths), and due to health worker-related problems (between

28.4% and 36.0% of deaths) in the metropolitan and rural areas respectively. Figures for cities and towns lay between these ranges. Deaths due to intrapartum asphyxia and birth trauma were thought to be clearly preventable within the health system in 63.1%, 34.4% and 35.7% of cases in the metropolitan areas, cities and towns, and rural areas respectively. Deaths due to hypertension and antepartum haemorrhage were thought to be clearly preventable within the health system in 18.7%, 15.4% and 20.0% of cases in the metropolitan areas, cities and towns, and rural areas respectively. Far fewer preventable deaths were recorded in the spontaneous preterm labour category.

Conclusion. Concentration on the remediable priority problems identified (namely labour management, resuscitation of the asphyxiated neonate, and care of the premature neonate) makes the reduction of perinatal mortality in South Africa feasible and inexpensive.

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Historically, where there has been a dramatic reduction in maternal mortality this has been associated with two technical phases.¹ The first phase is a description of the magnitude of the problem (both in local and in comparative terms) and the



realisation that it is feasible to do something about it. The second phase is the acquisition of new (scientific) knowledge, the teaching of this new knowledge to health workers, and finally making the knowledge and facilities available to the vast majority of the population. This, coupled with a political will and pressure from the population to do something about it, has resulted in a dramatic drop in the maternal mortality ratio. The same principles exist for reducing perinatal mortality.

The ingredients for the second phase are in place. The scientific knowledge is available, the teaching systems are in place, and a health system exists that can provide health care to the vast majority of the population. In South Africa, the magnitude of the problem and the primary obstetric causes of perinatal death have been described.² However, the manageability of the problems has not yet been described. This study was undertaken to fill that gap.

Methods

Users of the Perinatal Problem Identification Programme (PPIP) amalgamated their data to provide descriptive information on the causes of perinatal death and the avoidable factors, missed opportunities and substandard care in South Africa as described previously.² The data from various sites can be collated, enabling avoidable factors, missed opportunities or substandard care to be analysed for various groups of sites and for various diseases. The definition of avoidable factors, missed opportunities and substandard care used in the PPIP was the same as that adopted by the UK for its confidential enquiries into maternal deaths in 1985.³ The definition takes into account not only failure in clinical care, but also some of the underlying factors that may have produced a low standard of care for the patient. This includes situations produced by the action of the woman herself or her relatives, which may be outside the control of the clinicians. It also takes into account staff shortages, administrative failure in the maternity services, and failure of back-up facilities such as ambulance, anaesthetic and neonatal services. The basic assessment of care system devised for the PPIP analyses the woman and her environment (patient-related), the administrative circumstances surrounding the care, and the quality of health care (health worker-related),

with each component analysed separately. Analysis in these three categories has the obvious advantage that information gained can be fed back immediately to the relevant sectors for action. The avoidable factors, missed opportunities and substandard care were recorded and classified as either being 'possibly' related to or 'probably' related to the death of the baby. Those factors classified as 'probably' related to the death indicate that the omission or commission is directly related to the death of the baby, whereas those classified as 'possibly' avoidable only indicate a possible association with the death.

Seventy-three PPIP sentinel sites provided data and were grouped into three categories, those from metropolitan areas (defined as the new mega-cities), cities and towns, and rural areas as described previously.²

Each site submitted its data electronically to the PPIP co-ordinating centre which collated the data. Data were collected for the dates 1 October 1999 - 30 September 2002. Not all hospitals were PPIP sites for the whole period; however, the data submitted were used. PPIP automatically makes the data anonymous. Approval for the study was obtained from each participating hospital, the provincial and national departments of maternal, child and women's health, and the Faculty of Medicine of the University of Pretoria.

Results

Table I gives the proportion of all factors as well as the probable avoidable factors, missed opportunities and substandard care for the different areas. The most common category of avoidable factors was related to the pregnant woman's behaviour (all geographical areas), but when only those factors classified as probable were analysed, health worker-related factors were the most common in the metropolitan areas and cities and towns. Between one in six and one in eight perinatal deaths could have been avoided had the health workers reacted differently in all the areas. Administrative avoidable factors increased further away from the metropolitan areas.

The patient-related avoidable factors are shown in Table II. No, infrequent or late attendance at antenatal care occurred in 23.3%, 26.4% and 16.0% of perinatal deaths in the metropolitan areas, cities and towns, and rural areas respectively. An

Table I. A comparison between all factors and probably avoidable factors, missed opportunities and substandard care in perinatal deaths for the different areas (%)

Avoidable factors	Metropolitan areas		Cities and towns		Rural areas	
	All factors	Probable factors	All factors	Probable factors	All factors	Probable factors
Patient-related	31.5	6.5	40.6	14.7	47.5	16.2
Administrative	10.1	4.3	12.1	4.4	31.1	8.1
Health worker-related	28.6	16.0	28.4	12.1	36.0	13.5

**Table II. Patient-related avoidable factors, missed opportunities and substandard care for the different areas**

Patient-related factors	Metropolitan areas (% PND)	Cities and towns (% PND)	Rural areas (% PND)
Never initiated antenatal care	11.6	15.7	10.4
Late initiation of antenatal care	7.9	7.1	4.3
Infrequent attendance at antenatal care	3.8	3.6	1.3
Delays in seeking medical attention during labour	4.0	7.5	9.6
Inappropriate response to decreased fetal movements	10.8	8.6	6.4
Inappropriate response to rupture of membranes	1.1	1.2	2.0
Inappropriate response to antepartum haemorrhage	0.5	1.2	1.4

PND = perinatal deaths.

inappropriate response by the patient to poor fetal movement and delays in seeking medical attention during labour were other important factors associated with perinatal deaths.

Ambulance delays in transporting patients occurred in 4.3%, 4.8% and 2.9% of all perinatal deaths in the metropolitan areas, cities and towns and rural areas respectively. It was not possible to determine the correct denominator of those patients requiring ambulance transport, so these figure are gross underestimates. Delays in referring patients or in calling for assistance were reported in 6.1%, 7.6% and 4.0% of perinatal deaths in the metropolitan areas, cities and towns and rural areas respectively. The reasons for the delay were not recorded.

Table III lists the top 10 avoidable factors, missed opportunities and substandard care that were classified as probable for the different areas within the health system. These exclude patient-related factors as they are outside the control of the health system. A problem with fetal monitoring during labour was among the top three factors in all areas. Problems in managing the second stage of labour and in use of the partogram also featured prominently in all areas. Antenatal problems were most common in the metropolitan areas and cities and towns, and were mainly related to hypertension and fetal growth. Administrative problems such as lack of neonatal care facilities were most common in the rural areas. Delays in referral were present in each area.

The most common primary obstetric causes of death for all the areas were intrapartum asphyxia and birth trauma, hypertension and antepartum haemorrhage and spontaneous preterm labour. Table IV gives a comparison of the avoidable factors classified as probable for the various conditions and different sites. Almost two in three deaths due to intrapartum asphyxia were classified as being probably preventable within the health service for the metropolitan area, and one in three deaths for the other areas. Between one in five and one in six deaths due to hypertension and antepartum haemorrhage were thought to be preventable. Far fewer deaths due to spontaneous preterm labour were thought to be preventable,

Table III. Top 10 probably avoidable factors within the health system in each area

Metropolitan areas
1. Fetal distress misinterpreted intrapartum
2. Fetus not monitored during labour
3. Delay in referring to secondary or tertiary institution
4. No response to poor uterine fundal growth
5. No response to maternal hypertension
6. Inadequate theatre facilities
7. Too few doctors available to manage the patient
8. Second stage of labour prolonged without intervention
9. Too few nurses on duty to manage patient adequately
10. No response to apparent post-term pregnancy
Cities and towns
1. Delay in referring patient for secondary/tertiary care
2. Fetal distress misinterpreted intrapartum
3. Fetus not monitored intrapartum
4. No response to maternal hypertension
5. Delay in medical personnel calling for expert assistance
6. Inadequate facilities in neonatal unit/nursery
7. No response to poor uterine fundal growth
8. Lack of transport between institutions
9. Management of second stage of labour prolonged without intervention
10. Medical personnel underestimated fetal size
Rural areas
1. Inadequate facilities in neonatal unit/nursery
2. Fetus not monitored intrapartum
3. Fetal distress misinterpreted intrapartum
4. No syphilis screening performed at hospital/clinic
5. Delay in medical personnel calling for expert assistance
6. Partogram used incorrectly and poor progress not detected
7. No accessible neonatal ICU bed with a ventilator
8. Medical personnel underestimated fetal size
9. Partogram not used, poor progress in labour not detected
10. Delay in referring patient for secondary/tertiary treatment



Table IV. Comparison of the proportion of probably avoidable factors, missed opportunities and substandard care within the health system for the most common primary obstetric causes of death in the different areas of South Africa

Primary obstetric cause	Metropolitan areas (%)	Cities and towns (%)	Rural areas (%)
Intrapartum asphyxia and birth trauma	63.1	34.4	35.7
Hypertension and antepartum haemorrhage	18.7	15.4	20.0
Spontaneous preterm labour	6.1	7.5	14.7

except in the rural areas where 14.7% were thought to be preventable. This was mainly due to lack of facilities for the neonates in 8.7% of cases.

Discussion

These data are unique in that most of the input is from non-academic hospitals, giving a relatively true reflection of the perinatal care situation in South Africa. It must be remembered that those hospitals supplying PPIP data are likely to be of higher standard than those not supplying data. Hence the information is biased and probably reflects a more favourable situation than is really the case. The data also systematically exclude births occurring in private institutions.

Overall, about one in five deaths could probably have been prevented within the health system. However, that proportion increased greatly when deaths due to intrapartum asphyxia and birth trauma were analysed, varying between 34.4% and 63.1%, while the proportion decreased for spontaneous preterm labour. As expected, deaths related to administrative factors were more common in the rural areas, indicating the need for special attention in these areas.

The most common avoidable factor recorded was no, infrequent or late attendance for antenatal care. Ndiweni and Buchmann⁴ have demonstrated that in most cases the 'unbooked' mother who develops a complication has a lower risk than other women who develop complications in pregnancy, and that the vast majority intended to attend antenatal care but the complication occurred before they could do so. The Demographic and Health Survey of 1998⁵ indicated that 95% of women attend antenatal care when they are pregnant. It appears that the issue is not so much one of encouraging women to attend antenatal care, but rather of encouraging pregnant women to attend early. Most women have their pregnancies confirmed by a general practitioner (GP) or at a clinic within 3 months of missing a period, but then initiate antenatal care some months later on the instruction of the GP or clinic sister.⁶ Hence on average, pregnancy is confirmed at 12 weeks' gestation and antenatal care is started at 22 weeks.⁶ Clearly a golden opportunity to intervene early in the pregnancy is being lost. If the paradigm could change such that women receive their first antenatal examination at the point when the pregnancy is confirmed,

many of the above problems would cease to exist, as demonstrated by Jeffery *et al.*⁷

Most women have their pregnancies confirmed by a GP, hence part of the solution will be to bring GPs into the circle of health care workers providing antenatal care for indigent women. At the very least GPs should be supplied with antenatal cards by the health authorities, so that they can issue them to these women. Furthermore, the attitude of the general clinics will need to change so that they welcome women who attend early for antenatal care, rather than telling them to come back when they are 5 - 6 months pregnant. Innovative ways will need to be sought to change the health service to this paradigm.⁷

Poor reporting of reduced fetal movement was frequently reported as a patient-related avoidable factor. Whether this is realistic or a form of blaming is uncertain. Neldam⁸ showed that formal scoring of fetal movement in a low-risk population resulted in a significant reduction in perinatal mortality in Sweden in 1979. The large Royal College of Obstetricians and Gynaecologists trial⁹ performed in England later in the 1980s found no difference between formal recording of fetal movement and no formal recording. However, in the latter trial a similar number of women reported poor fetal movement in each group. Hence the importance of monitoring fetal movement is unclear. Furthermore, no randomised trial on fetal movement has been conducted in a developing country. There is clearly a need for a well-structured randomised trial to investigate the role of fetal movement recording or awareness, and its effect on perinatal outcome.

Delay in seeking medical attention during labour was another frequently recorded avoidable factor, most common in the rural areas. The reason for the delay is not known, but transport between the patient's home and the health institution is an important contributor to this. This, coupled with the problems experienced by the ambulance services, suggest that in rural areas hospital lodging facilities should be investigated for expectant mothers. In the other areas patients need to be informed on how to make clear plans for getting to hospital when in labour.

Delays in referring patients for secondary or tertiary treatment featured frequently in the top 10 avoidable factors probably associated with perinatal death in all areas. The



actual magnitude of the problem could not be determined accurately as the denominator of patients referred is unknown. Why is this the case? Is it because health workers did not know that they should have referred the patient? It is because the hospital to which the patient was being referred refused to accept the patient? Or are tertiary level hospitals too overcrowded, so that they just do not have space for referrals? These questions on the actual functioning of the health system need to be answered and the problems addressed.

The one area where health institutions should be able to provide good basic care is during labour. However, intrapartum asphyxia and birth trauma account for almost half of the perinatal deaths among babies weighing 2 500 g in rural areas, and just over one-third of such deaths in cities and towns.² Between one- and two-thirds of the deaths were reported as being probably avoidable. In all areas, poor monitoring of the fetus during labour featured in the top three avoidable factors probably associated with the perinatal death, and poor management of the second stage and no or incorrect use of the partogram were also commonly listed. All these factors should be relatively simple to correct, provided that there are adequate staff. Standard protocols are available for managing labour and are based on the correct use of the partogram. Perhaps the initial step would be to review the teaching of intrapartum care at nursing colleges and medical schools. It is an assumption that labour management is taught using current knowledge, concentrating on use of the partogram. Are midwives (who conduct the majority of births) properly qualified to manage labour? Has the integrated 4-year nursing course done away with the level of training necessary for midwives to manage labour safely? In the past, nurses had to do an extra year's training to become midwives. Now a nurse is regarded as a midwife on completion of the 4-year course and can be exposed to managing labour unsupervised in primary care settings. Similar comments can be made about doctors who with minimal or no training might be placed in charge of labour wards during their community service, again unsupervised.

Hypoxia of the neonate is one of the two most common causes of neonatal death.² Not quantified among the avoidable factors is the number of cases where poor or no neonatal resuscitation compounded the problem of an asphyxiated infant and was a major factor in the death of the infant. Can all midwives resuscitate an asphyxiated infant? Can all midwives provide effective mask ventilation? Is there equipment available at all sites where births occur? Answering all these questions might contribute significantly to saving asphyxiated infants.

Perinatal deaths due to hypertension and antepartum haemorrhage could potentially have been prevented in one in five cases. The most common avoidable factors were no response by the health worker to hypertension, poor fundal

growth, or fetal monitoring problems. It would appear that clear protocols for referrals, and auditing systems to ensure that the policies are followed are necessary to improve this situation. In circumstances where no referral centre is available, this will need to be established.

Spontaneous preterm labour is a common cause of perinatal deaths.² The neonatal death rates for babies weighing between 1 000 g and 2 000 g at birth in the rural areas, cities and towns are almost twice that of the metropolitan areas.² Spontaneous preterm labour is by far the most common cause of perinatal death in babies weighing between 1 000 g and 2 000 g at birth. However, relatively few of the deaths were recorded as being probably avoidable. The major avoidable factor was lack of adequate neonatal facilities in the rural areas. It appears that in cases of perinatal death due to spontaneous preterm labour, the woman arrives at the institution in advanced labour and the fetus is delivered shortly thereafter. The opportunity for intervention, for example suppressing labour or giving corticosteroids, was low. This is supported by previous experience at Kalafong Hospital.¹⁰ While little can be done to prevent the birth of these infants, mortality could be reduced by improving the neonatal care of these infants. Cities, towns and rural areas have very high rates of perinatal death due to spontaneous preterm labour. The question would be why the neonatal death rate is so much higher than in the metropolitan areas. Is it because of lack of facilities, lack of ability to refer patients, or lack of knowledge on how to manage these small babies?

Nasal continuous positive airways pressure (nCPAP) and kangaroo mother care (KMC) have been shown to be effective, inexpensive and user-friendly methods to decrease the neonatal death rate in this birthweight category in various settings.^{11,12} In combination they would appear to be possible solutions for hospitals caring for these neonates outside of the metropolitan areas.

Barely recorded as an avoidable factor is lack of staff. Are there enough staff, or are health workers so accustomed to chronic shortages that they regard this as normal? Clearly, staffing norms are urgently required. Once available, institutions can measure themselves against the norms and judge just how big their problem is.

Conclusion

In South Africa we now have a good estimate of the magnitude of the problem of perinatal death, we know the main causes, and we know that some of the major problems are manageable. By focusing on the remediable priority problems (namely, intrapartum management, resuscitation of the asphyxiated neonate, care of the premature neonate and restructuring of antenatal care), the perinatal mortality rate could be reduced substantially. This, coupled with the current medical



infrastructure (both the medical profession and the health system) and clear political support should see dramatic drops in the perinatal mortality rate in South Africa in the near future.

This article has been written on behalf of all the PIP users in South Africa. Without their hard, dedicated work, none of this would have been possible. Collation of the data and co-ordination of the sites was expertly done by Roz Prinsloo. The study was partly funded by Save the Children USA through a grant from the Bill and Melinda Gates Foundation. The contents are solely the responsibility of the authors and do not necessarily reflect the views of Save the Children USA or the Bill and Melinda Gates Foundation. We are thankful for other funding from the Medical Research Council, the World Health Organisation and the National Department of Health.

References

1. De Brouwere V, Tonglet R, Van Lerberghe W. Strategies for reducing maternal mortality in developing countries: what can we learn from the history of the industrialised West? *Trop Med Int Health* 1998; **3**: 771-782.
2. Pattinson RC. Why babies die. A perinatal care survey of South Africa 2000 - 2002. *S Afr Med J* (in press).
3. Department of Health. *Report on Confidential Enquiries into Maternal Deaths in the United Kingdom 1985 - 87*. London: Government Printer, xiv.
4. Ndiweni Q, Buchmann EJ. Unbooked mothers and their babies - what causes the poor outcome. *S Afr Med J* 1998; **88**: 192-199.
5. Department of Health. Maternal and child health. In: *South Africa Demographic and Health Survey 1998*. Pretoria: Government Printer: 108.
6. Tsuani M, Mabale T, Kgobane R, Pattinson RC. Health seeking behaviour of pregnant women. Proceedings of the 17th Priorities in Perinatal Care Conference, Aventura Aldam, Free State, 3 - 6 March 1998.
7. Jeffery BS, Tsuani M, Pistorius LR, Makin J, Pattinson RC. The impact of a pregnancy confirmation clinic on the commencement of antenatal care. *S Afr Med J* 2000; **90**: 153-156.
8. Neldam S. Fetal movements as an indicator of fetal well-being. *Lancet* 1980; **i**: 1222-1224.
9. Grant A. Routine formal fetal movement counting and risk of antepartum late death in normally formed singletons. *Lancet* 1989; **ii**: 345-349.
10. Dobbelaere S, Pattinson RC, Makin JD, Quintelier J. The potential for preventing the delivery and perinatal mortality of low birth weight babies in a black urban population. *S Afr Med J* 1995; **85**: 536-539.
11. Charpak N, Ruiz-Pelaez JG, Figueroa de CZ, Charpak Y. Kangaroo-mother versus traditional care for infants < 2000 grams: a randomised controlled trial. *Pediatrics* 1997; **100**: 682-688.
12. Ho JJ, Subramaiam P, Hendersen-Smart DJ, Davis PG. Continuous distending pressure for respiratory distress syndrome in preterm infants (Cochrane Review). In: *The Cochrane Library*, Issue 2, 2002. Oxford: Update Software.

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Domestic abuse — an antenatal survey at King Edward VIII Hospital, Durban

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Objectives. To determine exposure to domestic violence by a partner or spouse among pregnant women attending a public sector hospital in Durban, South Africa.

Design. Six hundred and four randomly chosen women from a low-income community were interviewed over a 6-month period using a standardised questionnaire.

Results. Thirty-eight per cent had experienced domestic

violence at some point in their lives. Physical abuse (52%) was the most common, and 35% had been abused during the current pregnancy.

Conclusion. Domestic violence is common in pregnancy among women attending a public sector hospital.

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Domestic abuse is defined as any act occurring between two individuals who live or who have lived together that is intended or perceived to cause physical or psychological harm.¹ It describes a continuum of behaviour ranging from verbal abuse, through threats and intimidation, manipulative behaviour, physical and sexual assault, to rape and even homicide.² Men, from all social classes and professions,

perpetrate the vast majority of such violence against women and their children. Pregnant women are therefore vulnerable and it is estimated that domestic violence may affect up to 30% of pregnant women.³ It is not surprising, therefore, that obstetric and gynaecological associations, including the American College and the Royal College (UK), have recommended universal screening for domestic violence during initial antenatal visits.^{1,4} In addition, these colleges have suggested that all obstetricians and gynaecologists be taught basic information on violence against women and that all must be aware of the confidential status of such information.⁴ Modern society has several other tools to treat domestic

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