Quality-of-care audits and perinatal mortality in South Africa
Emma R Allanson* & Robert C Pattinson

**Problem** Suboptimal care contributes to perinatal mortality rates. Quality-of-care audits can be used to identify and change suboptimal care, but it is not known if such audits have reduced perinatal mortality in South Africa.

**Approach** We investigated perinatal mortality trends in health facilities that had completed at least five years of quality-of-care audits. In a subset of facilities that began audits from 2006, we analysed modifiable factors that may have contributed to perinatal deaths.

**Local setting** Since the 1990s, the perinatal problem identification programme has performed quality-of-care audits in South Africa to record perinatal deaths, identify modifiable factors and motivate change.

**Relevant changes** Five years of continuous audits were available for 163 facilities. Perinatal mortality rates decreased in 48 facilities (29%) and increased in 52 (32%). Among the subset of facilities that began audits in 2006, there was a decrease in perinatal mortality of 30% (16/54) but an increase in 35% (19/54). Facilities with increasing perinatal mortality were more likely to identify the following contributing factors: patient delay in seeking help when a baby was ill (odds ratio, OR: 4.67; 95% confidence interval, CI: 1.99–10.97); lack of use of antenatal steroids (OR: 9.57; 95% CI: 2.97–30.81); lack of nursing personnel (OR: 2.67; 95% CI: 1.34–5.33); fetal distress not detected antepartum when the fetus is monitored (OR: 2.92; 95% CI: 1.47–5.8); and poor progress in labour with incorrect interpretation of the partogram (OR: 2.77; 95% CI: 1.43–5.34).

**Lessons learnt** Quality-of-care audits were not shown to improve perinatal mortality in this study.

---

**Introduction**

Perinatal mortality in South Africa remains high, with 33.4 deaths per 1000 live births in 2013.1–3 Quality-of-care audits have been shown in non-randomized trials to reduce perinatal mortality by up to 30%.4–6 The audit includes classifying avoidable deaths, changing service delivery and addressing health system problems.

The South African Medical Research Council introduced the Perinatal Problem Identification Program in the 1990s to capture perinatal mortality, identify modifiable factors and motivate change.7 This programme is a part of a quality-of-care audit cycle and until 2012 participation was voluntary. The programme is used at all levels of care, and captured 94% of hospitals (238/252) and 73% of births (1 330 869/1 820 664).8 We wanted to determine how perinatal mortality rates had changed in health-care facilities participating in the perinatal problem identification programme.

**Approach**

We used data from the programme to explore the impact of onsite quality-of-care audits on the perinatal mortality rate, which is defined as fetal and early neonatal deaths (0–7 days) per 1000 births. We analysed perinatal mortality rates of babies weighing more than 1000 g from 163 facilities with at least five years of continuous audits between 1990 and 2013. There were 3 406 347 births and 85 728 deaths from 29 community health centres, 105 district hospitals, 4 national central hospitals, 22 regional hospitals and three provincial tertiary hospitals.

Data were smoothed using 12 month moving averages; trends in mortality were analysed using Epi Info version 7 (Centers for Disease Control and Prevention, Atlanta, United States of America). SPSS version 22 (IBM Corp., Armonk, USA) was used for all other analyses. For each site, we tested for temporal trends in perinatal mortality rates using the extended Mantel-Haenszel M2 statistic with one degree of freedom. The trend was assumed to be monotonic (i.e. continuously increasing or decreasing, compared to the initial value of the perinatal mortality rate). A P-value of less than 0.05 was considered significant.

Next, we tested the effect of the programme on a subgroup of 54 facilities that began auditing from 2006 onwards. We analysed two of the specific indicators of quality-of-care audits: the identification of modifiable factors in a death and the final obstetric cause of death. We compared facilities with increasing mortality and facilities with decreasing mortality.

The programme defines 69 modifiable factors which are an incident related to the actions of the mother or health-care personnel, or the health-care system, which may have altered the outcome of the specific case had it been managed differently.9 Clinical staff identify potentially modifiable factors in the immediate period after the death. We estimated the crude odds ratios (OR) for a modifiable factor being implicated in a death in facilities with increasing mortality compared with facilities with decreasing mortality. To account for multiple testing (since more than one modifiable factor may be identified per death), a P-value of less than 0.01 was considered significant.

We calculated the average number of modifiable factors per death and the rates of obstetric causes of death (per 1000 total deaths) in the first and fifth year of audit. Changes in these values over time were assessed using a t-test for independent samples.

The Perinatal Problem Identification Program has ethical approval from the University of Pretoria. Data were collected with permission from the South African Department of Health. This secondary analysis was approved by the technical task team of the South African Medical Research Council.

---

* School of Women’s and Infants’ Health, University of Western Australia, King Edward Memorial Hospital, 374 Bagot Road, Subiaco, WA 6008, Australia.

South African Medical Research Council, Maternal and Infant Health Care Strategies Unit, Cape Town, South Africa.

Correspondence to Emma R Allanson (email: emma.allanson@gmail.com).

Submitted: 24 July 2014 – Revised version received: 13 January 2015 – Accepted: 23 January 2015 – Published online: 31 March 2015
Relevant changes

Of the 163 facilities, 29% (48) had a decreasing perinatal mortality rate, 32% (52) had an increasing rate and 39% (63) had no significant change. Included in these facilities were 29 community health centres (11 increasing, five decreasing and 13 no change), 105 district hospitals (32 increasing, 37 decreasing and 36 no change), 22 regional hospitals (seven increasing, five decreasing and 10 no change), four national central hospitals (one increasing, one decreasing and two no change) and three provincial tertiary hospitals (one increasing, two no change).

Fig. 1 shows the trend in perinatal mortality rates for facilities with a significant increase or decrease in mortality. One district hospital reduced its mortality rate from 100 deaths per 1000 live births at the beginning of the audits to 12 deaths per 1000 live births at the end of five years (smoothed data). As the site had only 2438 births (0.07% of total births) and 130 deaths (0.15% of total deaths) over the whole period, we did not remove these cases from subsequent analyses, however this site is omitted from Fig. 1.

In the 54 facilities that began auditing after 2006, 19 facilities (35%) had increasing mortality and 16 facilities (30%) had decreasing mortality. Facilities with increasing mortality were more likely to identify the following modifiable factors: patient delay in seeking help when a baby was ill (OR: 4.67; 95% confidence interval, CI: 1.99–10.97); lack of use of antenatal steroids (OR: 9.57; 95% CI: 2.97–30.81); lack of nursing personnel (OR: 2.67; 95% CI: 1.34–5.33); fetal distress not detected antepartum when the fetus is monitored (OR: 2.77; 95% CI: 1.47–5.8) and poor progress in labour with incorrect interpretation of the partogram (OR: 2.77; 95% CI: 1.43–5.34). These same facilities were also significantly less likely to identify of use of antenatal steroids (OR: 9.57; 95% CI: 2.97–30.81); lack of nursing personnel (OR: 2.67; 95% CI: 1.34–5.33); fetal distress not detected antepartum when the fetus is monitored (OR: 2.77; 95% CI: 1.47–5.8) and poor progress in labour with incorrect interpretation of the partogram (OR: 2.77; 95% CI: 1.43–5.34). These same facilities were also significantly less likely to identify
Lessons learnt
Audits are critical to the identification of potential problems; focused audits within a wider system can identify contextually specific service deficiencies and provide the impetus for change.10–12

The variation in mortality rates in the facilities with five years of continuous quality-of-care audits suggests that this process does not necessarily reduce mortality. Facilities with increasing perinatal mortality identified some modifiable factors which should be easily remediable once identified (e.g. using antenatal corticosteroids).

That the facilities with increasing mortality rates were less likely to identify several of the modifiable factors is difficult to explain. There are no obvious differences between the groups in terms of level of health care, numbers of births and the obstetric causes of death at the beginning of the audits. There were three community health centres with 39151 births in sites with increasing mortality and community health centres with 11168 births in sites with decreasing mortality (P = 0.137) and 16 district hospitals with 112754 births in sites with increasing mortality and 12 district hospitals with 90747 births in sites with decreasing mortality (P = 0.837).

We know from qualitative research that there are factors that make audits successful – team drivers, institutional review, feedback and communication within the system.13 We hypothesize that it is the quality of the process (the detailed death review and the response to modifiable factors) that is the vital component that changes perinatal mortality. This is supported by the significant reduction in the unexplained stillbirth category indicating a more thorough search for the cause of death.

Lessons from the field
Quality-of-care audits in South Africa
Emma R Allanson & Robert C Pattinson

The study has some limitations. Data were retrospective and so it was not possible to assess data accuracy or completeness of the review of perinatal deaths at each site. We did not adjust for temporal trends in maternal risk factors affecting perinatal mortality. Therefore, we cannot exclude the possibility that the observed changes in mortality were unrelated to clinical management.

In conclusion, we were unable to demonstrate an effect of quality-of-care audits on perinatal mortality. Further investigation of site response to audits and the effectiveness of mortality review needs to be undertaken to identify how best to use this tool, particularly in low- and middle-income settings with high perinatal mortality (Box 1).

Acknowledgements
We thank Jan Dickinson, School of Women’s and Infants’ Health, University of Western Australia.

Funding: Emma Allanson is a PhD candidate funded by the University of Western Australia with an Australian postgraduate award, and an Athelstan and Amy Saw Medical top-up scholarship, and by the Women and Infants Research Foundation with a Gordon King Doctor of Philosophy scholarship. The Perinatal Problem Identification Program is funded by the South African Medical Research Council.

Competing interests: None declared.
Problem: Des soins sous-optimaux contribuent à des taux élevés de mortalité périnatale. Les contrôles de la qualité des soins peuvent permettre de déterminer si des soins sont sous-optimaux et de les modifier, mais il reste à savoir si ce type de contrôle a permis de réduire la mortalité périnatale en Afrique du Sud.


Environnement local: Depuis les années 1990, le cadre du programme d’identification des problèmes périnataux (PPIP), des contrôles de la qualité des soins ont été réalisés en Afrique du Sud afin d’enregistrer les décès périnataux, de déterminer les facteurs modifiables et de favoriser des changements.

Changements significatifs: Des contrôles en continu sur cinq ans avaient été réalisés dans 163 établissements. Le taux de mortalité périnatale avait diminué dans 48 établissements (29 %) et augmenté dans 52 (32 %). Concernant le sous-groupe des établissements qui avaient commencé le contrôle en 2006, on a observé une diminution de la mortalité périnatale dans 30 % d’entre eux (16/54) mais une augmentation dans 35 % de ces établissements (19/54). Dans les établissements qui affichaient une augmentation du taux de mortalité périnatale, les facteurs suivants étaient plus fréquemment identifiés: consultation tardive des patients lorsqu’un enfant était malade (rapport des cotes, RC : 4,67 ; intervalle de confiance de 95 %, IC : 1,99 – 10,97); non-administration prénatale de stéroïdes (RC : 2,97 – 30,81); manque de personnel infirmier (RC : 2,67 ; IC de 95 % : 1,34 – 5,33); souffrance fœtale non détectée ante partum lors de la surveillance du fœtus (RC : 2,92 ; IC de 95 % : 1,47 – 5,8) et mauvaise progression du travail, avec une interprétation incorrecte du partogramme (RC : 2,77 ; IC de 95 % : 1,43 – 5,34).

Leçons tirées: Cette étude n’a pas montré que le contrôle de la qualité des soins permettait de réduire la mortalité périnatale.
Verificación de la calidad de la asistencia y mortalidad perinatal en Sudáfrica

Situción
El cuidado por debajo del nivel óptimo contribuye a las tasas de mortalidad perinatal. Las verificaciones de la calidad de la asistencia puede ser útil para identificar y cambiar el cuidado por debajo del nivel óptimo, pero no se sabe si tales verificaciones han reducido la mortalidad perinatal en Sudáfrica.

Enfoque
Se investigaron las tendencias de mortalidad perinatal en centros de salud que habían completado por lo menos cinco años de verificaciones de la calidad de la asistencia. En un subgrupo de centros que empezaron las verificaciones en 2006, se analizaron los factores modificables que podrían haber contribuido a las muertes perinatales.

Marco regional
Desde la década de 1990, el programa de identificación del problema perinatal ha realizado verificaciones de la calidad de la asistencia en Sudáfrica para registrar las muertes perinatales, identificar los factores modificables y estimular el cambio.

Cambios importantes
Cinco años de verificaciones continuas estuvieron disponibles para 163 centros. Las tasas de mortalidad perinatal disminuyeron en 48 centros (28%) y aumentaron en 52 (32%). En el subgrupo de centros que empezó la verificación en 2006, hubo una disminución en la mortalidad perinatal del 30% (16/54), pero un aumento del 35% (19/54). Los centros con una mortalidad perinatal en aumento tenían una mayor probabilidad de identificar los siguientes factores: retraso de los pacientes en la búsqueda de ayuda cuando un niño enfermaba (cociente de posibilidades, CP: 4,67; intervalo de confianza, IC, del 95%: 1,99–10,97), falta de uso de asteroides prenatales (CP: 9,57 (IC del 95%: 2,97–30,81)), no se revisó el partograma (CP: 2,77 (IC del 95%: 1,43–5,34)).

Lecciones aprendidas
Las verificaciones de la calidad de la asistencia no ha mostrado mejoras en la mortalidad perinatal en este estudio.

References
2. Osnin D, Prost A. Perinatal interventions and survival in resource-poor settings: which work, which don’t, which have the jury out? Arch Dis Child. 2010 Dec;95(12):1039–46. doi: http://dx.doi.org/10.1136/adc.2009.179366 PMID: 20980274