Improving intrapartum care: can we use routinely available data to monitor the effects of our actions?

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Over the past century in the UK, there has been a dramatic decrease in maternal mortality, attributed to improvements in obstetric care as well as social and living conditions. This has not been matched by an equivalent decline in stillbirths and neonatal mortality as comparative death rates show (figure 1). Intrapartum stillbirths and early neonatal deaths occurring as a consequence of events during labour are thought to be largely preventable with high quality labour care in high resource settings [1, 2]. However, the majority of stillborn babies die in the antepartum period, when prevention through better obstetric care is more challenging. Concerns have been expressed that current actions to prevent intrapartum stillbirths and neonatal deaths are simply 'shifting the problem', that is, babies who previously would have died either during labour or shortly after birth are those who are now born, and survive with, brain injuries and their subsequent long-term consequences. In England, this led the government to introduce, alongside a national ambition to halve the number of stillbirths and neonatal deaths, an ambition to halve the number of brain injuries occurring during or soon after birth by 2030.

Although there are some variations in the gestational and birthweight limitations used, defining and counting stillbirths and neonatal deaths may be considered straightforward. Defining and measuring brain injuries occurring during or soon after birth is less easy. In this issue, Gale and colleagues have developed a definition to enable the number of babies with brain injuries apparent soon after birth to be estimated using routinely available data from neonatal units in England [3]. Using routinely available data for a task such as this has clear advantages: the data are already being collected, they are available retrospectively to allow historic trends to be investigated, and the costs of ongoing surveillance will be low. However, the use of routinely available data has a number of limitations that must be borne in mind if this approach is taken.

Firstly, the definition used must be based solely on the data items available in the routine dataset, and therefore compromises have to be made. In this instance, the data used are extracted from electronic patient records from all infants admitted to neonatal units in England. The variables will only include data items considered useful for daily neonatal care. Perhaps of most relevance is a lack of detailed information about antenatal precursors to the recorded neonatal diagnosis, such that the timing 'during or soon after birth' cannot be accurately determined for many included babies and the causal event may have occurred many days or weeks previously in the antenatal period. This is of particular relevance when considering developing, or monitoring the results of, actions to prevent such brain injuries.

Secondly, the robustness of the results is limited by the quality of the data. As Gale at al. note, the experience of staff completing the neonatal records in hospitals can be extremely variable, which

can call into question the accuracy of diagnostic coding in particular. Validation studies have shown repeatedly that routine data can both under- and over-estimate diagnoses, and also document inconsistencies between data items reported for the same individual, and this is equally true in studies using data from UK neonatal units [4]. Of particular relevance in this analysis is the coding of neonatal encephalopathy, which was the largest contributor to term brain injury. There is variation of opinions on how this should be defined and therefore it is unlikely to be consistently classified across all the neonatal units in England. Missing data can also impact on validity of results; in this instance data missing due to incomplete coverage of neonatal units in the earlier years mean that rates can only be estimated for 2010 and 2011. Additionally, data are not included for any infants with brain injuries who are not admitted to neonatal units. Nonetheless, the rates of individual diagnoses documented by Gale at al. are comparable to those estimated from studies collecting specific research data, which provides some reassurance that any inaccuracies are not substantial.

Thirdly, the use of routine data from neonatal units allows only measurement of short-term outcomes. This is perhaps most relevant when considering the overall goal of collecting these data, which must be to reduce the numbers of children who have long term disabilities as a consequence of events during labour or after birth. The diagnostic codes used to identify brain injury are, at best, only a proxy for long-term motor or cognitive disability, which is surely what we wish to prevent.

How then can we use these data going forward? Interpreted with the appropriate considerations, they may provide a means to monitor in the future any effects of changes in public health, clinical practice or service provision on these short-term outcomes. However, this depends very much on the changes that take place and how closely related they are to the proxy measures of brain injury used here. Any impacts of changed practice on stillbirth or neonatal death will also need to be considered, thus surveillance of perinatal mortality must be maintained and reviewed in parallel. Additionally, actions to prevent adverse infant outcomes of intrapartum care must also take into account potential adverse maternal consequences, including rising intervention rates and associated impacts on future pregnancies [5].

Surveillance data alone such as these will not provide the information that is needed to work out how to prevent either deaths or morbidity. To develop actions to prevent such events we need to know not just the ‘what’, i.e. the number of babies, but the ‘why’, that is, the underlying causes of these babies’ brain injuries. Approaches such as confidential enquiries [1] or review of local reviews [2] are needed to understand at a system level the causal events underlying the figures provided by Gale et al. The recent MBRRACE-UK confidential enquiry into term intrapartum stillbirths and neonatal deaths concluded that different care may have changed the outcome for nearly four of

every five babies who died [1]. However, summarising the key findings to improve intrapartum care, the report noted that 'failure to recognise an evolving problem, or the transition from normal to abnormal, was a common theme. It was rarely due to a single issue, more commonly appearing to arise from a more complex failure of situational awareness and ability to maintain an objective overview of a changing situation.' The report also noted that most staff had little experience of babies who needed extensive neonatal resuscitation, and there was a need for immediate senior support in these situations.

These findings illustrate the challenges we have in putting in place actions to prevent adverse consequences of neonatal care and reduce neonatal mortality. No single action is likely to have a major impact on the rates of either mortality or morbidity, and this emphasises the importance of not relying solely on review of a single measure of brain injury to monitor change. Changes in the underlying causes of brain injury will need to be reviewed. Perhaps most importantly, we need to evaluate disability and other impacts of our actions in the longer-term to avoid falling into the trap of making a change which results in a decrease in the number of babies with brain injuries as estimated using this immediate measure, whilst increasing the numbers of children with long-term disabilities or mothers with problems in future pregnancies. Thinking only short-term is not enough for women or children.

Declaration of interests

Form completed at bmj.com

References

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3. Gale, C., et al., *Neonatal brain injuries in England: population-based incidence derived from routinely recorded clinical data held in the National Neonatal Research Database.* Arch Dis Child Fetal Neonatal Ed, 2017. **Epub ahead of print**.
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Figure legend

Figure 1: Stillbirth, neonatal death and maternal death rates, UK 2003/4-2014/15*

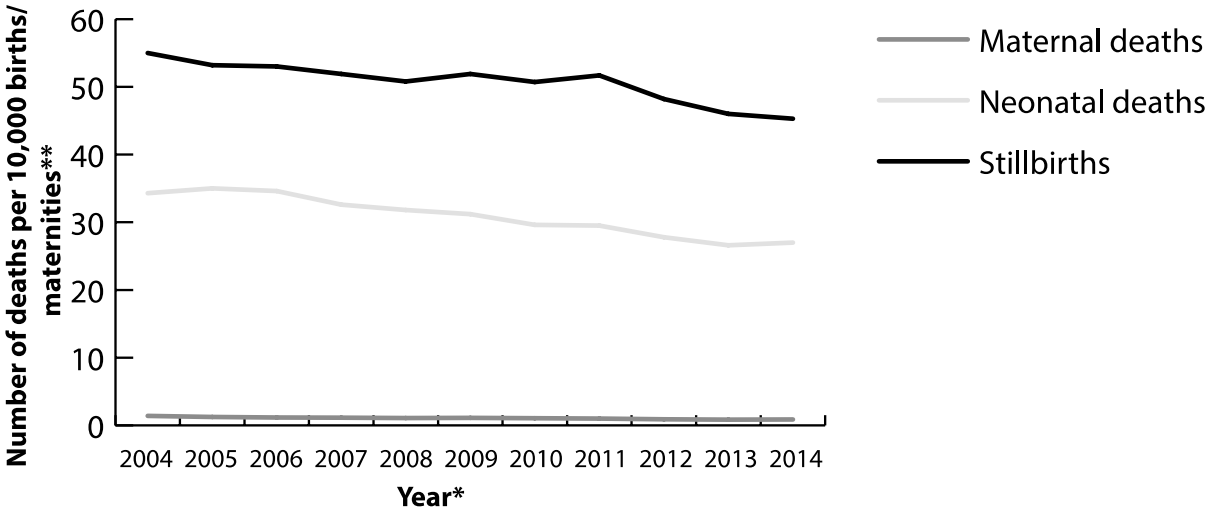

Figure footnote

*Figures for maternal deaths are rolling three-year average rates reported for the mid-year of each three-year period

** Stillbirth rates reported per 10,000 total births, neonatal death rates reported per 10,000 live births and maternal death rates reported per 10,000 maternities

Source: MBRRACE-UK