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IMPLICATIONS OF THE ICD-10 DEFINITIONS RELATED TO DEATH IN PREGNANCY, CHILDBIRTH OR THE PUERPERIUM

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The World Health Organization regularly convenes a conference of experts in public health, statistics and various diseases to review work undertaken on the revision of the International Classification of Diseases (ICD) and to submit the new version of the ICD to the World Health Assembly. Changes in the ICD codes can become necessary for many reasons: the nature of a disease itself may evolve, new diseases emerge, others fade into insignificance, new sources of injury are manufactured. Sometimes change is needed because our understanding of a disease or group of diseases progresses; this is the primary reason for a review of current definitions related to maternal mortality.

The system of periodic review of the ICD codes allows this classification system to keep abreast of developments in medical knowledge and research, and sometimes to play a part in clarifying research issues. Such is partly the case with the new ICD definitions developed at the most recent international conference on the ICD that took place in Geneva in September 1989.

Definition of maternal mortality

The ICD-10 definitions are as follows:

A *maternal death* is defined as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes. This definition is not different from that in ICD-9.

A *late maternal death* is defined as the death of a woman from direct or indirect obstetric causes more than 42 days but less than 1 year after termination of pregnancy.

A *pregnancy-related death* is defined as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the cause of death.

Both these definitions are new to ICD-10.

There are two issues which are responsible for the need to distinguish between these three related definitions: time of death, and cause of death.

Time of death

Historically, maternal mortality was defined as deaths occurring during pregnancy or within the first 6 weeks after termination of pregnancy. This timing

was also sanctioned by a variety of practices, both religious (such as the churching of women in the Anglican church) and cultural (such as name-giving ceremonies in some Indonesian societies), in which 6 weeks is a significant juncture.

Modern medicine, however, can prolong dying and delay death. Even before the era of modern medicine, it is likely that some women died more than 6 weeks after delivery or other termination from causes that were attributable to pregnancy, but their proportion was surely very small. Although modern life-sustaining procedures may increase that proportion, it probably will remain small. The Centers for Disease Control reports that 11% of maternal deaths in the United States of America occurred after 42 days but at less than 1 year after termination of pregnancy (1). Which of these deaths were delayed by extreme life-sustaining measures was unreported and probably unknown.

Deaths occurring within 42 days of pregnancy termination are more likely to be attributed to the pregnancy than deaths occurring later. The death of a woman from an eclamptic fit soon after delivery will be easily recognized as a maternal death. That of a woman dying 4 months post partum from kidney failure—a sequela of eclampsia—is far less likely to be classified as a (late) maternal death. The pregnancy is long since forgotten in the complexity and urgency of her clinical management, and kidney failure, not eclampsia, is written on her death certificate. The longer the time between pregnancy termination and death, the smaller the chance of correct attribution.

This situation does not yet cause much difficulty for developing countries (where 98% of maternal deaths occur), but it does create a dilemma for statisticians in developed countries. Reporting mortality only up to 42 days post termination clearly underestimates the level of maternal mortality. Reporting beyond 42 days better reflects the situation, but leads to figures no longer strictly comparable with international data.

One possible solution to this dilemma is to report the level of mortality separately for each of the time periods (pregnancy, childbirth, puerperium), as well as for the total period covered. While rational, this solution is not entirely satisfactory. Comparability remains an issue. Is the correct comparison between, say, France and Bangladesh, that between mortality within 12 months for France and within 42 days for Bangladesh? There is no answer to this question—although it could be debated at length. At what level of maternal mortality should a country move to investigating and reporting the longer period? Again, there is no clear answer.

Despite the impossibility of reaching answers, posing the questions adds insight. It is incumbent upon researchers to be aware of the issues and address

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them as is most appropriate to their situation. The researcher in maternal mortality has a variety of choices to make in how the magnitude of this is measured and reported. It is important to recognize that while the variety adds to our understanding of the problem, comparability with other research must also be maintained. Researchers should feel at liberty to use definitions and measures which best suit their purpose, while at the same time reporting in standard terms so that their findings can be compared with those of others.

Cause of death

Deaths from "accidental or incidental" causes have historically been excluded from maternal mortality which is often further divided into "direct obstetric" and "indirect obstetric" causes. These definitions remain unchanged from the ICD-9.

Direct obstetric deaths are those which result from obstetric complications of the pregnant state (pregnancy, labour and the puerperium), from interventions, omissions, incorrect treatment, or from a chain of events resulting from any of the above.

Indirect obstetric deaths, on the other hand, result from previously existing disease, or disease that developed during pregnancy and which was not due to direct obstetric causes, but was aggravated by physiological effects of pregnancy.

However, the distinction between incidental and indirect obstetric deaths is often more difficult to make than the distinction between direct and indirect obstetric deaths. Nor are all deaths that appear to be incidental always so, for example:

- Death 2 weeks post partum from rheumatic heart disease is clearly an indirect obstetric death (although often not reported as such) because rheumatic heart disease is known to be exacerbated by pregnancy.
- Death 2 months post partum from breast cancer is possibly an indirect obstetric death, since pregnancy is believed to cause more rapid progression of breast cancer. But it could also be reasonably argued that it is an incidental cause, unrelated to the pregnancy. This is, of course, also a late maternal death.
- Death during pregnancy from melanoma, on the other hand, is an incidental death because there is no evidence that pregnancy hastens progression of that disease.

Some deaths from external causes may in fact be attributable to the pregnancy itself. In my own research (2), I encountered the case of a young, unmarried woman who was murdered by her family, who preferred this drastic measure to the shame of a premarital pregnancy. It is likely that many homicides and probably most suicides of pregnant or recently-pregnant women are attributable in some way to the pregnancy. Accidents might also be considered in this light. Does the fatigue associated with pregnancy or a new baby, or the reduced mobility in advanced pregnancy reduce ability to avoid or survive accidents?

* Others prefer 10 000 or 100 000. The preference for larger denominators is mainly to avoid numbers less than 1, and whether 1 000, 10 000 or 100 000 is used is unimportant as long as it is clearly specified.

Once again, these questions are frequently impossible to answer and argue in favour of including all deaths of women during pregnancy or after termination of pregnancy, regardless of cause, in a measure of maternal death. The ICD-10 Committee chose to call these "pregnancy-related deaths", although this does not imply that the relationship is necessarily direct.

Researchers will enhance the comparability, as well as improve their grasp of their own data, if they report both measures: maternal mortality which excludes accidental and incidental causes and pregnancy-related mortality which includes them. While I would have preferred that the two terms (maternal death and pregnancy-related death) be reversed, the ICD-10 is a clear improvement over earlier revisions which failed to recognize the distinction. The introduction of these definitions is a step, albeit a timid one, towards an increased acceptance of epidemiology in determining the relationships which affect death related to pregnancy. It is to be hoped that the trend thus initiated can be encouraged.

Measures of maternal mortality

The ICD-10 does not address the issue of statistical measures, but the evolution of maternal mortality research has produced a need for at least two distinct measures. The traditional maternal mortality rate is defined as the number of maternal deaths (as defined above) during a given time period per 1 000 live births during the same time period.^b This measure, which is actually a ratio, measures the *obstetric risk*. Most researchers now call this the *maternal mortality ratio*. ICD-10, however, maintains the term rate in the interest of consistency (as is the case for the same reasons for the infant mortality rate, which strictly speaking is a ratio).

A much-needed measure, which has only come into use within the last decade, is the number of maternal deaths in a given time period per 100 000 women of reproductive age during the same time period. Most researchers today call this the *maternal mortality rate*. It is a true rate (statistically speaking), and it measures both the obstetric risk and the frequency with which women are exposed to the risk. If the purpose of research is, for example, to evaluate maternity services, then the maternal mortality ratio (maternal deaths per 1 000 live births) is the appropriate measure. If, on the other hand, the purpose is to measure the effect of family planning on maternal mortality, then the maternal mortality rate (maternal deaths per 100 000 women of reproductive age) is the appropriate measure. It is important to recognize the utility of this newer measure. For the sake of clarity, it is important to specify the denominator (live births, or all women) when using the terms ratio or rate.

The appropriate denominator for the maternal mortality ratio is another measurement issue. Clearly it would be desirable for the total number of *pregnancies* (live births and stillbirths, premature and term deliveries, induced and spontaneous abortions, ectopic and molar pregnancies) to be used as a denominator. However, this number is rarely available, whether in developing countries where most of the mortality occurs or in developed countries. Indeed, in many developing countries even the number of births is not known, but must be estimated. Once again, researchers in developed countries should feel at liberty to use such denominators

as are available to them (recognizing that a large proportion of early pregnancy loss is unrecognized), but also to report in standard terms (i.e. live births) for the sake of comparability with data from other countries.

Although these issues may seem very pedantic to many clinicians, and even to those responsible for

reporting vital statistics, in fact their implications are quite broad. The definitions influence how we think through questions about maternal mortality, how we evaluate interventions to reduce it, and even how we seek to reduce it. But they do not, and cannot, address the problem of underascertainment which is extensive in developed as well as developing countries (1).

SUMMARY

The Tenth Revision of the International Classification of Diseases (ICD-10) will include two new definitions concerning death related to pregnancy:

- *Late maternal death*—the death of a woman from direct or indirect obstetric causes more than 42 days but less than one year after termination of pregnancy.
- *Pregnancy-related death*—the death of a woman while pregnant or within 42 days of

termination of pregnancy, irrespective of the cause of death.

This article discusses the rationale underlying these definitions and their implications for public health statistics. The introduction of these definitions is a step, albeit a timid one, towards an increased acceptance of epidemiology in determining the relationships which affect death related to pregnancy. It is to be hoped that the trend thus initiated can be encouraged.

RÉSUMÉ

Implications des définitions de la CIM-10 relatives aux décès au cours de la grossesse, de l'accouchement ou de la puerpéralité

Dans la Dixième révision de la Classification internationale des maladies (CIM-10) figureront deux nouvelles définitions concernant les décès en rapport avec la grossesse:

- *Décès maternel tardif* — le décès d'une femme par suite de causes obstétricales directes ou indirectes plus de 42 jours mais moins d'une année après la terminaison de la grossesse.
- *Décès en rapport avec la grossesse* — le décès d'une femme alors qu'elle est enceinte ou dans

les 42 jours qui suivent la terminaison de la grossesse, quelle que soit la cause du décès.

Cet article examine les raisons qui sont à la base de ces définitions et les implications de celles-ci pour les statistiques de santé publique. L'introduction de ces définitions est un pas, timide peut-être mais qui a sa valeur, dans la voie de l'acceptation de l'épidémiologie pour déterminer les interrelations affectant les décès liés à la grossesse. Il faut espérer que la tendance ainsi esquissée sera encouragée.

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