Using ACME (Automatic Classification of Medical Entry) software to monitor and improve the quality of cause of death statistics

Various methods have been used to evaluate the quality of cause of death statistics.1,2 Traditionally, necropsy findings were deemed as the gold standard to evaluate the accuracy of cause of death certification. However, because of the biased selection of necropsy cases and the decreasing necropsy rate, fewer and fewer evaluation studies have used necropsy findings as the standard.1 Another commonly used standard to evaluate the quality of death certification is the consensus of a panel of physicians reviewing all available information related to the deceased.4 Most of the studies using this method were the byproducts of large cohort studies or randomised clinical trials. These studies wanted to assure that the end point was not biased. The shortcomings of using physician review as the standard were time consuming, costly, not applicable in a large scale and routinely.6,7

As more and more disease specific registries and hospital medical records were computerised, more and more investigators began to use these datasets as the standard to evaluate the quality of death certification. The merits of this method were time saving, less costly, applicable in large scale and routinely.8,9

PostScript

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Example 1

I (a) Acute myocardiac infarction (I219)
(b) Hypertension (I10)
(c) Diabetes (E149)

ACME process messages of example 1
01 I219/110/E149
02 Is I219 due to E149? YES
03 Is 110 due to E149? YES
04 Select Initial TUC = E149—General Principle
05 ACME UC: E149
Limitations of ACME

Though ACME has been deemed as the de facto international standard for interpreting ICD selection rules, it is not without problems. First limitation was there were many “MAYBE” causal relations in the decision tables, which led to manual assignments for the UC. Examples were listed as follow:

- Is K746 (liver cirrhosis) due to A419 (sepsis)? MAYBE
- Is K746 (liver cirrhosis) due to B169 (hepatitis B infection)? MAYBE
- Is I698 (sequels of stroke) due to E149 (diabetes)? MAYBE
- Is J449 (chronic obstructive pulmonary disease) due to I64 (stroke)? MAYBE
- Is J189 (pneumonia) direct sequel of I509? MAYBE
- Is R54 (senility) and I509 (heart failure) combined as R34? MAYBE

If different countries had different decisions for above “MAYBE” cases, this became another source of artefact undermining the comparability of mortality data across countries.

Another limitation, ironically this is in fact the strength of ACME, was the rigid adherence to the selection rules that resulted in the over-coding of mechanism of death (MOD). The MOD is a physiological derangement or a disease state under which death has occurred. Examples include various arrhythmias, renal failure, cardiopulmonary failure, sepsis, and hypovolaemic shock. The cause of death is whether, on the other hand, is a distinct entity, and is more causally specific. Examples include cerebrovascular infarction, lung cancer, diabetes mellitus, and alcoholic liver cirrhosis. Because of their lack of aetiological specificity, MOD should not appear on death certificates. Nevertheless, because medical treatment is often aimed at modifying or ameliorating mechanisms rather than causes, thereby physicians still filled many MODs on death certificates. This poor certification behaviour was fueled by high frequency of incorrect layout of diagnoses on the death certificates. Previous studies revealed that it was very common for physicians to enter two or more diagnoses in the same line in death certificate.

Examples were:

- 1 (a) Atelectasis, diabetes
- 1 (a) Heart failure, liver cancer
- 1 (a) Hepatic failure, ischaemic heart disease
- 1 (a) Acute myocardial infarction
- 1 (b) Pneumonia
- 1 (c) Sepsis
- 1 (a) Stroke
- 1 (b) Urinary tract infection
- 1 (c) Sepsis

According to international selection rule 2 (for first three examples) and general principle (for last two examples), ACME would select MOD—that is, aetiology, heart failure, hepatic failure, and sepsis as the UC for above examples. Most people will agree that these results were obviously not the original intents of the certifiers. MOD could not provide useful information for prevention.

Luckily many of the above mentioned problems might be resolved by the Mortality Reference Group (MRG), which was set up by the World Health Organisation with the mandate to issue authoritative instructions on the interpretation of the ICD coding rules and guidelines. The NCHS have pledged themselves to implement the decision of the MRG in ACME decision tables. It is hoped that the modified Decision Tables will be more acceptable to people in most countries.

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References

A negative annual secular trend was found for the period 1971–1980 ($r=−0.84, p=0.002$), which was replaced by the positive trend during the period 1982–1993 ($r=0.78, p=0.004$). No difference in mean SRs for the entire period was found between urban (0.513) and rural (0.513) populations.

The decrease in male births in the last quarter equates to fewer male conceptuses nine months previously—that is, in the first quarter. Climatic variations in west Siberia are extreme, with heavy snowfalls in winter. Thawing of snow requires considerable energy, therefore temperatures remain low in spring, and rise sharply from the second half of April. If the observed variation in SR is indeed temperature related, then it would seem that low temperatures either reduce male conceptuses or, through unknown mechanisms, reduce the survival of male conceptuses.

Industrialisation has been blamed for declining SRs in industrialised countries over the past half century. In Siberia, a different pattern is evident in that SR fell and then rose with a turning point in the early 1980s.

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References

