Author’s response to reviews

Title: Mortality in Dutch hospitals: Trends in time, place and cause of death after admission for myocardial infarction and stroke. An observational study.

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Author's response to reviews: see over
Mortality in Dutch hospitals: Trends in time, place and cause of death after admission for myocardial infarction and stroke. An observational study.

First review: Gordon Taylor

The reviewer states that the paper is interesting and well written, and has only some minor amendments. The typographical errors he points out have been corrected.

Second review: Michael Hill

The reviewer finds the research question strong and results compelling, but he raises several important issues to address. The remainder of this cover letter addresses his remarks and our responses in detail, we follow the numbering of points by the reviewer.

1. Criticism of stroke definition

1.1 main stroke definition

When we started to do this analysis we wanted to limit ourselves to ischemic stroke cases. However, in an early stage it became clear to us that it would be difficult to separate ischemic cases from some other types of cases, due to differences in coding practices, and because the Dutch hospitals register stroke-cases only to the fourth digit of the ICD9. Research by the registration holder ‘Prismant’ shows - by cross-checking of a large sample of patient files with the register- that in 84% of the cases the attributed diagnoses is exactly correct but in 10% of cases slightly of the mark, but almost always within the correct subgroup of the ICD9-system.1

Therefore we decided to use a broader definition including for instance also subdural hemorrhage. We finally agreed upon using the definition of stroke used by M. Goldacre in a study very similar in design to our study (see reference nr 9: ‘Place, time and certified cause of death in people who die after hospital admission for myocardial infarction or stroke’, so that we would be able to compare results with a study which uses very similar data. This broader definition leaves out one code the reviewer proposes (363.3), but this is an extremely rare condition, with very few cases (0-3 a year over the entire period 1995-2005) in the Dutch hospital register.

1 For the remaining 6% no comparison was possible, due to a lack of information in the patient files.
The use of a more elaborate definition along the lines the reviewer proposes would anyway be impossible, because the fifth digit isn’t registered in the Dutch medical registration for conditions 433.x and 434.x.

We agree with the reviewer that it was unfortunate to describe this broader group also as ischemic stroke, and propose to omit this adjective in the description of stroke in the article.

1.2 use of a different definition for stroke in table 1.
We fully agree with the reviewer that this is unfortunate. However in the source cited (Health data from Statistics Netherlands) the group cva (ICD9 430-434, 436-438) forms the closest match to our definition of stroke, and the group coronary heart disease (ICD9 410-414) the closest match to our group AMI. We don’t think the difference between definitions used in the research and table one is too much of a problem, because the purpose of the hospital prevalence numbers in table one is to give readers of our article unfamiliar with the health status of the Dutch population some background information on the level in which conditions like AMI or stroke occur in the Netherlands.

We propose to let the numbers stand as it is. Confusion for the reader is unlikely, because we specify the definitions used.

1.3 cause of death definition for stroke in ICD10 terms
The purpose of comparing cause of death with cause of morbidity was not to see if there was an exact match between those, but to examine if a change is visible over time in the proportion of deaths which are attributed to stroke in the death register after an admission for stroke. This would point to an increasing discrepancy between mortality and morbidity registers. In the Netherlands we have the unfortunate situation that the morbidity (ICD9) and mortality registers (ICD10) use different versions of the ICD, and no exact matching is possible.
Therefore we decided to use a broad definition for stroke, because if we used a narrow definition even very slight differences in coding practice or the matching problems would lead to the conclusion that a shift was visible. By choosing an even slightly broader ICD10 definition than our ICD9 morbidity definition we would err on the safe side.
Therefore we propose to let the ICD10 definition stand as it is.

2. Discussion increased death rate after transfer MI cases
Two issues are at stake here:
(a) the case-mix of patients transferred
(b) the effect of transfer on mortality rates of transferred cases

We fully agree with the reviewer that severe cases (with a high mortality-risk) are transferred. For MI we show that transfer significantly affects the magnitude of 30-day mortality reported. However, the effect is not large enough to affect the observed trends as we state in the discussion and we therefore recommend to compute only the most easily computed indicator, with the exclusion of transfer cases.
We think the second point should also be addressed in the discussion because otherwise - in view of the higher death rate- we could give the impression that transfer should be a bad idea, while generally speaking this isn’t. Especially in the Netherlands where transfer is often necessary to ensure a patient gets the best treatment, due to the policy of concentration of cardiac surgery in a few major centers.

From the comment of the reviewer we understand that he would like to put some more stress on the fact that in transfer only severe cases are transported, and that in our recommendation we ignore this a bit We will be glad to oblige to this point and propose the following changes in the text of the discussion, to give this point some extra attention.
We propose two changes in the text of the discussion:

Text before revision:

„It is important to stress that the observed increase over time in deaths after transfer for MI does not imply a higher death rate for transferred patients.”

Text after revision:

„Although it is likely only the most severe cases are transferred with a high risk of mortality, it is important to stress that the observed increase over time in deaths after transfer for MI does not necessarily imply an increase over time in death rates for transferred patients.”

Text before revision:

„For MI it is advisable to exclude transferred cases from the computation of mortality indicators, because of the significant rise of deaths occurring after transport observed over the study period. This is also in line with emerging literature where exclusion of transfer cases does not appear to alter the main conclusions about hospital performance (Peterson et al [18] Bradley et al (19)).”

Text after revision:

„For the specific evaluation for the effect of transfer on mortality rates of transferred patients - very likely more severe cases- a separate indicator could be constructed.”

3.1 focus the discussion on the misleading nature of in-hospital mortality as a relevant indicator of the quality of care, and stress it should be interpreted in context.

In view of the reviewers comment, we have added an extra line at the end of the discussion: „Therefore, one shouldn’t expect too much from the use of 30-day in-hospital mortality as an indicator, as our research shows it is well worth to study hospital mortality in the broader context of total mortality, and follow up mortality over longer time-frames.”

3.2 delete the paragraph on the feasibility of linkages- superfluous for the audience.

Only two sentences in the discussion refer to the feasibility of the linkage: „About 10% of MI and stroke records could not be linked to population and death registers, because people had administrative twins. However, research by Statistics Netherlands indicates that the influence of this on outcomes is limited [12].”

We think these remarks are important for the interpretation, and would like to let these in the article.

We have made a revised version of our article, which you will find alongside this letter,

We confirm that all authors have read and approved the paper in its revised form. Mr. Slobbe will handle all correspondence about this paper. We look forward to your response.

Sincerely yours,

Laurentius CJ Slobbe, MSc
&
Gert P. Westert, PhD

(On behalf of all authors)