One-year mortality after a first visit to a cardiology outpatient clinic: a useful performance indicator?

M.I.F.J. Oerlemans, D.J.A Lok, J.H. Cornel, A. Mosterd

Purpose. In 2003 the Dutch Health Care Inspectorate introduced performance indicators to monitor and compare quality of care in Dutch hospitals. In 2007, the new performance indicator 'one-year mortality after a first visit to a cardiology outpatient clinic' was introduced. We set out to evaluate this new indicator in three Dutch teaching hospitals.

Methods. Using electronic medical records, information was collected retrospectively of patients aged ≥ 70 years who visited the cardiology outpatient clinic of Medical Centre Alkmaar, Meander Medical Centre Amersfoort and Deventer Hospital between 1 January 2006 and 31 January 2006. Diagnoses were based on the diagnosis treatment combination (DBC) coding system.

Results. 547 patients (mean age 78.0 years, 53% men) were included, 35 (6.4%) of whom had died after one year. Cardiovascular disease was the most frequent cause of death (22/35, 62.9%). The one-year mortality among the three hospitals varied from 5.0 to 7.3% (NS).

Conclusion. One-year mortality after the first visit to a cardiology outpatient clinic amounted to 6.4%

in patients aged ≥ 70 years and did not differ significantly between the three Dutch teaching hospitals. The administrative load to obtain the necessary information was considerable. One-year mortality should be regarded as an 'outcome' parameter rather than a 'performance' indicator. (*Neth Heart J* 2009;17:52-5.)

Keywords: performance indicator, mortality, cardiology outpatient clinic

Public reporting of comparative information on quality of health care is becoming commonplace, in some countries to the extent that hospital performance is awarded financially, known as pay for performance.^{1,2} In 2003, the Dutch Health Care Inspectorate (IGZ) introduced performance indicators to monitor and compare quality of care in Dutch hospitals.³ Every year a set of performance indicators is composed and used as an instrument to measure hospital quality. In this way, the Dutch Inspectorate tries to increase transparency and accountability,⁴ and may take disciplinary actions if necessary. Public reporting of performance scores is viewed as an instrument to help patients make a well-considered choice between hospitals.⁵

As in most Western countries, cardiovascular disease is the leading cause of mortality in the Netherlands.⁶ Adequate outpatient diagnosis and treatment increase the chance of survival. In 2007 the new performance indicator 'one-year mortality in patients aged ≥ 70 years after a first visit to a cardiology outpatient clinic' was introduced, supported by the Netherlands Society of Cardiology.⁷ Although mortality is widely used as an indicator of the quality of hospital care, recent studies have shown little evidence that performance measures (e.g. mortality rates) are correlated with the quality of delivered care.^{8,9} Measuring quality can give opportunities to improve health care, but many factors influence patient outcomes. These may include geographic, patient and hospital-related variables as well as methodological differences in reporting between hospitals.^{10,11}

M.I.F.J. Oerlemans

Departments of Cardiology, Meander Medical Centre, Amersfoort and University Medical Centre Utrecht, the Netherlands

D.J.A Lok

Department of Cardiology, Deventer Hospital, Deventer, the Netherlands

J.H. Cornel

Department of Cardiology, Medical Centre Alkmaar, Alkmaar, the Netherlands

A. Mosterd

Departments of Cardiology, Meander Medical Centre, Amersfoort and University Medical Centre Utrecht; and Julius Centre for Health Sciences and Primary Care, University Medical Centre Utrecht, the Netherlands

Correspondence to: A. Mosterd
Meander Medical Centre, PO Box 1502, 3800 BM Amersfoort, the Netherlands
E-mail: a.mosterd@meandermc.nl

Table 1. Characteristics of 547 patients aged ≥ 70 years who were visiting the cardiology outpatient clinic for the first time.

Characteristics	Hospital 1 (n=198)	Hospital 2 (n=150)	Hospital 3 (n=199)	P value*
Mean age (years)	78.3	77.8	77.8	0.32
Male	103 (52)	82 (55)	105 (53)	0.88
Diagnosis				
- Non-cardiological	4 (2.0)	1 (0.7)	2 (1.0)	0.41
- Chest pain	48 (24.2)	32 (21.3)	47 (23.6)	0.88
- Aspecific chest pain †	26 (13.1)	10 (6.7)	10 (5.0)	0.01
- Angina pectoris, stable	17 (8.6)	21 (14)	36 (18.1)	0.01
- Dyspnoea/heart failure	25 (12.6)	19 (12.7)	20 (10.1)	0.42
- Rhythm disorders	38 (19.2)	34 (22.7)	58 (29.1)	0.02
- Atrial fibrillation / flutter †	20 (10.1)	27 (18)	36 (18.1)	0.02
- Congenital heart disease	12 (6.1)	12 (8.0)	22 (11.1)	0.07
- Vessels	2 (1.0)	1 (0.7)	2 (1.0)	0.98
- Infection	0 (0)	1 (0.7)	0 (0)	
- Follow-up after ACS/intervention	62 (31.3)	46 (30.7)	37 (18.6)	0.03
- Other	7 (3.5)	4 (2.7)	11 (5.5)	0.34

*Group 3 compared with group 1, ACS=acute coronary syndrome, † P value comparing group 1 with group 2, 0.05 and 0.03 respectively. Values given as numbers (%), unless otherwise indicated.

The aim of this study was to evaluate the new performance indicator 'one-year mortality after a first visit to a cardiology outpatient clinic' in three Dutch teaching hospitals.

Methods

The study was performed in the cardiology outpatient clinics of three regional teaching hospitals in the Netherlands – Medical Centre Alkmaar, Meander Medical Centre in Amersfoort and Deventer Hospital – together reflecting 5.5% of the Dutch population. Patients were included if they met the criteria as set out in the set of performance indicators.⁷ Inclusion criteria were: patients aged ≥ 70 years, who were visiting the cardiology outpatient clinic for the first time (in routine care – DBC-code 11–). Patients visiting the Emergency Department or patients receiving other forms of acute care were excluded. Patients who had visited the outpatient clinic before, but returned after at least one year and one day were also included.

Using electronic medical records, information was collected retrospectively for patients who visited the cardiology outpatient clinic between 1 January 2006 and 31 January 2006. Demographics (age, gender) and diagnoses were collected in the three hospitals by the same investigator (MIFJO). The diagnosis was based on the DBC coding of each patient by his or her cardiologist. Diagnoses were checked afterwards on completeness and type of delivered care by DBC controllers before final registration into the electronic medical records.

One-year mortality was the primary outcome studied. Cause of death was classified as cardiovascular

(cardiac, cerebrovascular and other vascular causes, e.g. ruptured aortic aneurysm) or non-cardiovascular. Classification was done by one of the authors (MIFJO) based upon the information available in the hospital information systems. In case of doubt the documents were reviewed by AM. General practitioners or municipal death registries were not consulted.

To compare differences between groups the χ^2 (categorical variables) and t-test (continuous variables) were used, with a p value < 0.05 considered statistically significant. Data analyses were performed with SPSS for Windows, version 15.0.

Results

A total of 547 patients (53% men) were included in this study with a mean age of 78 ± 5.2 years. Patient characteristics are shown in arbitrary order per hospital in table 1. Chest pain, rhythm disorders and follow-up after acute coronary syndrome (ACS)/intervention were the most frequent diagnoses in all hospitals. DBC-based diagnoses were remarkably similar for all hospitals, with the exception of a slightly higher rate of rhythm disorders ($p=0.02$) and lower rate of follow-up after ACS/intervention ($p=0.03$) in hospital 3. Breaking up the common denominators chest pain and rhythm disorders into subsets resulted in significant differences for atypical chest pain, stable angina pectoris and atrial fibrillation/flutter.

Cardiovascular disease was the most frequent cause of death (22/35, 62.9%), varying from 60% to 64.3% (table 2). Overall one-year mortality (35/547) was 6.4% (95% CI 4.0 to 8.0), varying from 5.0 to 7.3%.

Table 2. Mortality of 547 patients aged ≥ 70 years who were visiting the cardiology outpatient clinic for the first time.

Mortality	Hospital 1 (n=198)	Hospital 2 (n=150)	Hospital 3 (n=199)	P value
One-year mortality	7.1 (3.0-11.0)	7.3 (3.0-12.0)	5.0 (2.0-8.0)	NS
Cardiovascular death	64.3 (36-93)	63.6 (30-98)	60 (23-97)	NS

NS=not significant. Values given as percentage with 95% CI.

As with percentage cardiovascular death, no statistically significant differences were identified in one-year mortality between the three hospitals. The time needed to collect the necessary information varied from three to ten days per hospital. Computer-generated lists of patients had to be reviewed manually, due to systematic errors in the way patient visits were coded, resulting in a considerable administrative load to obtain the information needed.

Discussion

No statistically significant differences were found among three Dutch teaching hospitals in one-year mortality of 547 patients aged ≥ 70 years after their first visit to a cardiology outpatient clinic in January 2006. Thirty-five of 547 patients (6.4%, 95% CI 4.0 to 8.0) had died after one year (varying from 5.0 to 7.1% and 7.3% per hospital), cardiovascular disease (22/35, 63.9%) being the most frequent cause of death (60 to 64.3%).

Several limitations must be taken into account. Apart from the quality of care delivered, additional variables influence the outcome in medical practice, including patient-related (e.g. comorbidity) and hospital-related (e.g. referral patterns) variables.¹¹ Without detailed information on potential differences in these factors a fair and useful comparison is hard to make. This is inherent in using one-year mortality to compare hospital performance and forms one of the pitfalls of this indicator. A hospital with many high-risk patients that performs excellently can still have the same mortality rate as a hospital with low-risk patients performing poorly. Although the three hospitals involved in this study are similar in many ways (relatively large, regional teaching hospitals that cater for the general population) and no differences were observed in age and gender (generally important predictors of outcome), the possibility that the case-mix differed between the hospitals cannot be excluded.

Follow-up information was collected retrospectively using electronic medical records, without consulting general practitioners or municipal death registries. Although the hospital electronic records are updated regularly, some deaths could have been missed. It is unlikely that incomplete follow-up information would

lead to a serious bias. In addition, the definition of first administrative consultation (EAC) differed from hospital to hospital, particularly regarding patients who returned to the outpatient clinic after at least one year and one day.

To facilitate registration and to make sure no deaths are missed, a uniform registration system with direct coupling to the municipal death registry would be the ideal situation. The introduction of the citizen service number (burger service number, BSN) per 1 January 2008 as a unique personal information register may be helpful in this respect. Public reporting may be seen as one of the most important methods to monitor and improve the quality of health care. As in most countries, the introduction of performance indicators in the Netherlands in 2003 was a major step for both hospitals and the Dutch Health Care Inspectorate. However, convincing evidence that public reporting stimulates hospitals to improve their quality is lacking. Recent studies have shown that nationwide publication of performance indicators is not necessarily associated with quality improvements and reduction of mortality.¹²⁻¹⁴ Moreover, some studies suggest that public reporting may have negative and unintended consequences.^{15,16}

While performance indicators are intended to signal rather than to judge, it is conceivable that hospitals will be portrayed as 'good' or 'bad' based on the results of measures ('performance indicators') that are influenced by many factors other than the quality of care, including geographic, demographic and patient variables. Centres may perform equally well or equally poorly, or a centre may perform poorly on lower-risk patients, or excellently on high-risk patients. Physicians dealing with external pressure may be stimulated to avoid high-risk patients to improve quality ranking. They could also be encouraged to aim for targets and desirable outcomes instead of providing a complete package of medical care. This will reduce rather than improve the quality of health care. Comparison of one-year mortality after the first visit to a cardiology outpatient clinic may have an important signalling function, for example when mortality in one hospital is much higher than in other comparable hospitals, or when mortality in one hospital is higher than in previous years. These observations should prompt further investigations to determine the causes of the

observed difference, taking into account that differences in case-mix (e.g. comorbidity or referral patterns) can considerably influence mortality.

About 650,000 patients pay a first visit to a cardiology outpatient clinic in the Netherlands every year, of whom 35% are aged ≥ 70 years.¹⁷ Obtaining (follow-up) information in this particular group in every hospital in the Netherlands will be a very time-consuming job.

Conclusion

One-year mortality in patients aged ≥ 70 years after their first visit to a cardiology outpatient clinic amounted to 6.4% and did not differ significantly between three Dutch teaching hospitals. Given the questions about its use, the administrative load to obtain the necessary information and the potential unintended consequences, a critical reappraisal seems warranted before embarking on nationwide implementation of this performance indicator. One-year mortality should be regarded as an outcome parameter, useful for benchmarking and reflection, rather than a 'performance' indicator. ■

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