


Assessment of accuracy of Australian health service death data: implications for the audits of surgical mortality

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Introduction

The Victorian Audit of Surgical Mortality (VASM) is the Victorian section of the Australian and New Zealand Audit of Surgical Mortality (ANZASM), which has been established nationally over the last decade. The audits of surgical mortality are peer-reviewed educational audits designed to improve the level of patient care by monitoring and reporting on patient management issues that may occur during surgical admissions (whether an operation has occurred). In addition to providing educational feedback to individual surgeons, the audits produce de-identified case reports, annual reports with recommendations for improvement, as well as hospital performance reports that have all helped reduce surgical mortality throughout Australia.¹

Possible surgical deaths are reported to the VASM by participating public and private health services, the Coroner and self-reporting surgeons across the state. Hospitals are the main source of notification of death reports. Under-reported death data are not

Abstract

Background: The Victorian Audit of Surgical Mortality (VASM) investigates all surgically related deaths in Victoria, Australia, as a surgical educational activity aimed to make surgery safer. Whilst data collected within the audit are regularly reviewed for accuracy, there has never been a review of the data provided from health services.

Methods: Two-year death data provided by one Victorian health service were reviewed. Hospital notes for 4 months of each year were analysed to assess patients dying under surgical care. These data were compared to referrals to the VASM over the same period.

Results: Of the 3907 patient deaths recorded, 35.1% were reviewed. During their final admission, 178 (13%) patients underwent a procedure (93 medical and 85 surgical). Only 29.2% of these were recorded in the health service data set. Eighteen patients died under the care of a surgeon without a procedure, meaning that 103 deaths should have been reported to the VASM of which only 55.3% (57/103) were reported.

Conclusion: There were major errors in the health service database resulting in under-reporting of deaths to the VASM which could have education and policy repercussions. For improvements to the safety and quality of health services, it is critical that all deaths are accurately recorded by health services and reported to the relevant bodies with internal verification processes.

uncommon in healthcare settings;^{2,3} however, identification of under-reporting to a quality assurance activity raises concerns about whether all deaths are being reported by all healthcare services. The individual audits of surgical deaths regularly review their own data and results,^{4,5} but the quality of hospital source notification data has never been assessed.

This study aims to investigate reportable deaths to the VASM by reviewing death notifications from one of the Victoria's health services.

Methods

Two-year death data from a large Victorian health service were collected for analysis. Data for source document verification included the hospital patient unit record number, patient demographics, date of death, site of death, admitting hospital specialty, whether a procedure was performed in the last admission and the cause of death. These data were entered by medical coding health professionals

Table 1 Demographics of health service death data

Demographics	Number
Median age (range) years	77 (0–102)
Male:female:indeterminate	731:637:5 (53.2:46.4:0.4%)
Coroner referral	131 (9.5%)

based on the state-based incident reporting system and discharge summaries completed by the junior doctors (interns and residents) attached to the treating clinical team.

Patient deaths for the months of February, May, August and November (covering a full month) in each year were analysed in detail by reviewing the hospital medical records through the organization's scanned medical record files. The cause of death was verified and confirmed, any procedures in the last admission verified and recorded, death certificate information reviewed and any referral to the Coroner was recorded. If a surgical procedure in the last admission was identified or the patient was under the care of a surgeon during their last admission, the case should have been referred to the VASM. The hospital number for these patients was then compared to actual referrals submitted to the VASM as recorded in the Bi-National Audit Surgical mortality system database. The study was approved by the local human research ethics committee (reference RES-19-0000-693Q).

Results

A total of 3907 patient deaths were recorded in the health service database for 2 years. The case notes review sample for the 4 months of each year yielded: 1388 of 3907 (35.5%) cases. There were 1.1% (15/1388) of hospital medical record duplicates, leaving 35.1% (1373/3907) case notes for review. Patient demographics are shown in Table 1.

Overall, 178 (13%) patients underwent a procedure during their final admission, of which 52.2% (93/178) were medical procedures (Table 2) and 47.8% (85/178) were surgical procedures. The health service data set correctly identified 29.2% (52/178) of procedures. An additional 18 patients died under the care of a surgeon without an operation during their final admission, all correctly identified in the health service data set. A total of 103 patients with reportable criteria should have triggered a referral to the VASM, of which only 55.3% (57/103) were reported (Table 3). From 85 patients with surgical procedures, only 52.9% (45/85) were correctly recorded in the health service database (Table 3), although more

Table 2 Most common non-surgical procedure specialties ($n = 178$)

Specialty	Number (%)
Surgical specialties	85 (47.8)
Cardiology	21 (11.8)
Gastroenterology	19 (10.7)
Interventional radiology	7 (3.9)
Haematology	4 (2.2)
Other (e.g. bedside procedures)	42 (23.6)

Table 3 Breakdown of reporting of surgical and procedural deaths from health service

	Recorded by health service	Referred correctly to VASM
Surgical deaths with procedure ($n = 85$)	45 (52.9%)	50 (58.8%)
Surgical deaths with no procedure ($n = 18$)	18 (100%)	7 (38.9%)
Total ($n = 103$)	63 (61.2%)	57 (55.3%)

VASM, Victorian Audit of Surgical Mortality.

referrals were made to the VASM possibly because of coronial or self-reporting surgeon's referrals.

Discussion

One of the challenges for all health researchers is to obtain clean and reliable data.⁶ Databases are only as good as the quality of the data entered. Hospitals and health services have developed sophisticated systems that are used for funding purposes, and to compare information over time and sites. The accuracy of these data can be variable⁷ and is frequently maintained by inexperienced junior staff who often code written text from hospital notes. Staff without appropriate training may not understand either the actual data they are required to input or the significance of the data. The ANZASM have been collecting surgical death data for over a decade and regularly review their own data collection, management and transcription to ensure accuracy.^{4,5} The process is dependent on the initial notification of death which most commonly comes from hospitals and health services. An improvement in data accuracy may be achieved if surgeons increase their self-reporting. The ANZASM has established an online Fellows Interface which should help in the future.

This is the first study to assess the accuracy of data provided by health services to the audit. The most concerning issues were that the health service data failed to record over two-thirds of the procedures performed during the patient's final admission and nearly half of the appropriate cases were not referred to the VASM for independent review. All hospitals in the state have signed up to submit patient deaths to the VASM and all Fellows of the Royal Australasian College of Surgeons are expected to participate in the ANZASM. Those who fail to comply with ANZASM activities are considered in breach of the Royal Australasian College of Surgeons Code of Conduct and may be referred to the Professional Conduct Committee.⁸ These unreported cases will be subject to a detailed review to see how many adverse events or areas of concern were potentially missed.

Prior to identifying the validation pool of 103 cases, several errors in the health service death data extraction processes have been found. Over 1% of death data were duplicated and nearly 4% recorded the wrong cause of death. The way that data are collected may vary from hospital site to site but for the health service reviewed, the main trigger for data collection was the state-based incident reporting system. This system has been heavily criticized

in the recent past⁹ because it is unwieldy and there is difficulty rapidly adding data. Using this system as the source may be a cause of inaccurate data collection.

The success of the national audit depends on reviewing all surgical deaths to enable an accurate comparison of hospitals in terms of potentially preventable deaths and providing advice on preventable clinical management issues that contribute to death. It is a limitation of the study that the data are only from one health service and as such may just reflect errors in data collection at the one site as opposed to underlying problems throughout the health system. If there are similar issues elsewhere, there may be significant under-reporting of deaths which could call into question the foundation and rigour of the audit. This study will hopefully encourage all health services to audit their data.

The VASM routinely checks its death data with that collected by the Department of Health using its Victorian Admitted Episodes Dataset (VAED). The verification of reported deaths safeguards that no gaps in reporting from hospital services occur. The VAED is thought to be a robust database providing the case mix information required for hospital activity-based funding. There has been good correlation of surgical deaths between the two data sets, although the VAED death figures are routinely higher by approximately 25%.¹⁰ Previously, this has been ascribed to the VAED deaths including medical procedures such as cardiology, radiology and gastroenterology procedures, which are excluded from the VASM inclusion criteria. The results of the current study suggest that not all procedure-related deaths are being reported to the VAED as these three specialties accounted for over 50% of non-surgical procedural deaths and as a group totalled over half as many as the surgical procedural deaths (Table 2). This could call into question the quality of data provided to the state Department of Health.

It is crucial that reliable and accurate clinical data are provided by health services to state health departments, quality registries and audits to enable them to continue to identify, assess and review factors that can lead to better patient care. More attention to detail and resources need to be attached to collection and dissemination of basic hospital data to ensure that audit activities provide accurate data, allowing education and feedback to the hospital sites. There needs to be adequate training of staff so that they understand the reporting criteria and participate in a good hand over to avoid lost data. We would also recommend that all health services regularly perform data cleaning to detect and correct corrupt or inaccurate records from their database and audit their data against the clinical record (e.g. 2 weeks in every year).

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Conflicts of interest

None declared.

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