Increasing reporting of adverse events to improve the educational value of the Morbidity and Mortality Conference

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Short Title: Impact of a New System on Morbidity Recording

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Abstract

Background: To investigate the impact of a validated complication proforma on surgical morbidity and mortality (M&M) conference reporting.

Study Design: The ACS-NSQIP (American College of Surgeons-National Surgical Quality Improvement Programme) 30-day complication proforma, when implemented, has previously shown a 25% increase in morbidity and 50% increase in mortality reporting (1). A pilot study introducing the paper-based proforma was undertaken, collecting prospective morbidity and mortality data for 2094 of 2209 colorectal, upper gastrointestinal, breast and vascular inpatients (94.7% compliance). A comparative analysis using the proforma versus traditional M&M data collection was used to compare accuracy of morbidity and mortality data reporting.

Results: There was a 73% increase in morbidities reported using the proforma as compared to M&M reporting (547-v-316), and an increase of 10.81% (37-v-41) in the reporting of Mortalities. Of those patients with morbidities (n = 278), 70.24 (n = 203) had at least 1 surgical intervention. The median length of stay in patients with morbidities was 12 versus 3 days in those with no morbidities.

Conclusions: We demonstrated that prospective standardized incident recording provides significantly more accurate assessment of M&M data compared to current

reporting methods. This increased accuracy will favourably impact on surgical performance indicators and casemix funding.

Introduction

The Morbidity and Mortality conference is one of surgical teaching most powerful forums. It is unique in providing an open comprehensive review process for consultants and trainees to examine their surgical practice, identify adverse events, critique outcomes and correct errors, all without fear of blame or derision from their peers¹.

This collaborative peer review process is essential in the identification and measurement of healthcare delivery outcomes within an institution². Its highly structured format allows professionals to reliably collate and compare institutional data regarding outpatient clinics and procedures, information which is increasingly being requested by healthcare regulators and finance departments³. It allows clear identification and honest open discussion which is a critical aspect of quality assurance and education within a surgical department⁴.

Despite advancing standards in surgical quality and safety, morbidity and mortality data reporting seems to have lagged behind⁴ with healthcare providers recognising the need for significant improvement¹. The integrity of the clinical data has been repeatedly questioned³, with regard to the accuracy of its collation and subsequent peer review discussion⁵, therefore outcomes have often been viewed with distrust⁶ within the surgical and wider hospital specialities. The fundamental weakness

repeatedly identified is the traditional retrospective haphazard method of data collection, frequently by inexperienced trainees⁷. In addition adverse clinical events are often discussed in isolation in an anecdotal fashion, without consideration of previous similar events⁷. Inter and intra-institutional comparisons are often impeded by the lack of long term data collation and absence of meaningful audit⁸.

The American College of Surgeons-National Surgical Quality Improvement Program (ACS-NSQIP) is a quality improvement system to facilitate comparative evaluation and improvement of surgical care⁶. It is a prospectively collected, outcome based, risk adjusted program which is nationally validated⁶. Its standardised morbidity and mortality endpoints and definitions provide reliable data⁹ to facilitate continuous monitoring and enhancement of surgical care².

Data collection in our institution was observed to be completed in a haphazard way, and complication rates were reported on more than one occasion as 0%, a rate not realistically obtainable in a unit dealing with emergent cases in an aging population with multiple co-morbidities. However similar underreporting of adverse events has been consistently highlighted throughout the literature.^{4 10 11}.

Therefore the aim of this study was firstly to compare the efficacy of our institution's traditional retrospective Morbidity and Mortality data collection with that of prospective data collection via the validated (ACS-NSQIP) paper-based proforma. Secondly, we sought to address factors leading to adverse events and to instigate changes to avoid their recurrence.

Traditional Recording Method

Recording in our institution was previously carried out on a retrospective basis, typically by junior team members. The sources of data collection included patient charts and theatre log books, but for the most part, staff relied heavily on patient Electronic Discharge summaries, which were easily accessed on the Hospital Intranet. The coding of complications on these summaries was often poor, which translated to poor recording in the Morbidity and Mortality meeting. Furthermore, in the case of a patient death, discharge summaries were often left uncompleted. In this case, staff would often rely heavily on memory only to complete data collection.

Methods

A proforma (Figure 1) was adapted, from the American College Surgeons National Surgical Quality Improvement Program (ACS-NSQIP)², a well-validated measure of surgical patient outcome. This proforma was used to prospectively collate all adverse events for each individual operative or non-operative admission in the Department of Surgery, over a six month period. A case-matched comparative analysis of complication reporting using this proforma was compared to a synchronous traditional retrospective data review of the same patients over the six month period.

Day case admissions and any admissions with no proforma completed were excluded.

Data was analysed for:

- Number, source and length of stay of admissions
- Number of operative interventions per patient
- Number of cases in which at least one adverse event occurred
- Number of adverse events
- Mortalities

Statistical Analysis

Data was analysed and tabulated using PASW v.19 software.

Scale type data was assessed for normal distribution using the Shapiro-Wilk¹² test, with parametric and non-parametric tests applied as appropriate.

Data was tabulated in SPSS and univariate analyses performed using the chi-square test of contingency tables.

Results

Over the six month study period, a total of 2209 in-patients were recorded for the nine teams. Of these 2209 admissions, 2094 forms were completed, an impressive compliance of 94.7%.

The vast majority of admissions were non-elective, with 65% (n=1431) of admissions coming via the Emergency department, 4% (n=99) from out-patient clinic reviews, and 2% as transfers from peripheral secondary centres (n=36). Only 29% (n=643) of all admissions were elective.

Of 2209 admissions to the surgical unit, 48% (n=1061) underwent at least on-e surgical intervention, with a further 0.7% (n=16) undergoing a simple endoscopic investigatory procedure. The remaining patients were managed conservatively.

The proforma was found to be more effective in capturing adverse events at each level as outlined above (Table 1). The number of cases in which an adverse event was captured by means of the Proforma was 278, an increase of 143 as compared to the M&M (n=135), ($p<0.001$, χ^2). The number of individual adverse events captured by the Proforma was 547, a substantially expanded figure as compared to the 316 events reported in the M&M ($p<0.001$, χ^2). The number of mortalities, as coded in the traditional M&M conference compare with the NSQIP-based proforma was 41 versus 37. ($p<0.001$, χ^2)

As recorded in the M&M, complications were reported in 6.45% of patients, and rate of mortality reported at 1.77%. Records obtained by means of the Proforma showed these numbers to be greatly enhanced, with complications captured in 13.28%

patients, and mortality rates recorded at 1.96% (table 2). This translated to an increased capture of morbidities of 106% by use of standardised Proforma, and 10.81% increased capture of mortalities.

Complications were then further assessed, comparing each individual complication as outlined on the proforma – i.e. 22 variables (table 3). Adverse events listed in the free text space on the Proforma were tabulated and examined for frequency of occurrence (Table 4). For each specified complication, rates reported using the standardised proforma were significantly higher than those recorded in the M&M meeting. We further analysed the implications of morbidity and mortality on length of stay (Table 5). Unsurprisingly, patients in whom an adverse event occurred had a protracted length of stay compared to uncomplicated cases (mean LOS 17.98-v- 5.04).

While the poverty of accurate adverse event reporting was disappointing, it equates with similar poor rates reported in the literature^{4, 7}. It is concerning to discover four previously unreported deaths picked up by the proforma, which when analysed, explanations for their omission are again mirrored in the literature namely the substandard method of ad hoc retrospective reporting but also issues including fear of blame¹, as well as time pressures and poor record keeping¹⁸.

Discussion

Traditionally the retrospective haphazard method of morbidity and mortality data collation has led to failure of identification and therefore underreporting of adverse events⁷. Disappointingly but unsurprisingly our results confirm this underreporting in both morbidity and mortality rates using the historical method of data collection.

When looking at particular reasons for these results, we can postulate a number of aetiologies. It has been suggested repeatedly in the literature that surgeons may be unwilling to report all of their complications for fear of derision by their peers combined with the fear of litigation and possible institutional constraints which may be applied to their working practices, namely a 'blame and shame' ethos. Time constraints due to the difficult and labour intensive nature of retrospective collection have been shown to attribute to underreporting of data⁷. In certain instances poor knowledge and differing opinions of what constitutes reportable complications leads to errors and omissions. Other attributable reasons for data omission especially mortalities are to be found in patients with incurable diseases and in patients transferred to other specialities not involved directly in morbidity and mortality reporting.

The most commonly underreported morbidities in our study group were lower respiratory tract infections, wound infections, cerebrovascular events (CVA/TIA), and acute renal failure not requiring dialysis. We speculate that these events were underreported in the Electronic discharge summaries because of successful treatment prior to discharge. This highlights the need for prospective collection of data pertaining to complications. It may also address a lack of training of junior staff as regards correct coding of data in Electronic discharge summaries.

The use of validated prospective reporting systems is one method of intervention aimed at increasing reporting of complications. Our study using the validated ACS-NSQIP thirty day complication proforma improved capture of data by 106%, and by 10.81% for our mortality data. Such data can then be incorporated into morbidity and mortality conferences real time to give an accurate estimation of true institutional complications. We believe this to be the first reported use of an ACS-NSQIP-based platform for Complication Recording outside of North America. It is certainly a novel method in Ireland.

It is recognised however that the effect of such interventions are often short lived and the natural course is to relapse into historical underreporting⁷. As in our study, the real time visual use of the proforma during morbidity and mortality conferences helps to reinforce its value. This, combined with regular presentations from principal investigators, is critical in changing the mind-set of residents towards prospective proforma based reporting.

In a culture moving towards increased transparency and increased quality and safety in healthcare environments, honest and accurate reporting is critical. In an increasingly gloomy economic climate, hospital funding is becoming increasingly guarded. Remuneration of diagnostic and therapeutic procedures for presenting complaints and any subsequent morbidity is based on HIPE (Hospital Inpatient Enquiry scheme¹³) data, which is coded from Electronic discharge summaries. An incorporation of this proforma in an electronic format into the discharge summary application would address paucity in recording of complications, thereby increasing

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accuracy of HIPE coding, and ensuring correct financial reimbursement to the hospital. This in turn has obvious implications for service provision.

The ultimate success of such ventures as a measure of quality improvement rests on the enthusiasm and support of surgeons. Unified surgical support is necessary to ensure its acceptance compared to traditional but less well validated systems.

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Tables

Table 1: Recording of Morbidity and Mortality

Number of Patients experiencing at least one Adverse Event				
	M&M	Proforma	Difference	Difference (%)
Month 1	30	53	23	77
Month 2	15	33	18	120
Month 3	31	52	21	68
Month 4	33	60	27	82
Month 5	15	44	29	193
Month 6	11	36	25	227
	135	278	143	106%
Number of Mortalities				
	M&M	Proforma	Difference	Difference (%)
Month 1	6	7	1	16.67
Month 2	4	5	1	25.00
Month 3	6	6	0	0
Month 4	10	10	0	0
Month 5	6	7	1	16.67
Month 6	5	6	1	20.00
	37	41	4	10.81%
Number of Unique Adverse Events				
	M&M	Proforma	Difference	Difference (%)
Month 1	83	131	48	58
Month 2	36	70	34	94
Month 3	55	88	33	60
Month 4	71	108	37	52
Month 5	45	88	43	96
Month 6	26	62	36	138
	316	547	231	73%

Table 2: Reported Incidences of Morbidities and Mortalities

	M&M n(%)	Proforma n(%)	Increase N(%)
Patients with morbidities	135 (6.15)	278 (12.67)	143 (106)
Mortalities	37 (1.68)	41 (1.86)	4 (10.8)

Table 3: Complications

	M&M	Proforma	Difference	Increased
ARF	24	30	6	25
ARF not requiring Haemodialysis	4	13	9	225
Transfusion>4u	18	33	15	83.33
Arrest	14	15	1	7.14
CVA	2	6	4	200
Coma >24h	4	4	0	0
DVT	3	5	2	66.67
MI	10	12	2	20
LRTI	25	61	36	144
PE	5	9	4	80
Sepsis	20	32	12	60
Septic Shock	6	10	4	66.67
SIRS	7	10	3	42.86
Unplanned Return to Theatre	33	41	8	24.24
UTI	4	15	11	275
Intervention on the Ward	3	6	3	100
Reintubation	11	15	4	36.36
Ventilation>48hours	20	26	6	30
Wound Dehiscence	16	22	6	37.5
Wound Infection	37	74	37	100
Wound Haematoma	11	16	5	45.45

Table 4: Miscellaneous complications captured in the free text area of the Proforma

	M&M	Proforma	Difference	Increased
Circulatory Shock	8	11	3	37.5
Anastomotic Leak	5	7	2	40
Arrhythmia	5	13	8	160
VRE	4	8	4	100
Drug Reaction	2	4	2	100
Iatrogenic injury	4	11	7	175
ARDS	1	2	1	100
C Difficile Infection	1	4	3	300
Conjunctival haemorrhage	1	1	0	0
Pneumothorax	2	4	2	100
MOF	0	1	1	-
Exposure Keratitis	1	3	2	200
TIA	0	2	2	-
Bleeding Post Procedure	0	7	7	-
DIC	2	2	0	0
Electrolyte Disturbances	2	8	6	300
Anaesthetic Complication	0	1	1	-
haematemesis post extubation	0	1	1	-
Transfusion Reaction	1	1	0	0
Pancreatitis 2 to Intervention	0	1	1	-

Table 5: Impact of Adverse Events on Length of stay

		Complicated Case	Uncomplicated Case	p-value
Length of Stay (Days)	Mean+/- Std. Dev	17.98+/-20.44	5.04+/-5.44	<0.01 (Independent Samples Median Test)
	Median (range)	12 (0-155)	3 (0-70)	
Post-Operative Length of Stay (Days)	Mean+/- Std. Dev	15.78+/-19.96	3.51+/-3.62	<0.01 (Independent Samples Median Test)
	Median (range)	10 (0-153)	2 (0-28)	