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Adverse event reporting and patient safety at a University Hospital: Mapping, correlating and associating events for a data-based patient risk management

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Abstract.

BACKGROUND: Reporting adverse events (AE) with a bearing on patient safety is fundamental for the identification and mitigation of potential clinical risks.

OBJECTIVE: The aim of this study was to analyze the AE reporting systems adopted at a university hospital and of enhancing the learning potential afforded by these systems.

RESEARCH DESIGN: Retrospective cohort study

METHODS: Data were collected from different information flows (reports of incidents and falls, complaints, and cases of hospital-acquired infection [HAI]) at an university hospital. A composite risk index was used to combine the data from the different flows. Spearman's nonparametric test was applied to investigate the relationship between the AE rates and a Poisson regression analysis to verify the association among characteristics of the wards.

SUBJECTS: Sixty-four wards at a University Hospital.

RESULTS: There was a marked variability among wards AE rates. Correlations emerged between patient complaints and the number of incidents reported. Falls were positively associated with average length of stay, number of beds, patients' mean age, and type of ward, and they were negatively associated with the number of the Diagnosis-related group (DRG) of patients on a given ward. Claims and complaints were associated with the average DRG weight of a ward's patient admissions.

CONCLUSIONS: This study attempted to learn something useful from an analysis of the mandatory reporting data flows generated on adverse events occurring at an university hospital with a view to managing the risk to patients.

Keywords: Patient safety, adverse events, epidemiology and detection, safety culture, risk management, measurement/epidemiology

1. Introduction

A safety-oriented culture lies at the heart of a healthcare organization because of its role in framing the organization's risk awareness, and nurturing and sustaining effective risk management strategies [1]. Risk management starts with a consistent, coordinated approach to the

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[5]. The dominant frameworks are based on two safety metrics, one seeks to identify other seeks to identify injuries [5]. Several organizations have proposed indicators for adverse events (AEs) in terms of injuries, but injury-based patient safety measures are shortcoming, primarily because not all harm to patients is preventable, and these measures (adopted after the event), and secondly because they are liable to a selective reporting systematic investigation of AEs with a view to understanding and correcting the factors that them has led to remarkable improvement in operator safety in high-risk industries. At WHO, however, the practice of learning from our mistakes—which could lead to effective practice and behavior—is still not sufficiently advanced in the healthcare setting. Many inherent difficulties when it comes to analyzing effectively the growing body of reports of AEs, and the opportunities afforded by reporting systems for organizational experiences and understanding, and thus adopt more effective practical solutions are optimal. In addition, reporting on patient safety and incidents should be disentangled and families' complaints about what they consider as AEs because the harm reported in may not be physical, but due to emotional stress, life disruption or loss of trust.

The aim of this paper was to analyze the AE reporting systems adopted at a university a view to enhancing the learning afforded by these systems and to generating value to help healthcare providers implement more efficient risk management strategies and improve in-hospital risk prevention. First of all, we identify the AE rates in the various to draw a map of the related injury indicators by single adverse event, and also to develop AE indicator. Then we examine the correlations emerging from the AE metrics. Finally the associations between the AE rates and the organizational measures (average DRG of beds, average length of stay, mean age of patients).

2. Methods

2.1. Context

This survey was conducted at an University Hospital. This healthcare facility has 10 operating rooms, and in 2013 it managed 61,200 hospitalizations.

2.2. Materials

For this study, we analyzed the following data flows on in-hospital AEs:

but only 64 were included in the study, after excluding all units without beds for admissions and the wards that had less than 100 ordinary admissions in the course of

2.3. Statistical methods

The cumulative annual incidence of AEs occurring on a given ward was calculated as the number of events divided by the number of admissions for that ward in the year considered. A ward was considered at risk if it had at least one AE. The risk score for each ward was calculated as the number of events divided by the number days of hospitalization in the year. A composite risk indicator was developed by combining the AE data flows (for falls, infections and claims receiving compensation) using the SCIARE statistical software AGENAS. The AE risk for each ward was converted into a score ranging from 1 to 10. A score of 1 corresponded to a risk level of nil (no AEs had been reported) and a score of 10 corresponded to the highest level of risk registered at the hospital for a given type of AE-related phenomenon. The higher the score, the higher the number of AE-related phenomena on the ward.

Spearman's nonparametric test was applied to investigate the correlation between the risk score and the characteristics of the ward that were identified. Poisson regression analysis was used to verify the association among characteristics of the ward (average DRG weight, number of beds, average length of stay, mean age of patients and AE rates). A logistic regression analysis was used to compare the characteristics of the ward (average DRG weight, number of beds, average length of stay, mean age of patients and AE rates) with the prevalence of HAIs for each ward.

The level of statistical significance was set at $p < 0.05$. The statistical analyses were performed using Microsoft Office 2003 Excel and STATA ver. 12.

2.4. Ethical issues

The study complies with the Declaration of Helsinki and with Italian Law n. 30/1963 for the protection of personal data. No identifiable human data were used for this study.

3. Results

Table 1 shows the cumulative in-hospital patient risk and the rates of each of the AE-related phenomena analyzed.

Figure 1a shows the composite indicator for mapping AE-related phenomena by ward in each hospital. Eleven of the 64 wards (17.2%) were apparently "risk-free" in 2014 for the

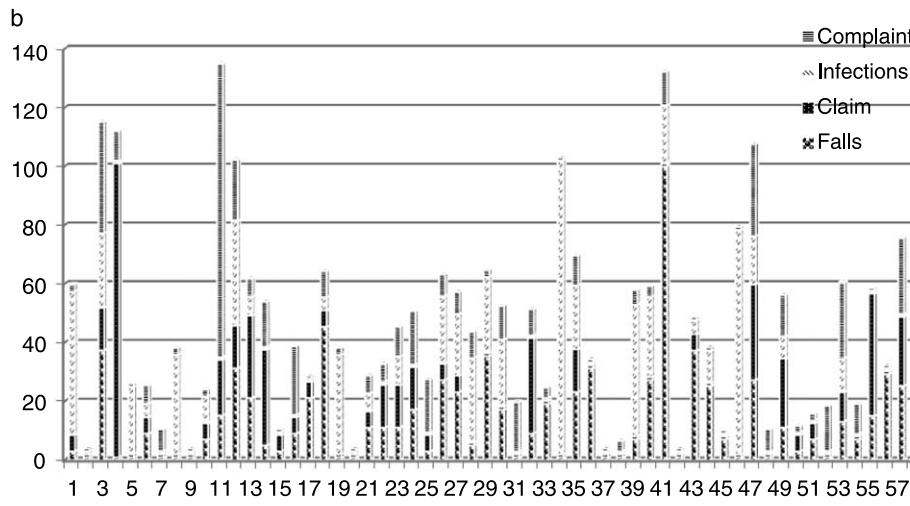
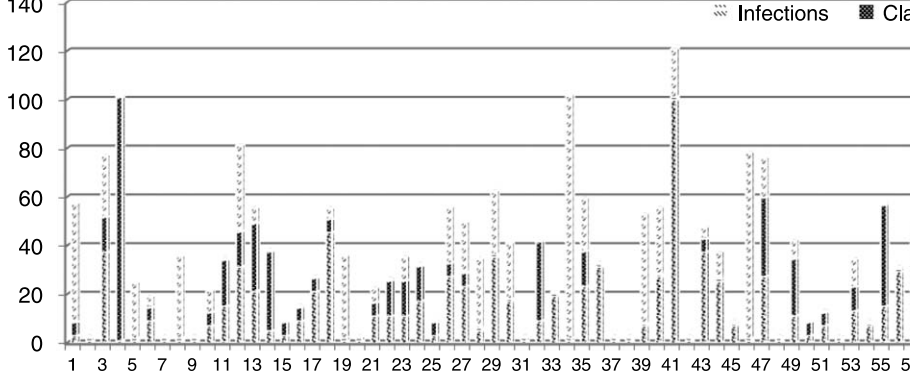


Fig. 1. (a) Mapping of adverse event scores among hospital units. (b) Mapping of adverse event scores including complaints.

the three AE-related phenomena. Three different wards had the highest scores (the w for three different AE-related phenomena. Figure 1b includes patients' complaints in

Table 2 shows the correlations between the rates for falls, incident reports, pati complaints, and the prevalence of HAI phenomena by ward. The data show a cor

claims phenomena and incident reports, falls, and the number of patients' complaints also revealed a correlation between the number of patients' complaints and incident

Table 3 shows the results of the Poisson regression. Our analyses revealed that falls were associated with average length of stay, number of beds, and mean age of patients on the ward, and were inversely associated with the average DRG weight of admissions to the ward. Unlike other variables, their complaints were directly associated with the average DRG weight of admissions to the ward. Finally, average length of stay was also associated with the prevalence of HAI. Finally, average length of stay is inversely associated with both claims and complaints.

4. Discussion

Using a composite indicator, this study revealed the overall distribution of AE-related phenomena on different hospital wards. We identified a correlation between the AE-related phenomena and patients' complaints. Our analysis also revealed that different wards' structural characteristics and productivity were associated with the rate of AE-related phenomena, and also with the number of patients' complaints.

A previous study had found little overlap among different AE reporting systems, suggesting that each system identified important and complementary safety issues. The authors concluded that to obtain a comprehensive picture of their patient safety problems, hospitals should use a variety of reporting approaches and then pool the information gleaned from all the different inputs into a single, cohesive whole [7]. Hence our decision to produce a composite indicator that could integrate a large amount of information in a format that could be easily understood and therefore used as a practical tool for conveying a summary assessment of performance. Our aim was not to weight different AE-related phenomena differently, but to arrive at a composite indicator to map the extent of AE-related phenomena (scoring each measure from 0 to 100) to pinpoint the areas of poor performance where resources were needed to be focused. Our composite indicator enabled us to obtain a global impression of the handling of AE-related phenomena by ward, with a view to prioritizing the resources for their prevention where these phenomena were more frequent. Mapping the clinical risk reports towards enhancing a patient safety culture: it is important to monitor the safety measures in each clinical setting, to ascertain what kinds of AE are more likely to occur, what aspects of the current practice warrant particular attention, and how safety-related information can be integrated and

Mean age of patients	1.03	0.000	1.02
Average hospital stay	1.03	0.021	1.002
Number of beds	1.01	0.036	1.002
<i>Pseudo R2</i>	<i>0.260</i>		
<i>Claims</i>	<i>IRR</i>		
Average DRG weight	1.41	0.010	1.08
Mean age of patients	1.00	0.395	0.99
Average hospital stay	0.84	0.000	0.78
Number of beds	1.00	0.540	0.98
<i>Pseudo R2</i>	<i>0.103</i>		
<i>Complaints</i>	<i>IRR</i>		
Average DRG weight	1.31	0.000	1.16
Mean age of patients	1.00	0.198	0.99
Average hospital stay	0.91	0.000	0.88
Number of beds	1.01	0.000	1.01
<i>Pseudo R2</i>	<i>0.095</i>		
<i>HAI</i>	<i>OR</i>		
Average DRG weight	1.68	0.152	0.83
Mean age of patients	1.03	0.039	1.00
Average hospital stay	0.99	0.82	0.87
Number of beds	1.03	0.202	0.99
<i>Pseudo R2</i>	<i>0.135</i>		

The decision whether or not to include the flow of complaints in our composite depend on how complaints are interpreted: they might or might not be considered as measure. Few healthcare institutions interpret patients' complaints as adverse event thoughtful paper by Spittal et al reminds us that, like any adverse event, patients' co epidemiology that can yield important lessons for prevention [10]. Patients are the of our medical intervention and should be the center of clinical processes, so they h to provide feedback on their care [11]. That is why, in a patient-centered view of composite indicators could capture reports from people who have experienced un problems during their hospital stay (i.e. reports of complaints). The link between pat and AE-related phenomena in our study was confirmed by the significant correlation of complaints and the incident reporting measure and claims rate. Many authors hav importance of patients as "smoke detectors" for patient safety [12]. Complaints are us of the iceberg: for every complaint received, unknown numbers of patients have pro

- safety: Making sense of the elephant. *Jt Comm J Qual Patient Saf.* 2010;36(9):402-10.
- [8] Vincent C, Burnett S, Carthey J. *BMJ Qual Saf.* 2014;0:1-8.
- [9] Gallagher TH, Mazor KM. *BMJ Qual Saf.* 2015;24:352-5.
- [10] Spittal M, Bismark M, Studdert D. The PRONE score: An algorithm for predicting doctors' risk of patient safety complaints using routinely collected administrative data. *BMJ Quality Saf.* 2015;24:360-8.
- [11] Lawton R, O'Hara JK, Sheard L, et al. Can staff and patient perspectives on hospital safety predict patient safety? A cross-sectional analysis of staff and patient survey data and routinely collected outcomes. *BMJ Qual Saf.* 2015;24:369-75.
- [12] Bacon N. A smoke-alarm for patient safety and healthcare quality. *Neil Bacon Blog* 2010. <http://neilbacon.wordpress.com/2010/12/13/a-smoke-alarm-for-patient-safety-and-healthcare-quality/>
- [13] Voluntary Patient Safety Event Reporting (Incident Reporting) AHRQ Patient Safety Network (PSN). <https://psnet.ahrq.gov/primers/primer/13/voluntary-patient-safety-event-reporting-incident-reporting/> (2016)
- [14] Healey F, Scobie S, Oliver D, et al. Falls in English and Welsh hospitals: A national observational retrospective analysis of 12 months of patient safety incident reports. *Qual Saf Health Care.* 2008;17:10.
- [15] European Centre for Disease Prevention and Control. Point prevalence survey of healthcare-associated infections and antimicrobial use in European acute care hospitals. Stockholm: ECDC. 2013:31.
- [16] Schwendimann R, Bühler H, De Geest S, et al. Characteristics of hospital inpatient falls across Europe. *Age Ageing.* 2008;37:342-8.
- [17] Hitcho EB, Krauss MJ, Birge S, et al. Characteristics and circumstances of falls in a hospital setting. *J Gen Intern Med.* 2004;19(7):732-9.