Characteristics of Notifications Before and After Implementing Specialized Patient Safety Technology

Características das Notificações Antes e Após Implementação de uma Tecnologia Especializada em Segurança do Paciente
Características de Notificaciones Antes y Después de Tecnología Especializada en Seguridad del Paciente

RESUMO
Objetivo: Identificar as características das notificações de eventos adversos antes e após a implementação de um sistema de tecnologia especializado em Segurança do Paciente. **Método:** Estudo retrospectivo, transversal, documental e quantitativo, realizado em um complexo hospitalar com duas unidades. Foram analisadas 11.154 notificações registradas entre setembro de 2022 e agosto de 2024, sendo o primeiro período com uso do Google Forms e o segundo com a tecnologia especializada em Segurança do Paciente. **Resultados:** O número total de notificações foi maior com o uso do Google Forms, porém eventos adversos moderados, graves e com óbito foram mais registrados com o sistema especializado. Observou-se também maior frequência de notificações na unidade que contempla a alta complexidade. **Conclusão:** A tecnologia especializada qualifica as notificações quanto à gravidade dos eventos, embora não tenha aumento significativo no seu quantitativo. A cultura institucional e a capacitação dos profissionais podem influenciar diretamente na efetividade do sistema de notificação.
DESCRITORES: Segurança do Paciente; Notificação de Evento; Tecnologias em Saúde.

ABSTRACT
Objective: To identify the characteristics of adverse event notifications before and after the implementation of a specialized patient safety technology system. **Method:** Retrospective, cross-sectional, documentary, and quantitative study conducted in a hospital complex with two units. A total of 11,154 notifications registered between September 2022 and August 2024 were analyzed, with the first period using Google Forms and the second using the platform. **Results:** The total number of notifications was higher with the use of Google Forms; however, moderate, severe, and fatal adverse events were more frequently reported with the specialized system. A higher frequency of notifications was also observed in the unit handling high-complexity cases. **Conclusion:** The specialized technology enhances the quality of notifications in terms of event severity, although there was no significant increase in the total number. Institutional culture and professional training may directly influence the effectiveness of the notification system.
DESCRIPTORS: Patient Safety; Adverse Event Notification; Health Technology.

RESUMEN
Objetivo: Identificar las características de las notificaciones de eventos adversos antes y después de la implementación de un sistema de tecnología especializado en Seguridad del Paciente. **Método:** Estudio retrospectivo, transversal, documental y cuantitativo, realizado en un complejo hospitalario con dos unidades. Se analizaron 11.154 notificaciones registradas entre septiembre de 2022 y agosto de 2024; el primer período utilizó Google Forms y el segundo, la plataforma. **Resultados:** El número total de notificaciones fue mayor con Google Forms, pero los eventos adversos moderados, graves y con fallecimiento se registraron más con el sistema especializado. También se observó mayor frecuencia de notificaciones en la unidad de alta complejidad. **Conclusión:** La tecnología especializada califica las notificaciones en cuanto a la gravedad de los eventos, aunque no haya un aumento significativo en su cantidad. La cultura institucional y la capacitación profesional pueden influir directamente en la efectividad del sistema de notificación.
DESCRIPTORES: Seguridad del Paciente; Notificación de Eventos Adversos; Tecnología en Salud.

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INTRODUCTION

The care provided by healthcare professionals gives patients a better chance of being cured of their illness. The World Health Organization (WHO) defines Patient Safety as an acceptable minimum of risk of unnecessary harm associated with healthcare [1].

The 72nd World Health Assembly adopted resolution WHA72.6 in May 2019, scheduled for the years 2021 to 2030, as the "Global action on patient safety," which stipulates that all patients seeking health services should be safe in the care provided by health professionals [2].

In Brazil, Patient Safety began to

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be regulated with the publication of Collegiate Board Resolution (RDC) No. 36, of July 25, 2013, by the National Health Surveillance Agency (ANVISA), which establishes actions aimed at promoting safe care environments. This standard provides for the mandatory implementation of the Patient Safety Center (NSP) in health services, with the responsibility of monitoring, analyzing, and proposing improvements in institutional processes [3].

In this context, the healthcare provided to patients aims to promote their healing without causing harm; however, failures can occur. Incidents that occur in Patient Safety are subject to whether or not they affect the patient, such as a risk circumstance, where there is significant potential for harm; a near miss, where the incident did not affect the patient; an incident without harm, where the incident affected the patient but did not cause harm; and an adverse event (AE) or incident with harm, where the incident affected the patient and caused harm to their health [4-5].

The report To Err is Human, published in 1999 by the Institute of Medicine (IOM), was a milestone in Patient Safety, demonstrating that in the United States, annually, 44,000 to 98,000 patients died due to incidents that could have been prevented. In Brazil, in 2023, 370,000 adverse events were reported to ANVISA, so there may have been more underreported adverse events [6].

Given these data, reporting the NSP, established by RDC No. 36 through the Patient Safety Plan in Health Services, on incidents that occur assists in the investigation of the event, as these are analyzed and evidenced as to the causes that may have generated them. Health professionals sometimes fail to report and notify these situations, and as a result, underreporting occurs [3].

Notifications aim to improve processes and patient safety. The WHO estimates that thousands of patients suffer adverse events annually due to unsafe care [6]. Reporting incidents promotes improvements and reduces failures. The Integrated Health Management Plan for Patient Safety reinforces the importance of monitoring risks and adverse events [7].

Ensuring a safe environment for reporting events is necessary so that the reporter does not feel exposed and understands that the purpose of reporting is to improve processes and not to punish them, in accordance with the safety culture [9]. Healthcare institutions need to have a reporting system that is available to all professionals and easily accessible, encouraging reporting and preventing underreporting.

Health technologies are great allies in promoting improvements in processes and agility in the information that institutions have. To do so, they need to handle sensitive patient data, and information security is necessary to ensure reliability so that technologies can be implemented in institutions [10]. Given this, implementing an event reporting program specializing in patient safety can be relevant for institutions, as long as the technology is secure enough to handle this data.

Institutions use everything from printed forms to adapted digital platforms. A specialized system facilitates reporting and provides greater understanding of risk and event classification.

Given the above, the guiding question of this research is: what are the characteristics of notifications before and after the implementation of a specialized Patient Safety technology tool? The objective is to identify the characteristics of notifications before and after the implementation of a specialized Patient Safety technology system.

METHOD

This is a retrospective, cross-sectional, documentary study with a quantitative approach. The sample consisted of 11,154 notifications from a hospital complex in Vale dos Sinos, analyzed between September 1, 2022, and August 31, 2024. In the first period (September 2022 to August 2023), the Google Forms platform was used; in the second (September 2023 to August 2024), specialized Patient Safety technology implemented by the institution was used.

The complex consists of two medium- and high-complexity hospitals, totaling 279 beds, including intensive care units, with various specialties, such as clinical, surgical, and pediatric.

Notifications made during the established period were included, even if the incident occurred on a different date, as long as they were related to Patient Safety. Only complete and legible records were considered, regardless of the cause, reporting sector, or shift. Incomplete, illegible, out-of-period, or unrelated to Patient Safety records were excluded.

Data collection was performed through the analysis of institutional reports. Google Forms data were accessed on NSP computers using specialized Patient Safety technology via authorized institutional login. The information was transcribed into a Microsoft Excel® 2019 spreadsheet prepared by the researcher.

The variables analyzed included: system used, hospital unit, notification classification, severity of the adverse event, and absolute frequency of notifications. The data were organized and submitted to descriptive statistical analysis, with absolute frequencies (%), according to the categories of the WHO International Classification for

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Patient Safety (ICPS) (10).

The study was approved by the Ethics Committee of Feevale University (Opinion No. 136443/2024) and registered on the Brazil Platform under CAAE: 84706124.3.0000.5348, in accordance with CNS Resolution No. 466/2012.

RESULTS

From September 1, 2022, to August 31, 2024, 11,154 Patient Safety notifications were made at a hospital complex with two units. Of these, 53.02% of Patient Safety notifications were made using Google Forms, and 46.98% were made using specialized Patient Safety technology, as described in Table 1. Analysis of the distribution of reports by hospital unit revealed that 15.81% occurred in Unit I and 84.19% in Unit II, as shown in Table 2.

Table 1: Notifications made between September 1, 2022, and August 31, 2024, in Google Forms and specialized Patient Safety technology – Vale dos Sinos, RS, 2025.

	n	%
Google Forms	5914	53,02%
Technology specializing in Patient Safety	5230	46,98%
Total	11154	100%

Source: Survey data (2025)

Table 2: Notifications made per unit in Google Forms and Specialized Patient Safety Technology – Vale dos Sinos, RS, Brazil, 2025.

	n	%
Unit I	1763	15,81%
Unit II	9391	84,19%
Total	11154	100%

Source: Survey data (2025)

The severity of adverse events is classified as mild, moderate, severe, and death. The analysis revealed that notifications classified as mild adverse events were more frequently reported in Google Forms (11.67%). Moderate (1.55%), serious (0.17%), and fatal (0.11%) adverse events were most frequently reported using specialized patient safety technology. As detailed in Table 3.

Table 3: Severity of reported adverse events – Vale dos Sinos, RS, Brazil, 2025.

	Google Forms n=5914	%	specialized technology Patient Safety n=5230	%
Light	690	11,67%	568	10,84%
Moderate	34	0,57%	81	1,55%
Severe	1	0,02%	9	0,17%
Death	0	0%	6	0,11%

Source: Survey data (2025)

Regarding the classification of notifications, the highest incidence of incidents were risk circumstances (67.21%), followed by incidents without harm (15.29%), adverse events (12.27%), near misses (2.63%), and technical complaints (2.59%), as described in Table 4. In the data on the classification of notifications by system, the highest incidence of adverse events occurred in the specialized Patient Safety technology (12.67%), and the highest incidence of incidents without harm occurred in Google Forms (15.52%), as described in Table 5.

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Table 4: Classification of Patient Safety event notifications – Vale dos Sinos, RS, Brazil, 2025.

	Total N=1154	%
Risk circumstance	7497	67,21%
Near Miss	293	2,63%
Incident without damage	1706	15,29%
Adverse event	1369	12,27%
Technical complaint	289	2,59%

Source: Survey data (2025)

Table 5: Classification of Patient Safety event notifications in the Google Forms system and specialized Patient Safety technology – Vale dos Sinos, RS, Brazil, 2025.

	Google Forms	%	Specialized Patient Safety Technology	%
Risk circumstances	3934	66,52%	3563	68%
Near Miss	165	2,79%	128	2,44%
Incident without damage	918	15,52%	788	15,04%
Adverse event	705	11,92%	664	12,67%
Technical complaint	192	3,25%	97	1,85%

Source: Survey data (2025)

DISCUSSION

AE reporting is an essential practice for promoting patient safety and continuously improving care processes [11]. The results of this study show that the number of reports is not necessarily related to the technological complexity of the system used, but perhaps to staff engagement, organizational culture, and professionals' perceptions of the reporting process.

Additionally, the concentration of notifications in Unit II, responsible for more complex care, indicates a relationship between the profile of patients treated and the occurrence of incidents. This trend has already been observed in previous studies, which report a higher incidence of adverse events in highly complex hospital settings, such as intensive care units, operating rooms, and emergency rooms[12].

The results show that the most frequent category was 'risk circumstance', which is in accordance with the WHO ICPS, which defines this category as 'notifiable circumstance', i.e., events with the potential to cause harm. The high incidence of 'incidents without harm' in the study is also in line with the ICPS, which recognizes the importance of reporting these incidents, even without harm, to prevent more serious events [13].

The data from this study showed that, during the period of use of the Google Forms system, there was a higher number of reports of adverse events in general. However, with the implementation of specialized Patient Safety technology, there was an increase in the reporting of moderate and serious adverse events and deaths, despite the reduction in the total number of reports, thereby improving the quality of the reports.

This change in the profile of notifications can be understood from the scientific literature, which points to the influence of several subjective factors on the behavior of professionals when reporting incidents. The main barriers identified for the non-reporting of Patient Safety incidents include fear of punishment, a punitive culture, lack of knowledge about what and how to report, work overload, and the centralization of reporting responsibility in nursing professionals [14-15].

Thus, it can be inferred that the reduction in reports using the specialized system may be related to the perception that this system is more formal, traceable, or institutional, which may have generated fear among professionals regarding possible administrative consequences. In addition, the complexity of the system or the lack of adequate training may have contributed to the underreporting of less serious incidents. In contrast, the simplicity and accessibility of Google Forms may have fostered a safer and more welcoming environment for spontaneous reporting, including events without harm.

These findings show that professional behavior and organizational culture have a direct influence on the effectiveness of reporting systems[16]. Thus, the adoption of specialized technologies alone does not ensure an increase in the number or quality of reports. It is essential to promote

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strategies for continuing education, encourage a culture of safety, and eliminate barriers to reporting in order to strengthen the system and ensure continuous improvement in the quality of care.

CONCLUSION

The results showed that, although the total number of reports was higher during the period when Google Forms was used, the adoption of specialized Patient Safety technology contributed to an increase in the reporting of moderate, serious, and fatal adverse events.

This indicates that computerization through a specialized system does not necessarily increase the volume of reports, which qualifies the records, providing greater clarity in identifying the severity of events. In addition, it was observed that most reports occurred in highly complex units, which reinforces the association between patient criticality and the occurrence of incidents.

The predominance of reports classified as "risk circumstances" and "incidents without harm" highlights a positive aspect of the institutional safety culture, focused on prevention. However, the data also point to the need to strengthen the non-punitive culture and expand training strategies for professionals, especially in view of the transition to more complex technological tools.

It is concluded that the effectiveness of reporting systems is directly related to the involvement of professionals, the promotion of a safe environment for reporting incidents, and continuous investment in Patient Safety education. Thus, the implementation of technologies must be accompanied by institutional actions that encourage reporting as a tool for improving the quality of care.

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