

Evaluando la seguridad del paciente: Análisis de eventos adversos en hospitales de Hidalgo

Evaluating patient safety: Analysis of adverse events in hospitals in Hidalgo

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Abstract:

This descriptive observational study analyzes adverse events in public hospitals in Hidalgo between 2013 and 2021. The main objective is to understand patient safety at the local level using data from the Adverse Event Recording System. Data from 1,830 surveys from 14 hospitals were collected, focusing on sociodemographic, clinical, and hospital service variables. The results indicate a higher prevalence of adverse events in women (59.78%) and in the age group of 21 to 30 years. The most common places of occurrence were Internal Medicine and Hospitalization, mainly during the morning shift. The most frequent incidents were medication-related, falls, and infections, with a majority classified as 'no harm'. Patient characteristics and the application of protocols were identified as factors most commonly present in adverse events. However, only 2.02% of the events underwent a root cause analysis. The study highlights the need to develop specific strategies for prevention and reporting, emphasizing continuous education of medical staff and the strengthening of hospital policies, and the consolidation of information on adverse events for future research.

Keywords:

Health information, incident, reporting

Resumen:

Este estudio observacional descriptivo analiza eventos adversos en hospitales públicos de Hidalgo entre 2013 y 2021. El objetivo principal es comprender la seguridad del paciente a nivel local utilizando datos del Sistema de Registro de Eventos Adversos. Se recopilaban datos de 1,830 encuestas de 14 hospitales, enfocándose en variables sociodemográficas, clínicas y del servicio hospitalario. Los resultados indican una mayor prevalencia de eventos adversos en mujeres (59.78%) y en el grupo etario de 21 a 30 años. Los lugares más comunes de ocurrencia fueron Medicina Interna y Hospitalización, principalmente en el turno matutino. Los incidentes más frecuentes fueron de medicación, caídas e infecciones, con una mayoría clasificados como 'sin daño'. Se identificaron las características del paciente y la aplicación de indicaciones como factores mayormente presentes en los eventos adversos. Sin embargo, solo el 2.02% de los eventos se sometió a un análisis de causa raíz. El estudio resalta la necesidad de desarrollar estrategias específicas de prevención y reporte, enfatizando la educación continua del personal médico y el fortalecimiento de políticas hospitalarias y la consolidación de información sobre eventos adversos para investigaciones futuras.

Palabras Clave:

Información en salud, incidente, reporte

INTRODUCTION

Patient safety is a fundamental element of medical care, crucial on a global scale, and a constant challenge for healthcare institutions.

Quality care is a concern that spans from low- and middle-income countries to high-income ones, significantly impacting the burden of harm due to substandard care. Globally, it is

estimated that "hospitalizations in low- and middle-income countries lead to 134 million adverse events annually, contributing to 2.6 million deaths." ¹.

In the United States, according to a study by the Agency for Healthcare Research and Quality (AHRQ), patient safety-related adverse event rates decreased significantly in the decade before the onset of the COVID-19 pandemic. This study examined nearly 245,000 patients in over 3,100 hospitals between 2010

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and 2019, finding substantial reductions in adverse event rates for patients with cardiac conditions, pneumonia, and major surgical procedures ².

In Latin America, a systematic review of studies that used the Hospital Survey on Patient Safety Culture (HSOPSC) revealed that the concept of patient safety culture, understood as the collective and firm commitment of the entire organization to actively ensure and promote patient safety, is relatively unknown or unmeasured in most countries in the region.

The studies considered in the review, from Argentina, Brazil, Colombia, Mexico, and Peru, with 10,915 participants, mostly nursing staff, a low positive perception (48%) of patient safety culture was observed. The dimensions of patient safety culture with the highest number of positive responses were "organizational learning" and "teamwork within units," while those with the lowest number of positive responses were "non-punitive response to errors" and "staffing." ³.

In this context, the present research aims to understand patient safety at the state level based on data contained within the Adverse Event Reporting System (SREA), which can provide valuable and up-to-date information to identify and address the causes of adverse events ⁴.

The absence of detailed reports for the variables available in the SREA limits the ability to analyze and make informed decisions by hospital quality managers and public health policy planners. Therefore, this study is not only relevant to describe the quality of healthcare services in Hidalgo during a specific period but also contributes to the enrichment of knowledge on patient safety, facilitating the adaptation of effective continuous improvement strategies in the various contexts addressed.

METHOD

A descriptive observational study was conducted, focusing on the analysis of adverse events in public hospitals in Hidalgo from May 2013 to December 2021. Data were collected from 1,830 surveys, each with more than 70 informational fields, selecting only the adverse events reported during the established period and excluding incomplete or unverifiable records.

The data came from the records of the following 14 public hospitals in the State of Hidalgo: General Hospital of Pachuca (762 records), Obstetric Hospital (271), Psychiatric Hospital Villa Ocaranza (256), Regional Hospital of the Mezquital Valley (109), General Hospital of Tulancingo (101), General Hospital of Tula (69), Integral Hospital Cinta Larga (67), General Hospital of Actopan (45), Integral Hospital Otomí-Tepehua (43), Regional Hospital of the Huasteca (39), General Hospital of Apan (32), General Hospital of Huichapan (17), Integral Hospital Jacala (11), and Integral Hospital Tlanchinol (8).

For data collection and structuring, a Python algorithm (Selenium) was used, ensuring its accuracy through pilot tests and consistency reviews. Additionally, computational resources were employed for data processing and analysis using the R statistical software.

From an ethical standpoint, the study adhered to the Regulations of the General Health Law on Health Research in Mexico ⁵. It was classified as a risk-free study, using retrospective techniques without intervention or modification of the individuals' variables. Institutional approval was obtained from the Directorate of Health Professionalization and Service Quality of the State of Hidalgo.

RESULTS

The following is a characterization of the patients who experienced adverse events, using sociodemographic variables and those related to hospital service for detailed analysis.

Sociodemographic variables

Table I shows that a higher percentage of adverse events occur in female patients (approximately 59.78%) compared to male patients (approximately 40.22%).

Table I. Distribution of adverse events by gender

Gender of the patient	Number of events	Percentage (%)
Female	1,094	59.78%
Male	736	40.22%
Total	1,830	100.00%

Source: Own elaboration with data from the Adverse Event Reporting System

Regarding the patients' age, Table II shows that most adverse events are concentrated in the 21-30 years age group, followed by the 51-60 and 61-70 years age groups. The youngest and oldest age groups (<10 and >80) show the lowest percentages of adverse events.

Table II. Distribution of adverse events by age

Age range	Number of events	Percentage (%)
Under 10	144	7.87%
10 to 20	153	8.36%
21 to 30	394	21.53%
31 to 40	235	12.84%
41 to 50	218	11.91%
51 to 60	267	14.59%
61 to 70	244	13.33%
71 to 80	100	5.46%
Over 80	67	3.66%
Unspecified	8	0.44%
Total	1,830	100.00%

Source: Own elaboration with data from the Adverse Event Reporting System

Hospital service characteristics

The hospital service variables analyzed were the place of occurrence, time shift, type of personnel who witnessed the event, type of incident, and severity (Table III).

Table III. Distribution of adverse events by hospital service characteristics

Hospital service characteristics	Number of events	Percentage (%)
Place of occurrence		
Internal medicine	427	23.33%
Hospitalization	422	23.06%
Gynecology/Obstetrics	240	13.11%
Emergency	147	8.03%
Pediatrics	108	5.90%
Time shift		
Morning	915	50.00%
Night	400	21.86%
Afternoon	278	15.19%
Accumulated shift	237	12.95%
Witnessed by		
Nurse	763	41.69%
Other	625	34.15%
Doctor	375	20.49%
Total	1,830	100.00%

Source: Own elaboration with data from the Adverse Event Reporting System

Concerning the place of occurrence of the adverse event, the highest incidence is recorded in the "Internal Medicine" area, with 427 events representing 23.33% of the total. The "Hospitalization" area closely follows, with 422 events, equivalent to 23.06%.

As for the time shift, it is noteworthy that half of the adverse events (915 cases, or 50%) occur in the morning shift. The night shift, with 400 events (21.86%), and the afternoon shift, with 278 events (15.19%), also show a considerable frequency.

Regarding who witnessed the event, nurses are the most frequent witnesses of these incidents, with 763 cases (41.69%). Other witnesses, probably including other medical staff members and possibly patients or visitors, total 625 events (34.15%). Doctors observed 375 events (20.49%).

Classification of adverse events

In Table IV, adverse events were analyzed according to the type of incident, severity, related factors, whether a root cause analysis was conducted, their preventability, and whether improvement actions were taken after identifying the adverse event.

Table IV. Distribution of adverse events by their reported characteristics

Classification of adverse events	Number of events	Percentage (%)
Type of Incident		
Medication incident	797	43.55%
Falls incident	311	16.99%
Healthcare-associated infection incident	247	13.50%
Severity type		
No harm	651	35.57%
Low	640	34.97%
Moderate	498	27.21%
Severe	25	1.37%
Death	16	0.87%
Incident factors		
Patient characteristics	1,175	64.21%
Application of instructions and protocols	638	34.86%
Teamwork	349	19.07%
Root Cause Analysis		
Root cause analysis conducted	37	2.02%
Preventability		
Events considered preventable	1,429	78.09%
Improvement actions		
Post-event corrective action	1,426	77.92%
Total	1,830	100.00%

Source: Own elaboration with data from the Adverse Event Reporting System

Notably, in all registered adverse events (1,830 events, 100%), information related to the adverse event was provided to the patients or their families. Regarding the type of incident, medication incidents lead with 797 cases (43.55%). Falls incidents, with 311 events (16.99%), and healthcare-associated infection incidents, with 247 events (13.50%).

With regards to the severity type, most events are 'no harm,' totaling 651 cases (35.57%). Low and moderate severity events are also common, with 640 (34.97%) and 498 events (27.21%), respectively. Severe events and those resulting in death are less frequent, with 25 (1.37%) and 16 events (0.87%), respectively.

In terms of the incident factors, it is highlighted that in 1,175 events (64.21% of the total), patient characteristics played a crucial role. Additionally, in 638 events (34.86%), factors related to the application of instructions and protocols were of considerable importance.

Regarding root cause analysis, it was conducted in a minority of cases, specifically in 37 events (2.02%). In terms of preventability of the adverse event, a significant proportion of events, 1,429 in total (78.09%), were considered potentially preventable. Concerning improvement actions, after 1,426 events (77.92%), corrective measures were taken, highlighting 618 actions related to strengthening the culture of quality and patient safety, 440 actions related to the implementation of monitoring mechanisms, and 380 actions related to the training of new staff and students.

CONCLUSION

The contribution of this study on adverse events in the hospital setting has revealed potential key areas for improvement in the management of patient safety in the State of Hidalgo. The analysis was conducted exhaustively, covering not only the frequency and diversity of adverse events but also their detailed categorization. This included sizing incidents related to medication and falls, considering factors such as the particular characteristics of patients and the effectiveness of implementing hospital protocols.

Among the most notable results is the higher prevalence of these events in female patients, with approximately 59.78%, and a significant concentration in the 21-30 years age group.

According to the research by Watson et al. (2019), based on records from the 1967-2018 period contained within the *VigiBase* database, the World Health Organization's database of global reports on individual patient safety, "a greater number of reports of adverse drug reactions were observed in women across all regions of the world." ⁶.

On the other hand, based on Inusah et al. (2020), for patients in their main hospital in the upper west region of Ghana, it was found that adverse events increase with age, with the 21-30 years age group representing the highest proportion (8.7%). These findings highlight the urgent need to develop specific prevention and management strategies focused on these demographic groups ⁷.

Based on the hospital service characteristics, it has been observed that most adverse events occur in areas such as Internal Medicine and Hospitalization, especially during the morning shift. According to Morales et al. (2019) and Barrera (2010), it has been found that patients hospitalized in internal medicine services are more exposed to adverse events ⁸⁻⁹.

Concerning the morning shift, Echevarría et al. (2011) highlight that, in a surgery service, a greater number of cases (77%) were reported for this shift, where it is important to take this value with caution since a larger number of trained personnel is available during this shift ¹⁰. However, these results underline

the importance of reinforcing safety and quality measures in these relevant aspects.

Regarding the classification of events, it is highlighted that medication incidents, falls, and healthcare-associated infections are the most frequent, with a majority of events classified as 'no harm,' although a notable incidence of low and moderate severity is also reported.

Therefore, according to the Study on Patient Safety in Primary Health Care (APEAS, 2008) for 48 Spanish primary health care centers, similar figures can be seen for these results, where only 7.3% of their adverse events were considered serious, while medication is highlighted as a causal factor of adverse events (25.7%) ¹¹.

One of the critical aspects identified is the contribution of patient characteristics and the application of instructions and protocols to the occurrence of adverse events. Aligned with the correct execution of mitigation guidelines for events, Paranaguá et al. (2014) highlight the importance of promoting the creation and use of tools for incident reporting, as they not only facilitate the effective management of health services but also allow proactive identification and addressing of aspects requiring improvements in the work environment ¹².

Although a considerable proportion of the analyzed events were considered preventable, only 2.02% of the cases were subjected to a root cause analysis, highlighting a significant opportunity for improvement in the prevention and analysis of adverse events. According to Rodríguez and Rodríguez (2021), they emphasize that the causal analysis of adverse events has the capacity to identify and correct hidden failures and errors in the medical care process and allow for the development of strategies that prevent future incidents, thus contributing to a safer and more reliable clinical environment ¹³.

Based on this work, future research could focus on developing more robust methodologies for this incident analysis and evaluating the impact of different strategies for preventing and reporting them. It would also be beneficial to investigate the long-term impact of certain types of adverse events both on the performance of services provided and on the patient safety culture of health personnel.

From a practical perspective, the importance of continuous education and training of medical personnel is indirectly emphasized, as well as the strengthening of hospital policies and protocols. The implementation of incident monitoring actions, operational supervision, and the development of quality and patient safety programs are recognized as decisive steps for continuous improvement.

A current challenge lies in accessing detailed health information on adverse events, particularly the limitation of the Adverse

Event Reporting System in generating reports with disaggregated data, which restricts the ability of decision-makers in hospitals and state health institutions to conduct a deep exploration of the most frequent causes of these events. An effort is required in consolidating state-level data to promote research by key public health system actors and to improve monitoring of the current situation of patient safety in their health systems.

In conclusion, this study provides a comprehensive overview of adverse events in the hospital environment, highlighting fundamental areas for improvement in patient safety and opening avenues for future research and practices in clinical units. Its focus on continuous improvement promises significant advances in the quality of health services.

REFERENCES

- [1] Dhingra-Kumar N, Brusaferrero S, Arnoldo L. Patient Safety in the World. In: Donaldson L, Ricciardi W, Sheridan S, Tartaglia R, editors. Textbook of Patient Safety and Clinical Risk Management. Cham (CH): Springer; 2021 Dec 15.
- [2] Agency for Healthcare Research and Quality. Major Study Finds Significant National Patient Safety Improvement. Rockville, MD: Agency for Healthcare Research and Quality; 2022 Jul [cited 2023 Nov 13]. Disponible en: <https://www.ahrq.gov/news/newsroom/press-releases/significant-patient-safety-improvement.html>.
- [3] Camacho-Rodríguez DE, Carrasquilla-Baza DA, Dominguez-Cancino KA, Palmieri PA. Patient Safety Culture in Latin American Hospitals: A Systematic Review with Meta-Analysis. Int J Environ Res Public Health. 2022;19(21):14380.
- [4] Dirección General de Calidad y Educación en Salud. Sistema de Registro de Eventos Adversos. Disponible en: <https://desdgc.es.salud.gob.mx/srea/acceso.php>.
- [5] Secretaría de Gobernación. Reglamento de la Ley General de Salud en materia de Investigación para la Salud. Diario Oficial de la Federación, Leyes y Reglamentos Federales; 2023. México. Disponible en: <http://www.ordenjuridico.gob.mx/Documentos/Federal/html/wo88535.html>.
- [6] Watson S, Caster O, Rochon PA, den Ruijter H. Reported adverse drug reactions in women and men: Aggregated evidence from globally collected individual case reports during half a century. EClinicalMedicine. 2019;17:100188. Disponible en: <https://doi.org/10.1016/j.eclinm.2019.10.001>.
- [7] Inusah D, Anyanful A, Nuvor SV. Adverse events and their relationship with the demographic characteristics of patients at Wa, the upper west regional hospital of Ghana. 2020.
- [8] Morales-Cangas MA, Ulloa-Meneses CM, Rodríguez-Díaz JL, et al. Eventos adversos en servicios de Cuidados Intensivos y de Medicina Interna. AMC. 2019;23(6):738-47.
- [9] Barrera Duque ME. Eventos adversos de referencia para prestadores de servicios de salud relacionados con la atención de enfermería en el servicio de medicina interna, hospital universitario Hernando Moncaleano Perdomo. Disponible en: <http://web.b.ebscohost.com/ehost/pdfviewer/pdfviewer?sid=144d1e44-3cd9-4678-a508-4d834c9fcbb3%40sessionmgr198&vid=47&hid=125>.
- [10] Echevarría ZS, Sandoval CF, Gutiérrez DS, et al. Eventos adversos en cirugía. Cir Gen. 2011;33(3):163-9.
- [11] Estudio APEAS. Estudio sobre la seguridad de los pacientes en atención primaria de salud. Madrid: Ministerio de Sanidad y Consumo; 2008.
- [12] Paranaguá Thatianny Tanferri de Brito, Braga Queren de Pádua, Bezerra Ana Lúcia Queiroz, Bauer de Camargo e Silva Ana Elisa, Azevedo Filho Francino Machado de, Gomes de Sousa Maiana Regina. Eventos adversos: instrumento de gerencia de la asistencia para la seguridad del paciente en el servicio de urgencias. Enferm. glob. Disponible en: http://scielo.isciii.es/scielo.php?script=sci_arttext&pid=S1695-61412014000200010&lng=es.
- [13] Rodríguez Padrón José Miguel, Rodríguez Izquierdo Mario Miguel. Metodologías validadas para el análisis causal de eventos adversos de trascendencia clínica en la biomedicina. Rev Cubana Invest Bioméd. Disponible en: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S0864-03002021000300017&lng=es.