

The Risks of Patient Safety Caused by Information Technology-preliminary Results in Taiwan

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Introduction

In recent years, the rapid development of health information technology (HIT) has been noted widespread implementation of information technology in hospitals to reduce the workload of clinical staff and improve management and operational efficiency. However, with the integration of HIT in healthcare, there is a growing number of HIT-related incidents affecting patient safety. The Emergency Care Research Institute (ECRI) in the United States annually publishes the top 10 health technology hazards, highlighting the risks associated with medical technology. In Taiwan, the Ministry of Health and Welfare emphasizes the importance of establishing a system for reporting and managing HIT-related patient safety incidents as part of the national patient safety goals.

Method

To raise awareness of the importance of the patient safety risks associated with medical technology in healthcare, the Joint Commission of Taiwan (JCT) established the nationwide "Information Technology-related Patient Safety (ITPS)" learning platform in 2020. Through this voluntary reporting and learning platform, hospitals can report issues related to information technology systems, equipment, operations, connectivity, and information security. Reports are analyzed by healthcare information experts who identify root causes, suggest improvement measures, and facilitate inter-hospital experience exchange and sharing.

Results

This study analyzed 113 cases reported from 23 hospitals participating in the ITPS platform from 2021 to 2022. The top three categories of incidents were

medication events (43.4%), laboratory/diagnostic/pathology events (23.9%), and clinical treatment and care events (19.5%)(Figure 1). Among medication events, most are related to the physician prescription interface, such as excessive reminder information. Classified by the event-related information systems/technologies, the top three were information system issues (51.3%), system interface issues (14.2%), and system operation issues (11.5%). Distinguishing the impact on patient safety caused by the incident based on the degree of harm, 5.3% were minor injuries or above (Table 1), and the rest were mostly no harm (52.2%) and near misses (33.6%). Among information system issues, most occurred in healthcare information systems such as computerized provider order entry, pharmacy, and laboratory information systems (59.2%), followed by clinical documentation systems (28.6%), the possible reasons for the incident are shown in Figure 2.

Conclusion

Healthcare information technology is complex, and information capacity varies among hospitals. Successful HIT implementation relies on effective communication and collaboration among multidisciplinary teams, active user participation in workflow design, and consideration of human factors and safety issues. Based on the literature, 75% of HIT-related patient safety incidents are preventable. However, people are not sufficiently aware of the risks associated with HIT in the medical field. The ITPS platform facilitates the flow of information on common risks and hazards in hospitals. It allows experts to consult and discuss cases and encourages sharing and learning of best practices between hospitals. As a result of this collaborative effort, we will develop systematic guidelines to prevent the recurrence of similar problems and safeguard patient safety.

Figure 1: The Proportion of Medical Event Categories

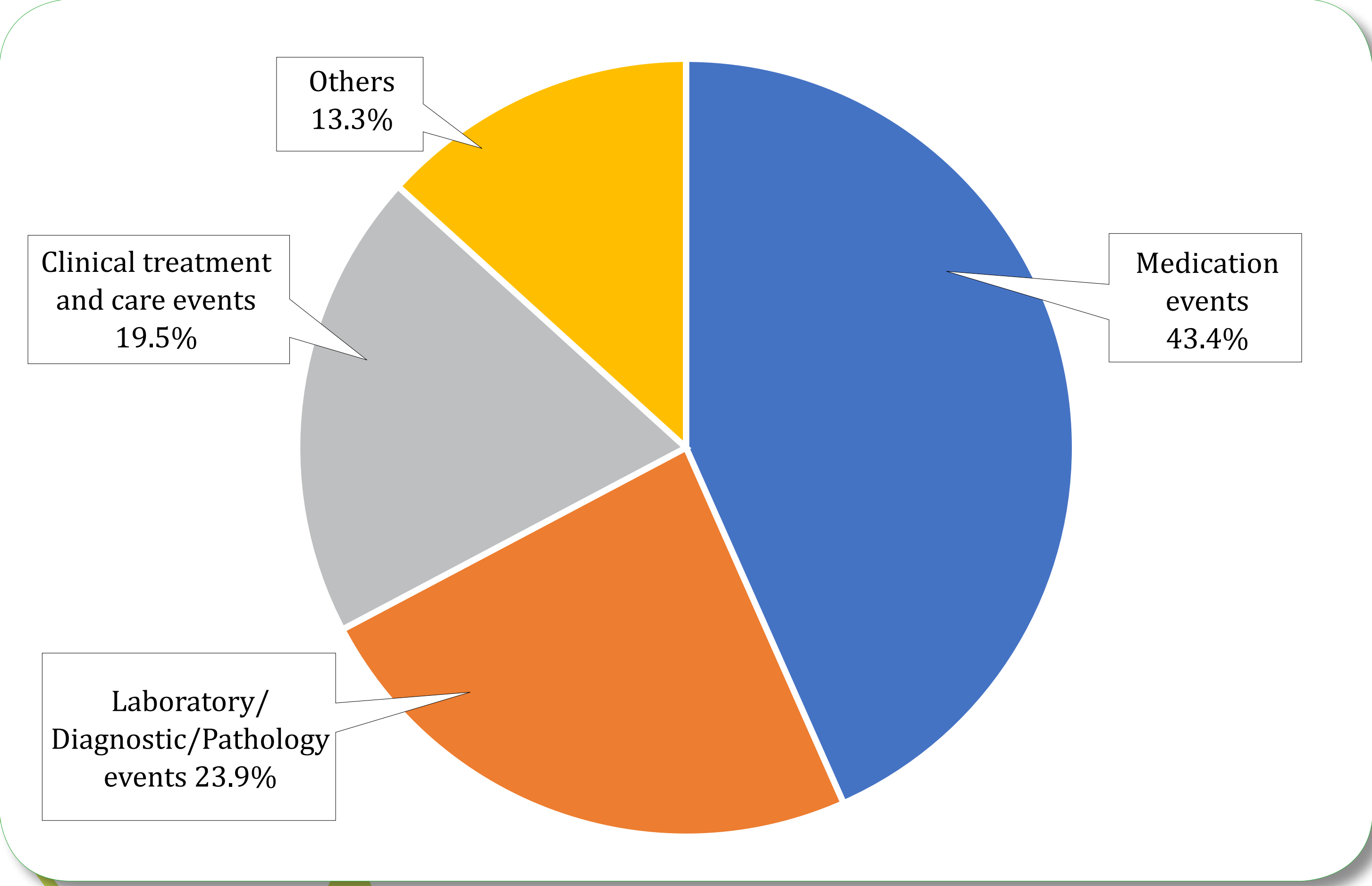


Figure 2: The Possible Reasons for the Incident Occurred (multi-choice)

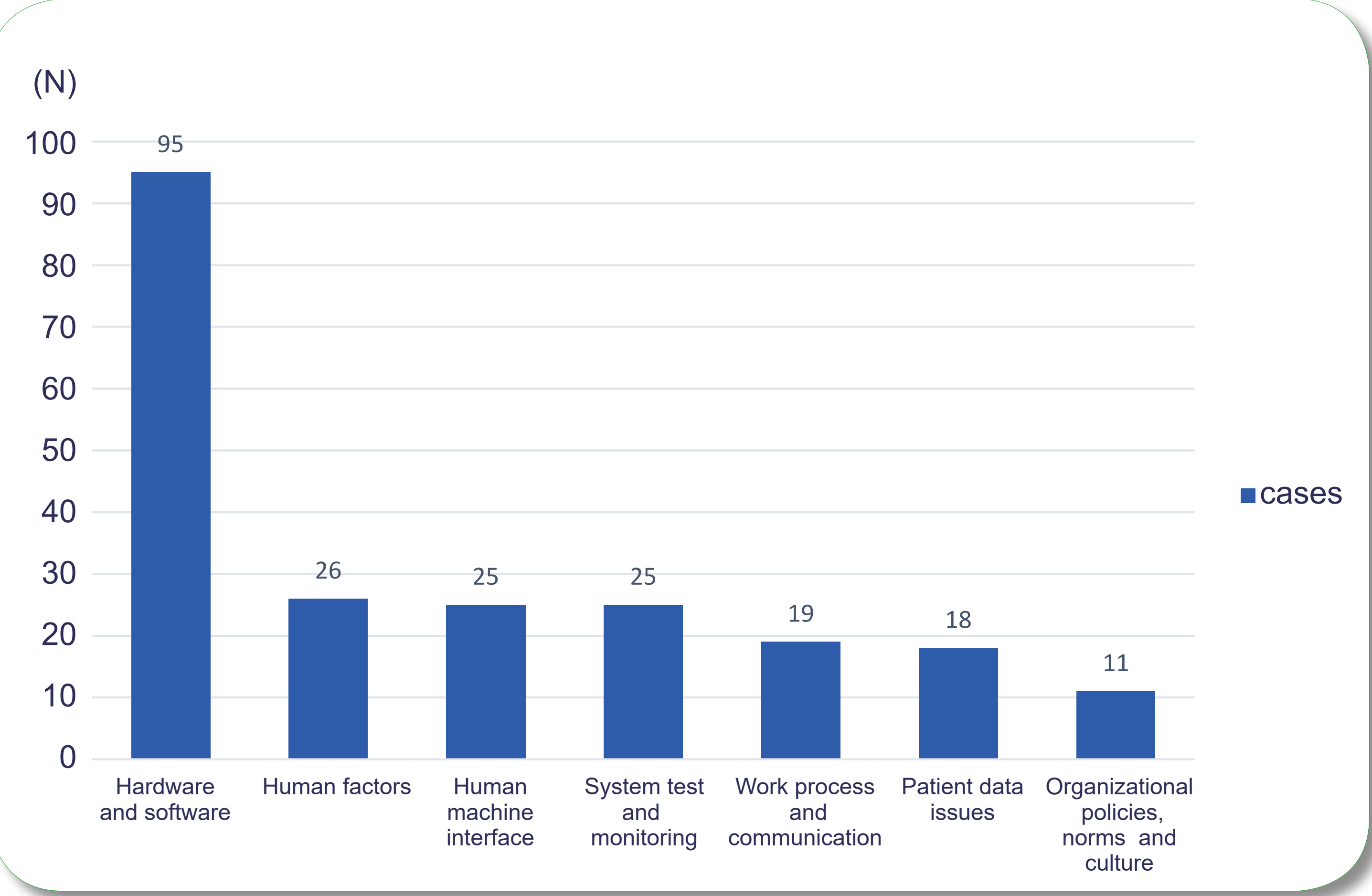


Table 1: Summary of Information Technology Related Moderate to Severe Injury Cases

Case	Age/Sex	Events	Information Technology Issue	Impact
1	Adult/M	Methylprednisolone administered via an inappropriate route (500 mg intramuscular injection instead of 500 mg intravenous infusion)	The system did not alert for the inappropriate route of administration.	Moderate injury: injection site tenderness and swelling.
2	Older/F	A total parenteral nutrition order was placed by copying the original prescription, and then an error in the infusion rate was given automatically.	A duplicate total parenteral nutrition order was placed; the system did not link the infusion rate correctly.	Severe injury: inadequate nutrition, fluids, and electrolytes for the patient.
3	Teenage/M	Incorrect route selection for morphine (subcutaneous injection instead of intravenous infusion). Although an additional note was added (G/W 24 ml with pump 1ml/hr run 24 hrs), the nurse did not perceive the additional note during administration.	Not directly related to the information system. Experts suggested increasing the notes' font size to make them more perceivable.	Moderate injury: poor pain control for the patient.
4	Adult/M	Incorrect drug concentration (50% G/W 500 ml instead of 5% G/W 500 ml)	The information system lacked any method to help users differentiate similar drugs (Look-alike, sound-alike [LASA]).	Severe injury: The patient suffered from seizures due to hyperglycemia.
5	Older/F	High-risk medication order with incorrect dosage (1.49% KCL 100 mEq (5 bottles) QD instead of 1.49% KCL 100 ml (1 bottle) QD).	The information system should limit the maximum doses for high-risk medications.	Severe injury: The patient suffered from hyperkalemia which increased the risk of cardiac arrest.
6	Older/M	Order was placed (Unasyn 375 mg intravenous stat and Q8H), but the nurse information system did not display the order until a day later.	The information system has poor data integration.	Moderate injury: missed medication administration for the patient.