Worldwide incident reporting

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Introduction

Worldwide incident reporting in anaesthesia is a system that allows healthcare providers to report adverse events, hazards or near misses which might occur during anaesthesia administration. The overall aim is to enhance patient safety by learning from these events and preventing potential incidents by providing insight into human factors and highlighting opportunities for improvement in anaesthetic techniques and procedures.

The reporting system typically involves collecting data on incidents,[1] some examples being medication errors, equipment failures, and adverse reactions to anaesthesia.[2,3] These data are then analysed to identify trends and patterns and in an ideal world the findings are then reported back to the anaesthetic community, providing system insights and learnings to increase patient safety.[1]

Many nations have created anaesthesia-specific national or regional incident reporting systems, and a few international organisations also gather and evaluate data on such events.[1] These mechanisms are crucial for enhancing patient safety and ensuring anaesthesia providers are responsible for their conduct.

The World Federation of Societies of Anaesthesiologists (WFSA) strives to improve anaesthesia patient safety. Many nations lack a uniform protocol or reporting format for anaesthetic incidents. A consistent reporting procedure and a centralized data analytics workgroup would produce reliable data for local and national quality improvements.

HISTORY

As a profession, anaesthesia has a long history of advocating for patient safety measures. Incident reporting systems have been established a long time ago to learn from adverse events and improve patient safety and outcomes.

Sir Robert Macintosh, a New Zealander based in Britain and the first professor of anaesthesia outside the United States, was one of the pioneers of anaesthetic management. He first drew attention to fundamental failures in anaesthetic practice in the 1940s.[4] In an open letter published in the British Journal of Anaesthesia, he recommended that an independent anaesthetist with suitable qualifications analyse every anaesthetic death immediately after its occurrence. Macintosh recognized that knowledge and investigations of such events would create valuable information. He compared the benefits of incident analyses and the information the anaesthetist would gain to the information provided to the sailor by lighthouses at dangerous locations.

Flannagan first described the critical incident reporting technique in 1954 to enhance military aviation performance and safety.[5] Since then, incident reporting and analysis have been well established in multiple high-risk industries, including aviation, nuclear power plants, scuba diving, and anaesthesia.

Cooper et al.[6] Modified Flannagan's critical incident analysis to examine preventable anaesthetic mishaps in 1978. They collected information about preventable incidents by interviewing 47 healthcare providers and identifying and categorizing 359 incidents. An anaesthesia-related critical incident was defined as "an occurrence that could have led or did lead to an undesirable outcome, ranging from increased length of hospital stay to death or permanent disability."[7] They only focused on preventable incidents. The overall aim of their study was to uncover patterns of frequently occurring adverse events.

Runciman et al[8] founded the Australian Incident Monitoring Study (AIMS) in 1987, which was the first national anaesthetic critical incident analysis program worldwide. Participating anaesthetists in Australia voluntarily and anonymously reported any preventable or non-preventable incident, ranging from near misses to major harm, via a standardised aims form. Data were collected via narratives, where the reporter could describe the incident, contributing factors, and alleviating factors via free text. Quantitative information, including patient demographics, the time of day of the events, and incident outcomes, was reported via pre-defined drop-down lists, where the reporters ticked the appropriate box. Incident reporting in anaesthesia gained further

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traction, with Switzerland adopting the principle next. Nowadays, there are a number of national incident reporting schemes in Europe, the United States and Asia.[9,10]

WHO GUIDELINES FOR INCIDENT REPORTING

The World Health Organization (WHO) has reviewed incident reporting in healthcare and has provided guidance to further increase patient safety.[1] The aim is not only to encourage healthcare professionals to report incidents, but also to identify systemic flaws and prevent future patient harm, via detailed incident analyses, quality improvement projects and healthcare system advancements. The ultimate goal is to reduce the number of adverse events .

The WHO defines an incident as any unforeseen event or circumstance that has the potential to injure a patient, a healthcare professional, or any other person. Additionally the WHO promotes reporting, and encourages healthcare organisation's to create a culture that supports and encourages this in a confidential non-punitive approach. Reporting systems are required to be easily accessible, user-friendly, and de-identified. These systems can be electronic or paper-based, but need to facilitate timely reporting and analysis of incidents.[1]

Information regarding the details of the event, such as the patient demographics, anaesthetic provider, surgical procedure, daytime, location, and a description of what happened, including any contributing variables should be collected. Ideally, the procedure should allow for any additional follow-up data that could be required, however, this might be difficult when considering de-identified and anonymous data collection.

Investigating reported incidents to determine their underlying causes and contributing elements is essential. These analyses might identify system weaknesses, and findings might improve healthcare practices and methodologies. It is crucial to share the lessons discovered from incidents with the relevant stakeholders to promote learning and prevent similar events in the future. Transparent communication regarding incident reporting and its outcomes will further support a culture of reporting and patient safety.

It is important to note that these recommendations need to be adapted and implemented according to each healthcare organisation's specific context and needs.

COMMON ELEMENTS OF INCIDENT REPORTING SYSTEMS

Anaesthesia incident reporting systems typically include several common elements to ensure comprehensive reporting and analysis of incidents. Depending on the particular design or organisation, these components may differ slightly. The following are some typical ones:

Confidentiality: encouraging healthcare professionals to report incidents without worrying about potential legal repercussions requires confidentiality and protection of the data. Systems for reporting anaesthesia incidents need to ensure that the data provided are kept de-identified and are handled by expert analysts.

Non-punitive strategy: a non-punitive strategy ensures that medical personnel who disclose situations do not face negative consequences for reporting. Focus is maintained on improving patient safety and learning from adverse events.

Reporting mechanisms: anaesthesia incident reporting systems may collect incident reports in various ways, including computerized reporting tools or paper-based forms. The objective is to make the reporting procedure simple and available to healthcare professionals.

Analysis and investigation: investigations of reported incidents are necessary to determine their underlying causes and contributory variables and to identify strategies to reduce the occurrence of adverse events. Analyses may identify system weaknesses and improve anaesthesia practices and protocols.

Feedback and learning: anaesthesia incident reporting systems need to provide feedback on findings to the anaesthetic community. It is crucial to share the lessons discovered from incidents to promote learning and prevent similar events in the future.[11]

Incident reporting form: systems reporting anaesthesia incidents often use a standard format to gather pertinent data. These data help to capture essential information about anaesthesia incidents, contributing factors, and patient outcomes. They facilitate comprehensive analyses of incidents, the identification of system weaknesses, and the implementation of corrective actions to improve patient safety in anaesthesia care. The form equally should allow easy access for review by the analysers.[12]

Common elements found in anaesthesia incident reporting forms include demographic data, including patient, surgical and anaesthetic factors. Narrative boxes describing the incident in the reporters own words provide the opportunity to 'paint the picture' of the event and to also reflect on contributing, alleviating and additional factors leading to the event. Data boxes ensuring the collection of information regarding the patient outcomes, the severity of the incident and suggested follow up actions are required for a complete picture of the incident.

These shared components help ensure that anaesthesia incident reporting systems facilitate the identification of safety issues, promote a culture of continuous quality improvement, and ultimately enhance patient safety in anaesthesia care.[1,12]

DIFFERENCES BETWEEN HIGH INCOME COUNTRIES (HIC) & LOW-MIDDLE INCOME COUNTRIES (LMIC)

In 2010, nearly one-third of global deaths were caused by conditions requiring surgical care, surpassing the combined number of deaths from HIV, tuberculosis, and malaria. A report published in 2015 by the Lancet Commission on Global Surgery[13] emphasized the importance of universal access to safe and affordable surgical and anaesthetic care. Perioperative mortality reflects surgical and anaesthetic safety. While global perioperative mortality rates have decreased over the past 50 years, low and middle-income countries (LMICs) still face a two-to-four times higher risk. Improving anaesthesia services has been identified as a priority in global health. There is a wide range of conditions in which anaesthetic providers with varying training backgrounds provide anaesthesia in LMICs. According to the WFSA workforce survey, there is a shortage of physician anaesthesia providers, with a significant discrepancy between HICs and LMICs.[14] In countries with advanced resources, anaesthesia incident reporting systems are commonly more established and comprehensive compared to low resource

countries. Some key differences include infrastructure, availability of technology, reporting culture, training and education, and outcome data analyses and feedback mechanisms.

HEALTHCARE INFRASTRUCTURE AND TECHNOLOGY

Healthcare infrastructure and technology play a crucial role in critical incident reporting, and there are significant differences between high-income countries (HICs) and low-middle income countries (LMICs) in this regard. HICs generally have well-developed healthcare infrastructure, including advanced hospitals and medical facilities, which allows for improved data collection and implementation of reporting systems. They also have reliable communication networks, enabling seamless information sharing among healthcare providers and institutions. Furthermore, HICs commonly leverage advanced technology such as Electronic Health Records (EHRs) and mobile applications designed for incident reporting purposes within anaesthesia practice settings.[15]

In contrast, LMICs may struggle with procuring essential resources and setting up incident reporting systems and allocating funds for it support and management. They often rely on manual or paper-based systems, making data collection and distribution more labour-intensive and prone to error. LMICs may also face challenges with internet connectivity, further complicating the use of technology for incident reporting purposes.

To facilitate comprehensive analyses at a national level and identify trends, patterns, and areas for improvement in anaesthesia care delivery practices, established databases or registries designed explicitly for collecting critical incident data are required. Sophisticated data analysis tools may be available in HICs, but LMICs may need more centralized databases due to resource limitations, it and internet structure improvements, availability of advanced technology, and resources for data analyses. HIC anaesthesia training programmes benefit from well-established educational institutions with experienced faculty members specialising in patient safety practices and critical incident reporting protocols. These programmes provide comprehensive training opportunities emphasizing the importance of accurate incident documentation and reporting procedures throughout a provider's career development.[15]

High-income country systems often include robust mechanisms for analysing reported incidents at both local and national levels. Regular feedback loops are established between anaesthesia providers, hospitals/clinics, regulatory bodies, and professional societies to disseminate lessons learned from incidents with the aim of improving patient safety practices overall. HICs may have well-established infrastructure for data analysis, including dedicated teams or departments responsible for analysing critical incident data. These teams utilise advanced analytical tools and methodologies to identify trends, patterns, and potential areas for improvement in anaesthesia care delivery practices.[16] In contrast, LMICs may have limited resources or expertise dedicated to comprehensive data analysis due to financial constraints.

Improving healthcare infrastructure and technology is an ongoing effort globally, with organisations such as the World Health Organization (WHO) and other international bodies working towards supporting LMICs in strengthening their healthcare systems, including critical incident reporting capabilities. Efforts are being made globally to bridge the technology gap between HICs and LMICs by promoting initiatives that support the adoption of cost-effective technologies and innovative solutions tailored to the specific needs of healthcare systems in resource-limited settings.

REPORTING CULTURE AND EDUCATION RESOURCES

HICs typically have established cultures for reporting critical incidents within the healthcare system. Healthcare professionals are encouraged to report adverse events or near misses without fear of retribution or blame.[1]

Openness and transparency: HICs often have a more robust culture of openness and transparency when reporting critical incidents. Healthcare providers are encouraged to report adverse events or near misses without fear of retribution or blame. There is an understanding that reporting incidents is essential for learning, improving patient safety, and preventing future occurrences. In contrast, LMICs face cultural barriers that discourage open reporting due to concerns about professional reputation, legal consequences, or a lack of trust in the system.[17]

Legal and regulatory frameworks: HICs usually have well-established legal and regulatory frameworks that protect healthcare providers who report critical incidents in good faith from legal repercussions or disciplinary actions. These protections help create an environment where healthcare professionals feel safe to report incidents without fear of negative career consequences. LMICs often need better legal protections for healthcare providers who report incidents and encourage individuals to come forth with their experiences.

Professional support systems: in HICs, professional societies and organisations promote a positive reporting culture by providing support systems for anaesthesia providers who experience critical incidents. These support systems offer guidance, counselling services, peer-to-peer discussions, and educational resources for incident reporting best practices.[17] LMICs need more resources to establish similar support systems for healthcare professionals.

Training and education on reporting practices: training and education on reporting practices is an important aspect of anaesthesia care delivery.[11] The following are examples of resources that many HIC anaesthesia training programmes have available but that are not as prevalent in LMIC training programmes.

- **Incident reporting**. HIC anaesthesia training programmes generally include education on incident reporting protocols as part of their curriculum. Anaesthesia providers receive training on accurately documenting critical incidents and understanding the importance of timely reporting for patient safety improvement efforts.[11]

- **Critical incident reporting protocols and implementation of patient safety practices**. In HICs, there is generally more investment in training programmes for anaesthesia providers regarding critical incident reporting protocols and patient safety practices. These programmes help create a culture of continuous learning and improvement in anaesthesia care delivery.[17]

- **Patient safety-trained faculty in anaesthesia training programmes**. HIC educational institutions often have experienced faculty members who specialize in patient safety practices, including critical incident reporting protocols. These faculty members can provide guidance, mentorship, and practical examples related to effective incident documentation techniques during the training process.

- **Simulation in training programmes**: HICs frequently utilise simulation-based training methods as part of their anaesthesia education curriculum. Simulations allow trainees to practise responding to critical incidents in controlled environments before encountering them in real-life situations. This includes practicing proper documentation techniques during simulated incidents for later analysis or debriefing sessions focused on improving communication skills related to incident reporting processes.

- **Investment in continuing professional development opportunities (CPD)**: HIC healthcare systems also often invest in CPD opportunities for anaesthesia providers that include workshops or conferences focused on patient safety practices and critical incident reporting strategies. These CPD activities allow providers to stay updated on best practices, learn from real-life case studies, and network with peers to share experiences.

Organisational culture: the organisational culture within healthcare institutions can significantly influence the reporting culture. In HICs, there is often a strong emphasis on a "culture of safety" that encourages reporting and learning from incidents. Institutions prioritise creating an environment where healthcare providers feel comfortable reporting incidents and are supported in their efforts to improve patient safety. In LMICs, resource constraints and other challenges may result in less focus on fostering such a culture.[13]

Quality improvement initiatives: HICs often implement quality improvement initiatives based on insights gained from critical incident data analysis. These initiatives aim to address identified areas for improvement through changes in policies, procedures, training programmes, or equipment upgrades that enhance patient safety practices within anaesthesia care settings. LMICs have fewer resources available for implementing such comprehensive quality improvement initiatives.

Research opportunities: HICs with well-established critical incident reporting infrastructures provide opportunities for research studies focused on patient safety and anaesthesia care. Researchers can access anonymised incident data to conduct studies that contribute to the understanding of factors contributing to critical incidents and the development of evidence-based interventions. LMICs have limited research opportunities due to challenges in data collection, analysis, and resource allocation for research purposes.

BENEFITS OF IMPROVING WORLDWIDE ANAESTHESIA CRITICAL INCIDENT REPORTING

Enhancing the global reporting of critical incidents in anaesthesia would yield a multitude of advantages that would contribute to the improvement of patient safety and the provision of high-quality healthcare. Several notable benefits encompass as follows: the practice of reporting critical incidents in anaesthesia fosters a culture that values openness and responsibility.[18] Through the process of reporting incidents, healthcare personnel can gain a deeper understanding of the various elements that contribute to these occurrences. This enhanced understanding subsequently leads to increased awareness and knowledge of potential dangers and the measures that may be taken to prevent them.[19] The act of globally reporting occurrences enables the identification of repeating trends or systemic issues that impact patient safety. These data can be utilised to enact focused interventions and create procedural modifications to address these concerns and mitigate similar situations effectively.[20]

Reporting critical incidents enables healthcare practitioners to effectively communicate their experiences and impart valuable knowledge gained from these events. Sharing information facilitates the widespread distribution of exemplary practices and pioneering methodologies, ultimately resulting in enhanced patient outcomes and the establishment of standardised treatment across diverse healthcare environments.[19] The process of critical event reporting catalyses quality improvement activities. By examining documented occurrences, healthcare institutions can identify specific domains that require enhancement and then employ evidence-based approaches to augment patient safety and maximise the utilisation of anaesthesia techniques.

Participating in critical incident reporting promotes a culture that prioritises ongoing learning and advancing professional skills. Healthcare practitioners can self-reflect on their practices, discern areas that require improvement, and actively pursue more education or training opportunities to augment their proficiency and understanding of anaesthetic treatment.[11] Enhancing global anaesthesia critical incident reporting will ultimately lead to advancing patient safety through identifying and mitigating possible hazards and system breakdowns. Healthcare organisations can enact preventive measures, optimise protocols, and establish a safer environment for patients who are undergoing anaesthesia.[20]

In brief, enhancing the global reporting of significant incidents in anaesthesia contributes to heightened consciousness, detection of systemic concerns, dissemination of exemplary approaches, endeavours for quality enhancement, professional growth, and enhanced patient safety and treatment quality.[11]

LIMITATIONS OF INCIDENT REPORTING SYSTEMS

Incident reports can provide valuable information for research and practice improvement, but there are limitations associated with this type of data. These limitations can be divided into two categories: data input and data analysis.

Limitations related to data input

The World Health Organization (WHO) has reported that underreporting of incidents is a significant issue.[1] It is believed that only a small percentage, between 7-15%, of incidents are ever reported. This underreporting is often due to a fear of punishment or retribution, which is a consequence of the so-called blame culture."[21] Other factors contributing to underreporting include a lack of user-

friendly reporting infrastructure, poor perceptions of the usefulness of incident reporting systems within the medical community, and time pressures in high-stress working environments.[22]

In addition, incident reports are subjective in nature and the views and experiences of the reporter can influence them. This can lead to selective recall bias or under-reporting of the incident. Additionally, medical professionals may not report near-miss events or incidents that did not cause harm to the patient, despite these occurring more frequently than significant adverse events. Analysing near-miss events is just as crucial as analysing significant adverse events.

Limitations related to data analysis

Data analysts face the challenge of having to work with large volumes of reports, often with limited time, resources, and expertise. In healthcare, interpreting and summarizing the findings of incident reports may come at the expense of implementing changes to improve patient care and safety. Although there are many published articles related to incident reports and their findings, far less attention has been paid to processing, learning from, and responding to these findings. Most incident reporting systems collect de-identified data, which means that the analyses are dependent on the information provided.[19] If information is unclear or missing, it is not possible to collect missing data or clarifications. Additionally, denominator data is commonly not available, making it impossible to calculate the true risks associated with many adverse events.[3]

STRATEGIES TO IMPROVE WORLDWIDE ANAESTHESIA INCIDENT REPORTING

We offer the following recommendations to improve incident reporting and patient safety globally.

- Develop and implement a standardised, anonymous reporting system worldwide.

- Encourage all healthcare facilities to regularly audit and verify the reporting of incidents and assess the efficiency of the reporting system.[23]

- Advocate and create cultures of safety in clinical practices. [11,21,22,24]

- Encourage the use of feedback mechanisms in healthcare facilities that effectively communicate the outcomes of healthcare experts' reports.[24]

- Establish collaborative efforts among diverse nations and healthcare institutions can facilitate the exchange of exemplary methodologies and enhance the efficacy of the reporting system.[23]

- Utilise technology such as mobile applications, web-based platforms, and digital health records to enhance the ease and efficiency of the reporting process.

- Pursue legal safeguards for all healthcare professionals who disclose critical incidents.[23]

SUMMARY

By working together, healthcare providers can help to improve patient safety and reduce the risk of critical incidents in anaesthesia care. There are a number of barriers to the optimal development and implementation of incident reporting processes.[25] These barriers are often more pronounced in LMICs but a number of them are also present in HICs. A global approach to improving incident reporting and reducing these barriers is possible and necessary if we are to continue to advance anaesthesia patient safety worldwide.[23]

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