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ORIGINAL RESEARCH

An investigation of barriers to reporting anaesthesia-related critical incidents using the National Guideline for Patient Safety Incident Reporting and Learning

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Background: Learning from anaesthesia-related critical incidents (ARCI) is essential to improving patient safety and outcomes in the perioperative period. Locally, the Department of Health's National Guideline for Patient Safety Incident Reporting and Learning (NPSIRL) mandates the disclosure of all patient safety incidents (PSI). However, under-reporting is a major issue. This study investigates the determinants of poor guideline adherence within anaesthetic practice by identifying barriers specific to the NPSIRL process and quantifying their impact on ARCI disclosure.

Methods: A self-administered online questionnaire was distributed to all doctors working in anaesthesia at university-affiliated training hospitals in KwaZulu-Natal. In addition to demographic and professional data, barriers to incident reporting were identified through thematically grouped open-ended questions and responses to 24 previously recognised barrier statements.

Results: The analysis included 122 complete responses from anaesthetists at 17 institutions. Of the participants, 34% had never reported a PSI using the NPSIRL system, with 75% having reported two or fewer ARCIs in the preceding 12 months. Fear of adverse consequences was the most common self-reported barrier theme (58%), followed by system-related reporting factors (49%). Of the previously identified barrier statements, a lack of feedback (86%), the reporting process being too time-consuming (70%), concerns about being blamed or disciplinary action (69%), and a lack of training (68%) were most frequently cited. Subgroup analysis showed that a lack of training and the time required to complete a report was more commonly associated with less experienced and junior anaesthetists.

Conclusion: Under-reporting of ARCIs, a consequence of the barriers identified in this study, represents a missed learning opportunity to ensure patient safety-orientated care. Strategies aimed at improving the reporting of ARCIs in South Africa require careful consideration of the context-specific challenges and barriers identified in this study.

Keywords: critical incident reporting, patient safety, anaesthesia-related critical incidents, incident-based learning, reporting barriers

Introduction

Patient safety is a fundamental principle in anaesthesia, with most safety initiatives based on the belief that learning from critical incidents (CI) leads to improved patient outcomes.[1] A CI, alternatively referred to as a patient safety incidents (PSI), is any unintended or unexpected event that could have or did harm a patient.[2,3] An anaesthesia-related critical incidents (ARCI) refers to a CI while under anaesthetic care.[4]

Incident reporting provides qualitative, often anonymous, data about rare but potentially serious events.[5] Case-based analyses of such events could result in collective learning and improved organisational safety through corrective feedback and locally tailored recommendations.[6,7]

Incident reporting systems (IRS) in anaesthesia were pioneered by Cooper et al.[8] in 1978, although their origins can be traced back nearly a century. However, the widespread implementation of IRSs in healthcare is often attributed to the landmark report *To err is human*, published in 1999.[9] Almost universally, IRSs have been established at the national, local, or institutional level. Professional organisations and societies have developed their own reporting systems, with anaesthesia-specific IRSs utilised in many predominantly high-income countries.[10]

CI reporting in South Africa is governed by the Department of Health's National Guideline for Patient Safety Incident Reporting and Learning (NPSIRL), implemented in 2018 and updated in 2022.[3] PSI reporting, including adverse events, no-harm incidents, and near misses, is mandatory in all health establishments. To our knowledge, no alternative or supplementary local, institutional, or anaesthetic-specific IRS exists.

The ability of an IRS to reduce preventable patient harm depends on healthcare workers' recognition and reporting of CIs. The first cited weakness of such systems is under-reporting.[7] Under-reporting is a direct consequence of perceived or encountered barriers. These barriers are determinants of professional practice that prevent improvement or adherence to guidelines. Multiple international studies have identified barriers to PSI reporting in healthcare in general, intending to design more effective reporting systems. Local data specific to the NPSIRL system or factors affecting the reporting of ARCIs are limited.

A 2023 study of staff perceptions of the NPSIRL system found that 98% of healthcare professionals working in specialised care

units in KwaZulu-Natal believed the reporting system was poorly implemented.[11] The study recommended identifying barriers to reporting and using the NPSIRL system to formulate practical strategies to facilitate its implementation.

Several literature reviews have sought to develop a theoretical or psychological framework of factors affecting PSI reporting by clinicians. The 2017 review by Archer et al.[12] grouped barriers into nine thematic groups. Factors relating to the "fear of adverse consequences" and "process and systems of reporting" were the most cited categories. An earlier 2010 framework classified previously identified barriers into three main thematic groups, including IRS-related and individual and organisational influences.[13]

Several international surveys explored incident reporting in anaesthetic practice. Commonly cited IRS-related barriers included a lack of availability of reporting forms or not knowing where to find them, inadequate feedback, being too busy, and not knowing what to report.[14-16] Barriers related to individual influences involved fear of adverse consequences, including litigation or being blamed by colleagues, and negative personal attitudes towards its relevance.[14-17] Organisational influences include the prevailing "culture of silence" and reporting not being integrated into anaesthetists' work.[16,17]

However, these findings may not be generalisable in our context. IRSs vary by country and/or medical discipline, with the prevailing safety culture and staff perceptions profoundly influencing reporting practices. Little is known about the influence of the NPSIRL guideline on reporting ARCIs in our context. Such information is essential to implement context-specific, evidence-based strategies to improve reporting practices and, ultimately, patient safety.

This study aims to identify barriers and rate their respective impact on reporting ARCIs using the NPSIRL system among anaesthetists in KwaZulu-Natal.

Methods

All doctors working in anaesthesia at university-affiliated training hospitals in KwaZulu-Natal were invited to complete the self-administered online questionnaire. Ethical approval was obtained from the Biomedical Research Ethics Committee, University of KwaZulu-Natal (BREC/00004662/2022).

SurveyMonkey (Momentive © 1999–2022) software was used. The questionnaire link was distributed to departmental members via email and social media platforms. Demographic and professional data, and current PSI reporting information were collected from January to April 2022.

Barriers to ARCI reporting were initially explored with an open-ended question asking doctors to list the three most significant barriers to formal PSI reporting. To allow for quantitative analysis, responses were categorised into one of nine thematic groups, adapted from the previously developed framework by Archer et al.[12]

Doctors were subsequently asked if they agreed or disagreed with 24 barrier statements previously identified in the literature. These statements were extracted from a literature review of 19 studies into barriers to incident reporting.[12] To avoid response bias, participants were prevented from editing their previous open-ended responses. If they agreed that a statement represented a barrier to reporting, its impact on their decision whether or not to report an ARCI was rated on a four-point Likert scale, stratified as follows: a minor barrier that rarely influences your decision; a moderate barrier that sometimes influences your decision; a significant barrier that often influences your decision; and finally, an extremely significant barrier that always influences your decision to report an incident.

Statistical analysis

IBM SPSS Statistics version 28 (IBM Corp., Armonk, USA) was used to analyse the data. Categorical data were summarised using frequency tables and relative percentages. Medians and interquartile ranges (IQR) were used to summarise the data that were not normally distributed. Associations between demographics and barriers were assessed using Pearson's chi-square tests and 2-sided *p*-values. Where assumptions of the test were not met, and there were more than 25% of cells with low expected counts, two-sided Fisher's exact test *p*-values were used, and *p*-values < 0.05 were considered statistically significant.

Results

A total of 159 responses were received from anaesthetists at 17 institutions, representing a response rate of approximately 76%. Only the 122 participants with completed responses to all barrier statement questions were included in the statistical analysis (Figure 1).

Table I shows the demographics and anaesthetic background of participants. A third of doctors had never reported a PSI using the NPSIRL system (Table II). Two-thirds (67%) agreed that ARCIs frequently go unreported, with 89% of those considering under-reporting a missed opportunity to improve patient safety. Over the preceding year, the median number of ARCIs reported by participants was one (maximum 12, IQR 0–2). No ARCIs were reported in the past year by 48 participants (39%).

Figure 2 presents the thematic categories of self-reported barriers, reflecting the number of doctors who cited a category at least once and the total number of times each category was

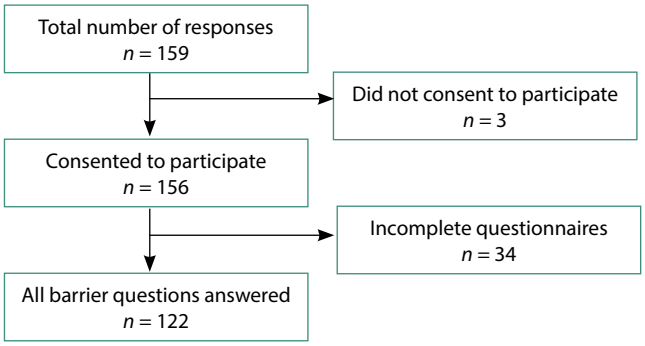

Figure 1: Flow diagram of respondents, including exclusion criteria

Table I: Demographics of respondents (n = 122)

	n (%)
Age	
≤ 30	18 (14.8)
> 30 but ≤ 40	66 (54.1)
> 40 but ≤ 50	29 (23.8)
> 50 but ≤ 60	9 (7.4)
> 60	0 (0.0)
Sex	
Female	73 (59.8)
Male	49 (40.2)
Rank	
Medical officer (including community service)	50 (41.0)
Registrar/trainee	32 (26.2)
Consultant/specialist anaesthesiologist	40 (32.8)
Years of anaesthetic experience	
≤ 5	40 (32.8)
> 5 but ≤ 10	34 (27.9)
> 10 but ≤ 15	30 (24.6)
> 15 but ≤ 20	9 (7.4)
> 20	9 (7.4)
Level of healthcare	
Rotating	32 (26.2)
District	7 (5.7)
Regional	42 (34.4)
Tertiary	15 (12.3)
Quaternary	16 (13.1)
Specialist	7 (5.7)
Unknown	3 (2.5)

cited. Over half (58%) of anaesthetists cited factors related to the fear of adverse consequences, comprising over a quarter (26%) of all barriers mentioned. Nearly half (49%) of doctors cited challenges regarding the IRS.

Table III reflects responses to the 24 previously identified barrier statements and their perceived impact. The three statements that most frequently represented a barrier to reporting were a lack of appropriate feedback, feeling that reporting is too time-consuming, and concerns regarding being blamed or disciplinary action. The three barriers that most frequently had a significant or highly significant impact on reporting practices were a lack of feedback, not knowing what to report, and a lack of training or guidance on how to report.

A subgroup analysis was undertaken to determine possible associations between demographic/professional factors and the five most frequently cited barriers (see *Supplementary digital file*). The reporting process being too time-consuming (p = 0.009) and a lack of training (p = 0.032) were barriers associated with less experienced anaesthetists. Males were more likely to consider a lack of training in reporting incidents a barrier (p = 0.030). No statistically significant association was found between demographics/professional attributes, a lack of feedback following PSI disclosure, fear of blame/disciplinary action, and concern regarding litigation.

Discussion

The NPSIRL guideline's purpose of preventing harm to patients through identifying all missed opportunities is, first and foremost, limited by a lack of clinician engagement with the process.[3] This study identified the factors impeding compliance

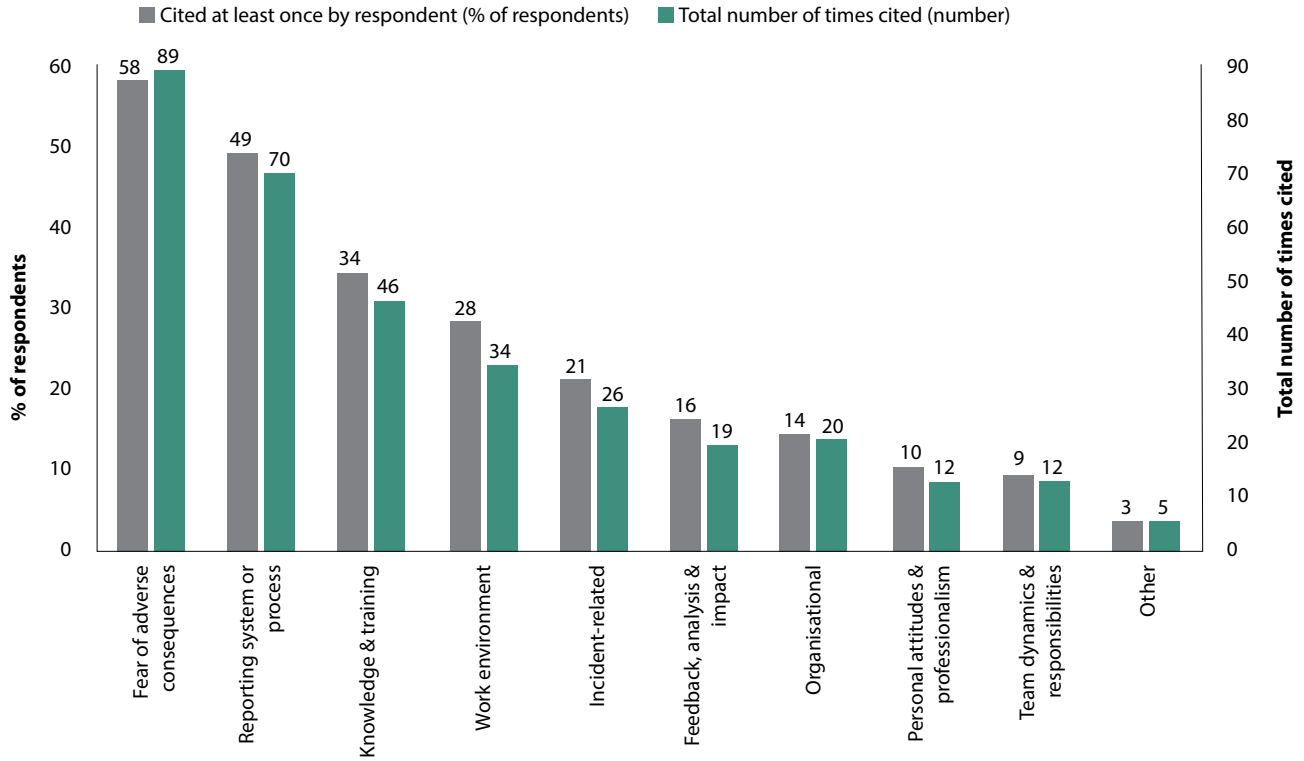

Figure 2: Categories or thematic groups of self-reported barriers

Table II: PSI reporting beliefs and behaviours

	Yes *n* (%)	No *n* (%)	Unsure *n* (%)
Ever reported a PSI using the NPSIRL system	81 (66.4)	41 (33.6)	0 (0.0)
Agree that ARCIs go unreported	82 (67.2)	19 (15.6)	21 (17.2)
Under-reporting represents a missed opportunity to improve patient safety (if agree that ARCIs go unreported [*n* = 82])	73 (89.0)	1 (1.2)	8 (9.8)

ARCI – anaesthesia-related critical incident, NPSIRL – National Guideline for Patient Safety Incident Reporting and Learning, PSI – patient safety incident

Table III: Barriers to PSI reporting and perceived impact

	Yes *n* (%)	No *n* (%)	Rank, statement represents a barrier	Significant or extremely significant barrier *n* (%)	Rank,statement represents a significant or extremely significant barrier
I believe that reporting incidents is not my responsibility/ job.	12 (9.8)	110 (90.2)	24	6 (4.9)	24
I believe that the PSI reporting system does not effectively improve patient safety.	51 (41.8)	71 (58.2)	18	20 (16.4)	18
I am concerned about legal consequences/litigation.	81 (66.4)	41 (33.6)	5	33 (27.0)	8
I am concerned about being blamed/disciplinary action.	84 (68.9)	38 (31.1)	3	40 (32.8)	4
I am concerned about being judged or my competence being questioned.	78 (63.9)	44 (36.1)	6	36 (29.5)	5
I am concerned about how reporting may reflect (negatively) on my colleagues.	71 (58.2)	51 (41.8)	9	24 (19.7)	15
I am concerned that my coworkers/colleagues won't support my decision to report.	42 (34.4)	80 (65.6)	19	18 (14.8)	19
I believe that there are better alternatives than reporting using the PSI system.	55 (45.1)	67 (54.9)	16	12 (9.8)	21
I am not encouraged to report PSIs by the department/ hospital.	31 (25.4)	91 (74.6)	21	14 (11.5)	20
I was not given training/guidance on reporting PSIs.	83 (68.0)	39 (32.0)	4	45 (36.9)	3
I feel that not reporting incidents formally is the norm in theatre.	56 (45.9)	66 (54.1)	15	22 (18.0)	16
I do not know what to report/what events meet the definition of a PSI.	71 (58.2)	51 (41.8)	9	46 (37.7)	2
I do not know how to report a PSI.	53 (43.4)	69 (56.5)	17	34 (29.7)	7
I do not know where to report a PSI or where to find PSI reporting forms.	57 (46.7)	65 (53.3)	14	30 (24.6)	11
I feel that the reporting form is inappropriate or overly complex/complicated *(third option for participants who have never reported a PSI n = 22 [18%])*.	64 (52.5)	36 (29.5)	13	32 (26.2)	10
I feel that PSI reporting is too time-consuming.	85 (69.7)	37 (30.3)	2	35 (28.7)	6
I feel that PSI reporting requires too much work and adds significantly to my workload.	78 (63.9)	44 (36.1)	6	30 (24.6)	11
I feel that PSI reporting is not integrated into my work and interrupts my clinical responsibilities.	65 (53.3)	57 (46.7)	12	26 (21.3)	14
I feel that there is a lack of (appropriate) feedback on reported PSIs.	105 (86.1)	17 (13.9)	1	50 (41.0)	1
I am concerned that the PSI reporting process is not confidential or anonymous.	74 (60.7)	48 (39.3)	8	29 (23.8)	13
I feel that the analysis of reported incidents is not performed by competent/appropriate persons.	67 (54.9)	55 (45.1)	11	33 (27.0)	8
I believe that incidents that do not have adverse outcomes and do not result in patient harm do not warrant reporting.	38 (31.1)	84 (68.9)	20	21 (17.2)	17
I believe that frequently occurring incidents do not warrant reporting.	18 (14.8)	104 (85.2)	23	7 (5.7)	23
I believe that PSIs that were not preventable do not warrant reporting.	30 (24.6)	92 (75.4)	22	10 (8.2)	22

PSI – patient safety incident

with the guidelines in anaesthetic practice so recommendations can be made to enhance its use in our setting.

Although the prevalence of ARCI under-reporting was not investigated, only one out of five anaesthetists believed such events were constantly disclosed. Three-quarters (75%) of anaesthetists reported two or less ARCIs in the past year. In contrast, a recent audit found ARCIs occurred in nearly 1% of anaesthetics.[18] The number of incidents reported by participants using the NPSIRL system in the preceding 12 months likely represents a fraction of the total number encountered.

A lack of appropriate feedback on reported incidents was the barrier statement most cited. Additionally, this had the greatest impact on ARCI reporting practices. This corresponds with other international studies. A survey from Switzerland found that 92% of anaesthetists did not receive feedback on reports.[16] According to a New Zealand study, inadequate feedback was also the most cited reason for not completing ARCI reporting forms.[14]

The most common theme in self-reported barriers, cited by over half (58%) of anaesthetists, relates to the fear of adverse consequences, including the fear of litigation, blame, disciplinary action, or judgement by colleagues. Compared to previous studies conducted in high-income countries, we found fear to be a more significant determinant of incident reporting practice.

Only 8% of the surveyed Swiss and just over a quarter (26%) of Australian anaesthetists expressed concern about later legal prosecution.[16,17] This is significantly lower than our study's two-thirds (66%). This discrepancy may be due to these countries' wider acceptance of reporting systems. In many situations, these systems have existed for prolonged periods, allowing them to mature, foster trust, build a reporting ethos, and remove a blame culture.

The NPSIRL system is confidential but not entirely anonymous, with the identities of the patient and reporter only known to those involved in managing the incident.[3] The benefits and controversies surrounding anonymous reporting systems have long been debated. Anonymity is associated with increased reporting rates, including the reporting of near-miss events. By creating a fear-free environment, under-reporting can be mitigated. However, such systems have numerous disadvantages, including poor report quality and difficult follow-up, resulting in information gaps and reduced feedback, making the system less conducive to learning.[19]

Barriers relating to the reporting system or process were the second most frequently cited. Half (49%) of anaesthetists surveyed mentioned at least one system-related factor when listing their most significant barriers. The reporting form's length or complexity was the second most frequently cited barrier in our study, with 70% of anaesthetists agreeing with the barrier statement. This represented a reporting barrier for only a quarter (24%) of Australian anaesthetists.[17]

A third (34%) of anaesthetists stated that there was a lack of training, the third most frequently mentioned barrier theme. Significantly, not knowing what to report and inadequate training were the second and third most impactful barriers. This is supported by a recent qualitative study by Gqaleni and Mkhize, which explored PSI reporting barriers at three specialised care units in KwaZulu-Natal.[20] The study, which included all healthcare workers, found insufficient education and training to be one of the main themes adversely affecting the implementation of the NPSIRL guideline.

Reassuringly, the assertion that anaesthetists were not responsible for reporting was agreed with the least of the previously identified barriers. In addition to participants accepting accountability for ARCI reporting, they seldom agreed that frequently occurring incidents, which were unpreventable or did not result in patient harm, did not warrant reporting. These findings suggest anaesthetists' willingness to report ARCIs. This would be facilitated by a standardised and simplified user-friendly IRS with an improved implementation strategy, with early and continuous training and professional development of healthcare workers.[20]

Looking beyond the NPSIRL system and its many barriers, an anaesthesia-specific incident reporting process should be developed to learn from ARCIs. This reporting process should be voluntary, non-punitive, less labour-intensive, and preferably web-based. Barriers relating to the fear of adverse consequences, the most cited barrier theme, would be diminished. System-related barriers concerning increased workload, form complexity, and bureaucracy could also largely be avoided.

Before the implementation of the NPSIRL system, a South African study found that 61% of anaesthetists believed medication errors required reporting to the South African Society of Anaesthesiologists (SASA), with only 20% of them deeming disclosure to the Department of Health necessary.[21] This preference to report to the discipline's professional organisation rather than the national health department suggests that an anaesthesia-specific IRS may be more readily adopted and implemented among local anaesthetists.

Some limitations of the study are noted. Firstly, the questionnaire completion rate is a possible limitation of this study. The overall response rate of 76% was negatively affected by survey dropout, which was higher among medical officers. Secondly, the rate of ARCI under-reporting is not known in our setting. It was presumed that critical anaesthetic events were not frequently reported, representing a missed learning opportunity, a belief shared by most participants. Thirdly, our focus specifically on anaesthesia practitioners without surveying nursing and surgical personnel may have missed the impact of a collaborative team effort in ensuring ARCI reporting. Whilst our study explored a single province, the inclusion of anaesthetists from across 17 university-affiliated institutions in KwaZulu-Natal may represent a strength in allowing the findings from such a broad geographic area to provide more generalisable data and to inform widespread proposals to improve the NPSIRL guideline adherence.

Conclusion

The key barriers identified in this study indicate an urgent need to prioritise the development of a culture of safety among anaesthetists. Successful implementation of the NPSIRL guideline requires a conviction that the system truly aims to improve patient outcomes while protecting the interests and well-being of staff.

The under-reporting of ARCIs resulted from the barriers identified in this study, of which the fear of adverse consequences was the most significant. This represents a deviation from guideline adherence, but perhaps more critically, a missed opportunity to ensure patient safety-orientated care. Any programme aimed at improving the reporting of ARCIs in South Africa needs to take cognisance of the barriers identified and attempt to address them.

Conflict of interest

The authors declare no conflict of interest.

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Ethical approval

Before the study commenced, ethical approval was obtained from the Biomedical Research Ethics Committee (BREC/00004662/2022). Informed consent (electronic) was obtained from all participants included in the study. No identifying information has been included in the article.

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