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Original Articles

Incident Reporting in Perfusion: Current Perceptions on PIRS-2

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Abstract: The Australia and New Zealand College of Perfusionists' (ANZCP) Perfusion Incident Reporting System was established in 1998 and has evolved to an open access on-line incident perfusion reporting system (PIRS-2). Changes were made to PIRS-2 to promote learning from what went well in unexpected situations. A 9-question survey was e-mailed to the PIRS-2 contact group to elicit feedback on attitudes to voluntarily reporting perfusion-related incidents and near-miss events to PIRS-2. In August 2019, a 9-question survey using SurveyMonkey® (San Mateo Ca) was e-mailed to 198 perfusionists currently on the ANZCP PIRS-2 e-mail contacts group. Responses for all responding practicing perfusionists were totaled and expressed as a percentage of the total number of respondents. The respondents were then grouped by region and responses were expressed as a percentage of respondents from each region as well as for grouped responses from Australia/New Zealand (ANZ) and non-ANZ respondents. The response rate was 49.5% with 95 practicing perfusionists completing the survey. In the 12 months before the survey, 22% of respondents had submitted reports to PIRS-2, whereas 79% had read e-mailed reports. Unit culture was the most frequently cited barrier to reporting from all respondents (19%; 0% to 40% by region). Twenty-five percentage of Australian respondents cited unit culture as a barrier to reporting vs. 0% of New Zealand respondents. A combination of concern of discovery and identification of region ranked second as a barrier for 17% of all respondents. The open access ANZCP PIRS-2 voluntary incident reporting in perfusion was widely viewed as relevant and beneficial to both individual practice and to team performance. A high likelihood to considering reporting incidents is tempered by the well-established barriers of ease of the reporting system, the fix and forget phenomenon, concerns of discovery, and a defensive unit culture. **Keywords:** safety, perfusion, cardiopulmonary bypass, incidents, reporting. *J Extra Corpor Technol. 2020;52:7–12*

INTRODUCTION

"All that we do as health and disability professionals should be patient focussed, and nothing is more important than ensuring the safety of the people in our care." Professor Alan Merry, Commission Chair HQSC New Zealand (1).

The manner in which we achieve that aim is a continuing source of debate. The current approach to patient safety termed "Safety-1" that focuses on reducing the number of adverse outcomes with a so-called find-and-fix approach is being challenged by the "Safety-2" concept of a ground-up approach to reconcile work-as-imagined with work-as-done (2,3). Although this philosophical argument is outside the scope of this article, incident reporting is not mutually exclusive to either concept.

The frequency of adverse events occurring in health care and the variable effectiveness of reporting has been widely reported both in the medical literature and elsewhere. In a study of New Zealand Public Hospitals published in 2002, it was estimated that 12.9% of hospital admissions were associated with an adverse event and that 6.3% were associated with preventable events of in-hospital origin (4,5).

In 2010, the U.S. inspector general of health reported that an estimated 13.5% of hospitalized Medicare beneficiaries experienced adverse events during their hospital stays projecting to an estimated 134,000 Medicare beneficiaries experiencing at least one adverse event in hospital during the 1-month study period (6). A subsequent report found that hospital staff failed to report 84% of events to

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hospital reporting systems (7). In 1997, the Australasian Perfusion Incident Survey of perfusionists in Australia and New Zealand reported an incidence of serious perfusion-related adverse events of 1:2,500 (8). This was noted to be about 10 times that in anesthesia. Over the time course of retrospective surveys of perfusion incidents and practice between 1980 and 2010 (8–13) despite advances in perfusion technology, an analysis of incidents that were directly related to cardiopulmonary bypass revealed no reduction in the frequency of serious adverse events (14). The inevitability of underreporting of perfusion incidents to a prospective incident reporting system was confirmed by interrogation of the Australian and New Zealand Collaborative Perfusion Registry where less than half of incidents reported to the Registry were submitted to the Australia and New Zealand College of Perfusionists' (ANZCP) Perfusion Incident Reporting System (PIRS) (14).

Numerous healthcare incident reporting systems have been established worldwide with the Australian Incident Monitoring Study being the first national specialty-based reporting scheme (15). In perfusion, the adoption of specialty-based incident reporting systems has been slow. The ANZCP PIRS was established in 1998 following the publication of the Australasian perfusion incident survey in 1997 (8). In 2004, the ANZCP PIRS was further developed to become the first national Web-based PIRS and subsequently became open access (16). More recently, the impact of Safety-II concepts that focus on "what went well" rather than "what went wrong" resulted in changes to PIRS to incorporate Safety-II principles. In 2018, the ANZCP PIRS was rebranded as the Perfusion Improvement Reporting System, PIRS-2, with the goal being to reinforce this change of focus and hopefully increase the likelihood of perfusionists using the reporting system.

The PIRS-2 Web page resides within the ANZCP Web site and contains submission forms for both the incident reports and reporting on excellence (17). PIRS-2 is a voluntary system. After clicking the "Submit" button on the form, data are encrypted and stored in a database on a server protected by a firewall and lives in a secure data center. A copy of the unencrypted data is sent the PIRS-2 editor via e-mail with a link that says, "Click here to acknowledge receipt of data." Once clicked, the encrypted data are removed from the server. Confidentiality is assured by encryption and by deidentification and anonymity of reports within 72 hours of submission. The 72-hour window is to allow questions to be asked of the reporter where the details of the event may be unclear or require elaboration by the PIRS-2 editor. Deidentified PIRS-2 reports details are only made available if permission to publish is given in the report form. Deidentified data are then stored in an Access database on a standalone computer. The reporting format was recently simplified and included a Safety-II question *"What went well "GOOD CATCH" (key points of rescue actions that demonstrate resilience of the system)."* At the same time, a contact group was established within the PIRS-2 framework and deidentified reports with permission to print are e-mailed to the contact group (on request reporting) and posted on the PIRS-2 Web page to allow rapid dissemination of reports and promote learning and sharing.

In August 2019, a 9-question survey was e-mailed to the PIRS-2 contact group to elicit feedback on attitudes to voluntarily reporting perfusion-related incidents and near-miss events to PIRS-2.

The purpose of the survey was to understand incident reporting habits and the usefulness of the reporting system from perfusionists regularly receiving reports through the PIRS-2 contact group.

METHODS

In August 2019, a 9-question survey using SurveyMonkey® (Sydney NSW, Australia) was e-mailed to 198 perfusionists currently on the ANZCP PIRS-2 e-mail contacts group (Appendix 1). The survey remained open for 3 weeks and then the responses were exported to a Microsoft® Office Excel worksheet (Microsoft Corp., Redmond, WA). Specific prescribed responses for all responding practicing perfusionists (hereafter referred to as respondents) were totaled and expressed as percentage of the total number of respondents. The respondents were then grouped by region, and the responses were expressed as a percentage of individual region respondents and for grouped responses from Australia/New Zealand (ANZ) and non-ANZ respondents. The open answer responses (other please specify) were grouped according to themes for all respondents and for ANZ and non-ANZ cohorts.

RESULTS

There were 98 respondents who completed the survey, a response rate of 49.5% of which two were retired perfusionists and one simulation educator resulting in 95 practicing perfusionist respondents (Table 1).

In the 12 months preceding the survey, 22% of respondents (0–47% by region) had submitted at least one report to PIRS-2, whereas 97% (91% to 100% by region) had read PIRS-2 reports e-mailed to the PIRS-2 contact group (Table 1). Overall, 85% (50% to 100% by region) of respondents were either very likely or likely to submit a report to PIRS-2 with a 91% likelihood of the ANZ cohort (87% Australia vs. 100% New Zealand) compared with 68% of respondents outside of Australia and New Zealand (Table 2).

In response to the value or relevance of receiving e-mailed PIRS-2 reports, value/relevance to individual practice was perceived greater than the value/relevance of

Table 1. Respondents by region and reporting engagement over last 12 months.

	All	Aust	NZ	USA	EU	CDN	Other	ANZ	Non-ANZ
N	95	53	17	14	5	4	3	69	25
Submitted last year	22%	10%	47%	7%	40%	0%	0%	26%	12%
Read last year	97%	91%	100%	100%	100%	100%	0%	94%	100%

Aust, Australia; NZ, New Zealand; USA, United States of America; EU, Europe; CDN, Canadian; ANZ, Australia or New Zealand; Non-ANZ, not Australia or New Zealand.

reports to the team (81% vs. 63%, respectively) apart from the five respondents from Europe, rating a value higher to that of the team. There were wide regional differences (Table 3).

Responses to specific questions interrogating barriers to submitting reports to PIRS-2 are shown in Table 4. Unit culture was the most frequently cited barrier to reporting in 19% of respondents (0% to 40% by region). Within the ANZ cohort, 25% of Australian respondents cited unit culture as a barrier to reporting vs. 0% of New Zealand respondents. Unit culture as a barrier was very similar for the ANZ and non-ANZ cohorts (19 and 20%, respectively). A combination of "concern of discovery" and "identification of region" ranked second as a barrier for 17% of all respondents. Discovery alone as a concern was highest for U.S. and European respondents (21 and 20%, respectively). Of the open responses on barriers to reporting, the other most frequent comments related to time constraints to submit reports. Open responses to what would facilitate reporting to PIRS-2 were mainly related to ease of reporting and access to the Web-based form, with a number of suggestions for a Web-based app. Concerns on the degree of anonymity were an additional theme. Overall opinion on access to published reports was in favor of the reports being available on both the ANZCP PIRS-2 Web site and on request (Table 5). Non-ANZ respondents had a greater preference for on-request-only access than respondents from Australia and New Zealand.

DISCUSSION

This survey is the first structured feedback to the only current open access voluntary PIRS. ANZCP PIRS-2 primarily targets perfusionists from Australia and New Zealand, but the survey results on the question of the value of reports to both individual and team practice demonstrates the potential benefit to the international perfusion community. The survey reveals a global view and regional differences in willingness to report perfusion-related incidents that PIRS-2 classifies using adapted World Health Organization definitions by adding the phrase *good catch* to near-miss, no-harm incidents. Every no-harm incident represents a "*good catch*," a term coined by Adrian Plunkett in his group's Learning from Excellence initiative in the United Kingdom (18). The term *good catch* invites reporters to identify and report what went well that avoided the occurrence of further harm—a Safety-II approach to reporting.

Table 2. Likelihood to submit an incident report to PIRS-2.

	Very Likely (%)	Likely (%)	Unlikely (%)	Very Unlikely (%)
All respondents	31	54	14	0
Australia	32	55	9	0
New Zealand	35	65	0	0
USA	7	57	36	0
EU	40	60	0	0
Canada	50	0	50	0
ANZ	33	58	7	0
Non-ANZ	24	44	32	0

USA, United States of America; EU, Europe; ANZ, Australia or New Zealand; Non-ANZ, not Australia or New Zealand.

Less than one-quarter of perfusionists actively engaged in PIRS-2, defined as having joined the PIRS-2 e-mail contact group, had submitted a report over the last year, despite nearly all having read PIRS-2 reports in the previous 12 months. This is not an unexpected finding and is consistent with the published literature on voluntary incident reporting systems. Barriers to reporting have been shown to include not only medico-legal fears but also lack of feedback, complexity of the system, time constraints, triviality, no point in reporting near-misses, mistrust of the hospital reporting systems, paucity of peer-reviewed literature substantiating incident reporting, blame deflection, and probably most commonly a fix-and-forget culture (3,19–21). Interestingly, nurses are more likely than doctors to know how to access a report, to have ever completed a report and to know what to do with the completed report (19). In a recent qualitative study of patient safety incident reporting, Mitchell and colleagues identified five key reasons why incident reporting has not achieved its potential in health care in the 15 years since the Institute of Medicine recommendations on incident reporting in 2000 (22). These were poor processing of incident reports, inadequate engagement of doctors, insufficient subsequent visible action, inadequate funding and institutional support, and inadequate usage of evolving health information technology. All these barriers are encompassed in the responses to the PIRS-2 survey.

Within the ANZ cohort, 47% of New Zealand perfusionists had reported incidents to PIRS-2 in the previous 12 months compared with 10% of their Australian colleagues. It could be argued that this may relate to New Zealand's "no fault" Accident Compensation Act legislation

Table 3. Relevance of e-mailed reports to practice.

Respondents by Region	Value to Own Practice (%)	Value to Your Team (%)
All	81	63
Australia	77	60
New Zealand	88	82
USA	93	43
Europe	60	80
Canada	100	75
ANZ	81	67
Non-ANZ	84	56

USA, United States of America; EU, Europe; ANZ, Australia or New Zealand; Non-ANZ, not Australia or New Zealand.

that encompasses medical injuries (23) as opposed to the Australian Tort law legislation permitting health professionals to be sued, notwithstanding New Zealand perfusionists are yet to be Registered under the Act. However, somewhat paradoxically more New Zealand respondents reported a combination of "concern of discovery" and "identity of region" as significant barriers to reporting. More likely, the lower frequency of reporting by Australian respondents relates to their more common citing of unit culture being a barrier to reporting (25%), whereas unit culture was absent as a barrier for the New Zealand cohort. Changing safety culture and overcoming the perceptions of blame remain a challenge for perfusion leadership. Education for perfusionists in human factors and safety, both formative and continuing, requires greater prominence. A specific module on safety theory has to date been absent from the Australasian Board of Perfusion curriculum (24). Program revisions to address this are currently underway.

Shifting the focus to a Safety-II paradigm in terms of incident reporting underpins the positive aspects of learning from what went well.

Not surprisingly, non-ANZ perfusionists' rate of incident submission to PIRS-2 was less than half that of the ANZ cohort. PIRS-2 does not yet have a high international profile and other jurisdictions, especially the United States, have a more litigious environment.

Notwithstanding this low frequency of reporting incidents, 85% of all respondents felt they were either very likely or likely to report incidents to PIRS-2 with 91% of the ANZ cohort and nearly 70% of the non-ANZ cohort. The survey response of a high likelihood to report (incidents) and the low frequency of reports that were actually submitted by respondents could imply that near-miss, no-harm or harmful incidents in perfusion occur rarely. This is certainly not the case.

The survey reveals that receiving PIRS-2 reports by e-mail as they became available was universally perceived to be of value and relevance to individual practice and to a lesser extend to the team, the latter a possible reflection of the unit culture barrier. A model for respondents receiving "request reporting" and sharing these reports in team meetings would be a significant improvement.

The cardiac operating room is a tightly coupled and highly complex system. The sequence of events required to complete a heart surgery procedure is subject to actions that are influenced by multiple interrelated activities, both human and technological. In such systems, error is said to be inevitable (25). However, although we understand that the systems and humans within the cardiac operating room are not infallible, there should not be an expectation or a culture that believes that patient harm is inevitable. The tenant *first do no-harm* is an endorsement that attention to minor error—near-miss and no-harm events—warrants particular attention as protection against a future iatrogenic bad outcome for a cardiac (or any) patient undergoing surgery. The criminology theory "broken windows" was introduced in the March 1982 issue of *the Atlantic* by James Q. Wilson and George L. Kelling that proposed that accepting or ignoring minor infractions (the broken windows) leads to a greater level of criminal activity. This was notably adopted by Mayor Rudolph Guiliani in the mid-1990s when he coined the phrase "sweat the small stuff." Despite widespread criticism that police resources were being diverted from more important crime, by the end of his term, this zero tolerance approach to minor offenses resulted in a significant reduction of both petty and serious crime in New York City. The analogy to attention to report and analyze *good catch* near-miss and no-harm events in cardiac surgery as prevention against potential serious injury is easily made.

Changing the culture of reporting will only be achieved if the reporting systems are easily accessible, straightforward

Table 4. Perceived barriers to reporting.

Barriers	Web Access (%)	Discovery (%)	Region ID (%)	Submission Format (%)	Unit Culture (%)
All respondents	8	14	3	9	19
Australia	4	11	4	9	25
New Zealand	25	18	6	18	0
USA	7	21	0	7	14
Europe	0	20	0	0	40
Canada	0	0	0	0	0
ANZ	9	13	4	12	19
Non-ANZ	8	16	0	4	20

USA, United States of America; EU, Europe; ANZ, Australia or New Zealand; Non-ANZ, not Australia or New Zealand.

Table 5. How respondents preferred to access PIRS-2 reports with permission to publish.

Access to Published Reports	Web (%)	Request Only (%)	Web + Request (%)
All respondents	28	24	49
ANZ	29	20	49
Non-ANZ	20	36	44

ANZ, Australia or New Zealand; Non-ANZ, not Australia or New Zealand.

to complete, and provide frequent feedback of pertinent information, along with recognition of the need for reporting. The recently published 2019 EACTS/EACTA/EBCP guidelines on cardiopulmonary bypass in adult cardiac surgery have stated the following: "It is recommended to objectively report, adequately record and properly analyse all adverse events related to CPB practice in an efficient and timely manner" as a level 1 consensus recommendation (26). The ability to implement this recommendation will enhance and potentially shape the future for reporting. In addition, a focus on the specialty-based mini-systems approach such as the ANZCP PIRS-2 that encourages reporting of *good catch* near-miss and no-harm incidents is precisely the ground-up approach of work-as-done vs. work-as-imagined that is espoused by the emerging Safety-2 approach to improving health care. However, better engagement of the perfusion community in voluntary incident reporting where expertise and experience have found solutions for unintended situations is required. Reporting systems such as PIRS-2 need to understand constraints to reporting and provide resources to facilitate engagement. Similarly, leadership within the perfusion community at both professional body and hospital departmental level is required to promote reporting as integral to improving patient outcome.

Limitations

The surveys had a 50% response rate that represents approximately half of perfusionists in Australia and New Zealand and a very small sample from other countries. Furthermore, the population surveyed are perfusionists who are on the PIRS-2 contact group receiving and reading PIRS-2 reports, and hence, not necessarily representative of the general perfusion community in attitudes to incident reporting.

CONCLUSION

The open access ANZCP PIRS-2 voluntary incident reporting in perfusion is widely viewed as relevant and beneficial to both individual practice and to team performance. A high likelihood to considering reporting incidents is tempered by the well-established barriers of ease of the reporting system, the fix and forget phenomenon, concerns of discovery, and a defensive unit culture.

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Appendix 1

Question 1: Have you submitted to PIRS-2 in the last 12 months?
Yes/No
Question 2: Have you read the PIRS-2 reports e-mailed to you in the last 12 months?
Yes/No
Question 3: Do you consider receiving reports of *good catch* near-miss/no-harm perfusion incidents?
Value/relevant to your own practice
Value/relevant to your team
Waste of your time
Question 4: How likely are you to submit to PIRS-2?
Very likely
Likely
Unlikely
Question 5: What is a barrier to you submitting a report to PIRS-2?
Access to the Web site
Concern of discoverability
Identification of region
The submission form format
Unit culture
Other
Question 6: Should PIRS-II reports with permission to publish be available?
On the Web site
Only on request
On the Web site and on request
Question 7: What would facilitate you submitting to PIRS-2 (open text)
Question 8: What region are you from
NZ
Aust
UK
USA
Canada
EU
India
Other
Question 9: Occupation
Clinical perfusionist
Medical perfusionist
Anesthetist
Medical corporate
Other

Abbreviations: NZ, New Zealand; Aust, Australia; UK, United Kingdom; USA, United States of America; EU, Europe; ANZ, Australia or New Zealand; Non-ANZ, not Australia or New Zealand.