

Implementing root cause analysis in an area health service: views of the participants

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Abstract

Purpose: This study identifies the attitudes of participants in the root cause analysis (RCA) process and barriers to its implementation within one New South Wales area health service.

Method: Employees and consumer representatives of the former South Western Sydney Area Health Service who participated in an RCA as either a team member or a team leader between December 2002 and October 2003 completed a self-administered survey.

Results: Thirty seven of 39 eligible participants completed the survey (response rate 95%). The respondents identified formulation of causal statements, ensuring the causal statements met the "rules of causality" outlined by New South Wales Health, and arranging times for interviews as most difficult. Team leader respondents ($n=7$) ranked keeping the team focused, organising the first meeting within 7 days of the incident, and completing the RCA in three 2-hour meetings as barriers to the process.

Conclusions: Training was valued by participants, however greater emphasis on the development of causal statements could be beneficial. Team leaders expressed difficulty in keeping the team focused and meeting the stipulated RCA timeframes, suggesting that additional support for RCA participants may be warranted.

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What is known about the topic?

There is little rigorous evaluation of the implementation of root cause analysis (RCA) processes in health care.

What does this paper add?

This paper outlines the views of participants completing RCAs in one NSW area health service. While the sample is small, the study suggested that additional support for RCA participants would be beneficial.

What are the implications for practitioners?

Participants in RCA evaluations would benefit from further educational support, in particular in developing causal statements. The team leaders reported difficulty in meeting the RCA timelines required by NSW Health.

IN DECEMBER 2002 the Safety Improvement Program (SIP) was initiated in New South Wales.¹ This program is based on a similar undertakings in the United States in 2000 by the National Center for Patient Safety in the Department of Veterans Affairs.² The NSW program aims to ensure that health care professionals develop skills to "recognise, report, investigate, analyse and most importantly address problems within the health care system".¹ (page 7) Under this initiative, all adverse events, defined as "incidents in which unintended harm resulted to a person receiving health care"³ and ideally "near miss" or "close call" incidents require prioritisation by allocation of a Severity Assessment Code (SAC).¹ NSW Health has developed a matrix to determine the SAC based on the consequence of the event ("serious", "major", "moderate", "minor" or "minimum") and the likelihood of it recurring ("rare", "unlikely", "possible", "likely" or "frequent").⁴ The SAC codes range from "extreme risk" events (SAC 1) to "low risk events" (SAC 4). SAC 1 incidents must be reported to NSW Health within 24 hours, while SAC 2, 3 or 4 incidents and those likely to attract external attention are reported at the discretion of the area health service Chief Executive Officer.⁴

All SAC 1 incidents require root cause analysis.⁴ RCA is a systematic method of analysing a specific adverse event to determine what happened, why it happened and what can be done to prevent it from happening again.⁵ The RCA is conducted by a team of three to five multidisciplinary health care providers not directly involved in the incident and sometimes consumers are included in the team. The team interviews those involved in the incident, consults experts, and examines existing policies, procedures and relevant best practice evidence.⁴ The team utilises practical tools and aids developed by NSW Health^{4,6} to develop appropriate causal statements and recommendations that may prevent similar events from occurring in the future.

The RCA method of reporting and analysing adverse events is relatively new in health care and there is only one published study that has evaluated the process in health.² This before-and-after study undertaken by the National Center for Patient Safety in the US compared 29 randomly selected RCA reports conducted in 2000 and 2001 with 30 randomly selected reports conducted in 1998 and 1999 under a previous adverse event reporting system known as a “focused review” (FR). Significantly more of the FR reports attributed the root cause of the event to be patient behaviour or “course of the disease”. Identification of root causes and formulation of recommended actions for these two categories may be difficult. Indeed, further results demonstrated significantly more of the FR reports had no recommended actions compared with the number of RCA reports precluding formulation of prevention strategies.² The authors concluded that the RCA process can result in an increased emphasis on the identification of system problems rather than on human errors for which root causes are often difficult to identify.²

In NSW, education about the RCA process consists of a 2.5-day SIP training course run by NSW Health. Team leaders must have completed this course, but it is not mandatory for team members. “Just in Time” training is offered to staff allocated to participate in an imminent RCA who have not completed the SIP training program.

The suggested schedule for the RCA process is three 2-hour meetings.⁴

This survey was undertaken to determine attitudes of participants in the RCA process and barriers to its implementation within the former South Western Sydney Area Health Service (SWSAHS).

Method

All employees and consumer representatives from SWSAHS known by the SWSAHS Patient Safety Officer (PSO) to have participated in an RCA as either a team member or a team leader between December 2002 and October 2003 were invited to participate in the self-administered survey. They received a telephone call from the Patient Safety Officer (Carol Walker) informing them that a survey about the RCA process would be sent to them by email. One week later, an email was sent by the SWSAHS Director of Nursing and Clinical Services (Rosemary Chester) inviting them to participate in the attached survey. Participants could complete the survey in an attached document and return it by email, fax or mail. Non-responders were followed up by email from the PSO 1 week after the initial survey was emailed to them and then again 1 week later by telephone.⁷

Instrument

In the first section of our six-page survey, respondents were asked about the training received before participating in an RCA (four questions). Next, using a four point Likert scale, participants were asked a question about their level of confidence in participating in the RCA process (“very confident” to “not at all confident”). Participants were then asked about the usefulness of two NSW printed resources on the RCA process — the NSW Health *Checklist flip-chart for root cause analysis teams*⁶ and the *Safety improvement program training manual*⁴ using a four point Likert scale (“very useful” to “not at all useful”). Next, using a five point Likert scale (“very difficult” to “not at all difficult”), participants were asked about the level of difficulty experienced for 16 elements of the RCA process grouped over time as follows: meeting one (four

I Training received before participating in root cause analysis

Survey question	Response (no. [%])
Attended the 2.5-day SIP training (<i>n</i> =37)	
Yes	23 (62)
No	14 (38)
Usefulness of the 2.5-day SIP training (<i>n</i> =23)	
Very useful	18 (78)
Useful	4 (17)
Somewhat useful	1 (4)
Not at all useful	0
Can't remember	0
Given JITT training (<i>n</i> =36)	
Yes	15 (41)
No	18 (49)
Can't remember	3 (8)
Usefulness of the JITT training (<i>n</i> =15)	
Very useful	9 (60)
Useful	5 (33)
Somewhat useful	1 (7)
Not at all useful	0
Can't remember	0
Attended either 2.5-day SIP or JITT training or both (<i>n</i> =37)	
Yes	29 (78)
No	8 (22)

SIP=Safety Improvement Program. JITT=Just in Time Training.

tasks), the interview process (four tasks), meeting two (three tasks), and meeting three (five tasks).

A second version of the questionnaire was administered to team leaders with 18 additional questions. These additional questions asked about the degree of difficulty in undertaking ten tasks specific to the role of team leader as follows: preparation for the RCA (three questions), administrative duties (four questions), and team leadership (three questions) using a five point Likert scale ("very difficult" to "not at all difficult"). Other questions addressed selection of team members; interview skills for team members; their level of confidence in the team leader role; level of support they received from the Area Health Service; and

responsibility for feeding back recommendations to staff, consumers or other stakeholders at the conclusion of the RCA.

All participants were asked three demographic questions: sex, job classification (clinical or managerial) and profession (nursing, medical, allied health, other).

Data analysis

Data were analysed using SPSS Version 10.0 (Norusis MJ. SPSS Professional Statistics Version 10.0.7. SPSS Inc., Chicago, 2000). Frequencies for questionnaire responses were calculated for all variables. Univariate analyses using chi square statistics were performed to examine measures of association between confidence in participating in the RCA process and the following demographic variables: sex (men versus women), job classification (clinical versus management) and profession (medical versus non-medical). McNemar's chi square test was used for paired responses for usefulness of the two NSW Health resources.

Results

Of 39 eligible employees and consumer representatives, 37 participated (response rate 95%). Of those who responded, five (14%) returned the survey by fax, three (8%) by mail and 29 (78%) by email. Twenty-three (62%) of the participants were female. Twenty-three (62%) were clinicians, with the medical profession the most represented clinical group (12/23), followed by nurses (9/23). There was one consumer representative. Thirty participants (81%) had participated in an RCA as a team member with the remaining seven (19%) acting as team leaders.

The majority of participants (29; 78%) had attended either the 2.5-day SIP training conducted by NSW Health or the Just in Time training conducted by SWSAHS (Box 1). As required, all team leaders had attended the SIP training. Of the 30 team members, over a quarter (8; 27%) had not attended either the SIP training or the Just in Time training. Of the 23 (62%) participants who attended the SIP training, 22

(96%) stated it was “very useful” or “useful”. Similarly, 93% of the 14 participants who attended the Just in Time training agreed it was “very useful” or “useful” (Box 1).

The majority of participants (33; 89%) stated they felt “very confident” or “somewhat confident” about participating in the RCA process. None of the demographic variables (sex [$\chi^2=1.42$; $df=1$; $P=0.23$]; clinical versus management job classification [Fisher’s Exact Test, $P=0.72$]; medical versus non-medical profession [Fisher’s Exact Test, $P=1.0$]) were predictors of a “very confident” response about participation in the RCA process. Similarly, participation in training (Fisher’s Exact Test, $P=1.0$) was not a predic-

tor of a “very confident” response about participation in the RCA process.

The NSW Health resource *Checklist flipchart for root cause analysis teams* was rated “very useful” by 60% (22/37) of participants with the *Safety improvement program training manual* similarly rated by 46% (17/37) of participants. Neither the *Checklist flipchart for root cause analysis teams* nor the *Safety improvement program training manual* was rated significantly more useful than the other (McNemar’s $\chi^2=1.13$; $df=1$; $P=0.29$).

As shown in Box 2, the elements of the RCA process rated most difficult were: arranging times for interviews (“very difficult” or “difficult”, 11; 30%), the formulation of causal statements (“very

2 Ratings of difficulty for 16 elements of the root cause analysis (RCA) process (n = 37)*

Variable	Rating	
	“Very difficult” or “Difficult” (no. [%])	“Somewhat difficult” or “Not at all difficult” (no. [%])
Meeting 1		
Developing the initial flowchart	4 (11)	33 (89)
Determining what further information was needed	3 (8)	34 (92)
Using the NSW Health flipchart questions as prompts for further questions	1 (3)	34 (92)
Allocation of tasks within the team	0	37 (100)
Interview process		
Arranging times for interviews	11 (30)	26 (70)
Availability of staff to be interviewed	7 (19)	30 (81)
Explaining the RCA process to interviewees	4 (11)	32 (87)
Obtaining sufficient information	4 (11)	32 (87)
Meeting 2		
Completing the cause and effect diagram	9 (24)	27 (73)
Completing a detailed flow chart	6 (16)	30 (81)
Using additional information from interviews etc. to clarify the incident	2 (5)	34 (92)
Meeting 3		
Ensuring causal statements meet Rules of Causality as per the NSW Health Checklist flipchart for root cause analysis teams ⁶	13 (35)	22 (60)
Formulating causal statements	11 (30)	25 (68)
Formulating recommendations that will produce change	9 (24)	27 (73)
Determining outcome indicators	7 (19)	29 (78)
Formulating recommendations that link to causal statement	5 (14)	31 (84)

*Where totals do not add to 100%, percentages have been rounded or data were missing.

3 Rules of causality⁴

Rule 1: Causal statements must clearly show the “cause and effect” relationship.

Rule 2: Negative descriptors (eg, “poorly” or “inadequate”) should not be used in causal statements.

Rule 3: Each human error must have a preceding cause.

Rule 4: Each procedural deviation must have a preceding cause.

Rule 5: Failure to act is only causal when there is a pre-existing duty to act.

4 Team leaders’ views of the root cause analysis process (n = 7)

Survey question	No.
Confidence in taking on role of team leader	
Very confident	1
Somewhat confident	4
Not at all confident	2
Can’t remember	0
Level of support from the Patient Safety Officer for role as team leader	
Sufficient support	6
Some support	0
No support at all	0
Can’t remember	1
Level of support from within your hospital for role as team leader	
Sufficient support	5
Some support	1
No support at all	0
Can’t remember	1
Involved in selection of team members	
Yes	5
No	2
Identified need for improved interview skills for any team member	
Yes	2
No	4
Unsure	1

difficult” or “difficult”, 11; 30%); and ensuring the causal statements met the Rules of Causality (Box 3) outlined by NSW Health in the *Safety improvement program training manual* (“very difficult” or

“difficult”, 13; 35%) (Box 2).⁴ Just under a quarter of participants (9; 24%) stated that formulating recommendations that will produce change was “very difficult” or “difficult” with 14% (5/37) stating that formulating recommendations that link to causal statements was “very difficult” or “difficult”.

Team leaders’ responses

Two of the seven team leaders stated that they felt “not at all confident” in taking on the team leader role for the RCA process. The majority stated they had “sufficient support” from the PSO (6/7), with slightly fewer (5/7) stating there was “sufficient support” from within their hospital. Five team leaders were involved in the selection of their team members. The need for improved interview skills for team members was identified by two of the team leaders (Box 4).

Of 10 barriers to the process, all seven team leaders stated that keeping the team focused on the task was “very difficult” or “difficult” (Box 5). The next two most highly ranked barriers were organising the first meeting within seven days of the incident (“very difficult” or “difficult”, 5); and completing the RCA in three 2-hour meetings (“very difficult” or “difficult”, 5) (Box 5). Over half the team leaders (4/7) stated that meeting the 45-day time frame for submitting a report to the area health service was “very difficult” or “difficult”.

The team leaders reported responsibility to provide feedback following the RCA to staff involved in the incident (5/7) and stakeholders (4/7), with only two reporting a responsibility to provide feedback to consumers involved in the incident. The small number of team leaders precluded significance testing.

Discussion

Encouragingly, the majority of participants, including all team leaders, had attended training before participating in an RCA and the training appeared to be valued by participants. The majority of the participants reported approaching the RCA in a confident manner. The two written resources provided by NSW Health to guide RCA participants also appeared to be valued.

5 Team leaders' ratings of difficulty for 10 elements of the root cause analysis process (n=7)

Elements	Ratings	
	"Very difficult" or "Difficult" (no.)	"Somewhat difficult" or "Not at all difficult" (no.)
Preparation		
Getting the team together	3	4
Having an effective mix of people in the team	2	5
The release of staff from clinical duties to enable participation	2	5
Administrative duties		
Organising the first meeting within 7 days of the incident	5	2
Completing the root cause analysis in 3 2-hour meetings	5	2
Meeting the 45-day timeframe for submitting the signed off report to the Area Health Service	4	3
Finding time for administrative duties (eg, organising meetings, completing reports)	2	5
Team leadership		
Keeping the team focused on the task	7	0
Getting the team to function cohesively	1	6
Separating staff performance issues from system issues	1	6

While patients, relatives and health service managers require prompt investigation into adverse events, the practicalities of organising the RCA process within the stipulated time frames proved difficult for team leaders. Specifically, arranging times for interviews, undertaking the RCA within 7 days of the incident, completing the RCA in three 2-hour meetings and meeting the 45-day time frame for submitting a report to the Area Health Service were reported as difficulties experienced by the team leaders.

Accurate causal statements are essential in order to develop clear and specific recommendations for future actions during the RCA process.² NSW Health has outlined five "Rules of Causality" to which RCA teams must adhere when developing causal statements (Box 3).⁴ Formulating causal statements and ensuring they met NSW Health's Rules of Causality appeared to be one of the major difficulties reported by participants. Of interest, only 14% of participants stated that formulating recommendations that link to causal statements was "very difficult" or "difficult". An audit to determine whether recommendations arising from RCAs are relevant to the causal statements would be of value.

All team leaders stated that keeping the team focused was "very difficult" or "difficult". While the majority of team members had undergone either the SIP training or Just in Time training, over a quarter (27%) had not. Thus, their ability to remain focused on the task may have been difficult due to a lack of understanding of the process, which could have made it difficult for the leaders to keep the team focused. Team leaders could benefit from further support when undertaking an RCA as over a quarter stated that they were "not at all confident" in taking on this role. NSW Health is currently developing an RCA Team Leader Support Program. Evaluation of this program will be important.

Methodologically, the study achieved a high response rate (95%), and hence views expressed are likely to be representative of all participants who had taken part in an RCA at SWSAHS within the time frame of the study. However the absolute number of participants who had taken part in an RCA at SWSAHS was small.

Investigations of adverse events run the risk of confidential cases coming under the spotlight from the media and various investigating bodies.⁸

As a result, staff may be reluctant to comment publicly for fear of retribution, and there is some concern within the health care profession that the culture of blame is “back on the agenda”.⁸ (page 363) This may lead to unease among clinicians about the RCA process and a continuation of the current culture of under-reporting of adverse events and near misses⁹. However, recent legislative changes to the *Health Administration Act 1982* to protect health care workers who conduct or provide information during the RCA process may result in increased reporting of such events.¹⁰

It is not yet clear whether the RCA process makes a difference to patient safety and whether it offers any advantages over and above alternative methods of appraisal such as peer review or clinical practice improvement activities. An extensive state-wide evaluation of the NSW Safety Improvement Program currently under way will include an in-depth examination of the RCA process including the education and training components.¹¹ While the newly established Clinical Excellence Commission will be responsible for regular audit of patient safety systems in NSW including the RCA process, the Commission will not revisit judgments made by RCA teams.¹² Evaluation of the RCA process at the local level, including reviews of the usefulness of recommendations arising from RCAs, is imperative. In addition, as participants become more familiar with the RCA process, further research to determine attitudes and barriers to the process is recommended.

Conclusions

New policies should be based on the rational analysis of best available evidence and, in particular, of initiatives with demonstrated effectiveness.¹³ This is one of the first studies of the RCA process within the NSW health system and, as such, has the potential to inform health care policy makers about future needs of staff participating in the RCA process. The respondents in this study generally felt confident in the RCA process, but identified difficulties in constructing causal statements and meeting the required time-frames. This suggests there may be a need for additional training content.

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Competing interests

The authors declare that they have no competing interests.

References

- 1 NSW Health. Providing the best health care. Information Paper. Sydney: NSW Health, 2004.
- 2 Bagian JP, Gosbee J, Lee CZ, et al. The Veterans' Affairs root cause analysis system in action. *J Qual Improvement* 2002; 28(10): 531-45.
- 3 Australian Council for Safety and Quality in Health Care 2004. Available at: <<http://www.safetyandquality.org/index.cfm?page=Action>> (accessed Sep 2005).
- 4 NSW Health and the Institute for Clinical Excellence. Safety improvement program training manual. Sydney: NSW Health and the ICE, 2003.
- 5 Veterans Affairs National Center for Patient Safety. Available at: <<http://www.patientsafety.gov/rca.html>> (accessed Sep 2005).
- 6 NSW Health. Checklist flip chart for root cause analysis teams. Sydney: NSW Health, 2003.
- 7 Edwards P, Roberts I, Clarke M, et al. Increasing response rates to postal questionnaires: systematic review. *BMJ* 2002; 324: 1183-93.
- 8 Frankum B, Attree D, Gatenby A, et al. The “Cam Affair”: an isolated incident or destined to be repeated? *Med J Aust* 2004; 180: 362-3.
- 9 Vincent C, Stanhope N, Crowley-Murphy M. Reasons for not reporting adverse incidents: an empirical study. *J Eval Clin Pract* 1999; 5: 13-21.
- 10 Health Legislation Amendment (Complaints) Bill 2004, Schedule 4. Amendment of other Acts. Available at: <<http://www.parliament.nsw.gov.au/prod/parliament/nswbills.nsf/0/48cd15428a039b2aca256f3900254c75?OpenDocument>> (accessed Sep 2005).
- 11 Braithwaite J, Travaglia JF, Mallock NA, et al. Evaluation of the Safety Improvement Program in NSW: overview of studies. Kensington: Centre for Clinical Governance Research, University of New South Wales, 2005.
- 12 NSW Health. The NSW patient safety and clinical quality program. Technical paper. Sydney: NSW Health, 2004 May 18.
- 13 Nutley S. Bridging the Policy/Research Divide. Reflections and lessons from the UK. [Keynote paper] National Institute of Governance Conference, Canberra. 23-24 April 2003. Available at: <http://www.treasury.govt.nz/academiclinkages/nutley>.

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