Costs and Benefits of Implementing a Root Cause Analysis Framework into the Queensland Correctional Oversight System

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ROOT CAUSE ANALYSIS (RCA) is a system of investigation designed to identify fundamental factors, or root causes, responsible for errors in performance within a system or process. This approach analyzes the chain of events leading up to an error, and traces these back to the ultimate factor or factors that can be held responsible for the error in question. This style of analysis is often seen as superior to more conventional investigations, because it delves deeper to find the fundamental cause of an issue, rather than identifying simplistic factors as the problem. For example, initially it may seem that operator error is the cause of a lot of mistakes, but when further analysis is undertaken, it becomes apparent that it is actually aspects of the system in which the individual is embedded that have led to the operator error (Carroll et al., 2002). Treating the operator error through solutions such as re-training or disciplining the individual in question will not effectively remedy the problem because the underlying deficit in the system will still remain (Carroll et al., 2002). Once root causes are identified, solutions can be tailored that address the root cause, rather than merely addressing symptoms further up the chain of events, and this should decrease the chance of a similar error recurring. When done well, RCA should lead to increased system reliability and hence greater public confidence in a system's legitimacy.

While initially developed to analyze industrial incidents, RCA has been widely applied in a variety of sectors, including manufacturing, computing, engineering, industrial, aeronautical, and medical sectors (Bagian et al., 2002; Carroll et al., 2002; Dunn & Moga, 2010; Leszak et al., 2000). Indeed, within many of these sectors RCA is often a mandatory requirement following serious, or "sentinel," events (Ritter, 2015). However, while it is widely applied in technical industries, it is not as commonly practiced in more "human services"-based sectors, such as child protection, legal services, or corrections (National Institute of Justice, 2014; Rzepnicki & Johnson, 2005; Ritter, 2015). These types of sectors generally have in place systems for dealing with errors, such as internal review boards or ethics committees. However, these systems often become mechanisms for assigning blame to specific individuals or groups, which can have the effect of driving errors underground and act as an impediment to system improvement (National Institute of Justice, 2014). When errors occur in a complex system, they are rarely only the result of one individual's mistake. Rather, multiple small errors tend to combine and be exacerbated by some underlying system weakness (National Institute of Justice, 2014). Blaming an individual prevents questions from being asked about what in the individual's environment led them to make the decisions they did. Consequently, any structural systems failings are not identified, allowing similar mistakes to occur in the future (National Institute of

Justice, 2014; Taitz et al., 2010). When it works effectively, RCA operates in a non-blaming fashion seeking to identify failures so they can be remedied, rather than identifying individuals so they can be punished (National Institute of Justice, 2014).

While it is not currently widely applied, there is an increasing interest in applying a RCA framework to assess problems that occur in human services sectors. For example, it has recently been used to assess shortcomings in the child protection system (Rzepnicki & Johnson, 2005) and is currently being trialed in the U.S. to examine issues such as wrongful convictions and self-harm among prisoners in corrections institutions (Ritter, 2015). Over the last 18 months, RCA has also been introduced as a technique to be used within the Queensland (Australia) correctional oversight system. The role of the Queensland correctional oversight system is to monitor Queensland correctional centers through a series of regular inspections to ensure that they are adhering to a set of healthy prison standards; investigate serious incidents, such as escapes, deaths in custody, riots, and serious assaults, to identify why these have occurred and what can be done to prevent these from occurring in the future; and conduct thematic reviews of system-wide recurring issues.

Previously, this oversight was conducted by visiting correctional centers, undertaking interviews with key stakeholders, and

producing a report containing an outline of events and recommendations for improvement based on the experience and opinion of the investigating staff. Root cause analysis was introduced in an effort to make the investigation process more structured, rigorous, and evidence-based. As far as the authors are aware, there is very little literature available that discusses RCA in a correctional context, and therefore it is our aim in this article to evaluate the costs and benefits of the RCA approach from a correctional perspective, based on the experience gained in implementing this in the Queensland correctional oversight system.[1]

Root Cause Analysis: Application to the Study of Prison Violence in the Queensland Prison System

The Office of the Chief Inspector has conducted multiple investigations, reviews, and inspections using a RCA approach. In 2014, the authors conducted a requested review of the nature and extent of prison violence in Queensland's adult corrections system, using the RCA research framework. To complete the investigation, it was necessary to examine official data sources on the extent of various forms of prison assault in Queensland. We also reviewed the available national-level data on prison assault to get a sense of how Queensland compared to other Australian states in the number and rate of prison assault. While global comparisons of prison assault rates are difficult, we included data on the extent of the assault problem in other countries, including the United States and the United Kingdom. We supplemented our review of these official data sources with qualitative interview data collected in person and in recorded teleconferences. Finally, we used the recent evidence-based review of the available research on prison violence cause, prevention, and control conducted by Byrne and Hummer (2008), and updated for this investigation by Byrne and the staff of the Global Centre for Evidence-based Corrections and Sentencing (GCECS) at Griffith University.

A detailed description of our RCA-based

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[1] The authors of this article conducted a review of the prison violence problem in the Queensland Corrections system—using the root cause analysis framework—between January and June, 2014. Samay Zhouand is the Chief Inspector (Office of the Chief Inspector) of QCS; James Byrne (Professor, Griffith University, at the time of the review) was appointed Inspector of Prisons in Queensland for the purpose of conducting the review.

CHART 1

Step 1	Reviewed the available incident and assault data from each of Queensland's prisons; and compared assault rates with other Australian states and territories, and with other global regions.
Step 2	Reviewed the available research on the cause, prevention, and control of prison assault globally.
Step 3	Reviewed the available internal research on the cause, prevention, and control of prison violence.
Step 4	Conducted in-depth interviews with prison managers from each prison, along with a small number of central office managers involved with assault issues.
Step 5	Conducted in-depth interviews with training staff of QCS.
Step 6	Conducted extensive focus group interviews with staff and prisoners in six prisons.
Step 7	Conducted selected interviews with central office staff responsible for coding and/or reviewing accuracy of assault data.

review procedures in relation to the examination of prison assaults is provided in Chart 1.

One key feature of this report is that it was based on a combination of data sources. It included four separate assessments of the nature and extent of Queensland's prison assault problem: (1) *prisoners'* perceptions of the root causes of the problem, and their recommendations for change; (2) *staff* perceptions of the root causes of the problem, and their recommendations for change; (3) *managers'* perceptions of the root causes of the problem, and their recommendations for change; and (4) the expert opinion of the *inspectors* conducting this review, based on their review and analyses of the available data, the information gleaned from in-person and phone interviews with prisoners, staff, and managers across QCS, and their assessment of the available research on prison assault cause, prevention, and control, not only in Australia, but globally. For each of the groups we interviewed (prisoners, staff, managers), we presented both their views of root cause and recommendations for change in our final report. This provided a unique opportunity to give each of these groups a "voice," and it allowed us to present assessments of both the root causes of problems and recommended solutions from multiple (and often varying) perspectives.

In addition to the groups identified above, we interviewed central office staff involved in the monitoring and review of assault data reported by individual facilities, along with training staff and managers responsible for the implementation of the Staff Assault Reduction Strategy (SARS) developed in 2013 by Queensland Corrective Services in response to a reported staff assault problem across Queensland's prison system. Finally, we interviewed central office managers involved in initiatives that appeared to be related to the

prison assault investigation, such as the smoking ban that was being rolled out during the last stages of our review.

In the interest of transparency, the full, unedited transcripts of each of our interviews with inmates, staff, managers, and training and central office personnel were included in separate appendices of the report, along with the evidence-based review of the available research used in this investigation, and a comprehensive bibliography including all available research on prison violence conducted globally over the past two decades, with links to each of the research studies referenced in the report. Any questions that readers may have raised about our review procedures, findings, and recommendations were answered by reviewing the detailed appendices accompanying the IG report.

Benefits of Using a RCA Framework in the Queensland Correctional Oversight System

By design, RCA seeks to analyze adverse events in a structured and systematic fashion, using a variety of analysis tools such as timelines, cause-effect charts, "five whys," fault trees, and fishbone diagrams.[2] These tools offer different methods for identifying, mapping, and understanding latent or root cause factors. This is one of the key advantages of RCA. Because RCA requires investigators to use structured methodologies, the investigation can be focused on the underlying causes of events, rather than allowing them to stop at a point before true root causes have been identified. These methods also encourage

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[2] For a full description of these RCA tools, see Okes (2006). These tools also have their critics. For an overview of the research on this strategy, see Percarpio, K., Watts, B., and B. Weeks (2008). The current body of evaluation research, while limited in scope and quality, supports the use of RCA.

the analysis of data in a disciplined, systematic, and evidence-based fashion, and help highlight the interactions between system components.

Since the introduction of RCA into the Queensland Correctional Oversight System by the Office of the Chief Inspector, the chief inspectorate has observed that the more disciplined nature of the investigation has increased the rigor and depth to which investigators analyze the facts available to them, particularly for investigations of serious incidents. While previously investigators made a raft of findings relating to the symptoms of the issue in question, since the introduction of RCA, investigators have identified a smaller number of key factors that represent the underlying cause of symptoms being observed. This can be seen in Table 1, which shows that the average number of findings made per investigation while using traditional analysis was nearly 11, but that this decreased to between 3 and 6 once RCA was adopted. In addition, the RCA methods used explicitly categorize root causes into problems with the environment, management, or processes, and so better highlight where solutions need to be targeted. Anecdotally, it has been observed that the disciplined and structured nature of investigations employing RCA has led to increased confidence in the legitimacy of the investigations being conducted. (See Table 1.)

Other authors have also observed that the introduction of RCA into workplaces has resulted in a shift towards more disciplined thinking (Carroll et al., 2002). The focus of RCA on identifying underlying root causes, rather than seeking out individuals to blame has also been observed by the Office of the Chief Inspector to lead to a shift in culture towards more trust and openness, which has improved the sharing of information (Carroll et al., 2002). It is important to note, particularly in a correctional context, that while RCA seeks to foster a culture of non-blame, this must not lead to any dilution in individual accountability in instances where gross or criminal negligence is apparent.

Costs of Using a RCA Framework in the Queensland Correctional Oversight System

While in theory RCA analysis is a robust methodology that should deliver sound recommendations to help improve systems and processes, in practice there are a number of challenges associated with using the methodology that can reduce its effectiveness. In

the medical sector, in particular, a number of authors have noted limitations associated with poor implementation of RCA techniques (Wu et al., 2008; Nicolini et al., 2011; Percarpio et al., 2008; Karl & Karl, 2012; Taitz et al., 2010).

One of the keys to a high-quality RCA is the rigor with which the RCA methodologies are applied. In practice, a lack of expertise by investigators, insufficient time and resources to conduct rigorous analysis, a failure to investigate far enough to find the true root cause, difficulties associated with interpersonal relationships leading to poor sharing of information, hierarchical tensions, and pre-existing agendas have all been observed to adversely influence the quality of RCA analysis (Percarpio et al., 2008; Dunn & Moga, 2010; Nicolini et al., 2011). One study noted that there was still a tendency within some medical jurisdictions to use RCA to identify individuals who failed, rather than how the system allowed those individuals to fail, and to carry out RCA in a secretive environment due to concerns around litigation (Karl & Karl, 2012). Such an approach prevents the RCA process from operating optimally and leads to sub-optimal findings and recommendations (Karl & Karl, 2012).

The importance of senior management's support of the RCA process has also been identified as key by a number of authors (Nicolini et al., 2011; Ritter, 2015; Carroll et al., 2002). In a trial of a RCA in the criminal justice context in the U.S., it was observed that many officials operate within an inherently political context. While RCA can identify and correct system failures, it can also invite public scrutiny and criticism, making support by upper management essential for staff to feel protected and for the process to operate effectively (Ritter, 2015). People naturally select and interpret data to support prior opinions and please powerful audiences. Managers, therefore, have considerable power to influence whether the RCA process results in truthful reporting and rigorous analysis, or

leads to superficial analysis and palliative answers. Pursuing facts and digging out causes is difficult, time consuming, and potentially politically hazardous unless managers provide sufficient resources and psychological safety (Carroll et al., 2002). In a corrections environment, the use of RCA is a major paradigm shift from how investigations have typically been conducted. Instilling a culture of non-blame and achieving true transparency take work and cannot be achieved overnight (Browning et al., 2015), and this process is also ongoing in the Queensland correctional oversight system.

A further limitation of the RCA process occurs where root causes are identified that may be beyond the capacity of individual sectors to fix (Taitz et al., 2010; Wu et al., 2008; Ritter, 2015). Where this occurs, there can be a tendency to develop weak recommendations, such as staff education or re-training, which have little effect on removing the underlying hazard (Wu et al., 2008; Taitz et al., 2010). Many authors have highlighted that RCA needs not only to ask what the root causes of events are, but to examine whether subsequent recommendations have been successful at reducing risk (Wu et al., 2008; Nicolini et al., 2011; Percarpio et al., 2008; Taitz et al., 2010).

In the Queensland correctional oversight system, the time required to conduct RCA has certainly been a disadvantage associated with the methodology, and acted as a strain on available resources. A lack of investigator expertise can also be an impediment to good analysis, and there is a need to be rigorous in not allowing analysis based on conjecture and personal opinion to creep into the process. One way that Queensland has addressed the latter risk has been to treat each finding in the chain of causation as a hypothesis and, subsequently, test or cross-check the rationale and evidence of each finding through a secondary process. The structured manner in which this is done can be seen in Table 2. Because of the high-risk nature of decisions

TABLE 1

Average number of findings per investigation made using traditional and RCA methods, 2012-2015

Year	Analysis method	Average No. Findings/Investigation
2012	Traditional	10.9
2013	Traditional	10.9
2014	RCA	3.4
2015	RCA	6

Source: Office of the Chief Inspector, Queensland Corrective Services

TABLE 2
Structure used to cross check the evidence for investigation hypotheses.

Hypothesis	Rationale	Information Required	Sources/Process	Findings	Evaluation (confirmed-disconfirmed-insufficient information)

(Watanabe, 2009)

made within a correctional context, it is also necessary to ensure that as well as highlighting solutions that will address the root cause, overlying symptoms are also addressed where the occurrence of these presents a safety risk. For example, the remediation of a root cause, such as organizational culture, might take significant time to address, meaning that more immediate symptoms, such as dynamic security failings, would still need to be addressed by a correctional institution. (See Table 2.)

It should also be noted that when presenting any RCA to decision makers, the analysis should be accompanied by supporting contextual information to help fully illuminate the issues at play. It is up to decision makers to decide whether to remediate the shortcomings identified by a RCA, and it was apparent in Queensland that additional information was essential to allow decision makers to make informed decisions about whether to implement the suggested remediation. This contextual information included, but was not limited to:

- Listing the symptoms of the root causes next to the relevant root cause so that the decision makers were aware of the implications if the root causes were unaddressed.
- Stipulating whether the root cause was an issue shared by the whole system or a local issue, so that the decision makers were aware of the extent of the problem.
- Listing and rating the adequacy of existing controls of the root cause so that decision makers could make an informed decision about whether similar events or situations would recur.
- Providing a risk rating of the root causes using existing organizational risk assessment matrixes, so that decision makers

were aware of the magnitude and likelihood of the relevant risks.

An example of the type of table used to supply managers with this information in a Queensland correctional context can be seen in Table 3 and in Figure 1 below.

Conclusions and Ways Forward

While not without its disadvantages, overall, the introduction of RCA has improved the quality of analysis and recommendations developed in response to significant events within the Queensland correctional oversight system. The increased rigor and discipline associated with analyses and the development of a few clearly defined recommendations directed towards the treatment of root causes, rather than a raft of broad ones aimed at addressing the symptoms of system failures, are seen as particular advantages associated with the technique. In this regard, RCA is also better at avoiding a series of ad hoc recommendations that add layers of complexity to systems. However, ensuring that investigators receive sufficient resources to conduct adequate analyses, that they have sufficient expertise to analyze issues, and that there is a continued move towards a non-blaming/learning-based focus in investigations (except in instances of deliberate misconduct, or gross or criminal conduct or negligence) are recognized as challenges to the RCA process.

To further improve the RCA process within a correctional context, a number of changes could be made. Publishing RCA reports, either publicly or internally, could have significant advantages for the RCA process.[3] This approach is taken within both the airline and some health sectors, where the results of investigations into

FIGURE 1
Risk Rating System for a Root Cause Analysis of the Problem under Review

Priority	Description
High	Represents a major risk that if not resolved will have a significant adverse impact. Where practicable, requires immediate remedial action.
Medium	Represents a moderate risk that if not resolved has the potential to have a significant adverse impact. Where practicable, requires remedial action in the short to medium term (i.e., within 3-6 months).
Low	Represents a minor risk that if left unresolved may have an adverse impact on outcomes. Requires remedial action in the longer term (i.e., within 6-12 months)

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[3] The final report presented to Queensland Corrective Services (QCS) has not been released publicly as of September, 2017. In Queensland, the office of the Chief Inspector is located internally within QCS; in other parts of Australia the office is operated as an independent agency. While certainly important, a discussion of the advantages and disadvantages of internal vs. external reviews by the Chief Inspector is beyond the scope of this article.

TABLE 3
Summary of root causes used to supply managers with contextual information.

Root causes	Local or System Issue	Symptoms	Existing controls to deal with root causes – Post incident	Adequacy of existing controls	Risk rating	Recommendations/Remedial examples	Criteria for determining whether to mitigate root cause
Methods	System						
Management Systems	Local/ System						
Environment	System						

sentinel events are made publicly available to inform other practitioners in the area of what has been learned (Ritter, 2015). Making key learnings internally available—not only to individual centers, but to the corrections system as a whole—can only improve the ability of the relevant system to evolve and learn from its mistakes. If results were publically available, the benefits of learnings made in one institution would also be available to corrections systems nationally and internationally, although we acknowledge the significant privacy, operational security, and political difficulties associated with such an approach.

Greater incorporation of operational staff in investigation teams could also have positive outcomes for the RCA process. Including such staff could improve the quality of recommendations made due to the incorporation of those with on-the-ground knowledge of the development of solutions. Greater incorporation of operational staff could also help increase the correctional staff's trust in the investigation team, improving the flow of information and the quality of recommendations made.

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