

Evaluation of Learning Teams Versus Root Cause Analysis for Incident Investigation in a Large United Kingdom National Health Service Hospital

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Introduction: Significant resource is invested into investigation of adverse healthcare events. Outcomes of such investigations have varying degrees of effectiveness. The “hierarchy of effectiveness” model proposes system-focused changes have greater impact than person-focused actions. The traditional approach to investigation is root cause analysis (RCA); however, such an approach does not prioritize system-focused action generation. Learning team-based investigations are thought to generate more effective system-focused actions; however, this has not been evaluated.

Methods: Retrospective mixed methods evaluation of learning teams compared with RCA. Twenty-two learning team investigations compared with 22 RCA investigations, with quantitative assessment of the number of system-focused and person-focused actions generated. Assignment of the two different methods to incidents was not random, with learning teams being selected for cases, which were initially judged to be process-focused problems. Semistructured interviews were conducted with four learning team facilitators with thematic analysis to identify causes for outcome variations.

Results: Learning team investigations yielded a median of 7.5 actions compared with 3.5 actions for RCA: 57% of learning team actions were system focused versus 30% for RCA. We identified variations in personnel involved, culture of the investigation, and differences in the investigative approaches as potential drivers for these differences.

Conclusions: We observed that learning team investigations that targeted process-focused problems generated more actions and a higher number of system-focused actions. There is a difference in culture created during learning team investigations. Although learning teams are not suitable for all investigations, they represent a readily reproducible and valuable addition to the investigative toolkit.

Key Words: root cause analysis, incident investigation

(*J Patient Saf* 2021;17: e1800–e1805)

Reporting of patient safety incidents and their investigation represents a central tenet of delivering safe healthcare.¹ Incident reporting and investigation include incidents resulting in harm,² near misses,³ and, more recently, positive safety incidents.⁴ Certain severe incidents or collections of incidents can

be investigated in more detail, often by multiagency teams, for sustained time periods.⁵

In England’s National Health Service (NHS), there were 2,005,869 reported patient safety incidents in the 12 months from July 1, 2017, and June 30, 2018.⁶ This represents 3.8 patient safety incidents reported every minute. There were 11,286 reported incidents resulted in serious harm or death, including 469 never events. Incidents resulting in serious harm or death represented 0.56% of incidents reported, and it is likely the majority if not all these incidents were subject to a serious incident investigation, such as a root cause analysis (RCA). There were thus likely up to 5.42 incident investigations ongoing every working hour of the week in the NHS last year. There is no available research evidence on the average duration or resource requirement for a serious incident investigation; however, it is self-evident that a significant amount of time and energy is being invested globally into incident investigation. Local experience suggests that it takes a lead investigator, often a clinician, at least 40 hours (nearly five working days) to complete the clinical investigation part of the process and the time within which these investigations are to be completed is currently 60 days in the NHS. This contrasts with other safety critical industries where investigations are normally undertaken by full-time investigators, who will take weeks or months to investigate a single incident.⁷ There is therefore a significant investment of front-line NHS resource in the investigation of serious incident, with the most common outcome of resource investment being a report and list of corrective actions.⁸ These alone are insufficient to drive change in an organization, and in this article, we evaluate how, given the significant resource dedicated to incident investigation, outcomes can be targeted to those delivering effective *system-focused* learning, as opposed to less-effective *person-focused* actions.

THE HIERARCHY OF EFFECTIVENESS

The Hierarchy of Effectiveness is a risk management theory and framework for considering effectiveness of actions generated from serious incident investigations.⁹ The tool classifies actions into *person-focused actions*, which attempt to control or change individual behavior, and *system-focused actions*, which change the system healthcare workers operate in. System-focused interventions are considered more effective than person-focused ones, although they can be more challenging to identify and implement¹⁰ and some person-focused interventions may still be required in a robust action plan. The framework is demonstrated in Figure 1. This model and approach to considering error have been available for nearly 20 years, yet serious incident investigations all too often focus on the recommendation of *person-focused* actions rather than *system-focused* actions. Coming up with person-focused actions rather than system-focused actions is rooted in deep-seated challenges encountered with identifying and subsequently implementing system-focused actions in the context of complex healthcare systems. Examples of effective system-focused changes would

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The authors disclose no conflict of interest.

T.R. is supported by a WMG PhD Studentship.

Supplemental digital contents are available for this article. Direct URL citations appear in the printed text and are provided in the HTML and PDF versions of this article on the journal’s Web site (www.journalpatientsafety.com).

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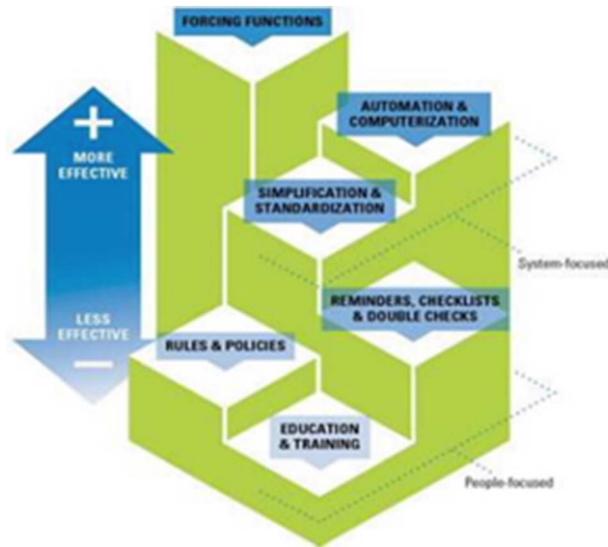


FIGURE 1. The Hierarchy of Effectiveness.¹¹ Figure reproduced with permission from Longwoods.com.

include implementation of a hospital-wide electronic results acknowledgement system, as opposed to the people-focused intervention of retraining individual clinicians whenever a critical laboratory result is missed.

ROOT CAUSE ANALYSIS

Serious healthcare incidents are traditionally investigated through RCA, which involves a “method of structured risk identification and management in the aftermath of adverse events.”¹¹ The focus of RCA is to understand how and why an incident occurred and then to use that knowledge to try to prevent similar incidents occurring in the future, by addressing or eliminating those “root causes.”¹² Increasingly, the benefits and application of RCA are being questioned.⁸ We suggest that traditional RCA approaches rarely generate effective system-focused actions. For this to occur, it would require a RCA to conclude that the root cause of any given adverse event was the very system itself in which individuals worked. We propose that there is generally an assumption that

the system as a whole is well designed or not a fundamental problem. It is thus important to consider other potential tools in the investigative toolkit.

LEARNING TEAMS

The challenge of identifying meaningful system-level changes often result from a disconnect between those investigating and those providing front-line clinical care. Operational learning approaches seek to overcome this. Operational learning represents a technique of learning from those closest to the front line and can be best facilitated by learning teams.¹³

A learning team can be described as a “facilitated conversation between those that do the work and those that design the work, to share operational intelligence between the two groups and improve system design.”¹⁴ The learning team approach consists of two facilitated workshops, where a team of staff who undertake the task being examined describe the process with a focus on what needs to happen for things to go right. These staff will be those directly involved with the processes under investigation, but not necessarily those involved with the specific incident. After the first task-mapping session, staff are given a few days “soak time” to reflect on what was discussed before reconvening to discuss and develop solutions. This team, along with the learning team facilitators, will then be responsible for implementing these solutions.

By shifting the focus away from what happened to a specific patient in a specific incident, and instead examining the process as whole, any idea of “blame” is automatically removed from the conversation and the discussion moves to examining systems and ways of working, rather than individual behavior. This allows the team to develop their understanding of why errors occur, why they occurred in that specific incident, and why *person-focused* actions often fail to prevent similar errors when different people are involved in a future scenario or the scenario occurs in a different setting. Crucially, operational learning goes beyond clinical teams simply explaining their actions to investigators and instead empowers those clinical teams to themselves identify changes needed to prevent similar incidents occurring again.

In this analysis, we retrospectively evaluate adoption of a learning teams approach to achieve system-focused learning in a large United Kingdom NHS center. We explore potential opportunities and explore the challenges to disseminating and implementing

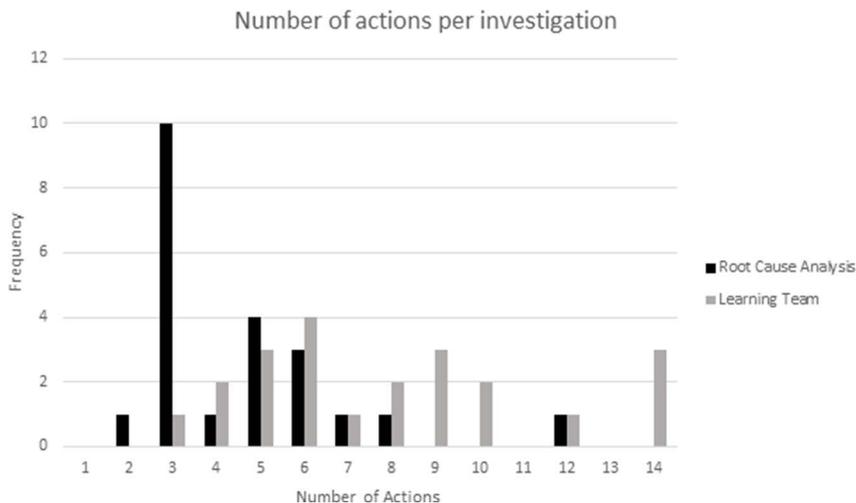


FIGURE 2. Number of actions per investigation.

learning team approaches. Such a topic is highly relevant given recent concerns about how individuals may inappropriately be blamed in the wider context of underrecognized system-level challenges.¹⁵

METHODS

We piloted use of learning teams to investigate serious incidents alongside existing RCA methods from January 2018 to May 2018 at a large university NHS Trust, a 1250-bed tertiary referral center in the West Midlands.

All incidents at the hospital are reported through the Datix (Datix Ltd, London, United Kingdom) electronic incident reporting software and graded according to the level of harm (no harm, mild, moderate, severe, or death) by the incident reporter, with subsequent review by the responsible manager. All incidents resulting in moderate harm or above trigger an incident investigation. During the study period, all such incidents were evaluated by the hospital's patient safety team to determine which of the two investigation tools (RCA or learning team) might be most appropriate. The assignment of the two different methods to investigate incidents was not random, with learning teams that selected cases that were felt on initial evidence to be process-focused problems, with a risk of reoccurrence, and where more effective controls were required to reduce the risk and/or mitigate the harm.

Learning team investigations were performed according to the principles described previously. The learning team pro-formas (<http://links.lww.com/JPS/A249>) used within this process are included as a supplement to this article. Four learning team chairs from the Quality Department were trained to facilitate learning team sessions. This training was an in-house program, piloted and developed by a human factors specialist. RCA investigations were performed along established NHS principles,¹⁶ continuing with established practices at the NHS Trust, and were undertaken by investigators trained in RCA.

Investigations were undertaken between January and May 2018; we reviewed reports in late 2018. There were more RCA investigations than learning team reports, so to ensure an equal number of reports examined, we reviewed root cause analyses in chronological order until the numbers matched.

We identified the number of actions in each report, excluding actions around duty of candor, which were common to each report. We categorized actions as to whether they were predominantly person-focused or system-focused using the definitions previously mentioned. This evaluation was performed independently by two authors (T.R. and S.T.), with subsequent discussion of any discrepancies in grading and a joint decision.

On completing evaluation of investigation reports, we designed semistructured interviews to understand the reasons behind the differences in outcomes between the investigative methods. This semistructured interview schedule was developed using the principles outlined by Kallio et al.¹⁷ We interviewed four learning team facilitators, with audio recording of the interviews and subsequent full transcription. All learning team facilitators also had significant experience in RCA approaches. The aim of the interview process was to enable a comparison between learning teams and RCA investigative methods, and therefore, we specifically interviewed those with experience of both methods. We subsequently reviewed, content categorized, and coded the transcribed interviews with thematic analysis.¹⁸

The implementation of learning teams and evaluation of report outcomes was completed for the purposes of service development and therefore did not require ethical approval. This was agreed with the institution's research, Development & Innovation Department. The interviews with learning team chairs were submitted for ethical approval, which was granted locally under Governance

arrangements for Research Ethics Committee provision (Reference Number: GF301).¹⁹

RESULTS

We analyzed 22 incidents where the learning team approach had been selected and used for incident investigation, matched to 22 where RCA was used. A total of 275 actions were generated and recorded in the reports for these 44 incidents. The incidents investigated using traditional RCA approaches generated a total of 101 actions (median, range [interquartile range] = 3.5, 8 [2]) per incident report. Incidents investigated using the learning team approach yielded 174 actions (median, range [interquartile range] = 7.5, 10 [3.25]) (Fig. 2). For traditional RCA investigations, 30% of actions were graded as system-focused actions versus 57% for learning teams.

The semiquantitative interviews of four learning team chairs created 66 minutes of audio recording, which generated a 9476-word transcript. Thematic analysis identified five overarching themes that distinguished learning teams from traditional RCA. The themes were (a) personnel involved, (b) content of discussions, (c) culture, (d) challenges, and (e) outcomes. The greatest area of focus was culture (theme 3). The themes are explored in more detail hereinafter.

Theme 1: Personnel Involved

Interviewees highlighted that a key distinguishing feature that drives variation in outcomes between learning teams and RCA investigations is that learning teams were designed from the outset to be inclusive events involving all people involved with the processes under discussion, generating better representation of the whole team, not just a focus on those team members directly involved in the incident. An underlying tenant of the learning team approach is that those individuals may not necessarily have been involved in the incident that triggered the learning team but were involved in the processes under investigation. This is unlike root cause analyses, where only those directly involved with that specific incident are invited. The interviewees also reported that with RCA, staff members typically perceived as being lower within an "institutional hierarchy" (e.g., healthcare assistants) were less frequently invited, and these staff members were reported to have valuable insights within learning team approaches. Those interviewed stated that they felt this may represent one important reason for the increased number of actions generated from learning teams.

Theme 2: Content of Discussions

The content of discussions in learning teams was consistently referred to in terms of "processes" and "policies" around a "patient journey." These discussions were typically generic and focused on how pathways "operate normally" alongside variations in process within that pathway. Interviewees reported that this relied less on "recall of the specific incident" and more on an understanding of how processes operate in real life. In contrast, the language used to described RCA's was focused around a single "specific incident" or "event" with significant time spent establishing exactly "what went wrong." It was felt that root cause analyses typically focus on the "last barrier to fail" rather than more holistically considering other barriers that were believed to work but *at risk* of failing. Root cause analyses less commonly considered the context of "why" a particular set of events occurred in comparison to learning teams where this was an essential feature, incorporating a review of the "setting," "wider context," and "environment." There is significantly more flexibility in learning team discussions, with an inherent tendency for root cause analyses

to focus toward distilling a single root cause and thus risking “oversimplification” with “bias against consideration of other safety relevant factors.” In contrast, learning teams maintained a high degree of “complexity” that was informed by “front-line staff” who delivered rich detail. It was noted that the RCA approach to distilling information was favored by the medical workforce who seemed more uncomfortable with maintaining the multiple lines of enquiry used in learning teams. We interpreted this to reflect the typical clinical role of medical staff in collecting complex information about patients and then distilling this down to a unified diagnosis (“because of what they are used to producing, because of what they know is medical case reports, is disease progression, management”). The flexibility and detail maintained in learning teams led to more “transferability” in terms of topics considered relevant other areas of safe care, and it also facilitated development of more actions and possibly more system-focused actions.

Theme 3: Culture

The contrasting culture between learning teams and root cause analyses was the most frequently discussed theme. Learning teams were described as “supportive” and “open” with “barriers released” creating an “open culture to learn” where members could ask a “stupid question” in a “safer,” more free environment. It was noted that there was not a traditional hierarchy within the learning team group and that the process was less technical and therefore did not “lose people” for whom risk matrices and similar concepts may be unfamiliar. In contrast, the language used to describe root cause analyses included concepts around “blame” and “mistake.” The root cause analyses focused much more on the “individual” staff members and participants tended to be more emotionally involved. Descriptors, such as “fear” and “guilt,” were used meaning that people “did not speak up” but rather the only voice was that of the “loudest and most senior.”

Theme 4: Challenges

Although interviewees were broadly positive regarding learning teams, it is important to note that they cautioned they do not “suit every incident” and that learning teams should be considered as a single tool within a wider range of options. The challenges described contrasted between learning teams and root cause analyses. The interviewees stressed that root cause analyses are well established and have the advantage of familiarity, with unfamiliarity and “skepticism of the unknown” being a challenge with learning teams. The greatest challenges with learning teams were described as getting the right people in the room. Staff lower in the traditionally perceived organizational hierarchy found it more difficult to participate given their lack of protected administrative time and lack of control over their own diaries. The discussion elements of learning teams typically also take longer than root cause analyses, usually for two half-day sessions; however, it was noted that almost universally those who attended the first session became highly engaged and went on to attend the second session. There were also challenges around certain staff groups feeling the review of the whole patient journey within a learning team may be a “waste of time” but similarly such staff groups were known to cause difficulties within the team dynamics of root cause analyses. To overcome challenges specific to learning teams, it was felt that wider organizational communication and understanding were essential, yet this is something that can be difficult to achieve within healthcare environments.

Theme 5: Variations in Outputs

The interviews suggested variations in output between the two methods, beyond those that we set out to measure (i.e., number

and quality of actions). The impact on staff was highlighted, with staff members feeling supported after a negative incident through learning teams. Learning teams were felt more often to challenge established practice and seek more innovative solutions, with a greater tendency to fundamentally change existing processes. Learning team outputs were typically generated “from the coal face,” unlike root cause analyses where actions more typically arise from the chair and senior management (from the coal face is an English idiom meaning “doing the work involved in a job, in real working conditions, rather than planning or talking about it”). These are potentially important reasons in system-focused as opposed to person-focused action generation.

Wider involvement of front-line clinical staff in identifying actions has also an important impact on implementation of actions, as staff implementing changes are involved in creating them, encouraging engagement. An important difference described was that learning teams consider all possible safety risks arising from a process, unlike RCAs that focus on the causes of a specific incident. One interviewee described that “the worst case scenario in an RCA is if there were 100 ways something could go wrong and we only fix one of them in an RCA, we could do a perfect investigation and get to the exact specific reason [for that incident] and solve it, but we don’t fix the other 99 that go on to happen tomorrow or the next week.”

DISCUSSION

Learning team investigations targeting process-focused problems produce numerically more actions from each investigation, with those actions appearing to be potentially of a higher quality when compared with RCA investigations. Actions were deemed higher for being system-focused actions rather than person-focused actions and thus higher within the hierarchy of effectiveness model described previously. Our interviews indicated that learning teams provide support to healthcare teams after adverse events and may generate more innovative actions, with a greater tendency to challenge existing practices. Overall, we observed that learning teams involve all staff, even those not involved in the incident, to help foster a nonbiased blame-free assessment with a focus on system problems.

There are concerns with learning teams regarding ensuring the attendance of the right staff groups who may also be skeptical of a new and relatively unknown approach to incident investigation.

It is not practical for every incident to be investigated by a “learning team,” so institutions need to be selective and assign a learning team when an incident has a likelihood of being process or system focused. There seem to be a number of reasons to explain differences between learning team and RCA outcomes meriting selective use of each technique. Learning teams seem to foster a safer, more open culture where everyone participating is able to speak up. Those participants are likely to represent a wider cross-section of the workforce creating a wider spectrum of ideas. The content of learning team investigations is also different, considering the whole patient journey in comparison with a fact-finding exercise and specific targeting of the underlying cause of an adverse event. This enables learning teams to maintain complexity regarding the context of healthcare processes, unlike the tendency of root cause analyses to oversimplify in the pursuit of a distilled underlying cause and subsequent action.

Learning teams are not appropriate for all incident investigations but rather should be considered as one tool within a wider selection. The applications of these findings requires that patient safety teams (or similar) select the correct investigative tool for each incident under investigation. Incidents involving primarily process challenges are likely to benefit significantly from learning

team approaches (e.g., incidents involving the process of hand-over and transfer of patients between two organizations), whereas RCA approaches would be better selected where it seems that there is a specific incident that is less likely to recur outside the specific circumstance and group of people involved in that incident (e.g., late cancer diagnosis from a misreported radiology investigation). We have also found that there is limited benefit to repeating a learning team event for high-frequency categories of adverse event has occurred again after a recent comprehensive learning team review (e.g., patient falls). In this context, RCA to identify any case-specific additional changes or challenges is likely to be most appropriate. There may not be one “right” investigative methods, and rather incidents lie on a spectrum, and therefore, judgment needs to be applied to establish which investigative methods to choose. The greater experience teams have with both methods, the more apt they will become at selecting the best investigation. Importantly, the decision of which investigative approach to apply may be governed by national regulatory requirements as well as the expectations of patients and relatives and certain events may require the meticulous fact-finding approach enabled by RCA.

Potential Impact of Learning Teams

Adopting a learning team approach represents an organization-wide change that will directly benefit patients through creation of a safer clinical environment but also empower and engage a healthcare workforce that is currently under pressure from low morale and fears of blame.²⁰ The organizational impact of blame and culpability is well explored through Reason’s Culpability Model,²¹ which has been adapted into the NHS Improvement Just Culture Guide.²² We propose that the learning team approach provides a clear structure for ensuring that effective actions are implemented from patient safety incidents that either through the Just Culture Guide’s foresight test or substitution test demonstrates the need for further investigation and wider actions. Importantly learning teams enable staff to be supported after adverse event, which will directly reduce the negative impact on the “second victim.”²³ The approach of enabling wider staff groups to contribute to learning teams creates a more collaborative working environment. However, it is important that the contributions and inputs of those staff members are fully recognized. This currently happens within the learning teams themselves, but the potential for this to be more widely celebrated would help develop wider organizational understanding of the learning team approach.

Enabling the attendance of wider staff groups is a key benefit of learning teams but also identified as a challenge in enabling direct care givers to take time away from the clinical environment to contribute to the learning team process. We argue that this can be mitigated through strong leadership from patient safety management teams who convene the learning teams and also emphasizing the importance of learning team investigations within the wider organizational culture. It is further important that adoption is done in collaboration with patients, while also accepting that it may not always be appropriate for patient representatives to be present within incident investigation meetings.²⁴ The adoption of learning team approaches enables patient ambassadors to engage directly through establishing the structure and terms of reference for learning team investigations and being engaged in the system changes that are created. This then allows true patient engagement with system change and safety culture development, which is acknowledged internationally as a challenging, yet important step to the delivery of safer care.²⁵

Strengths and Limitations

This evaluation, however, has a number of limitations. The evaluation was performed retrospectively; however, retrospective

analyses have problems. This was also a strength because investigators at the time were not influenced by any knowledge that later analysis would occur. Secondly, incidents were not allocated randomly to the two approaches but instead based on a preliminary assessment. There was thus a potential for bias. This bias, however, was not substantiated by the semistructured interviews that suggest fundamental differences in the content, culture, and outcomes of learning teams that explain and underpin the variations in quantitative variables seen. The semistructured interviews themselves have limitations in that they interview only those involved with chairing learning teams (although all those interviewed also had extensive experience of RCA), rather than including all participants in the learning team and RCA meetings.

We were not able during the study period to follow up the reports of investigations to identify whether actions were completed and subsequently maintained, and such an approach would require a significant lag phase, which is outside the remit of this article but would make useful piece for future research. Further work is also needed to characterize the best approach to the selection of incidents for investigation by learning teams and to better understand the experiences and outcomes of those participating. A strength of this work is that our model could serve as a template, wherein learning teams could be evaluated across multiple healthcare contexts and these items proposed further work rigorously evaluated.

CONCLUSIONS

Healthcare organizations put significant resource behind incident reporting and investigation. To capitalize on the resources invested, it is essential that investigations generate effective outcomes and actions. We observed the following differences between learning teams and RCA investigation techniques: that learning teams involve all staff, even those not involved in the incident, to help foster a nonbiased blame-free assessment. Learning teams focus on system problems, unlike RCA that focuses on staff performance problems. We observed that applying learning team approaches empowers front-line staff to identify solutions themselves and elevates actions within the well-established, yet rarely applied Hierarchy of Effectiveness. Empowered staff creating effective outcomes is the best possible result from unfortunate yet serious incidents that happen in healthcare, such an approach relies on a safety-focused organizational culture but offers the potential of a safer future for all.

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