Root Cause Analysis – Application guidelines

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CONTENTS

Preface
Acknowledgements

Introduction

The root cause analysis process

1 – Identify incidents/issues and investigation/analysis level
2 – Select investigation and analysis team
3 – Plan and conduct investigation
4 – Determine sequence of events
5 – Identify the contributing factors
6 – Determine root causes
7 – Develop risk reduction/quality improvement strategies
8 – Report and action plan
9 – Implement actions
10 – Evaluate effectiveness of actions

References and additional resources

Annex A – Contributory factors framework
Annex B – Fishbone diagram
Annex C – Root cause analysis: Scenarios (case studies)
Annex D – Root cause analysis: Summary reports (case studies)
Preface

These guidelines were developed to underpin training on root cause analysis for the Malaysian Ministry of Health. They are based on similar guidelines developed for the Hong Kong Hospital Authority and for the Health Service Executive in Ireland.

The guidelines set out a simplified process for the investigation and analysis of healthcare incidents and issues. The intention of this guidance is not to be heavily prescriptive. Rather, individual hospitals should ensure their own approaches to RCA conform to the principles espoused in this guidance and the practices illustrated in the associated training.

It is one thing to study the RCA process and examine the use of various tools and techniques, but quite another to practically carry out RCAs, especially in a health care context. You only truly begin to learn through case studies and getting involved in practically applying the principles in real RCA situations. In recognition of this, it is important that regular 'learning and sharing' sessions around RCA are mounted and attended so that you can share your experiences, learn from each other and, most importantly, improve both your approach to RCA and improve the safety and quality of care for patients, and the safety and quality of the working environment for staff.

Stuart Emslie (Oxford, UK)
July 2007
Acknowledgements

The guidelines are fundamentally based on similar guidelines developed for Hong Kong Hospital Authority by Stuart Emslie, UK, and Dr Maree Bellamy, a medical doctor and clinical risk specialist from Australia. In addition to Stuart and Maree’s practical experience of developing and applying root cause analysis in healthcare in several countries since 1994, these guidelines are based on a combination of Sally Taylor Adam’s and Charles Vincent’s publication ‘Systems Analysis of Clinical Incidents’ (known as ‘the London Protocol’) and Standards New Zealand’s publication ‘Sentinel Events Workbook’ (see section on references and additional resources). The Hong Kong version of the guidelines was subsequently updated for use in the public health service in Ireland by Stuart Emslie, and the Malaysian version of these guidelines is based on the Hong Kong and Irish guidelines.

Case study materials have been supplied by healthcare professionals and organisations in Ireland and England.

The contributory factors framework outlined in Annex A is based on the work of Sally Taylor-Adams and Charles Vincent together with work undertaken previously for Hong Kong Hospital Authority.
INTRODUCTION

What is root cause analysis?

According to Bjorn Anderson and Tom Fagerhaug, “Root Cause Analysis is a structured investigation that aims to identify the true cause of a problem, and the actions necessary to eliminate it” (1). The Australian Council on Quality and Safety in Health Care defines root cause analysis as “A systematic process whereby the factors which contributed to an incident are identified” (2).

In other industries or sectors, root cause analysis is just one step of a full investigative process after an adverse incident has occurred. However, healthcare, in many countries, has chosen to use the term to describe the entire process including the monitoring and review of risk reduction strategies and corrective improvement actions.

In the context of this document, our key interest is in applying root cause analysis (RCA) to individual adverse incidents that occur. Thus individual adverse incidents is our key ‘problem’. However, we are also interested in dealing with ‘issues’ that arise from time to time, possibly from analysing trends in reported incidents. For example, in terms of individual incidents, patient falls may not appear to be a real problem. However, the trend in reported patient falls over time, and perhaps in specific wards or other areas, may well show up issues that need to be investigated and analysed further. In some approaches to root cause analysis in health care, the process of identifying issues from incident trend data is called aggregate review.

Why is root cause analysis important in health care?

The nature of health care is such that things sometimes go wrong and this can have potentially devastating consequences for patients, their family and friends, and, of course, health care staff and the hospital or health care facility concerned. When things go wrong, therefore, it is important that the circumstances are properly examined to establish why things went wrong and what actions are needed to prevent similar problems in the future. Establishing causation (i.e. why things went wrong) and, as a consequence, implementing risk reduction strategies (i.e. the actions necessary to prevent recurrence) are key to successful root cause analysis.

Take the case study opposite, for example. Here we have a healthy family man in his early forties presenting for a cardiac angiogram as a precautionary measure. He is accidentally injected with air rather than radio-opaque fluid and dies as a consequence. Why you think this incident might have happened. Who do you think you would ‘blame’ for this incident?

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Case Study – Accidental patient death during a routine cardiac angiogram

A 42 year old man attends as an out patient for a cardiac angiogram as a precautionary exercise. He is the first patient to undergo a cardiac angiography procedure after lunch.

He is injected with radio-opaque fluid but dies of an air embolism, leaving a wife and three young children. Investigation revealed that the syringe, contained in the syringe driver, was approximately 70% air and only 30% radio-opaque fluid.

The syringe had been drawn up before lunch. Coming back from lunch, some members of the clinical team changed shift. There were no formal arrangements in place to check the syringe contents. Due to the design of the syringe driver, it was difficult to see, clearly, the syringe contents.

Driven by external ‘political’ factors, the main concerns of the hospital Board were with activity figures, i.e. getting as many patients through the system as possible, and ‘balancing the books’, i.e. ensuring the hospital kept within budget. Safety (and quality of care) was not an organisational priority. The lack of safety culture was evident at all levels in the organisation up to and including the Board.

1 Now the Australian Commission on Safety and Quality in Health Care.
How does root cause analysis relate to wider risk management and quality improvement efforts in health care?

Root cause analysis (RCA) is an important tool in the quest for improving the safety and quality of care following errors, mistakes or other adverse incidents. RCA seeks to get beyond simply blaming individuals for bad outcomes by trying to establish why things went wrong.

But it is important to remember it is only a tool and must, therefore, be used with care. In the hands of properly trained and experienced professionals, root cause analysis can help make major improvements to the safety and quality of care for patients as well as the safety and quality of working environments for staff.

RCA is most commonly described as a risk management tool, since it is typically used to identify risk reduction strategies following an incident, or series of incidents. However, it can also be used ‘proactively’ to identify quality improvements in systems and processes. The case study opposite, for example, shows how RCA was used to good effect in the retrospective evaluation of handling of a public health incident in England.

Case study – Legionnaire’s disease outbreak

An outbreak of legionnaires’ disease was declared in the City of Hereford, England on 6th November 2003. It took almost a week of intensive case finding and environmental investigation before the likely source was identified and by the time the outbreak was declared over, a further three weeks later, there were a total of 28 associated cases and 2 deaths. This was, de facto a “public health incident” requiring not only the investigation and management of a traditional community outbreak of infectious disease, but also sustained media handling, and the strategic and tactical management of a range of economic and political issues.

Post-incident evaluation incorporating the use of root cause analysis methodology indicated that the handling of the outbreak was, overall, deemed successful by the partner agencies involved. In particular, it demonstrated the value of separating the strategic management of the incident from the investigation and management of the outbreak through the operation of a strategic group and an outbreak control team (OCT). This arrangement provided both “headroom” for the OCT to operate unhindered to locate the source of the infection about which no easy clues existed, and the necessary clarity about the respective roles of the Primary Care Trust (the organisation with designated responsibility for co-ordination of primary care activity in the area) and the Health Protection Agency (HPA).

The key organisational lessons gleaned from the RCA relate particularly to the need to clarify the roles and responsibilities of health partners in the event of a public health incident such as this, and to ensure the availability of adequate surge capacity to mount an effective response to sustained and intensive public and media interest. These lessons are being widely disseminated within the HPA and to National Health Service (NHS) partners.

Is root cause analysis a complicated and time consuming process?

In the majority of circumstances, RCA is a very straightforward process and need not be excessively time consuming. There are, of course, occasions where the complexity of an incident or issue is such that significant time needs to be devoted to investigating and analysing all the circumstances. This helps ensure that causation is properly determined and, hence, that appropriate risk reduction strategies are identified for implementation. But such occasions are usually the exception rather than the norm.
In many cases only a brief investigation and analysis is required, with some issues requiring little more than for an inquisitive health care professional or manager to ask a series of WHY questions to establish causation.

Take the case study below, for example, which relates to a number of identified issues in an Elderly Care Department. Here we have a scenario where an inexperienced risk manager ‘accidentally’ carries out a root cause analysis without realising it. Do you think this constitutes a sufficiently rigorous approach in this particular instance? Can you think of any instances where you have carried out an ‘accidental’ root cause analysis?

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**Case Study - The Accidental Root Cause Analysis**

In a small North of England NHS Trust, the Risk Manager had been seconded to the post, ill experienced and untrained, with only common sense and a nursing background to guide her. She had no risk management qualifications and had only a few days with the previous post holder to grasp the intricacies of the job.

Early into the job the Risk Manager was asked to attend a Senior Team Meeting within the Elderly Care Department. Under discussion were a number of items, two of particular interest to the Risk Manager were the number and themes of complaints and the readmission rate.

The complaints were interesting in that many were coming from local General Practitioners (GPs). Their concern was that they were not receiving copies of discharge letters for many weeks and sometimes months after their patients were discharged from hospital. In one case a GP received a discharge letter after his patient had been readmitted and died in hospital: the letter referred to a previous admission some months before declaring the patient to be well and at home. Thus it was taking some time for the GPs to review their patients post-discharge, and providing any continuity in care was exceedingly difficult.

Next on the agenda was readmission to hospital within three months of discharge. The Unit had a particularly high readmission rate - not unusual for Elderly Care, many of the patients had chronic conditions requiring regular admission - but the rate had increased and with winter approaching this was a concern to both the doctors and the Trust Board.

Now, it occurred to the Risk Manager that there was a link between these two problems. Even if one was not the cause of the other it was possible that they were part of the same chain of events. So………..she began to ask why?

**Why** were GPs unhappy?
*Because their patients were not being properly cared for.*

**Why** were their patients not being properly cared for?
*Because the GPs could not review treatment, monitor progress and this on occasion led to a health crisis and readmission to hospital.*

**Why** could the GPs not do this?
*Because the GPs did not know they had been in hospital.*

**Why** did the GP not know the patient had been in hospital?
*Because a discharge letter had not been sent.*

**Why** was the discharge letter not sent?
*Investigation showed that the letters were dictated very soon after discharge, sometimes on the day of discharge itself but were not sent until much later as they were not typed.*

**Why** were they not typed?
*Because there was a shortage of secretarial staff in the department.*

So after asking ‘why’ a few times, it transpired that the complaints and readmissions could be reduced if the number of medical secretaries were increased. The estimated annual cost of the increase in secretarial time to meet targets for the receipt of discharge letters (two weeks after discharge), was £22,000 (approx. HK$ 300,000). This seemed a small amount to pay in the interests of better patient care, improved relationships with the GPs, and reduced readmission rates and their associated costs, which probably exceeded the cost of employing additional secretarial staff by an order of magnitude. Therefore the secretaries were employed, the letters went out, GP complaints reduced, and the readmission rate reduced to an acceptable level.
THE ROOT CAUSE ANALYSIS PROCESS

The overall process of root cause analysis is not ‘rocket science’. There are essentially ten key stages within the process and these are summarised in the figure below, and elaborated further in Table 1 overleaf.

The figure below also identifies ‘learning and improving’ as key to the RCA process – not just learning from things that go wrong and improving the safety and quality of care as a result, but also learning from application of the various stages of the RCA process and making improvements to the process whenever necessary.

Depending on the seriousness and complexity of the incident or issue under investigation, certain stages of the process can be ‘compressed’ to reduce time yet still arrive at robust causes and risk reduction strategies. For example, for less serious incidents it may not be necessary to put together an investigation and analysis team. Instead, the ward or departmental manager might do a basic investigation to determine the sequence of events and arrive at causation and actions required. In such circumstances, reporting would be minimal and, overall, the whole RCA process might, in accordance with Table 1, take well under ten hours of staff time. Conversely, some incidents or issue will be very serious indeed and, for accountability purposes as much as learning and improvement, significant effort might need to go in to putting together an investigation and analysis team, planning and conducting the investigation, carrying out the analysis of contributing and root causes, reporting and action planning.

Table 1 introduces the concept of the ‘mini’ RCA, in addition to the ‘full’ RCA. The ‘mini’ RCA recognises that incident investigation is a ‘secondary’ responsibility for health care professionals and therefore health care resources to undertake detailed RCAs is very limited; very often the investigation and analysis needs to be done quickly to effect ‘immediate’ improvements in the safety and quality of care; and there are often simply too many reported incidents to spend much time on any one. In the ‘mini’ RCA approach, the number of investigation team members and investigation team meetings is reduced compared to the full RCA, and reportage requirements is greatly reduced. The aim is to arrive at the root causes and risk reduction strategies as quickly as possible in a defensible way whilst minimising resource requirements.

However, whilst saving time and effort, the compromises involved may mean that more subtle causes of the incident or issue aren’t detected and corrected. In addition, it may be the case that in some instances the risk reduction strategies and action plans implemented on the results of a simplified analysis might be less likely to resolve the underlying system issues.
### Table 1 – Summary of the RCA process (Indicative only)

<table>
<thead>
<tr>
<th>Process stage</th>
<th>Objective</th>
<th>Basic investigation</th>
<th>Mini RCA</th>
<th>Full RCA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Identification of incidents/issues and investigation/analysis level.</td>
<td>Determine the significance of the incidents/issues and whether investigation/RCA is needed</td>
<td>Category ‘green’ response (minor)</td>
<td>Category ‘yellow’ response (moderate)</td>
<td>Category ‘red’ response (major)</td>
</tr>
<tr>
<td>2 Select investigation and analysis team</td>
<td>Bring together people who have an intimate knowledge of the context surrounding the incident(s), including the care process(es) and clinical issues involved</td>
<td>Not applicable – basic investigation undertaken by local manager</td>
<td>RCA team leader plus typically 1-2 others</td>
<td>RCA team leader plus typically 3-4 others</td>
</tr>
<tr>
<td>3 Plan and conduct investigation</td>
<td>Collect facts, knowledge and physical items related to the incident as soon as possible</td>
<td>Local manager collects as little information as needed in order to establish the facts</td>
<td>Full determination of information. Interview all relevant individuals.</td>
<td>Full determination of information. Interview all relevant individuals.</td>
</tr>
<tr>
<td>4 Determine sequence of events</td>
<td>Understand the incident as fully as possible to ensure investigation accuracy</td>
<td>Basic description of events leading up to the incident</td>
<td>Leader develops sequence of events/chronology table, which is agreed at first meeting.</td>
<td>Leader and team jointly develop sequence of events/chronology table, which is agreed at first meeting.</td>
</tr>
<tr>
<td>5 Identify the contributing factors</td>
<td>Identify the causal factors that contributed to the incident</td>
<td>Possible use of contributory factors checklist</td>
<td>Contributory factors checklist and fishbone diagram</td>
<td>Contributory factors checklist plus fishbone diagram and probably detailed events and causal factors chart</td>
</tr>
<tr>
<td>6 Determine root causes</td>
<td>Find the correctable root cause(s) for the incident</td>
<td>Possible use of ‘Five Whys’ approach</td>
<td>‘Five Whys’ approach. Possible use of events and causal factors chart</td>
<td>‘Five Whys’ approach using events and causal factors chart</td>
</tr>
<tr>
<td>7 Develop risk reduction/quality improvement strategies</td>
<td>Determine appropriate risk reduction strategies to address root causes and any additional strategies required to improve overall quality</td>
<td>Determination by local manager</td>
<td>Brainstorming by team</td>
<td>Brainstorming by team</td>
</tr>
<tr>
<td>8 Report and action plan</td>
<td>Summarise the overall investigation and analysis and translate the risk reduction/quality improvement strategies into detailed actions for implementation</td>
<td>Brief paragraph setting out summary description of the incident, how and why it happened, and any actions taken to prevent recurrence. Consider summary report. Where relevant, include key risks (i.e. root causes) in local risk register</td>
<td>Summary report. Include key risks (i.e. root causes) in local risk register</td>
<td>Full report. Include key risks (i.e. root causes) in local risk register</td>
</tr>
<tr>
<td>9 Implement action plan</td>
<td>Ensure that risk reduction strategies are put in place</td>
<td>Local discretion</td>
<td>Team leader ensures responsibilities for action are clearly assigned and monitoring/review mechanisms in place</td>
<td>Team leader ensures responsibilities for action are clearly assigned and monitoring/review mechanisms in place</td>
</tr>
<tr>
<td>10 Evaluate effectiveness of actions</td>
<td>Ensure that risk reduction and/or quality improvement strategies achieve desired outcomes or results</td>
<td>Local discretion</td>
<td>Part of risk register process</td>
<td>Part of risk register process</td>
</tr>
</tbody>
</table>

**Suggested number of meetings for process stages 4-8 (sequence of events to reportage/action plan):**
- Minimise time taken for RCA
  - Not applicable
  - Maximum 2
  - Typically 3-4

**Indicative total time to complete investigation/RCA to process stage 8 above, i.e. report and action plan:**
- Minimise time taken for investigation/RCA
  - Less than 10 hours – typically 2-3 person hours
  - 10-50 hours – typically 20-25 person hours
  - More than 50 hours, but less than 100 hours – typically 60-70 person hours
Investigating/analysing incidents, or other issues

When an incident is reported by front-line staff, management must respond appropriately to try to ensure, wherever possible, that similar incidents do not happen again. The same is true when complaints or other issues are reported by patients and others. Management and staff need to learn from incidents, complaints and other issues and work together to improve the safety and quality of care for patients, as well as the health, safety and welfare of front-line staff, and protect the safety of the general public.

When a complaint or incident is reported, it should be managed and investigated in accordance with local policies and procedures. The investigation will, in most instances, be instigated and led by a senior manager or complaints officer within the hospital or department.

Some incidents will require immediate initial investigation, while others can wait some hours. However, people tend to forget things quite quickly after an incident occurs, so it is important that essential information be collected as quickly as is reasonably possible.

Given limited resources, not all complaints or incidents can, or should be investigated and analysed in detail. Instead, they should be subject to some form of ‘triage’ based on seriousness or risk. Refer to local policies and procedures to determine the accepted ‘triage’ process that apply to you.

Table 1 provides further information. Annex C provides five scenarios that, having absorbed these guidelines, you might like to use in order to understand the overall root cause analysis process and its application.
Investigating/analysing issues

Conducting ‘aggregate reviews’ of historical incident or complaints patterns and trends may identify issues that require further investigation and analysis. Indeed, any worthy situation involving concern for personal safety, loss or damage, and/or providing potential for learning can be subjected to root cause analysis. Such situations need not be flagged up through local reporting and analysis systems but, instead, may be triggered by, for example, public concern.

The two case studies presented in this section of the guidance illustrate how issues worthy of investigation can be identified from consideration of incident trends. The case study involving maternity services at a hospital in England, further illustrates how public concern helped trigger the investigation. In both case studies, whilst a concern for patient safety and the need to implement risk reduction strategies was paramount, the potential for improving the overall quality of care, including safety, was significant.

Problems with identification of incidents to investigate

In some instances the reported incident may not reveal the final actual outcome for the patient. For example, a medication error may take days, or even weeks to adversely impact on the patient to the extent that the final outcome is known. According to Sally Taylor-Adams and Charles Vincent (1), in these circumstances, the designated person “needs to take a pragmatic look at the problem and decide what timescale is to be the focus of immediate attention, while allowing that a more elaborate and complex story may unfold. Analysis should initially focus on the time period where problems were most apparent.”

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**Case Study – Incident trend**

The figure below shows an actual trend for adverse events (i.e. incidents involving harm to patients) for a hospital in the UK. The number of reported incidents involving patient harm is plotted at 2-weekly intervals over a one year period commencing 4 January 1996.

The trend clearly reveals a doubling in the number of reported adverse events during August/September. A subsequent investigation identified that many of these incidents were directly caused by mistakes on the part of newly appointed junior doctors. However, detailed root cause analysis showed that the factors contributing to these incidents included lack of competence on the part of the junior doctors, lack of induction training and lack of clinical supervision (many senior doctors were on annual leave). Thus the key risk reduction strategies included mandatory induction training for all newly appointed junior doctors and a proper system for scheduling annual leave for the senior staff to ensure there was adequate clinical supervision at all times.
Case study - Investigation into maternity services provided by the Royal Wolverhampton Hospitals NHS Trust at New Cross Hospital, England

A combination of four serious incidents early in 2003 and concerns expressed by the public about the quality of care provided in the maternity services at the same time led to the decision to investigate. The four incidents were:

- a woman had an emergency caesarean section as a result of maternal and fetal distress following unsuccessful attempts to deliver her baby using forceps and ventouse suction. The mother and baby survived
- a woman had an unexpected breech presentation and prolonged second stage labour. The baby died shortly after birth
- a woman had a normal labour and delivery, but the baby was born in poor condition and died within minutes
- a woman had a poor fetal heart trace, prolonged second stage of labour and delayed emergency caesarean section. The baby was stillborn.

Until 2003 the maternity services in the trust were largely an invisible service, which was not high on the senior management agenda and not enough attention was paid to the quality of service provided to women and their babies. The investigation found a number of key factors that led to the unsatisfactory quality of care provided to women using the trust’s maternity services:

- **poor team work**
  A lack of team work was a cause of concern, with long standing difficulties between consultants and consultants and midwives. Working relationships were not as effective as necessary to ensure the delivery of a good service for patients.

- **weak management and leadership**
  The maternity services and midwifery in particular have had a low profile within the trust, and leadership at all levels has been weak and inconsistent. Maternity services have not been a priority as the attention of senior management has been engaged on their financial and corporate management goals.

- **women not being listened to**
  Some women felt that staff did not listen to them and that care could be better focussed on the individual needs of women. The confidence of women in the safety and quality of care provided by the trust was low. One major area of concern for women was that they felt there was inadequate handover of information when staff change shifts meaning they often have to tell staff the same information again.

- **not complying with national and local guidelines**
  The trust was not fully compliant with all the National Institute for Clinical Excellence (NICE) guidance relating to maternity services, for example, midwives did not always follow guidelines about baby heart traces.

The full report on the investigation and actions required is available from the Healthcare Commission in England [www.healthcarecommission.org.uk](http://www.healthcarecommission.org.uk).
Select investigation and analysis team

For those incidents or issues where a team approach is desirable, i.e. where a category yellow or red response is suggested (see Table 1), it is essential that the team is comprised of individuals with appropriate knowledge, skills, experience and perspectives. Teams are, in most instances, preferable to individuals when solving problems. Teams will outperform individuals when:

1. the task is complex
2. creativity is needed
3. the path forward is unclear
4. more efficient use of resources is required
5. fast learning is necessary
6. high commitment is desirable
7. the implementation of a plan requires the commitment of others
8. the task or process is cross functional

The team must have a suitable leader or facilitator with appropriate knowledge and practical experience of conducting detailed investigations and root cause analysis. The investigation team leader will be appointed in accordance with local procedures.

For a category yellow response, it is suggested that the team comprise, as a minimum, the team leader and 1-2 other appropriate people. For a category red response, it is suggested that the team comprise the team leader and, as a minimum, 2-3 other appropriate people. In some instances, for a category red response it can be advantageous to give the investigation team leave from their normal duties so that they can focus on the investigation and analysis.

In the case of a category red response, the investigation team might comprise a combination of the following range of expertise:

- Incident investigation and analysis experience
- Senior management experience
- Senior clinical experience
- Patient advocacy
- Someone who knows the department or affected system well, but who was not directly involved in the incident
- External expert view

Ideally, each team member should possess excellent communication skills. This will be particularly important for team members who are required to collect information from individuals about an incident or issue, and who therefore need to gain people’s trust.
Plan and conduct investigation

Regardless of the suggested level of response required, it is essential that all facts, knowledge and physical items related to the incident be collected as soon as possible. This may be carried out exclusively by the investigation team leader, leaving the team ‘free’ to carry out a thorough analysis of the collected information, or, alternatively, the team leader may plan the investigation and delegate the responsibility for aspects of collecting information to other members of the team.

According to Sally Taylor-Adams and Charles Vincent (1), the information etc. that needs to be collected may include:

- All medical records (e.g. nursing, medical, community, social workers, GPs, etc).
- Documentation and forms related to the incident (e.g. protocols and procedures).
- Immediate statements and observations.
- Conduct interviews with those involved in the incident.
- Physical evidence (e.g. ward layout schematics, etc).
- Secure equipment involved in incident (e.g. shower rail used to commit suicide).
- Information about relevant conditions affecting the event (e.g. staff rota, availability of trained staff, etc).

Where appropriate, photographs should be taken to capture visual information that might assist with subsequent analysis activity.

The use of a simple tracking system for information and other data sources, including physical evidence, is essential. The following is an example of a tracking form that can be adapted to suit local needs.

South African Health - Pelonomi Hospital
Date: 26 July 1996 10:08

"Cleaner Polishes Off Patients."

"For several months, our nurses have been baffled to find a dead patient in the same bed every Friday morning" a spokeswoman for the Pelonomi Hospital (Free State, South Africa) told reporters. "There was no apparent cause for any of the deaths, and extensive checks on the air conditioning system, and a search for possible bacterial infection, failed to reveal any clues." "However, further inquiries have now revealed the cause of these deaths. It seems that every Friday morning a cleaner would enter the ward, remove the plug that powered the patient's life support system, plug her floor polisher into the vacant socket, then go about her business. When she had finished her chores, she would plug the life support machine back in and leave, unaware that the patient was now dead. She could not, after all, hear the screams and eventual death rattle over the whirring of her polisher.

"We are sorry, and have sent a strong letter to the cleaner in question. Further, the Free State Health and Welfare Department is arranging for an electrician to fit an extra socket, so there should be no repetition of this incident. The enquiry is now closed."

Source Cape Times, 6/13/96
### Planning and conducting interviews

Conducting interviews can be very resource intensive, but can yield substantial information. The people you need to interview should be carefully selected and interviews as soon as possible after the incident as most people’s recall of events tends to reduce markedly after 48 hours.

The following are key elements to consider in planning interviews:

- Who do you want to interview
- Why do you want to interview the person
- What facts do you want to know
- Who will conduct the interview; it is often useful to have two people, with one talking and asking questions building a rapport and another person taking notes
- In what order do you want to interview people
- What timescale do you have to do the interviews, for example you may have to see people more than once
- Are you going to give people the opportunity to bring someone with them for support
- Who will conduct the interview and who will take notes
- Where will you conduct the interview (ensure privacy and no interruptions)
- What breaks are planned
- This is to establish facts and interviewers should not be judgemental therefore it is important to put the interviewee at their ease and explain the purpose of the discussion.

When conducting the interview the following guidelines should be applied:

1. Welcome the person and explain the purpose of the interview and that notes will be taken.

2. It is important to try and build a rapport before starting the interview, the interviewee probably will not hear what you say in the first few minutes so make sure that you reinforce whatever you are explaining and check their understanding.

3. As a basis the questions should focus on the what, why, where, when, how and why. Use open questions as much as possible and take the person back to the events that occurred. For example, “tell me what happened on ###, start from the beginning, when did you come on duty, what was happening…….”

4. People will not necessarily remember things in the correct order but do not interrupt them. Once they have recounted everything go through the sequence of events with them and recap, e.g. “so you said that you came in at #### you were involved in ####### and you saw #######. Is that right?”

5. Don’t be afraid to go back over a particular aspect and probe further.
6. In closing the interview, thank the person for their time and frankness, and explain the timescale for the interview and plans for concluding the investigation. Ask them if there is anything else that they wish to add and suggest that they contact you if they think of something after the interview has ended.

**Potential pitfalls in incident investigation**

There are many pitfalls for the unwary in incident investigation. Perhaps two of the major pitfalls are lack of good interpersonal skills on the part of investigators, and ‘hindsight bias’.

The issue of hindsight bias is considered in the table opposite, which is reproduced from the USA Veterans Affairs Gaps Centre. Essentially, hindsight bias occurs when our knowledge of the outcome of an incident biases our judgment about the events that led up to the outcome. According to Richard Cook in the opposite table, “Hindsight bias remains the primary obstacle to [incident] investigation.”

The interpersonal skills possessed by those individuals involved in investigating incidents must be of the highest calibre. Diplomacy, tact, sensitivity, empathy and objectivity are all attributes required to effectively and efficiently obtain information required to carry out the root cause analysis.

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**Hindsight bias in incident investigation**

"Knowledge of the outcome makes it seem that events leading to the outcome should have appeared more obvious than was actually the case. This outcome knowledge poisons the ability of after-accident observers to recreate the view of the situation before the accident. Hindsight bias remains the primary obstacle to accident investigation."


"Hindsight bias" is one of the most reproduced research findings relevant to accident analysis and reactions to failure. Knowledge of outcome biases our judgment about the processes that led up to that outcome. Just as the "Monday Morning" quarterback would have recognized dangers and grabbed opportunities while leading the team to certain victory, we second-guess adverse events without fully understanding the complexity of the situation. When we know the outcome of a situation, we are much more likely to judge the process as inadequate, substandard, or less than perfect when the outcome is negative than when positive.

Hindsight, however is not foresight. After an accident, we know all of the critical information and knowledge needed to understand what happened. But that knowledge is not available to the participants before the fact. In looking back, we tend to oversimplify the situation the actual practitioners faced, and this tends to block our ability to see the deeper story behind the label human error.

Hindsight bias is impossible to eliminate and greatly entrenched in retrospective accident investigations. Outcome knowledge makes it difficult to see the complexity of the situation at the time of decision making. Knowledge of outcome taints the evaluation of the process. This makes it seem that those involved failed to account for information or conditions that should have been obvious or behaved in ways inconsistent with significant information known after the fact. The correct action that should have occurred is crystal clear. Hindsight is 20-20.

Source: [www.gapscenter.org/Stories.asp](http://www.gapscenter.org/Stories.asp)

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2 Update - The website has changed to [www.gapscenter.va.gov/stories/HindsightBiasWhatIs.asp](http://www.gapscenter.va.gov/stories/HindsightBiasWhatIs.asp)
Determine sequence of events

This stage in the RCA process relates primarily to individual incidents and not usually to issues identified by, for example, trends.

The investigation team, having conducted a detailed investigation into the events leading up to a category yellow or red incident, should determine the sequence of events, or ‘incident chronology’. This should provide as complete a picture as possible of all of the events leading up to the incident in order that contributing factors can be properly identified (see stage 5 – Identify contributing factors).

The use of a simple system for logging information on the sequence of events is essential. The following is an example of a sequence of events, or incident chronology form that can be adapted to suit local needs.

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Date</th>
<th>Time (24 hour clock)</th>
<th>Location</th>
<th>Event description</th>
<th>Key person(s) involved/affected</th>
<th>Comments/Queries</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/107</td>
<td>4/8/04</td>
<td>11:54</td>
<td>CA suite</td>
<td>Nurse FG draws up syringe in syringe driver.</td>
<td>Nurse FG</td>
<td>Nurse FG has done this many times</td>
</tr>
<tr>
<td>2/107</td>
<td>4/8/04</td>
<td>12:00</td>
<td>CA suite</td>
<td>Team goes for lunch. Nurse FG goes off duty.</td>
<td>Team</td>
<td></td>
</tr>
<tr>
<td>3/107</td>
<td>4/8/04</td>
<td>13:00</td>
<td>Reception</td>
<td>Patient arrives at hospital and is sent to CA suite.</td>
<td>Patient Receptionist HI</td>
<td>Patient arrives on time for routine cardiac angiogram</td>
</tr>
<tr>
<td>7/107</td>
<td>4/8/04</td>
<td>13:40</td>
<td>CA suite</td>
<td>Patient pronounced dead.</td>
<td>Patient Dr ABC</td>
<td>Patient’s wife informed by Dr ABC of husband’s death at 13:48</td>
</tr>
</tbody>
</table>

Depending on the complexity of the incident, a flowchart can be helpful in visually determining the precise sequence of events, and can be useful in presenting information on the sequence of events to others.
Fundamentally, root cause analysis aims to establish WHAT happened, HOW it happened and WHY it happened. Getting at the WHY is all about understanding causation, or causal factors. There are three types of causal factors:

- those that directly give rise to an incident or issue, e.g. staff administer the wrong medication;
- those that contribute to the incident or issue, e.g. pressure of work, inadequately labelled medicines, lack of staff training, etc.; and
- those that are regarded as the root causes, i.e. those fundamental causes that, if ‘treated’ by implementing appropriate risk reduction strategies, would eliminate or significantly reduce future risk.

In some texts on root cause analysis the terms immediate and underlying cause are used. These can be considered as synonymous with direct and contributory causal factors.

In this stage of the RCA process, the objective is to identify all the causal factors that contributed to the incident or issue. Some of these will be identified as root causes and this will be discussed in the next stage of the RCA process (Step 6 – Determine root causes).

Having identified the sequence of events in detail, the investigation team can then commence the identification of contributing factors.

Contributory factors framework

To assist with the process of establishing all the contributory factors, it is helpful to refer to a contributory factors framework (CFF). A logical framework, based on the work of Sally Taylor-Adams and Charles Vincent (1), is outlined in Figure 2 and contains seven key categories of contributory factor as follows:

- **Patient factors** – patients themselves can contribute to an incident by virtue of their clinical condition, personal characteristics or circumstances, and inter-personal relationships.
- **Task and technology factors** – the care tasks (e.g. as defined in care pathways or protocols) and technology involved, including medicines, can contribute to an incident.
- **Individual staff factors** – staff can contribute to an incident.
- **Team factors** – team aspects such as communication, supervision and leadership can contribute to an incident.
- **Work and care environment factors** – the working or care environment might contain deficiencies that can contribute to an incident.
- **Management and organisational factors** – shortcomings in the management and organisation of a hospital or department can contribute to an incident.
- **External factors** – finally, factors external to the organisation can contribute to the incident, such as regulatory or economic issues.
Annex A provides a checklist of factors that can be used to help you establish the direct and contributory factors that gave rise to a complaint, incident or issue. Starting with the patient factors, and taking on board all that you have learned as a consequence of any investigation activity, systematically work thorough the contributory factors framework asking appropriate questions to arrive at a list of factors contributing to the incident or issue. Which of these is the direct cause?

**Cause and Effect (fishbone) diagram**

A useful tool to help you organise and present your thoughts regarding contributory factors is the fishbone, or Ishikawa diagram (Figure 3 and Annex B). The fishbone diagram is very simple to use and can help get everyone involved in any team effort both to determine causation, and to establish whether the incident, issue or care delivery problem (CDP) has been thoroughly investigated. Essentially, the team brainstorms for up to 15 minutes and puts as many contributory factors on to the fishbone diagram as they can possible think of. The key factors are then selected to help identify the root causes.
Events and Causal Factors (ECF) charting

Events and Causal Factors charting is a more advanced technique for helping establish contributing factors in root cause analysis involving incidents. It is particularly well suited to a category red incident investigation/analysis response. An ECF can assist in the verification of causal chains and event sequences; can provide a structure for integrating investigation findings; and can communicate the investigation activities during and on completion of the investigation and analysis. Most importantly, an ECF chart can help highlight areas where additional investigation is required.

Figure 4 shows an outline of an ECF chart, which takes basic event details from the sequence of events, or incident chronology table and provides a structure to help ensure that all necessary additional information and conditions are identified. Events are enclosed in rectangles and causal factors (or ‘conditions’) in ovals. The assumption, of course, is that all events and causal factors/conditions are known, i.e. are based on valid factual information. In practice, it may be necessary to occasionally make a presumption about an event or causal factor/condition. In such a case, they would be shown with a dashed rather than solid outline (e.g. see the ‘unconfirmed condition/cause’ in section (d) on Figure 4).

In defining causal factors/conditions, the basic approach is to take each event in turn and ask ‘Why?’, putting the answer down as a confirmed, or unconfirmed cause/condition. Successively asking ‘Why?’ will help ‘drill down’ to, eventually, the root causes. In some instances (e.g. sections (b) and (c) in Figure 4), the causal factors/conditions are ‘mutually exclusive’ and are represented as shown. Note, however, that section (c) shows two mutually exclusive factors/conditions, but the second has an ‘underlying’ cause/condition.

There are a number of ways of practically constructing an ECF chart. To maximise team participation in the ECF exercise, draw the chart on a large sheet of paper fixed to a suitable vertical surface. Then get team members to write confirmed and unconfirmed information or conditions on different coloured ‘Post-It™’ notes and affix the notes to the chart in the correct positions.
Determine root causes

There is a Chinese proverb that says that to get rid of a weed, you must dig up the roots. Similarly, to eliminate incidents, you must find and eradicate the root causes.

The root causes are those contributory factors that represent the most basic **systemic** causes of an incident or issue and, most importantly, are causes that **management has the control to fix**. There is usually more than one root cause for each incident, complaint or issue. A root cause can be a **direct cause**, but more often root causes are found ‘further down’ in the contributory factors contained in Annex A. It should be noted that Annex A does not contain an exhaustive list of contributory factors.

The most fundamental, and simplest, technique to determine root cause is simply to repeatedly ask ‘why?’. This is sometimes referred to as the ‘Five Whys’ approach, although there is no compunction to always ask ‘Why?’ five times! You will recall this approach in the case study titled ‘The Accidental Root Cause Analysis’ in the **Introduction** section of this publication. We also came across the approach in the ‘Events and Causal Factors Charting’ section in the previous RCA process stage – **Identifying contributing factors**. The case study opposite provides a further example of this very simple technique.

By systematically, successively and thoroughly asking ‘Why?’ in relation to each contributing factor, we eventually ‘drill down’ to the root causes – i.e. those contributory factors that management has the control to fix.

**You know when you have found the root cause when:**

- Everyone agrees the nominated root cause is the factor preventing resolution of the problem
- The root cause explains why the incident or issue occurred
- The cause is logical and makes sense
- The cause is something you can influence, control and address
- The team has come to a dead end when asking “Why” questions

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**Case study – Example of the ‘5 Whys’ technique**

Q1 - Why did the doctor make an error?
A1 - Because he did not pay sufficient attention to the important part of the problem.
Q2 - Why didn’t he pay sufficient attention?
A2 - Because he was stressed………
Q3 - Why was he stressed?
A3 - Because he was caring for two acutely ill patients at the same time and he was rather inexperienced
Q4 - Why did he have to do that? Couldn’t he contact someone for help? Was he too inexperienced to be assigned to this work task?
A4 - Well, the senior staff doctors don’t like to be disturbed at night. And yes, he was maybe too inexperienced for this kind of patient care assignment.
Q5 - Do you have any procedures regulating the necessary level of training and experience that doctors must have before they are assigned to a particular care task?
A5 - No, not really.

Once identified, these root causes can be translated into risk reduction (or quality improvement) strategies, and an action plan established to implement the actions resulting from the risk reduction strategies in order to eliminate or minimise the risk of the identified incident or issue recurring (and hence improve quality of care). Steps 7 and 8 consider developing risk reduction strategies and action plans.

Note that root causes are risks that should, ideally, be put onto the relevant risk register and dealt with as part of the overall hospital risk management process. Refer to relevant MoH or local Risk Management/Risk Register guidelines for further information.
Whilst the fundamental aim of root cause analysis is to identify and fix basic system deficiencies in an effort to eliminate or minimise risk, it is also the case that the process of root cause analysis inevitably identifies the opportunity for quality improvements. Hence we have ‘opened up’ this stage of the RCA process to consider the development of quality improvement strategies alongside those for risk. This is sensible as risk and quality are essentially ‘two sides of the same coin’. However, for the purposes of this guidance, we will consider risk reduction strategies only.

Following on from the identification of risk reduction strategies, a detailed action plan will be needed to translate the risk reduction strategies into effective risk reduction. This is considered in stage 8 of the RCA process.

Risk reduction strategies typically aim to reduce rather than eliminate risk. They do so usually by reducing the likelihood of a risk materialising, but sometimes they also reduce the consequences if the risk were to materialise. A root cause is a risk, hence risk reduction strategies aim to impact on the root causes in a way that reduces overall risk.

Take the ‘Incident Trend’ case study in the section covering stage 1 of the RCA process in this document (replicated opposite). The key risk reduction strategies are clearly identified. Each of these strategies addresses a root cause and is within management’s control to fix.

Further, more detailed case study examples outlining risk reduction strategies are contained at Annex C and also in the Victorian Health Department’s 2002-03 Sentinel Event Program Annual Report (4).
Report and action plan

The purpose of the report is to convey the results and proposed risk reduction strategies and action plan from the investigation team in a comprehensible way. The reader must be helped to understand what happened and how it happened (the incident description and sequence of events), together with why it happened (the contributing factors and root causes) and what can be done to prevent recurrence (the proposed risk reduction strategies and specific corrective actions).

Reports should be kept a brief as possible, commensurate with the complexity of the incident or issue being reported on and the need to present information for accountability as well as learning and improvement purposes. Because of accountability issues, particularly in high profile incidents attracting significant public interest, some reports may be necessarily lengthy.

In this section of the guidance, we consider three basic types of reportage:

1. Very minimal reportage in relation to a basic investigation for a category green response;
2. Production of a summary report in relation to a category yellow response requiring a ‘mini RCA’; and
3. Production of a full report in relation to a category red response requiring a ‘full RCA’.

1. Minimal reporting

At the very minimum, a concise paragraph or two should be recorded indicating a brief summary description of the incident, how and why it happened, and any actions taken to prevent recurrence.

2. Summary report

A summary report in relation to a ‘mini RCA’ should, as a minimum, include the following:

- Summary of incident, including individuals (preferably job titles rather than names) involved in investigation/analysis
- Contributing factors and root cause(s)
- Risk reduction strategies/proposed corrective actions
- Learning points
- The total time taken to conduct and report on the RCA

Summary report should typically be no more than 2-4 pages in length. Annex D gives several examples of summary reports. Note that in some instances a summary report may be considered adequate for reporting a full RCA.
3. Full report

It is not the intention here to be prescriptive about precisely what format should be adopted. The key issue must be that the report conveys the results and proposed risk reduction strategies and action plan from the investigation team in a comprehensible way.

Standards New Zealand (5) provide a useful format for reporting that can be used as a ‘benchmark’, and a slightly modified version of their format is provided here. They suggest that the report should include:

**Summary**
1. State the incident or issue
2. Summary of root causes
3. Summary of actions

**Introduction**
1. A brief background description of the incident or issue and a statement regarding the team assigned to conduct the investigation
2. Descriptions of the scope of the investigation, its purpose, timeframe, time involved by the team in completing the overall RCA, methodologies employed in conducting the investigation and the findings.

**Analysis and Findings**
1. Factual description of the incident/issue, including, where relevant, the chronology and responses to the incident/issue.
2. Brief description and results of the analyses that were conducted (e.g. fishbone diagram, events and causal factors analysis). Include charts or diagrams in either the main body of the report or in the ‘attachments’ section.

**Recommendations**
1. Root cause(s) identified and rationale for selecting the root causes.
2. Proposed and/or implemented risk reduction strategies/corrective actions, i.e. action plan. Correlate actions with root cause(s) to which they apply (A specimen action plan format that correlates with the requirements of the specimen Malaysian Ministry of Health risk register is provided below).
4. Plans for evaluating the effectiveness of corrective actions.
5. Outline of ‘residual risks’ that will exist if risk reduction strategies/corrective actions are not implemented

**Learning points**
Pass on the knowledge. A specific listing of the learning points that need to be passed on to appropriate departments and staff, and other stakeholders as necessary, either through formal training or through some other means, e.g. staff briefings, newsletters, required reading, etc.

**Attachments**
A listing of all attachments referred to in the report. This may include but is not limited to flow charts, existing policy or new policies and external standards.

**Action plan (see over……)**
Action Plan

A simple action plan template is provided below. This can be used to identify the key actions (also known as ‘additional controls’ in the context of a risk register) together with any resources requirements (financial, physical, staff, etc.), priority order, identification of who is responsible for implementing the action (preferably a named individual), the ‘due date’ by which the action should be implemented, a ‘review date’, if appropriate, and the ‘completion date’ when the action has been implemented. Progress during any review can be recorded in the final column.

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Root Cause</th>
<th>Actions</th>
<th>Resource requirements</th>
<th>Priority H/M/L</th>
<th>Responsibility for action</th>
<th>Due Date</th>
<th>Review Date</th>
<th>Completion Date</th>
<th>Progress</th>
</tr>
</thead>
</table>

Hierarchy of controls

Certain types of controls are preferable to others. For example, it is usually preferable to simplify a process than to train staff to overcome process problems; or to standardise on equipment types (e.g. infusion pumps) rather than have to train staff to use a range of different equipment; or to introduce physical controls, such as computer assisted drug dispensing, rather that rely on staff ‘double checking’ patient medication requirements. Indeed, any controls that rely on people are inherently potentially weak as people are not infallible and make errors.

The following is an outline hierarchy of controls that can be applied when considering whether the most appropriate risk reduction strategies/actions are being proposed.

<table>
<thead>
<tr>
<th>Strength of control</th>
<th>Category of control</th>
<th>Comments/Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stronger control</td>
<td>Elimination</td>
<td>Stop providing service; discontinue a particular clinical procedure; discontinue use of a particular product or service, e.g. stop using latex gloves, or stop using a particular type of equipment.</td>
</tr>
<tr>
<td></td>
<td>Substitution</td>
<td>Replace a conventional material or process with a less harmful alternative. Re-engineer a process to reduce potential for ‘human error’.</td>
</tr>
<tr>
<td></td>
<td>Engineering controls</td>
<td>Introduce ‘hard’ engineering controls, e.g. installation of patient handling devices.</td>
</tr>
<tr>
<td></td>
<td>Administrative controls</td>
<td>Introduce new administrative policies and procedures e.g. job rotation.</td>
</tr>
<tr>
<td></td>
<td>Work practice controls</td>
<td>Change the behaviour of staff, e.g. get clinicians to adopt a single policy on hypertension control, make staff wear personal protective equipment, etc.</td>
</tr>
</tbody>
</table>

Hierarchy of controls
Implement action plan

Developing an action plan is one thing. Actually implementing an action plan is often another thing entirely. Implementation can be fraught with many challenges and pitfalls, particularly where cultural change is involved (e.g. changes in clinical practice) or where significant resources are required.

The template action plan suggested in the previous section covering stage 8 of the RCA process has been designed to facilitate actual implementation. Resource requirements can be identified, actions can be prioritised and timescales can be set for implementation and progress review. When the action has been implemented, the date can be specified.

However, it is often the case in many health care organisations that at any point in time a myriad of competing demands are placed upon organisational resources. These stem not just from root cause analysis, but also other demands emanating from, for example, risk management, quality improvement processes, and general wishes and desires of organisations and their staff. Implementation of an action plan to reduce risk in relation to an RCA can never, therefore, be guaranteed.

One approach that can be very useful in securing resources for implementation action plans resulting from RCA is to include the actions within the local risk register. In this approach, the root causes become risks and the proposed corrective actions become ‘additional controls’.

Another potentially useful exercise is to identify and assess the ‘barriers to change’. The following simple template can be used for this purpose.

<table>
<thead>
<tr>
<th>Areas where resistance to change may emerge</th>
<th>Estimated level of resistance (High/Medium/Low)</th>
<th>Proposed actions to overcome such resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Evaluate effectiveness of actions

It is essential that actions taken to implement risk reduction strategies that address root causes achieve the desired results. The desired results are either elimination or reduction of risk. Where other quality improvement strategies are proposed in addition to specific risk reduction strategies, the desired results will include achievement of quality improvement objectives.

Ensuring actions achieve desired results

The effectiveness of actions need to be monitored and reviewed to ensure they achieve the desired results. This is facilitated by establishing key indicators for risk reduction or for performance improvement, typically referred to as 'key risk indicators' or 'key performance indicators', or simply as ‘key indicators’. Sometimes they are referred to as ‘outcome measures’.

Key indicators should be selected in accordance with the following criteria:

- They should be capable of being measured easily and impose little additional data collecting burden on health care staff.
- They should be quantifiable (e.g. % reduction in medication errors; % improvement in on-call response times for senior clinical staff; % staff completing training requirements; etc.).
- Where appropriate, key indicators should be expressed as ‘rate-based’ indicators, i.e. with numerator and denominator (e.g. number of injury incidents per 1000 in-patients; self-harm incident per 100 unassessed patients; etc.)
- They should measure the effectiveness of the action and not simply completion of the action (e.g. measure the actual incidence of patient harm, rather than simply that the action has been taken)

Having determined, through appropriate monitoring and review, the effectiveness of actions, the results should be communicated to key stakeholders. Thus appropriate communication strategies should be put in place. The following template can be added to the template outlined in stage 8 of the RCA process to assist with identification of key indicators, monitoring and review requirements, and communication strategies.

<table>
<thead>
<tr>
<th>Actions</th>
<th>Key Indicators</th>
<th>Monitoring and Review</th>
<th>Communication strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
REFERENCES AND ADDITIONAL RESOURCES

References


Additional root cause analysis resources

Publications


Web resources

The following sites typically contain extensive practical guidance and information on RCA and incident investigation. The UK National Patient Safety Agency site has an e-learning package on RCA and also an electronic ‘Incident Decision Tree’ tool that can be used by health care organisation to establish ‘culpability’ for patient safety incidents.

1. USA - Department of Veterans Affairs, National Centre for Patient Safety www.patientsafety.gov

2. Veterans Affairs GAPS Centre www.gapscenter.va.gov/stories/HindsightBiasWhatIs.asp

3. USA - Joint Commission on Accreditation of Healthcare Organizations www.jcaho.org


7. UK – Consequence Ltd., specialists in clinical incident investigation and root cause analysis www.consequence.org.uk
## Annex A - Contributory factors framework

<table>
<thead>
<tr>
<th>Patient Factors</th>
<th>Clinical</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Known risks associated with treatment</td>
<td>☐</td>
<td>101</td>
</tr>
<tr>
<td>Pre-existing co-morbidity</td>
<td>☐</td>
<td>102</td>
</tr>
<tr>
<td>Complexity of condition</td>
<td>☐</td>
<td>103</td>
</tr>
<tr>
<td>Seriousness of condition</td>
<td>☐</td>
<td>104</td>
</tr>
<tr>
<td>Treatability of condition</td>
<td>☐</td>
<td>105</td>
</tr>
<tr>
<td>Difficulty in diagnosis</td>
<td>☐</td>
<td>106</td>
</tr>
<tr>
<td>Clinical/health history</td>
<td>☐</td>
<td>107</td>
</tr>
<tr>
<td>Inexplicable/Unknown factors</td>
<td>☐</td>
<td>108</td>
</tr>
<tr>
<td>Other</td>
<td>☐</td>
<td>109</td>
</tr>
</tbody>
</table>

| Personal | ☐ | 110 |
| Personality | ☐ | 111 |
| Physical state (e.g. malnourished, poor sleep pattern, etc.) | ☐ | 112 |
| Cultural background | ☐ | 113 |
| Religious beliefs | ☐ | 114 |
| Language and communication | ☐ | 115 |
| Social and family circumstances | ☐ | 116 |
| External support | ☐ | 117 |
| Stress | ☐ | 118 |
| Disclosure of health history | ☐ | 119 |
| Other | ☐ | 120 |

<p>| Inter-personal | ☐ | 121 |
| Patient-staff relationship | ☐ | 121 |
| Patient-patient relationship | ☐ | 121 |</p>
<table>
<thead>
<tr>
<th>Task and technology factors</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Availability and use of protocols (including guidelines)</td>
<td></td>
</tr>
<tr>
<td>Availability of protocols to staff</td>
<td>201</td>
</tr>
<tr>
<td>Use of protocols</td>
<td>202</td>
</tr>
<tr>
<td>Poor quality of information included in the protocol</td>
<td>203</td>
</tr>
<tr>
<td>Procedures for reviewing and updating protocols</td>
<td>204</td>
</tr>
<tr>
<td>Inappropriate use of protocol</td>
<td>205</td>
</tr>
<tr>
<td>Other</td>
<td>206</td>
</tr>
<tr>
<td>Availability and accuracy of health information, including medical record and test results</td>
<td></td>
</tr>
<tr>
<td>Availability of information</td>
<td>207</td>
</tr>
<tr>
<td>Reliability of information</td>
<td>208</td>
</tr>
<tr>
<td>Information inaccessible to staff</td>
<td>209</td>
</tr>
<tr>
<td>Misinterpretation by staff</td>
<td>210</td>
</tr>
<tr>
<td>Disagreements regarding the interpretation of information</td>
<td>211</td>
</tr>
<tr>
<td>Inadequately flagged information/alert</td>
<td>212</td>
</tr>
<tr>
<td>Need to chase up information</td>
<td>213</td>
</tr>
<tr>
<td>Other</td>
<td>214</td>
</tr>
<tr>
<td>Task design</td>
<td></td>
</tr>
<tr>
<td>Relevance</td>
<td>215</td>
</tr>
<tr>
<td>Ease of task execution</td>
<td>216</td>
</tr>
<tr>
<td>Design deficiency</td>
<td>217</td>
</tr>
<tr>
<td>Other</td>
<td>218</td>
</tr>
<tr>
<td>Decision making aids</td>
<td></td>
</tr>
<tr>
<td>Availability, use and reliability of specific types of equipment e.g. CTG</td>
<td>219</td>
</tr>
<tr>
<td>Availability, use and reliability of specific types of tests, e.g. blood testing</td>
<td>220</td>
</tr>
<tr>
<td>Availability and use of a senior clinician</td>
<td>221</td>
</tr>
<tr>
<td>Other</td>
<td>222</td>
</tr>
<tr>
<td>Medication-related</td>
<td></td>
</tr>
<tr>
<td>Wrong medication</td>
<td>223</td>
</tr>
<tr>
<td>Adverse drug reaction</td>
<td>224</td>
</tr>
<tr>
<td>Miscalculation</td>
<td>225</td>
</tr>
<tr>
<td>Complicated dosage design</td>
<td>226</td>
</tr>
<tr>
<td>Mislabelling</td>
<td>227</td>
</tr>
<tr>
<td>Incorrect computer entry</td>
<td>228</td>
</tr>
<tr>
<td>Poor/ Similar packaging and labelling</td>
<td>229</td>
</tr>
<tr>
<td>Similar looking or sounding names</td>
<td>230</td>
</tr>
<tr>
<td>Other</td>
<td>231</td>
</tr>
<tr>
<td>Staff factors</td>
<td>Code</td>
</tr>
<tr>
<td>---------------</td>
<td>------</td>
</tr>
<tr>
<td>Competence</td>
<td></td>
</tr>
<tr>
<td>Inadequate knowledge</td>
<td>301</td>
</tr>
<tr>
<td>Inadequate skills</td>
<td>302</td>
</tr>
<tr>
<td>Inadequate experience</td>
<td>303</td>
</tr>
<tr>
<td>Other</td>
<td>304</td>
</tr>
<tr>
<td>Compliance</td>
<td></td>
</tr>
<tr>
<td>Failure to comply with policy/procedure/protocol</td>
<td>305</td>
</tr>
<tr>
<td>Intentional violation</td>
<td>306</td>
</tr>
<tr>
<td>Unintentional violation</td>
<td>307</td>
</tr>
<tr>
<td>Other</td>
<td>308</td>
</tr>
<tr>
<td>Personal</td>
<td></td>
</tr>
<tr>
<td>Personality</td>
<td>309</td>
</tr>
<tr>
<td>Stress</td>
<td>310</td>
</tr>
<tr>
<td>Fatigue</td>
<td>311</td>
</tr>
<tr>
<td>Distraction</td>
<td>312</td>
</tr>
<tr>
<td>Attitude</td>
<td>313</td>
</tr>
<tr>
<td>Inadequate motivation</td>
<td>314</td>
</tr>
<tr>
<td>Lapse of concentration</td>
<td>315</td>
</tr>
<tr>
<td>Mental impairment (e.g. illness, drugs, alcohol, pain)</td>
<td>316</td>
</tr>
<tr>
<td>Specific mental health illness (e.g. depression)</td>
<td>317</td>
</tr>
<tr>
<td>Domestic issues</td>
<td>318</td>
</tr>
<tr>
<td>Other</td>
<td>319</td>
</tr>
<tr>
<td>Inter-personal</td>
<td></td>
</tr>
<tr>
<td>Staff-patient relationship</td>
<td>320</td>
</tr>
<tr>
<td>Staff-staff/team relationship</td>
<td>321</td>
</tr>
<tr>
<td>Staff-organisation relationship</td>
<td>322</td>
</tr>
<tr>
<td>Other</td>
<td>323</td>
</tr>
<tr>
<td>Team factors</td>
<td>Code</td>
</tr>
<tr>
<td>----------------------</td>
<td>------</td>
</tr>
<tr>
<td><strong>Verbal Communication</strong></td>
<td></td>
</tr>
<tr>
<td>Communication between junior and senior staff</td>
<td>401</td>
</tr>
<tr>
<td>Communication between professions</td>
<td>402</td>
</tr>
<tr>
<td>Communication outside of the ward/department etc.</td>
<td>403</td>
</tr>
<tr>
<td>Inadequate hand over</td>
<td>404</td>
</tr>
<tr>
<td>Communication between staff and patient</td>
<td>405</td>
</tr>
<tr>
<td>Communication between specialists and departments</td>
<td>406</td>
</tr>
<tr>
<td>Communication between staff of the same grade</td>
<td>407</td>
</tr>
<tr>
<td>Voicing disagreements and concerns</td>
<td>408</td>
</tr>
<tr>
<td>Communication between staff and relatives or carers</td>
<td>409</td>
</tr>
<tr>
<td>Other</td>
<td>410</td>
</tr>
</tbody>
</table>

| Written communication |      |      |
| Incomplete/absent information (e.g. test results) | 411  |      |
| Incomplete/absent information (e.g. test results, handover) | 412  |      |
| Discrepancies in the notes/documentation | 413  |      |
| Incomplete documentation | 414  |      |
| Illegible | 415  |      |
| Missing signature | 416  |      |
| Poor quality of information in the notes/documentation | 417  |      |
| Inter-dept communication | 418  |      |
| Communication with HSE/other hospitals/agencies | 419  |      |
| Misinterpretation | 420  |      |
| Other | 421  |      |

| Supervision and seeking help |      |      |
| Decision/willingness of staff to seek help | 422  |      |
| Unavailability of staff to help | 423  |      |
| Responsiveness of staff to help | 424  |      |
| Other | 425  |      |

| Congruency/consistency |      |      |
| Definition of tasks between professions | 426  |      |
| Definition of tasks between different grades of staff | 427  |      |
| Definition of tasks between same grades of staff | 428  |      |
| Other | 429  |      |

| Leadership and Responsibility |      |      |
| Ineffective leadership | 430  |      |
| Unclear definitions of responsibility | 431  |      |
| Other | 432  |      |

<p>| Staff colleagues response to incidents |      |      |
| Inadequate support by peers after incident | 433  |      |
| Inadequate support by staff of comparable grades across professions e.g. senior nurse and junior doctor | 434  |      |
| Other | 435  |      |</p>
<table>
<thead>
<tr>
<th>Code</th>
<th>Work and care environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>501</td>
<td>Building and design</td>
</tr>
<tr>
<td>502</td>
<td>Maintenance management</td>
</tr>
<tr>
<td>503</td>
<td>Functionality (ergonomic assessment e.g. lighting, spaces, etc.)</td>
</tr>
<tr>
<td>504</td>
<td>Other</td>
</tr>
<tr>
<td>505</td>
<td>Housekeeping</td>
</tr>
<tr>
<td>506</td>
<td>Control of the physical environment (e.g. temp, light, etc.)</td>
</tr>
<tr>
<td>507</td>
<td>Movement of patients between wards/sites</td>
</tr>
<tr>
<td>508</td>
<td>Storage</td>
</tr>
<tr>
<td>509</td>
<td>Other</td>
</tr>
<tr>
<td>510</td>
<td>Physical environment</td>
</tr>
<tr>
<td>511</td>
<td>Malfunction/failure/reliability</td>
</tr>
<tr>
<td>512</td>
<td>Unavailability</td>
</tr>
<tr>
<td>513</td>
<td>Maintenance management</td>
</tr>
<tr>
<td>514</td>
<td>Functionality (e.g. ergonomic design, fail-safe, standardisation)</td>
</tr>
<tr>
<td>515</td>
<td>System design</td>
</tr>
<tr>
<td>516</td>
<td>Other</td>
</tr>
<tr>
<td>517</td>
<td>Equipment/supplies</td>
</tr>
<tr>
<td>518</td>
<td>Malfunction/failure/reliability</td>
</tr>
<tr>
<td>519</td>
<td>Unavailability</td>
</tr>
<tr>
<td>520</td>
<td>Unavailability</td>
</tr>
<tr>
<td>521</td>
<td>Maintenance management</td>
</tr>
<tr>
<td>522</td>
<td>Functionality (e.g. ergonomic design, fail-safe, standardisation)</td>
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<tr>
<td>523</td>
<td>System design</td>
</tr>
<tr>
<td>524</td>
<td>Other</td>
</tr>
<tr>
<td>525</td>
<td>Information technology</td>
</tr>
<tr>
<td>526</td>
<td>Malfunction/failure/reliability</td>
</tr>
<tr>
<td>527</td>
<td>Unavailability</td>
</tr>
<tr>
<td>528</td>
<td>Unavailability</td>
</tr>
<tr>
<td>529</td>
<td>Maintenance management</td>
</tr>
<tr>
<td>530</td>
<td>Functionality (e.g. ergonomic design, fail-safe, standardisation)</td>
</tr>
<tr>
<td>531</td>
<td>System design</td>
</tr>
<tr>
<td>532</td>
<td>Other</td>
</tr>
<tr>
<td>533</td>
<td>Staffing</td>
</tr>
<tr>
<td>534</td>
<td>Induction/orientation</td>
</tr>
<tr>
<td>535</td>
<td>Other</td>
</tr>
<tr>
<td>536</td>
<td>Ongoing and refresher training</td>
</tr>
<tr>
<td>537</td>
<td>Other</td>
</tr>
<tr>
<td>538</td>
<td>Workload/Hours of work</td>
</tr>
<tr>
<td>539</td>
<td>Inadequate regular rest breaks</td>
</tr>
<tr>
<td>540</td>
<td>Heavy workload</td>
</tr>
<tr>
<td>541</td>
<td>Long working hours</td>
</tr>
<tr>
<td>542</td>
<td>Other</td>
</tr>
<tr>
<td>543</td>
<td>Service delivery</td>
</tr>
<tr>
<td>544</td>
<td>Delay</td>
</tr>
<tr>
<td>545</td>
<td>Missed</td>
</tr>
<tr>
<td>546</td>
<td>Inappropriate</td>
</tr>
<tr>
<td>547</td>
<td>Other</td>
</tr>
</tbody>
</table>

Root cause analysis guidelines
<table>
<thead>
<tr>
<th>Management and organisational factors</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadership and governance</td>
<td></td>
</tr>
<tr>
<td>□ Leadership presence</td>
<td>601</td>
</tr>
<tr>
<td>□ Leadership style</td>
<td>602</td>
</tr>
<tr>
<td>□ Governance arrangements</td>
<td>603</td>
</tr>
<tr>
<td>□ Other</td>
<td>604</td>
</tr>
<tr>
<td>□ Hierarchical arrangement of staff within the organizational context</td>
<td>605</td>
</tr>
<tr>
<td>□ Span of control</td>
<td>606</td>
</tr>
<tr>
<td>□ Unclear roles/ responsibility</td>
<td>607</td>
</tr>
<tr>
<td>□ Other</td>
<td>608</td>
</tr>
<tr>
<td>Organsational structure</td>
<td></td>
</tr>
<tr>
<td>□ Management arrangements (function)</td>
<td>609</td>
</tr>
<tr>
<td>□ Operation (e.g. Facility Management, Materials Management, Contract Management)</td>
<td>610</td>
</tr>
<tr>
<td>□ Human resources policy</td>
<td>611</td>
</tr>
<tr>
<td>□ Financial policy</td>
<td>612</td>
</tr>
<tr>
<td>□ Information policy</td>
<td>613</td>
</tr>
<tr>
<td>□ Risk management (e.g. incident reporting, investigation and analysis, safety culture)</td>
<td>614</td>
</tr>
<tr>
<td>□ OSH management</td>
<td>615</td>
</tr>
<tr>
<td>□ Other</td>
<td>616</td>
</tr>
<tr>
<td>Objectives, policies and standards</td>
<td></td>
</tr>
<tr>
<td>□ Human resources</td>
<td>617</td>
</tr>
<tr>
<td>□ Financial</td>
<td>618</td>
</tr>
<tr>
<td>□ Other</td>
<td>619</td>
</tr>
<tr>
<td>Resources and constraints</td>
<td></td>
</tr>
<tr>
<td>□ Inadequate safety culture</td>
<td>620</td>
</tr>
<tr>
<td>□ Wrong priorities</td>
<td>621</td>
</tr>
<tr>
<td>□ Other</td>
<td>622</td>
</tr>
<tr>
<td>Safety culture and priorities</td>
<td></td>
</tr>
<tr>
<td>External factors</td>
<td>Code</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>------</td>
</tr>
<tr>
<td><strong>Political</strong></td>
<td></td>
</tr>
<tr>
<td>□ Goals</td>
<td>701</td>
</tr>
<tr>
<td>□ Perceptions</td>
<td>702</td>
</tr>
<tr>
<td>□ Other</td>
<td>703</td>
</tr>
<tr>
<td><strong>Economic</strong></td>
<td></td>
</tr>
<tr>
<td>□ Climate</td>
<td>704</td>
</tr>
<tr>
<td>□ Other</td>
<td>705</td>
</tr>
<tr>
<td><strong>Regulatory</strong></td>
<td></td>
</tr>
<tr>
<td>□ Laws and regulations</td>
<td>706</td>
</tr>
<tr>
<td>□ Ministry of Health requirements</td>
<td>707</td>
</tr>
<tr>
<td>□ Requirements of other regulatory agencies/bodies</td>
<td>708</td>
</tr>
<tr>
<td>□ Other</td>
<td>709</td>
</tr>
<tr>
<td><strong>Partnership working with external organisations</strong></td>
<td></td>
</tr>
<tr>
<td>□ Governance arrangements</td>
<td>710</td>
</tr>
<tr>
<td>□ Management arrangements</td>
<td>711</td>
</tr>
<tr>
<td>□ Contractual arrangements</td>
<td>712</td>
</tr>
<tr>
<td>□ Communication</td>
<td>713</td>
</tr>
<tr>
<td>□ Other</td>
<td>714</td>
</tr>
</tbody>
</table>
Annex B – Fishbone diagram

- Management and Organisational Factors
  - External Factors
  - Work/Care Environment Factors
- Team Factors
- Task and Technology Factors
  - Individual Staff Factors
  - Patient Factors
- Incident/issue being explored
Annex C – Root cause analysis scenarios

1. Death of a 13 month old baby congestive cardiac failure and upper respiratory infection.
2. Alleged ‘negligent care’ involving an 85 year old woman with Clostridium difficile.
3. Possible medication error involving 25 year old male neurology patient resulting in additional 2 day length of stay.
4. Small laboratory explosion during an experiment causing minor injury to a scientist.
5. Injury and 10 day additional length of stay involving 62 year old female orthopaedic patient who fell from her bed whiles being manually lifted into bed by two nursing staff.
Scenario 1

Lizzy was a 13-month-old female who was admitted to the Paediatric Intensive Care Unit of Safeway General Hospital from the A&E department on 24/2/02 with an admitting diagnosis of congestive cardiac failure and upper respiratory infection. Her parents, who stated that Lizzy’s main complaint was a 2-week history of increased respiration, wheezing, weight loss and generalised agitation accompanied her. Lizzy had a past history of cardiac abnormalities. Past surgeries included open heart surgery for repair of the congenital heart defect and gastrostomy tube placement.

She was admitted to the Unit by Dr Smith (Paediatric SHO) and Staff Nurse Jones (Paediatric ICU Nurse).

During her inpatient course of stay, Lizzy was treated with intravenous antibiotics for the upper respiratory infection and with oral Frusemide (t.i.d – i.e. 3x daily) and Digoxin (b.i.d – i.e. twice daily) for her CHF.

The medical and nursing progress notes indicate that her congestive heart failure slowly improved although it is difficult to decipher some of the written entries in both records and there are some ‘gaps’ identified in both records.

Despite this improvement she was having persistent vomiting with her feeds and, as a result she was having trouble maintaining her baseline weight.

On her ninth day of admission, an X-ray of her upper gastrointestinal system with contrast media was performed. She arrived back from Radiology at 13.20 hours she was quite restless and she appeared to be in discomfort. The nurse (S/N Brown) who took the report on Lizzy contacted the attending doctor, Dr Green who documented three orders on Lizzy’s drug kardex, one of them was to administer (what looks like) 0.7 mg of digoxin intravenously. Based on Lizzy’s weight the dose should have been 0.07 mg.

S/N Brown faxed the order sheet to the hospital pharmacy as the ward attendant allocated to the ward had gone on their lunch break.

Prior to sending the order for the digoxin to the pharmacy S/N Brown administered the morphine and choral hydrate that had also been included on Lizzy’s kardex. When the dose arrived from the pharmacy S/N Brown checked the single dose vial label ‘Digoxin’ with another registered nurse S/N Red and then administered the dose intravenously.

S/N Brown has documented in her nursing notes that after administering the digoxin, S/N White told her that the pharmacy had contacted the Unit to report that too large a dose of digoxin had been sent to the Unit.

She has also documented that she (S/N Brown) paged Dr Green once again to inform him about the digoxin dose and to ask him if Digiband should be administered as a drug to reverse the digoxin. However she has noted that he stated that he did not want Digiband given and ‘to wait and see and he would come to the Unit to see her’. There is no record that Dr Green attended the Unit after this time.

Within 2 hours of the digoxin being administered Lizzy began vomiting and went into respiratory distress, with arrhythmias ranging from bradycardia to ventricular fibrillation and subsequently went into cardiac arrest.

The crash call was activated and Lizzy was resuscitated within approximately 35 minutes.
According to the crash call records she was orally intubated, received the appropriate cardiac arrest drugs, and also received Narcan to reverse any possible narcotic-induced respiratory depression. The nursing notes state that Lizzy was extubated after the code by the attending physician on his arrival to the Unit, but her oxygen saturation levels quickly decreased. The Dr then requested that Lizzy be placed on a nasopharyngeal continuous positive airway pressure (CPAP), which she tolerated well for the remainder of the day. At this time Lizzy was in normal sinus rhythm, but 12 hours after her first cardiac arrest Lizzy again showed signs of CHF with increased respiratory distress. The Paediatric Registrar Dr Pink performed Nasotracheal intubation and she was placed on ventilation support. However, by 03.00 hours Lizzy was requiring increased oxygen and showed respiratory distress. Lizzy had a systolic blood pressure that was in the 70’s, decreased breath sounds, and oxygen saturation readings that ranged between 73%-77%. Lizzy then went into cardiac arrest and was pronounced dead 45 minutes later.

Reviewing the Incident:

Questions:

- What level of RCA is required to analyse this incident?
- Which disciplines of personnel should be represented on the investigation and analysis team?
- What documentation will you require access to?
- What will be the time scope for this review?
- Which members of staff will you require to meet with as part of this RCA?

Next Steps (Interview with S/N Brown):

- Nominate 2 members of the group to conduct the interview (one reviewer, one recorder)
- Nominate one member of the group to be S/N Brown

Can the group identify contributory factors and risk reduction strategies?

- What are the contributory factors/root causes that lead to the development of the CDP(s) identified?
- What are the required recommendations (risk reduction strategies) to prevent/reduce the likelihood of recurrence?

Background Information – S/N Brown

You are S/N Brown, you are a RGN and you have 12 years post-registration experience. You have worked in the Adult ICU at Safeway General Hospital for 4 years.

You are a trained ICU nurse but not Paediatric ICU you were sent to the P.I.C.U today on relief due to a number of the staff who work on the Unit going down with flu.

You were asked to go down to the Unit at 09.30 hours (the day shift starts at 08.00 hours) therefore you received a very brief hand-over report from the Nurse in Charge while standing in the middle of the Unit. You received no induction to the Unit.

At 13.20 hours when Lizzy returned to the ICU, 2 of the other nursing staff had gone on their lunch-break leaving you with 2 other staff on the Unit, as they were both engaged with other very sick children you were asked to look after Lizzy
You had never administered a paediatric dose of digoxin before and had no specialised training in intensive care for children. Therefore you gave the dose of digoxin to Lizzy without calculating the correct dosage based on her weight which is the protocol for the administration of such drugs on this Unit.

You did not follow up with Dr Green in relation to reviewing Lizzy when he did not come to the Unit as the other nurses had returned to the Unit from their break by that time, and you thought that one of them would do it, also as you lacked paediatric experience you left it with them as they knew far more about it.

You are very upset about what has happened and feel that you will be ‘blamed’ for this tragic incident. You have not really talked about what had happened as you feel guilty and ashamed.

Your nurse manager has told you that there would be Review carried out by the Risk Management Service and that you would be required to attend an interview. You have never participated in a Review before and do not know anything about the process. You are now frightened and anxious about the implications of the Review.

In addition you have been having difficulty sleeping since the incident you are tense and short tempered at home and feel your partner doesn’t really understand how you feel.

You were not offered access to Critical Incident Debriefing following the incident
Scenario 2

An 85 year old female, Mary Smith, was transferred to a Community Nursing Unit on Tuesday 2/2/04 from the acute hospital for continued wound care and intravenous antibiotics for methicillin-resistant Staphylococcus aureus (MRSA) osteomyelitis of the heel for which Mary was prescribed IV Vancomycin. On the Thursday after admission to the Unit Mary began to have frequent, large stools. By Friday morning her condition had not improved and the nursing staff on duty requested that her GP attend the Unit to review Mary’s condition.

Mary’s GP arrived at 16.30 hours and reviewed Mary, subsequently he ordered a test for Clostridium difficile (C diff). Mary was his last call of the day and following this appointment he was due off call for the weekend.

Later that evening (18.30 hours), the test result was returned as Positive. The Medical Scientist in the Laboratory telephoned the ward but was unable to get a reply from the number. He then rang the Main Reception and requested that the Receptionist would contact a member of staff from Ward 1 for him, after trying the ward number without success for five minutes, the Receptionist bleeped the Senior Nurse Manager on duty and transferred the telephone call to her office. The Senior Nurse Manager took the result and went to the ward and relayed the result to a member of the nursing staff, Staff Nurse Brown.

Staff Nurse Brown was also providing the nursing care to Mary during the rest of the evening. Staff Nurse Brown did not inform the GP on call or the other nursing staff on the ward of the result. However she did place isolation signs on Mary’s door and chart, and she also noted the result in the patients nursing notes.

Each nurse that subsequently cared for Mary assumed that medical personnel were aware of the result, in large part because the patient was receiving vancomycin. However, it was IV vancomycin (for the MRSA osteomyelitis), not oral vancomycin, which is required to treat C.difficile.

On Monday afternoon, Mary’s GP, Dr Grey who originally ordered the C.difficile test returned to assess the patient and found isolation signs on her door. He asked why he had not been informed and why the patient was not being treated. The nurse on duty told him that Mary was on IV vancomycin. Mary’s GP immediately charted Mary for the appropriate dose of medication and Mary received her first dose of medication shortly after this.

Due to the lack of follow-up the patient was three days without treatment for C.difficile, and continued to have more than 10 loose stools daily. Given her advanced age her physical condition subsequently became very weak, she required assistance to wash, to mobilise and to feed herself. She was also quite ‘weepy’ and distressed at times, stating ‘I will never get better – I’m going to die here’.

Mary’s daughter and son who were in the Unit on a number of occasions over the weekend period and were aware that she was being cared for in isolation were very angry when they learned that she did not receive any medical treatment over the weekend and by what they see as the hospitals ‘negligent care’ of their mother.

Mary’s hospital stay was extended by a period of twenty days and at the time of her discharge her son and daughter state that she is not the same person that she was prior to her admission.

They have stated that they will be bringing this matter to the attention of their local politician and to the media.
Root cause analysis guidelines

Reviewing the Incident:

Questions:

- What level of RCA is required to analyse this incident?
- Which disciplines of personnel should be represented on the investigation and analysis team?
- What documentation will you require access to?
- What will be the time scope for this review?
- Which members of staff will you require to meet with as part of this RCA?

Next Steps (Interview with S/N Brown):

- Nominate 2 members of the group to conduct the interview (one reviewer, one recorder)
- Nominate one member of the group to be S/N Brown

Next Steps (Interview with Dr Grey):

- Nominate 2 members of the group to conduct the interview (one reviewer, one recorder)
- Nominate one member of the group to be Dr Grey

Can the group identify any contributory factors and risk reduction strategies?

- What are the contributory factors/root causes that lead to the development of the CDP(s) identified?
- What are the required recommendations (risk reduction strategies) to prevent/reduce the likelihood of recurrence?

Background Information – S/N Brown

You are S/N Brown, you are an agency nurse and this is your first shift at the Community Nursing Unit – you have been booked to cover a series of shifts on the Unit starting today and the evenings of the next three days.

You are a Registered Psychiatric Nurse with ten years post-registration experience, the majority of your working career was spent in the area of Acute Admissions. You joined the agency six months ago to facilitate your domestic/child-care needs. When you joined the agency you expressed a preference that you would only be allocated to work in Psychiatric Units. However the agency contacted you this afternoon and asked would you accommodate them on this occasion as they had no suitably qualified nurses and the Unit had indicated that they were ‘desperately short-staffed’ on this occasion.

You received no induction on commencing duty in the Unit at 18.00 hours but did receive a hand-over report in relation to the eight patients that you were caring for on your shift. The majority of the patients require intensive nursing care and assistance with the activities of daily living, you have been told that you can ‘call on another nurse’ if you require any assistance.

At the hand-over report you were informed that a sample and been taken from Mary and sent to the Laboratory for C.Diff.

However you were not aware that you were required to inform the GP of the result as it was your previous experience that the physician would check the results of the tests that he had ordered.
At 19.00 hours the Nurse Manager informed you that the result had been returned as Positive. This was an extremely busy time on the Unit as patients were being bathed, assisted to the bathroom and the medication round was just being finished off. You were also trying to deal with the requests of visitors who were on the Unit at the time – one group of visitors had two toddlers with them who are running around the ward upsetting some of the patients on the Unit.

You charted the Positive result in the patient’s nursing notes as soon as you had an opportunity but did not report the result to the other members of nursing staff as you assumed that those other nursing staff providing care to Mary would refer to these notes.

**Background Information – Dr Grey**

*You are Mary’s GP and have been looking after her for the past three years when you joined the GP practice.*

Your secretary relayed a message to you at 11.20 hours to request that you would attend the Community Nursing Unit to review one of your patients Mrs Mary Smith who was experiencing ‘persistent bouts of diarrhoea’ for the previous twenty four hours.

You attended the Unit at 16.30 hours and saw Mary, based on her presentation and symptoms you requested that a stool sample be taken and sent to the Laboratory for testing for C.diff.

You left the Unit at 17.00 hours and were off call for the rest of the weekend, however you had to make one emergency house visit prior to this, and it was 20.00 hours before you finally finished duty.

You did not inform your colleague Dr Pink – who was on call for the weekend of Mary’s treatment plan as it was your assumption that the nursing staff would contact her on receipt of the test result from the Laboratory.

There is an informal system of hand-over telephone calls between GPs on call but because of the emergency visit that you were required to make you did not have an opportunity to make this call to Dr Pink and you subsequently forgot to call her when you eventually got home.

There is no system in place for structured sign-outs for on-call medical staff to include ‘to-do’ lists in place at the Unit although you had mentioned that this might be useful as a similar near-miss incident occurred three months ago prior to a Bank Holiday weekend.
Scenario 3

John Black is a twenty-five year old male admitted to the neurological service of Safeway General Hospital on Monday 14/7/03 for monitoring and treatment for a seizure disorder which has been recently diagnosed.

John was admitted to the Ward by Dr Blue (Senior House Officer) and Staff Nurse Red.

John was prescribed Carbamazepine 200mgs twice daily. As part of the management plan for John daily serum drug levels were ordered and performed. The results of the daily serum drug levels were consistently below the therapeutic range, which led the medical team to gradually increase the doses of the drug.

On the seventh day of admission during the afternoon, John appeared drowsy, which progressed to a stupor, John became unresponsive and was hypotensive. The Neurological Registrar, Dr Brown was contacted and requested to review John’s condition.

In order to rule out all possible causes of John’s condition the Registrar also requested that a serum drug level should be carried out in addition to the other blood tests ordered for John. On return of the results she was very surprised to learn that the Carbamazepine level was markedly elevated, in the toxic range.

The cause of the toxic Carbamazepine level was assumed to have been caused by an accidental overdose on the day of the patient’s deterioration. Although there is no evidence of this from the patient’s medical/nursing record or the prescription chart. When asked Staff Nurse White who administered medications on the 20/7/03, and Staff Nurse Pink who administered them during the night shift of the 19/7/03 confirm that there was no medication errors made during the day or the previous night.

The patient’s Consultant and the Hospital Pharmacist were also informed of the incident.

The appropriate treatment regime was initiated and John’s serum drug levels returned to normal levels, he did not suffer any long-term effects from the incident, although the incident did result in a two day extension to the length of John’s expected stay in hospital.

Reviewing the Incident:

Questions:

- What level of RCA is required to analyse this incident?
- Which disciplines of personnel should be represented on the investigation team?
- What documentation will you require access to?
- What will be the time scope for this incident?
- Which staff members will you require to meet as part of this review?

Next Steps (Interview with S/N White and Hospital Pharmacist Green)

- Nominate two members of the group to conduct the interviews (one reviewer, one recorder)
- Nominate two members of the group to be S/N White and Pharmacist Green

Can the group identify any contributory factors and risk reduction strategies?

- Using the MoH RCA guidelines, what are the contributory factors/root causes that led to the incident (if any)?
What are the required recommendations (risk reduction strategies) to prevent/reduce the likelihood of recurrence?

**Background Information – S/N White**

You are S/N Pink a staff nurse on the neurology ward, you are an RGN with six years post-registration experience. You have been allocated to the neurology ward for the past six months.

On the day of this incident you were working a ‘long-day’ and were on duty from 08.00 hours to 20.00 hours, therefore you conducted each of the drug administration rounds between those hours. The drug rounds were conducted at 08.00 hours, 14.00 hours and 18.00 hours. Because the ward is generally busy and other members of the nursing staff were engaged in other duties you were on your own when administering the drugs (This practice does comply with professional standards laid down by your professional body).

You can recall administering the medication to John as he was having difficulty coming to terms with the relatively new diagnosis of his condition and you had spent a few minutes talking to him about the medication you were giving him. You recall administering the Carbamazepine suspension (as this was the preparation available on the drug trolley) , prior to the administration of the medication you shook the bottle momentarily as you usually would when administering any suspension.

You are very upset by the events of the day, you believe that senior staff on the ward suspect that you administered an incorrect dose of medication with one senior staff member stating ‘That is the only logical conclusion’. However you are sure that you did not make an error in relation to the dosage that you administered to John.

Your manager has told you that this incident will be ‘investigated’ but you are not sure what that means, in your experience this generally means ‘whose fault was this?’

You are worried about the outcome of this investigation and fear that you may be ‘scape-goated’ in the absence of any other explanation.

**Background Information Hospital Pharmacist Green:**

You are the Hospital Pharmacist at Safeway General Hospital and have worked there for the past three years.

You were informed that this incident had occurred because it was related to medication use.

You have conducted your preliminary investigation into this incident and based on the levels of suspension remaining in the Carbamazepine container/bottle on the ward you are satisfied that that the dosing error did not occur on the day of the patient’s deterioration.

You have also identified that the brand of Carbamazepine suspension used in the hospital was recently changed to a generic formulation that tends to settle out of the suspension significantly faster than the original manufacturer’s suspension.

Based on these facts you have reached the conclusion that a failure to shake the bottle or to shake it vigorously enough prior to administration resulted in the initial doses of the drug being very dilute, however as more of the drug was used the remaining solution became increasingly concentrated, resulting in a toxic dose.
The suspension bottle did not have a ‘Shake Well’ sticker as it was assumed that all staff would be aware of this requirement prior to administration.
Scenario 4

Azobisisobutyronitrile Fire

On the 2nd February 2005 Rose White, a scientist at X laboratory was heating dioxane, a flammable solvent, and azobisisobutyronitrile on a hot plate in a glove box when a leak developed in the box. The experiment involved heating 300mls of dioxane, 30 grams of N-isopropylacrylamide, and 6.4 grams of azobisisobutyronitrile (VAZO 64) in an inert atmosphere, on a hot plate. Early on in the experiment the scientist suspected that there might be an air leak because the gloves which normally inflated were sagging.

As she endeavoured to locate the source of the leak she spilled approximately 10mls of the VAZO 64. Working within the gloves, she wiped up the spill with some paper towelling. Suddenly, with no warning the reaction exploded and threw her three to four feet into the bench behind her.

Another scientist telephoned Security and the Environmental Health and Safety Office. He evacuated all of the rooms on the hallway and all of the adjacent laboratories, taking the Safety Statement (which contained the Material Safety Sheets) for the area with him. The injured scientist was assisted from the building and she informed the Health and Safety Officer (John Brown) of the chemicals that were involved in the incident, however she forgot to mention the VAZO 64. She was visibly shaken and her eyelashes and hair were singed. The Health and Safety Officer advised that she shower, change clothes and attend the local Accident and Emergency department.

The weather on this day was extremely cold and the staff from the laboratory were requesting to go and get their coats etc. John Brown from the Health and Safety Office entered the lab with a half face respirator with organic vapour cartridges to shut down the experiment, retrieve personal items and open windows. He found that many of the windows which had been designed to open were sealed shut. After about 10 minutes of trying to open the windows, a pane of glass was broken for ventilation.

An emergency response team from the local fire service was called after several hours to appraise the situation because of the persistent smell.
The emergency response team wore Self Contained Breathing Apparatus.

Neither scientists experienced any chemical exposure symptoms, although both were examined by physicians. The scientist involved in the explosion did sustain a fractured rib as a result of her impact with the counter.

The next day the scientist was interviewed again. She informed the Health and Safety Office of the chemical that she had forgotten to mention the day before. As she thought it might be responsible for the residual smell in the laboratory. Researching the chemical the Health and Safety Office discovered that upon heating the VAZO 64 readily converts to Tetramethylsuccinonitrile, an odourless chemical that is highly toxic and can be fatal in very small amounts. Concentrations of Tetramethylsuccinonitrile are Immediately Dangerous to Life and Health (IDLH) at 5ppm (For reference: NIOSH lists Sodium Cyanide, gas at 25 ppm, both by inhalation).

John Brown (Health and Safety Officer) who had entered the room experienced temporary symptoms for Tetramethylsuccinonitrile that had penetrated his cartridges and was subsequently out of work for a period of four days.
Reviewing the Incident:

Questions:
- What level of RCA is required to analyse this incident?
- Which disciplines of personnel should be represented on the investigation and analysis team?
- What documentation will you require access to?
- What will be the time scope for this incident?
- Which staff members will you require to meet as part of this RCA?

Next Steps (Interview with Scientist Rose White and Health and Safety Officer John Brown)
- Nominate two members of the group to conduct the interviews (one reviewer, one recorder)
- Nominate two members of the group to be Rose White and John Brown.

Can the group identify any contributory factors and risk reduction strategies?
- Using the MoH RCA guidelines, what are the contributory factors/root causes that led to the incident (if any)
- What are the required recommendations (risk reduction strategies) to prevent/reduce the likelihood of recurrence?

Health and Safety Officer John Brown

You have been employed as the Health and Safety Officer at the campus for the past two years. Although you have undergone the basic Health and Safety training you have never undergone Hazmat training (chemicals), consequently your knowledge/skills in this area is not complete. Your colleague/superior has undergone this training but on the day of this incident he was on annual leave.

There were no protocols or Standard Operating Procedures in place to manage suspected chemical spills etc at the time of this incident that you were aware of. Thus you made your selection of Personal Protective Equipment in the absence of this information and based on what you thought was right (the PPE selected was insufficient to protect you from the chemicals that had been released).

You had never seen the Safety Statement for the laboratory before the day of the incident. Because of this and in the absence of protocols you made the decision to enter the laboratory despite the fact that it was an unknown atmosphere, and you removed the student’s possessions at their request without the area being decontaminated.

Despite the fact that there were two full-time Health and Safety Officers on campus you or your superior/colleague had never attended a Safety meeting in the laboratory. You had raised this as an issue with your superior/colleague in the past however you were told ‘this was a specialised area and they look after themselves’.

You are very angry about this incident and the potential danger that you were exposed to, you feel that the organisation failed in it’s duty to protect you.
**Scientist: Rose White**

You have only worked in X laboratory for three months, although you had done some graduate work there about twelve months ago, for this reason it was felt that there was no requirement for you to undertake the mandatory induction programme in place at the laboratory.

You were aware that there was a Safety Statement in place for the laboratory, however it had never been made clear to you that you were required to read the document and be familiar with it’s contents. The document is stored in a dusty folder on the top shelf in the Main Office, you're not sure if anyone has ever read it, it is your understanding that it is there because the legislation says you must have one, not because it is an important safety management tool. A copy of the Materials Safety Data Sheet for VAZO 64 was available to read in the Safety Statement.

You had never used VAZO 64 in a procedure prior to the day of the incident when you asked one of the senior scientists if there were any special precautions to be taken in relation to the use of this substance. They had told you that they were not sure, but that you should refer to the Materials Safety Data Sheet. Most Material Safety Data Sheets are on display over the work-bench areas, however the MSDS for VAZO 64 was not copied and put on display, instead it was placed in the Safety Statement with all other MSDS’s. You were not aware that this is where you would find the MSDS and when you could not see it on display over the work-bench you assumed that there were no special precautions required in the use of this substance.

There was a manual of Standard Operating Procedures in place at the laboratory at the time of this incident, and this document contains an instruction that all MSDS’s are available to view in the Safety Statement. However as the experiment that you were conducting was relatively simple you did not refer to the SOP manual on this occasion.

You are very upset about this incident. In addition now that you have been told that the incident will be subject to an investigation you are worried and concerned, in particular you are worried – will you face discipline/will this effect your promotional prospects/ what if the Health and Safety Officer ‘sues’ will you be personally liable.
Scenario 5

Mrs Ann Green is a 62 year old lady she was admitted to the Orthopaedic Ward of Safeway General Hospital on the 11/1/05 for a left Total Hip Replacement.

Ann has a history of chronic Osteo-arthritis and Chronic Obstructive Airways Disease.

Because of this she has been experiencing decreased mobility over the past 18 months and has become wheelchair bound for the 2 months leading up to her surgery. Ann lives alone and she is a smoker, smoking approximately 25-30 cigarettes daily.

The nursing staff reported that Ann was slow to progress, she had intermittent nausea and vomiting in the two days post her surgery but this has now stopped. The physiotherapist, Ms Pink has been getting Ann out of bed onto a chair since day 5 post –operatively. Since then Ann has also been mobilising a few steps each day with the aid of a Zimmer Frame. Ms Pink has documented in Ann’s medical notes that Ann should get up and sit out in a chair for a few hours during the day and that she should be assisted to mobilise with the Zimmer Frame as able with assistance from staff as required.

On the 23/1/04 Staff Nurses Black and White assisted Ann to sit out in her chair at 11.00 hours. At 11.30 hours Ms Pink arrived to the ward to see Ann and she assisted Ann to mobilise with her Zimmer Frame. She told Ann that she would endeavour to come back in the afternoon to mobilise Ann once again.

Ann remained sitting in her chair to have her lunch, at 14.30 hours Ann called out to the two members of the nursing staff who were administering medication in the ward (Staff Nurses Black and White) and asked them to assist her back to bed, as she was very tired.

The two staff nurses indicated that they would 'be with Ann in a minute', they closed and locked the medicine trolley and went over to Ann’s bed area as they approached her, another patient in the ward who appeared to be intermittently confused and upset began to shout out and was crying loudly.

Staff Nurse Black suggested that they use the hoist on the ward to transfer Ann back to bed, but the two nurses noted that the hoist was not in it's usual storage position on the ward. Staff Nurse White then indicated that she had managed to get Ann out of bed this morning with minimum assistance so she suggested that it would be quicker to do a manual transfer.

Ann stood from her chair with assistance from the two nurses and she mobilised to the edge of the bed, however the bed was too high and she slid to the floor. Staff Nurse White endeavoured to break her fall and both she and Ann ended up on the floor.

Following the incident Ann complained of a pain in her left hip and she was unable to place her left foot on the floor. Staff Nurse White said that she was experiencing lower back pain.

Ann had an X-ray taken and it was found that she had a displaced her left hip replacement. Staff Nurse White was sent off duty to see her G.P and was subsequently out on sick leave for 14 days, she experienced no long-term consequences.

Ann had to remain in hospital for an additional 10 days to have the required interventions to repair her left hip replacement. She was very upset by the incident and has become very anxious in manner and is very worried about returning to her home in case she falls again and has no-one to call on for assistance.
Reviewing the Incident:

Questions:
- What level of RCA is required to analyse this incident?
- Which disciplines of personnel should be represented on the investigation and analysis team?
- What documentation will you require access to?
- What will be the time scope for this review?
- Which members of staff will you require to meet with as part of this RCA?

Next Steps (Interview with S/N Black):
- Nominate 2 members of the group to conduct the interview (one reviewer, one recorder)
- Nominate one member of the group to be S/N Black

(Interview with S/N White):
- Nominate 2 members of the group to conduct the interview (one reviewer, one recorder)
- Nominate one member of the group to be S/N White

Can the group identify any contributory factors and risk reduction strategies?
- Using the MoH RCA guidelines, what are the contributory factors/root causes that lead to the incident?
- What are the required recommendations (risk reduction strategies) to prevent/reduce the likelihood of recurrence?

Background Information – S/N Black

You are S/N Black, you are an agency nurse and this is your first shift at the Orthopaedic Ward of Safeway General Hospital.

You are a Registered General Nurse and you qualified in 1975. The majority of your working career was spent in Theatre, however you gave up full time work in 1985 to facilitate your home-life and child-care needs and you have only returned to work in the past 6 months when you joined the agency.

When you joined the agency you were told that moving and handling training would be provided but so far you have not been contacted in relation to this training and you did not follow it up as you felt things couldn’t have changed that much since you did your last training.

You received no induction on commencing duty on the ward at 08.00 hours but you did receive a hand-over report in relation to the patients on the ward.

At the hand-over report you were informed that Ann Green was 10 days post-operative post Total Hip Replacement and that she was mobilising with minimal assistance, no further details were provided.

You were also aware that Ann was seen by the Physiotherapist, Ms Pink this morning however to your knowledge there was no communication following this intervention between Ms Pink and the nursing staff on the ward. You were later told that the Physiotherapists do document orders in the patient’s medical charts however this information is not always communicated to the
nursing staff unless they read and transcribe the information into the patient’s Nursing Care Plan.

At the time that this incident occurred you were already involved in the medication round on the ward with S/N White, and as you both went to assist Ann, another patient who was reported as being confused with a propensity to get out of bed was observed to be agitated. You were therefore worried that she might endeavour to get out of bed by herself and sustain another fall (it was reported at the hand-over that she had already fallen 5 times in the past 2 weeks.)

You had suggested using the hoist to transfer Ann, however when you went to get the hoist, it was not in the storage place indicated to you, S/N White told you that it was always being taken away for repair without any notice.

S/N White also indicated at this time that she had managed to get Ann out of bed this morning with minimum assistance. Because of this, the absence of the hoist and your concerns for the safety of the other patient you both decide to implement a manual transfer.

Following the incident you are very upset and worried, you are also concerned that you may have contributed to the incident because of the manner in which you implemented the transfer and that this may have implications for your future employment.

You are contacted by the agency at your home to tell you that the hospital are investigating the incident and want to speak to you ‘as a matter of urgency’, this increases your anxiety, you are also angry as you feel that you are being blamed for this incident because you are an agency staff member.

**Background Information – S/N White**

You are S/N White, you are a Registered General Nurse you qualified in 1999 and have worked at Safeway General Hospital for the past 6 years since qualifying. You have worked on the Orthopaedic Ward for the past 18 months.

You last undertook moving and handling training in 2000. You are aware that there are mandatory requirements in relation to this training but you are unsure what they are. To your knowledge there are no Moving and Handling Instructors on site but periodically training is provided at the hospital usually after an incident has occurred. As far as you are concerned and aware this is not really an area of priority, it is just something you have to do when you are sent.

During the 18 months that you have worked on the ward, there have been numerous occasions when the hoist has been ‘missing’. It has usually been borrowed or removed for repair or maintenance, There is one hoist available in a ten bedded area, although because of the ward profile it is frequently required to move/transfer patients.

It has been brought up at a number of Team Meetings that the number of hoists is inadequate and also the issue that the hoist may not be available and staff are unaware of it’s whereabouts. However nothing has been done about this to date and staff now just accept the situation and try to work around it as far as possible. There is no Safety Statement in the ward area and you are unsure what this is or what it does.

The issue of an integrated Care Plan for patients has also been discussed in relation to improving communication between multidisciplinary teams, however there has been no agreement reached on this. The existing communication between the nursing and physiotherapy staff is not as good as it could be, physiotherapists often come onto the wards and treat patients when nursing staff are engaged in changing dressings/consultants rounds and therefore information may not be transferred.
On the day of this incident you had assisted Ann out of bed in the morning on your own, however you had lowered the bed prior to assisting her to stand up which you forget to do when assisting her in the afternoon because of the distractions.
Annex D – Root Cause Analysis summary reports (case studies)

1. Delay in Diagnosis of Inappropriate Anti-Diuretic Hormone Secretion (in a patient undergoing pituitary surgery).

2. Death of a female patient due to missed diagnosis of renal failure and hyperkalaemia.


4. Death of a 63 year old male patient from the delayed management of a gastrointestinal haemorrhage after transfer from a rural hospital to a tertiary referral centre.

5. Death of an 83 year old female patient after sustaining a fractured neck of femur in a fall. The patient’s family submitted a complaint to the Health Care Complaints Commission alleging that the medical management of the patient had been inadequate. They did so after failing to resolve their issues with the hospital’s complaints officer.

6. Suicide death of a 22 year old male patient who used his bed sheet to hang himself from the ceiling fan in his single room within a mental health facility.
Root Cause Analysis – Summary Incident Report

Case Study 1

Delay in Diagnosis of Inappropriate Anti-Diuretic Hormone Secretion (in a patient undergoing pituitary surgery).

Incident Description

- Annette was a 40 year old woman who was on a methadone treatment regime for long term narcotic addiction. She presented initially to the ophthalmology clinic with disturbed vision. A CT scan revealed a large adenoma in the pituitary gland and her care was transferred to the endocrinology and neurosurgical teams.

- She was commenced on diazepam to assist methadone withdrawal. However after eight days her vision suddenly deteriorated and she was placed on the urgent list for surgery.

- Annette was taken to theatre late on Monday afternoon. She had been assessed by the endocrinology team at the end of the previous week. Surgery was contemplated for the weekend, but other critical trauma cases prevented this from occurring.

- The patient’s family had expressed concerns about her drowsiness for a few days before this, but the staff attributed it to diazepam. The family felt that their concerns were not heeded and that the staff members were dismissive.

- Annette had a blood sample taken for biochemical analysis one hour before going to theatre. The test was ordered by the junior resident who then left for the day.

- After six hours in neurosurgical recovery, the patient’s condition began to deteriorate. The endocrinologist was rung at 2 am – he did not know that the surgery had occurred. He did not know that the patient had an extremely low sodium of 105. That result had been rung through from the pathology department to a ward clerk in the ophthalmology unit. The patient had not received the pre-operative steroid regime that had been recommended and recorded in the patient’s notes on the preceding Friday by the endocrinology team.

- The neurosurgical registrar delegated management of the patient’s fluid balance and electrolytes to an intern who, unaware of the abnormal electrolytes, ordered an inappropriate fluid and electrolyte regime. The endocrinologist was telephoned on two occasions, but did not attend as he did not realize the gravity of the situation.

- The patient lapsed into coma. Life support was ceased 4 days later. Blood samples, which had previously been drawn for the purposes of calculating prolactin levels every two days in the lead-up to surgery, were subsequently analysed. It was found that the patient had suffered extremely abnormal biochemical parameters, including a low sodium level, for many days prior to surgery.

Contributing Factors

- Poor communication between treatment teams (endocrinology, neurosurgery and anaesthetics).

- Insufficient pre-operative assessment and preparation.
Inability to track patient’s location within the hospital as she moved to other wards and the operating theatre.

Poor systems within the pathology department for delivering highly abnormal results to practitioners, especially in the after-hours.

**Risk Reduction Strategies**

- Improved protocols for the neurosurgical, anaesthetic and endocrine management of patients with pituitary pathology who are at risk of developing diabetes insipidus.
- Improved registrar training. Education about the protocol for neurosurgical and endocrinology registrars on a recurring basis. Sign off by new trainees at the beginning of their training terms that they have read and understood the protocol.
- Improved liaison pre-operatively between anaesthetists and neurosurgeons in relation to patients undergoing pituitary surgery (to be included in the protocol).
- The development of tailored consultation sheets to be used where more than one treatment team is caring for a patient (for all patients).
- Abnormal pathology results to be delivered to a medical practitioner who is able to understand and act on them.
- Development of a new tracking system to enable staff in pathology and other areas to determine the patient’s location any point in time. A special icon will flash on the computer screen when the patient is in the operating theatre.

**Learning Points**

Special challenges were experienced with this case with regard to

- Open disclosure of information to family members after an adverse outcome
- The ability (or inability) to offer an ex-gratia payment within a public health system
- Monitoring and review of actions – the need to be able to provide evidence that changes have been implemented
- The delivery of RCA findings to family members
- Culture change – moving away from department/division led one-man investigations to an open RCA team process
- Two ineffective recommendations for improvement which were not appreciated for 6 months
Root Cause Analysis - Summary Incident Report

Case Study 2

Death of a female patient due to missed diagnosis of renal failure and hyperkalaemia.

Incident Description

- June was a 54 year old obese woman who presented at midday by ambulance to the Emergency Department of a rural hospital after seeing her family physician in his consulting rooms. The patient attended the GP because of diarrhoea, vomiting and back pain.

- At 2pm she was reviewed by the clinician and found to have a degree of heart failure. A chest x-ray and biochemical tests were ordered. There was some difficulty collecting the blood test at 3.30 pm. The patient was given Lasix just after this but did not void.

- At 9.30 pm staff noted that the patient had become very drowsy. The on-call general practitioner was asked to review the patient. The patient’s oxygen saturation was 84%.

- At 10 pm the treating doctor was notified that the patient’s BP had dropped to 75/40 and she was transferred to the high dependency unit.

- At 11pm the patient had a cardio-respiratory arrest. The resuscitation was carried out by another GP – the current system within the hospital means that the on-call doctor changes every four hours during the evening. The original treating doctor also attended and there was confusion about who was meant to be doing what during the attempted resuscitation. The doctors were unable to intubate because of the patient’s short and obese neck and their lack of skills in difficult intubations.

- June had a creatinine level of 800. No potassium level had been assessed because the afternoon blood sample was haemolysed on collection. Subsequent analysis gave a potassium level of 8.0. The creatinine level had been faxed to the original treating GP’s surgery and home at 6pm. He did not check his home fax machine and he had already departed from his consulting rooms. The pathology result was not phoned through to the ward at the hospital. The printed copy of the result arrived the next day.

- The doctor had not been rung about the high creatinine because” there are so many patients in renal failure in that region” it was not regarded as unusual. He had not been informed that the blood sample was haemolysed and unsuitable for potassium assessment.
Contributing Factors

- Inadequate systems for the delivery of highly abnormal pathology results to ward staff and practitioners
- Inadequate systems for informing ward staff and practitioners that blood or tissue samples need to be re-collected where there is a problem upon reception by the laboratory.
- Inadequate GP resuscitation skills – especially dealing with difficult intubations.
- A confusing and inefficient roster system for provision of after-hours medical care by GPs.
- No protocols in place for the team management of cardiac or respiratory arrest

Risk Reduction Strategies

- The General Practitioners providing services to the hospital will review and improve the roster for after-hours call
- The pathology service will review and improve its policy and processes around the notification of abnormal results, especially in the after-hours.
- A formal resuscitation protocol will be developed for the hospital and it will be accompanied by an implementation plan.
- General management will facilitate annual review and training for GP resuscitation skills, including intubation.

Learning Points

Special challenges were experienced with this case with regard to

- The application of a logic based software programme to drill down to the true root causes, and to generate causation statements
- Referral to the RCA process via death audits / limited occurrence screening processes
- A systems focus of the investigation as opposed to individual performance.
- The importance of feedback to the clinicians and their peer review processes
Root Cause Analysis - Summary Incident Report

Case Study 3


Incident Description

- Henry is a 24-year-old male who suffered a fracture of the temporal bone when he was hit in the head with a baseball bat. He was transferred from a regional hospital 24 hours after the incident to the tertiary referral center by helicopter and taken immediately to the operating theatre for relief of a L sided subdural haematoma.

- During the operation, a bone flap was removed from the patient’s skull. 4 bone chips and swabs were sent for bacterial assessment and the rest of the flap was sent to the Bone Bank for storage. The patient was transferred to the ICU.

- 5 days later the patient was transferred to the neurosurgical ward where he made an uneventful recovery. 10 days later he was transferred back to the regional hospital and advised to wear a bicycle helmet when he was outside.

- 2 months later the patient attended an outpatient clinic at the tertiary centre where he was reviewed by a registrar. Henry was placed on the waiting list for cranioplasty and informed that the procedure would be done in the next few weeks. The registrar issued a request for admission with an Urgency rating of 7 and it was submitted to the hospital by the patient on the same day.

- The patient’s family regularly contacted the registrar throughout the next seven months attempting to ascertain an admission date.

- After eight months the patient’s family contacted A Current Affair who contacted the Minister of Health to enquire about the patient’s extended waiting time.

- The following day the hospital scheduled the patient for cranioplasty one week later. Three days later the hospital contacted the bone bank and were told that the bone flap had been discarded. The family was then contacted re the planned date for surgery.

- On the same day A Current Affair covered the extended waiting time issue in their programme. The following evening it went to air with information that the bone flap had been discarded. The television interviewer was the person who informed the patient and his family that there was no viable bone flap and that an acrylic substitute would be used.

- One week after surgery had been completed, A Current Affair aired another programme showing the successful outcome for the patient and his family.
Further information Gleaned from Interviews

- Patients with RFA Urgency Level 7 should receive treatment within 90 days
- Requests for admission are meant to contain the recommended admission date for planning purposes
- The treating specialist had directed Admissions to refer private patient enquiries to his consulting rooms and those of public patients to his registrar. Various registrars are contacted re admission enquiries and advise specialists accordingly. Other neurosurgeons work to a different system. They personally organize their theatre list directly with Admissions and manage all enquiries from patients and their families with regards to re-admission.
- 7 days after admission the pathologist advised both the neurosurgical ward staff and the treating neurosurgeon that one bone segment was not sterile. This was probably because of contamination at the time of collection.
- One day after surgery the bone bank medical officer and specialist decided to re-pack the bones (Femoral head to skull flap kit)
- 18 days after admission Bone Bank notified the specialist that the bones were being disposed of because they had not been repacked
- At four months and seven months post discharge, the family were sent the waiting list audit by the Admissions department to validate the waiting list

Contributing Factors

- The OT could not locate a Skull Cap Kit, which led to the bone being harvested onto a Femoral Head Kit that impaired sterility and resulted in the bone being disposed of.
- The bone was not re-packed into the correct kit despite several discussions between Bone Bank and the consultant, which impaired sterility and resulted in the bone being disposed of.
- Registrars informed the specialist that the patient was calling regularly requesting a sate for re-admission but the specialist considered the case was non-urgent and cosmetic in nature in comparison to other cases on the waiting list.
- Registrars have to field enquiries from public patients and their families but do not have control of, or the necessary information, to manage the waiting list effectively. As a consequence there is no mechanism for regularly reviewing the clinical priority of public patients being treated by this particular specialist. Inadequate GP resuscitation skills – especially dealing with difficult intubations.
- There are inadequate resources allocated to treating Urgency 7 patients awaiting surgery within 3 months.
Risk Reduction Strategies

- Specialists are to review patients at the out-patient clinic and disclose the expected waiting list time in writing (and in the medical file) by the relevant urgency category.

- The Admissions Dept is to forward to specialists the statistical average length of waiting list by urgency when sending out the public patient waiting list.

- Neurosurgeons to agree and formalize clinical guidelines for categorizing the urgency of Cranioplasties.

- Establish a register of all bone flap removals/samples so that patients receive appropriate follow up procedures before the bone samples expire or are discarded.

- All patients requiring cranioplasties are to be given, at the time of discharge, an Request For Admission with a proposed re-admission date and clinical management plan.

- Review the storage process for Skull Flap Kits within OT to ensure supplies are adequate. Place a warning sign that Femoral Head Kits are not to be used.

- Establish a process of formal clinical management plans for all patients so that enquiries for the public hospital waiting list can be dealt with efficiently.

- Establish an agreed common process for managing public neurosurgical patients on the waiting list.

- Advise general management when the service is unable to comply with the health department waiting list times.

- Bone Bank to develop a system of early written liaison with the hospital when bones are to be discarded.

- Bone Bank to establish an Informed Consent process in relation to the acquisition and storage of bone samples.

Learning Points

Special challenges were experienced with this case with regard to

- Communication skills required for effective interviewing of challenging clinicians.

- The need for effective outcome/implementation measures.

- Individual performance versus systems issues.
Root Cause Analysis - Summary Incident Report

Case Study 4

Death of a 63 year old male patient from the delayed management of a gastrointestinal haemorrhage after transfer from a rural hospital to a tertiary referral centre.

Incident Description

- Harold was a 63 year old patient who presented to a rural hospital with a two week history of epigastric pain. He was found to be tender in the epigastrium on examination and an ultrasound and endoscopy were booked for 4 days later. He was sent home after being assessed as a non-urgent patient. The patient was taking anti-inflammatory medications for arthritis.

- Harold returned the next day at 1230 with epigastric pain and shock. He had a pulse rate of 120 and the BP, which initially improved then fell again, was 80/60. The trainee GP called the tertiary centre and discussed the patient with the gastroenterologist on call. He was advised to send the patient to that center immediately by ambulance. The specialist was not told of the patient’s presentation on the previous day. As instructed, the GP registrar called the ward H3 to book the patient a bed.

- No observations were taken after 1400 hours.

- A road ambulance was booked at 1430. It left for the tertiary centre one hour later. No transfer letter accompanied the patient, there was no handover of the patient between nursing and ambulance attendants and no ambulance transfer form was filled out.

- During transfer, no BP readings were taken as the patient had an IVC in each arm. SAO2 and pulse were monitored but not recorded and no records were kept of the nature or volume of IV fluids administered during the trip.

- When the patient arrived at the tertiary hospital he was taken directly to the ward without being assessed in the Emergency Department. He was admitted to the ward at 1715 hours. No observations were taken on admission. The specialist was not notified that the patient had arrived. The patient was noted to have tachycardia but the staff in attendance did not diagnose that the patient was shocked.

- The Junior Medical Officer was paged to assess the patient when he developed respiratory problems, but the doctor did not respond. The patient also developed bright rectal bleeding. His shortness of breath was diagnosed as asthma by the nursing staff.

- The MET was called at 1845 but the patient could not be resuscitated.
Questions to be Answered

- What time did the rural GP call and what information was relayed?
- What discussion took place about transporting the patient
- To what location was the patient directed upon arrival at the tertiary center
- What policies and procedures are in place throughout the region with regard to gastrointestinal haemorrhage
- What is the policy concerning making contact with the gastrointestinal medicine registrar when patients are being transferred
- The patient was on an anti-inflammatory – a COX Inhibitor. Should it have been ceased after the initial presentation?
- What handover occurred between treating teams
- What observations were taken at the referring hospital
- What observations were taken in transit
- Was oxygen given in transit
- Is there a method for taking BP readings in such patients during transfer
- What was the level of competence of the RN who accompanied the patient
- What fluids did the patient receive in transit
- Why did the patient go straight to the ward
- Why were observations not taken in the ward
- What happened to the ambulance summary
- What handover occurred between nurses – transport to ward
- Why was the GIH Policy not followed
- Was anyone aware of the shocked status of the patient
- Do staff members know what to do if the patient becomes shocked
- What was the level of ward activity on the day
- Was the patient haemodynamically stable on the first day of presentation

Contributing Factors

- The absence of a policy and procedure for management of Gastro-Intestinal haemorrhage increased both the likelihood of the patient’s hypotension not being recognized and a plan of management not being put in place

- The absence of an inter-hospital transfer policy and process resulted in both the patient being admitted directly to the Ward H3 and a subsequent delay in diagnosing and treating the patient’s shock.

- Unclear guidelines about the need for regular observations and the exchange of this information between treating teams at both hospitals contributed to a delay in diagnosis of the severity of the patient’s condition.

- The inadequate level of training provided to nursing staff for the performance of inter-hospital transfers increased the likelihood that the nurse did not perform appropriate observations during transit.

- Failure to notify the medical team of the patient’s admission to the Ward resulted in the patient not receiving adequate medical assessment and admission procedures and to a delay in initiating treatment for shock
Risk Reduction Strategies

- Develop and implement a policy for the admission and management of GIH for all facilities and in transit
- Implement a standard inter-hospital transfer process via the Patient Flow Collaborative (IHI Breakthrough Series)
- Develop and implement guidelines for minimum patient observations and hand-over for patients with hypotension. Supportive educational programmes to be initiated in peripheral and tertiary referral centers.
- Ensure an appropriate rostering of qualified nursing staff in rural emergency departments. Implement appropriate policies for annual competency assessment and training.
- Investigate the possibility of developing specifically trained transport nurses for the Hospital Transport System
- Review the allocation and communication skills of Junior Medical Staff within the Division of Medicine.
- Standardise the practice for contacting Junior Medical Officers (JMOs) within the wards of the tertiary centre

Learning Points

Special challenges were experienced with this case with regard to

- The challenge of senior medical staff with a pre-determined agenda
- Linkage to a quality improvement initiative to address a key root cause
- Lack of communication between risk management and quality improvement activities
- A potential model of aggregate root cause analysis
Root Cause Analysis - Summary Incident Report

Case Study 5

Death of an 83 year old female patient after sustaining a fractured neck of femur in a fall. The patient's family submitted a complaint to the Health Care Complaints Commission alleging that the medical management of the patient had been inadequate. They did so after failing to resolve their issues with the hospital's complaints officer.

Incident Description

- Rosanna sustained a fall at home at 2200 hours. She declined transport to hospital. 5 hours later, because of increasing pain, Rosanna was taken by ambulance to the ED. She received 10mg of morphine, administered by the ambulance officers, prior to transfer.

- The patient was drowsy and hard to rouse on admission and was given Narcan with good effect. A CXR confirmed cardiomegaly. The patient had a history of cardiac disease, hypertension and congestive cardiac failure. ECG revealed atrial fibrillation and ischaemic changes.

- The family discussed surgical intervention with an unidentified practitioner (? anaesthetic registrar). They were informed that, given the mother’s pre-existing cardiac problems, the only safe anaesthetic would be a spinal block. A consent form was signed by the patient’s daughter.

- Later that day the patient had a Right Pin and Plate inserted under a general anaesthetic. The family waited for a long time outside theatres, but the patient was transferred internally to the recovery unit and then to the high dependency ward. No-one spoke to the family.

- On the following day a MET call was placed because the patient was drowsy following the administration of morphine. Progress ECG indicated ischaemic deterioration.

- The next day the patient was reviewed by a geriatrician. He approved the use of low dose oral morphine because the patient appeared to be agitated by pain. Following cardiac review later that day, IM morphine was again given.

- The next day the cardiology team diagnosed that the patient had suffered a myocardial infarction. Later that afternoon the patient developed hypotension and drowsiness. Morphine was ceased again, with the patient receiving reversal with Narcan.

- The patient was diagnosed with pneumonia. She was transferred to the High Dependency Ward where she received intensive antibiotic treatment via a central line. A cardiac echo was performed which revealed significant dysfunction. A family discussion occurred which focused on the patient’s co-morbidities and impaired cardiac system.
The patient improved in the HDU. She was transferred back to the ward again where she became confused and agitated.

The patient's condition deteriorated. She became more confused, pulling out all IV lines and tubes. Rosanna was given endone, which led to her requiring reversal once again with Narcan. Sepsis was queried.

A family discussion which involved a social worker was organised. An entry was made in the notes Not for CPR.

The patient was again transferred to the HDU – a central line was inserted. The patient was febrile. Gentamycin and flucloxacillin were commenced.

Antibiotics were ceased after 3 days. Many discussions were held with the family re their dissatisfaction. One key issue was the inconsistent and confusing information provided about the patient’s complications and prognosis. The family was referred to the Customer Service Unit. The Unit representative issued a directive that the family members were to have no direct interaction with individual members of nursing staff from that point on.

The medical registrar discussed Not For Resuscitation orders with the family.

Rosanna, who was on fluid restriction, received fluid overload requiring reversal. Subsequently the patient's condition deteriorated.

Discussions were held with family re deterioration. The patient suffered a cardiac arrest. MET called – the team arrives and begins to work on the patient whilst the nursing staff are on the telephone to the daughters seeking instructions with regard to resuscitation. Distressed by pressure of having to make a decision under the circumstances, the daughters are further upset by the abrupt termination of the conversation because the MET team decided to cease resuscitation after reading the medical records.

Questions to be Answered

- To what extent did the General Anaesthetic play a role
- Why did the clinicians keep administering morphine derivatives
- What was the extent of the patient’s heart disease on admission
- What role did the Migrant Health Service play
- What is the process for involving interpreters
- What is the ambulance policy re the administration of morphine
- What is the likely outcome for this type of patient
- What were the treatment options for the fracture
- What is the policy for communicating with large fragmented families about their relatives

Contributing Factors

- Multiple and, at times, inconsistent communication from the clinicians advising that their mother's prognosis was poor created information processing challenges for the family. This led to anger, confusion and frustration
- Lack of a clean comfortable environment for the patient exacerbated the family's level of anxiety which led to the family's perception that the state of the hospital led to their mother’s outcome
The lack of a clear policy about communication with families meant that multiple staff members provided varying information to multiple family members which led to the delivery of conflicting messages.

Inadequate communication with the family about morphine sensitivity led to the family associating their mother’s deterioration with the administration of morphine.

The lack of communication with the family after the surgical procedure meant that the family viewed the administration of the GA as a mistake, and a contributing factor to their mother’s illness.

CATEGORIES

- Communication/information
- Training/skills
- Environment/equipment
- Policy and practices

Risk Reduction Strategies

- An information pamphlet to be developed to inform families of the true risks involved for patients with fractured necks of femur. This should include an outline of the general plan of care and the role of various team members.

- A pamphlet explaining the function of the unit and the role of various team members be given to families when patients are admitted to High Dependency Unit.

- Ensure wards comply at all times with Australian standards for cleanliness. That the Smoke Free policy be enforced outside designated areas.

- A policy and process be developed and implemented for cases where communication difficulties arise with families. Ensure a multidisciplinary process, including the involvement of the Migrant Health Unit. Promote the use of a trained independent mediator as the point of contact.

- Develop and implement a policy which ensures that at risk elderly patients receive appropriate assessment by either the Geriatric Assessment or Acute Pain teams.

- Develop an improved method of communicating information to patients and their families when obtaining consent for an anaesthetic. Require clear documentation of details of the discussion and of post-surgical discussions about the patient’s condition.

- Review the clinical pathway for managing fractured neck of femur and educate staff.
Learning Points

Special challenges were experienced with this case with regard to

- The need for a different fact finding process when an RCA arises from a serious complaint.
- The need to interview family members
- The problems that arise when actions are agreed to by the wrong person.
- What information from the RCA report should be given to the patient’s family if they request it?
- How poor communication sets the scene for complaints and litigation
Root Cause Analysis - Summary Incident Report

Case Study 6

Suicide death of a 22 year old male patient who used his bed sheet to hang himself from the ceiling fan in his single room within a mental health facility.

Incident Description

- The police found David wandering in the grounds of the general hospital. He was mildly intellectually disabled and carried a long rope, which he had formed into a noose at one end.

- The police took David to the emergency department of the local mental health facility where he was assessed by the junior registrar.

- The boy’s parents were separated. His mother and sister had moved to another city two years before and David had remained behind with his father. Just recently his father had remarried and David had moved into a flat by himself. His father and new wife had been overseas for two weeks.

- The junior registrar decided that David had mild depression and sedated him for the evening with a dose of diazepam. David went to sleep in the emergency department and was moved to a single room in a ward near the nurses’ station. He was not admitted to the high-risk ward.

- The next morning David ate his breakfast and showered. He engaged in conversation with nursing staff. They questioned him about whether he was still inclined to kill himself. In response he laughingly told them that he could not because the rope had been taken away.

- Ten minutes later David was found hanging by his sheet from a ceiling fan in his room. Attempts were made to resuscitate him, but they were unsuccessful.

Questions to be Answered

- Why was a suicidal patient placed in a single room where he could not be directly observed at all times
- Why were hanging points such as ceiling fans still in situ within the mental health unit
- What is the nature of risk assessment for suicidality in the acute psychiatric unit
- Were the family members contacted about David’s admission?
- Was the resuscitation process performed well
- Was the patient’s previous psychiatric history available to the mental health registrar
- Did the registrar seek the advice and guidance of his senior specialist
Contributing Factors

- The absence of an adequate risk rating tool for the assessment of patient suicidality in the Psychiatric Emergency Unit led to the patient not being properly assessed.

- The absence of an adequate management protocol for the placement and supervision of patients at risk of suicide led to the patient not receiving optimal placement and care.

- The lack of a regular structured environmental risk assessment of the mental health facility led to the continued presence of hanging points.

- The lack of clear guidelines for junior staff about when to involve and seek the advice of their senior colleagues compromised the patient’s assessment and placement.

- The patient’s previous medical records were not available. He had been admitted and treated at another institution within the area for attempted self harm eighteen months earlier.

Risk Reduction Strategies

- The Centre for Mental Health recently published a document for assessing the environmental risk of suicide. The organization is to self assess against the standards in this document and rectify non conformities.

- The Clinical Governance Unit to research international standards and risk identification tools to further the self assessment process.

- All hanging points to be removed immediately.

- Guidelines to be developed and implemented so that all clinical staff – nursing and medical – are aware of the patient categories that warrant the input of senior medical staff.

- A risk- rating tool to be developed by PEC for use in the assessment of patients for suicide risk during their assessment in the emergency department.

- A working group to be formed to address the problem of fragmented mental health records and lack of access to important information across the spectrum of community and in-patient facilities.

- An external team of surveyors to perform another environmental assessment at 3 and 6 months to ensure all non-conformities have been addressed.
Learning Points

Special challenges were experienced with this case with regard to

- High profile media case involving vocal family members
- Reluctance from management to accept the recommendations of the RCA team
- Resistance from higher entities to the practical input and suggestions from staff working at the coal-face
- Concurrent investigation by the coroner and the Centre for Mental Health
- Police anger that the health system allowed the death of a patient for whom they held grave concerns and believed they had acted appropriately