Case Study: Royal Bolton Hospitals NHS Foundation Trust
Using Root Cause Analysis to Reduce MRSA Bacteraemias

Summary
In 2005/06, the Royal Bolton Hospitals NHS Foundation Trust had a high incidence of healthcare associated infections (HCAIs), in particular methicillin-resistant Staphylococcus aureus (MRSA) bacteraemia. A significant number of these were found to be from the trust’s critical care department.

After receiving in June 2007 some external, expert advice on how to prevent and control HCAIs, the trust made concerted efforts to tackle the problem. It did a root cause analysis (RCA) for the most recent bacteraemias. RCA involves a systematic review of any activity associated with the patient to try and identify causal effects. The results were used, along with best practice guidance, such as HCAI high impact interventions (HIIs), to develop a comprehensive action plan. This plan involved reviews and activity aimed at improving leadership, culture, training and education and the environment within the trust.

Following the implementation of the action plan there was a relatively significant gap before another bacteraemia occurred. The gap between bacteraemias has increased and there has been a year on year decline in the number of MRSA bacteraemias at the trust and the rate is now averaging one per year within critical care.

This case study outlines how the trust went about utilising the RCA tool to understand where best practice was not being followed and, from that, where improvements could be made.

Introduction
The Royal Bolton Hospital NHS Foundation Trust is a district general hospital with approximately 700 inpatient beds. It also provides emergency care and received 32,396 emergency admissions in 2007/08.

The trust’s critical care department consists of an 8-bed, level 3 facility and a 10-bed, level 2 facility. Both units have a high occupancy rate, regularly in excess of 100%, and receive approximately 1300 admissions per year.

In 2005/06, the trust had 46 cases of MRSA trust wide and 7 of these were in critical care. From January to June 2007 the trust had had a total of 20 MRSA – the figure below covers these months and shows the upward trend.
The trust determined that significant attention needed to be paid and action taken to improve the HCAI prevention and control practices across the trust.

Because a significant proportion of the cases (15%) were coming from the critical care department, the board determined that effort was particularly required in that area. However, this was met with resistance and, in order to both demonstrate the need for action and ensure it was taking place in the right areas (i.e. where the most effect would be felt) the trust used the RCA tool and HIIs to diagnose issues and inform action plans.

**Challenge**
The areas of concern within critical care were identified as part of the trust-wide RCA work. These included lack of leadership, poor practice and the culture within the department.

The critical care department had effectively been leaderless since the resignation of the department manager 12 months before. An alliance of four ward managers had run the department in this time, which meant that the critical care teams had no single point of leadership and there was no overall accountability for infection control issues.

The poor practice was identified by an audit of compliance with the HIIs, which showed that only partial compliance was being achieved.

In uncovering and raising the profile of the issues with leadership and poor practice, another challenge was identified; that of the culture of the critical care department, which was one of denial. The critical care department made it clear that it felt that it was not part of the problem and therefore divorced from it and the solutions. Because the trust’s IP&C Team knew that this was not the case, they put the department under intense scrutiny and a defensive attitude developed as a result.

**Success criteria**
The absolute priority of the trust was to reduce the occurrence of MRSA and other HCAIs throughout the organisation. In the short term the trust needed to at least stay within its annual trajectory – i.e. not have an increase in numbers. In the long term the trust was committed to tackling the problem and significantly reducing the incidence of HCAIs and improving the quality of patient care and ultimately the patient experience.

**Activity**
The results of the RCA and HII audits, which demonstrated beyond any doubt that practices were less than ideal, went a long way to changing the attitude of denial. From this point on the critical care department realised that the delivery of care in relation to infection control was inadequate and their attitude to the scrutiny and activity in this area changed accordingly. When a matron from within the department was given ultimate responsibility for reducing healthcare associated infections, she supported the continued efforts and commenced a project aimed at making improvements in infection prevention and control practices within the department. Having HCAI prevention-focused leadership within the department contributed to the positive change in attitude.

The critical care department HCAI lead matron began the infection prevention and control improvement project by closely re-examining the three most recent MRSA bacteraemias and repeating the RCAs. The purpose of repeating these was to improve the knowledge and understanding of the problem within the department and also to upskill critical care department staff in the use of RCAs.

RCAs concentrate on identifying the timeline of events and are very useful for looking particularly closely at invasive procedures, such as central line and cannula insertion. They allow the reviewers to drill down as far as necessary to determine whether or not best practice standard procedures are being followed and identify issues.
The Royal Bolton Hospital NHS Foundation Trust found the ‘Five Whys’ aspect of the RCA very effective when striving to identify the most likely source of the infections. This involves asking ‘why’ as many times as required to get to the bottom of why something was done a particular (potentially less than ideal) way. The trust has provided an example of one of their Five Whys exercises below, which involved the ‘whys’ being asked of team members from the critical care department:

**Scenario**
A patient of approximately 75 years was admitted with community-acquired pneumonia. The patient was screened for MRSA on admission and found to be negative. The patient developed MRSA bacteraemia within 1 week of being admitted to the critical care department.

**Why?**
A significant amount of MRSA was found on the central line tip, indicating that the probable source was the central line.

**Why?**
Poor insertion documentation meant it was difficult to ascertain if insertion best practice was breached. However, it is known that 2% chlorhexidine +70% alcohol skin preparation was not utilised in the department or trust at the time and the use of this is considered best practice. Therefore, best practice was breached.

Also, accessing the line could have been a cause or contributory factor as none of the staff had been competency assessed in aseptic non touch technique and the perception is that the technique used would not have been suitable.

**Why?**
The best practice HIIs were not fully implemented and practice and competence was not being audited.

**Why?**
No one had direct responsibility for infection control within the units.

In this case four ‘whys’ appeared to get to the root of the problem and confirm that lack of leadership was a major contributory factor. The results of this exercise were validated by completion of other RCA exercises.

As a result of the investigation elements of the infection prevention and control improvement project, the roll out of the compulsory use of the best practice HIIs and associated regular audits to ensure adherence was achieved very quickly. This was supported by project work streams aimed at ensuring staff had the right training and competencies and also the right equipment to implement the HIIs.

IP&C team members were utilised to assess critical care department staff skills and understanding of aseptic non touch technique as a priority and provide training as required. This was completed within a four week period with a well advertised ‘go live’ date from which point all department staff were expected to utilise the technique.

Because practice around central lines was found to be a particular concern, the department commenced daily auditing of practice either by the nurse in charge or a nominated deputy. As a result of this an interesting phenomenon was observed; compliance improved immediately as a result of the audit. The instant feedback the audits provided meant non compliance could immediately be rectified.

One of the primary findings for Royal Bolton Hospital NHS Foundation Trust as a whole was that record keeping was poor. This was addressed by the development of standard invasive device documentation, based on the insertion-orientated HII best practice guides (i.e. High Impact Impact...
Intervention No. 1 – Central Venous Catheter Care, High Impact Intervention No. 2 – Peripheral Intravenous Cannula Care and others).

Monthly training and development days were established to ensure critical care department staff understood and were utilising the best practice techniques and actions described in the HIIs. The project team made use of junior members of staff to deliver some of these sessions in order to engage the direct caregivers and improve the sustainability of the project and skills on the ground.

As part of the project the roll out MRSA screening and the introduction of a decolonisation treatment policy for all high risk patients, including those in critical care, was commenced. Individualised care pathways were then developed for each patient depending on the results of the screening. This meant that the trust moved away from blanket screening of patients on a set day of the week, which was the previous practice. This move was in response to the results of a RCA on MRSA bacteraemia in the orthopaedic department. A trust-wide patient group directive (PGD) for decolonisation treatment was developed and deployed for all high risk patients.

As part of the wider improvement programme the trust also considered environmental matters. A decluttering and reorganisation project was undertaken utilising LEAN principles. Poor quality assessment results for domestic services were addressed in partnership with the domestic services management team.

In addition, the intensive care unit was repainted with antimicrobial paint. This was more symbolic than a real infection control measure. It drew a line under what had gone before and signified a new beginning for the team within the unit. If also reinforced the message of zero tolerance and that improving infection prevention and control processes and practice was at the top of the trust’s agenda.

By the end of 2007 success was demonstrated in the resulting decline that was seen in MRSA bacteraemias within critical care. As shown in the figure below:

However, unfortunately, a MRSA bacteraemia occurred in the critical care department in December 2007 – a root cause analysis was completed and the ‘5 Whys’ exercise results are shown below:
**Scenario**
A patient was admitted to the ICU with multi organ failure secondary to sepsis, from an intra abdominal collection. The patient was identified as having MRSA bacteraemia approximately 10 days following admission to ICU.

**Why?**
Probably from the insertion or manipulation of a haemodialysis line.

**Why?**
The patient had become colonised with MRSA while they were receiving care on the ICU.

**Why?**
Possibly due to poor hand hygiene technique. Correct insertion could be proved due to improved insertion documentation and audit results.

**Why?**
Several staff had poor hand condition due to a change in the weather and this was possibly affecting hand hygiene technique.

**Action taken**
Staff affected were referred to occupational health and a campaign to re-highlight the importance of correct hand washing technique and hand conditioning was implemented.

**Wider organisation awareness raising/ involvement**
The infection prevention and control improvement programme of work within the critical care department was closely monitored by the divisional nurse and the IP&C Team. Bi-monthly progress reports were required.

The actions and results of the project activities were demonstrated to the staff and visitors by displaying infection rates, audit results and hand hygiene compliance rates. This was a trust-wide initiative known as ‘Achievement Boards’. These helped staff to understand their team’s and the trust’s position and what they personally and collectively needed to target to improve the situation and continue with good practice.

The trust intranet home page displayed a clock that counted the number of days since the last bacteraemia. This kept the issue at the forefront of minds and it became a talking point if the clock was reset following the identification of another bacteraemia.

The learning from root cause analysis within the critical care department was shared with the wider organisation, through senior staff infection control sessions. These sessions where developed late in the summer of 2007 and were aimed at ward and department leaders. The sessions covered aseptic and non touch technique competencies, general infection control measures, the roll out of the eradication PGD and HII awareness in addition to the critical care work.

**Outcomes**
The success of the work done to improve infection prevention and control processes and practices is shown by the figure below:
However success was not just about the reduction in the numbers of cases. It was also about the staff understanding that they had a role to play and their actions could positively impact on healthcare associated infections. The RCAs, roll out of the HIIs and auditing of their usage meant that staff realised that they were pivotal and could absolutely take control of the situation and improve patient safety and the quality of care.

Assurance
Assurance that action was being taken and improvement would be achieved around infection was provided to the trust board through the trust-wide IP&C Improvement Programme Steering Group. The group membership comprised of the Deputy Director of Nursing, the IP&C Team, medical infection control leads and matrons. The group focused on reporting about actions taken to reduce HCAIs across the trust and the tangible results, i.e. audit results and rates of MRSA.

Sustainability
The improvements that came about as a result of the improvement programme have been sustained. This is largely due to staff engagement at the early stages and the training, best practice guidance and audit practices, which have meant that the changes have been embedded. Daily auditing continues as part of the ongoing efforts and the achievement boards are still maintained in all the trust wards and departments.

Involving key staff, i.e. practice educators and infection prevention and control link nurses, in rolling the changes out ensured sustainability of the improvements seen in critical care – these staff members continue to act as IP&C leads in their areas.

Within the critical care department infection control issues are kept on the team agenda through monthly discussion at departmental governance and staff meetings.

Lessons learnt/top tips
Royal Bolton Hospitals NHS Foundation Trust believes that several factors positively influenced the reduction of healthcare associated infections within critical care in particular. They were:

- Good leadership is essential
- Ensuring staff engagement is important
- Standardising procedures and reduces the room for error – use HIIs
- Find the direct cause of a problem before trying to fix it – use RCAs
- Effective communication is essential
- Audit will improve compliance.
Royal Bolton Hospitals NHS Foundation Trust firmly believe these principles can be applied to any issue that needs to be addressed and that, if they are executed thoroughly, their use will lead to success.

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