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Active Surveillance Testing (AST) for MRSA Carriage

The issue of healthcare-associated infections (HAIs) is one that commands increasing public, professional and governmental attention worldwide. The success of interventions to control avoidable HAIs, including infections associated with meticillin-resistant Staphylococcus aureus (MRSA), is evidenced by recent data from the European Antibiotic Resistance Surveillance System (EARSS) which reported 30 percent of S. aureus to be MRSA, compared with 42 percent in 2006. However, HAIs and MRSA remain unacceptably high in many countries (Figure 1) and are associated with significant morbidity, mortality and associated cost to healthcare systems. Further reductions in these infections are a priority for most European Countries.

Active surveillance testing (AST) for MRSA carriage for use in clinical decision making was introduced as part of an innovative programme implemented in a large district hospital in the North West of England. Data presented at the European Congress of Clinical Microbiology and Infection 2009 (Helsinki, Finland) showed that this programme significantly reduced the incidence of MRSA. This approach is suitable for healthcare institutions facing MRSA challenges across Europe.

Background

In the United Kingdom, mortality from MRSA quadrupled between 1997 and 2007. Since then, multiple initiatives have been introduced by the Department of Health (DoH) including the mandatory surveillance of HAIs. These have been successful in reducing the number of MRSA bacteraemias towards a target of a 50 percent reduction from 2003/4 rates. In 2008, the number of MRSA bacteraemias ranged from 0.96 to 1.2 infections/10,000 bed days compared to 1.3 to 2.4 infections/10,000 bed days in 2001. However, as nearly a quarter of MRSA infections are detected within two days of hospital admission and one third of patients who are colonised with MRSA will go on to develop an infection, rapid screening of all patients attending hospitals could further reduce the number of cases.

Since March 2009, NHS Trust hospitals in the UK are committed to screening all patients admitted for elective surgery. A DoH policy document states, “All trusts should have reviewed their screening policies, identified patient groups for screening, and implemented a decolonisation regimen for people identified as carrying MRSA, both to reduce the risk of infection occurring in themselves and the spread of MRSA to other vulnerable patients.” However, there is a debate about whether all patients, elective and emergency, should be routinely screened.

Therefore, it is important to share success stories about HAIs management strategies in order to encourage a consistently high standard in the UK and Europe. This is particularly the case where investment in rapid AST technologies and techniques are being considered by hospitals in a climate of financial turbulence. Clinical experiences are gradually emerging, contributing to a growing body of evidence that demonstrates the efficacy of rapid screening in MRSA management, as well as its ability to provide a sound business case and return on investment by enhancing clinical quality, improving patient safety and reducing the cost of MRSA infections. It is our experience that the key to a successful HAI reduction programme is very much a cooperation between Chief Executive, infection control team including microbiologists and clinical teams (nursing and medical staff), with every party fully and actively on board. The remainder of this article describes the rapid screening strategy, techniques and technologies implemented, and their results, at Blackpool Victoria Hospital in the North West of England.

The Challenge

In 2006/7, Blackpool Victoria Hospital had unacceptably high rates of MRSA infections. In 2006, the DoH had set a target reduction in MRSA bloodstream infection rates of 50 percent by 2008. Reducing the number of MRSA infections became a top priority for the hospital, and a number of initiatives as a part of a new HAI strategy were implemented. The hospital set five key objectives:

- Reduce the number of MRSA infections;
- Enhance patient safety and quality of care;
- Deliver the Trust vision of providing “Best in NHS” Care;
- Raise staff and public awareness of HAIs; and
- Strengthen the infection control team.
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The first element was ‘Board-to-Ward’ proactive involvement of the chief executive and executive directors in the new programme. A new Director of Infection Prevention and Control (DIPC) was appointed and the infection control team was expanded to include consultant microbiologists, an antibiotic pharmacist, a surveillance nurse and a data analyst. Under the banner of “Ban the Bugs,” the programme included banners and posters with key infection prevention messages being displayed around the hospital to raise staff and public awareness. Mandatory infection prevention training for staff was implemented and hand hygiene champions appointed. The information on MRSA infections was collected and audited, and an MRSA “counter” was displayed on all staff computers detailing the number of days since the last MRSA bloodstream infection. A new “Bare Below the Elbow” uniform policy was introduced. Special initiatives around hand hygiene and antiseptic-non-touch-technique (ANTT) were undertaken.

A key component of the new strategy was the rapid identification of MRSA carriage. The trust introduced rapid polymerase chain reaction (PCR)-based MRSA testing for all emergency admissions (medical and surgical), intensive care, high dependency, surgical high care and cardiac intensive care units. Testing was offered seven days a week from 8 am until 12 pm (based upon hospital admission peaks over 24hrs). A test result phoned at midnight would be acted upon immediately, rather than being constrained by ordinary working hours.

Prior to the introduction of PCR testing the hospital had been relying on conventional, targeted and risk-based culture testing to screen for MRSA. The results of these tests took two to three days to be reported. This delay in identification and reporting MRSA had multiple implications, including the sub-optimal utilisation of limited single room facility, inappropriate barrier nursing and increased potential for transmission / self-infection. Due to the time delay in obtaining a test result, many patients were either transferred to wards or discharged before the results were available and control measures were either delayed or not initiated at all.

Elective admissions continue to be screened prior to admission using chromogenic culture based methods. Elective patients who test positive for MRSA prior to admission receive notification by letter and are offered a decolonisation regimen which includes mupirocin nasal ointment and chlorhexidine body wash/shampoo. Patients who are MRSA positive are isolated (wherever possible in single rooms) and nursed using barrier techniques. Visitors are notified that they must seek advice on appropriate precautions. Staff use disposable gloves and aprons, and strict hand hygiene is required after every contact.

The Results

The results of Blackpool Victoria's active surveillance initiative with PCR testing are compelling. Post its introduction, MRSA bloodstream infections fell by 78 percent (9 against 40 in previous year) in a 12-month period. Usually, MRSA test results are available in five hours rather than three days. Approximately 96 percent screened patients are reassured within this short timeframe that they are not carrying MRSA. This also facilitates the optimal management of the remaining four percent. The hospital is the first in the country to use clinico–economic modelling to justify running an 8 am to 12 pm laboratory service with demonstrable success and to use the results to complement clinical decision making. The laboratory staff working the 4 pm to midnight shift can perform other tasks during "quiet" periods. They also frequently work right up to midnight in order to accommodate late-breaking situations with vulnerable patients where a life may be at risk.

Blackpool Victoria Hospital was awarded the HAI Technology Innovation Team Award on 26 February, 2009 by the DoH and the NHS Purchasing and Supply Agency for the most practical and innovative use of technology to reduce HAIs. Following a 400,000 pounds investment by the Primary Care Trusts, Blackpool Victoria and surrounding hospitals within the Trust are among the first to successfully complete a deep clean programme.

Blackpool Victoria Hospital intends to continue PCR-based MRSA testing. They also plan to extend the use of PCR testing to cover other HAI-related organisms and high-risk patient groups. The use of PCR-based active surveillance was not only associated with a significant reduction in MRSA transmission, but was also found to be cost-effective.

Conclusion

In summary, rapid confirmation of MRSA carriage permits targeting infection control protocols to minimise risk of infection and cross transmission. PCR is more rapid and accurate than traditional or chromogenic culture testing, and the timeliness of reporting has advantaged the clinical decision-making process. This same timeliness prevents unnecessary isolation, barrier nursing and the use of prophylactic decolonisation regimes for emergency admissions. Moreover, patients are reassured by knowing that we test all emergency admissions and know their MRSA status.

Our approach of PCR testing all emergency admissions (medical and surgical) up to midnight (so as to match peak admissions), is unique. We fervently hope, however, that this kind of successful, carefully planned approach can become the norm in hospitals in Britain and across similarly challenged European health systems.

In addition to improving the efficiency of the screening service in our hospital, the study also demonstrates the importance of teamwork with individuals from all sectors of a hospital, from Chief Executive Officer, Infections Control Teams, Laboratory Services and medical and nursing staff, in facilitating change for the ultimate benefit of patients.

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