Improving the detection and management of central venous catheter-related blood stream infections in haematology-oncology patients


Derby Teaching Hospitals NHS Foundation Trust

Background

• Catheter-related bloodstream infections (CRBSIs) are an important cause of morbidity and mortality, with an estimated cost of £6,229 per patient.1,2
• Diagnosing CRBSI is challenging, with UK and European surveillance projects utilising the "Hospitals in Europe Link for Infection Control through Surveillance" (HELICS) criteria. Alternative definitions are available from the CDC.4
• Diagnosis requires both positive blood cultures and other microbiological criteria (see table below).
• National treatment guidelines are also lacking, with evidence for central venous catheter (CVC) removal being clear for certain organisms (Staphylococcus aureus, Pseudomonas aeruginosa, fungi and Mycobacteria) but unclear for skin flora organisms.5
• We evaluated our CRBSI incidence in haematology-oncology patients and assessed how we treat infections in this high-risk patient group.

Summary of HELICS criteria for CRBSI

<table>
<thead>
<tr>
<th>Infection type</th>
<th>HELICS criteria</th>
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<tr>
<td>Line insertion</td>
<td>Semi-quantitative CVC culture &gt; 15 CFU and one of: pus and/or inflammation at the insertion site or tunnel, fever &gt;38°C, chills or hypotension which improves within 48hrs of catheter removal</td>
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<td>Peripheral blood cultures</td>
<td>CVC blood sample culture positive 2hrs or less before peripheral blood culture (blood samples drawn at the same time)</td>
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<tr>
<td>Positive blood culture with the same micro organism from pus from insertion site or tunnel, fever &gt;38°C, chills or hypotension which improves within 48hrs of catheter removal</td>
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<tr>
<td>Positive blood culture with significant organism</td>
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<td>Two positive blood cultures for a common skin contaminant</td>
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Methods

• The clinical records of all haematology-oncology patients who had a CVC inserted in 2016 were reviewed for positive blood cultures, and cross checked with all positive blood cultures coded as ‘line-related infection’ by a consultant microbiologist.
• Note was made of organisms isolated, antibiotics used and subsequent line management.

Results

• Of 114 CVCs inserted in 2016, there were 26 CRBSI episodes coded from 17 patients. 3 patients had more than one CRBSI coded per CVC.
• CVC removal dates were inconsistently documented, so we were unable to calculate line infection rate.
• Lines used were Hickman (58%) or PICC (42%) and the commonest underlying diagnosis was AML (84%).
• The median number of days the patient had been admitted prior to positive blood culture was 13 (Range 0 – 93)
• 7 out of 26 CRBSI episodes did not have paired blood cultures. In 13 out of 26 episodes which grew skin flora, only one set of positive blood cultures had been sent.
• Repeat blood cultures were taken in 20 of 26 cases. Mean days to repeat cultures was 3 days (range 1 - 12 days) (see Figure 1 below)

Conclusions

• Most organisms isolated were coagulate negative staphylococci (n = 22), with the other organisms being Rothia (1), Acinetobacter baumannii (1), Stenotrophomonas maltophilia (1) and Escherichia coli (1), shown below in Figure 2:
• 10 CVCs were removed (median time from positive culture to removal 2.5 days, range 0-20 days). Antibiotic line locks were used in 13 cases, with a median duration of lock of 7 days (range 3 – 11 days). Systemic antibiotics were prescribed in 9 of the 13 cases where line locks used.

References


