An Audit of *Staphylococcus Aureus* Bacteraemia Treatment in a UK District General Hospital

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INTRODUCTION

Staphylococcus aureus bacteraemia (SAB) is one of the most common serious bacterial infections worldwide[1], with a mortality of 20-30%[2] and a significant morbidity. Prompt effective treatment and sufficient investigations can help reduce this bacteria's devastating effects.

Many studies have shown improvements in mortality in patients treated with 14 days of antibiotics for SAB[3, 4]. The Infectious Diseases Society of America released guidelines in 2011 which also recommend a 14 day minimum course of effective antibiotics for SAB[5].

This audit aimed to see whether Medway Maritime Hospital, UK, was following these guidelines, and whether a simple intervention could improve compliance and therefore patient treatment.

METHOD

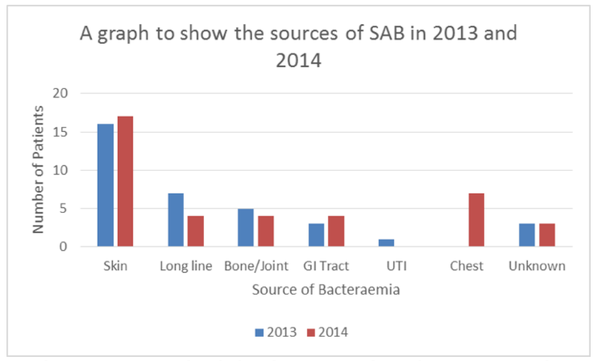
All patients with SAB between April 1st 2013 and September 30th 2014 were identified and their clinical notes, laboratory findings and drug charts were reviewed. Patients who transferred to other hospitals or who died or had treatment withdrawn for palliation within 14 days of diagnosis were excluded from this study as antibiotic treatment lengths were the primary outcome measure.

Starting in January 2014 all SAB were reported on the online pathology results system, accessible to all clinicians, with the following advice; '*Staphylococcus aureus* bacteraemia warrants a minimum of 14 days treatment. Treatment may be longer in cases of deep seated infection.' The antibiotic treatment length was calculated for each patient and compared between the groups pre and post intervention.

Secondary outcome measures were the presence of documentation of microbiology advice in patient notes, length of admission, readmission rate with SAB, 3 month mortality post treatment and whether echocardiography was carried out. To determine whether the two groups were similar, demographic information, risk factors for and source of bacteraemia, and inflammatory markers at diagnosis were compared.

RESULTS

100 patients had SAB, 74 of whom fitted the inclusion criteria, 35 pre and 39 post intervention. The demographics were comparable between groups (average age 63 vs 56, 54.3% vs 69.2% male) although the sources of bacteraemia differed slightly:



In terms of risk factors for bacteraemia, more patients had indwelling lines in 2013. There was also a higher proportion of patients with ulcers, skin lesions, cellulitis and with cancer in 2013. Results are below:

	Percentage of Patients	
Risk factors for SAB	**2013**	**2014**
Diabetes	37	28
Steroids	11	13
Cancer	29	15
HIV	0	0
Renal impairment	23	23
Liver disease	14	26
IVDU	3	13
Bedbound	0	3
Nursing/residential home	17	5
Indwelling lines	37	18
Operative wound	11	15
Ulcer/skin lesion	40	28
Cellulitis	40	18
Prosthetic material	9	10

Average inflammatory markers were lower in 2013 than 2014 (White cell count 12.0 vs 13.3x10^9/L, C-reactive protein 127.2 vs 161.7mg/L). Outcome measures are detailed in the table below:

	2013	2014
Appropriate antibiotic and length of treatment	48.60%	74.40%
Average treatment length (excluding deep-seated infections)	11.0 days	16.7 days
Average treatment length (discitis, osteomyelitis, septic arthritis)	44.4 days	46.9 days
Documented microbiology discussion in notes	82.90%	89.70%
Echocardiography performed	28.30%	41.20%
Length of admission following SAB diagnosis	20.5 days	20.5 days
Readmission rates with bacteraemia	14.50%	5.12%
Proportion SAB which are healthcare associated	31.43%	33.33%
3 month mortality: healthcare associated SAB	18.18%	7.69%
3 month mortality: community acquired SAB	4.94%	19.71%
3 month mortality: SAB all causes	9.10%	15.70%

The most commonly used antibiotics identified in this audit were flucloxacillin followed by co-amoxiclav, and clarithromycin for those with a penicillin allergy.

DISCUSSION

The recommended 14 days of treatment for uncomplicated SAB helps to prevent relapse. The introduction of guidance with blood culture results has demonstrated better compliance with this treatment length. There was significant improvement in post intervention patients receiving appropriate antibiotic treatment, reduced readmission rates, and more echocardiography performed. At the same time an increased proportion of patients had a documented microbiology discussion in their notes.

Despite overall appropriate antibiotic regimens, the total length of stay during pre and post intervention remains equal. This audit showed increased mortality in the post intervention group of patients. This result is influenced by a few patients who died from unrelated conditions such as lung cancer. Mortality was highest in the over 65 age group. Skin was the commonest source of all SAB. In terms of measuring an accurate impact of this intervention on patient outcomes, the sample size limits us obtaining statistically significant results.

CONCLUSION

This simple intervention appears to have the potential to improve treatment of SAB in aiding clinicians to understand the importance of the appropriate treatment and proper investigations for deep seated SAB infections as well as helping them follow the guidelines to prevent SAB complications. Appropriate investigations and treatment would help prevent SAB complications as well as reduce strain on health resources.

RECOMMENDATIONS

Present this audit to staff at our hospital.
Evaluate all patients with significant SAB for the presence of deep seated infections.
Continue to collect data on patients with SAB for more accurate post intervention results.

Medway NHS Foundation Trust

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