

Introduction

Chronic wounds have been reported to cost the NHS over 8 billion pounds per year in clinical care and appropriate dressings. Non-healing wounds with a heavy bacterial load may appear otherwise asymptomatic, while other wounds may heal despite high bacterial counts. Successful treatment can be encouraged by identification of pathogens and optimisation of therapy. Chronic wound pathogens are often opportunistic, this study aimed to identify trends between chronic wound pathogens and bacteria residing on the contralateral limb.

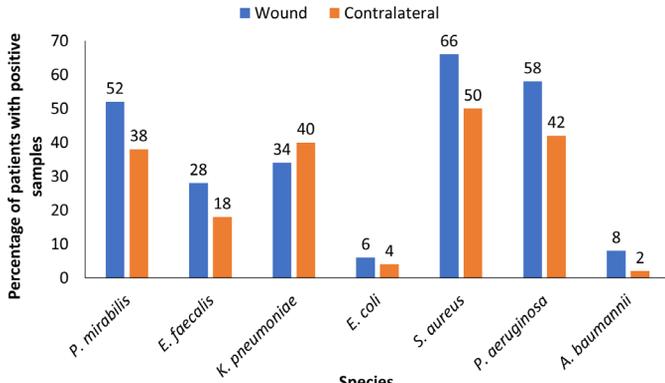


Figure 1. Percentage of patients with positive qPCR results, in their wound and on their contralateral limb, for seven bacterial species.

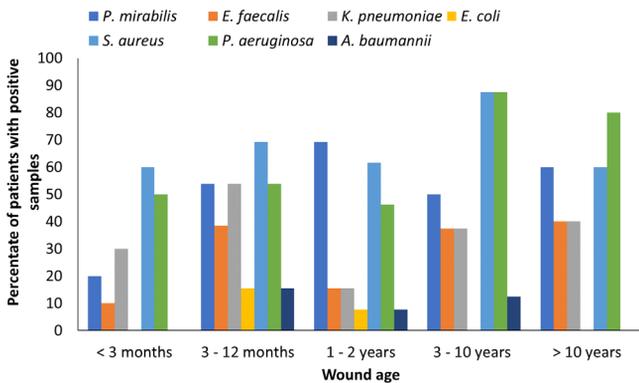


Figure 3. Percentage of patients with positive detection of seven bacterial species from wounds of each age range.

Results

Staphylococcus aureus was the most commonly detected species in both wound and contralateral samples, with 66% and 50% of samples testing positive respectively. *Pseudomonas aeruginosa* was the second most commonly detected species in both wound and contralateral samples, with 58% and 42% of samples testing positive respectively (Figure 1). For six of the seven bacterial species, the organisms were found more commonly in wounds than in the contralateral sample, with the exception of *K. pneumoniae*.

For 34% of patients, the same number of bacterial species were detected in the wound and contralateral samples. For 46% of patients more species were detected in the wound sample and in 20% of patients, more species were detected in the contralateral sample than the wound sample.

The number of bacterial species detected in wounds larger than 10 cm was significantly higher than in wounds under 10 cm ($p < 0.05$, Figure 2). All seven bacterial species were detected in wounds between 3 months and 2 years age, whereas wounds under 3 months and over 3 years contained only 5 out of seven species. (Figure 3). Half of the patients sampled were identified as having venous wounds and the average age of a venous wound was significantly higher than other wound types ($p < 0.05$, Table 1).

Half of patients sampled had been treated with antibiotics in the 30 days prior to sampling and 26% had been treated with an antimicrobial wound dressing. There was no significant difference in the number of species detected from samples with and without treatment.

Discussion and implications for future work

Combining the bacterial detection data with the results of the patient questionnaire has provided information about the presence and absence of correlations. Wounds were shown to contain more bacterial species than the contralateral limb, further investigation could investigate these differences and sequencing techniques could be used to identify differences between species colonising wounds and healthy skin. Wounds aged between 3 months and 3 years and wounds over 10 cm in size were colonised by more bacterial species. This information could guide treatment as these wounds may require broad spectrum antimicrobial treatments. Further work would be required with additional samples to confirm findings.

Methodology

Swabs were taken from the wound site and the contralateral limb of 50 patients. Primers were designed to detect seven bacterial species. Genetic material was recovered from swabs and qPCR was used to identify the presence or absence of the seven bacterial species. At the time of sample collection, anonymised data relating to wound type and duration was also recorded. This data was analysed in combination with the bacterial data to identify patterns and trends.

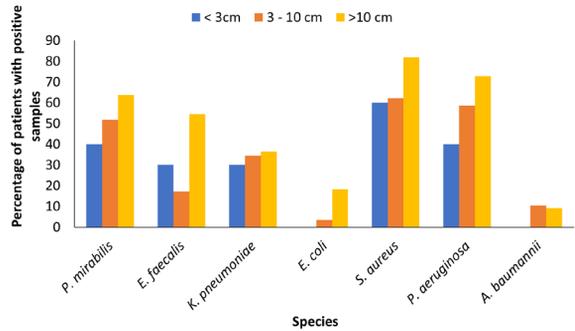


Figure 2. Percentage of patients with positive detection of seven bacterial species from a wounds of each size.

Wound age	Venous wounds	Other wound types
< 3 months	4.17%	36.00%
3 – 12 months	20.83%	32.00%
1 – 2 years	29.17%	20.00%
3 – 10 years	25.00%	12.00%
> 10 years	20.83%	0%

Table 1. Comparison of wound age from patients with venous wounds compared to other wound types.