

Not as pathogenic as we thought?

The Queensland *Staphylococcus lugdunensis* Bacteraemia audit update.

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Introduction

Staphylococcus lugdunensis has a reputation of being perhaps the most pathogenic coagulase negative *Staphylococcus*, with a well documented predilection for endocarditis^{1,2,3}. It is, however, often dismissed as a contaminant.

Given the pathogenic potential and wide spectrum of clinical disease associated with *S.lugdunensis*, there is a need to study and clarify the significance of the isolates.

Aim

To determine the prevalence of infective endocarditis, true bacteraemias, and contaminants amongst patients in which *S.lugdunensis* was identified in blood cultures, with reference to the number of positive isolates and clinical risk factors.

Methods

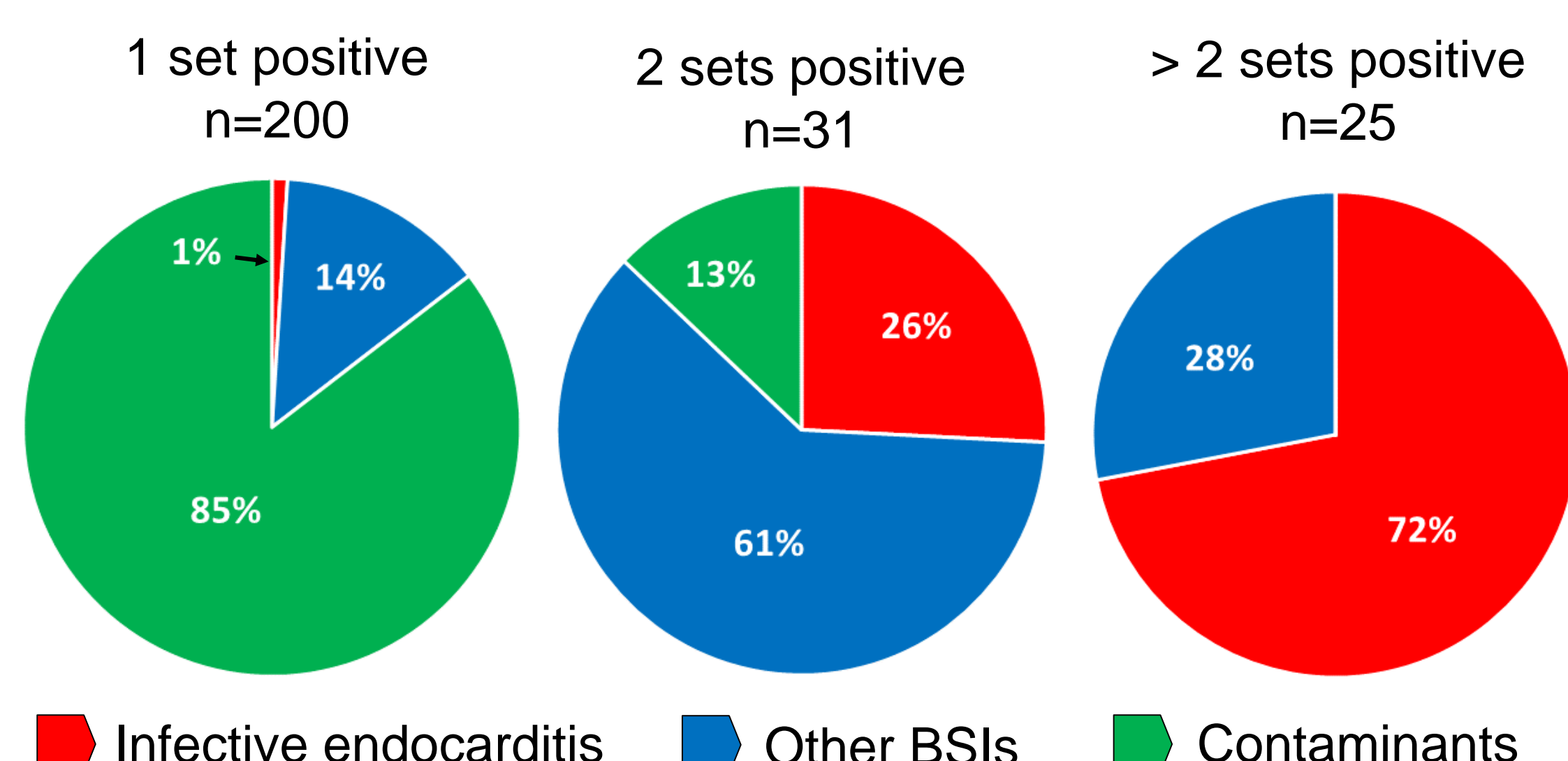
- We performed a retrospective audit of all *S.lugdunensis* bacteraemias identified in the laboratory information system of Pathology Queensland.
- 305 episodes of bacteraemia were identified in 34 Queensland hospitals, between 1998-2017.
- An audit questionnaire was sent to all centres with 2 or more episodes for clinical data to ascertain patient characteristics, risk factors for infective endocarditis and comorbidities (see *acknowledgements*).
- Based on the available information from the survey and laboratory test results, the Duke criteria were applied to establish the classification of patients into the following categories:
 - IE confirmed based on Duke criteria with *S.lugdunensis* as a causative agent
 - Possible IE based on Duke criteria with *S.lugdunensis* as a causative agent
 - Blood stream infection (BSI) with known non-cardiac source
 - BSI with unknown source
 - Contaminants

Results

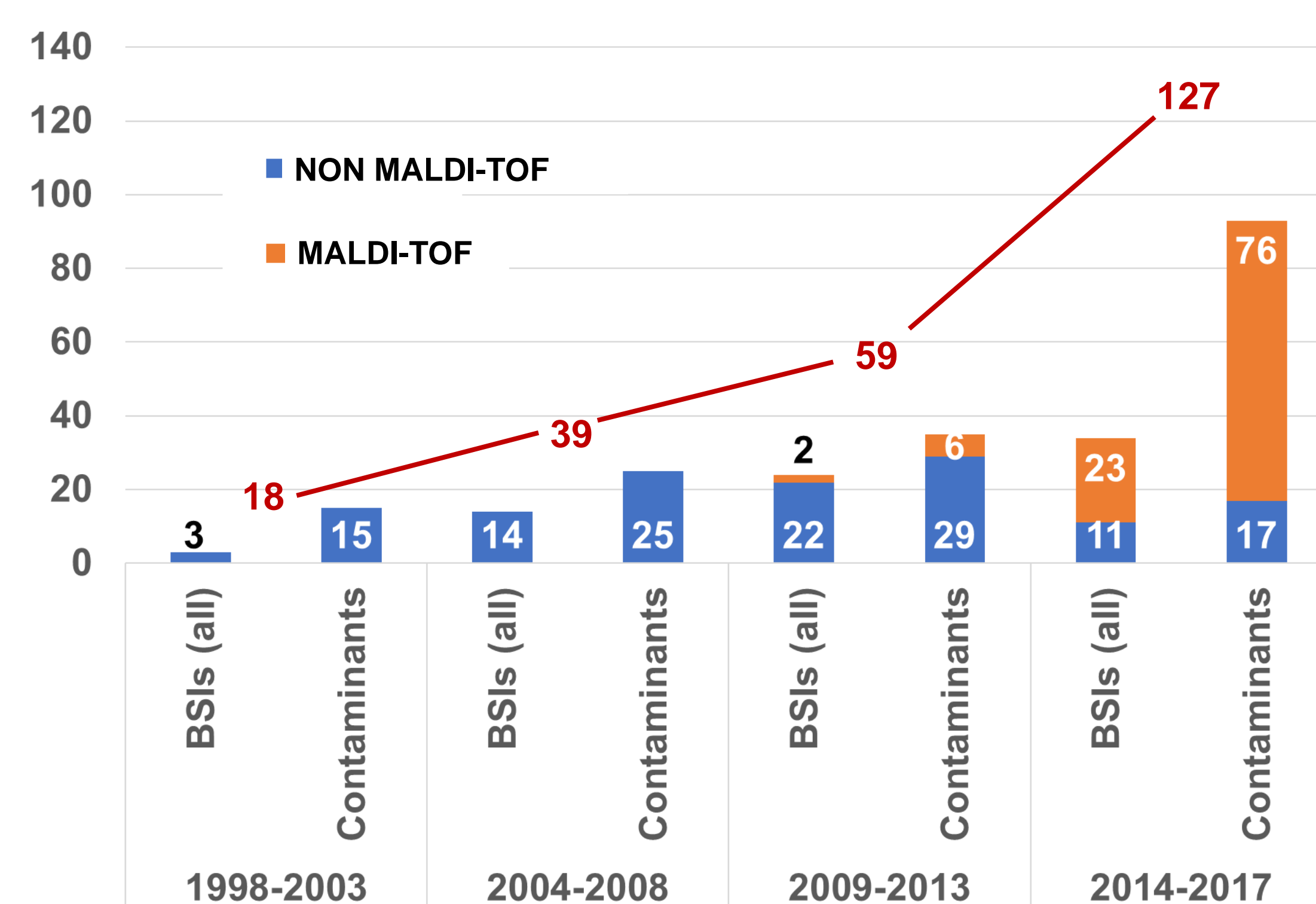
- A total of 256 completed questionnaires have been received to date. Of these, 28 patients had definite or probable IE, giving an incidence of 10.9% amongst patients with positive *S.lugdunensis* blood cultures.
- 78% of the isolates were judged as contaminants if only one set positive (171/200), and none if multiple isolates (> 2 sets) were positive (0/25).
- Preliminary data of the 19 year audit suggests that the incidence of endocarditis was low (1.0% or 2/200) if only a single blood culture (BC) set was positive, but the incidence was higher if 2 (22.5% or 8/31) or more (72.0% or 18/25) were positive.
- With regard to bacteraemias of a non-cardiac source, incidence was 13.6% (or 27/200) if only a single BC set were positive, and increased if 2 (61.3% or 19/31) or more (28.0% or 7/25) sets were positive. Data suggests that pre-existing central vascular catheters were a risk factor (30% or 16/53) for bacteraemia.
- In terms of ≤30 day mortality (n=256), we observed high mortality rates of 39.3% (11/28) in patients with infective endocarditis; rates of 7.5% (4/53) in those with blood stream infections (of a non-cardiac source), and 5.2% (9/175) with contaminants. *No mortality events in the contaminant cohort were directly related to *S.lugdunensis*.
- We also observed on review of the first 243 (of 256) surveys that the introduction of *MALDI-TOF** (in 2013) resulted in a 3-fold overall rise in identification of *S.lugdunensis* and a 4-fold increase in contaminants with an affiliated 2-fold increase in significant bacteraemias. However, the gradual increase in IE did not appear related to MALDI-TOF.

*MALDI-TOF: Matrix Assisted Laser Desorption Ionization – Time of Flight mass spectrometry.
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Distribution of patients by diagnosis and number of positive sets (n=256)



Effect on the number of positive isolates with the introduction of MALDI-TOF* in 2013 (n=243)



Conclusions

- 256 cases (83.9% of 305 identified episodes) have so far been recorded in our audit, which we believe is the largest series of *S.lugdunensis* bacteraemia and *S.lugdunensis* IE to our knowledge.
- 28 endocarditis episodes (19 definite, 6 possible on Duke criteria and 2 device (ICD) infections) were observed of which 92.9% (26/28) had 2 or more positive blood cultures.
- 53 blood stream infections – non cardiac episodes were observed of which 49.1% (26/53) had 2 or more positive blood cultures.
- The significant difference in relative risk of deep seated infection with escalating numbers of positive blood cultures highlights the importance of sequential blood cultures drawn PRIOR to antibiotic commencement, especially in those with risk factors for intravascular disease.
- Further analysis of the perceived high mortality rates in the IE group is ongoing.
- MALDI-TOF identification systems have resulted in a significant increase in contaminants, and a smaller but still significant increase in detection of bacteraemias.

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Website: <https://medicine-program.uq.edu.au/school-clinical-medicine/research/infective-endocarditis-qld>