SECTION I BACTERAEMIA IN RRT RECIPIENTS: A JOINT REPORT WITH HEALTH PROTECTION SCOTLAND

This section's data are available on-line in Tableau format which enables interaction with the data: http://www.srr.scot.nhs.uk/publications/Dashboards/Bacteraemia.html.

Patients treated by renal replacement therapy (RRT) for established renal failure are at high risk of infection with associated increased morbidity and mortality. Infection was the second most frequent cause of death of RRT recipients in 2017.

All bacteraemia episodes in Scotland, that is bacteria being detected within a patient's blood stream by means of a positive blood culture, are reported directly from microbiology laboratories to Health Protection Scotland (HPS) using the Electronic Communication of Surveillance in Scotland (ECOSS) system. Methicillin resistant *Staphylococcus aureus* (MRSA) bacteraemia incidence surveillance has been mandatory in Scotland since 2001 and surveillance was extended in 2006 to include methicillin sensitive *S. aureus* (MSSA). In addition, mandatory *Escherichia coli* bacteraemia surveillance was introduced in Scotland in April 2016. Whilst surveillance of bacteraemia with other organisms is not mandatory, all positive blood cultures are reported to ECOSS enabling these data to be used robustly in epidemiological analyses.

Database linkage was performed between the Scottish Renal Registry including all patients who have received RRT in Scotland and ECOSS bacteraemia data namely *S. aureus*, *Staphylococcus epidermidis*, *Streptococcus* sp., *E. coli*, *Klebsiella* sp. and Pseudomonas sp.. These organisms were chosen due to their clinical significance in RRT patients. For the purpose of the analyses, *E. coli*, *Klebsiella* sp. and *Pseudomonas* sp. were grouped as Gram-negative organisms. Linkage was performed for the period 01 January 2013 to 31 December 2017. An episode of bacteraemia was defined as a bacteraemia in a patient without a previous episode of bacteraemia with the same organism in the preceding two weeks.

I1 Bacteraemia reported in patients treated by RRT 2013-2017

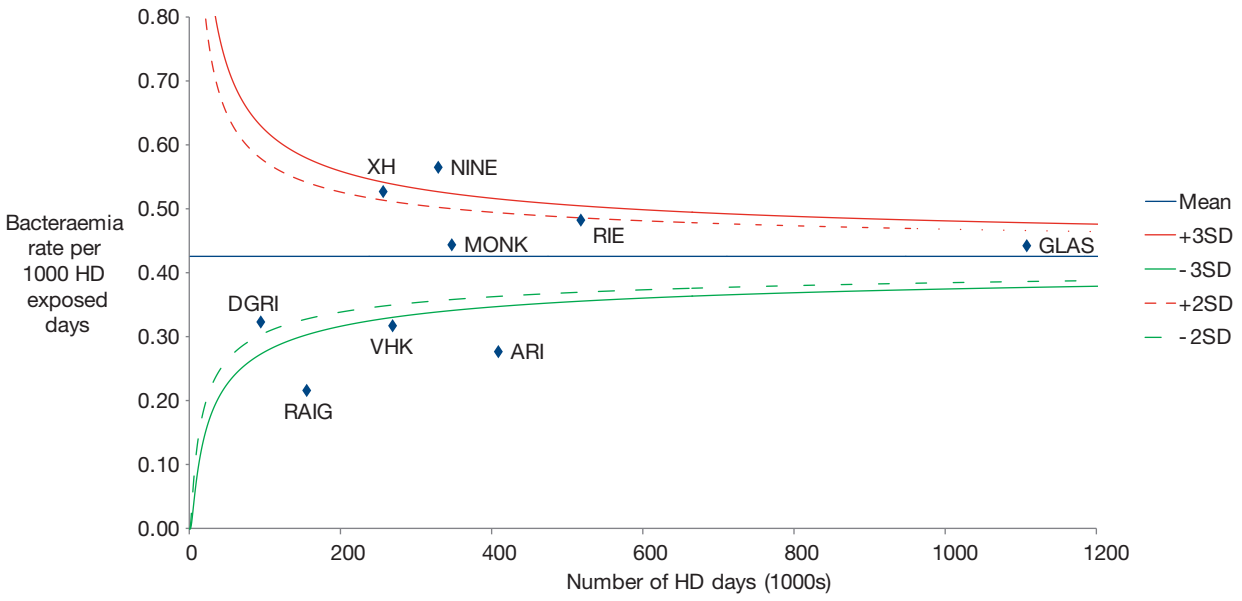
I1.1 Incidence of Bacteraemia in RRT population 2013-2017 by modality of RRT

Organism	HD		PD		Tx		All	
	n	%	n	%	n	%	n	%
Gram negative*	350	**23**	18	**32**	341	**65**	709	**34**
Staphylococcus aureus	495	**33**	11	**20**	36	**7**	542	**26**
Staphylococcus epidermidis	474	**31**	21	**38**	103	**20**	598	**29**
Streptococcus sp.	191	**13**	6	**11**	44	**8**	241	**12**
Total	1510	-	56	-	524	-	2090	-

* Gram-negative organism group comprises *Escherichia coli*, *Klebsiella* sp. and *Pseudomonas* sp.

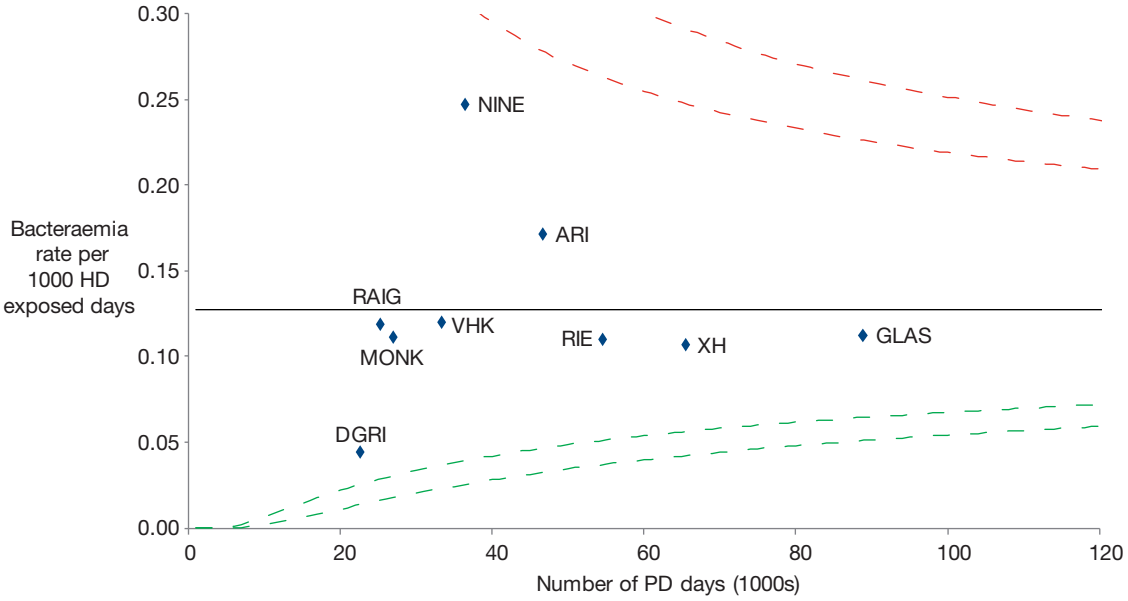
S. epidermidis, a member of the coagulase negative Staphylococcus group, are commonly found on the skin and may be identified in blood cultures incidentally due to a breakdown in technique during collection of blood cultures. Bacteraemia rates should be interpreted with caution as the laboratory and linkage data used has not been validated and clinical investigation was not undertaken to assess whether the positive blood cultures were a true bacteraemia or a contaminated blood culture.

I1.2 Haemodialysis patient bacteraemia* rate per 1000 HD treatment days by adult renal unit 2013-2017



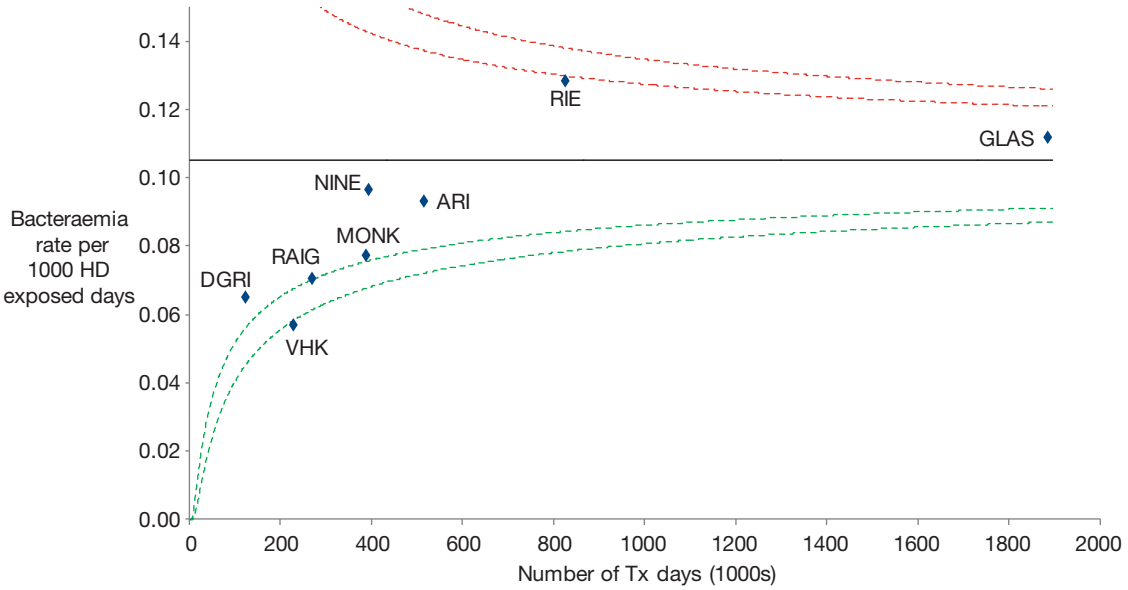
* Includes *S. aureus*, *S. epidermidis*, *Streptococcus* sp. and Gram-negative group as previously defined.

I1.3 Peritoneal dialysis patient bacteraemia* rate per 1000 PD treatment days by adult renal unit 2013-2017



*Includes *S. aureus*, *S. epidermidis*, *Streptococcus* sp. and Gram-negative group as previously defined.

I1.4 Transplanted patient bacteraemia* rate per 1000 Tx treatment days by adult renal unit 2013-2017



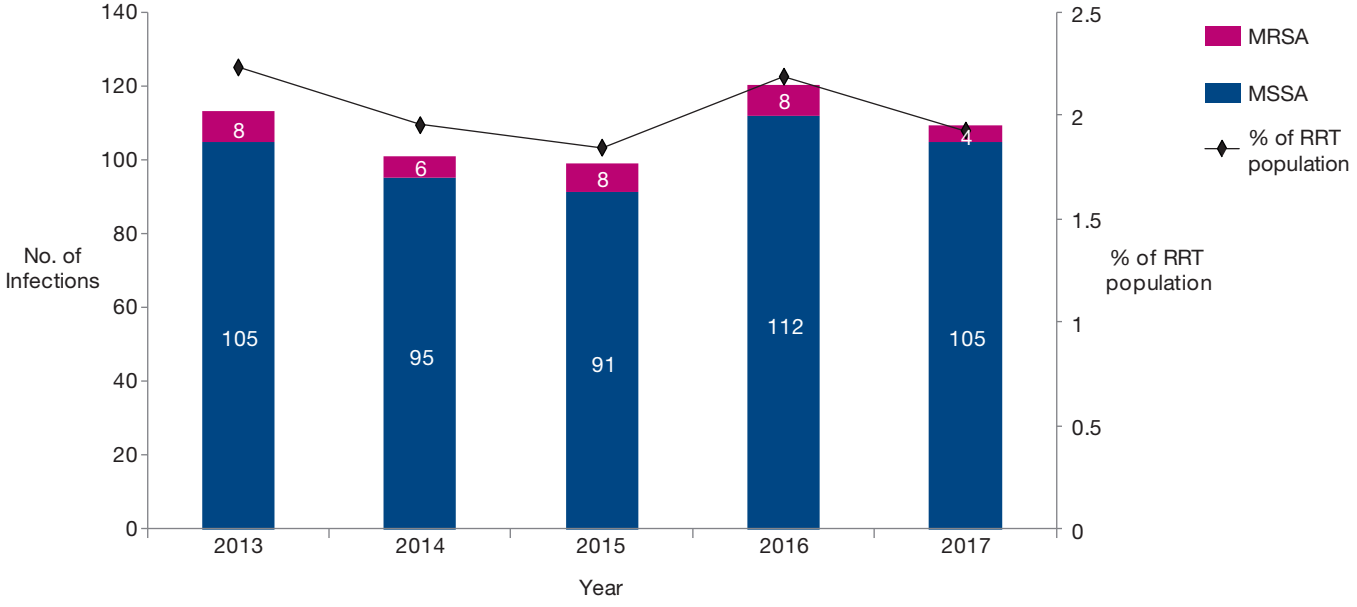
*Includes *S. aureus*, *S. epidermidis*, *Streptococcus* sp. and Gram-negative group as previously defined.

Graphs I1.2, I1.3 and I1.4 show the bacteraemia rate occurring in patients treated by each mode of RRT. The number of treatment days for each modality is the total number of days provided at each adult unit for all patients in the time period 2013-2017.

The data would suggest across Scotland as a whole during 2013-2017 one bacteraemia episode occurred in every 2352 days of delivered haemodialysis; every 7844 days of delivered peritoneal dialysis and 9504 days in patients with a kidney transplant.

I2 Staphylococcus aureus bacteraemia reported in patients treated by RRT 2013-2017

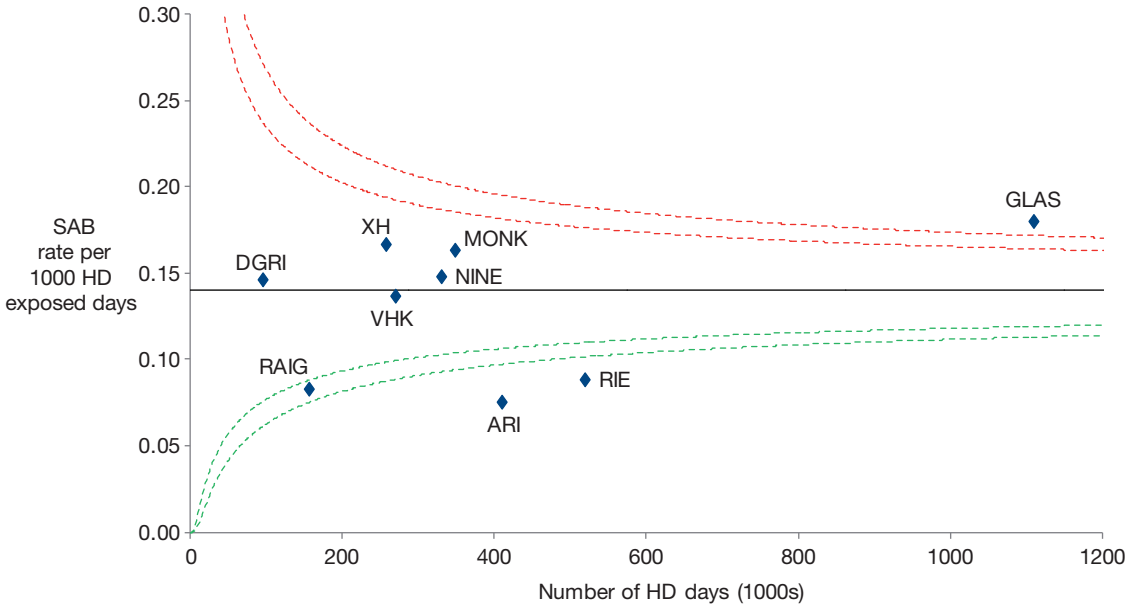
I2.1 Incidence of MRSA and MSSA bacteraemia reported in RRT patients in Scotland 2013-2017



I2.2 *Staphylococcus aureus* bacteraemia rate for haemodialysis patients by adult renal unit 2013-2017

Unit	Rate per 1000 HD Days 2013-2017	95% CI
ARI	0.08	(0.05, 0.11)
XH	0.17	(0.12, 0.23)
DGRI	0.15	(0.08, 0.25)
GLAS	0.18	(0.16, 0.21)
MONK	0.16	(0.12, 0.21)
NINE	0.15	(0.11, 0.2)
RAIG	0.08	(0.04, 0.14)
RIE	0.09	(0.06, 0.12)
VHK	0.14	(0.1, 0.19)
Scotland	**0.14**	**(0.13, 0.15)**

I2.3 *Staphylococcus aureus* bacteraemia (SAB) rate for haemodialysis patients by adult renal unit 2013-2017



I2.4 Number of episodes of *Staphylococcus aureus* bacteraemia (SAB) per patient on RRT between 2013-2017

Number of infections	Number of patients	Number of SAB episodes
1	348	348
2	53	106
3	18	54
≥4	5	27

I2.5 Number of deaths following an episode(s) of *Staphylococcus aureus* bacteraemia (SAB) per patient on RRT between 2013-2016

Number of SABs	Number of Deaths within 1 year	% deaths within 1 year of SAB
360	124	34.4

* For patients who had multiple SAB episodes between 2013-2016 - only the final SAB episode is counted within this table.

I2.6 Cause of deaths within 1 year of a *Staphylococcus aureus* bacteraemia (SAB) in patients on RRT between 2013-2016

Cause of Death	Died within 1 year of SAB*	
	n	%
Cardiovascular	33	26.6
Infection	40	32.3
Malignancy	3	2.4
Other	11	8.9
RRT Complication	3	2.4
Treatment Withdrawn	33	26.6
Missing	1	0.8
All	**124**	**100.0**

* For patients who had multiple SAB episodes between 2013-2016 - only the final SAB episode is counted within this table.

I2.7 Number of deaths within 1 year of starting RRT between 2013-2016 in those who had a SAB and those who did not

	Number of patients	Number of Deaths within 1 year of starting RRT	% deaths within 1 year of starting RRT
Number of patients with SAB* within 1 year of starting RRT	162	29	17.9
No SAB recorded within 1 year of starting RRT	2093	269	12.9
Number starting RRT 2013-2016	2255	298	13.2

* Those patients who had multiple SAB episodes - only the first SAB is counted within this table.