Public Health England

ICCQIP infection in critical care quality improvement programme

NEONATAL **ICUs: October 2016-June 2018**

Table 1a. Counts and rates of positive blood cultures and blood stream infections which meet the case definition in your critical care unit and for all neonatal critical care units, October 2016-September 2017

	Q 3 (October-December 2016)		Q 4 (January-March 2017)		Q 5 (April-June 2017)		Q 6 (July-September 2017)	
	Your Unit	Neonatal CCUs[§]	Your Unit	Neonatal CCUs[§]	Your Unit	Neonatal CCUs[§]	Your Unit	Neonatal CCUs[§]
Total number of positive blood cultures		13		19		24		14
Total number of patient days		3,500		7,632		8,450		3,541
Total number of blood culture sets taken		237		363		400		265
Rate of positive blood cultures per 1,000 patient days		3.7		2.5		2.8		4
Rate of positive blood cultures per 1,000 blood culture sets taken		54.9		52.3		60		52.8
Total number of BSIs[¥]		5		6		9		3
Rate of BSI per 1,000 patient days		1.4		0.8		1.1		0.8

[§] 2, 3, 4, and 5 units provided full denominator and event data and are included in the total Neonatal CCU metrics in Q3, Q4, Q5, and Q6 respectively. Additional units provided only event data and so could not be included in the overall totals and overall rates.

[¥] see appendix for definitions

Public Health England

ICCQIP infection in critical care quality improvement programme

Table 1b. Counts and rates of positive blood cultures and blood stream infections which meet the case definition in your critical care unit and for all neonatal critical care units, October 2017-June 2018

	Q 7 (October-December 2017)		Q 8 (January-March 2018)		Q 9 (April-June 2018)	
	Your Unit	Neonatal CCUs[§]	Your Unit	Neonatal CCUs[§]	Your Unit	Neonatal CCUs[§]
Total number of positive blood cultures		26		45		41
Total number of patient days		9,919		9,358		9,021
Total number of blood culture sets taken		580		525		466
Rate of positive blood cultures per 1,000 patient days		2.6		4.8		4.5
Rate of positive blood cultures per 1,000 blood culture sets taken		44.8		85.7		88
Total number of BSIs[¥]		10		13		16
Rate of BSI per 1,000 patient days		1.0		1.4		1.8

[§] 5, 4 and 5 units provided full denominator and event data and are included in the total Neonatal CCU metrics in Q7, Q8 and Q9, respectively. Additional units provided only event data and so could not be included in the overall totals and overall rates.

[¥] see appendix for definitions

Public Health England

ICCQIP infection in critical care quality improvement programme

Table 2a. Counts and rates of ICU-associated blood stream infections, CVC-associated ICU-associated BSI and CVC-related ICU-associated BSI in your critical care unit and all neonatal critical care units, October 2016-September 2017

	Q 3 (October-December 2016)		Q 4 (January-March 2017)		Q 5 (April-June 2017)		Q 6 (July-September 2017)	
	Your Unit	Neonatal CCUs[§]	Your Unit	Neonatal CCUs[§]	Your Unit	Neonatal CCUs[§]	Your Unit	Neonatal CCUs[§]
Number of ICU-associated BSIs[¥]		3		5		7		9
Number of patient days, amongst patients in the ICU>2 days		3,430		7,486		8261		9,071
Rate of ICU-associated BSI per 1,000 patient days*		0.9		0.7		0.8		1
Number of CVC-associated ICU-associated BSIs[¥]		3		1		4		6
Number of CVC days, amongst patients in the ICU>2 days		729		1,703		2,015		2,231
Rate of CVC-associated ICU-associated BSI per 1,000 ICU-CVC days*		4.1		0.6		2		2.7
Number of CVC-related ICU-associated BSI[¥]		2		0		0		2
Rate of CVC-related ICU-associated BSI per 1,000 ICU- CVC days*		2.7		0		0		0.9
CVC utilisation*		21.3%		22.7%		24.4%		24.6%

[§]2, 3, 4, and 5 units provided full denominator and event data and are included in the total Neonatal CCU metrics in Q3, Q4, Q5 and Q6 respectively. Additional units provided only event data and so could not be included in the overall totals and overall rates.

[¥]see appendix for definitions

*calculated from patients in the ICU >2 nights

Public Health England

ICCQIP infection in critical care quality improvement programme

Table 2b. Counts and rates of ICU-associated blood stream infections, CVC-associated ICU-associated BSI and CVC-related ICU-associated BSI in your critical care unit and all neonatal critical care units, October 2017-June 2018

	Q 7 (October-December 2017)		Q 8 (January-March 2018)		Q 9 (April-June 2018)	
	Your Unit	Neonatal CCUs[§]	Your Unit	Neonatal CCUs[§]	Your Unit	Neonatal CCUs[§]
Number of ICU-associated BSIs[¥]		10		13		15
Number of patient days, amongst patients in the ICU>2 days		9,550		9,163		8,847
Rate of ICU-associated BSI per 1,000 patient days*		1		1.4		1.7
Number of CVC-associated ICU-associated BSIs[¥]		4		7		7
Number of CVC days, amongst patients in the ICU>2 days		2,456		2,532		2,168
Rate of CVC-associated ICU-associated BSI per 1,000 ICU-CVC days*		1.6		2.8		3.2
Number of CVC-related ICU-associated BSI[¥]		1		3		2
Rate of CVC-related ICU-associated BSI per 1,000 ICU- CVC days*		0.4		1.2		0.9
CVC utilisation*		25.7%		27.6%		24.5%

[§] 5, 4 and 5 units provided full denominator and event data and are included in the total Neonatal CCU metrics in Q7, Q8 and Q9, respectively. Additional units provided only event data and so could not be included in the overall totals and overall rates.

[¥]see appendix for definitions

*calculated from patients in the ICU >2 nights

Public Health England

ICCQIP infection in critical care quality improvement programme

Table 3a. Counts and percentages of species identified through positive blood cultures in your ICU and for all neonatal critical care units, October 2016-September 2017

	Q 3 (October-December 2016)				Q 4 (January-March 2017)				Q 5 (April-June 2017)				Q 6 (July-September 2017)			
	Your Unit		Neonatal CCUs[§]		Your Unit		Neonatal CCUs[§]		Your Unit		Neonatal CCUs[§]		Your Unit		Neonatal CCUs[§]	
	No. of patients*	% of +ve BC**	No. of patients*	% of +ve BC**	No. of patients*	% of +ve BC**	No. of patients*	% of +ve BC**	No. of patients*	% of +ve BC**	No. of patients*	% of +ve BC**	No. of patients*	% of +ve BC**	No. of patients*	% of +ve BC**
Positive blood cultures			13	100.0			19	100.0			24	100.0			30	100.0
Recognised pathogens			6	46.2			11	57.9			14	58.3			15	50.0
Skin commensals			7	53.8			8	42.1			10	41.7			17	56.7
Skin commensals which meet the BSI case definition[◊]			2	15.4			0	0.0			2	8.3			4	13.3
Polymicrobial infections[†]			2	15.4			2	10.5			2	8.3			6	20.0
Coagulase negative Staphylococci			7	53.8			7	36.8			9	37.5			17	56.7
C. albicans			0	0.0			0	0.0			0	0.0			0	0.0
E. cloacae			1	7.7			1	5.3			0	0.0			1	3.3
E. faecium			0	0.0			0	0.0			0	0.0			0	0.0
E. coli			1	7.7			0	0.0			3	12.5			3	10.0
K. pneumonia			0	0.0			0	0.0			2	8.3			0	0.0
P. aeruginosa			0	0.0			0	0.0			0	0.0			0	0.0
S. aureus			1	7.7			3	15.8			4	16.7			3	10.0
Staphylococci other			0	0.0			0	0.0			3	12.5			1	3.3

[§] 2, 3, 4, and 5 units provided full denominator and event data and are included in the total Neonatal CCU metrics in Q3, Q4, Q5 and Q6 respectively. Additional units provided only event data and so could not be included in the overall totals and overall rates. *patients can have polymicrobial blood cultures, meaning that the sum of the types of positive blood culture may exceed the total number of patients. **positive blood cultures. [◊] See appendix for definitions. [†] defined as any blood sample with multiple organisms cultured OR multiple positive blood cultures from the same patient on the same calendar date. 9 PBCs in Neonatal ICUs which are defined as polymicrobial infections from 9 patients (0 additional PBC from other PBCs on the same date)

Public Health England

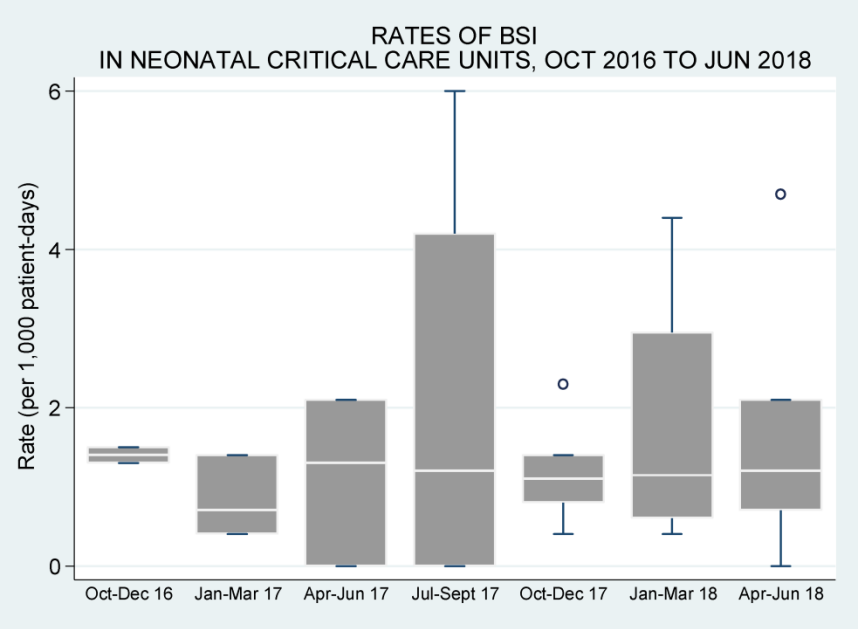
ICCQIP infection in critical care quality improvement programme

Table 3b. Counts and percentages of species identified through positive blood cultures in your ICU and for all neonatal critical care units, October 2017-June 2018

	Q 7 (October-December 2017)				Q 8 (January-March 2018)				Q 9 (April-June 2018)			
	Your Unit		Neonatal CCUs[§]		Your Unit		Neonatal CCUs[§]		Your Unit		Neonatal CCUs[§]	
	No. of patients *	% of +ve BC**	No. of patients*	% of +ve BC**	No. of patients*	% of +ve BC**	No. of patients*	% of +ve BC**	No. of patients*	% of +ve BC**	No. of patients*	% of +ve BC**
Positive blood cultures			26	100.0			45	100.0			41	100.0
Recognised pathogens			16	61.5			19	42.2			24	58.5
Skin commensals			13	50.0			30	66.7			21	51.2
Skin commensals which meet the BSI case definition [◊]			1	3.8			4	8.9			6	14.6
Polymicrobial infections[†]			3	11.5			6	13.3			9	22.0
Coagulase negative Staphylococci			13	50.0			29	64.4			21	51.2
C. albicans			0	0.0			0	0.0			0	0.0
E. cloacae			1	3.8			1	2.2			2	4.9
E. faecium			0	0.0			1	2.2			0	0.0
E. coli			2	7.7			3	6.7			8	19.5
K. pneumonia			0	0.0			1	2.2			0	0.0
P. aeruginosa			0	0.0			0	0.0			1	2.4
S. aureus			1	3.8			1	2.2			3	7.3
Staphylococci other			6	23.1			8	17.8			6	14.6

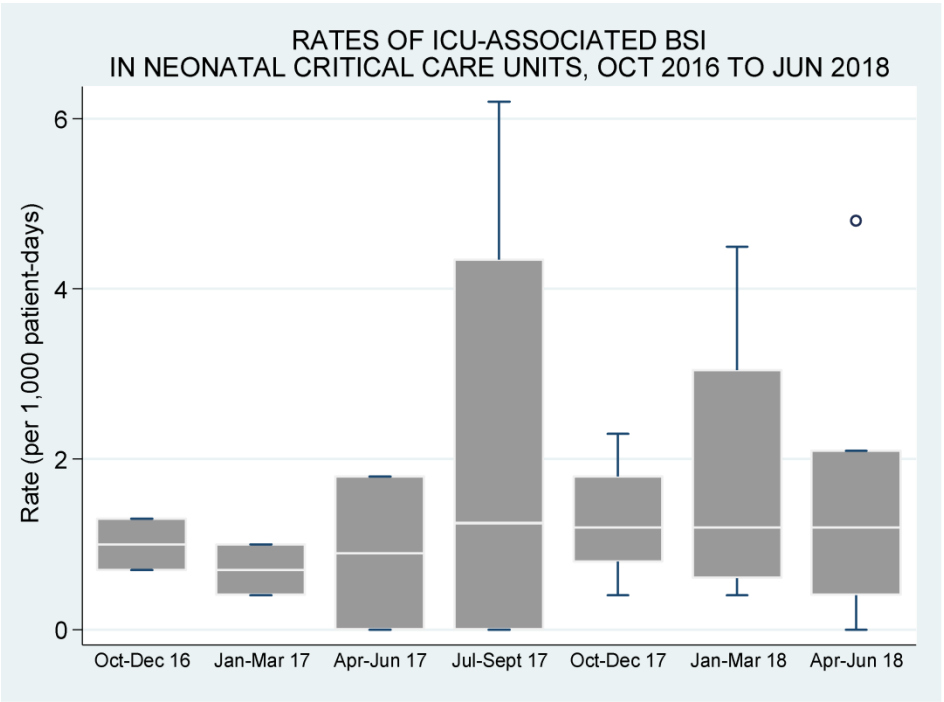
[§] 5, 4 and 5 units provided full denominator and event data and are included in the total Neonatal CCU metrics in Q7, Q8 and Q9, respectively. Additional units provided only event data and so could not be included in the overall totals and overall rates. *patients can have polymicrobial blood cultures, meaning that the sum of the types of positive blood culture may exceed the total number of patients. **positive blood cultures. [◊] See appendix for definitions. [†] defined as any blood sample with multiple organisms cultured OR multiple positive blood cultures from the same patient on the same calendar date. XX PBCs in Neonatal ICUs which are defined as polymicrobial infections from XXX patients (X additional PBC from other PBCs on the same date)

Box and whisker plots of the rate of BSIs per 1,000 patient days in neonatal critical care units, October 2016 – June 2018



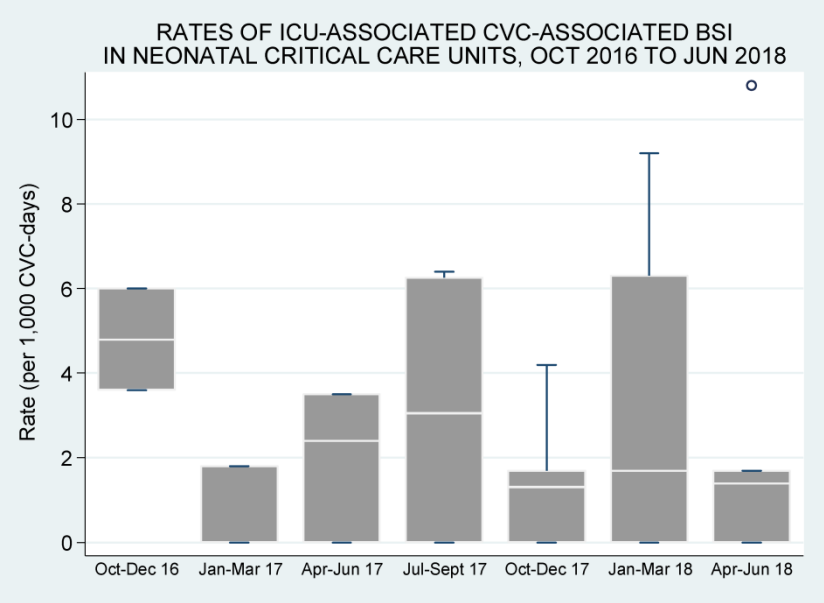
The red dots on the box and whisker plots represent the rates for your unit. If the red dot is missing from any of the plots, it is because rates could not be calculated for your unit due to non-participation, missing data or zeros entered for denominators.

Box and whisker plots of the rate of ICU-BSIs per 1,000 ICU patient days* in neonatal critical care units, October 2016 – June 2018



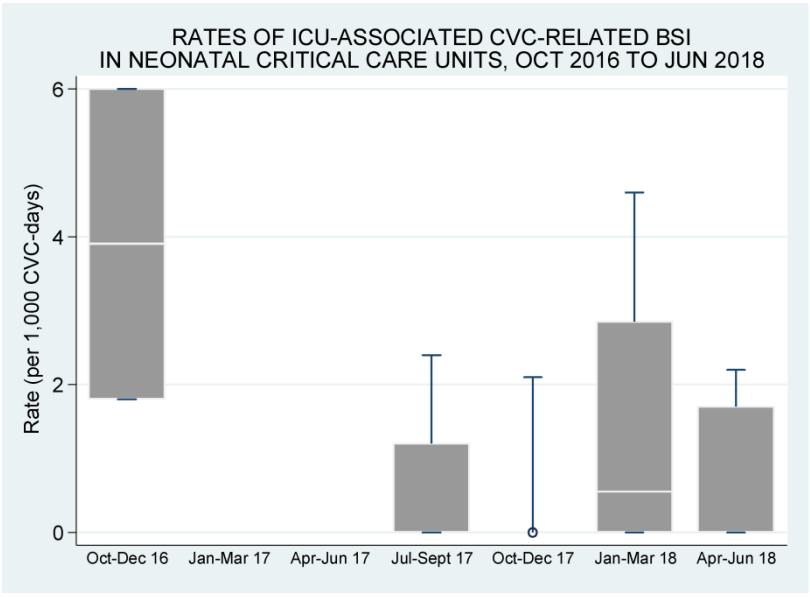
*ICU-patient days calculated from patients in the ICU >2 nights.
The red dots on the box and whisker plots represent the rates for your unit. If the red dot is missing from any of the plots, it is because rates could not be calculated for your unit due to non-participation, missing data or zeros entered for denominators.

Box and whisker plots of the rate of ICU-CABSIs per 1,000 ICU CVC days* in neonatal critical care units, October 2016 – June 2018



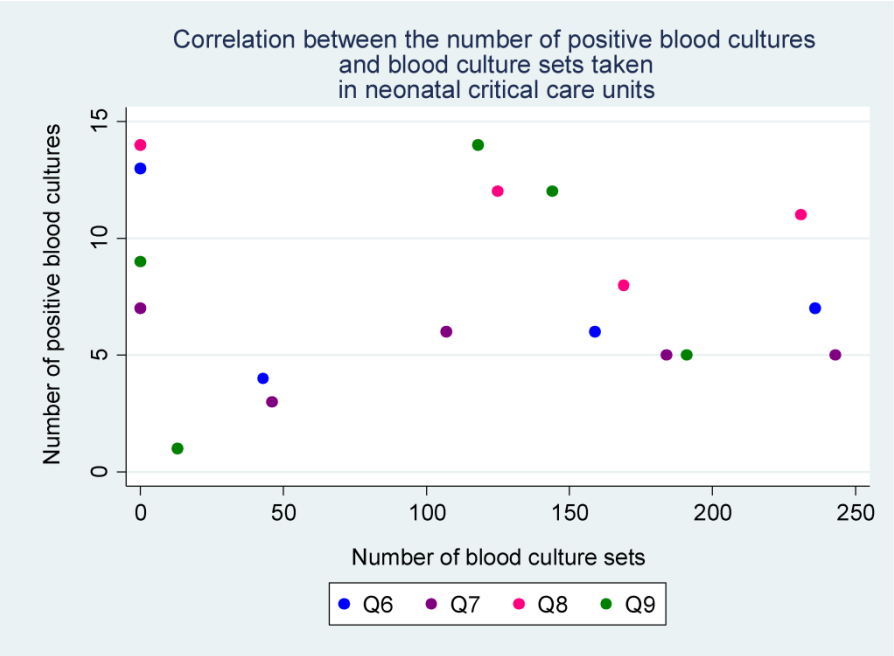
*ICU-CVC days calculated from patients with at least 1 CVC in the ICU >2 nights.
The red dots on the box and whisker plots represent the rates for your unit. If the red dot is missing from any of the plots, it is because rates could not be calculated for your unit due to non-participation, missing data or zeros entered for denominators.

Box and whisker plots of the rate of ICU-CRBSIs per 1,000 ICU CVC days* in neonatal critical care units, October 2016 – June 2018



*ICU-CVC days calculated from patients with at least 1 CVC in the ICU >2 nights.
The red dots on the box and whisker plots represent the rates for your unit. If the red dot is missing from any of the plots, it is because rates could not be calculated for your unit due to non-participation, missing data or zeros entered for denominators.
Please note, for quarters 4 & 5 (January-March 2017 & April-June 2017) the boxes and whiskers are missing from the plots as the median and interquartile range (25th and 75th percentile) values were all 0.

Correlation between the number of positive blood cultures and the number of blood culture sets in neonatal critical care units, July 2017 – June 2018



The black dots on the correlation plots represent the data for your unit. If the black dots are missing from the plot, it is because one of the data items used to create the plot was missing for your unit

Appendix: Case Definitions

1. Blood stream infections (BSIs)

Table A1: Criteria for case definitions for bloodstream infections in adults and paediatrics

Adults (≥13 years)	Paediatrics (<13yrs)
Meets one of the following criteria:	***Meets one of the following criteria:***
a) A recognised pathogen from at least one blood culture	a) A recognised pathogen from at least one blood culture
OR	**OR**
b) A common skin microorganism* from 2 blood cultures drawn on separate occasions and taken within a 48hr period **AND** The patient has at least ONE symptom of fever >38^{o}C, chills or hypotension	b) A common skin microorganism* from 2 blood cultures drawn on separate occasions and taken within a 48hr period **AND** The patient has at least TWO symptoms of paediatric SIRS[1]: tachycardia, bradycardia (<1yr), temperature >38.5^{o}C <36^{o}C, elevated respiratory rate, leukocytes (elevated/depressed for age), leukocyte count (if leukocyte is selected)

*coagulase-negative *Staphylococci*, *Micrococcus* sp., *Propionibacterium acnes*, *Bacillus* sp., *Corynebacterium* sp. etc

[1]The presence of at least TWO of the following four criteria (one of which must be abnormal temperature or leukocyte count):

- Tachycardia defined as a mean heart rate >2SD above normal for age in the absence of external stimulus, chronotropic drugs or painful stimuli
- For children <1 year old bradycardia defined as a mean heart rate <10th percentile for age in the absence of external vagal stimuli, beta blocker drugs or congenital heart disease
- Core temperature of >38.5 or <36 degrees Celsius
- Mean respiratory rate >2SD above normal for age or mechanical ventilation for an acute process not related to underlying neuromuscular disease or receipt of general anaesthesia
- Leukocyte count elevated or depressed for age (not secondary to chemotherapy induced leukopenia) or >10% immature neutrophils

Table A2: Criteria for case definitions for bloodstream infections in neonates

Neonates (<28 days)
Meets one of the following criteria:
a) A recognised pathogen from at least one blood culture **OR** b) A common skin microorganism* is cultured from blood AND Patient has ONE of: C-reactive protein >2.0 mg/dL immature/total neutrophil ratio (I/T ratio) >0.2 leukocytes <5/nL platelets <100/nL
AND
At least TWO of: temperature >38°C or <36.5°C or temperature instability tachycardia or bradycardia apnoea extended recapillarisation time metabolic acidosis hyperglycaemia other sign of BSI such as apathy

Table A3: Criteria for Neonatal Data Analysis Unit Definition

Neonates (<28 days): Neonatal Data Analysis Unit Definition[2]
Meets one of the following criteria:
a) A single recognised pathogen from at least one blood culture
OR
b) Growth of mixed organisms or skin commensals* **AND** Three or more predefined clinical signs: • Increase in apnoea or bradycardia • Temperature instability • Impaired peripheral perfusion (CRT > 3s pallor/mottling/core-peripheral temp gap >2°C) • Metabolic acidosis/base deficit < -10mmol/L • Lethargy/irritability/poor handling • Increased oxygen requirement or ventilator support • Ileus/onset of feed intolerance • Fall in urine output • Hypotension • Glucose intolerance

**Aerococcus sp., Bacillus sp. other, Corynebacterium sp., Coagulase-negative staphylococci not specified, Coagulase-negative staphylococci other, Micrococcus sp., Propionibacterium sp., Staphylococcus epidermidis, Staphylococcus haemolyticus, Streptococcus (Viridans group)*

Lower values for heart rate, leukocyte count and systolic BP = 5th percentile; upper values for heart & respiratory rate, leukocyte count = 95th percentile

†NDAU Definitions for catheter association BSI accessed 15th April 2016: https://www1.imperial.ac.uk/resources/99F3B656-C321-4881-8E24-EA1F4355B276/definitionforcabsiv3.pdf

[2] NDAU Definitions for catheter association BSI accessed 15th April 2016: https://www1.imperial.ac.uk/resources/99F3B656-C321-4881-8E24-EA1F4355B276/definitionforcabsiv3.pdf

2. ICU-associated bacteraemia

3. Date of positive blood culture > 2 days (or >48 hours if ICU admission time and ICU specimen time provided) after date of ICU admission (where the date of ICU admission is day 1).

4. Central catheter-bloodstream infection (CVC-BSI)

a. Catheter-associated BSI (CABSI)

Table A4: Criteria for defining catheter-associated BSI (CABSI)

Meets ALL of the following criteria:
a) One of the criteria for bloodstream infection
AND
b) The presence of at least one central venous catheters at the time of the positive blood culture, or CVC removed within 48 hrs before positive blood cultures
AND
c) The signs and symptoms, and the positive laboratory results, including pathogen cultured from the blood, are not primarily related to an infection at another site

b. Catheter-related BSI (CRBSI)

Table A5: Criteria for defining catheter-related BSI (CRBSI)

Meets ALL of the following criteria:
a) One of the criteria for bloodstream infection
AND
b) The presence of at least one central venous catheters at the time of the positive blood culture **or** CVC removed within 48 hrs before positive blood cultures
AND
c) At least <u>one</u> of the following where the same culture was identified: I) quantitative CVC culture $\geq 10^3$ CFU/ml or semi-quantitative CVC culture > 15 CFU II) quantitative blood culture ratio CVC blood sample/peripheral blood sample > 5 III) differential delay of positivity of blood cultures: CVC blood sample culture positive 2 hours or more before peripheral blood culture (blood samples drawn at the same time) IV) positive culture with the same micro-organism from pus from insertion site V) symptoms improve within 48hr of removal of CVC