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ICCQIP infection in critical care quality improvement programme

ADULT 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 adult 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	Adult CCUs[§]	Your Unit	Adult CCUs[§]	Your Unit	Adult CCUs[§]	Your Unit	Adult CCUs[§]
Total number of positive blood cultures		280		496		590		721
Total number of patient days		29,969		60,380		75,207		82,616
Total number of blood culture sets taken		3,881		8,248		9,243		10,561
Rate of positive blood cultures per 1,000 patient days		9.3		8.2		7.8		8.7
Rate of positive blood cultures per 1,000 blood culture sets taken		72.1		60.1		63.8		68.3
Total number of BSIs[¥]		167		280		365		468
Rate of BSI per 1,000 patient days		5.6		4.6		4.8		5.7

[§] 32, 57, 71, and 77 units provided full denominator and event data and are included in the total Adult 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

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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 adult critical care units, October 2017-June 2018

	Q 7 (October-December 2017)		Q 8 (January-March 2018)		Q 9 (April-June 2018)	
	Your Unit	Adult CCUs[§]	Your Unit	Adult CCUs[§]	Your Unit	Adult CCUs[§]
Total number of positive blood cultures		792		757		770
Total number of patient days		97,633		97,940		90,584
Total number of blood culture sets taken		10,824		11,197		10,303
Rate of positive blood cultures per 1,000 patient days		8.1		7.7		8.5
Rate of positive blood cultures per 1,000 blood culture sets taken		73.2		67.6		74.7
Total number of BSIs[¥]		487		449		445
Rate of BSI per 1,000 patient days		5.0		4.6		4.9

[§] 79, 77, 78 units provided full denominator and event data and are included in the total Adult 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

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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 adult 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	Adult CCUs[§]	Your Unit	Adult CCUs[§]	Your Unit	Adult CCUs[§]	Your Unit	Adult CCUs[§]
Number of ICU-associated BSIs[¥]		102		173		220		272
Number of patient days, amongst patients in the ICU>2 days		20,847		42,300		52,326		59,358
Rate of ICU-associated BSI per 1,000 patient days*		4.9		4.1		4.2		4.6
Number of CVC-associated ICU-associated BSIs[¥]		23		23		58		55
Number of CVC days, amongst patients in the ICU>2 days		13,114		25,836		29,866		33,590
Rate of CVC-associated ICU-associated BSI per 1,000 ICU-CVC days*		1.8		0.9		1.9		1.6
Number of CVC-related ICU-associated BSI[¥]		20		28		37		43
Rate of CVC-related ICU-associated BSI per 1,000 ICU- CVC days*		1.0		1.1		1.2		1.3
CVC utilisation*		63.5%		57.7%		56.2%		58.0%

[§]32, 57, 71, and 77 units provided full denominator and event data and are included in the total Adult 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

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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 adult critical care units, October 2017-June 2018

	Q 7 (October-December 2017)		Q 8 (January-March 2018)		Q 9 (April-June 2018)	
	Your Unit	Adult CCUs[§]	Your Unit	Adult CCUs[§]	Your Unit	Adult CCUs[§]
Number of ICU-associated BSIs[¥]		324		282		264
Number of patient days, amongst patients in the ICU>2 days		67,930		70,878		63,157
Rate of ICU-associated BSI per 1,000 patient days*		4.8		4.0		4.2
Number of CVC-associated ICU-associated BSIs[¥]		68		53		39
Number of CVC days, amongst patients in the ICU>2 days		39,997		44,013		40,959
Rate of CVC-associated ICU-associated BSI per 1,000 ICU-CVC days*		1.7		1.2		1.0
Number of CVC-related ICU-associated BSI[¥]		49		36		31
Rate of CVC-related ICU-associated BSI per 1,000 ICU- CVC days*		1.2		0.8		0.8
CVC utilisation*		58.8%		60.2%		61.4%

[§] 79, 77, 78 units provided full denominator and event data and are included in the total Adult 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

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Table 3a. Counts and percentages of species identified through positive blood cultures in your ICU and for all adult 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		Adult CCUs[§]		Your Unit		Adult CCUs[§]		Your Unit		Adult CCUs[§]		Your Unit		Adult 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			280	100.0			496	100.0			590	100.0			721	100.0
Recognised pathogens			162	57.9			270	54.4			357	60.5			460	63.8
Skin commensals			128	45.7			246	49.6			254	43.1			291	40.4
Skin commensals which meet the BSI case definition [◊]			5	1.8			10	2.0			9	1.5			10	1.4
Polymicrobial infections[†]			37	13.2			58	11.7			73	12.4			78	10.8
Coagulase negative Staphylococci			116	41.4			227	45.8			235	39.8			262	36.3
C. albicans			6	2.1			6	1.2			16	2.7			25	3.5
E. cloacae			5	1.8			15	3.0			12	2.0			25	3.5
E. faecium			17	6.1			33	6.7			27	4.6			18	2.5
E. coli			35	12.5			48	9.7			73	12.4			86	11.9
K. pneumonia			15	5.4			22	4.4			30	5.1			39	5.4
P. aeruginosa			10	3.6			15	3.0			27	4.6			27	3.7
S. aureus			12	4.3			44	8.9			53	9.0			68	9.4
Staphylococci other			9	3.2			28	5.6			20	3.4			38	5.3

[§] 32, 57, 71, and 77 units provided full denominator and event data and are included in the total Adult 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. 165 PBCs in Adult ICUs which are defined as polymicrobial infections from 142 patients (23 additional PBC from other PBCs on the same date)

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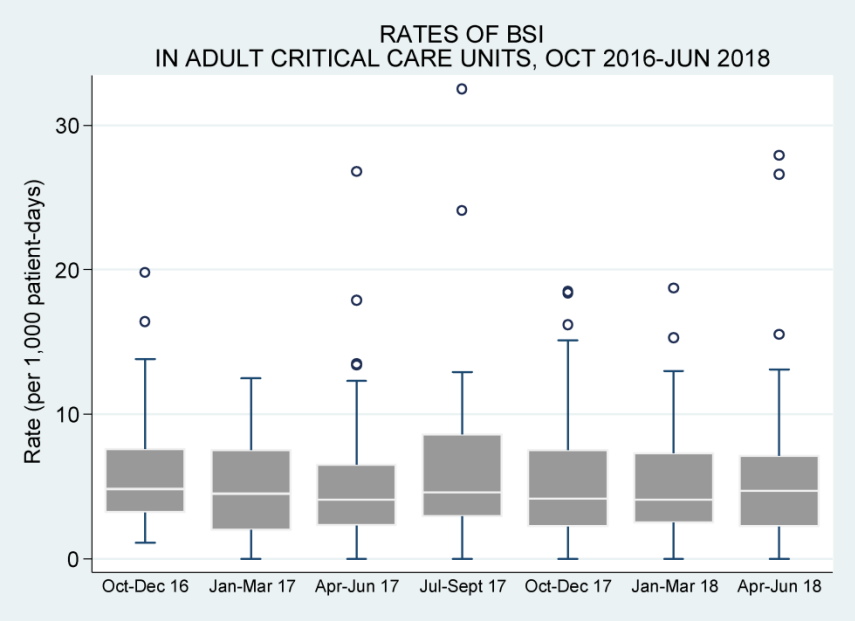
Table 3b. Counts and percentages of species identified through positive blood cultures in your ICU and for all adult critical care units, October 2017-June 2018

	Q 7 (October-December 2017)				Q 8 (January-March 2018)				Q 9 (April-June 2018)			
	Your Unit		Adult CCUs[§]		Your Unit		Adult CCUs[§]		Your Unit		Adult 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			792	100.0			757	100.0			770	100.0
Recognised pathogens			476	60.1			446	58.9			432	56.1
Skin commensals			353	44.6			334	44.1			367	47.7
Skin commensals which meet the BSI case definition [◊]			12	1.5			8	1.1			14	1.8
Polymicrobial infections[†]			108	13.6			55	7.3			79	10.3
Coagulase negative Staphylococci			328	41.1			313	41.3			332	43.1
C. albicans			22	2.8			0	0.0			11	1.4
E. cloacae			21	2.7			17	2.2			11	1.4
E. faecium			45	5.7			11	1.5			45	5.8
E. coli			71	9.0			34	4.5			95	12.3
K. pneumonia			45	5.7			81	10.7			36	4.7
P. aeruginosa			17	2.1			33	4.4			28	3.6
S. aureus			68	8.6			35	4.6			71	9.2
Staphylococci other			43	5.4			58	7.7			33	4.3

[§] 79, 77, 78 units provided full denominator and event data and are included in the total Adult 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

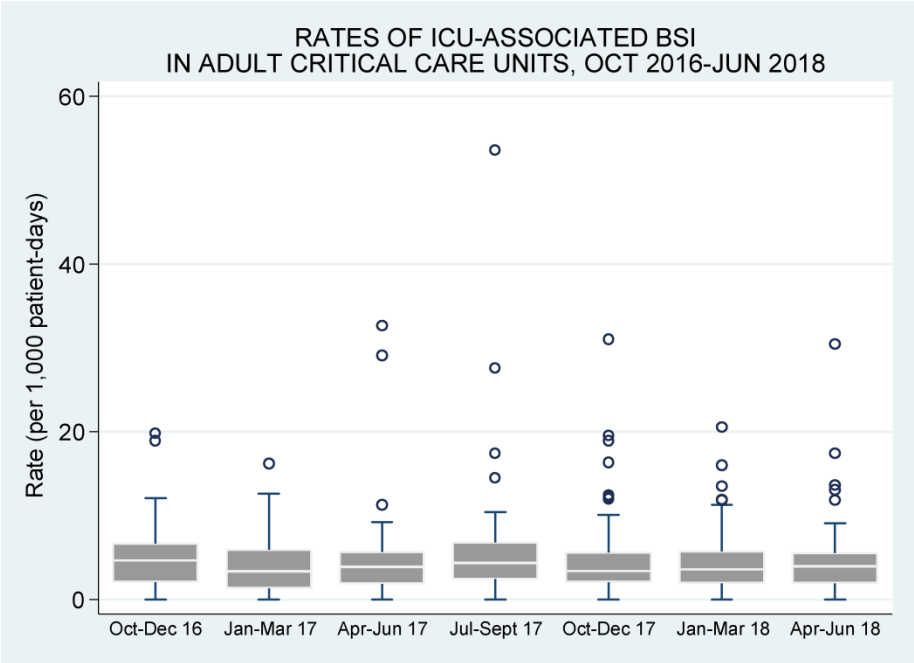
[◊] See appendix for definitions. [†] defined as any blood sample with multiple organisms cultured OR multiple positive blood cultures from the same patient on the same calendar date. 152 PBCs in Adult ICUs which are defined as polymicrobial infections from 133 patients (19 additional PBC from other PBCs on the same date)

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



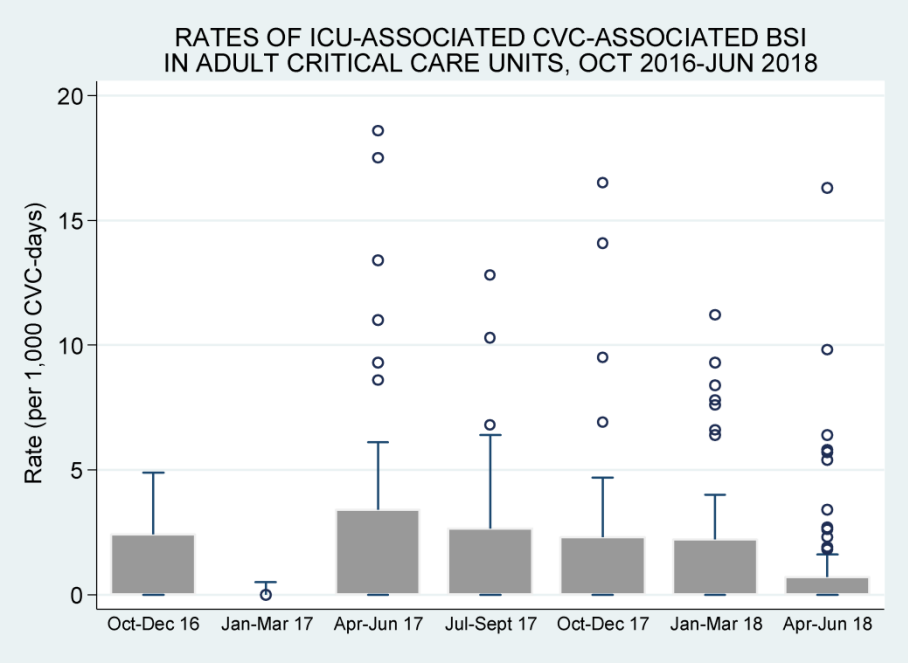
The red dots on the box and whisker plots represent the rates for your unit. If the red dot is missing from any of the plots, it is because rates could not be calculated for your unit due to non-participation, missing data or zeros entered for denominators.

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



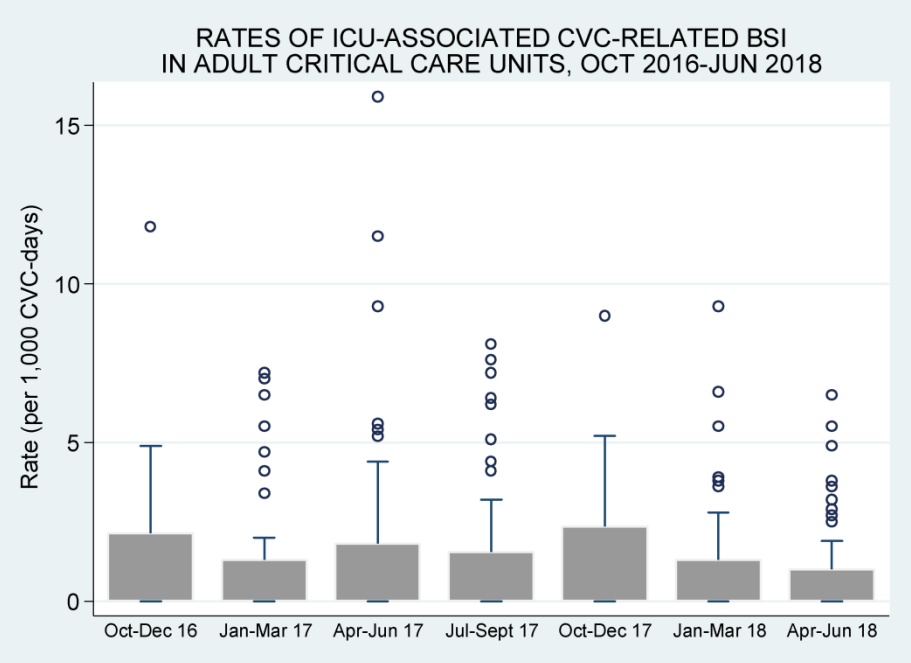
*ICU-patient days calculated from patients in the ICU >2 nights.
The red dots on the box and whisker plots represent the rates for your unit. If the red dot is missing from any of the plots, it is because rates could not be calculated for your unit due to non-participation, missing data or zeros entered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

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



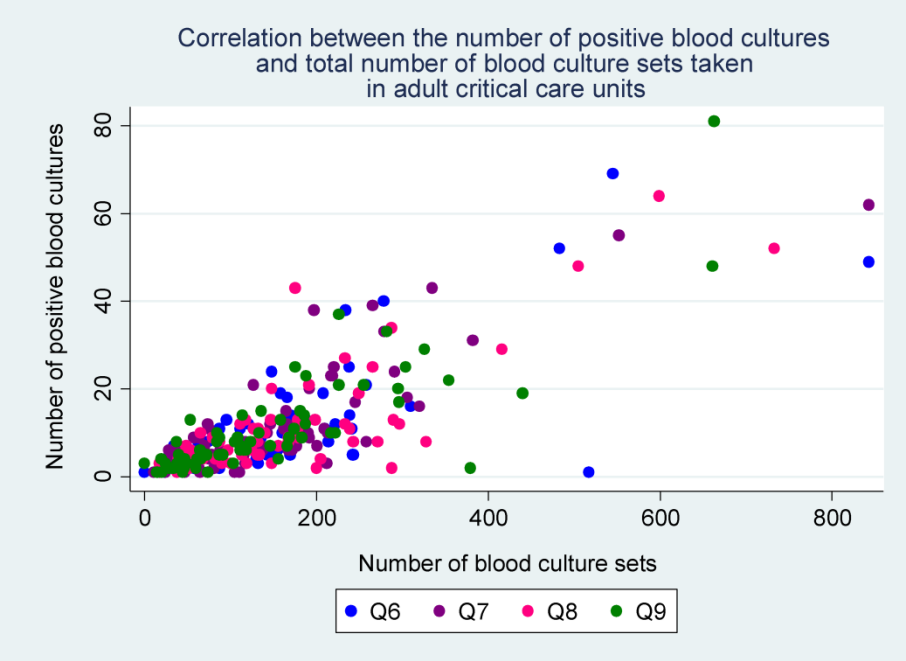
*ICU-CVC days calculated from patients with at least 1 CVC in the ICU >2 nights.
The red dots on the box and whisker plots represent the rates for your unit. If the red dot is missing from any of the plots, it is because rates could not be calculated for your unit due to non-participation, missing data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

Box and whisker plots of the rate of ICU-CRBSIs per 1,000 ICU CVC days* in adult 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.

Correlation between the number of positive blood cultures and the number of blood culture sets in adult 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

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).

3. 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