

## **NEONATAL ICUs: January 2017 to September 2018**

**Table 1. 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, January 2017-September 2018**

	<b>Q 4 (January- March 2017) §</b>	<b>Q 5 (April-June 2017) §</b>	<b>Q 6 (July-September 2017) §</b>	<b>Q 7 (October- December 2017) §</b>	<b>Q 8 (January- March 2018) §</b>	<b>Q 9 (April-June 2018) §</b>	<b>Q10 (July-September 2018) §</b>
Total number of positive blood cultures	19	24	30	26	45	41	42
Total number of patient days	7,632	8,450	9,326	9,919	9,879	10,321	10,099
Total number of blood culture sets taken	363	400	481	550	550	579	597
Rate of positive blood cultures per 1,000 patient days	2.5	2.8	3.2	4.6	4.6	4	4.2
Rate of positive blood cultures per 1,000 blood culture sets taken	52.3	60	62.4	81.8	81.8	70.8	70.4
Total number of BSIs <sup>‡</sup>	4	2	3	9	9	7	5
Rate of BSI per 1,000 patient days	0.5	0.2	0.3	0.9	0.9	0.7	0.5

§ 3, 4, 5, 5, 5, 5 and 5 units provided full denominator and event data and are included in the total Neonatal CCU metrics in Q4, Q5, Q6, Q7, Q8, Q9 and Q10 respectively. Additional units provided only event data and so could not be included in the overall totals and overall rates.

‡see appendix for definitions

**Table 2. 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, January 2017- September 2018**

	Q 4 (January-March 2017) <sup>§</sup>	Q 5 (April-June 2017) <sup>§</sup>	Q 6 (July-September 2017) <sup>§</sup>	Q 7 (October- December 2017) <sup>§</sup>	Q 8 (January- March 2018) <sup>§</sup>	Q 9 (April-June 2018) <sup>§</sup>	Q10 (July- September 2018) <sup>§</sup>
Number of ICU-associated BSIs <sup>‡</sup>	3	2	3	4	9	7	3
Number of patient days, amongst patients in the ICU>2 days	7,486	8,261	9,071	9,550	9,666	10,123	9,850
Rate of ICU-associated BSI per 1,000 patient days*	0.4	0.2	0.3	0.4	0.9	0.7	0.3
Number of CVC-associated ICU- associated BSIs <sup>‡</sup>	0	2	2	1	4	4	3
Number of CVC days, amongst patients in the ICU>2 days	1,703	2,015	2,231	2,456	2,556	2,393	2,264
Rate of CVC-associated ICU- associated BSI per 1,000 ICU-CVC days*	0	1	0.9	0.4	1.6	1.7	1.3
Number of CVC-related ICU- associated BSI <sup>‡</sup>	0	0	0	0	3	0	2
Rate of CVC-related ICU- associated BSI per 1,000 ICU- CVC days*	0	0	0	0	1.2	0	0.9
CVC utilisation*	22.7%	24.4%	24.6%	25.7%	26.4%	23.6%	23.0%

<sup>§</sup> 3, 4, 5, 5, 5 and 5 units provided full denominator and event data and are included in the total Neonatal CCU metrics in Q4, Q5, Q6, Q7, Q8, Q9 and Q10, respectively. Additional units provided only event data and so could not be included in the overall totals and overall rates.

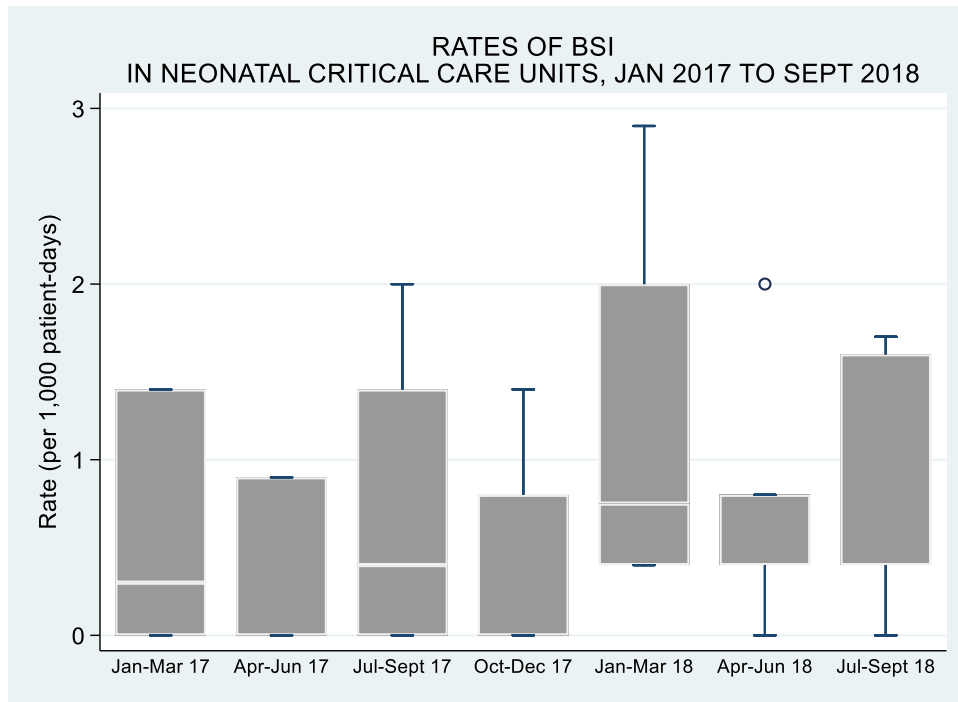
<sup>‡</sup>see appendix for definitions. \*calculated from patients in the ICU >2 nights

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

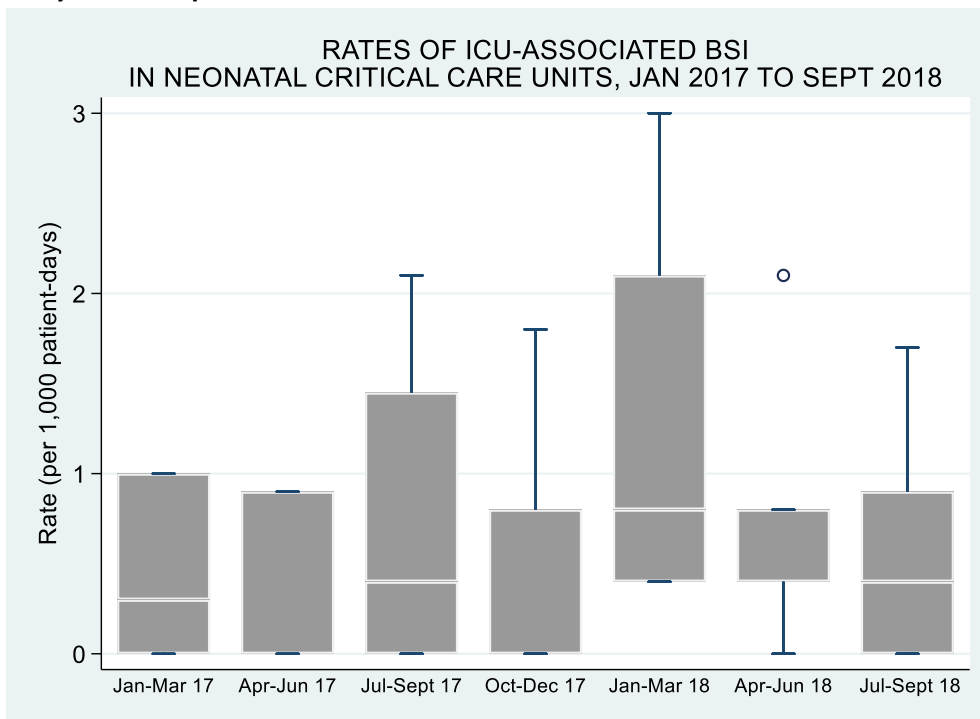
	Q 4 (January-March 2017) <sup>§</sup>		Q 5 (April-June 2017) <sup>§</sup>		Q 6 (July-September 2017) <sup>§</sup>		Q 7 (October- December 2017) <sup>§</sup>		Q 8 (January-March 2018) <sup>§</sup>		Q 9 (April-June 2018) <sup>§</sup>		Q10 (July-September 2018) <sup>§</sup>	
	No. of pts*	% of +ve BC**	No. of pts*	% of +ve BC**	No. of pts*	% of +ve BC**	No. of pts*	% of +ve BC**	No. of pts*	% of +ve BC**	No. of pts*	% of +ve BC**	No. of pts*	% of +ve BC**
Positive blood cultures	19	100.0	24	100.0	30	100.0	26	100.0	45	100.0	41	100.0	42	100.0
Recognised pathogens	11	57.9	14	58.3	15	50.0	16	61.5	19	42.2	24	58.5	18	42.9
Skin commensals	8	42.1	10	41.7	17	56.7	13	50.0	30	66.7	21	51.2	27	64.3
Skin commensals which meet the BSI case definition <sup>°</sup>	0	0.0	1	4.2	1	3.3	1	3.8	4	8.9	2	4.9	0	0.0
Polymicrobial infections <sup>†</sup>	2	10.5	2	8.3	6	20.0	3	11.5	6	13.3	9	22.0	4	9.5
Coagulase negative Staphylococci	7	36.8	9	37.5	17	56.7	13	50.0	29	64.4	21	51.2	27	64.3
<i>C. albicans</i>	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
<i>E. cloacae</i>	1	5.3	0	0.0	1	3.3	1	3.8	1	2.2	2	4.9	1	2.4
<i>E. faecium</i>	0	0.0	0	0.0	0	0.0	0	0.0	1	2.2	0	0.0	0	0.0
<i>E. coli</i>	0	0.0	3	12.5	3	10.0	2	7.7	3	6.7	8	19.5	1	2.4
<i>K. pneumonia</i>	0	0.0	2	8.3	0	0.0	0	0.0	1	2.2	0	0.0	0	0.0
<i>P. aeruginosa</i>	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	2.4	0	0.0
<i>S. aureus</i>	3	15.8	4	16.7	3	10.0	1	3.8	1	2.2	3	7.3	2	4.8
Staphylococci other	0	0.0	3	12.5	1	3.3	6	23.1	8	17.8	6	14.6	5	11.9

<sup>§</sup> 3, 4, 5, 5, 5, 5 and 5 units provided full denominator and event data and are included in the total Neonatal CCU metrics in Q4, Q5, Q6, Q7, Q8, Q9 and Q10, 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. <sup>°</sup> See appendix for definitions. <sup>†</sup> defined as any blood sample with multiple organisms cultured OR multiple positive blood cultures from the same patient on the same calendar date.

**Box and whisker plots of the rate of BSIs per 1,000 patient days in neonatal critical care units, January 2017 – September 2018**

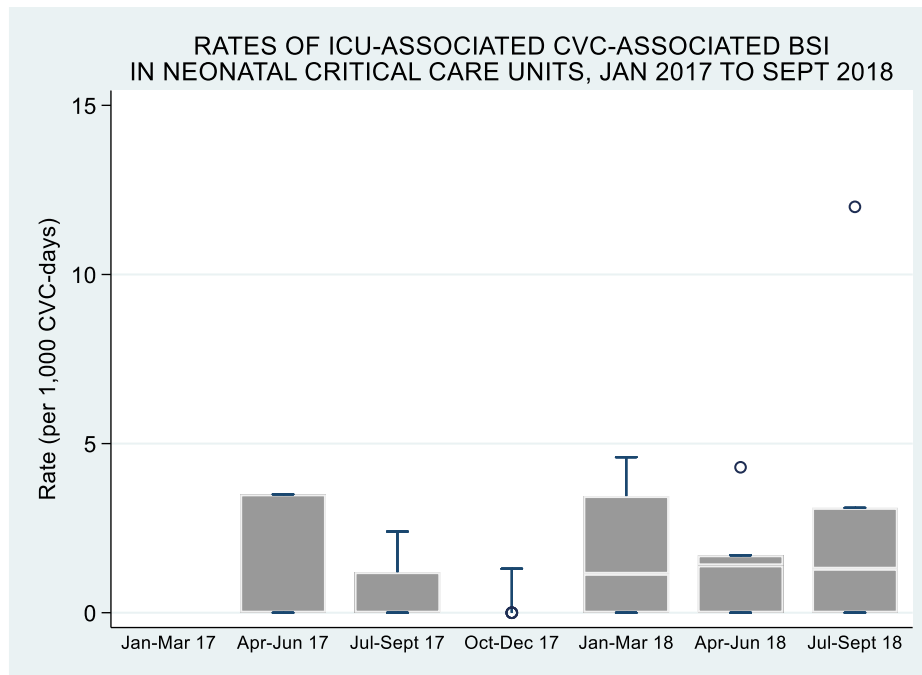


**Box and whisker plots of the rate of ICU-BSIs per 1,000 ICU patient days\* in neonatal critical care units, January 2017 – September 2018**



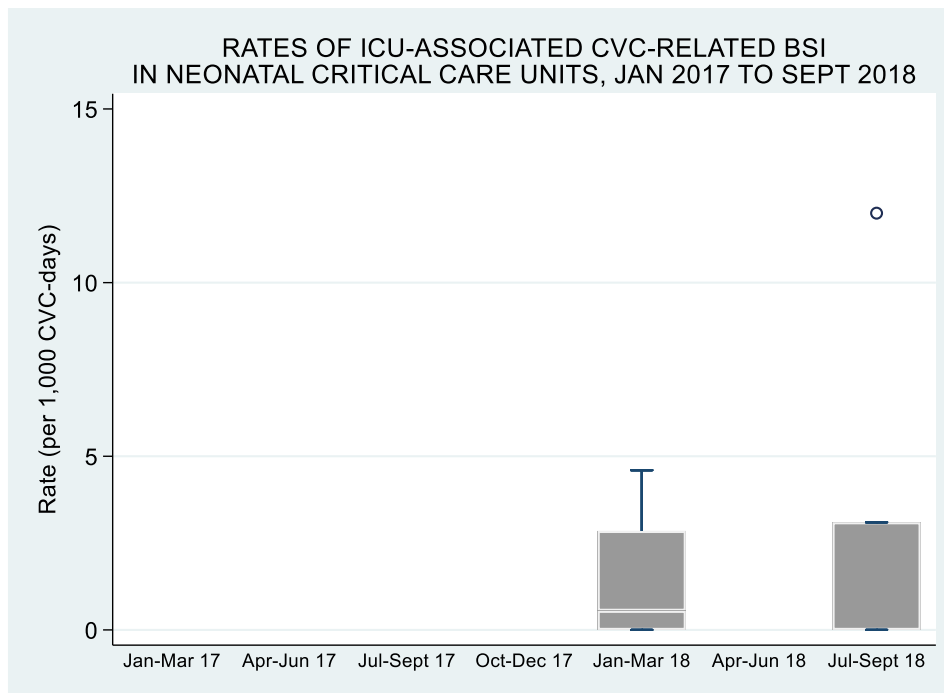
\*ICU-patient days calculated from patients in the ICU >2 nights.

**Box and whisker plots of the rate of ICU-CABSIs per 1,000 ICU CVC days\* in neonatal critical care units, January 2017 – September 2018**



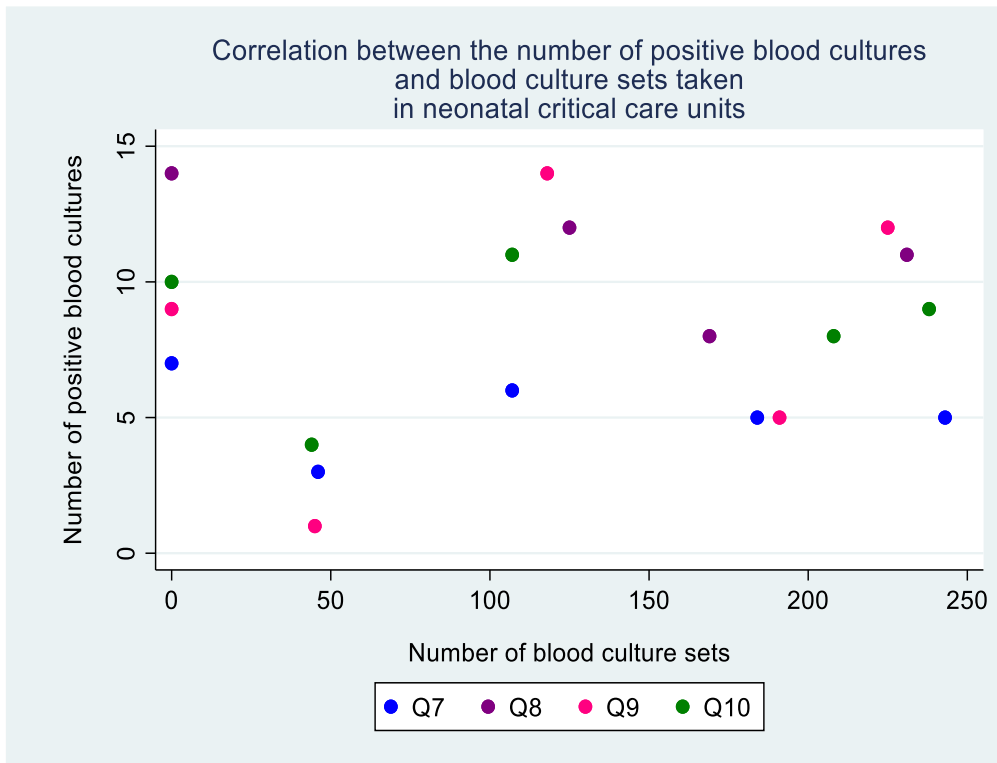
\*ICU-CVC days calculated from patients with at least 1 CVC in the ICU >2 nights.  
Please note, for quarters 4 & 7 (January-March 2017 & October-December 2017) the boxes and/or whiskers are missing from the plots as the median and interquartile range (25<sup>th</sup> and 75<sup>th</sup> percentile) values were all 0.

**Box and whisker plots of the rate of ICU-CRBSIs per 1,000 ICU CVC days\* in neonatal critical care units, January 2017 – September 2018**



\*ICU-CVC days calculated from patients with at least 1 CVC in the ICU >2 nights.  
Please note, for quarters 4, 5, 6, 7, 9 (January-March 2017, April-June 2017, July-September 2017, October-December 2017, April-June 2018) the boxes and whiskers are missing from the plots as the median and interquartile range (25<sup>th</sup> and 75<sup>th</sup> 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, October 2017 – September 2018**



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

\**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)*

<sup>1</sup>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)
<p><i>Meets one of the following criteria:</i></p>
<p>a) A recognised pathogen from at least one blood culture</p> <p><b>OR</b></p> <p>b) A common skin microorganism* is cultured from blood</p> <p><u>AND</u></p> <p>Patient has ONE of:</p> <p>C-reactive protein &gt;2.0 mg/dL</p> <p>immature/total neutrophil ratio (I/T ratio) &gt;0.2</p> <p>leukocytes &lt;5/nL</p> <p>platelets &lt;100/nL</p>
<p><b>AND</b></p>
<p>At least TWO of:</p> <p>temperature &gt;38°C or &lt;36.5°C or temperature instability</p> <p>tachycardia or bradycardia</p> <p>apnoea</p> <p>extended recapillarisation time</p> <p>metabolic acidosis</p> <p>hyperglycaemia</p> <p>other sign of BSI such as apathy</p>

\**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)*



**Table A3: Criteria for Neonatal Data Analysis Unit Definition**

Neonates (<28 days): Neonatal Data Analysis Unit Definition <sup>2</sup>
<i>Meets one of the following criteria:</i>
a) A single recognised pathogen from at least one blood culture
<b>OR</b>
b) Growth of mixed organisms or skin commensals*
<b>AND</b>
Three or more predefined clinical signs:
<ul style="list-style-type: none"> <li>• Increase in apnoea or bradycardia</li> <li>• Temperature instability</li> <li>• Impaired peripheral perfusion (CRT &gt; 3s pallor/mottling/core-peripheral temp gap &gt;2°C)</li> <li>• Metabolic acidosis/base deficit &lt; -10mmol/L</li> <li>• Lethargy/irritability/poor handling</li> <li>• Increased oxygen requirement or ventilator support</li> <li>• Ileus/onset of feed intolerance</li> <li>• Fall in urine output</li> <li>• Hypotension</li> <li>• Glucose intolerance</li> </ul>

\**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 = 5<sup>th</sup> percentile; upper values for heart & respiratory rate, leukocyte count = 95<sup>th</sup> percentile

<sup>2</sup> NDAU Definitions for catheter association BSI accessed 15<sup>th</sup> 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 were provided) after date of ICU admission (where the date of ICU admission is considered day 1).

## 3. Central catheter-bloodstream infection (CVC-BSI)

### a. Catheter-associated BSI (CABSIS)

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

<i>Meets ALL of the following criteria:</i>	
a)	One of the criteria for bloodstream infection
<b>AND</b>	
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
<b>AND</b>	
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 (CRBSIS)

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

<i>Meets ALL of the following criteria:</i>	
a)	One of the criteria for bloodstream infection
<b>AND</b>	
b)	The presence of at least one central venous catheters at the time of the positive blood culture <b>or</b> CVC removed within 48 hrs before positive blood cultures
<b>AND</b>	
c)	At least <u>one</u> of the following where the same culture was identified: <ul style="list-style-type: none"> <li>I) quantitative CVC culture <math>\geq 10^3</math> CFU/ml or semi-quantitative CVC culture &gt;15 CFU</li> <li>II) quantitative blood culture ratio CVC blood sample/peripheral blood sample &gt;5</li> <li>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)</li> <li>IV) positive culture with the same micro-organism from pus from insertion site</li> <li>V) symptoms improve within 48hr of removal of CVC</li> </ul>