**Supplementary material**

**Table 1.** Survey participants’ beliefs regarding likelihood of bacteremia with different clinical scenarios.

**Table 2.** Survey participants’ perceptions regarding barriers and potential strategies to improving blood culture (BCx) utilization.

**Interview Guide.**

**Table 1.** Survey participants’ beliefs regarding likelihood of bacteremia with different clinical scenarios, N=282.

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| --- | --- | --- | --- |
| **Syndrome** | **Very likely/Likely****N (%)** | **Neutral****N (%)** | **Very unlikely/****Unlikely****N (%)** |
| **Initial blood cultures** |  |  |  |
| Cellulitis | 46 (16.2) | 42 (14.8) | 196 (69.0) |
| Severe community-acquired pneumonia | 138 (48.6) | 78 (27.5) | 68 (23.9) |
| Non-severe community-acquired pneumonia | 12 (4.2) | 35 (12.3) | 237 (83.4) |
| Ventilator-associated pneumonia | 89 (31.3) | 91 (32.0) | 104 (36.6) |
| Meningitis | 150 (52.8) | 72 (25.3) | 62 (21.8) |
| Pyelonephritis | 196 (69.0) | 60 (21.1) | 28 (9.9) |
| Septic shock | 272 (95.8) | 11 (3.9) | 1 (0.3) |
| Sepsis | 219 (77.1) | 54 (19.0) | 11 (3.9) |
| **Follow-up blood cultures** |  |  |  |
| Follow-up BCx in uncomplicated *E. coli* bacteremia\*  | 31 (10.9) | 61 (21.5) | 192 (67.7) |
| Follow-up BCx in uncomplicated *S. pneumoniae* bacteremia\* | 39 (13.7) | 83 (29.2) | 162 (57.0) |
| Follow-up BCx in *S. aureus* bacteremia\* | 156 (55.3) | 93 (32.7) | 35 (12.3) |

\*Clinical response, source control achieved, no suspicion for endovascular infection.

**Table 2.** Survey participants’ perceptions regarding barriers and potential strategies to improving blood culture (BCx) utilization. The table shows the proportion of respondents who strongly agreed/agreed with the statement. These were multiple-choice questions.

|  |  |  |
| --- | --- | --- |
| **Survey statement** | **N** | **%** |
| **Major barriers to obtaining peripheral BCx in clinical practice setting. N=290** |  |  |
| Inability to get peripheral venipuncture due to patient related factors (e.g., anasarca, difficult access)  | 267 | 92.07 |
| Desire to rule out catheter-related bloodstream infections  | 70 | 24.14 |
| Lack of trained staff to draw the blood cultures  | 67 | 23.10 |
| Opinion of consulting service or other clinicians  | 18 | 6.21 |
| Pain/discomfort of the patient versus painless draw from existing catheter  | 87 | 30.00 |
| **Major barriers to reducing unnecessary BCx. N=287** |  |  |
| Concern for potentially missing an infection  | 238 | 82.93 |
| Lack of guidelines for when to draw blood cultures  | 159 | 55.40 |
| Not receiving feedback on blood culture utilization rates  | 147 | 51.22 |
| Poor communication between physicians  | 40 | 13.93 |
| Poor communication between physicians and nurses  | 35 | 12.19 |
| Requested/recommended by another clinical team (e.g., Infectious Disease, Nephrology)  | 90 | 31.35 |
| Thought that there is no need to improve the number of blood cultures in the unit  | 73 | 2.43 |
| Other priorities | 16 | 5.57 |
| **Approaches that might be most helpful in improving BCx utilization. N=287** |  |  |
| An algorithm integrated into existing hospital treatment guidelines  | 164 | 57.14 |
| An algorithm with indications built into the Electronic Medical Record  | 185 | 60.64 |
| A printed algorithm with indications posted in unit work areas  | 94 | 32.75 |
| A risk calculator for bloodstream infection based on patient data  | 158 | 55.05 |
| A summary of patient’s blood culture data integrated into clinician hand-off process  | 77 | 26.82 |
| Receiving feedback on blood culture utilization rates, and other quality indicators of collection practices such as blood culture contamination rates  | 152 | 52.96 |
| Other | 6 | 2.09 |

**Interview Guide**

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| --- |
| **Intervention source** |
| Why did you decide to participate in this collaborative to implement the Blood Culture Stewardship Program? |  |
| Which unit(s) did you select for this project? |  |
| Why were these units selected? |  |
| **Tension for change/implementation climate/inner setting**, **Structural characteristics/inner setting** |
| Do you have any thoughts about *blood culture ordering practices* in your unit?  |  |
| Are blood cultures drawn too frequently or not often enough? Are they drawn at the right frequency? What are the drivers of that [their observation]?  |  |
| How is the decision to obtain blood cultures made? (who does ultimately make the call about getting BC?) |  |
| Do you have any thoughts about *blood culture collection process* in your unit? |  |
| Any concerns about obtaining adequate volume of blood to fill the blood culture bottle? |  |
| Any concerns about the number of blood culture sets? |  |
| Any concerns about practices that may results in blood culture contamination? (e.g. drawing blood cultures from existing lines, drawing blood cultures from central lines) |  |
| Who draws most of the blood cultures? Any thoughts about who should be drawing blood cultures? |  |
| What have been some of the drivers for these observations you have made?  |  |
| Have you received feedback about blood culture quality indicators such as blood culture contamination rates, number of positive blood cultures, how many were collected as single sets, etc.? |  |
| Is there an institutional policy that specifies instructions for how to collect blood cultures? |  |
| Is there a need for implementing the Blood Culture Stewardship QI initiative?  |  |
| **Relative advantage/intervention characteristics** |
| Are you aware of or have you implemented efforts to improve blood culture use in the past? (ask about reduce unnecessary blood cultures, reduce “panculture”, reduce blood culture contamination, reduce solitary blood cultures). |  |
| If yes, |  |
| What have been some of the barriers to improve blood culture practices (ordering and collection) in the participating units?  |  |
| How does this Blood Culture Stewardship Program compare to those efforts? |  |
| **Compatibility/implementation climate/inner setting** |
| What is the general level of receptivity on the participating unit(s) to implementing the Blood Culture Stewardship Program? |  |
| Are there individuals/groups that might obstruct this project? |  |
| Can you think of any barriers to implementing the Blood Culture Stewardship program successfully? |  |
| How well does the Blood Culture Stewardship Program fit with your existing work processes and practices? |  |
| **Relative priority/implementation climate/inner setting** |
| Are there any other QI projects on your unit(s) that may be prioritized over the Blood Culture Stewardship Program? |  |
| Do you have any thoughts about the sustainability of this QI after the intervention period? |  |
| **Leadership engagement/readiness for implementation/inner setting** |
| What kind of support or actions can you expect from hospital/unit leaders in your organization to help make implementation of this QI successful? |  |
| **Outer setting** |
| How do you think this collaborative work with Johns Hopkins and the other institutions may facilitate/hinder your local QI efforts related to BCx improvement efforts? |  |
| **Access to knowledge and information/readiness for implementation/inner setting** |
| What kind of training do you think is necessary to improve blood culture practices in the unit? And who should be trained? |  |
| What kinds of information and materials about the Blood Culture Stewardship Program are planned for individuals in your organization/unit? |  |
| Who would be the main person to help with questions regarding the Blood Culture Stewardship Program? |  |
| **Complexity** |
| How complicated do you anticipate it will be to implement the Blood Culture Stewardship Program? |  |
| What will be the challenges to implementing the Blood Culture Stewardship Program? |  |
| **Networks and communication/Inner setting** |
| How would you describe the working relationships on the unit(s)?  |  |
| Is there mutual respect between different professionals or between different levels or between leadership and frontline? |  |
| **Culture, learning climate/implementation climate** |
| How would you describe the Safety Climate/Culture of the participating unit? |  |
| If you saw a safety issue on your unit (e.g., unnecessary blood culture, people not following best practices), what would you do? |  |
| To what extent are new ideas embraced and used to make improvements in your organization/unit? |  |
| To what extent is input from frontline providers valued and to what extent are they involved in decision-making for your unit? (This would also be Communication) |  |
| Have initiatives/efforts related to antimicrobial and or diagnostic stewardship been supported in the unit(s)? |  |