## The effect of a care bundle on the rate of blood culture contamination in a general ICU.

**SUPPLEMENTARY TABLES**

**Table S1**. Indications for blood culture in the two phases of the study.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Indication for blood culture | | PRE phase | POST phase |  | Total |
| N (%) | N (%) | P value | N (%) |
| Fever | Yes | 716 (59,2%) | 586 (58,8%) | p>0.05 | 1302 (59,0%) |
| No | 494 (40,8%) | 410 (41,2%) | 904 (41,0%) |
| WBC abnormalities | Yes | 433 (35,8%) | 341 (34,2%) | p>0.05 | 774 (35,1%) |
| No | 777 (64,2%) | 655 (65,8%) | 1432 (64,9%) |
| Increased CRP (>5 mg/dl) | Yes | 381 (31,5%) | 178 (17,9%) | p<0.001 | 559 (25,3%) |
| No | 829 (68,5%) | 818 (82,1%) | 1647 (74,7%) |
| CVC change | Yes | 930 (76,9%) | 977 (98,1%) | p<0.001 | 1907 (86,4%) |
| No | 280 (23,1%) | 19 (1,9%) | 299 (13,6%) |
| Previous positive BC | Yes | 879 (72,7%) | 789 (79,2%) | p<0.001 | 1668 (75,6%) |
| No | 330 (27,3%) | 207 (20,8%) | 537 (24,4%) |
| No BC indications | Yes | 45 (3,7%) | 35 (3,5%) | p>0.05 | 80 (3,6%) |
| No | 1165 (96,3%) | 961 (96,5%) | 2126 (96,4%) |

**Table S2**. The distribution of blood volume in each phase

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | PRE phase | | POST phase | |  |
| Total vials | (n=2050) | (%) | (n=2187) | (%) | p |
| 1-4 ml | 379 | 18.5 | 0 | 0 | <0,001+ |
| 5-7 ml | 962 | 47 | 142 | 6.5 | <0,001+ |
| 8-10 ml | 665 | 32.4 | 2045 | 93.5 | <0,001+ |
| >10 ml | 44 | 2.1 | 0 | 0 | <0,001+ |

**Table S3.** Compliance to care bundle from BCs received by venipuncture

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | | PRE Phase  (n=100, 51,3%) | | POST Phase  (n=95, 48,7%) | |  |
|  | | n | % | n | % | **P value** |
| Disinfect cap of BC vials with 70% alcohol | No | 71 | 71,0 | 0 | 0,0 | <0,001 |
| Yes | 29 | 29,0 | 95 | 100,0 |
| Hand hygiene before procedure | No | 62 | 62,0 | 0 | 0,0 | <0,001 |
| Yes | 38 | 38,0 | 95 | 100,0 |
| Use of CHG 2% for the skin, leave time to dry | No | 60 | 60,0 | 1 | 1,1 | <0,001 |
| Yes | 40 | 40,0 | 94 | 98,9 |
| Use aseptic technique for obtain, no touch critical sites | No | 57 | 57,0 | 2 | 2,1 | <0,001 |
| Yes | 43 | 43,0 | 93 | 97,9 |
| Inoculate BCs first, follow other exams | No | 30 | 30,0 | 0 | 0,0 | <0,001 |
| Yes | 70 | 70,0 | 95 | 100,0 |
| Overall compliance | No | 98 | 98.0 | 2 | 2.1 | <0.001 |
| Yes | 2 | 2.0 | 93 | 97.9 |

**Table S4.** Compliance to care bundle from BCs received from CVC

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | | PRE Phase  (n=45, 56,3%) | | POST Phase  (n=35, 43,8%) | |  |
|  |  | n | % | n | % | **P value** |
| Disinfect cap of BC vials with 70% alcohol | No | 25 | 55,6 | 2 | 5,7 | <0,001 |
| Yes | 20 | 44,4 | 33 | 94,3 |
| Hand hygiene before procedure | No | 27 | 60,0 | 0 | 0,0 | <0,001 |
| Yes | 18 | 40,0 | 35 | 100,0 |
| Use gloves (sterile or not, it depends) | No | 15 | 33,3 | 2 | 5,7 | 0,003 |
| Yes | 30 | 66,7 | 33 | 94,3 |
| Scrub the hub with CHG 2% for 30 sec | No | 25 | 55,6 | 0 | 0,0 | <0,001 |
| Yes | 20 | 44,4 | 35 | 100,0 |
| Inoculate BCs first, follow other exams | No | 5 | 11,1 | 0 | 0,0 | 0,04 |
| Yes | 40 | 88,9 | 35 | 100,0 |
| Overall compliance | No | 42 | 93.3 | 4 | 11.4 | <0.001 |
| Yes | 5 | 6.7 | 31 | 88.6 |

**Table S5: Association between indications for BC and contaminated BC sets**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Indication for blood culture | | Contaminated | Negative |  | Total |
| n (%) | n (%) | p | n |
| Fever | No | 19 (1,8%) | 1040 (98,2%) | ns | 1059 |
| Yes | 17 (2,4%) | 677 (97,6%) | 694 |
| WBC abnormalities | No | 16 (2,5%) | 614 (97,5%) | ns | 630 |
| Yes | 20 (1,8%) | 1103 (98,2%) | 1123 |
| Tachycardia or tachypnoea | No | 30 (2,0%) | 1459 (98,0%) | ns | 1489 |
| Yes | 6 (2,3%) | 258 (97,7%) | 264 |
| CRP > 5 mg/dl | No | 14 (3,2%) | 428 (96,8%) | ns | 442 |
| Yes | 22 (1,7%) | 1289 (98,3%) | 1311 |
| Suspected endocarditis | No | 34 (2,0%) | 1681 (98,0%) | ns | 1715 |
| Yes | 2 (5,3%) | 36 (94,7%) | 38 |
| CVC change | No | 29 (1,9%) | 1502 (98,1%) | ns | 1531 |
| Yes | 7 (3,2%) | 215 (96,8%) | 222 |
| Previous positive BC | No | 24 (1,7%) | 1348 (98,3%) | ns | 1372 |
| Yes | 12 (3,2%) | 368 (96,8%) | 380 |
| No BC indications | No | 2 (2,8%) | 70 (97,2%) | ns | 72 |
| Yes | 34 (2,0%) | 1647 (98,0%) | 1681 |

**Table S6: Association between indications for BC and contaminated or indeterminate BC sets**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Indication for blood culture | | Contaminated or indeterminate | Negative |  | Total |
| n (%) | n (%) | p | n |
| Fever | No | 67 (6,1%) | 1040 (93,9%) | ns | 1107 |
| Yes | 47 (6,5%) | 677 (93,5%) | 724 |
| WBC abnormalities | No | 48 (7,3%) | 614 (92,7%) | ns | 662 |
| Yes | 66 (5,6%) | 1103 (94,4%) | 1169 |
| Tachycardia or tachypnoea | No | 90 (5,8%) | 1459 (94,2%) | ns | 1549 |
| Yes | 24 (8,5%) | 258 (91,5%) | 282 |
| CRP > 5 mg/dl | No | 40 (8,5%) | 428 (91,5%) | 0.016 | 468 |
| Yes | 74 (5,4%) | 1289 (94,6%) | 1363 |
| Suspected endocarditis | No | 110 (6,1%) | 1681 (93,9%) | ns | 1791 |
| Yes | 4 (10,0%) | 36 (90,0%) | 40 |
| CVC change | No | 93 (5,8%) | 1502 (94,2%) | ns | 1595 |
| Yes | 21 (8,9%) | 215 (91,1%) | 236 |
| Previous positive BC | No | 80 (5,6%) | 1348 (94,4%) | 0.036 | 1428 |
| Yes | 34 (8,5%) | 368 (91,5%) | 402 |
| No BC indications | No | 3 (4,1%) | 70 (95,9%) | ns | 73 |
| Yes | 111 (6,3%) | 1647 (93,7%) | 1758 |

**Table S7: Association between continuous variables and contaminated or indeterminate BC sets**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable | Contaminated BC sets\* | Negative BS sets\* | p value | Total\* |
| Hosp adm to BC days | 18.00 (8.00-41.50) | 15.00 (6.00-33.00) | 0.371 | 15.00 (6.00-33.00) |
| ICU adm to BC days | 10.00 (2.00-27.00) | 8.00 (2.00-23.00) | 0.480 | 8.00 (2.00-23.00) |
| Volume | 6.00 (5.00-8.00) | 8.00 (6.00-10.00) | 0.007 | 8.00 (6.00-10.00) |
| Age | 61.50 (45.00-71.00) | 61.00 (44.00-71.00) | 0.814 | 61.00 (44.00-71.00) |
| Charlson comorbidity index | 2.50 (1.00-6.00) | 3.00 (0 .00-5.00) | 0.357 | 3.00 (0.00-5.00) |
| APACHE | 16.00 (12.00-20.00) | 16.00 (11.00-20.00) | 0.997 | 16.00 (11.00-20.00) |
| SOFA on admission | 8.00 (7.00-9.00) | 9.00 (7.00-11.00) | 0.296 | 9.00 (7.00-11.00) |
| SOFA on BC day | 5.00 (0.00-10.00) | 3.00 (0.00-9.00) | 0.452 | 3.00 (0 .00-9.00) |
| Albumin on admission | 3.30 (2.70-3.80) | 2.90 (2.60-3.50) | 0.031 | 3.00 (2.60-3.50) |
| CRP (mg/dl) on admission | 5.30 (1.50-28,0) | 8.40 (1.90-21.00) | 0.141 | 8.40 (1.90-21.00) |
| CRP (mg/dl) on BC day | 1.04 (0.00-12.70) | 0.87 (0.00-12.40) | 0.577 | 0.87 (0.00-12.40) |

\*Median, 25th-75th percentile

**Table S8. Patient-related risk factors for contaminated BC.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable | Category | Contaminated | Negative | Chi-square  p value | Odds ratio 995% CI) |
|  |  | n (%) | n (%) |  |  |
| Age (mean, SD) |  | 65.5 (58.0-69.0) | 64.0 (47.0-74.0) | 0.93 | n/a |
| Sex | Female | 1 (.55) | 182 (99.45) | 0.23 | 4.15 (0.48-35.88) |
| Male | 5 (2.23) | 219 (97.77) |  |
| ICU Section | Medical | 5 (2.06) | 238 (97.94) | 0.40 | 0.29 (0.03-2.52) |
| Surgical | 1 (.61) | 163 (99.39) |  |
| Charlson comorbidity index | n/a | 4.0 (2.0-6.0) | 3.0 (1.0-5.0) | 0.58 | n/a |
| Chronic dialysis | No | 5 (1.27) | 388 (98.73) | 0.19 | 5.67 (0.65-54.79) |
| Yes | 1 (7.14) | 13 (92.86) |  |
| Asplenia | No | 6 (1.49) | 398 (98.51) | 1.0 | n/a |
| Yes | 0 (.00) | 3 (100.00) |  |
| HIV (w/o AIDS) | No | 6 (1.49) | 396 (98.51) | 1.0 | n/a |
| Yes | 0 (.00) | 5 (100.00) |  |
| Bone marrow transplant | No | 6 (1.51) | 392 (98.49) | 1.0 | n/a |
| Yes | 0 (.00) | 9 (100.00) |  |
| Solid organ transplant | No | 6 (1.50) | 395 (98.50) | 1.0 | n/a |
| Yes | 0 (.00) | 6 (100.00) |  |
| BMI<18.5 | No | 6 (1.49) | 397 (98.51) | 1.0 | n/a |
| Yes | 0 (.00) | 4 (100.00) |  |
| Prosthetic heart valve | No | 6 (1.51) | 392 (98.49) | 1.0 | n/a |
| Yes | 0 (.00) | 9 (100.00) |  |
| Pacemaker | No | 6 (1.51) | 392 (98.49) | 1.0 | n/a |
| Yes | 0 (.00) | 9 (100.00) |  |
| Vascular implant or stent | No | 5 (1.30) | 380 (98.70) | 0.28 | 3.61 (0.40-32.38) |
| Yes | 1 (4.55) | 21 (95.45) |  |
| Orthopaedic endoprosthesis | No | 6 (1.50) | 393 (98.50) | 1.0 | n/a |
| Yes | 0 (.00) | 8 (100.00) |  |
| APACHE† | n/a | 19,5 (9.0-25.0) | 15,0 (11.0-20.0) | 0.57 | n/a |
| SOFA on admission† | n/a | 10,0 (7.0-13.0) | 8,0 (7.0-11.0) | 0.40 | n/a |
| SOFA on BC day† | n/a | 0,0 (0.0-5.0 | 0,0 (0.0-4.0) | 0.74 | n/a |
| Albumin on admission | n/a | 2,8 (2.6-3.3)0 | 3,0 (2.5-3.6) | 0.80 | n/a |
| CRP on admission | n/a | 11,5 (3.4-34.4) | 8,4 (2.0-19.1) | 0.59 | n/a |
| Albumin on BC day | n/a | 0,0 (0.0-2.2) | 0,0 (0.0-2.0) | 0.80 | n/a |
| CRP on BSI | n/a | 0,0 (0.0-6.3) | 0,0 (0.0-4.7) | 1.0 | n/a |
| Chemotherapy | No | 5 (1.32) | 373 (98.68) | 0.36 | 2,67 (0,30-23,59) |
| Yes | 1 (3.45) | 28 (96.55) |  |
| Corticosteroids | No | 5 (1.35) | 365 (98.65) | 0.438 | 2,03 (0,23-17,83) |
| Yes | 1 (2.70) | 36 (97.30) |  |
| Short-term CVC | No | 0 (.00) | 28 (100.00) | 1.0 | n/a |
| Yes | 6 (1.58) | 373 (98.42) |  |
| Implantable CVC | No | 6 (1.49) | 398 (98.51) | 1.0 | n/a |
| Yes | 0 (.00) | 3 (100.00) |  |
| Billiary or urinary drainage or stent | No | 6 (1.52) | 390 (98.48) | 1.0 | n/a |
| Yes | 0 (.00) | 11 (100.00) |  |
| Peritoneal dialysis catheter | No | 6 (1.48) | 399 (98.52) | 1.0 | n/a |
| Yes | 0 (.00) | 2 (100.00) |  |
| Urinary bladder catheter | No | 0 (.00) | 7 (100.00) | 1.0 | n/a |
| Yes | 6 (1.50) | 394 (98.50) |  |
| Intubation | No | 1 (1.75) | 56 (98.25) | 0.59 | 0,81 (0,09-7,07) |
| Yes | 5 (1.43) | 345 (98.57) |  |
| CRRT | No | 6 (1.95) | 302 (98.05) | 1.0 | n/a |
| Yes | 0 (.00) | 99 (100.00) |  |
| Wound drainage tubes | No | 5 (1.91) | 257 (98.09) | 0.42 | 0,36 (0,04-3,08) |
| Yes | 1 (.69) | 144 (99.31) |  |
| Respiratory infection | No | 4 (1.52) | 260 (98.48) | 1.0 | 0,92 (0,16-5,09) |
| Yes | 2 (1.40) | 141 (98.60) |  |
| Urinary tract infection | No | 6 (1.49) | 396 (98.51) | 1.0 | n/a |
| Yes | 0 (.00) | 5 (100.00) |  |
| Intra-abdominal infection | No | 6 (1.56) | 379 (98.44) | 1.0 | n/a |
| Yes | 0 (.00) | 22 (100.00) |  |
| Skin and soft tissue infection | No | 6 (1.56) | 379 (98.44) | 1.0 | n/a |
| Yes | 0 (.00) | 22 (100.00) |  |
| CNS infection | No | 6 (1.51) | 392 (98.49) | 1.0 | n/a |
| Yes | 0 (.00) | 9 (100.00) |  |
| CR-BSI | No | 6 (1.48) | 400 (98.52) | 1.0 | n/a |
| Yes | 0 (.00) | 1 (100.00) |  |
| Surgical site infection | No | 6 (1.48) | 399 (98.52) | 1.0 | n/a |
| Yes | 0 (.00) | 2 (100.00) |  |