**Table S1.** Diagnostic criteria for central line-associated blood stream infections (CLABSI) and ventilator-associated pneumonias (VAP) used in the study

|  |
| --- |
| **Diagnostic criteria for CLABSI** |
| * A laboratory confirmed bloodstream infection (defined as recovery of a pathogen from a blood culture – 1. a single blood culture for organism not commonly present on the skin, or 2. two or more blood cultures for organism commonly present on the skin) when a patient has a central line in for greater than two days and in place the day of or the day before the development of infection. The infection cannot be related to an infection at another site.
 |
| **Diagnostic criteria for VAP** |
|  Clinical |
| * Having underlying heart or lung disease with two or more sequential imaging tests showing the following findings (new and persistent or progressive and persistent): infiltrate, opacification, or cavitation; or
 |
| * Showing one of the following signs and symptoms: fever (temperature > 38°C), leukopenia (< 4,000 cells/mm3), or leukocytosis (> 12,000 cells/mm3). For patients 70 years old or older, alteration in the level of consciousness with no other apparent cause; or
 |
| * Showing two of the following signs and symptoms: appearance of purulent discharge, or change in the characteristics of the discharge, or increase in the respiratory discharge, or increase in the need for aspiration; worsening of gas exchange (desaturation, for instance PaO2/FiO2 < 240, or increase in oxygen supply, or increase in ventilation parameters); auscultation with rhonchi or rales; onset of cough or dyspnea.

AND |
| Microbiological |
| * Positive blood culture, with absence of another focus of infection; or
 |
| * Positive culture of the pleural fluid; or
 |
| * Positive quantitative culture of pulmonary discharge obtained by means of a procedure with minimum contamination potential (bronchoalveolar lavage, protected brushing, and endotracheal aspirate).
 |

**Table S2.** General characteristics of 21 Brazilian hospitals during the COVID-19 pandemic

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Hospital | Region in Brazil | Public/private | Number of ward beds | Number of ICU beds | Patient-daysa | CLABSI incidence densityb | VAP incidence densityc |
|  |  |  |  |  | Apr 2019 -Jun 2019 | Apr 2020 -Jun 2020 | Apr 2019 -Jun 2019 | Apr 2020 -Jun 2020 | Apr 2019 -Jun 2019 | Apr 2020 -Jun 2020 |
|  |  |  |  |  |  |  |  |  |  |  |
| Hospital Alvorada | Southeast | Private | 161 | 30 | 1458 | 1601 | 1.84 | 1.95 | 0 | 1.42 |
| Hospital Estadual de Diadema | Southeast | Public | 233 | 33 | 1526 | 1468 | 3.07 | 7.46 | 2.55 | 3.15 |
| Hospital Estadual de Sampopemba | Southeast | Public | 152 | 20 | 1765 | 1694 | 4.08 | 6.54 | 7.09 | 7.58 |
| Hospital Estadual Vila Alpina | Southeast | Public | 160 | 57 | 1768 | 2842 | 2.19 | 12.52 | 1.43 | 0.54 |
| Hospital Maternidade de Campinas | Southeast | Public | 170 | 42 | 383 | 325 | 0 | 0 | 0 | 0 |
| Hospital Regional UNIMED Fortaleza | Northeast | Private | 416 | 145 | 3432 | 2741 | 2.75 | 5.21 | 3.55 | 3.65 |
| Hospital São José | Northeast | Public | 150 | 8 | 736 | 731 | 0 | 1.43 | 9.20 | 4.59 |
| Hospital São Luiz São Caetano | Southeast | Private | 77 | 50 | 2199 | 3747 | 0 | 4.67 | 0 | 7.05 |
| Hospital UNIMED Vitória | Southeast | Private | 129 | 66 | 2864 | 2114 | 4.98 | 0.98 | 2.54 | 14.36 |
| Hospital Universitário de Londrina | South | Public | 291 | 89 | 1721 | 1623 | 1.20 | 2.81 | 7.71 | 14.84 |
| Hospital Universitário Walter Cantídio | Northeast | Public | 237 | 14 | 1188 | 1042 | 0.88 | 2.11 | 4.15 | 1.34 |
| Hospital Santa Paula | Southeast | Private | 118 | 47 | 4268 | 3479 | 4.60 | 6.77 | 4.45 | 6.36 |
| Hospital Santa Catarina | Southeast | Private | 211 | 79 | 4300 | 4392 | 0.99 | 0.40 | 3.98 | 0 |
| Hospital Alemão Oswaldo Cruz | Southeast | Private | 296 | 68 | 2673 | 3797 | 0 | 0.94 | 0 | 0.74 |
| Hospital do Servidor Público Estadual de São Paulo | Southeast | Public | 712 | 86 | 4398 | 5045 | 4.33 | 7.79 | 5.14 | 6.05 |
| Hospital Estadual Central | Southeast | Public | 125 | 38 | 848 | 1396 | 0 | 1.27 | 6.12 | 3.64 |
| Hospital Paulistano | Southeast | Private | 125 | 20 | 1220 | 1318 | 1.60 | 2.69 | 0 | 2.63 |
| Hospital Regional de Sorocaba | Southeast | Public | 164 | 96 | 3273 | 3546 | 5.97 | 7.00 | 2.99 | 3.66 |
| Hospital São Domingos | Northeast | Private | 259 | 84 | 3825 | 6026 | 1.31 | 1.86 | 1.62 | 2.41 |
| Real Hospital Português de Beneficência em Pernambuco | Northeast | Private | 659 | 195 | 9147 | 11283 | 1.18 | 3.77 | 2.88 | 4.11 |
| Vitória Apart Hospital | Southeast | Private | 80 | 40 | 3433 | 2069 | 5.04 | 7.09 | 4.23 | 6.57 |

aTotal patient-days from adult intensive care units (ICU).

bCentral line-associated bloodstream infection incidence density from adult ICU patients.

cVentilator-associated pneumonia incidence density from adult ICU patients.

**Table S3.** Comparison of the causative organisms of central line-associated blood stream infections (CLABSI) and ventilator-associated pneumonias (VAP) in the intensive care units of 21 Brazilian hospitals between February 2019 through June 2019 and February 2020 through June 2020

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Total number of cases and proportion (%) each organism was identified overalla |  | Mean (SD) of the proportion of cases each organisms was identified in each hospital (%) |  | Median (25th - 75th percentile) of the proportion of cases each organisms was identified in each hospital (%) |  | *p*-valueb |  | Adj.*p*-valuec |
|  |  | Apr 2019-Jun 2019 |  | Apr 2020-Jun 2020 |  | Apr 2019-Jun 2019 |  | Apr 2020-Jun 2020 |  | Apr 2019-Jun 2019 |  | Apr 2020-Jun 2020 |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Causative organisms of CLABSI  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *Acinetobacter baumannii* |  | 7 (10) |  | 14 (8) |  | 9 (21) |  | 6 (12) |  | 0 (0 – 7) |  | 0 (0 – 10) |  | 0.674 |  | 1.000 |
| *Burkholderia cepacia* |  | 1 (1) |  | 7 (4) |  | 1 (3) |  | 3 (5) |  | 0 (0 – 0) |  | 0 (0 – 4) |  | 0.078 |  | 0.858 |
| *Candida spp.* |  | 10 (15)d |  | 38 (21)e |  | 6 (12) |  | 27 (33) |  | 0 (0 – 7) |  | 14 (0 – 50) |  | 0.017 |  | 0.221 |
| *Enterobacter spp.* |  | 5 (7) |  | 3 (2) |  | 6 (14) |  | 2 (5) |  | 0 (0 – 5) |  | 0 (0 – 0) |  | 0.150 |  | 1.000 |
| *Enterococcus faecalis* |  | 2 (3) |  | 21 (12) |  | 1 (4) |  | 14 (17) |  | 0 (0 – 0) |  | 8 (0 – 15) |  | 0.002 |  | 0.028 |
| *Enterococcus faecium* |  | 1 (1) |  | 3 (2) |  | 1 (3) |  | 1 (2) |  | 0 (0 – 0) |  | 0 (0 – 0) |  | 1.000 |  | 1.000 |
| *Escherichia coli* |  | 1 (1) |  | 1 (1) |  | 1 (2) |  | 2 (7) |  | 0 (0 – 0) |  | 0 (0 – 0) |  | 0.655 |  | 1.000 |
| *Klebsiella pneumoniae* |  | 16 (24) |  | 26 (15) |  | 15 (21) |  | 12 (23) |  | 0 (0 – 33) |  | 0 (0 – 20) |  | 0.209 |  | 1.000 |
| Other *Enterobacteriaceae* |  | 3 (4) |  | 4 (2) |  | 4 (11) |  | 2 (6) |  | 0 (0 – 0) |  | 0 (0 – 0) |  | 0.500 |  | 1.000 |
| *Pseudomonas aeruginosa* |  | 6 (9) |  | 18 (10) |  | 7 (16) |  | 8 (11) |  | 0 (0 – 0) |  | 0 (0 – 16) |  | 0.423 |  | 1.000 |
| *Serratia spp.* |  | 2 (3) |  | 4 (2) |  | 19 (61) |  | 4 (16) |  | 0 (0 – 0) |  | 0 (0 – 0) |  | 1.000 |  | 1.000 |
| *Staphylococcus aureus* |  | 8 (12) |  | 10 (6) |  | 7 (13) |  | 2 (4) |  | 0 (0 – 13) |  | 0 (0 – 4) |  | 0.046 |  | 0.552 |
| *Coagulase negative Staphylococcus* |  | 10 (15) |  | 38 (21) |  | 20 (37) |  | 19 (26) |  | 0 (0 – 35) |  | 13 (0 – 29) |  | 0.865 |  | 1.000 |
| *Stenotrophomonas maltophilia* |  | 1 (1) |  | 1 (1) |  | 1 (3) |  | 1 (5) |  | 0 (0 – 0) |  | 0 (0 – 0) |  | 0.655 |  | 1.000 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Causative organisms of VAP |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *Acinetobacter baumannii* |  | 7 (12) |  | 24 (18) |  | 6 (13) |  | 16 (30) |  | 0 (0 – 0) |  | 0 (0 – 25) |  | 0.155 |  | 1.000 |
| *Burkholderia cepacia* |  | 1 (2) |  | 5 (4) |  | 1 (5) |  | 2 (5) |  | 0 (0 – 0) |  | 0 (0 – 0) |  | 0.498 |  | 1.000 |
| *Candida spp.* |  | 0  |  | 0 |  | 0 |  | 0 |  | 0 |  | 0 |  | 1.000 |  | 1.000 |
| *Enterobacter spp.* |  | 1 (2) |  | 5 (4) |  | 1 (2) |  | 2 (4) |  | 0 (0 – 0) |  | 0 (0 – 2) |  | 0.138 |  | 1.000 |
| *Enterococcus faecalis* |  | 0 |  | 1 (1) |  | 0 |  | 0 (0) |  | 0 |  | 0 (0 – 0) |  | 0.317 |  | 1.000 |
| *Enterococcus faecium* |  | 0 |  | 0 |  | 0 |  | 0 |  | 0 |  | 0 |  | 1.000 |  | 1.000 |
| *Escherichia coli* |  | 1 (2) |  | 1 (1) |  | 2 (11) |  | 2 (7) |  | 0 (0 – 0) |  | 0 (0 – 0) |  | 0.655 |  | 1.000 |
| *Klebsiella pneumoniae* |  | 10 (18) |  | 23 (17) |  | 11 (21) |  | 15 (22) |  | 0 (0 – 17) |  | 0 (0 – 23) |  | 0.721 |  | 1.000 |
| Other *Enterobacteriaceae* |  | 3 (5) |  | 3 (2) |  | 6 (15) |  | 1 (4) |  | 0 (0 – 0) |  | 0 (0 – 0) |  | 0.343 |  | 1.000 |
| *Pseudomonas aeruginosa* |  | 21 (37) |  | 44 (32) |  | 29 (36) |  | 33 (33) |  | 11 (0 – 50) |  | 27 (0 – 44) |  | 0.983 |  | 1.000 |
| *Serratia spp.* |  | 5 (9) |  | 8 (6) |  | 5 (11) |  | 9 (22) |  | 0 (0 – 0) |  | 0 (0 – 8) |  | 0.646 |  | 1.000 |
| *Staphylococcus aureus* |  | 11 (19) |  | 21 (15) |  | 19 (31) |  | 10 (15) |  | 0 (0 – 24) |  | 0 (0 – 20) |  | 0.650 |  | 1.000 |
| *Coagulase negative Staphylococcus* |  | 0 |  | 0 |  | 0 |  | 0 |  | 0 |  | 0 |  | 1.000 |  | 1.000 |
| *Stenotrophomonas maltophilia* |  | 2 (4) |  | 17 (12) |  | 3 (11) |  | 7 (14) |  | 0 (0 – 0) |  | 0 (0 – 2) |  | 0.345 |  | 1.000 |

aSome healthcare-associated infections had more than one causative organism.

bPairwise comparison of medians by the Wilcoxon signed rank sum test (*p*-value unadjusted for multiple comparisons).

c*P*-values adjusted for multiple comparisons according to the Hochberg procedure.

d*Candida* species: 2 *C. albicans*, 2 *C. glabrata*, 1 *C. krusei*, 4 *C. parapsilosis*, and 1 *C. tropicalis*.

e*Candida* species: 13 *C. albicans*, 8 *C. glabrata*, 8 *C. parapsilosis*, 8 *C. tropicalis* and 1 non-albicans *Candida* species.

**Table S4.** Comparison of Defined Daily Dose (DDD) of selected antimicrobials in the intensive care units of 16 Brazilian hospitals between February 2019 through June 2019 and February 2020 through June 2020

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Antimicrobials |  | Median (25th - 75th percentile) DDD(per 1,000 patient-days) |  | *p*-valuea |
|  |  | Apr 2019-Jun 2019 |  | Apr 2020-Jun 2020 |  |  |
|  |  |  |  |  |  |  |
| Ceftriaxone |  | 151 (99 – 230) |  | 209 (118 – 272) |  | 0.215 |
|  |  |  |  |  |  |  |
| Piperacillin/tazobactam |  | 119 (74 – 209) |  | 119 (48 – 175) |  | 1.000 |
|  |  |  |  |  |  |  |
| Meropenem |  | 124 (103 – 179) |  | 174 (105 – 236) |  | 0.134 |
|  |  |  |  |  |  |  |
| Vancomycin  |  | 111 (36 – 166) |  | 90 (23 – 133) |  | 0.469 |

aPairwise comparison of medians by the Wilcoxon signed rank sum test.