**Spectrum Scores: Towards a Better Definition of De-Escalation**

**Supplementary Appendix**

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**Inclusion/Exclusion Criteria**

Eligible patients were adults with an ICD-9 or ICD-10 discharge diagnosis code for pneumonia during the study period of interest (see below). Patients were enrolled if they met pre-defined criteria for HAP or VAP, which included: 1) index date of infection onset ≥ 48 hours after hospital admission for HAP or ≥ 48 hours after initiation of mechanical ventilation for VAP, 2) chest radiograph completed within ± 24 hours of index pneumonia date, 3) active orders for either anti-MRSA or anti-PSAR antibiotics, and 4) at least one sign of infection, including a white blood cell count (WBC) ≥ 11 or ≤ 4 x 109 cells/L, or temperature ≥ 38 or ≤ 36˚ C. Only the first eligible admission for a given patient was included. Patients were excluded if they discharged or expired prior to day 3 or if they met criteria for pneumonia within 48 hours of hospital admission. The index date of pneumonia diagnosis was defined as day 0.

List of ICD codes:

('A01.03','A02.22','A37.01','A37.11','A37.81','A37.91','A50.04','A54.84','B01.2','B05.2','B06.81','B77.81','J09.X1','J10.0','J10.00','J10.01','J10.08','J11.0','J11.00','J11.08','J12','J12.0','J12.1','J12.2','J12.3','J12.8','J12.81','J12.89','J12.9','J13','J14','J15','J15.0','J15.1','J15.2','J15.20','J15.21','J15.211','J15.212','J15.29','J15.3','J15.4','J15.5','J15.6','J15.7','J15.8','J15.9','J16','J16.0','J16.8','J17','J18','J18.0','J18.1','J18.2','J18.8','J18.9','J85.1','J95.851')

**Supplementary Table 1: Antibiotic and Culture Data**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Characteristic | Total (n=1812) | DE (n=786) | NDE (n=1026) | p-value | Traditional DE (n=585) | Traditional NDE (n=1227) | p-value |
| Baseline antibiotics on day 1VancomycinCefepimeMeropenemLinezolidAzithromycinPiperacillin-tazobactamCeftriaxoneGentamicin | 1012 (55.8)951 (52.5)616 (34.0)468 (25.8)278 (15.3)112 (6.2)91 (5.0)22 (1.2) | 481 (61.2)445 (56.6)269 (34.2)218 (27.7)164 (20.9)58 (7.4)69 (8.8)18 (2.3) | 531 (51.8)506 (49.3)347 (33.8)250 (24.4)114 (11.1)54 (5.3)22 (2.1)4 (0.4) | <0.0010.0020.8570.104<0.0010.064<0.001<0.001 | 381 (65.1)321 (54.9)165 (28.2)143 (24.4)92 (15.7)37 (6.3)53 (9.1)4 (0.7) | 631 (51.4)630 (51.3)451 (36.8)325 (26.5)186 (15.2)75 (6.1)38 (3.1)18 (1.5) | <0.0010.160<0.0010.3530.7540.861<0.0010.155 |
| Anti-MRSA antibioticDay 1Day 3 | 1494 (82.5)1090 (60.2) | 687 (87.4)239 (30.4) | 807 (78.7)851 (82.9) | <0.001<0.001 | 524 (89.6)52 (8.9) | 970 (79.1)1038 (86.4) | <0.001<0.001 |
| Anti-Pseudomonal antibioticDay 1Day 3 | 1670 (92.2)1371 (75.7) | 729 (92.7)408 (51.9) | 941 (91.7)963 (93.9) | 0.418<0.001 | 530 (90.6)206 (35.2) | 1140 (92.9)1165 (94.9) | 0.087<0.001 |
| Spectrum Score AdmissionDay 0Day 1Day 3 | 3 [0-13]14 [11-16]14 [12-16]12 [7-15] | 3 [0-13]14 [11-16]15 [12-18]7 [3-12] | 5 [0-12]13 [12-16]13 [10-15]15 [12-16] | 0.7660.786<0.001<0.001 | 3 [0-12]13 [10-16]14 [12-16]5 [0-9] | 5 [0-13]14 [12-16]14 [12-16]15 [12-16] | 0.0810.0410.684<0.0001 |
| Respiratory samples orderedPositive for likely respiratory pathogen | 964 (53.2)523/964 (54.3) | 445 (56.6)257/445 (57.8) | 519 (50.6)266/519 (51.3) | 0.0110.043 | 321 (54.9)211/321 (65.7) | 643 (52.4)312/643 (48.5) | 0.325<0.001 |
| Respiratory clinically insignificant flora¥ | 304 (16.8) | 152 (19.3) | 152 (14.8) | 0.011 | 127 (21.7) | 177 (14.4) | <0.001 |
| Respiratory bacteria isolated | 430 (23.7) | 226 (28.8) | 204 (19.9) | <0.001 | 191 (32.6) | 239 (19.5) | <0.001 |

Results shown as no. (%) or median [IQR] unless otherwise indicated

\*Sputum-like = sputum, induced-sputum, and tracheal aspirates; BAL = bronchoalveolar lavage, washings, and brushings

¥Clinically insignificant flora is only reported when other bacterial/fungal species are identified and reported in culture

**Supplementary Table 2: Clinical Outcomes**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Outcome | Total (n=1812) | SS DE (n=786) | SS NDE (n=1026) | p-value | Traditional DE (n=585) | Traditional NDE (n=1227) | p-value |
| In-hospital mortality | 517 (28.5) | 212 (27.0) | 305 (29.7) | 0.198 | 147 (25.1) | 370 (30.2) | 0.027 |
| 14-day mortality | 407 (22.5) | 180 (22.9) | 227 (22.1) | 0.695 | 124 (21.2) | 283 (23.1) | 0.373 |
| 30-day mortality | 571 (31.5) | 252 (32.1) | 319 (31.1) | 0.660 | 181 (30.9) | 390 (31.8) | 0.717 |
| Readmission for pneumonia  | 97 (5.4) | 37 (4.7) | 60 (5.8) | 0.285 | 29 (5.0) | 68 (5.5) | 0.605 |
| Antibiotic days from day 0 to 28 | 10 [6-17] | 9 [6-15] | 11 [7-18] | <0.001 | 9 [5-15] | 11 [7-18] | <0.001 |
| *C. difficile* infection index to 90 days | 56 (3.0) | 17 (2.2) | 39 (3.8) | 0.046 | 14 (2.4) | 42 (3.4) | 0.236 |

Results shown as no. (%) or median [IQR]

**Modified Antibiotic Spectrum Index**