Reviewer’s report

Title: Description and Validation of a Spectrum Score Method to Measure Antimicrobial De-escalation from Electronic Medical Records Data

Version: 2 Date: 23 February 2015

Reviewer: Michael Calderwood

Reviewer’s report:

Overview:

I appreciated the opportunity to review "Description and Validation of a Spectrum Score Method to Measure Antimicrobial De-escalation from Electronic Medical Records Data" by Madaras-Kelly et al.

This is a Technical Advance article which builds upon prior work by this group published in Infect Control Hosp Epidemiology 2014;35:1103-13. In this prior work, Madaras-Kelly et al. used a modified Delphi method to develop an Antibiotic Spectrum Score to measure antibiotic de-escalation events, with experts agreeing on the following: "Antibiotics used to treat intrinsically resistant organisms, particularly P. aeruginosa, should be weighted more heavily than other antibiotics; an ordinal scale of antibiotic susceptibility was preferable to categorically assigning susceptibility to an antibiotic; and accounting for duplicate coverage of organisms was important when measuring de-escalation." In this prior work, the Spectrum Score worked well in identifying de-escalation events EXCEPT in cases involving substitution of oral antibiotics.

The need to develop objective surveillance for de-escalation events is highlighted by one other publication from this group (J Antimicrob Chemotherap 2015;70:598-601). In this recent publication, Huttner et al. showed a large degree heterogeneity across VA hospitals in the rate of stopping antibiotics (narrowing to definitive therapy).

In the current paper, the authors provide the technical specifications which were missing in the earlier Infect Control Hosp Epidemiol paper. This will allow others to replicate this methodology. They also improve the sensitivity and specificity of their Spectrum Score (up to 96 and 94%, respectively), by adding credit for conversion from IV to PO antibiotics. These performance metrics are based on comparison with the opinion of experts in the field (reference standard), but the paper showed a high intra-class correlation (0.86) consistent with agreement between the experts who were surveyed.

1. I have no Major Compulsory Revisions.

2. I have no Minor Essential Revisions.

3. I have the following Discretionary Revisions which would improve the paper:
A. Figure 1 and 2 were very helpful in walking the reader through the calculation of the Spectrum Score, including the conversion of susceptibility percentages to an ordinal scale, weighting based on coverage of intrinsically resistant organisms, summation, smoothing, and adjustment for PO antibiotics.

*** The authors might consider merging Steps 1/2 and Steps 3/4 in Figure 1. It would be useful to directly compare the ordinal scale with the susceptibility percentages, and the only difference between Steps 3 and 4 is the addition of the summation (Spectrum Score).

B. Table 1 is key for others looking to replicate this work. This includes the ordinal susceptibility scores for the various antimicrobial-organism pairs.

*** As was done in Step 1 of Figure 1, the authors should consider adding the susceptibility percentages to Table 1, in addition to the ordinal scale.

C. In Table 1, I would also be interested in seeing the mean susceptibility percentages and standard deviations across the 152 medical centers included in the VA Corporate Data Warehouse. This could alternatively be presented as median and IQR if non-normal in distribution.

*** Table 1 serves as a version of an antibiogram for the entire VA. How susceptibility to various antibiotics varies by hospital is key to understanding the generalizability of the Spectrum Score.

*** Antibiograms may differ by hospital, unit (e.g., ICU, non-ICU), and specimen source (e.g. sputum, wound). It would be good for the authors to comment on a single Spectrum Score applied across all medical centers. This will be important as hospitals consider the need to input their own local susceptibility data when replicating these methods.

D. The authors comment that "antimicrobial stewards view IV to PO conversion favorably when classifying de-escalation events." I agree with this statement; however, I wonder whether it is clinically relevant to highlight the p-value of 0.002 when comparing mean Likert scores for paired vignettes containing IDENTICAL antimicrobials but differing routes of administration. The values of 5.0 and 4.6 seem quite similar in terms of expert opinion on a 7 point scale.

E. Appendix A is user-friendly for someone with a programming background. Appendix B will have 20k rows. I wonder if the authors might make their code available for others to use as they develop their own institutional Spectrum Score.

**Level of interest:** An article whose findings are important to those with closely related research interests

**Quality of written English:** Acceptable

**Statistical review:** No, the manuscript does not need to be seen by a statistician.
Declaration of competing interests:

I declare that I have no competing interests.