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Towards a definition for healthcare-associated infection

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Background: Multidrug resistant organisms (MDROs) have spread over the past decades from hospitals to other healthcare settings and to the community. "Healthcare-associated infection" (HcAI) is a definition frequently used to describe community-onset infections more likely to be caused by an MDRO among patients with significant healthcare exposure. This definition leads to recommendations for patient management, particularly pertaining to empiric antimicrobial choices. The most frequently used definition was developed at Duke University in 2002 (Duke-2002). While some professional societies have based management recommendations on Duke-2002 (or modifications thereof), neither Duke-2002 nor other variations have had their performances measured. We studied patients with bacteremia present on admission in order to: 1) test whether the HcAI definition was predictive of bacteremia caused by an MDRO; and 2) to develop an alternative score to predict whether bacteremia is caused by an MDRO.

Material/methods: A case-control study was conducted at Assaf Harofeh Medical Center (AHMC) in Israel. The sample included all patients with bacteremia present on admission from January to July 2013. Cases were patients whose bacteremia was caused by an MDRO; controls were patients whose bacteremia was not caused by an MDRO. A multivariable model to predict MDRO infection on admission was used in order to develop a prediction score. The performances of this score and of the Duke-2002 definition to predict whether the bacteremia was caused by an MDRO were calculated.

Results: 315 patients with bacteremia present on admission were enrolled: 100 cases and 215 controls. Using Duke-2002 to predict bacteremia caused by an MDRO, sensitivity was 87%, specificity was 49%, PPV was 44% and NPV was 89%; the area under the ROC curve was 0.68. Our score included 6 items: hospitalization in the past 90 days (1 point), long-term care facility stay prior to hospitalization (3 points), dialysis (3 points), antibiotic use in the past 90 days (2 points), neurological disease (1 point) and severe sepsis (1 point). Using a cutoff score of 4, sensitivity was 70%, specificity was 79%, PPV was 60% and NPV was 85%; the area under the ROC curve was 0.74.

Conclusions: Although the term HcAI is frequently used in a descriptive sense, it does not perform well at predicting whether bacteremia on admission is caused by an MDRO. Our alternative score was also not a good predictor of MDRO bacteremia with onset in the community. A definition or prediction rule that more accurately predicts whether an infection present on admission is caused by an MDRO is needed to both improve empiric antibiotic selection and reduce unnecessary use of broad-spectrum agents.