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Antibiotic computerised decision support system does not increase 30-day readmission: a cohort study

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Background

Antibiotic computerised decision support systems (CDSSs) have been shown to improve antibiotic prescribing, but evidence of the effects of CDSSs on patient outcomes is limited. Antibiotic CDSSs recommend the narrowest-spectrum antibiotic appropriate for common organisms responsible for the diagnosed infection. Physicians are concerned about the non-resolution of infections in their patients, should they accept antibiotic CDSS recommendations.

Our study's objective was to evaluate the effect of an antibiotic CDSS on hospital readmission, as a surrogate for infection non-resolution.

Methods

We assembled a prospective inpatient cohort, starting from the point of antibiotic prescribing to 30 days post-hospital discharge.

All patients admitted to a 1500-bed tertiary-care hospital in Singapore, from October 1, 2011 through September 30, 2012, and prescribed piperacillin-tazobactam or a carbapenem for empiric therapy resulting in the automatically-triggered launch of the in-house CDSS to receive antibiotic recommendations were included. The CDSS integrates antimicrobial stewardship with electronic antibiotic prescribing.

Exposure

Receipt of antibiotics recommended by CDSS determined by matching antibiotics on the electronic prescribing system with CDSS-recommended antibiotics

Outcomes

- 30-day all-cause readmission
- 30-day infection-related readmission

Data analyses

Odds ratios (OR) and confidence intervals (CI) were computed and propensity-score adjusted multivariable multilevel logistic regression models were constructed to control for potential confounding and account for clustering of patients within prescribing physicians.

Results

- One-quarter of 1886 eligible inpatients received CDSS-recommended antibiotics.
- More patients treated for pneumonia (33.2%) than sepsis (12.1%) and urinary tract infection (7.1%) received CDSS recommendations.
- Among the 1492 patients who were discharged from hospital:
  - 25.0% were readmitted within 30 days for all causes
  - 11.2% were readmitted within 30 days for infection-related causes.

Results

On multivariable analysis, no increase in 30-day all-cause readmission (OR 1.13, 95% CI 0.64-1.99, *P*=0.68) and infection-related readmission (OR 1.16, 95% CI 0.48-2.79, *P*=0.74) was observed in patients who received antibiotics recommended by the CDSS, compared to those who did not.

Table. Propensity Score (PS)-Adjusted Multivariable Analysis of Factors associated with 30-day Infection-related and All-cause Readmission

(using 2-level logistic regression analysis of data on 1886 patients nested within 575 prescribing physicians)

	30-day Infection-related Readmission [a,b]			30-day All-cause Readmission [a,b]		
Factor	**OR**	**(95% CI)**	***P* value**	**OR**	**(95% CI)**	***P* value**
Patient Factors						
Age >65 years	**2.21**	**(1.34 - 3.64)**	**0.0018**	**1.56**	**(1.13 - 2.14)**	**0.0066**
Male gender	1.08	(0.77 - 1.50)	0.6666	1.12	(0.88 - 1.43)	0.3581
Ethnicity						
Chinese	**0.44**	**(0.21 - 0.93)**	**0.0305**	0.72	(0.39 - 1.34)	0.2962
Malay	**0.37**	**(0.15 - 0.92)**	**0.0329**	0.82	(0.41 - 1.64)	0.5686
Indian	**0.28**	**(0.10 - 0.77)**	**0.0141**	0.71	(0.34 - 1.50)	0.3677
Other	1.00	..	..	1.00	..	..
Singapore resident	3.35	(0.89 - 12.62)	0.0746	**3.55**	**(1.45 - 8.69)**	**0.0056**
Private ward class	0.87	(0.45 - 1.70)	0.6893	1.11	(0.71 - 1.75)	0.6398
Charlson's comorbidity index >5	0.61	(0.33 - 1.12)	0.1103	0.98	(0.67 - 1.42)	0.8967
ICU Admission	0.73	(0.38 - 1.40)	0.3459	0.66	(0.42 - 1.04)	0.0747
Prescribing Physician Factor (ICC=0% for both models)						
Junior physician	1.02	(0.59 - 1.77)	0.9426	1.02	(0.59 - 1.77)	0.9426
Recommendation	1.16	(0.48 - 2.79)	0.7354	1.13	(0.64 - 1.99)	0.6806
Receipt of ARUSC Recommendation*Age>65	0.89	(0.35 - 2.29)	0.8148	0.85	(0.45 - 1.60)	0.6127

[a] Propensity score derived from presumed infection source, time and day of antibiotic prescription, hospitalization days prior to antibiotics, prior hospitalization, and prior antibiotics.

[b] Survivors of hospitalization episode only

Conclusion:

- Receipt of antibiotic CDSS recommendations did not increase 30-day all-cause and infection-related readmissions.
- Physicians should be reassured of the non-increase in the non-resolution of infections among patients who received CDSS-recommended antibiotics to increase their acceptance of CDSSs and their antibiotic recommendations.