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Letter to the Editor

Outpatient antibiotics study investigating stewardship potential-transitions of care (OASIS-T)

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To the Editor—Antimicrobial stewardship at transitions of care is an evolving practice. Data from the United States have highlighted that a significant proportion of antibiotics given upon discharge were inappropriate[1,2]; however, data on practices in Asian hospitals are limited. We conducted a study to evaluate the prevalence of oral antibiotics prescriptions at discharge and the opportunities for antimicrobial stewardship.

Methods

National University Hospital is a 1,200-bed, tertiary-care, teaching hospital in Singapore. The antimicrobial stewardship program (ASP) team reviews the use of inpatient broad-spectrum antibiotics through an audit-and-feedback strategy on weekdays. A cross-sectional retrospective study was carried out to identify stewardship opportunities upon hospital discharge. For the purposes of this study, 4 dates were randomly generated between July 1, 2016, and June 31, 2017. Adult patients discharged with oral antibiotics on these 4 chosen dates were further assessed.

A pharmacy resident reviewed the information in the electronic case notes. The assessment of antibiotic appropriateness was based on in-house and international guidelines, mainly from the Infectious Diseases Society of America (IDSA). For antibiotics without a documented indication, a probable indication was postulated based on the inflammatory markers, signs and symptoms, or radiological evidence of infection. Uncertain cases were discussed with 1 ASP pharmacist and 1 intensive care unit pharmacist for consensus. Stewardship opportunities were defined as prescriptions with inappropriate dosing regimen, antimicrobial spectrum, or duration, or cases in which antibiotics were not warranted. Ethics approval was obtained for this study (NHG DSRB no. 2017/01070).

Results

On the 4 chosen dates, there were 1,054 discharge prescriptions, and 233 (22%) of these included at least 1 oral antibiotic. In total, 253 antibiotic courses were dispensed. Amoxicillin/clavulanic acid was the most commonly prescribed antibiotic (55.3%), followed by the fluoroquinolones (16.2%). The median duration of discharge antibiotic was 6 days, with a total duration of 7 days. The most commonly documented indications were respiratory tract infections, skin and soft-tissue infections, followed by intra-abdominal infections (Table 1). Only 156 (61.7%) of the antibiotics prescribed had a documented indication; 72.4% were identified to have a probable indication for prophylaxis whereas 26.5% had a probable indication for treatment.

Overall, 14 courses were given for noninfective etiologies including viral upper respiratory tract infection and nonneutropenic fever. Also, 20 courses (7.9%) had an inappropriate dose and 10.3% had an inappropriate spectrum, most of which were too broad. Although 18% of patients had an inappropriate treatment duration, 96.9% had an inappropriate duration for surgical prophylaxis. Those with inappropriate duration had a median of 5 excess days of therapy (Table 1). Overall, 95 (37.5%) of the prescribed antibiotics represented stewardship opportunities.

Discussion

This is the first study in Asia to evaluate antimicrobial stewardship opportunities at hospital discharge. Prior studies have demonstrated the prevalence of discharge antibiotics between 20% and 30%.[3,4] Our study showed similar findings. In contrast, the most commonly prescribed antibiotic was amoxicillin/clavulanic acid instead of fluoroquinolones,[1,2] which may be due to the growing concerns of black-box warnings of fluoroquinolones and our institution's high incidence of fluoroquinolone-resistant infections. In our study, 37.5% of the oral antibiotic prescriptions at discharge represented stewardship opportunities. Excessive antibiotic duration, especially for surgical prophylaxis, accounted for most of these opportunities. Similar findings have been reported in previous studies.[2–4]

In our study, only 61.7% of antibiotics had a documented indication. A documented indication is critical to facilitate selection of optimal antibiotic regimes and to improve communication among healthcare providers. Documentation itself also serves as a prompt to evaluate the need for an antibiotic. Given its importance, the Centers for Disease Control and Prevention (CDC) *Core Elements of Hospital ASPs* recommends that all antibiotics have a documented indication.[5] Possible interventions to improve this include mandating an indication for antibiotics as part of hospital protocol or incorporating indications into the computerized prescribing order entry.

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Table 1. Treatment Indication, Antibiotic Characteristics, and Appropriateness of Discharge Prescriptions[a]

Characteristic	Cases, No. (%)[b]
Documented indications for treatment (n=142)	
Respiratory tract infections	32 (22.5)
Skin and soft-tissue infections	29 (20.4)
Intra-abdominal infections	27 (19)
Urinary tract infections	26 (18.3)
Noninfective etiology	14 (9.8)
Others	7 (5)
Bacteremia	4 (2.8)
Febrile neutropenia	3 (2.1)
Antibiotic characteristics and description of inappropriate use	
Duration prescribed upon discharge, median d (IQR)	6 (4–7)
Total prescribed duration of therapy, median d (IQR)	7 (7–10)
Inappropriate dosing regimen (n=253)	20 (7.9)
Inappropriate antibiotic spectrum (n=253)	
Too broad	25 (9.9)
Too narrow	1 (0.4)
Inappropriate duration	
For treatment (n=168)	30 (18)
For surgical prophylaxis (n=65)	63 (96.9)
Excess days of therapy per patient, median d (IQR)	5 (2–6)

Note. IQR, interquartile range.
[a]This is the average excess days of therapy from the patients with prolonged treatment duration, prolonged surgical prophylaxis, and those in whom antibiotics were not warranted.
[b]Data are in no. (%) unless otherwise stated.

We found that antibiotics are being prescribed for a duration longer than guidelines recommend. Notably, a high proportion of these were intended for surgical prophylaxis. Studies have shown that these additional days increased risk of nephrotoxicity and *Clostridium difficile* infection.[6] Growing evidence supports a shorter duration of antibiotic treatment.[7] We sought to develop in-house guidance on the expected duration for common infections and mandating stop dates for all antibiotics. A recent global point-prevalence survey involving our hospital showed that prolonged surgical prophylaxis was common.[8] To improve this, a national work group was recently formed to investigate guideline standardization, national surveillance, and reporting.

Our study adds to the emerging literature suggesting that stewardship efforts can benefit antibiotic overuse at discharge. Pharmacists face unique challenges on making antibiotic interventions upon discharge because discharge turnaround times are often prioritized. Some of the proposed models include developing an institutional guidance for oral step-down antibiotic and duration, pharmacy-led discharge review, providing discharge advice as part of routine ASP interventions, and incorporating antibiotic time-out at discharge.[9,10]

The limitation of our study is its small sample size in a single center, which limits its generalizability. The retrospective nature of this study may have impeded the accuracy of our assessment. We may have underestimated stewardship opportunities due to the absence of adjudication by an infectious diseases physician.

In this study, we demonstrated that the prevalence of antibiotic use upon hospital discharge was >20% and that stewardship opportunities were indicated for more than one-third of these. More novel ASP approaches should be explored to target this significant unmet need at the point of discharge, especially in the area of prolonging antibiotic therapy.

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