Antibiotic Prescribing at the Transition from Hospitalization to Discharge: A Target for Antibiotic Stewardship

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Background

- Thiessen, cutting the number of antibiotics has focused on the inpatient setting and outpatient paternal antibiotic therapy
- Little is known about the use of oral antibiotics at the transition from inpatient to outpatient care
- For most common infections, the majority of the antibiotic course is completed with an oral antibiotic after hospital discharge

Objectives:

- To describe the indication, choice, dose, and duration of oral antibiotics prescribed at the transition from inpatient to outpatient care
- To evaluate the appropriateness of antibiotic prescriptions and identify the factors associated with inappropriate prescribing

Methods

- Study Design: Single center, retrospective cohort study
- Setting: Academic, teaching hospital
- Study Period: July 1, 2012 through June 30, 2013
- Population: Hospitalized patients age ≥18 prescribed an oral antibiotic at discharge
- Data Extraction: Query of data warehouse for antibiotics filled within the study center only

Exclusions:

- Discharge with intravenous antibiotics
- Prophylactic or suppressive antibiotics
- No documented indication for therapy
- Non-bacterial infection
- Transfer to/from outside institution
- Re-admission for ongoing infection
- No antibiotics prescribed at discharge
- Leaving against medical advice

Appropriateness Review:

- Subset of included cases randomly selected for appropriateness review by two ID physicians
- The indication, selection, dose and duration of discharge antibiotic(s) were graded against institutional antibiotic guidelines
- Discordant cases were further adjudicated

Statistical Analysis:

- Univariate and multivariate analyses
- Appropriateness of inpatient and outpatient antibiotic prescribing were identified using logistic regression

Results

Table 1: Patient Demographics

| Age, mean (standard deviation) | 62.8 (16.6) |
| Male | 171 (57) |
| Diabetes mellitus | 87 (23) |
| Antibiotic use within 6 months | 67 (31) |
| COPD | 48 (16) |
| Hospitalization within 90 days | 45 (15) |
| HIV infection | 17 (6) |
| Pregnancy | 13 (4) |
| Chronic | 13 (4) |
| Hospital stay, median days (IQR) | 4 (3-5) |
| Admitting Service | General Medicine 222 (74) Medical Surgical subspecialty 75 (25) ICU admission 53 (18) Infectious Diseases consultation 42 (14) Failed outpatient antibiotic(s) 17 (6) Ascites 14 (5) | |

Table 2: Duration of Therapy and Antibiotics Prescribed at Discharge

| Inpatient treatment duration | 3 (5) |
| Outpatient treatment duration | 6 (4-10) |
| Total treatment duration | 10 (12-15) |
| Outpatient antibiotic cost per US dollar (IQR) | 147 (20-214) |
| Amoxicillin/clavulanate | 37 (12) |
| Amphotericin | 37 (12) |
| Metronidazole | 29 (10) |
| Ciprofloxacin | 28 (9) |
| Trimethoprim-sulfamethoxazole | 34 (9) |
| Dicloxacillin | 19 (6) |
| Pencillin/Gentamicin | 15 (5) |
| Others | 25 (9) |

Legend: Percentage of total cohort (n=300)

- Head and neck: 14%
- Urinary tract infection: 24%
- Other: 14%
- 45%

Table 1: Indicators for Antibiotic Therapy at Discharge

| COPD exacerbation | 74 (25) |
| Severe cardiovascular disease | 76 (25) |
| Severe autoimmune disease | 76 (25) |
| Severe diabetes | 76 (25) |
| Severe renal failure | 76 (25) |

Legend: Proportion of total cohort (n=300) with microbiologic data

- Blood | 5%
- Urine | 12%
- Respiratory | 14%
- Other | 21%
- Any culture obtained | 33%
- Empiric Therapy | 21%
- 45%

Legend: Odds ratios with 95% confidence intervals for factors associated with inappropriate prescribing

- Community-acquired pneumonia
- Antibiotics at discharge
- Levofloxacin at discharge

Legend: Cases reviewed for appropriateness (n=150). 79 cases (53%) included inappropriate prescriptions. Includes 17 cases with >2 types of inappropriate prescribing.

Figure 1: Indications for Antibiotic Therapy at Discharge

Figure 2: Microbiology

Figure 3: Appropriateness Review

Figure 4: Univariate and Multivariate Associations with Inappropriate Prescribing

Results

- Discharge prescription(s) inappropriate 176 (59)
- Duration of therapy inappropriate 485 (53)
- Suboptimal antibiotic selection 253 (17)
- Incorrect dose 136 (9)
- Did not warrant antibiotics 68 (6)

Conclusions

- CAP, SSTI and COPD exacerbations accounted for 23% of all antibiotic prescriptions
- 23% of the treatment duration occurred after discharge
- 69% prescribed empiric antibiotic therapy
- Levofloxacin was most commonly prescribed antibiotic
- Antibiotics subgroup in over half of all cases
- Most community due to excessive treatment duration
- CAP was associated with inappropriate prescribing
- antimicrobial with appropriate prescribing

Limitations

- Retrospective study design with reliance on the discharge summary to accurately document the treatment indication
- May have overestimated the need for antibiotics for non-infectious conditions or self-limiting viral illness
- Single center study with the minority of patients receiving targeted antimicrobial therapy
- Recommended empiric therapy is dependent on local resistance and may lend perspectivity
- Data limited to antibiotics filled within the study center only

Implications

- Antibiotic prescribing at hospital discharge is an important and under-recognized opportunity to improve antibiotic use
- Interventions to improve discharge prescribing for common infections such as LUTI, CAP, and SSTI are clearly needed

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