Developing a Tool for Prospective Assessment of Treatment Appropriateness in Urinary Tract Infections

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Background

- Antimicrobial resistance is an increasingly serious threat to global public health[1]
- Audits and endorsement of appropriate antimicrobial use should be a priority for all antimicrobial stewardship programs[2]
- **To assess treatment appropriateness**, it is recommended that a standardized tool be developed[3] for quality improvement
- Many UTI treatment guidelines exist, however there are limited published tools designed for prospectively assessing treatment appropriateness

Objective

- **Develop an assessment tool** for auditing UTI treatment that assesses appropriateness, based on **guideline concordance**:
  - **Prospective**
  - **Standardized** to drive the approach
  - **High inter-rater agreement**

Methods

- The project team drafted a survey tool for assessing appropriateness of antibiotic therapy in patients with UTI
- The tool was developed using an iterative approach
- Two auditors **independently** reviewed UTI antibiotic therapy in 50 cases in October 2016
  - On the basis of **local UTI guidelines**, the auditors noted whether the therapy was "appropriate" or "suboptimal" (i.e. guideline concordant, or not)
- Inter-rater agreement between the two auditors was estimated with **Cohen's kappa** statistic[4]
- A minimum of 48 cases needed to be assessed to detect a statistically significant kappa of 0.80 or greater in a two-tailed test ($P \leq 0.05$), with 80% power[5]

Figure 1: UTI Treatment Appropriateness Assessment Tool

Assess Based on Day of Therapy:
☐**1-2** (Refer to A + B) ☐**3-4** (Refer to A + C + D) ☐**5 & later** (Refer to A + C + D + E)

A. Diagnosis a) Signs & symptoms documented by physician: ☐Dysuria or urgency or frequency or suprapubic pain ☐Flank pain or back pain or CVA tenderness ☐New fevers or rigors or neutrophilia without other source ☐Non-specific symptoms in a patient with spinal cord injury or paralysis ☐Sepsis (per qSOFA score) without other known etiology b) Investigations: ☐Urinalysis performed ☐Urine culture performed	☐Signs & symptoms of UTI documented ☐No symptoms documented or delirium only
B. Empiric Therapy *Suspected* Infection of Urinary Source, based on symptoms: ☐No Documented Symptoms ☐Uncomplicated Cystitis ☐Complicated Cystitis ☐Pyelonephritis ☐Urosepsis/Febrile UTI ☐CAUTI (☐Catheter removed if feasible) **Drug** ☐Appropriate per local guideline on back page, patient history, or as recommended by ID physician ☐Therapy Too Broad Spectrum ☐Inappropriate (Consider allergy and recent antibiotic use) **Dose** ☐Appropriate ☐Suboptimal (Consider renal function)	☐Appropriate ☐Suboptimal
C. Culture-Directed Therapy ☐No Documented Symptoms ☐Uncomplicated Cystitis ☐Complicated Cystitis ☐Pyelonephritis ☐Urosepsis/Febrile UTI ☐CAUTI (☐Catheter removed if feasible) **Drug** (check all that apply) ☐Appropriate for confirmed or presumed pathogen, or as recommended by ID physician ☐Opportunity for de-escalation ☐Bug-drug mismatch ☐Therapeutic duplication ☐Suboptimal (Consider allergy) **Dose** ☐Appropriate ☐Suboptimal (Consider renal function)	☐Appropriate ☐Suboptimal
D. Route ☐Current route indicated ☐IV to PO step-down indicated (Clinically stable & symptoms improving, functional GI, tolerates oral) ☐Organism not susceptible to oral options	☐Appropriate ☐Suboptimal
E. Duration (Total treatment) ☐Appropriate per local guideline on back page or as recommended by ID physician ☐Too long ☐Too short	☐Appropriate ☐Suboptimal
Ultimately, was this UTI treated appropriately? (Must be symptomatic* and "Appropriate" in all applicable categories) *Unless pregnant, history of solid organ transplant, awaiting urologic procedure with expected bleeding	☐**Appropriate** ☐**Suboptimal**

Figure 2: Inter-rater Agreement

		Auditor #1		
		Appropriate	Suboptimal	Total
Auditor #2	Appropriate	**22**	**3**	25
	Suboptimal	**2**	**23**	25
	Total	24	26	50

Kappa = 0.80 (95% CI: 0.63-0.97)
"Substantial Agreement"

Results

- A tool with five sections was developed (**Figure 1**):

Day of therapy	Sections assessed by auditors
1-2	A+B
3-4	A+C+D
5 & later	A+C+D+E

- 50 cases were assessed as "appropriate" or "suboptimal", in different sections of the tool, depending on day of therapy
- If a case was deemed "appropriate" in all applicable sections, it was adjudicated as "ultimately appropriate" and inter-rater agreement was estimated on this final adjudication
- The auditors had the same adjudication in 45 of 50 cases (**90% agreement**) (**Figure 2**), kappa was **0.80** (95% CI: 0.63-0.97)

Discussion

- Our group has designed a tool that can be used **for prospective auditing** with a **standardized approach**
- The tool had **substantial inter-rater agreement**[4] for assessing appropriateness of UTI therapy in field testing
- A unique design feature of this tool is that patients were assessed using different sections of the form, depending on where they were in the course of antimicrobial therapy
- This tool is useful for conducting point prevalence surveys and serves as a template for other antimicrobial stewardship teams to modify according to their needs
- With modification, the described assessment process is also applicable to other infectious disease syndromes
- The main limitation of this tool is that it has not been tested by other trained auditors for usability

Conclusions

- The tool and its development process provide a template that can be used by other antimicrobial stewardship teams to implement audits of treatment appropriateness and improve quality of care.

References available upon request