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Research Brief

Implementation of a multidisciplinary 48-hour antibiotic timeout in a pediatric population

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In an effort to decrease antibiotic overuse in the inpatient setting, in 2017 The Joint Commission (TJC) recommended the use of an "antibiotic timeout" (ATO) to facilitate the evaluation of empirically prescribed antimicrobials after an initial 48–72 hours.[1] The strategy behind an ATO is to have a structured discussion after newly ordered antibiotics have been administered to a patient for a period of 2–3 days to determine whether the patient is clinically responding; whether microbiologic data support continued use of the ordered antimicrobial(s) or de-escalation to a narrower-spectrum agent; and whether the dose, route and duration of therapy are appropriate.[2] However, little guidance on the best method to build this practice into workflow is available, and mixed evidence has been published in the adult population as to whether this practice is effective in promoting judicious antimicrobial use.[3–6] Even fewer studies have been conducted in a pediatric population and often include an ATO bundled with other interventions; therefore, the impact of an ATO itself remains unclear.[7–9]

Methods

This pre–post–post design project was conducted at an urban, academic, tertiary-care center with an embedded 172-bed pediatric hospital. The study was conducted over 3 periods: the pre-ATO period (February 1, 2016, through September 20, 2016), the pharm-ATO period (February 1, 2018, through September 30, 2018), and the multi-ATO period (February 6, 2019, through September 15, 2019). The study periods were chosen to account for seasonality in respiratory viral infections; there was no overlap in study periods. Pediatric inpatients receiving intravenous or oral antibiotics during the study periods for at least 48 hours were included. Patients were included if admitted to the PICU or the general hospitalist and pediatric subspecialty services; these same groups were studied for each period. The primary outcome was average antibiotic days of therapy (DOT) per patient; we were unable to measure DOT per 1,000 patient days because the denominator data at our hospital are retrieved by unit and not by patient. Data regarding length of stay (LOS), mortality and 30-day readmissions were collected as balancing measures.

Both interventions were supported by an innovative ATO patient list column in the electronic health record (EHR) with an active noninterruptive alert. This alert prompted the responsible clinician to review clinical information pertinent to antimicrobial decision making in the ATO work space (Appendix online) and to document their decision regarding antibiotic continuation, discontinuation or optimization. For patients started on multiple antibiotics at the same time, the ATO fired, and one-time documentation addressing all antibiotics satisfied the requirement of completing an ATO.

Before the ATO, no formal process was in place for performing or documenting an ATO. During the pharm-ATO, the team pharmacist reviewed the information in the ATO workspace when alerted, then engaged in a discussion about the antibiotic decision with the provider during in-person morning rounds. When consensus was achieved, the pharmacist documented this in the ATO workspace. During the multi-ATO, the nurse taking care of the patient attended bedside rounds and prompted the team to complete the timeout (Appendix online); the resident taking care of the patient then reviewed the ATO workspace, discussed with the team on rounds, and documented the antibiotic decision (Appendix online). A random sample of ATOs were prospectively audited monthly by the antimicrobial stewardship program (ASP) pharmacist for completion and appropriateness of therapy changes.

Results

During the pharm-ATO, 404 ATOs were performed, encompassing 868 antibiotic orders and 323 unique patients. During the multi-ATO, 399 ATOs were performed, encompassing 949 antibiotic orders for 305 unique patients. Overall, 1,284 antibiotic orders (n = 572 unique patients) were reviewed in the pre-ATO group. ATOs were completed a median of 42.75 hours (interquartile range [IQR], 36.3–55.8 hours) after initial antibiotic administration during the pharm-ATO, and a median of 44.75 hours (IQR, 37.6–56.6 hours) during the multi-ATO. The average DOT was not significantly different before versus after the intervention for either methodology (Table 1). LOS was significantly longer for both interventions when compared to the pre-ATO group (Table 1).

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PREVIOUS PRESENTATION: These data were presented as an abstract and poster at IDWeek 2020, which was conducted virtually.

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Table 1. Outcomes Data

Outcomes	Pre-ATO Group	Pharm-ATO Group	Multi-ATO Group	*P* Value		
				Pharm-ATO vs Pre-ATO	Multi-ATO vs Pre-ATO	Pharm-ATO vs Multi-ATO
Antibiotic DOT, mean d	4.64	4.67	4.81	.872	.418	.503
Mortality, %	0.3	0.3	1.0	1	.348	.359
LOS, median d	6	7	7	<.01	<.001	.076

Note. ATO, antibiotic timeout; DOT, days of therapy; LOS, length of stay.

The mortality and 30-day readmissions rates were similar between groups (Table 1).

A greater proportion of ATOs during the pharm-ATO period resulted in the decision to continue antibiotics for a suspected infection when compared to the decisions made at ATOs during the multi-ATO (41.3% vs 28%; $P < .0001$). A smaller proportion of ATOs during the pharm-ATO resulted in continuation for directed therapy toward a known pathogen when compared to the decisions made at ATOs during the multi-ATO (17.4% vs 34.9%; $P < .0001$). The proportion of ATOs resulting in continuation for pending cultures (12.7% pharm-ATO vs 17.3% multi-ATO; $P = .059$) and in discontinuation of antibiotics (6% pharm-ATO vs 8.3% multi-ATO; $P = .197$) were similar for both groups. No data were available regarding antibiotic decision-making rates for the pre-ATO period because it pre-dated the development of the ATO workspace.

Discussion

An ATO at 48 hours did not significantly decrease average antibiotic DOT in a pediatric population, regardless of methodology. Although LOS increased by 1 day, the ATO was not otherwise associated with increased mortality or 30-day readmissions.

This study has several limitations. It was a single-center study. We lacked data on confounding factors that may have influenced LOS such as case-mix index, and we lacked denominator data for ATO opportunities across study periods.

This negative result further underscores the challenges in determining which stewardship interventions are not only efficacious but also provide good return on investment of time and resources. Although the standalone ATO did not require substantial ASP resources to implement, it did not translate to improved outcomes. Thus, it might be better utilized as part of a bundled intervention or along with direct supervision by the ASP. More research must identify optimal strategies for conducting an effective ATO in children.

Supplementary material. To view supplementary material for this article, please visit https://doi.org/10.1017/ice.2021.347

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