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Reducing antibiotic use at a pediatric oncology center: Q+A



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What does changing antibiotic practice in pediatric oncology look like? On the heels of World Antimicrobial Awareness Week, we spoke with Asst. Prof. Alexandra Satty, a pediatric hematologist oncologist, about a project she led at Memorial Sloan Kettering Cancer Center that reduced antibiotic use in the target patient population from 97 percent at baseline to 9.6 percent – an order of magnitude difference.

Q: What change in antibiotic practice did you aim to evaluate?

We conducted our intervention at a large cancer center, with pediatric cancer patients who were being treated in an outpatient setting, who had a central line in place, and who presented with non-neutropenic fever.

We know that due to the dual risk factors of chemotherapy and of having a central line, these patients are at higher-than-normal risk of serious bacterial infection and bacteremia, or bacteria in the bloodstream. Where it gets interesting is that there are no specific guidelines on antibiotic use in non-neutropenic fever in pediatric oncology patients. There isn't even a standardized definition of fever. The practice at our institution had been to empirically draw blood cultures and administer IV antibiotics, without first evaluating individual patients' specific risk factors and whether antibiotics were required.

We suspected that we were administering a lot of antibiotics to patients who didn't need it, and so the goal of our project was to decrease the empiric antibiotic rate in patients presenting with non-neutropenic fever who were assessed to be at low risk of serious bacterial infection.

Q: What did your intervention look like?

Our first step was to conduct a retrospective chart review to determine the actual risk of bacteremia in our patient population.

We found that we were giving antibiotics to the vast majority of patients—97 percent—but the actual occurrence of bacteremia or a significant complication from infection was very low. For instance, we saw that most patients who tested positive for bacteria by blood culture had gram positive bacterial infections, which were not covered by the antibiotic we were giving and in most cases were unlikely to cause acute or life-threatening infectious complications. We presented the data throughout the department, and it made a compelling case that we were overusing antibiotics.

We next met with relevant stakeholders in our facility, including oncology attendings in our division and the infectious disease team, to create an algorithm that could stratify patients and identify those who were at particularly low risk for bacteremia.

We then disseminated the finalized algorithm and led education sessions not only with physicians but also advance practice providers (nurse practitioners and physician assistants) and nurses, and when patients came into our outpatient clinic with non-neutropenic fever, we had very strict criteria to determine their eligibility for withholding antibiotic administration.

Q: What follow-up did you do to track outcomes?

We very closely chart reviewed patients for at least two years to confirm that their outcomes were acceptable according to the criteria we had prospectively defined. Once we showed enough data that there was high compliance with the intervention, and that patients really weren't experiencing infectious complications, we moved to less frequent monitoring.

Q: What were the results?

We reduced empiric antibiotic administration from about 97 percent pre-intervention to less than 10 percent post intervention across the first year. We had set 50 percent as our anticipated target because we weren't sure what the reception would be. We far exceeded that, and nevertheless, patients' rates of bacteremia and complications from infection stayed below our predefined threshold.

Q: The results are remarkable. In practice, did you see lapses in implementation? Was re-training needed?

We reviewed patient charts weekly to track compliance. Mostly, it remained very high. Once or twice, if we saw it dip, we did targeted interventions, where we provided additional education that we felt might be of benefit.

In some ways, I think we were lucky—a lot of providers were almost asking for this intervention, to confirm a growing sense amongst our teams that we could safely reduce administration of empiric antibiotics to these patients. We found that they were right.

Q: Did you run into challenges or resistance?

When we introduced the project, we heard two main concerns, especially from senior members of the division who had years of experience seeing very serious complications from infection: one was that antibiotic administration would be delayed for patients who needed it. The second group of concerns were largely about how we were going to monitor patients to make sure they didn't have bad outcomes.

Q: And how did you address both of those concerns?

I think we had good plans in place before we rolled out the intervention. It's also important to note that we were targeting a defined group of patients and all the patients seen are known to us.

One significant change we made with this intervention involved the way in which we ordered antibiotics for patients who presented with a complaint of fever. Where previously we would have just placed the antibiotic order in the electronic medical record, in this case we examined the patient before placing it. We did see a slight delay in time to treatment on

average – a little over our institutional target of an hour – but the finding was mostly driven by a couple of significant outliers. Most patients who received antibiotics did so within the hour. Overall, we saw no impact on outcomes.

As for monitoring patient outcomes, first, we followed our algorithm for determining whether a patient was at higher risk of serious bacterial infection, and we screened out maybe 50 or 60 percent of patients upfront. The decrease from 97 percent of patients receiving empiric antibiotics to under 10 percent was in a very selected, controlled population.

Then, because the patient population we were following was relatively small and known to us, we can track patients closely, make phone calls, and proactively follow our patients. All of the providers seeing these patients were pediatric hematology/oncology trained, and patients are seen in our urgent care. As a result, we can control guidance and take precautions in a more controlled manner than would be the case if patients are seen in an ER by providers who don't already know them and have the capacity to closely follow up with them.

Q: What about the reception from patients and their families?

The patients and families in our intervention did not voice any real concerns with following our guidance on antibiotic use.

Q: Do you think that the screening approach you took is scalable, or do you think it was specific to the institution and patient population?

I think the principle of screening is scalable. Adam Esbenshade at Vanderbilt University is developing algorithms that can be adapted to institutions' contexts for identifying patients who are at low risk of complications from bacterial infection. I think our model was unique to our institution because it was developed using our retrospective data. Other institutions could do something similar, but it requires knowledge of their own retrospective data.

Adam Esbenshade's model has been validated across several institutions and might be more universally scalable.

To learn more, we recommend:

Dr. Satty's interventional study in *Pediatric Hematology and Oncology*: Reducing empiric antibiotic administration in pediatric oncology patients with non-neutropenic fever: a single-center quality improvement initiative

2025 ASCO Educational Book by Dr. Esbenshade and colleagues, Implementing Evidence-Based Strategies to Improve Pediatric Oncology Infection Management