

**IDENTIFICATION OF EDUCATIONAL AND INFRASTRUCTURAL BARRIERS TO
PROMPT ANTIBIOTIC DELIVERY IN FEBRILE NEUTROPENIA:
A QUALITY CONTROL PROJECT**

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Purpose: Prompt antibiotic administration in 60 minutes is considered standard of care in febrile neutropenia (FN), but anecdotal evidence suggests this benchmark is often missed. Few studies have examined the prevalence of or reasons for antibiotic delay. We describe the median time to antibiotic administration, as well as barriers and predictors of delays in order to suggest future interventions.

Method: LEAN methodology was used to identify sources of delay in antibiotic administration. LEAN techniques have been developed by the automotive industry to identify system inefficiencies and minimize waste. These techniques have been adapted to health care to improve patient care. This is done through the collaboration of all individuals directly involved in patient care to determine the most efficient flow of events, and to identify and minimize processes that are not necessary to patient care. A trained LEAN moderator conducted group interviews with representatives from all groups involved in the emergency care of neutropenic children. Consensus on barriers to prompt antibiotics was sought. Independently, a random sample of 50 episodes of FN presenting to the ER between December 2008 and November 2009 were subject to chart review. Triage time, initial MD assessment, reporting of lab results and antibiotic administration were recorded. Patient, family and ER variables were examined as possible predictors of delayed administration.

Results: The LEAN process identified important areas of delay and several misunderstandings between hospital departments, leading to interventions including the development of an ER pre-printed order sheet for FN. The pre-printed order sheet will allow bloodwork to be done immediately at triage in any oncology patient presenting with fever. It will also facilitate antibiotic ordering when a neutropenic bloodwork has been reported. Other interventions include early port access, as well as changes to the collection and labelling of bloodwork to minimize previously identified delays. The chart review showed a median time of 216 minutes from triage to antibiotic administration (interquartile range [IQR]=151-274). The time of greatest delay occurred between the lab reporting bloodwork results and antibiotic administration. Only season significantly predicted time to antibiotics, with longer times seen in the fall (Median=263 minutes, IQR 218-294; P=0.04).

Conclusion: This study has shown that time to antibiotic administration in children with FN greatly exceeds our one hour benchmark. The chart review and the LEAN process suggested targets for both educational and infrastructural interventions, including a pre-printed order sheet and targeted nursing education. Although this study did not evaluate for a correlation between delayed antibiotic administration and patient outcomes, these interventions should minimize delays and improve treatment times without requiring additional resources. Extra resources may be justified during the fall. Our methodology represents a model in improving process efficiency and developing "best-practice" benchmarks at pediatric oncology institutions.

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