Utility of the Rapid Absolute Neutrophil Count: Striving to Reduce Time to Antibiotics in Febrile Neutropenic Pediatric Oncology Patients Presenting to the Emergency Department

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Background: Patients with chemotherapy-induced neutropenia (an absolute neutrophil count of <500 cells/μL) who present with fevers (temperatures of ≥38.0°C twice within 24 hours or ≥38.3°C once) are at risk of serious bacterial infections and require prompt administration of empiric antibiotics. The rapid absolute neutrophil count (rapid ANC) is an automated reading from the hematology analyzer; it is thought to be a reasonable estimate of the true ANC. Use of the rapid ANC at Lurie began in May of 2014 as an initiative to decrease time to antibiotics in febrile and neutropenic oncology patients.

Objectives: The purpose of this study was to determine whether the rapid ANC decreases time to antibiotics in febrile neutropenic pediatric oncology patients, and to determine whether the rapid ANC is a clinically actionable proxy for the true ANC.

Hypotheses: 1) At Lurie, use of the rapid ANC decreases time to antibiotics in febrile neutropenic patients who do not meet any of the following criteria: the patient is ill-appearing, the patient has a recent ANC <<500 cells/μL, and/or there is explicit instruction from the Hematology/Oncology team to administer immediate antibiotics upon ED arrival. The presumption is that in any of these scenarios, antibiotics would be administered prior to obtaining any laboratory results. 2) The rapid ANC is a reasonable proxy for the true ANC.

Design/Methods: This was a retrospective chart review of oncology patients with fever who presented to the Lurie ED between October 2018 and March 2019. Potential subjects were identified through the daily Hematology/Oncology departmental email sign-out as well as through Epic's ED Census Report feature.

Results: 113 pediatric oncology patients presented to the ED for fever during the study period. Of this group, 65 were neutropenic and received empiric antibiotics. 11 of 65 febrile neutropenic patients (17%) received antibiotics after the rapid ANC result but prior to the true ANC result. The remaining patients received antibiotics prior to any results or after both labs had resulted.

We repeated analysis after removal of cases in which the rapid ANC would be unlikely to affect antibiotic timing. This included 18 patients who were ill-appearing, had an ANC <400 cells/μL within 24 hours prior to ED presentation, and/or had a note authored by a Hematology/Oncology provider instructing immediate administration of antibiotics. 10 of 47 patients (21%) received antibiotics after the rapid ANC result but prior to the true ANC result.

When comparing the rapid ANC to the true ANC, we found the average difference between values was 112 cells/μL. However, only 5 of 113 cases (4%) had a clinically relevant discrepancy where one ANC value was <500 cells/μL while the other ANC value was >500 cells/μL.

Conclusions: Based on the above data, if we presume that the rapid ANC could be said to decrease time to antibiotics in cases where antibiotics were given after the rapid ANC result but prior to the true ANC result, the rapid ANC appears to decrease time to antibiotic delivery in pediatric oncology patients with febrile neutropenia in 17% of cases. This represents a lower frequency than expected. This value only minimally improved to 21% after adjusting for scenarios in which patients were anticipated to receive antibiotics immediately upon ED presentation. Given that only 4% of cases showed a clinically relevant discrepancy between ANC values, the rapid ANC is a clinically actionable proxy for the true ANC.

Further research would help elucidate whether improved provider education and/or revised clinical guidelines could increase the utility of the rapid ANC with respect to antibiotic administration timing, or whether alternative ED initiatives to decrease time to antibiotics would be more successful.