

POCT Utilization for Improved Patient Care in the Neonatal Intensive Care Unit using the GEM 4000

Nicole Brooks, MLT, BSc¹, Deb Barnard, RN², Nicole Squires, MLT¹, and Cynthia Balion, PhD¹

¹Hamilton Regional Laboratory Medicine Program, ²Hamilton Health Sciences, McMaster University Medical Centre, Neonatal Intensive Care Unit, Hamilton, Ontario, Canada

Background: In 2011 a GEM 4000 blood gas analyzer was implemented in the Neonatal Intensive Care Unit (NICU) at the McMaster University Medical Centre (MUMC) for STAT testing with a test panel including blood gas, electrolyte, metabolite and co-oximetry testing. In May 2013 the decision was made to allow testing of daily blood work, including glucose, lactate and electrolytes. There were changes to daily blood collection time and handling times to support this initiative at the point of care. All testing was carried out by Respiratory Therapists. The goal was to improve quality of care by providing timely results, minimizing the sample volume required and decreasing total number of samples collected. We sought to find out if these goals were met.

Methods: We gathered information on the process of collecting and sending samples to the laboratory from the NICU. Data was obtained for specimen counts in the laboratory and at point of care plus turn-around-times from the laboratory information and point of care data management systems. We also obtained information on how point of care testing impacted the multi-disciplinary NICU team.

Results: A review of testing platforms confirmed that both the laboratory and NICU use the GEM 4000 analyzer with blood gas, electrolyte, metabolite and co-oximetry testing. For neonatal electrolyte and lactate orders laboratory testing is performed on the Abbott Architect analyzer. The GEM 4000 has three sample volume (65, 100 and 150 µL) requirements depending on the combination of tests being reported. Customized test panels have been created on the NICU GEM 4000 using the 65 µL micro mode for ease of use. The NICU collects capillary blood using a 100 µL plastic balanced heparinized tube and arterial/venous blood using a 1 mL plastic advanced formula heparinized syringe (maximum 150 µL of blood collected). Neonatal electrolyte and lactate orders require a minimum sample volume of 300 µL heparinized plasma (minimum 450 µL of blood collected). By using the NICU GEM 4000 when electrolyte and metabolite testing is required there is a reduction in required blood volume collection.

Samples sent as STAT using the direct pneumatic tube in NICU take approximately 12 minutes to be received in the laboratory. Once received the average time to result verification is 1.5 hours. When testing occurs in the NICU using the GEM 4000 the results are available within 30 minutes. Also adding to time savings is no test pre-order in the Laboratory Information Management System (LIMS); point of care tests are ordered by interface scripting between a data management system and the LIMS. Therefore timely results are achieved through testing at the point of care, approximately saving 1 hour.

Data obtained from specimen counts demonstrate that testing has increased using the NICU GEM 4000. Laboratory testing has decreased proportionally on the GEM 4000 but has not reduced using the Abbott Architect platform. The reason why samples continue to be sent to the laboratory for electrolyte testing is partly due to the need to order total bilirubin performed on the Abbott Architect analyzer. The increase in testing at the point of care has impacted the Respiratory Therapist workload causing delays in testing during peak blood work times. The solution to this problem was to train a group of Charge Nurses to run samples on the GEM 4000 analyzer. The multi disciplinary team has found that having results available within minutes allows for an opportunity to make clinical decisions regarding ventilation strategies & fluid therapy, with minimal delay.

Conclusion: Increased utilization of the GEM 4000 in the NICU does minimize blood collection volumes for testing in our most vulnerable patient population. However, achieving the goal of decreasing samples collected for testing in the laboratory has been tempered by the need for bilirubin testing. An initiative to include total bilirubin on the GEM 4000 analyzer test panel is expected to lead to further reduction of sample volume and laboratory testing. We found that test results are available more quickly when testing occurs in the NICU providing a better flow for decision making and improved quality of care.