1.0 PURPOSE AND INTENT

1.1 To provide the clinical indications, clinical assessment tools and guidelines for use of focused ultrasound (US) in neonatal care within the Neonatal Intensive Care Units in the WRHA.

Note: All recommendations are approximate guidelines only and practitioners must take into account individual patient characteristics and situation. Concerns regarding appropriate treatment must be discussed with the attending neonatologist.

2.0 PRACTICE OUTCOME

2.1 Real time diagnosis of unexpected critical conditions and cardiorespiratory collapse (e.g. pleural and pericardial effusions).

2.2 Dynamic and specific assessment of parenchymal lung diseases either independently or as an adjunct to CXR according to the clinical indications.

2.3 To evaluate the cause of sudden onset cardiorespiratory collapse in neonates where urgent intervention might be lifesaving (e.g. pneumothorax, pleural or pericardial effusion).

2.4 To assess the motility and perfusion of intestine in neonates where there is a concern for necrotizing enterocolitis (NEC) and guide management decisions

2.5 To assess urinary bladder prior to supra-pubic aspiration to improve its yield

3.0 DEFINITIONS

3.1 Focused ultrasound in neonatal care: An ultrasound performed by a trained neonatal health provider for real time assessment of a predefined clinical condition and interpreted in the clinical context. Performed with a high frequency transducer (7.5 to 10 MHz) for both phased array and linear transducers.

3.2 Integrated evaluation: Integrating the results of the focused ultrasound with clinical evaluation, in parallel with other modalities such as targeted neonatal echocardiography or near infrared spectroscopy (NIRS).

4.0 GUIDELINES

4.1 Neonatal health providers complete the audited training program before performing clinical focused ultrasound studies. Interpret, annotate and archive all studies which are of good quality according to the guidelines that follow. See APPENDIX A for safety and logistics and information on the focused ultrasound oversight committee.

4.2 Focused ultrasound may include some echo views for evaluation of line position or effusions, this technique SHOULD NOT BE considered a substitution of the comprehensive targeted neonatal echo (TNE).
4.3 Archive all studies in the IMPAX system with the following patient information:
   - Last name: all uppercase with checked spelling
   - First name: as INFANT
   - MRN in this format: 0999999-9 (HSC), or St Boniface format
   - DOB: Month-day-year
   - Gender
   - Operator name
   - Study description or protocol e.g. LUS or FAITH protocol

4.4 Document results and interpretation in the medical record as a procedure note. Consider consulting either a pediatric radiologist or pediatric cardiologist when there is uncertainty about the interpretation of results.

4.5 When conducting the exam, consider the impact on the patient and keep the length of time of the exam and the disruption to the baby’s sleep to a minimum. When a repeat exam is required soon after, assess the baby’s ability to tolerate the exam before proceeding.

Lung US

4.6 When considering ordering a chest x-ray (CXR) consider if an US can be done instead, or in parallel as an additional modality to help with the following determinations.

4.6.1 Mild to moderate respiratory distress: Differentiate Respiratory Distress Syndrome (RDS) from Transient Tachypnea of the Newborn (TTN).

4.6.2 Confirm and follow up of CXR with areas suspicious for effusions or pneumothorax with semi-quantification (mild, moderate or severe) and to help determine both need for and guide needle aspiration or chest tube insertion.

4.6.3 Lung ultrasound scoring as a screening exam before and after specific interventions in infants with worsening hypoxemia.

4.6.4 If the infant needs intubation, a CXR should be done to assess the endotracheal tube position. The lung ultrasound can be done as a follow-up to assess the lung fields.

4.6.5 To evaluate the adequacy of respiratory support in neonates with respiratory distress.

4.6.6 To differentiate between collapse and consolidation in neonates with a suggestive CXR finding.

4.7 Performing Lung US for patients with structural heart diseases should be considered only as requested or directed by the pediatric cardiologist

Chest / Abdominal US

4.8 To confirm vascular line placement. Primarily for umbilical venous catheters and central venous lines placed in the inferior vena cava:

4.8.1 Confirm central tip location immediately after insertion. The line can be manipulated under US guidance to a good position. In cases where visualization is difficult, injection of few cc of normal saline can be tried to help visualize the tip. If confirmation is still difficult, then a chest/abdominal X-ray should be done to confirm the tip position.

4.8.2 To evaluate the position of lines later especially when the line has moved from its original position.

4.8.3 Any time a neonate with a central line has a clinical deterioration, a prompt US to locate the tip of central line as well as a quick assessment to rule out pleural or pericardial effusion.

Bladder US

4.9 To Measure urine volume in the urinary bladder and to guide supra pubic tap for urine culture.
Abdominal US

4.10 Targeted assessment of compromised intestinal motility and perfusion using dynamic ultrasound and color Doppler. To be utilized in situations in which x-ray findings for necrotizing enterocolitis remain inconclusive. In such cases where the index of suspicion based on clinical findings remains high the practitioner should perform said studies after consultation with the primary physician. Using NIRS in this situation may provide additive support in interpreting results from ultrasound assessment.

5.0 REFERENCES


6.0 PRIMARY AUTHORS

6.1 Dr. Yasser Elsayed (Neonatologist and training Instructor)
6.2 Dr. Deepak Luiz, Neonatologist
6.3 Doris Sawatzky-Dickson, Neonatal Clinical Nurse Specialist
APPENDIX A

Focused ultrasound in neonatal care committee:

Dr. Michael Narvey (Section Head of neonatology and coordinator)
Dr. Yasser Elsayed (Neonatologist and training Instructor)
Dr. Deepak Louis (Neonatologist)
Dr. Ruben Alvaro (Director of St Boniface NICU)
Dr. Jens Wrogemann (Radiologist and Supervisor of training quality)

Responsibilities:
1. Set and maintain standard for practice
2. Cultivate education and research initiatives

Patient safety and logistics:

Canadian Medical Protective Association has been consulted to reassure safety aspects of performing focused ultrasound, and has the view that performing such special skills by trained personnel should be permitted -as per local guidelines- especially with any potential expected relief of patient stresses, and it is unethical to withhold any special skills expected to improve a patient’s clinical condition. This is only true if the practitioners have been appropriately trained and are able to provide such skills with confidence according to the following:

1. Performing focused ultrasound should be implemented in accordance with the published evidence and accepted local guidelines for training.

2. Lung ultrasound, intestinal ultrasound, and line assessment can be performed by a staff member or a fellow who assigned as a provider after completion of the required training, and his training has been signed off by the training instructor for any one of the 3 modalities separately.

3. Before considering any intervention or adjustment of the management the ultrasound study should be reviewed and signed off by the staff who completed fellowship in Targeted Neonatal Echocardiography, and expert are in focused ultrasound. This program is let by Neonatologists Dr. Yasser Elsayed and Dr. Deepak Luis.

4. Involvement of either a pediatric radiologist or pediatric cardiologist may be considered in situation of uncertainty about the interpretation.