

BLADDER PRESSURE MONITORING IN NEONATES - GCNC - CHW

PRACTICE GUIDELINE[®]

DOCUMENT SUMMARY/KEY POINTS

- This practice guideline is for clinicians working in Grace Centre for Newborn Care who are required to monitor bladder pressure in a neonate with a congenital malformation and/or in the post-operative period:
 - The set-up for bladder pressure monitoring is an aseptic procedure
 - The transducer set is clearly labelled to avoid confusion with arterial line monitoring
 - The intra-abdominal pressure should be less than 12mmHg to avoid complications of abdominal compartment syndrome

CHANGE SUMMARY

- Document due for mandatory review
- The references have been updated

READ ACKNOWLEDGEMENT

- **Training/Assessment Required** – staff that have not cared for an infant with bladder pressure monitoring are supervised by a senior member of the nursing team when setting up for the procedure.
- All clinical staff in Grace Centre for Newborn Intensive Care is expected to read and acknowledge they understand the contents of this guideline.

This document reflects what is currently regarded as safe practice. However, as in any clinical situation, there may be factors which cannot be covered by a single set of guidelines. This document does not replace the need for the application of clinical judgement to each individual presentation.

Approved by:	SCHN Policy, Procedure and Guideline Committee	
Date Effective:	1 st December 2022	Review Period: 3 years
Team Leader:	Clinical Nurse Consultant	Area/Dept: GCNC - CHW

Defining Statement

The primary goal in the surgical repair of abdominal wall defects is to return the viscera to the abdominal cavity as expediently as possible. Infants undergoing closure of congenital abdominal wall defects are at risk of developing increased intra-abdominal pressure¹⁻⁴ Increased intra-abdominal pressure can also be due to loss of laxity in the abdominal wall such as when there is gross postoperative oedema with NEC particularly if there is marked hypoalbuminaemia.

Elevated and sustained intra-abdominal pressure (>10mm Hg) may cause significant impairment of cardiac, pulmonary, renal, gastrointestinal and hepatic function.^{1-3,5-7} Urinary bladder pressure monitoring is a simple and reliable method of quantifying intra-abdominal pressure and facilitates clinical management.⁵

Definition of terms

Pressure monitoring of the abdominal compartment: is usually achieved by monitoring the patient's bladder pressure using a standard pressure transducer and the urinary catheter. The pressure transducer monitoring set is connected to the patient's urinary drainage system.⁸

Bladder pressure: reflects the intra-abdominal pressure and is measured in mm Hg⁵.

Intra-abdominal pressure (IAP): is the pressure within the abdominal cavity. In critically ill children IAP is 4-10mm Hg^{5,7-8}

Intra-abdominal hypertension (IAH): is defined as an IAP that is sustained or greater than 10mm Hg due to an increase in the volume of retroperitoneal or abdominal contents. A critical IAP is >20mm Hg and is dependent upon age and blood pressure.⁶⁻⁸

<p>IAH is graded as Grade 1 IAP 12-15mmHg Grade 2 IAP 16-20mmHg Grade 3 IAP 21-25mmHg Grade 4 IAP >25</p>

Abdominal Compartment Syndrome (ACS): defined as a sustained IAP >10-mmHg that is associated with new or worsening organ dysfunction/failure.⁷

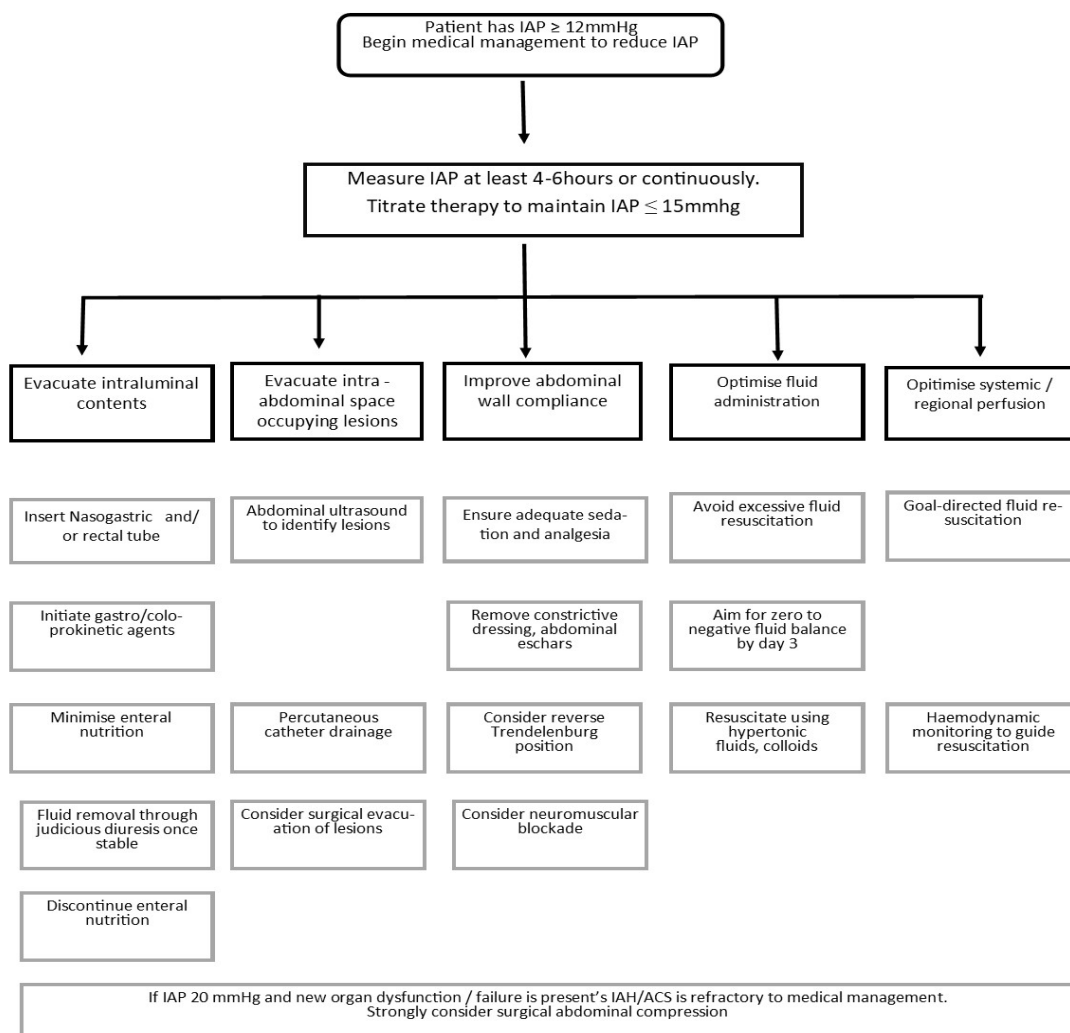
Abdominal Perfusion Pressure (APP): is defined as Mean Arterial Pressure (MAP) – Intra-abdominal pressure (IAP).⁷

Symphysis pubis: is where the pubic bones meet in the front midline of the body in front of the pelvis

Management

- IAP is measured indirectly via the infant's bladder. The changes in intravesicular pressure are an accurate reflection of intra-abdominal pressures.^{1-2,8-9}
- Renal function is important in the management of patients with increased IAP. An IAP > 15mm Hg may impair renal perfusion⁵. Patients with raised IAP and decreased urine output require appropriate, timely intervention and close monitoring of renal function.⁸
- IAP is measured regularly (every 4 hours) when >12 mmHg and if an infant is hypotensive, has decreased urine output or a tense abdomen.⁸
- An increased IAP reading should be rechecked to ensure there is no technical problem e.g. a blocked catheter.
- Postoperatively the intra-abdominal pressure should be maintained below 10mm Hg by following a guideline which links the administration of analgesics, sedatives and muscle relaxants to pressure measurements.¹⁰
- Increased intra-abdominal pressure may exist for 3-4 days following operative repair.

IAH /ACS Medical Management Algorithm



Intra-abdominal pressure monitoring procedure

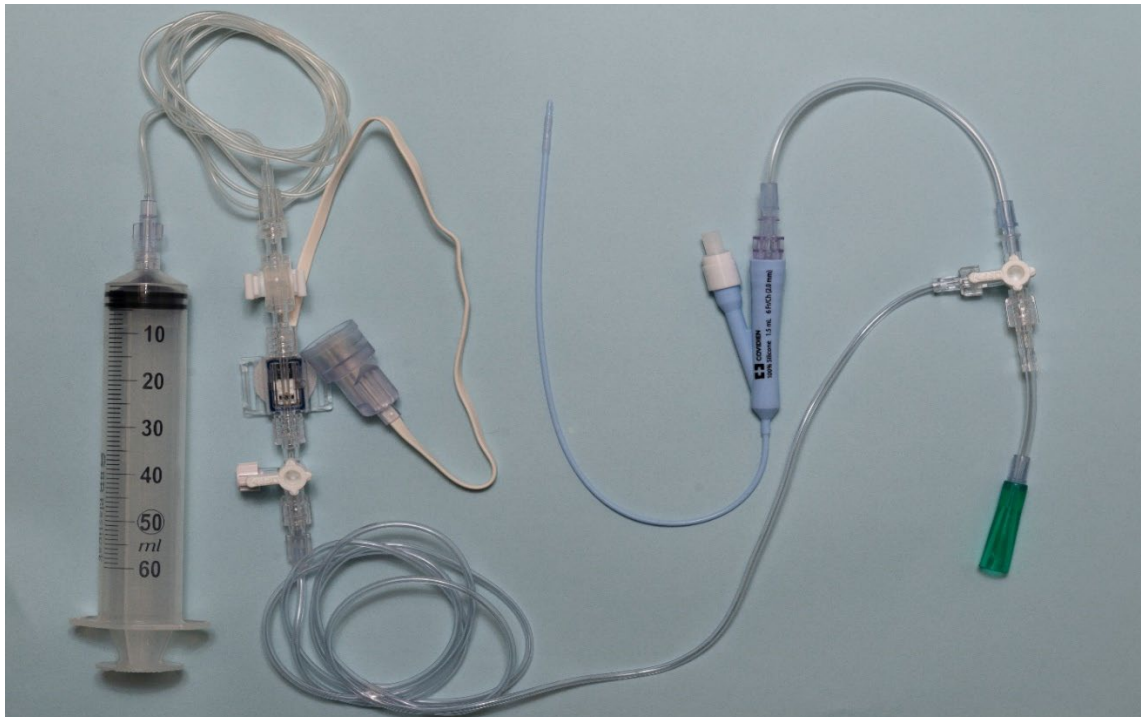
Intra-abdominal pressure can be measured via the infant's bladder using a Foley catheter, bladder pressure kit and transducer and Phillips monitor.

Equipment required

- Foley urine catheter FG 6 (Size 8FG may be required in some female infants)
- Urine meter and bag for drainage of urine
- Bladder pressure monitoring kit (ICU medical)
- Syringe driver.
- Syringe extension set
- 50mL syringe
- 50mL Normal Saline¹⁰
- Green connector (remove white part)

Circuit assembly

- Using an aseptic non-touch technique, prime the transducer set and kit with 0.9% Sodium Chloride⁸.
- A transurethral 6FG Foley catheter and urinary drainage system is connected to a pressure monitoring kit (see diagram below).
- Urine flow into the drainage bag is not interrupted except during the measurements of bladder pressure¹¹.
- The pressure transducer is aligned to the level of the symphysis pubis and is zeroed^{1, 11}.
- See photo below for complete set-up.



Measurement of Intra-abdominal pressure

- Ensure the pressure transducer is aligned with the symphysis pubis on the infant
- Turn on syringe pump.
- Turn stopcock off to the urinary drainage system.
- Slowly fill the bladder with 1mL/kg of 0.9% Sodium Chloride (minimum 2-3mls) using the syringe driver set at 20mL/hr. The volume of fluid in the bladder should be constant for each measurement.¹²
- Turn setting on syringe driver back to 1mL/hour.
- Allow 1 minute for reading to stabilise.
- Read the pressure on the monitor in mmHg.
- The abdominal blood flow should produce fluctuations in the waveform. Air in the system or kinking of the monitoring lines may dampen the waveform¹¹.
- Using this system accurate urine output and /or intermittent measurements of bladder pressure can be obtained.
- Turn off the syringe pump.
- Turn stopcock to open urinary drainage and close pressure line.

Special Considerations

- 0.9% Sodium Chloride should only be used to fill the patient's bladder when undertaking an intra-abdominal pressure measurement⁸.
- All transducer monitoring lines should be labelled clearly and transducer sets should be changed every 72 hours.
- All lines should be clearly labelled.
- The tubing must be free of kinks and air bubbles.
- All interventions must be carried out using an aseptic technique.

Complications

- Infection of the bladder is a complication of this procedure. Symptoms vary depending on the age of the child but include:
 - Fever
 - Lethargy
 - Vomiting
 - General malaise
 - Local pain
 - Dysuria

Urine culture and sensitivity is the gold standard for diagnosis if an infection is suspected^{8,12}

Documentation

- Document the bladder pressure measurement and frequency on the infant's observation chart.
- Pressures are measured and recorded every 8 hours unless instructed more frequently.

- If the pressures have a rising trend inform the medical team.

Discontinuing monitoring

- The transducer/monitoring attachments can be disconnected and removed prior to the removal of the patient's urinary catheter.
 - Detach the transducer kit from the urinary catheter.
 - Re-attach the urinary catheter to the drainage bag, using a clean non touch technique.
- The pressure monitoring device is usually only required for a short period. Removal is usually discussed in approximately 3-4 days.

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