Guideline Title  Intra-abdominal Pressure Monitoring

Summary: This guideline provides information regarding accurate set-up and measurement of Intra-Abdominal Pressure (IAP) to aid in the diagnosis of Intra-Abdominal Hypertension (IAH) and/or Abdominal Compartment Syndrome (ACS) in Intensive Care Unit.

Approved by: ICU Medical Director

Publication (Issue) Date: May 2014

Next Review Date: May 2017

Replaces Existing Guideline: Intra-abdominal Pressure Monitoring

Previous Review Dates: February 2008, 2010

Background Information:
Measuring intra-abdominal pressure (IAP) is used to identify patients at risk of intra-abdominal hypertension (IAH) and abdominal compartment syndrome (ACS). Both IAH & ACS are associated with significant morbidity and mortality, notably cardiorespiratory, renal and hepatic dysfunction. Early recognition and treatment of IAH & ACS has been shown to significantly improve morbidity and mortality.

The IAP is the steady-state pressure concealed within the abdominal cavity. It is usually measured indirectly via the patient’s bladder as changes in intravesical pressure has been demonstrated to accurately reflect IAP. Normal IAP is approximately 5-7mmHg in critically ill adults. A sustained elevation in IAP of ≥12 mmHg is defined as IAH while ACS is defined as sustained IAP of ≥20mmHg associated with new organ dysfunction/failure (e.g. the pulmonary, cardiovascular, renal, gastrointestinal, hepatic and neurological systems).

1. Introduction contains:
The risk addressed by this policy:

Patient Safety.

The Aims / Expected Outcome of this policy:
To facilitate staff to accurately set-up and measure Intra-Abdominal Pressure (IAP) for patients in Intensive Care Unit.

Related Standards or Legislation
NSQHS Standard 1 Governance
2. **Policy Statement:**
   - All care provided within Liverpool Hospital will be in accordance with infection prevention and control, manual handling and minimisation and management of aggression guidelines.
   - IAP monitoring should only be applied by nursing and medical staff who have received appropriate education on how to perform the procedure.
   - Transducer systems will be set up and managed using aseptic technique.
   - The reference point is symphysis pubis and should be marked on the patient so that transducers are leveled to the same mark each time.
   - Transducer must be checked at the commencement of each shift.
   - Transducer sets should be changed every 72 hours.
   - IAP should be measured when any known risk factor for Intra abdominal Hypertension (IAH)/Abdominal Compartment Syndrome (ACS) is present in a critically ill or injured patient.
   - Vigilant fluid management with avoidance of positive cumulative fluid balance in the critically ill with, or at risk of, IAH/ACS is important.

3. **Principles / Guidelines**

**Indications**
- Acute respiratory failure secondary to raised intra-thoracic pressure
- Abdominal surgery
- Trauma
- Pancreatitis
- Burns
- High BMI (with central obesity)
- Ascites
- Ilius or bowel obstruction
- Massive fluid resuscitation > 5L/24hrs
- Large blood transfusion >10units/24hrs
- Feed intolerance
- Head of the bed <30°

**Contraindications**
- Ruptured bladder
- Intra bladder hematoma
- Neurogenic bladder
- Recent bladder surgery
- Uro-genital anomalies
- Anuric chronic renal failure

**Complication**
- Infection of the bladder

**Risk Factors for IAH/ACS**
- Diminished abdominal wall compliance (major trauma & burns; acute respiratory failure; abdominal surgery).
- Increased intra-luminal contents (Gastroparesis; ileus; pseudo obstruction)
- Increased abdominal contents (Ascites / liver dysfunction; haemoperitoneum / pneumoperitonium).
- Capillary leak/fluid resuscitation (Acidosis, hypotension, hypothermia, massive fluid resuscitation, poly transfusion, coagulopathy, sepsis, major trauma and burns).

**Equipment**
- Bedside monitor
- Pressure module and cable
PROCEDURE
Preparation of monitoring equipment
- Explain procedure to patient.
- Perform hand hygiene.
- Connect module and cable to monitor and select LAP label.
- Set up dressing pack and sterile gloves.
- Set up a blue sheet under IDC and drape the area.
- Prime pressure transducer by attaching 10mL syringe to port and flush with sterile 0.9% sodium chloride and connect cannula cap to the end.

- Connect bladder T-piece between IDC and drainage bag.

- Connect transducer to T-piece.
• Connect pressure cable to the transducer.

• Ensure bladder is empty of urine.
• Clamp the IDC distal to the T-piece with a 10mL syringe.

• Determine the symphisis pubis and mark it with an "X".
• Position the transducer at the symphysis pubis and strap transducer to patient with tape.
Measurement of Intra-abdominal pressure
- Position patient in supine position
- Zero transducer at symphysis pubis (catheter should be clamped and the 2-way tap open), the transducer should be turned off to the patient and open to air.

- Slowly inject 25mL sterile 0.9% sodium chloride into bladder via the injection port on the transducer.

- Allow 30-60 seconds for equilibrium to occur, and allowing bladder detrusor muscle to relax.
- Measure IAP at end expiration and ensure that abdominal muscle contractions are absent.
• Release clamp by removing 10 ml syringe and allow fluid to be drained out from patient’s IDC.
• Remember to subtract 25mL from the next hour’s urine output.
• Turn the 2-way tap on the T-piece off to the transducer
• Leave T-piece and transducer in-situ for next measurement
• Discard to appropriate waste, remove gloves and wash hands.
• Document findings on the flow chart and in the patient’s health care record, as required.

**Frequency and Management**

**IAP ≥ 12mmHg**: measure IAP at least 4-6 hours or continuously. Refer to Appendix IAH/ACS Medical Management Algorithm.

**IAP> 20mmHg**: recheck reading, recheck that the transducer is correctly zeroed at the symphysis pubis, the catheter is not kinked and the patient is supine. If the reading remains >20mmHg, contact the ICU Registrar, and continue checking serial measurements at least 4th hourly. (See Appendix). In a surgical or trauma patient the ICU team should notify the surgical or trauma team.

**Grading IAH and ACS**

<table>
<thead>
<tr>
<th>Grade IAH</th>
<th>IAP Measurement</th>
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</thead>
<tbody>
<tr>
<td>Grade I IAH</td>
<td>12-15mmHg</td>
</tr>
<tr>
<td>Grade II IAH</td>
<td>16-20</td>
</tr>
<tr>
<td>Grade III IAH</td>
<td>21-25</td>
</tr>
<tr>
<td>Grade IV IAH</td>
<td>&gt;25</td>
</tr>
<tr>
<td>ACS</td>
<td>Sustained IAP &gt; 20mmHg associated with new organ dysfunction / failure</td>
</tr>
</tbody>
</table>

**Clinical Issues**

• Document patient position, amount of fluid and zeroing level on the flow chart and patients notes to ensure consistency of results.
• The abdominal blood flow should produce fluctuations in the waveform. Air in the system or kinking of the monitoring lines may dampen the waveform
• Sustained pressures above 20 for more than 2 consecutive measurements must be notified to the ICU medical officer, who will then notify the surgical and/or trauma team.
• An increased IAP reading should be rechecked to ensure there is not a technical problem e.g. blocked catheter.
• Ensure appropriate pain and anxiety relief as per the analgesia, sedation and delirium protocol.
• Ensure that gastric decompression is in place with gastric or rectal tubes when the stomach or colon is dilated in the setting of raised intra abdominal pressure.
• Aim for neutral fluid balance and avoid positive fluid balance in patients with IAH /ACS. For acute resuscitation fluid boluses may be indicated as per medical review and prescription.

4. **Performance Measures**

All incidents are documented using the hospital electronic reporting system: IIMS and managed appropriately by the NUM and staff as directed.
5. References / Links


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Reviewers: Director of Intensive Care, ICU Nurse Manager, ICU Staff Specialists, ICU Nursing Unit Managers, Clinical Nurse Educators, ICU Clinical Nurse Specialists, ICU Equipment Officers

Endorsed by: A Prof. Michael Parr
APPENDIX

INTRA-ABDOMINAL HYPERTENSION (IAH) / ABDOMINAL COMPARTMENT SYNDROME (ACS) MANAGEMENT ALGORITHM

**Definitions**

IAH - intra-abdominal hypertension
ACS - abdominal compartment syndrome
IAP - intra-abdominal pressure
APP - abdominal perfusion pressure (MAP - IAP)
Primary ACS - A condition associated with injury or disease in the abdominopelvic region that frequently requires early surgical or interventional radiological intervention
Secondary ACS - ACS due to conditions that do not originate from the abdominopelvic region
Recurrent ACS - The condition in which ACS redevelops following previous surgical or medical treatment of primary or secondary ACS
IAH / ACS MEDICAL MANAGEMENT ALGORITHM

- The choice (and success) of the medical management strategies listed below is strongly related to both the etiology of the patient's IAH / ACS and the patient's clinical situation. The appropriateness of each intervention should always be considered prior to implementing these interventions in any individual patient.
- The interventions should be applied in a stepwise fashion until the patient's intra-abdominal pressure (IAP) decreases.
- If there is no response to a particular intervention, therapy should be escalated to the next step in the algorithm.

Patient has IAP > 12 mmHg
Begin medical management to reduce IAP
(GRADE 1C)

Measure IAP at least every 4-6 hours or continuously.
Tritrate therapy to maintain IAP ≤ 15 mmHg (GRADE 1C)

Evacuate intraluminal contents
Evacuate intra-abdominal space occupying lesions
Improve abdominal wall compliance
Optimize fluid administration
Optimize systemic / regional perfusion

Step 1
- Insert nasogastric and/or rectal tube
- Abdominal ultrasound to identify lesions
- Ensure adequate sedation & analgesia (GRADE 1D)
- Avoid excessive fluid resuscitation (GRADE 2C)
- Goal-directed fluid resuscitation

Step 2
- Initiate gastrointestinal prokinetic agents (GRADE 2D)
- Abdominal computed tomography to identify lesions
- Remove constrictive dressings, abdominal eschars
- Aim for zero to negative fluid balance by day 2 (GRADE 2C)
- Hemodynamic monitoring to guide resuscitation

Step 3
- Administer enemas (GRADE 1D)
- Percutaneous catheter drainage (GRADE 2C)
- Consider reverse Trendelenberg position
- Resuscitate using hypertonic fluids, colloids
- Fluid removal through judicious diuresis once stable

Step 4
Consider colonoscopic decompression (GRADE 1D)
Consider surgical evacuation of lesions (GRADE 1D)
Consider neuromuscular blockade (GRADE 1D)
Consider hemodialysis / ultrafiltration

If IAP > 20 mmHg and new organ dysfunction / failure is present, patient's IAH / ACS is refractory to medical management. Strongly consider surgical abdominal decompression (GRADE 1D).