Intra-abdominal pressure measurement [TITLE]

Intra-abdominal pressure measurement - Improving clinical monitoring and patient safety through audit and implementation of a practice change [HEADING 2]

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Intra-abdominal measurement is an emerging practice amongst intensive care units (ICU). In the last decade, there has been a growing awareness of intra-abdominal hypertension (IAH) and abdominal compartment syndrome (ACS) [1].

Clinical studies demonstrate that intra-abdominal hypertension, (defined as sustained or repeated IAP>12 mmHg) and abdominal compartment syndrome (defined as sustained IAP>20 mmHg and organ dysfunction/failure) are common pathological conditions in the ICU, with intra-abdominal hypertension occurring in more than 50 per cent of all surgical and medical ICU patients [2].

Although the effects of intra-abdominal hypertension and abdominal compartment syndrome on different organs can be life-threatening, it was only recently that the adverse consequences of the raised intra-abdominal pressure were studied. Intra-abdominal hypertension is associated with significantly increased morbidity and mortality [3], and with adverse affects on many organs [4]. These suggest the need for heightened awareness, early diagnosis and prompt treatment.

This initiated the ICU at UHS to appraise its current practice amongst the multi-professional team and the authors undertook a review of:

- literature and evidence into intra-abdominal hypertension and ACS
- intra-abdominal monitoring techniques at University Hospital Southampton. Findings showed no consistent approach, poor understanding of techniques and limited understanding of the monitoring results, including confusion between the terms mmHg and cmH₂O
- availability of medical devices for intra-abdominal monitoring. The medical devices on the market were reviewed for ease of use, cost effectiveness, infection prevention and quality benchmarking. The intravesical Unomedical device was identified. In a study [5] it was concluded that the use of a manometer measuring intra-abdominal pressure via the intravesical route offered a rapid and cost-effective way of making clinically validated IAP measurements.

An audit was carried out on 20 intravesical intra-abdominal pressure systems that were used. The inclusion criteria utilised was from the World Society Abdominal Compartment Syndrome (WSACS) [1]:

- postoperative patients (abdominal surgery)
- patients with open or blunt abdominal trauma
- mechanically ventilated ICU Patients with other organ dysfunction
- patients with a distended abdomen and signs and symptoms consistent with ACS
- patients with abdominal packing after temporary abdominal closure for multiple trauma or liver transplantation
F. Patients with an open abdomen, especially if they have an IV bag closure and are in the early postoperative period, who may still develop ACS.

G. Patients who have not had an operation but have received large volumes of fluid resuscitation in the context of an underlying capillary leak problem.

This audit was undertaken in conjunction with a review of:

- Current practice against the WSACS\textsuperscript{[1]} algorithm and treatment guidance - compliance with algorithms or guidance was found.
- Best practice and implementation into clinical practice - multi-disciplinary education was commenced with a medical lead appointed.
- Cost comparison of techniques.
- Continuous re-evaluation of the changes to practice.

The majority of patients audited were postoperative pancreaticoduodenectomy patients. Out of the 20 patients, 19 patients had medical management as per the WSACS algorithm\textsuperscript{[1]} and one required surgical intervention based on an increasing IAH that progressed to an ACS, over the subsequent days end organ perfusion improved due to this prompt management.

There is also a cost comparison consideration, demonstrating a saving of £82.28 based on disposable usage. There are other cost savings including reduction of catheter stream infections (system stays in situ for seven days and is not disconnected), usually accounting for 17.2 per cent of health care acquired infections\textsuperscript{[6]} and improved patient safety with appropriate treatment and reductions in the need for surgery, a laparotomy costs £9282 for ACS\textsuperscript{[7]}.
## Conclusion

We have found that instigating a device for measuring intra-abdominal pressure monitoring has improved treatment of IAH, supported in practice by our audit findings and clinical case studies. This has also had a financial cost saving. Rollout has commenced on the ICU making this the recognised management plan for suspected IAH and the plan is to introduce this to the operating theatres for use with complex Intra-abdominal surgical cases. Currently, the next 20 patients are being audited and the integrated teaching program continues. We plan to develop this for use as a screening tool in patients.

## References


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<thead>
<tr>
<th>Old System</th>
<th>New System</th>
<th>Immeasurable Outcomes</th>
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<tbody>
<tr>
<td>Catheter Spigot (£1.45)</td>
<td>Intravesical device (£25.00)</td>
<td>Objective timely treatment decisions</td>
</tr>
<tr>
<td>Urine Catheter (£2.81)</td>
<td>Urine Catheter (£2.81)</td>
<td>Consistent measuring</td>
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<td>Saline - 100ml (0.46p)</td>
<td>20ml saline (0.91p)</td>
<td>Patient safety improvement</td>
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<td>Fluid Giving set (£1.49)</td>
<td>20ml syringe (0.09p)</td>
<td>Catheter stream infections</td>
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<td>Sterile Dressing pack (£4.32)</td>
<td>Sterile Dressing pack (£4.32)</td>
<td>Laparotomy cost</td>
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<td>Alcohol wipe (0.03p)</td>
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<td>Transducer set (£13.70)</td>
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<td>Pressure bag (£12.00)</td>
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<td><strong>Total: £116.26</strong></td>
<td><strong>Total: £33.98</strong></td>
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5. Manu LNG Malbrain: Different techniques to measure intra-abdominal pressure (IAP): time for a critical re-appraisal


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