

A nurse led approach to assessing Intra-Abdominal Pressure

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Content of the Session

- ◆ Definitions
- ◆ Why measure IAP
- ◆ Physiological Impairments
- ◆ Causes and predisposing factors
- ◆ Monitoring
- ◆ Treatment options
- ◆ Scenario

Definition IAP

- ◆ **Intra-abdominal pressure** (IAP) is the steady-state pressure concealed within the abdominal cavity.

(Malbrain et al. 2006)

- ◆ Normal is approx. 5-7 mmHg for critically ill adults.

(Malbrain et al. 2006)

IAH & ACS

- ◆ **Intra-Abdominal Hypertension (IAH)** is defined as a pressure of IAP > 12 mmHg (Graded I – IV).
- ◆ **Abdominal Compartment Syndrome (ACS)** is defined as an IAP > 20 mmHg + at least one organ failure ~ Extreme form IAH. (Not graded: all or nothing).

Malbrain et al. 2006

ACS Classification (All or Nothing!)

◆ Primary

- Abdomen involvement

◆ Secondary

- Not originating from the abdomen
- Signs & symptoms of ACS

◆ Recurrent

- ACS redevelops following previous surgical or medical treatment of primary or secondary ACS
(Malbrain et al 2006; Sugrue, 2005)

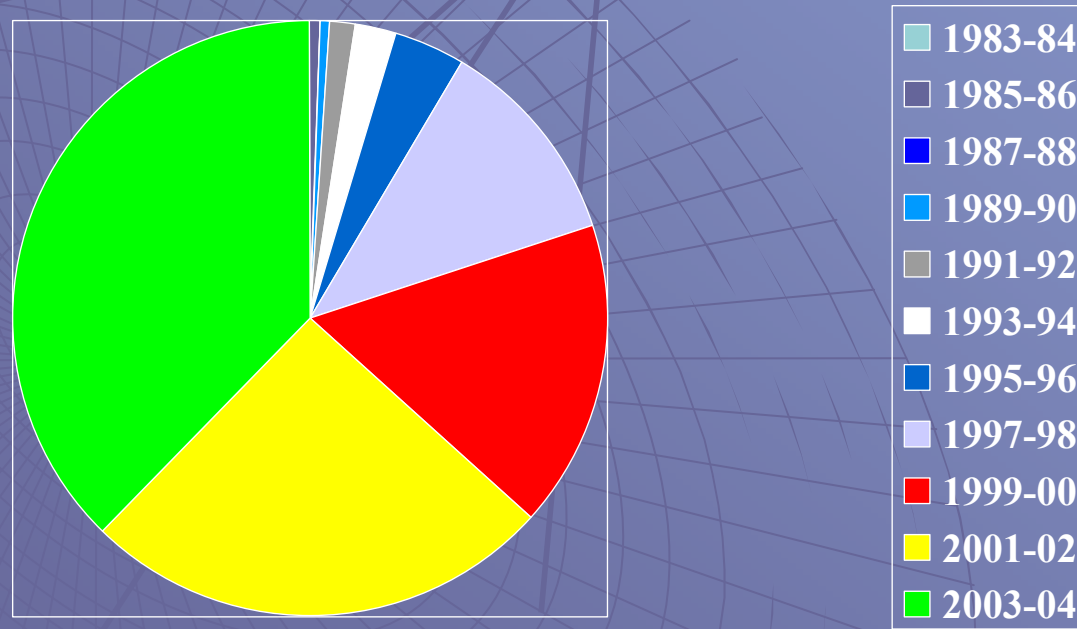
FACT

The higher the IAP the higher the risk of ACS & associated organ failure.

Increased Incidence

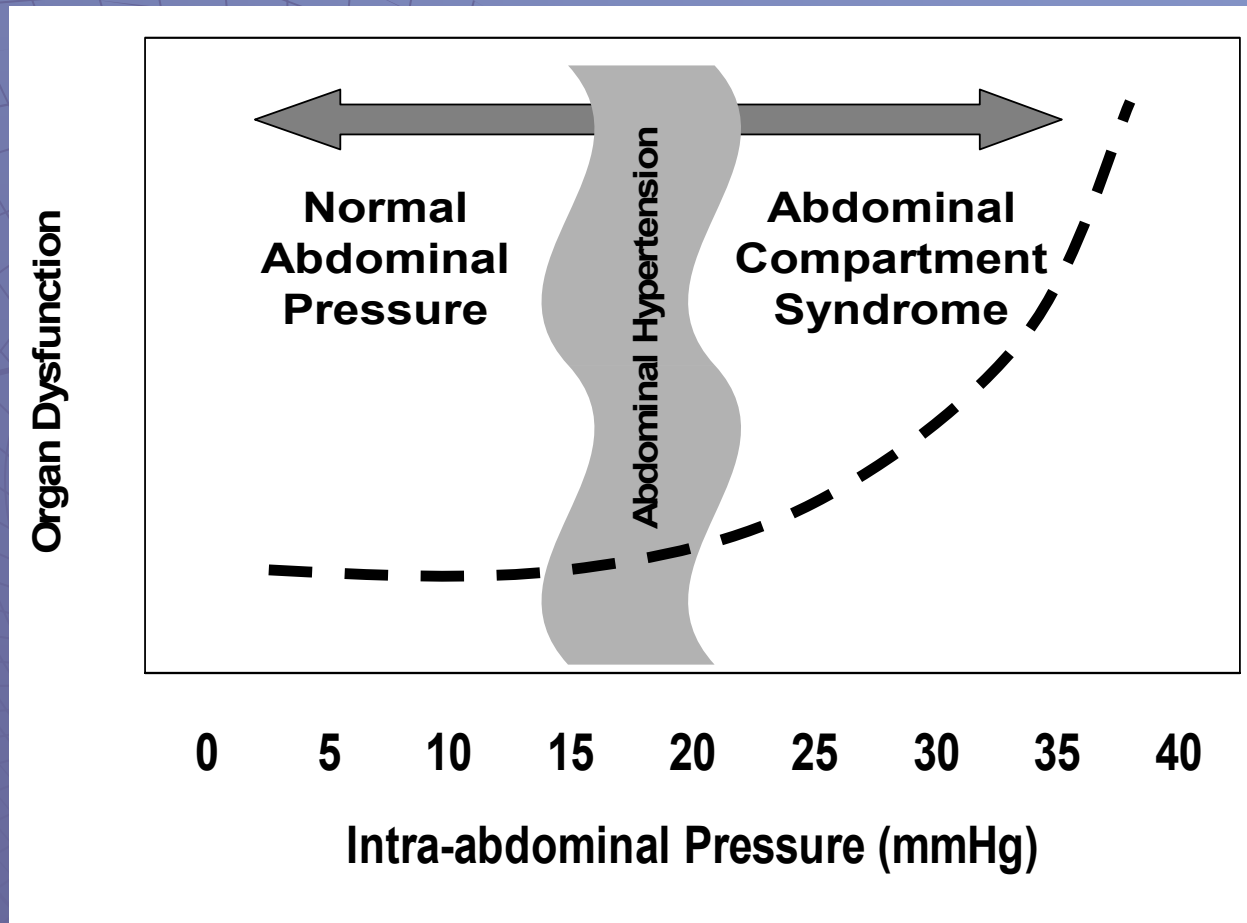
- Increased recognition to monitor IAP
- Patient population sicker in critical care

ACS Literature: publication explosion



Wolfe, T. 2007

IAP versus Organ Dysfunction



Malbrain et al. 2005

We don't want to let it get like this!



Causes and predisposing factors

Direct:

- ◆ Abdominal surgery
- ◆ Pancreatitis
- ◆ Ileus

Indirect:

- ◆ Inflammatory response
- ◆ Massive fluid resuscitation
- ◆ Acidosis
- ◆ Polytransfusion/Coagulopathy
- ◆ Mechanical Ventilation

Why measure IAP

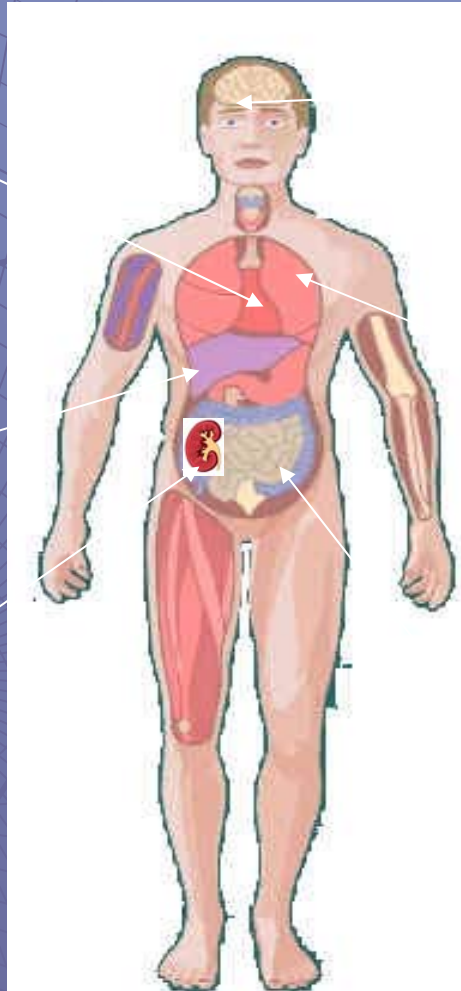
- ◆ IAH affects **ALL** organs
- ◆ IAH is associated with significantly increased morbidity and mortality
- ◆ IAH appears in 18-81% critically ill pts
- ◆ No large prospective multi-centre data on IAH available
- ◆ IAH is undiagnosed: not routinely measured
- ◆ Need to recognise that ACS may be a potential problem in critically ill patients

Physiological Impairments

Cardiovascular:
↑CVP ↑ SVR ↓ MAP
↓CO ↓Venous return

Hepatic: ↓ Hepatic (art & portal blood) flow.
↓ Lactate & glucose metabolism.

Renal: ↓ Renal blood flow & diuresis ↓GFR
↑ Tubular dysfunction



CNS: ↑ ICP ↓CPP

Respiratory:
↑ Intrathoracic pressure
↑ PAP ↓ compliance
?Problems weaning

GI & Abdominal Wall:
↓ Mesenteric artery blood flow
↓ Abdominal wall compliance
↓ EN feed absorption (+/- problems)
↑ wound complications (if app)

When to Monitor IAP

- ◆ IAH can develop rapidly
- ◆ Monitor the trend:
 - Rising IAP
 - Static IAH → poor prognosis
- ◆ Consider continuous if rapidly changing IAP
- ◆ Measured every 8 hours in patients at risk
- ◆ Increasing every 2-4 hours in those at greater risk

Monitoring

‘If you don’t take a temperature
you can’t find a fever’.

one can say

‘If you don’t measure IAP you
cannot make a diagnosis of
IAH or ACS’.



Monitoring

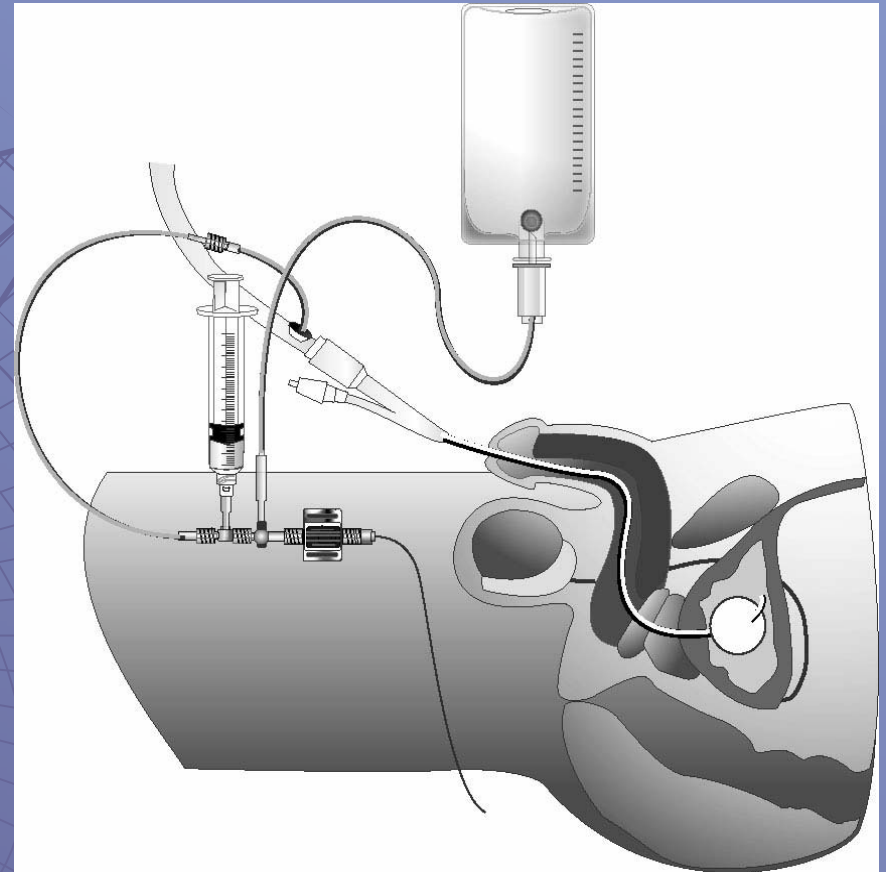
- ◆ Controversy in the ideal method of measuring IAP
- ◆ How good is clinical judgement?
- ◆ **Direct:** measurement is via direct needle puncture/intra-vesical and transduction of the pressure within the abdominal cavity
- ◆ **Indirect:**
 - Transduction of intravesicular or 'bladder'.
 - Gastric
 - Colonic or Uterine via a balloon catheter

Measurement Methods

- ◆ No absolute 'Gold Standard'
- ◆ Difficult to compare the different techniques:
 - Bladder Manometer
 - Bladder Transducer
 - CiMON (Gastric)
- ◆ Cost-effectiveness is an issue

'Home made' Pressure Transducer

- ◆ Transducer
- ◆ 3-way taps
- ◆ Syringe
- ◆ NaCl bag & spike
- ◆ 1 needle
- ◆ Clamp for Foley catheter
- ◆ Sterile assembly



'Home made' Pressure Transducer

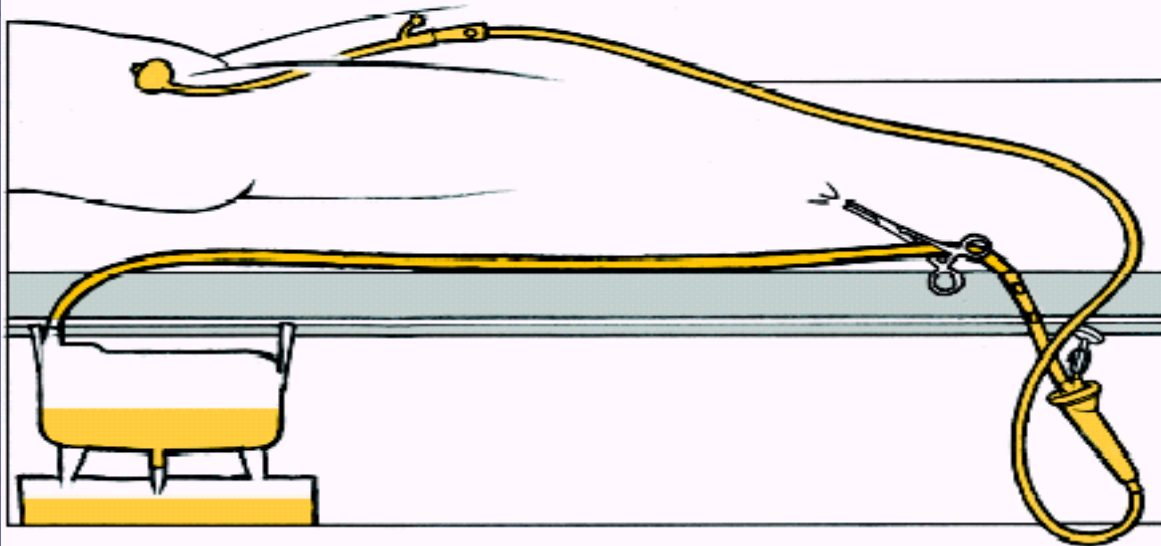
Problems:

- ◆ Home-made:
 - No standardization
 - Sterility issues
- ◆ Time consuming
- ◆ Data reproducibility errors
- ◆ Other:
 - Needle stick injury
 - Recurrent penetration of sterile system
 - Leaks, re-zeroing problems/errors

Bladder Manometer Holtech Medical™

- ◆ Clean Indwelling catheter port & insert 25ml NaCl (0.9%) & Clamp tubing (Malbrain, 2006; Maerz et al. 2008).
- ◆ Connect the Foley Manometer (bio-filter clamped).
- ◆ Hold in a vertical position with the 0mmHg @ the Symphysis Pubis level & open bio-filter clamp.
- ◆ Close clamp after measure finished & rest on the side of the bed.

Foley Manometer (Holtech Medical™)

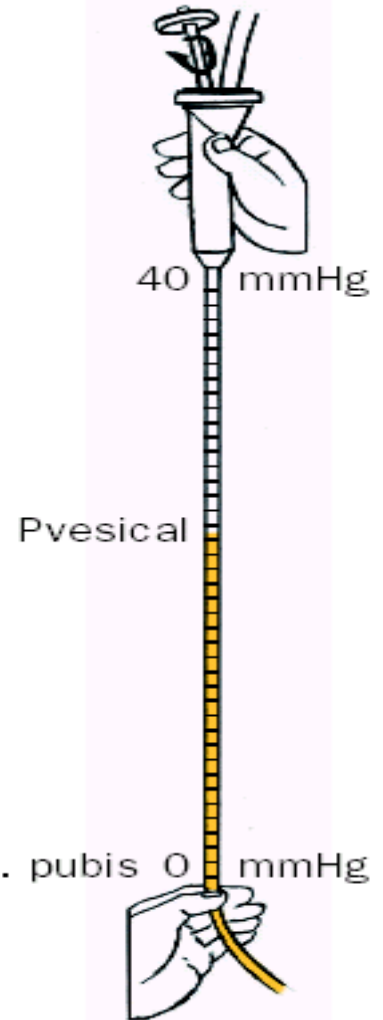


Urine drainage:

The urine fills the FoleyManometer chamber and flows on to the urine collection device.

Measure intra-vesical pressure:

The urine in the elevated chamber returns to the bladder when the vent clamp is opened. Hold the "0 mmHg" mark of the manometer tube at the symph. pubis level and read Pvesical at the position of the meniscus.



Measuring IAP using Manometry

Advantages

- ◆ Needle-free
- ◆ Closed system
(↓infection risk)
- ◆ Repeated measurements
- ◆ Simple
- ◆ Inexpensive
- ◆ Fast/quick

Disadvantages

- ◆ Accuracy regarding reproducibility
- ◆ Inaccuracy if air bubbles
- ◆ Not constant
- ◆ Blocking of the bio-filter giving a false reading
- ◆ No multicentre validation

Bladder Transducer AbViser™

AbViser Tray:

- ◆ All materials needed for IAP monitoring except transducer and saline bag.
- ◆ Integrates into any ICU using their established transducer, cabling and monitors.



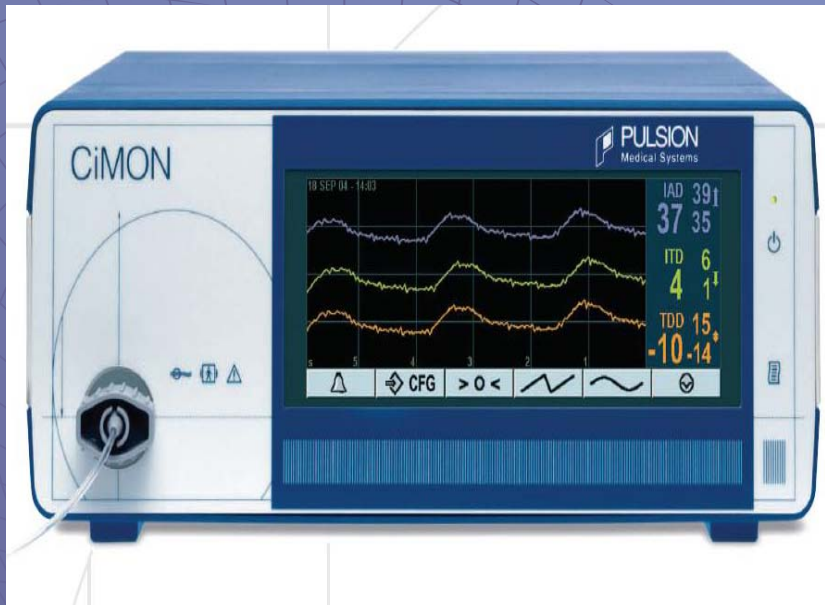
Bladder Transducer AbViser™

Closed system in-line with the Foley catheter.

- ◆ Can be left in situ
- ◆ 30 seconds to measure IAP
- ◆ Standardized measurement
- ◆ No reproducibility errors
- ◆ Closed system
- ◆ No needles
- ◆ No contamination risk
- ◆ Expensive!



CiMON: Nasogastric intra-abdominal pressure monitor and catheter



Intra-abdominal and transthoracic pressure monitor

Nasogastric tube, feeding tube and IAP catheter



Essential Components

- ◆ Consistency in the monitoring system
- ◆ Gain a baseline
- ◆ Closed system ~ ↓infection
- ◆ Expert Panel findings
- ◆ Document findings

Do NOT wait for signs of ACS to be present before you decide to check IAP. Monitor high risk patients early and intervene before its too late!

Treatment Options

- ◆ Non-Surgical:
 - Paracentesis
 - Gastric suctioning, rectal enemas
 - Gastric/colon prokinetics
 - Frusemide
 - CVVH
 - Sedation
- ◆ Surgical: decompression

IAP Monitoring in Practice ~ Holtech Medical™



Case: Severe Acute Pancreatitis

26 year old male, acute necrotising pancreatitis

~ 50% necrosis on CT, free fluid in abdomen

Hx: ETOH, Schizophrenia

Assessment:

MAP 80, T 38 °C, SR, UO 25-40, BiPAP 30/8 FiO₂ .65, Tidal Volume 350mls splinting diaphragm on CXR. Poor ABGs. Abdomen taut. Sedated, Ng tube on free drainage. IAP 30mmHg

Patient with a VAC Dressing



Clinical Guideline

Intra-Abdominal Pressure Monitoring

IAP monitoring should be used in discussion with the Medical Team. It should be used as part of the patient assessment in conjunction with the patients' clinical appearance.

Equipment required to perform IAP Monitoring:
Dressing pack, new urometer drainage bag, bladder syringe, normal saline 0.9% for instillation, blue clamp, antiseptic cleaning solution.

| Action | Rationale |
|--|---|
| Ensure all equipment is at the bed space. Set up the dressing trolley with the equipment. Place the patient in the SUPINE position. | This should be a sterile procedure & leaving the bed space to obtain further equipment may introduce infection. Supine to ensure a baseline position. |
| Consider the need for further supplementation/addition of analgesia &/or sedation. | The procedure could be uncomfortable. If rapid breathing &/or the patient is taking large tidal volumes this could distort the measurement obtained. |
| Wash Hands. Explain the procedure to the patient. | Explaining the procedure will assist in reducing anxiety & distress that the patient may be experiencing. |
| Clean the IDC connection to the urometer drainage bag with antiseptic solution. Aspirate the IDC & instil 25mls of sterile N/saline 0.9% into the catheter & clamp (blue) the IDC. | The IDC is aspirated to remove air & ensure patency. N/saline 0.9% lessens the chance of haemolysis. A constant amount of fluid lessens the reading discrepancy. Clamp the catheter to retain the fluid in the bladder. |
| Take the Foley Manometer kit from the pack & ensure the vent clamp is closed. | To prevent fluid/urine draining into the vent clamp and wetting the filter. |

Attach the Foley Manometer to the IDC & the urometer. Allow fluid/urine to drain into the urometer.

Fluid is required in the system to get an accurate reading in the Foley Manometer kit.

Hold the Foley Manometer kit in a vertical position with the 0 mmHg mark at the symphysis pubis level & open the vent clamp.

Holding the 0 mmHg mark at the symphysis pubis level ensures an accurate reading to atmospheric pressure. The urine collected flows back towards the bladder when the vent clamp is open.

Close clamp after the reading has been obtained & rest the tubing on the urine collection bag at the side of the bed.

The clamp is closed to allow drainage of urine & prevent saturating of the vent filter. The tubing is placed on the urine collect bag to prevent it falling on the floor.

Record the IAP in the 'patient care' section on carevue. Discuss the frequency of performing the procedure with the MDT.

Document the IAP reading to allow a record of the results & observe trends.

Inform the NIC/Dr if the IAP reading is >25 mmHg or >10 mm Hg from the previous reading.

IAP > 25 mm Hg may require a surgical review. Other systematic effects may be evident: reduced CO, oliguria & reduced chest wall compliance.

REFERENCES:

Malbrain, M. L. N. G. (2004) Different techniques to measure (IAP): time for a critical reappraisal. *Intensive Care Medicine* 30 pp. 357-371

Malbrain, M. L. N. G. et al. (2004) Prevalence of intra-abdominal hypertension in critically ill patients: a multicentre epidemiological study. *Intensive Care Medicine* 30 pp. 822-829

Ravishankar, N. & Hunter, J. (2005) Measurement of intra-abdominal pressure in intensive care units in the United Kingdom: a national postal questionnaire study. *British Journal of Anaesthesia* 94 (6) pp.763-766



Any Questions?

References & Essential Reading!

- ◆ Cheatham, M. L et al. (2007) Results from the International Conference of Experts on Intra-abdominal Hypertension and Intra-abdominal Hypertension. II. Recommendations Intensive Care Medicine
- ◆ Maerz, L & Kaplan, L.J. (2008) Abdominal compartment syndrome Critical Care Medicine 26 pp.S212 -215
- ◆ Malbrain, M. L. N. G. (2004) Different techniques to measure (IAP): time for a critical re-appraisal. Intensive Care Medicine 30 pp. 357-371
- ◆ Malbrain, M. L. N. G. et al (2005) Intra-abdominal hypertension in the critically ill: it is time to pay attention. Current Opinion in Critical Care 11: pp.156-171
- ◆ Malbrain, M. L. N. G et al. (2006) Results from the International Conference of Exerts on Intra-abdominal Hypertension and Abdominal Compartment Syndrome. I. Definitions. Intensive Care Medicine 32: pp.1722-1732
- ◆ Moore, A.F.K. et al. (2004) Intra-abdominal hypertension and the abdominal compartment syndrome. British Journal of Surgery 91 pp.1102-1110
- ◆ Sugrue, M. (2005) Abdominal compartment syndrome. Current Opinion in Critical Care 11 pp.333-338
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