Guideline on the assessment and management of intra-abdominal hypertension

AIM: To provide guidance on the management of IAH and ACS.
SCOPE: All adult ICUs within Brighton and Sussex University Hospitals

Suggested Assessment Flowchart,
taken from WSACS, the Abdominal Compartment Society (2013)

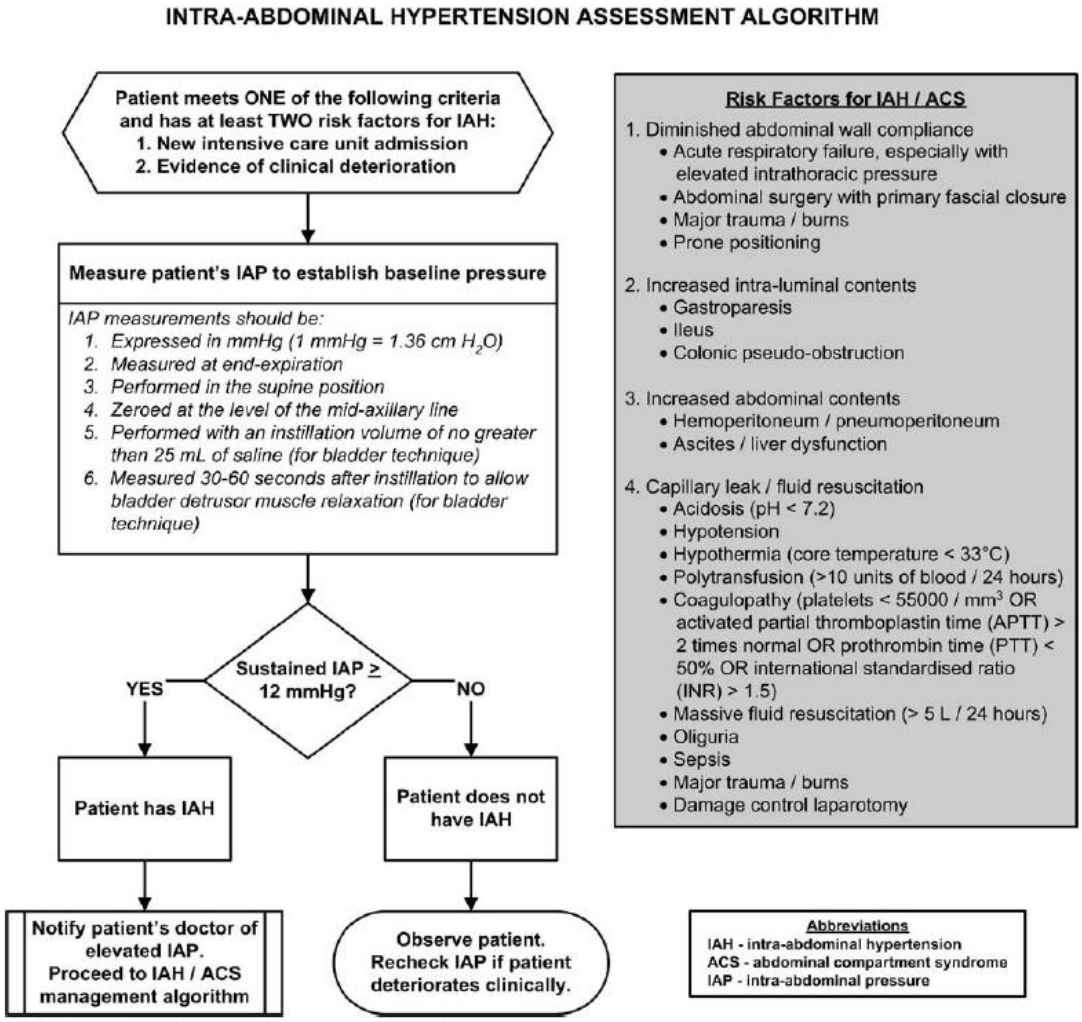
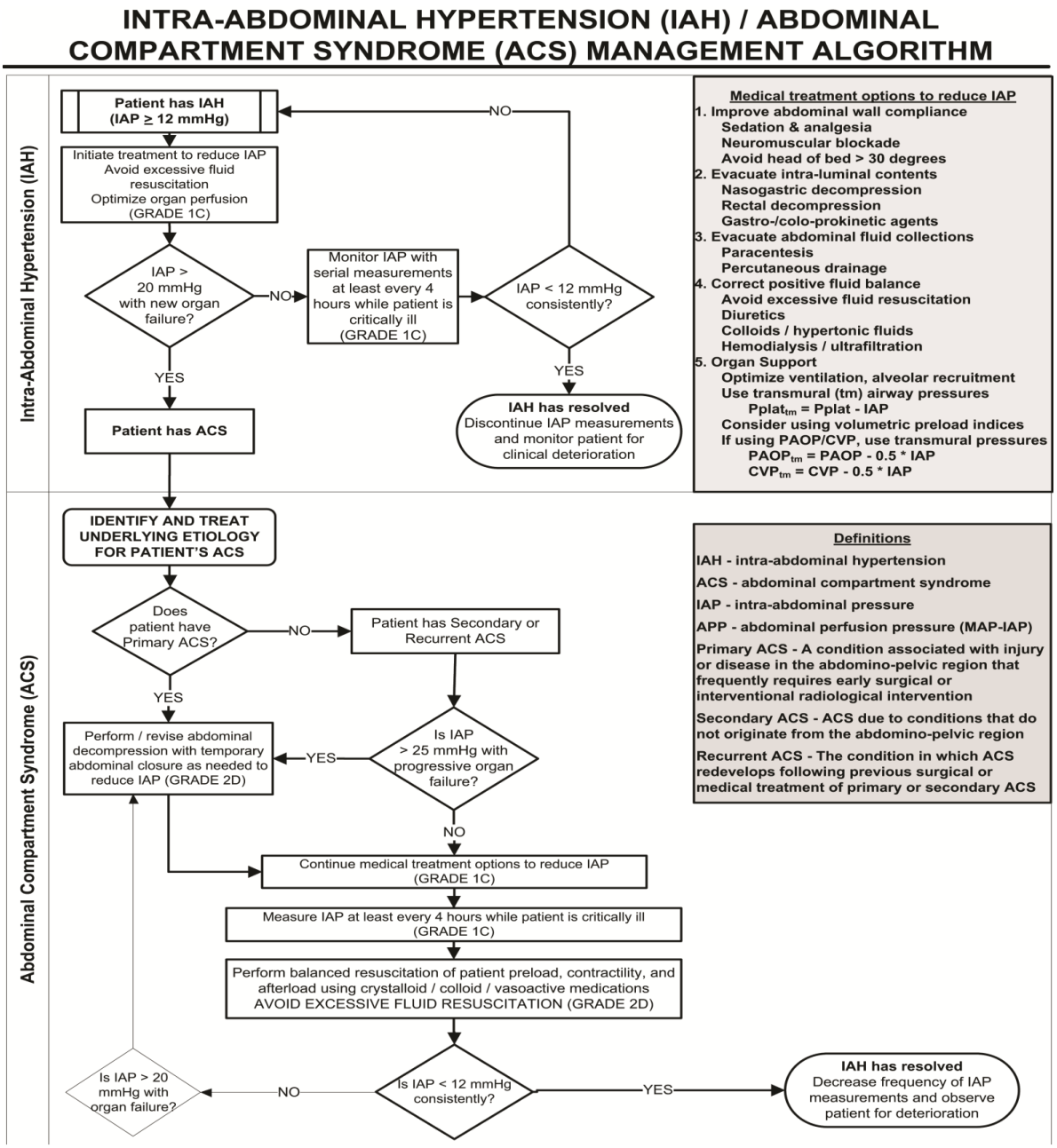


Fig. 1 Intra-abdominal hypertension assessment algorithm

WSACS The Abdominal Compartment Society

Suggested Management Flowchart #1,
taken from WSACS, the Abdominal Compartment Society (2013)



1. INTRODUCTION

The aims of these guidelines are to identify the correct technique for measurement of intra-abdominal pressure in BSUH critical care units, and to suggest options for subsequent management of intra-abdominal hypertension and the abdominal compartment syndrome. Although much of the guidance is taken from WSACS publications, clinicians should use their own judgement as to the correct management for the patient in front of them.

2. PROCESS

Recommendation (Action)	Justification (Rationale)
Consider risk factors for the development of IAH and ACS	*Diminished abdominal wall compliance* Abdominal surgery Major Trauma/ Major burns Prone positioning *Increased intra-luminal contents* Gastroparesis/gastric distension/ileus Colonic pseudo-obstruction / volvulus *Increased intra-abdominal contents* Acute pancreatitis Haemoperitoneum/pneumoperitoneum or intra-peritoneal fluid collections Intra-abdominal infection/abscess/tumours Liver dysfunction/cirrhosis with ascites *Capillary leak/fluid resuscitation* Acidosis / hypothermia Damage control laparotomy Massive fluid resuscitation or positive fluid balance *Others/miscellaneous* Age, bacteremia Coagulopathy Mechanical ventilation Obesity or increased body mass index Sepsis / shock or hypotension

Recommendation (Action)	Justification (Rationale)

Table 2 Physiological changes associated with intra-abdominal hypertension and abdominal compartment syndrome[1,2]

Organ system/physiological change	IAP range*	Explanation
Cardiovascular ⇧ Central venous pressure, pulmonary artery pressure, pulmonary capillary wedge pressure, systemic vascular resistance ⇩ Cardiac output (more pronounced with hypovolemia) ⇩ Blood pressure or normal blood pressure ⇩ Venous return from lower extremities (risk of deep venous thrombosis)	Low to moderate	Increased abdominal pressure prevents venous return (preload reduction) and impedes arterial outflow (increase in afterload). Transmitted back pressure from the abdominal cavity falsely elevates central venous pressure, pulmonary artery pressure, pulmonary capillary wedge pressure, pulmonary vascular resistance, and systemic vascular resistance.
Pulmonary ⇧ Intrathoracic pressures ⇧ Peak inspiratory pressures ⇩ Tidal volume → hypercarbia + ⇩ Pao_2 ⇩ Compliance	Moderate to severe	Increased intra-abdominal pressure causes increase in intrathoracic pressure and limits diaphragm excursion, resulting in hypoventilation and hypoxia.
Renal ⇩ Renal blood flow → ⇩ glomerular filtration rate → ⇩ urine output	Low to moderate	Increased intra-abdominal pressure compresses the renal parenchyma, reducing blood flow and urine output.
Neurological ⇧ Intracranial pressure ⇩ Cerebral perfusion pressure	Low to moderate	Increased intra-abdominal pressure impedes venous outflow from the brain, increasing cerebral venous congestion.
Gastrointestinal or hepatic ⇩ Celiac and portal blood flow ⇩ Lactate clearance ⇩ Mucosal blood flow → ⇩ intramucosal pH (acidosis)	Low to moderate	Increased intra-abdominal pressure reduces perfusion to the abdominal organs.

*IAP range indicates range of intra-abdominal pressures at which initial effects on organ system occur; ⇧, increase; ⇩, decrease.

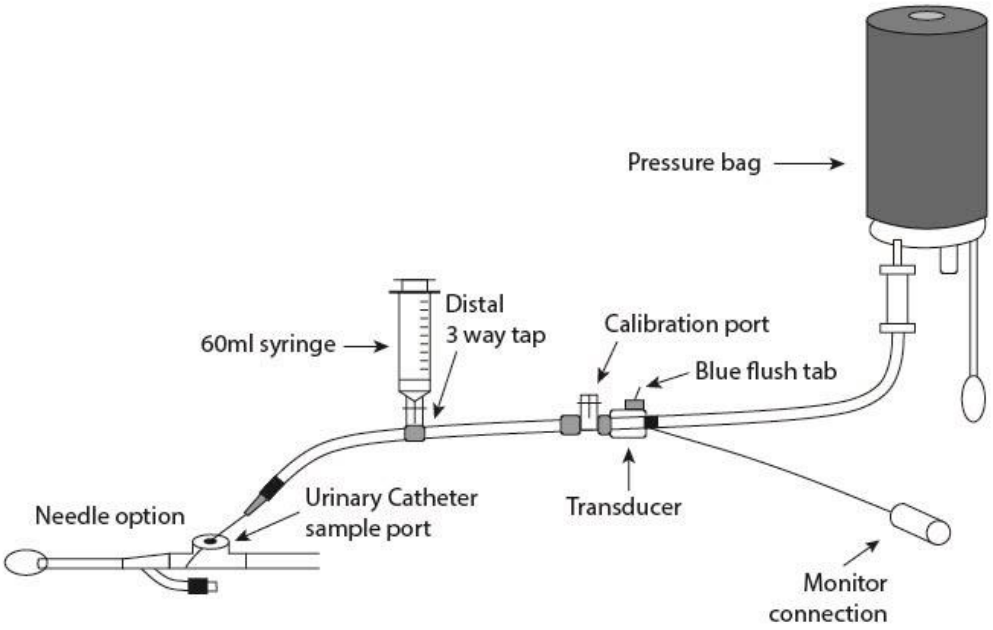
Measure intra-abdominal pressure (IAP) in patients at high risk of, or suspected to have, abdominal compartment syndrome (ACS).	The physiological consequences of increased intra-abdominal pressure include the following :
Assemble the necessary equipment to measure IAP (via urinary catheter)	Invasive monitoring capability 500ml Normal saline and pressure bag Standard pressure transducer and line with 2 x 3-way taps Transducer connection cable 50 ml Luer-Lock syringe Clamp 2% chlorhexidine swab 18G (green needle)

Procedure

1. Wash hands and follow universal precautions. If the patient is awake, explain the procedure. If the patient is sedated, ensure adequate sedation to minimize movement.

2. Assemble and pressurize the transducer system

Figure 2



3. Attach the 50 ml syringe to the distal 3-way tap and attach the needle to the end of the transducer tubing (Fig 2)

4. Connect the transducer to the pressure module of the monitoring system and ensure a waveform appears on the screen. Select a scale in the <50 mmHg range. Zero the pressure module at the mid-axillary line of the patient & mark for future reference.

5. The patient should be placed supine, or if there is a clinical contra-indication, as flat as possible. The position of the patient during the measurement should be noted in the care record and further measurements performed in the same position.

6. Clamp the bladder drainage system just distal to the connection of the catheter to the drainage bag.

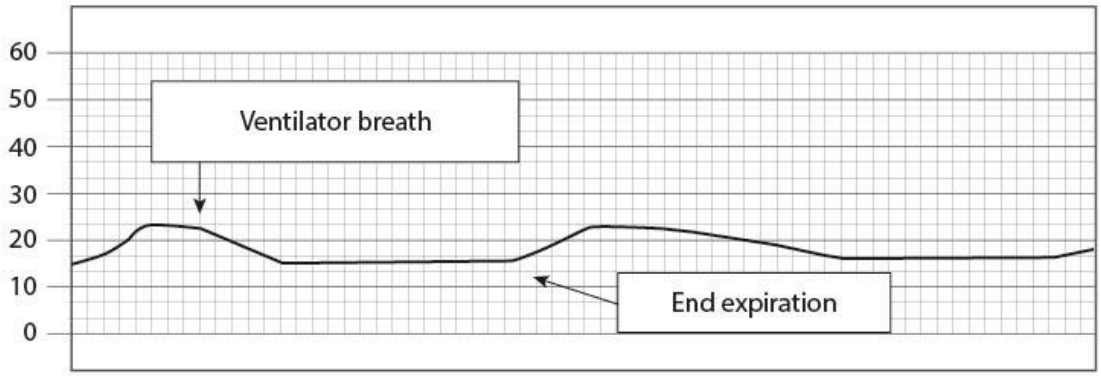
7. Clean the sampling port on the catheter with a 2% chlorhexidine wipe and aseptically insert the needle into the port.
8. Turn the 3-way tap attached to the syringe off to the patient and open to the pressure bag and syringe. Use the fast-flush pigtail catheter to fill the syringe to 25 ml.

9. Turn the 3-way tap off to the pressure bag and inject the 25ml of saline into the bladder.

10. Using the proximal 3-way tap level and zero the transducer at the mid-axillary line.

11. Allow 30-60 seconds for the pressures to equalise and then measure the intra-abdominal pressure from the waveform on the monitor. Measurements should be at end-expiration as in the example below where the intra-abdominal pressure is 15mmHg. (Fig 3)

Figure 3



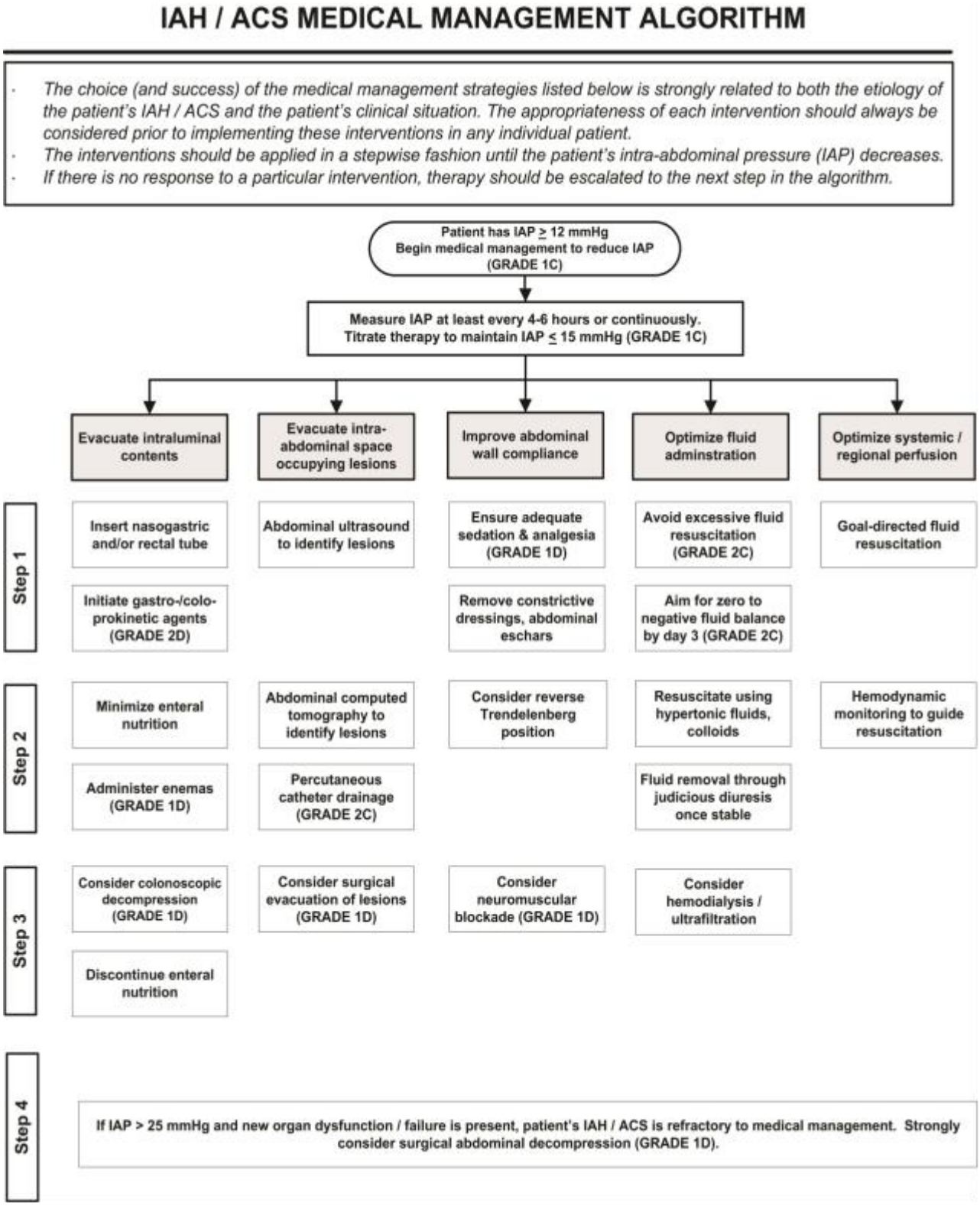
12. Once the measurement has been obtained, remove the needle from the sampling port and unclamp the drainage system.

13. Record the intra-abdominal pressure on MetaVision and remember to subtract the 25ml of saline from the hourly urine output.

14. Report intra-abdominal pressure to medical staff. Suggested management of the patient is outlined in the IAH/ACS management algorithm.

Recommendation (Action)	Justification (Rationale)
Inform senior medical team on critical care unit if IAH is identified, and consider referral to surgical team.	Although flowcharts from WSACS are included in this guideline, the treating critical care doctor must decide the correct management strategy, in consultation with the critical care consultant +/- surgical team.
Take action to improve organ dysfunction by reducing IAP where possible.	An evidence-based scheme is suggested by WSACS, as below.

Suggested Management Flowchart #2,
taken from WSACS, the Abdominal Compartment Society (2013)



3. GLOSSARY

4. REFERENCES

1. Hunt, L., et al. 2012. A comparison of fluid instillation volumes to assess intra-abdominal pressure using Kron's methods. *Journal of Trauma & Acute Care Surgery* 73 (1): 152-155.
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3. Lee, R.K. 2012. Intra-abdominal hypertension and abdominal compartment syndrome a comprehensive overview. *Critical Care Nurse* 32 (1): 19-32.
4. Malbrain, M.L., et al. 2013. Intra-abdominal hypertension: Definitions, monitoring, interpretation and management. *Best Practice & Research Clinical Anaesthesiology* 27 (2): 249-270.
5. Malbrain,M.L. and J.DeWaele. 2013. *Intra-abdominal hypertension core critical care*. Cambridge: Cambridge University Press
6. Min Yi., et al. 2012. The evaluation of the effect of body positioning on intra-abdominal pressure measurement and the effect of intra-abdominal pressure at different body positioning on organ function and prognosis in critically ill patients. *Journal of Critical Care* 27 (2): 222.e1-6.
7. Kirkpatrick AW, et al (2013) Intra-abdominal hypertension and the abdominal compartment syndrome: updated consensus definitions and clinical practice guidelines from the World Society of the Abdominal Compartment Syndrome. Intensive Care Med (2013) 39:1190–1206

5. ONLINE RESOURES

WSACS Consensus Guidelines Summary | WSACS