



Intra-abdominal Hypertension and the Open Abdomen: Nursing Guidelines From the Abdominal Compartment Society

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Intra-abdominal hypertension has been identified as an independent risk factor for death in critically ill patients. Known risk factors for intra-abdominal hypertension indicate that intra-abdominal pressures should be measured and monitored. The Abdominal Compartment Society has identified medical and surgical interventions to relieve intra-abdominal hypertension or to manage the open abdomen if abdominal compartment syndrome occurs. The purpose of this article is to describe assessments and interventions for managing intra-abdominal hypertension and open abdomen that are within the scope of practice for direct-care nurses. These guidelines provide direction to critical care nurses caring for these patients. (*Critical Care Nurse*. 2020;40[1]:13-26)

This article outlines an evidence-based approach to nursing care for patients at risk of or experiencing intra-abdominal hypertension (IAH) and treatment of patients with an open abdomen. The nursing guidelines for the management of IAH and open abdomen are based on the 2013 clinical practice guidelines from the World Society of Abdominal Compartment Syndrome, now known as the Abdominal Compartment Society.¹ An international group of nurses under the auspices of the Abdominal Compartment Society's executive committee developed nursing management guidelines for patients with IAH or an open abdomen.

CE 1.0 hour, CERP A

This article has been designated for CE contact hour(s). The evaluation tests your knowledge of the following objectives:

1. State the frequency of intra-abdominal hypertension (IAH) in critically ill adult patients on the basis of the evidence.
2. Identify at least 5 risk factors for IAH that commonly occur in your unit.
3. List 2 nursing interventions that can be done for patients with IAH and/or an open abdomen.

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Background

Intra-abdominal hypertension may also manifest as abdominal compartment syndrome (ACS). According to studies published after the Abdominal Compartment Society established clear definitions of IAH and ACS, an estimated 50% to 80% of critically ill adult patients will develop IAH and 2.7% to 51.7% will develop ACS, depending on the patient population.²⁻⁸ Results from studies in the adult population indicate that surgical and trauma patients develop IAH and ACS more frequently but that medical patients develop more severe cases of IAH and ACS and have higher mortality rates. In a study that used the Abdominal Compartment Society consensus definition in children, the incidences of IAH and ACS in

Surgical and trauma patients develop IAH and ACS more frequently, but medical patients develop more severe cases of IAH and ACS.

a mixed pediatric intensive care unit were 12.6% and 4%, respectively.⁸ The frequency

of IAH and ACS in critical care patients highlights the necessity for nurses to regularly monitor intra-abdominal pressure (IAP) and end-organ function and to communicate these findings to the critical care medical provider for the ongoing care of the patient.^{9,10}

Intra-abdominal hypertension was originally associated with trauma and surgical disease, but it has also been found in adults and children with nonsurgical disease.^{8,11,12} In a 1-day prevalence study of IAH involving 13 intensive care units in 6 countries, 58.8% of patients had IAH (IAP > 12 mm Hg) and 8.2% had ACS (IAP > 20 mm Hg with at least 1 organ failure); 54.4% were medical patients and 65.0% were surgical patients at the time of the highest measured IAP.¹³ Elevated IAP affects a wide spectrum of critically ill patients and carries a high risk of mortality and morbidity. Intra-abdominal hypertension is an independent predictor of mortality

in a variety of patient populations.^{7,8,11-17} Recent research confirms findings of earlier studies regarding the prevalence, outcomes, and increased risk of morbidity and mortality of IAH and ACS in critically ill patients.^{7,18,19}

Elevation of IAP in both adults and children has been associated with cardiovascular compromise,²⁰ bowel ischemia,^{21,22} bacterial translocation,^{23,24} acute renal failure,^{5,25} respiratory failure, and central nervous system impairment,^{26,27} depending on the level of IAP and the patient's overall hemodynamic condition. Early identification of factors that might increase the risk of IAH and timely, objective measurement of IAP would be useful in guiding the clinical care of these patients (Figure 1).²⁸

Awareness of IAH and ACS has increased since the 2004 inception of the World Society of Abdominal Compartment Syndrome.²⁹⁻³¹ In 2013 the Abdominal Compartment Society updated the consensus definitions and clinical practice guidelines for IAH and ACS by using the evidence available and the Grading of Recommendations, Assessment, Development, and Evaluation system.^{1,30} These guidelines were the foundation for development of a nursing approach for caring for patients with IAH or ACS. The definitions pertinent to the discussion of this topic are extracted from the 2013 consensus definitions of the Abdominal Compartment Society (Table 1).¹

Appropriately selecting patients who need IAP monitoring is important to recognize those with IAH and prevent progression to ACS and to recognize and intervene early in those with IAH to prevent irreversible organ damage or mortality. Although abdominal distention is often a good indicator that IAP might be elevated, it is not an accurate predictor of the presence or degree of IAP elevation.^{32,33} Patients with mildly distended abdomens may present with ACS that is relieved by surgical abdominal decompression. Patients with marked abdominal distention may not have significant IAP elevations and may have no clinical evidence of worsening organ dysfunction.

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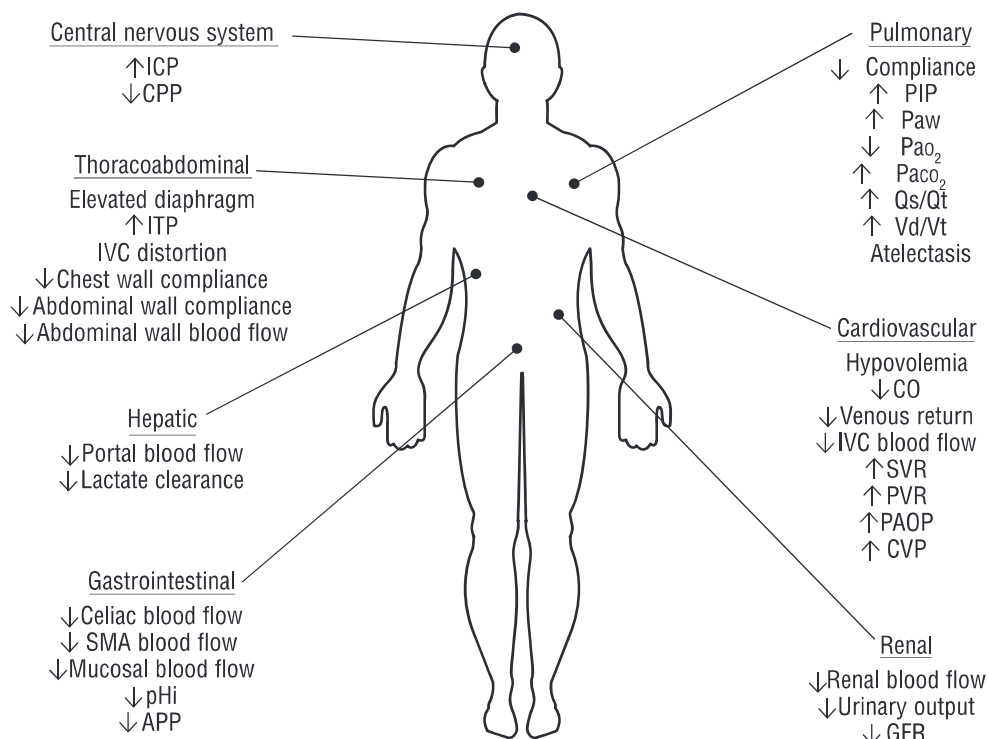


Figure 1 Physiological effects of intra-abdominal hypertension on multiple organ systems.

Abbreviations: APP, abdominal perfusion pressure; CO, cardiac output; CPP, cerebral perfusion pressure; CVP, central venous pressure; GFR, glomerular filtration rate; ICP, intracranial pressure; ITP, intrathoracic pressure; IVC, inferior vena cava; PAOP, pulmonary artery occlusion pressure; Paw, mean airway pressure; pHi, gastric intramucosal pH; PIP, peak inspiratory pressure; PVR, pulmonary vascular resistance; Qs/Qt, intrapulmonary shunt; SMA, superior mesenteric artery; SVR, systemic vascular resistance; Vd/Vt, pulmonary dead space.

This figure was first published in Cheatham ML. Abdominal compartment syndrome: pathophysiology and definitions. *Scand J Trauma Resuscitation Emerg Med.* 2009;17:10. doi:10.1186/1757-7241-17-10. The article is available from <http://www.sjtrm.com/content/17/1/10>.

Table 1 Descriptions of terms

Term	Description
Intra-abdominal pressure (IAP)	A sustained pressure within the abdominal cavity A normal IAP range is 5 to 7 mm Hg in critically ill patients.
Intra-abdominal hypertension (IAH)	A sustained or repeated increase in IAP ≥ 12 mm Hg
IAH grading	IAP grade I: IAP 12-15 mm Hg IAP grade II: IAP 16-20 mm Hg IAP grade III: IAP 21-25 mm Hg IAP grade IV: IAP > 25 mm Hg
Abdominal perfusion pressure (APP)	APP = mean arterial pressure – IAP. APP reflects the perfusion of organs within the abdominal cavity. The aim is to maintain an APP of > 60 mm Hg.
Abdominal compartment syndrome (ACS)	A sustained IAP ≥ 20 mm Hg (with or without an APP of < 60 mm Hg) that is associated with a new organ dysfunction/failure
Primary IAH or ACS	A condition associated with injury or disease of the abdominopelvic region that frequently requires surgical or interventional radiological intervention
Secondary IAH or ACS	A condition that does not originate from the abdominopelvic region
Recurrent IAH or ACS	A condition in which IAH or ACS redevelops following medical or surgical treatment for either primary or secondary IAH or ACS

The compliance of the abdominal wall may play a significant role in abdominal distention without IAP elevation. Abdominal wall compliance is a measure of

the ease with which the abdomen expands in response to increasing pressure, which is determined by the elasticity of the abdominal wall and diaphragm.¹ Abdominal