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The Critical Role of Nursing Assessment in Clinical Outcomes of Acute Compartment Syndrome: An Integrative Literature Review

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Background:
Although acute compartment syndrome (ACS) has been recognized as a critical medical condition since the 1800’s, it has only been in the past 20 years that its impact on patients has been thoroughly studied (Hunt, Frost, Hillman, Newton, & Davidson, 2014). Acute Compartment Syndrome is a medical emergency that occurs when pressure builds to dangerous levels within the various enclosed spaces of the human body that have little to no ability for tissue expansion (Mabvuure, Malherbe, Hinchdo, Khan, & Juma, 2012). ACS is most commonly caused by severe trauma, including car accidents and bone fractures. Bone fractures account for as much as 69% of ACS cases by inducing bleeding and edema that increases pressure in the enclosed spaces. Casting and bandaging used for treatment can also create a smaller space for tissue expansion, creating a higher pressure (Mabvuure et al., 2012). Additionally, ACS can be caused by badly bruised muscles, reestablished blood flow following blocked circulation, crush injuries, and anabolic steroid use (American Academy of Orthopaedic Surgeons, 2018). The spaces most prone to developing acute compartment syndrome are the legs, arms, and the abdomen (American Academy of Orthopaedic Surgeons, 2018). Pressure build up in the enclosed compartment causes a decrease in blood flow to the area, resulting in deoxygenation to the nerves, muscle cells, capillaries, and organs in the area. Pressure in the compartment must be relieved quickly to prevent permanent disability and tissue death, which can result in amputation or death (Mabvuure et al., 2012).

Problem Statement:
Nurses play a critical role in assessing for acute compartment syndrome. Ensuring that nurses are properly equipped to assess for these signs and symptoms is imperative, as delaying or failing to recognize ACS typically results in poor outcomes for patients (Mabvuure et al., 2012). Despite the improvements made in diagnosing and treating patients with this potentially deadly situation, as well as an increased awareness of ACS, nurses are falling short when required to display knowledge and identify patients with the syndrome. Along with identifying at-risk patients for developing ACS, nurses can aide the clinical diagnosis of ACS through assessing for the six cardinal features including: pain, pallor, paralysis, paresthesia, pressure, and a persisting cold temperature (Mabvuure et al., 2012).

Methods:
A computerized search of literature was completed using online databases accessed through Rosalind Franklin’s library website. The databases searched included PubMed, Cumulative Index to Nursing and Health Literature, Academic Search Complete. Multiple text combinations in the search include the following key words: acute compartment syndrome, compartment syndrome, ACS, nursing, nursing assessment clinical outcomes, and clinical judgment.

Inclusion criteria: sources reviewed were limited to peer-reviewed articles. Articles must be available in English and be of the nursing, medicine, or healthcare discipline. Additionally, articles must focus on reducing the risk and determining outcomes of acute compartment syndrome. Full-text links of articles for viewing were also required within the search criteria.

Exclusion criteria: articles reviewing abdominal compartment syndrome, as this literature review focuses specifically on studying acute compartment syndrome of the limbs. Additionally, this study is focused solely on acute cases of compartment syndrome, therefore articles centered on chronic conditions were also excluded.

Research Question:
What factors contribute to positive clinical outcomes associated with effective nursing assessment and the identification of patients at risk for acute compartment syndrome?

Results & Discussion:
After review of ten studies, two contributing factors were identified to contribute to positive clinical outcomes associated with effective nursing assessment and the identification of patients at risk for acute compartment syndrome.

Early diagnosis and recognition of the signs of compartment syndrome is imperative to positive clinical outcomes. As noted in a 2018 study by Alqahtani, et al., “the outcome of ACS depends on the time of diagnosis from injury to intervention,” which is crucial for preventing nerve damage and limb amputation. Because of the time sensitive nature of this condition, “missed compartment syndromes continue to be one of the most common causes of malpractice lawsuits” (Harvey, et al., 2012).

Because nurses are most often times the providers completing assessments, they must be aware of the most important signs and symptoms of acute compartment syndrome. Nurses must be vigilant with their assessments and keep a close monitor on the evolution of ACS to allow for prompt intervention (Lollo & Grabsky, 2018). In addition to the 5 P’s of ACS (pain, pallor, paresthesia, pulselessness, and paralysis) the cardinal signs for ACS are patient report of “escalation in leg pain and changes in sensation” with the severity of nerve damage increasing with time (Lollo & Grabsky, 2018).

In order to ensure early diagnosis and recognition of patients with acute compartment syndrome, nurses must be thoroughly aware of those at the highest risk. The body part most commonly associated with ACS is the leg, most specifically the tibia. In 2018 study by Lollo & Grabsky, 41% of the patients with developed acute compartment syndrome presented with either a proximal tibia or tibia shift fracture. Nurses must be hyperaware of this association and diligently assess their patients with tibial fractures for increased levels of pain and sensations in their leg. In addition to the leg being the most common site for acute compartment syndrome to develop, the male gender is a reliable indicator of the possibility of developing acute compartment syndrome (Alqahtani, et al., 2018). For example, in one study of 124 patients, 81% of the patients that developed acute compartment syndrome were male, and 19% were female. Finally, youth is considered the strongest predictor for developing acute compartment syndrome following a tibial fracture (McQueen, et al., 2015). The ages with the highest prevalence of developing acute compartment syndrome are between “12-19 years, and 20-29 years” (McQueen, et al., 2015).

Nursing Practice Implications:
Nurses play a critical role in early recognition of acute compartment syndrome. When properly educated on the how to assess for the critical signs and symptoms of acute compartment syndrome, as well as identifying those at the highest risk for ACS, nurses can prevent further nerve damage, vascular damage, and amputation from occurring. Through the use of early recognition and identifying at-risk patients, completing diligent assessments for escalation of pain and changes in sensation, in addition to identifying patients with tibial fractures, those of the male gender, and those between the ages of 12-19 years and 20-29 years, are key in preventing ACS from progressing.