The Prevalence of Abdominal Compartment Syndrome in the State of Florida

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Introduction

Abdominal compartment syndrome (ACS) was formely defined by World Society of ACS (WSACS) as a sustained intra-abdominal pressure >20mmHg associated with a new organ dysfunction. A systematic review in 2021 found 6 post-definition prospective studies which reported an intra abdominal hypertension (IAH) prevalence of 30-50% in ICU patients. ACS prevalence ranged from 1.6-6.1%. These studies where performed from 2008 to 2019. The increase in identification was attributed to better definition of intraabdominal hypertension and its monitoring protocol. [1]

ACS has been recognized for the last 25 years however formal attempts to standardize and define it has been the last 10 to 15 years [2]. Studies on the incidence has been contradictory along those years: some studies showed decreasing incidence [2-4] while others shows an increasing [5-6] . Risks factors including fluid resuscitation , trauma , pancreatitis , burn had been associated with the development of ACS, early identification and treatment its important to decrease mortality. Mortality has been reported to be between 25-75% if treated and >90 % if not treated [7-8] .

Multiple studies have been produced evaluating the prevalence of ACS at individual institutions and/or for only short durations of time. To date, no study has looked at the change of incidence over an extended time or to have included non-academic institutions

Purpose

The propose of this study is to evaluate the trend in the prevalence of ACS over time within the state of Florida.

Methods

This is a population based retrospective cohort study. Data was obtained from deidentified data from Florida's Agency of Healthcare Database (AHCA) between 2007 and 2021. Inclusion criteria included patients older than 18-year-olds who were admitted to the Intensive care unit

Demographics were gathered from the database these included age, gender, race, payer source, comorbidities and the development of shock during the admission. Comorbidities including HTN, DM, CAD , intestinal disorders, ARDS and kidney disease.

Outcome measure

The primary outcome was the development of Abdominal compartment syndrome. Secondary outcomes included mortality, ICU days, number of surgeries, hospital days and complication rates. Complications defined as pneumonia, urinary tract infection , sepsis, wound infections , cardiac arrest , deep vein thrombosis, coagulopathy, pulmonary embolism and/or fistula . Outcome were identified using ICD- 9 and ICD- 10 codes.

Statistical Analysis

A multivariable regression analysis was performed to adjust for confounders. Outcomes were risk adjusted for age, diabetes, hypertension, coronary artery disease, and intestinal disorders

Discussion

Despite the development of identification, monitoring and treatment guidelines by WCACS in 2006 and later revised in 2013, there still remains a paucity of data about the prevalence of ACS within the ICU. [1,9] Khot *et al.* previously reported on studies after the WCACS guidelines a range from 1.6-6.1% with IAH ranging from 30-49%.[1] Strang *et al.* suggested among severely injured patient prevalence of ACS decreased after the implementation of WCACS guideline from 5.2% to 3.7%.[10] In our multicenter study, the reported prevalence of ACS slowly trended up from 0.029% to 0.04% after 2006. This could be attributed to the development of WCACS guidelines and better awareness of ACS as it occurred following the introduction of there original guidelines. Unfortunately, we were unable access data prior to this time to determine if there was any trend prior to 2006.

Mortality in the presence of ACS has been reported anywhere between 0-100% [1] . When comparing mortality to the medical versus surgical treatment of ACS, medical treatment had a mortality rate of 29.8 when compared to surgical decompression of 21.1% in one study [7] . The same study found that mortality depended on the underling cause for intra abdominal hypertension, finding less rates in trauma patient and higher mortality rates in necrotizing pancreatitis. They also found that mortality was reduce by 8.7% if treated with surgical decompression [7] Unfortunately, they did not show a statistical significance in treatments but it is notable that they had a significant delay in decompression with a median of 16 hours prior decompression after identifying ACS. Experimental studies have demonstrated that earlier decompression will likely provide better outcomes. [11]

This multicenter study encompasses all hospitals within the state of Florida. This includes academic and non-academic centers. It is notable that our reported prevalence across any year of 0.029% to 0.04% is much lower that the lowest reported number of 1.6%. Other studies have been from single academic centers actively evaluating for IAH and ACS. The only notable multicenter study reported was actively evaluating for IAH and ACS, as well. [12] Our study incorporates sites that may not actively be looking for IAH or ACS. To quote House of God, "If you don't take a temperature, you can't find a fever".[13] This is especially concerning considering the improved outcomes if guidelines are followed.[14]

Limitations in this study include the reliability on the accuracy on ICD 9 and ICD 10 codes for identification of data, which may lead to misclassification bias. No ICD codes for IAH exist to follow this data and this likewise, cannot be evaluated in our study. This study is also limited to the state of Florida and patterns in this state may not be the same for other states.

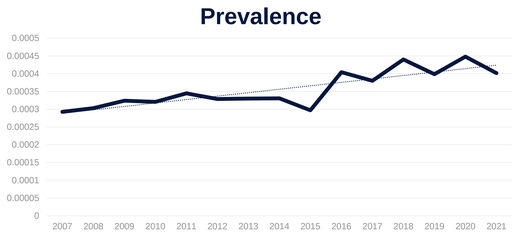
Conclusion

The prevalence of ACS has slowly increased over the years within the state of Florida. Mortality and complication rates have remained relatively unchanged during that same time period. Length of stay for ACS has decreased during that same time period. Formal ICD-10 codes may benefit in identifying IAH.

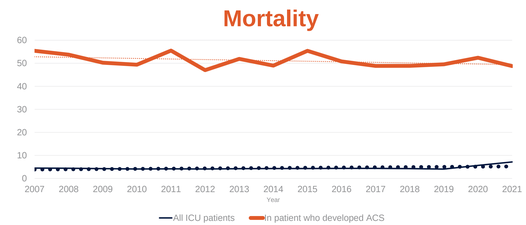
Results

	Developed ACS N=4,002	Did not developed ACS N=16,213,615	P value
Age			
<18	7.1%	3.5%	<0.0001
18-64	58.0%	41.2%	<0.0001
>64	34.9%	55.3%	<0.0001
Gender			
Female	34.7%	48.8%	<0.0001
male	65.3%	51.2%	<0.0001
Race			
White	56.2%	68.6%	<0.0001
Black	21.5%	14.9%	<0.0001
Hispanic	15.6%	13.2%	<0.0001
Asian	1.5%	0.6%	<0.0001
Other	5.3%	2.7%	<0.0001
Comorbidities			
DM	12.0%	11.2%	0.08
HTN	29.5%	29.3%	0.78
CAD	3.7%	4.3%	0.05
Intestinal disorder	21.8%	6.7%	<0.0001
Acute respiratory failure	29.9%	7.2%	<0.0001
Kidney Disease	31.9%	18.5%	<0.0001
Payer source			
Medicare	36.6%	58.9%	<0.0001
Medicaid	18.9%	10.3%	<0.0001
Commercial health insurance	31.4%	20.5%	<0.0001
Workers compensation	1.1%	0.3%	<0.0001
Government	3.7%	2.5%	<0.0001
Self pay	6.3%	5.5%	0.02
Other	2.0%	2.0%	0.87
Shock			
Trauma shock	46.1%	3.8%	<0.0001
Hypovolemic shock	21.0%	1.3%	<0.0001
Cardiogenic shock	5.0%	0.9%	<0.0001
Distributive shock/obstructive shock	29.8%	2.3%	<0.0001

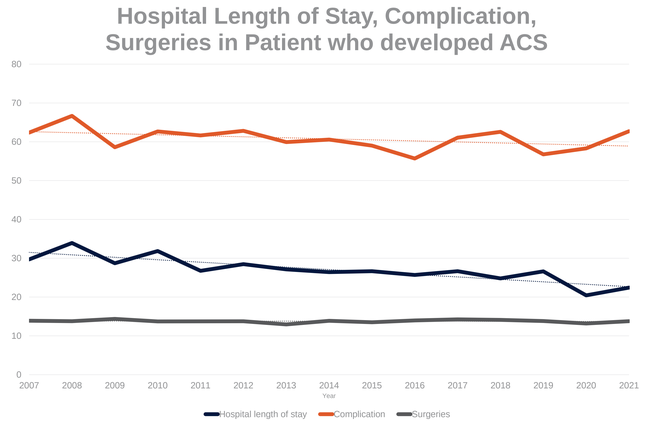
Table 1: Population Demographics



Graph 1: Prevalence of abdominal compartment syndrome form 2006-2021 in ICU in Florida.



Graph 2: comparison of mortality between all patient in the ICU and patient who developed Abdominal compartment syndrome



Graph 3: Hospital length of stay, complication and surgeries in patient who develop abdominal compartment syndrome from 2006-2021

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