



Children's Hospital  
Colorado

# Using shock index, pediatric age adjusted (SIPA) to predict prolonged length of stay in perforated appendicitis: a retrospective review

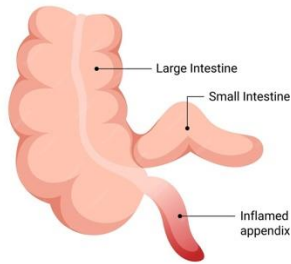
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## BACKGROUND

Acute appendicitis accounts for 60,000-80,000 pediatric hospital admissions in the United States annually with perforation occurring in approximately 35% of cases. Hospital length of stay (LOS) in perforated appendicitis is difficult to predict.



Shock Index (SI) =  $\frac{\text{Heart Rate (HR)}}{\text{Systolic Blood Pressure (SBP)}}$

Shock index, pediatric age adjusted (SIPA) accounts for vital sign variation amongst children

**Table 1**

Normal pediatric vital sign ranges based on patient age.

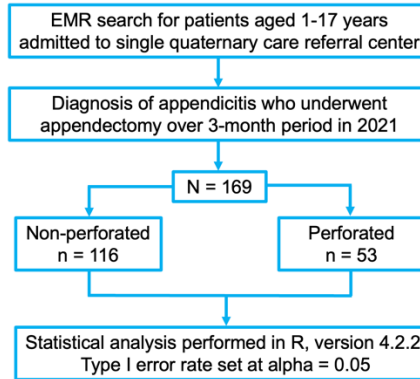
Age	Heart rate	Systolic blood pressure	Diastolic blood pressure	Respiratory rate	Maximum normal SIPA
4-6 years	65-110	90-110	60-75	20-25	1.222222222
6-12 years	60-100	100-120	60-75	14-22	1
>12 years	55-90	100-135	65-85	12-20	0.9

SIPA—shock index, pediatric age adjusted; equal to maximum normal heart rate/minimum normal SBP.

## AIMS

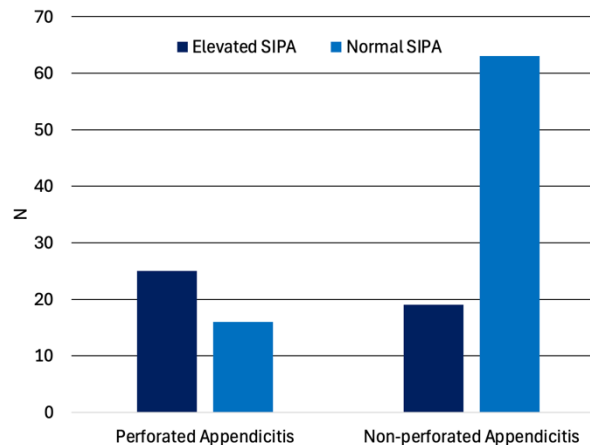
1. Determine the relationship between **elevated SIPA at presentation** to the emergency department (ED) and risk of **perforation** identified in the operating room (OR)
2. Determine the relationship between **elevated SIPA at presentation** and **markers of severe disease** (hospital LOS, time to tolerate regular diet, total antibiotic duration, unplanned ED visit within 30 days of discharge).
3. Determine the relationship between **time to normalization of SIPA** postoperatively and the **outcomes** described in aim two.

## METHODS



## RESULTS

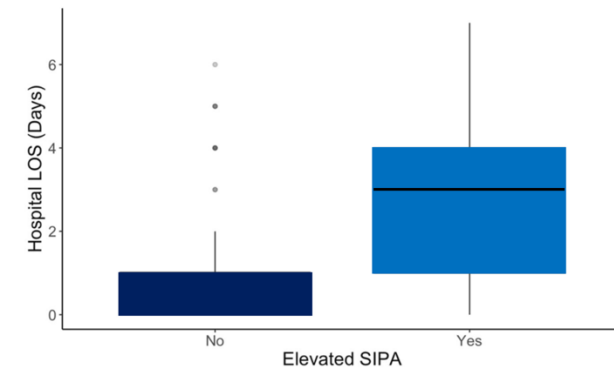
There is a significant association between elevated SIPA at ED presentation and presence of perforation ( $p < 0.001$ ).



**Figure 1** Association between elevated SIPA at ED presentation and perforation among children with appendicitis

## RESULTS

There is a significant association between elevated SIPA at ED presentation and time to normalization of SIPA postoperatively and longer hospital LOS ( $p < 0.0001$ ,  $p < 0.0001$ ), longer time to tolerate regular diet ( $p < 0.0001$ ,  $p < 0.001$ ), and longer antibiotic duration ( $p < 0.0001$ ,  $p < 0.001$ ).



**Figure 2** Association between elevated SIPA at ED presentation and hospital LOS in children with appendicitis

## DISCUSSION

Limitations of this study include its retrospective nature, small sample size, and data collection over a short period of time.

Future work will aim to investigate whether SIPA is a metric that could be targeted for intervention.

These findings support the incorporation of SIPA into triage of pediatric patients with appendicitis and when counseling families about expected hospital course after surgery.



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