

## Introduction

Hangings and strangulation in the pediatric population have a potential for severe morbidity or mortality. We present a large cohort of pediatric patients evaluated for hanging-type injuries, focusing on initial presentation and outcome, to determine if any aspects of clinical presentation correlate with outcome.

## Methods

We reviewed medical records from 1992 – 2015. Data from children with hanging injuries were examined. Outcome was measured using Pediatric Cerebral Performance Category (PCPC). For categorical variables, p-values were from fisher exact test, and for continuous variables, p-values were from non-parametric Wilcoxon test. Statistical significance was defined as  $P < 0.05$ .

## Results

We identified 84 patients. Median age was 12, and 56% were male. Of the total injuries, 51 were intentional, and the remaining were accidental or of unknown intent. At the time of discharge, 19 patients died, 1 was comatose, 1 had severe disability, 6 had mild disability, and 57 were neurologically intact. All patients with mild or no disability (PCPC<3) were either discharged home or to a psychiatric facility. Poor prognosis was associated with: lower GCS, intubation, a lower initial pH on arterial blood gas (ABG), presentation with a cardiac arrhythmia, and anoxic brain injury noted on imaging. The single comatose patient, and all patients who ultimately died, presented with a specific combination of findings: history of cardiac arrest requiring prehospital CPR and an initial GCS of 3. No other patients had this particular combination of findings.

Table 1. Patient demographics (n=84)

Age (year)	%	
Male sex (%)	56 (67.6)	
Patients with a Prior Psychiatric Diagnosis (%)	68 (82.6)	
Etiology of Injury (%)		
Accidental ligature in non-infant	9 (10.7)	
Accidental ligature in infant/toddler	19 (22.6)	
Voluntary ligature w/ suicidal intent	8 (9.5)	
Voluntary ligature w/ suicidal intent	43 (51.2)	
Unknown	5 (6)	
Median Admission GCS	18	
Arterial Blood Gas Median pH	7.24E	
Arterial Blood Gas Median pCO2	40	
Prehospital Cardiac Arrest (%)	31 (37)	
Prehospital CPR Performed (%)	31 (37)	
Intubated (%)	39 (46.4)	
Admitted to the Pediatric Intensive Care Unit (%)	43 (51.2)	
Associated Complications (%)		
Cervical fracture or dislocation	0	
Seizure	17 (20.2)	
Pulmonary Edema	16 (19.0)	
Pneumonia	8 (9.5)	
Acute Respiratory Distress Syndrome	4 (4.8)	
Multiorgan Failure	10 (11.9)	
Pediatric Cerebral Performance Category Scale (%)		
Score	Category	
1	Normal	57 (67.9)
2	Mild Disability	6 (7.1)
3	Moderate Disability	0
4	Severe Disability	1 (1.2)
5	Coma	1 (1.2)
6	Brain Death/Death	19 (22.6)
Disposition (%)		
1	Home	42 (50)
2	Inpatient Rehabilitation Facility	0
3	Skilled Nursing Facility	0
4	Inpatient Psychiatric Facility	23 (27.4)
5	Death	19 (22.6)

Table 2. Hospital characteristics of injury outcomes

	Total N (%)	Survived (n=64) (%)	Mild Disability (n=7) (%)	P-value
Admission to PICU				0.000
Yes	4 (4.8%)	0 (0%)	0 (0%)	
No	80 (95.2%)	64 (64%)	7 (7%)	
Seizures				0.000
Yes	17 (20.2%)	10 (15.6%)	1 (14.3%)	
No	67 (80.0%)	54 (84.4%)	6 (85.7%)	
Pulmonary Edema				0.000
Yes	16 (19.0%)	10 (15.6%)	1 (14.3%)	
No	68 (81.0%)	54 (84.4%)	6 (85.7%)	
Pneumonia				0.000
Yes	8 (9.5%)	5 (7.8%)	1 (14.3%)	
No	76 (90.5%)	59 (92.2%)	6 (85.7%)	
ARDS				0.000
Yes	4 (4.8%)	0 (0%)	0 (0%)	
No	80 (95.2%)	64 (64%)	7 (7%)	
Multiorgan Failure				0.000
Yes	10 (11.9%)	6 (9.4%)	1 (14.3%)	
No	74 (88.1%)	58 (90.6%)	6 (85.7%)	
Cardiac Injury on Imaging				0.000
Yes	1 (1.2%)	0 (0%)	0 (0%)	
No	83 (98.8%)	64 (64%)	7 (7%)	
Heart Length of Stay				0.000
Yes	1 (1.2%)	0 (0%)	0 (0%)	
No	83 (98.8%)	64 (64%)	7 (7%)	
ICU Length of Stay				0.000
Yes	1 (1.2%)	0 (0%)	0 (0%)	
No	83 (98.8%)	64 (64%)	7 (7%)	

## Conclusions

Pediatric patients with hanging-type injuries often have a wide variety of presentations. While prognosis correlated with several findings, persistent vegetative state or mortality were firmly associated with history of cardiac arrest requiring prehospital CPR and an initial GCS of 3.

## Learning Objectives

By the conclusion of this session, participants should be able to: 1) Describe the relevance of studying pediatric hanging-type injuries 2) Discuss, in small groups, how to evaluate these patients 3) Identify clinical findings that will be most helpful in predicting outcome.