

## BACKGROUND

Fever of unknown origin (FUO) cases are often challenging to differentiate benign, self-limited from more serious, life-threatening etiologies and are associated with prolonged hospital stays and high costs.

There is limited literature in this population, and outcomes from the emergency department (ED) setting has not yet been studied.

Given the wide array of potential diagnoses for FUO, we hypothesized that there could be variability in disposition decisions and the opportunity to promote high value care and reduce resource utilization.

## PURPOSE

To describe the factors associated with hospitalization in children with FUO and compare the outcomes between those hospitalized and discharged from the ED.

## METHODS

- Retrospective, cohort study
- Previously healthy children, ages 6 months to 18 years who presented to TCH between 1/2017-12/2019
- Inclusion criteria: initial ICD-10 encounter diagnosis code of FUO or prolonged fever, reported fever for  $\geq 7$  days, no localizing signs or symptoms of infection at presentation
- Outcome measures: association factors defined a priori and adverse outcomes
- Statistical analysis: Descriptive statistics and binary logistic regression modeling using backward-step approach

**Table 1. Demographic and clinical factors of children with FUO (N = 351)**

	Discharged N = 238 (67.8%)	Hospitalized N = 113 (32.2%)	
	N (%) or Median (IQR)	N (%) or Median (IQR)	P-value
Age (years)	4 (1, 9)	5 (2, 9.5)	0.35
Ethnicity			
Non-Hispanic	114 (48.5)	66 (60.6)	0.04
Hispanic	121 (51.5)	43 (39.4)	
Missing	3	4	
Race			
White	182 (79.1)	83 (76.1)	0.82
Black	30 (13.0)	16 (14.7)	
Asian	18 (7.8)	10 (9.2)	
Missing	8	4	
Weekend Presentation			
No	134 (56.3)	68 (60.2)	0.49
Yes	104 (43.7)	45 (39.8)	
Insurance			
Private	72 (30.3)	44 (38.9)	0.26
Public	149 (62.6)	61 (54.0)	
Self-Pay/None	17 (7.1)	8 (7.1)	
Distance from Campus (miles)	13.8 (8, 24.3)	13.2 (7.8, 24.85)	0.92
Fever Length (days)	11 (8, 14)	10 (8, 14)	0.91
Appearance			
Non-Ill	231 (97.1)	106 (93.8)	0.15
Ill	7 (2.9)	7 (6.2)	

**Table 2. Outcomes in hospitalized children**

	N (%) or Median (IQR)
Adverse Outcomes	
ICU level of care	2 (1.8)
Shock	0 (0)
Vasopressor or ventilatory support	0 (0)
Deaths	0 (0)
Discharge Etiology Category	
Unknown	56 (49.6)
Infectious	42 (37.2)
Bacterial	18
Viral	24
Rheumatologic	8 ( 7.1)
Miscellaneous	5 ( 4.4)
Unknown Combination*	2 ( 1.7)
Final Etiology Category	
Unknown	32 (28.3)
Infectious	60 (53.1)
Rheumatologic	12 (10.6)
Miscellaneous	8 ( 7.1)
Malignancy	1 ( 0.9)

\*Unknown combination = combined categories of unknown and infectious disease or unknown and miscellaneous etiologies

**Table 3. Outcomes in ED discharged children**

	N (%) or Median(IQR)
Same Cause Return Disposition	
Hospitalized	13 (72.2)
ED Discharge	5 (27.8)
Discharge Etiology Category	
Unknown	215 (90.3)
Infectious	22 ( 9.2)
Bacterial	15
Viral	7
Rheumatologic	0 (0)
Miscellaneous	0 (0)
Unknown Combination*	1 ( 0.4)
Final Etiology Category	
Unknown	129 (54.2)
Infectious	99 (41.6)
Rheumatologic	6 (2.5)
Miscellaneous	4 (1.7)
Malignancy	0 (0)

## RESULTS

- 351 children with FUO were included
- 113 (32%) children were hospitalized and 238 (68%) were discharged from the ED at initial presentation
- Factors associated with hospitalization:
  - Prior PCP visit (aOR 1.59; 95% CI, 1.25 – 2.03)
  - Prior outpatient subspecialist visit (aOR 3.79; 95% CI, 1.63 – 8.81)
  - Abnormal c-reactive protein level (aOR 6.64; 95% CI, 2.62 – 16.79)
- 2 (1.8%) hospitalized children required ICU
- No adverse outcomes for ED discharged children
- Median length of stay was 2 (1,4) days
- 5 (4%) hospitalized children returned within 30 days after hospital discharge
- 18 (8%) children discharged from ED returned within 30 days of initial ED encounter for FUO
- Hospital charges: \$20,458 (IQR: \$13,904, \$33,610.50)
- ED charges: \$6,538.00 (IQR: \$5,368.00, \$7,886.50)

## CONCLUSION

Factors associated with hospitalization reflected either prior attempt at outpatient evaluation or lab value reflecting systemic inflammation.

Most children remained undiagnosed, adverse outcomes were rare in both groups and hospitalizations were short with high costs.

Future studies can evaluate the individual provider factors that influence disposition decisions.

## REFERENCES

1. Antoon, J. W., Peritz, D. C., Parsons, M. R., Skinner, A. C., & Lohr, J. A. (2018). Etiology and resource use of fever of unknown origin in hospitalized children. *Hospital Pediatrics*, 8(3), 135-140.
2. Szymanski, A. M., Clifford, H., & Ronis, T. (2020). Fever of unknown origin: a retrospective review of pediatric patients from an urban, tertiary care center in Washington, DC. *World Journal of Pediatrics*, 16(2), 177-184.