Retrospective Study of Lumbar Punctures by Trainees and Practicing Providers in Pediatric Patients

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Introduction

Examination of cerebrospinal fluid (CSF) using lumbar puncture (LP) is a common procedure with over 89,000 LPs performed in the US each year.

Unsuccessful LPs lead to diagnostic ambiguity, prolonged hospitalizations, and prolonged use of antibiotics.

LP success rates of pediatric trainees in different hospital settings has yet to be explored.

Objective

To determine LP success rates of trainees and practicing providers in different units at an urban, tertiary children's hospital.

Methods

Used a retrospective chart review of patients aged 0-18 years old undergoing first LP of their hospital encounter between January and December of 2019.

Successful LP was defined as obtaining enough CSF to be sent for culture or pathogen panel and containing <400 RBCs/mm^3.

Number of attempts, location in the hospital, and training level were compared.

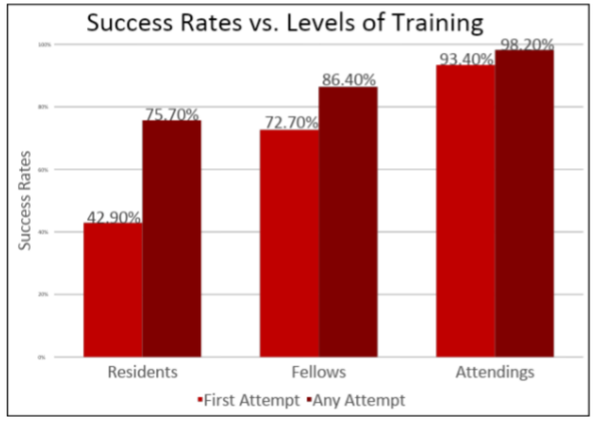
Univariate and multivariate analysis of variables were used to determine which were associated with successful LPs.

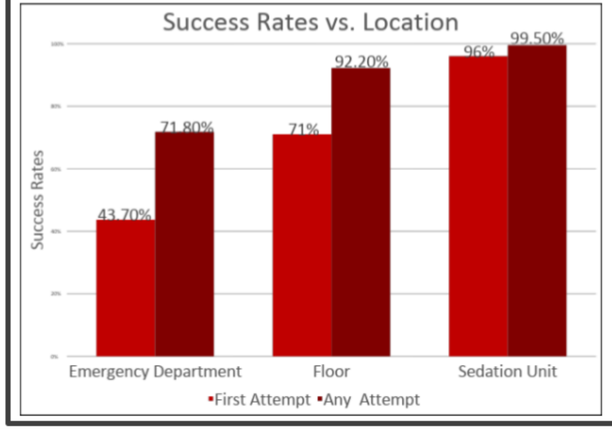
Results and Data

Of the 375 charts reviewed, 363 met inclusion criteria.

Mean number of attempts per LP performed was 1.36.

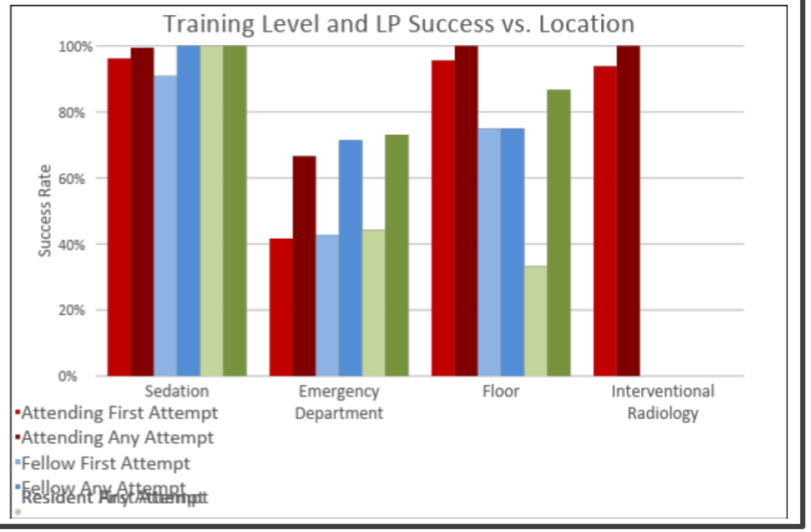
The sedation units had the highest success rate with 96% on first attempt and 99.5% on any attempt. On the general medicine floor, 71% were successful on first attempt and 92.2% on any attempt. The emergency department had the lowest success rates with 43.7% on first attempt and 71.8% after any attempt.





Lumbar Puncture Success Variables

Predictors		First Attempt Success	Any Attempt Success	P-Value
Location of procedure	Sedation (Referent)	192/200 (96.0%)	199/200 (99.5%)	
	Floor	30/42 (71.4%)	39/42 (92.9%)	0.030
	Intervention radiology	46/50 (92.0%)	49/50 (98.0%)	0.306
	Emergency department	31/71 (43.7%)	51/71 (71.8%)	0.001
Level of training	Attending	253/271 (93.4%)	266/271 (98.2%)	0.004
	Fellow	16/22 (72.7%)	19/22 (86.4%)	0.427
	Resident (Referent)	30/70 (42.9%)	53/70 (75.7%)	
Age of patient in months	0 to 59 days (Referent)	33/64 (51.6%)	49/65 (76.6%)	
	2 to 5 months	5/10 (50.0%)	8/10 (80.0%)	0.976
	6 to 11 months	5/6 (83.3%)	6/6 (100.0%)	0.484
	12 to 24 months	12/14 (85.7%)	14/14 (100%)	0.967
	≥ 25 months	244/269 (90.7%)	261/269 (97.0%)	0.617



Discussion

Success rates for LPs performed by residents we 42.9% (first attempt) and 75.7% (any attempt), consistent with prior studies.

Low success rates in the ED may indicate areas of improvement, such as the use of Point of Care Ultrasound to identify landmarks.

One limitation of this study may be the large number of attending performed LPs, mostly performed by the Hematology-Oncology providers with the use of procedural sedation.

Conclusions

Our institution's baseline data for LP success rates is similar to previously documented ranges for pediatric trainees. There is the greatest room for improvement in the pediatric emergency department and floor as well as in the residents and fellows.

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