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Impact of a Mobile Device-Based Clinical Decision Support Tool on Guideline Adherence and Mental Workload Among Trainee and Attending Physicians

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Disclosures

- I have no disclosures.

Background

- Serious bacterial infection (SBI) occurs in 8-12% of febrile infants <90 days of age
- Different risk stratification criteria have led to wide variation in evaluation of febrile infants with suspected SBI
- Clinical practice guidelines (CPGs) can help standardize care of febrile infants

Aronson et. al. *Pediatrics* 2014.
Pantell et. al. *JAMA* 2004.
Aronson et. al. *Pediatr Emerg Med Pract* 2013.

Background

- Electronic clinical decision support tools (ECDS) can effectively disseminate CPGs
- ECDS tools can be helpful in many settings
- No formal evaluation of the efficacy of ECDS tools exists and very little evaluation comparing attending and trainee physicians

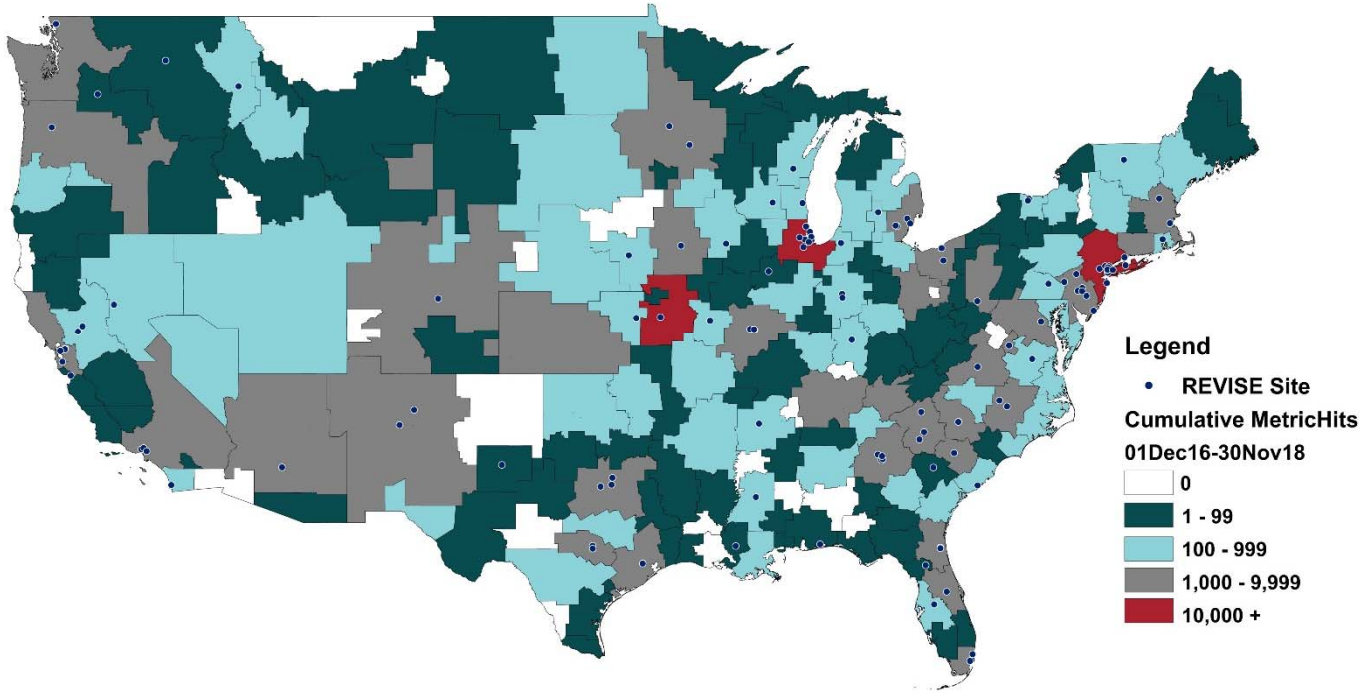
McCulloh and Alverson. *Pediatrics* 2012.
Denson P. *Trans Am Clin Climatol Assoc* 2011.
Cortez et. al. *NEJM* 2014.

Background

- Children's Mercy Kansas City released a free mobile application for managing febrile infants: PedsGuide™ (formerly CMPeDS)
- Released November 9, 2016
- December 1, 2016- March 2019
  - Used in 64 countries
  - Sessions: 95,000

McCulloh et. al. *J Am Med Inform Assoc* 2018.

Map of **PedsGuide** Sessions

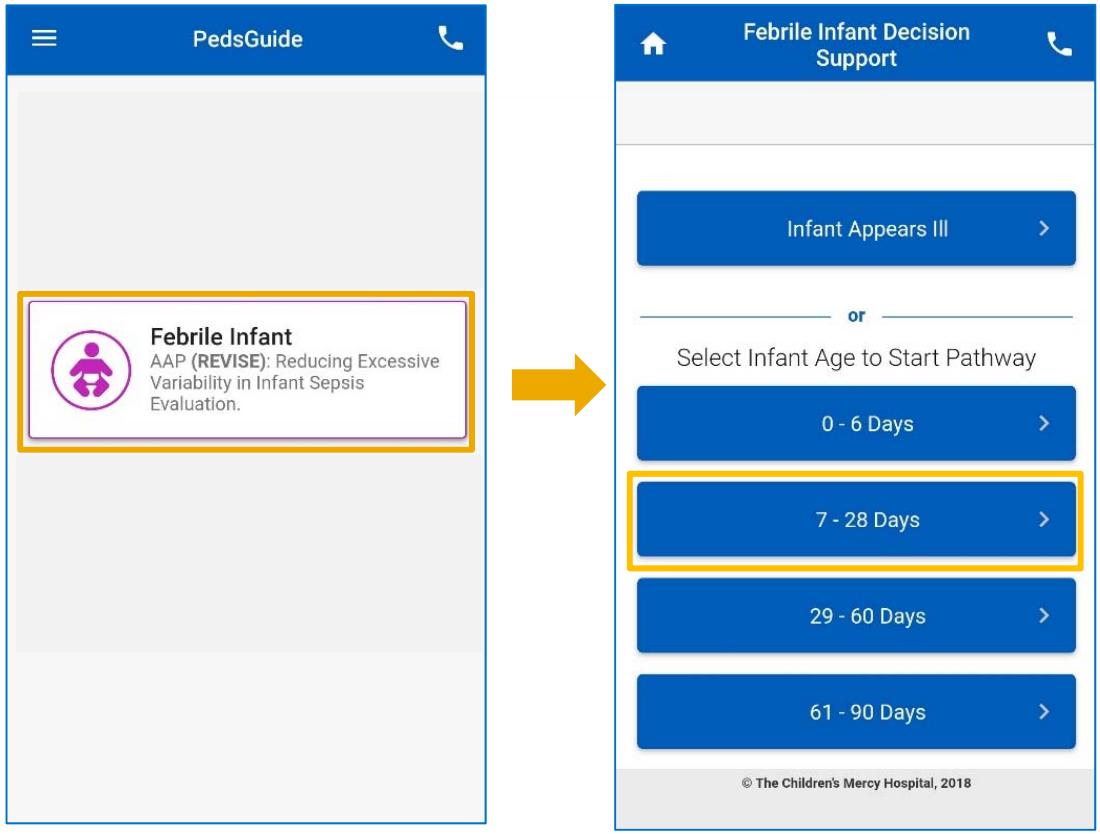


Objective

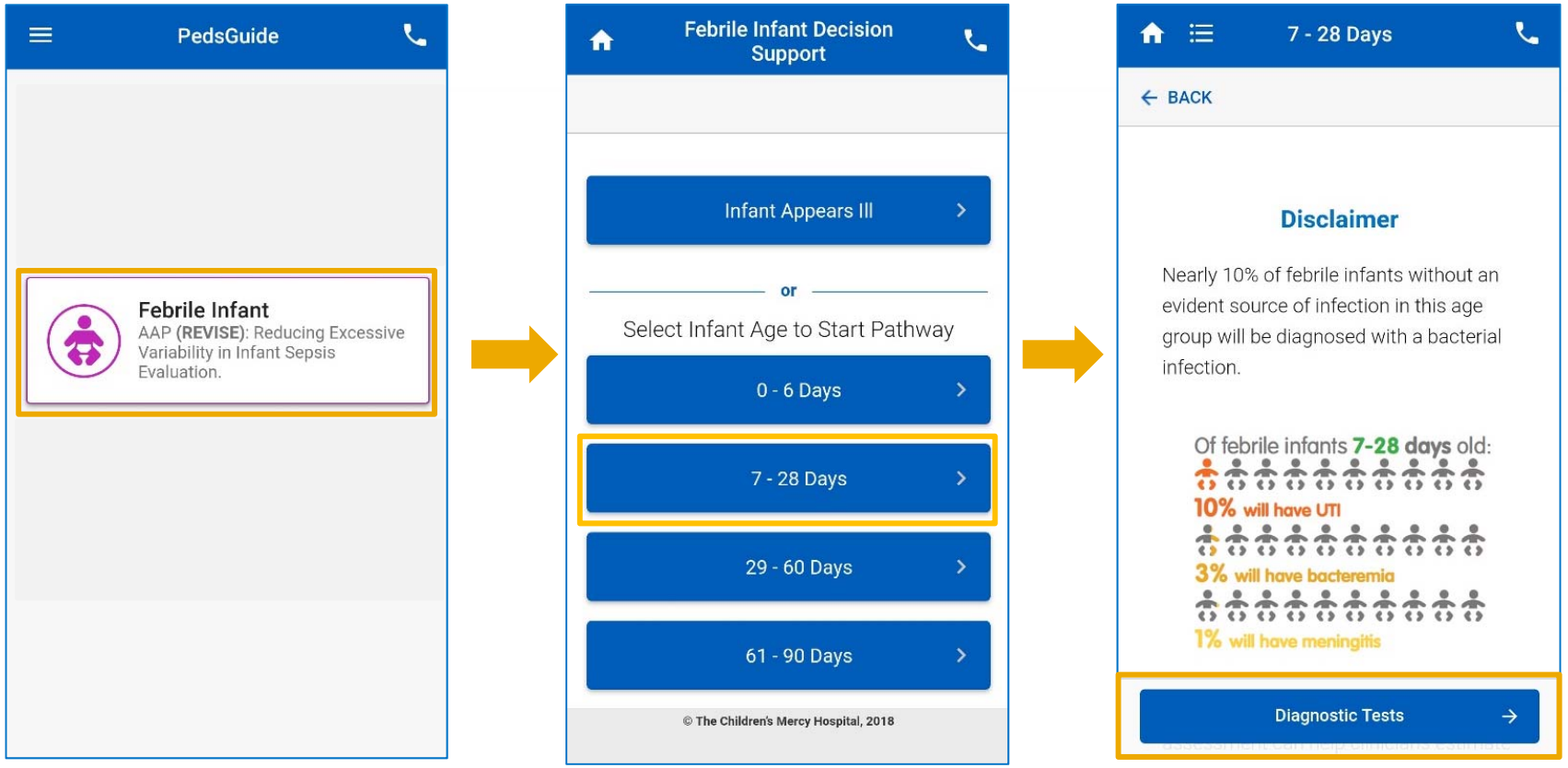
- Assess the individual level impact of PedsGuide™ on management of febrile infants among attending and resident physicians as it relates to:
  - Medical decision-making
  - Cognitive load

PedsGuide Application

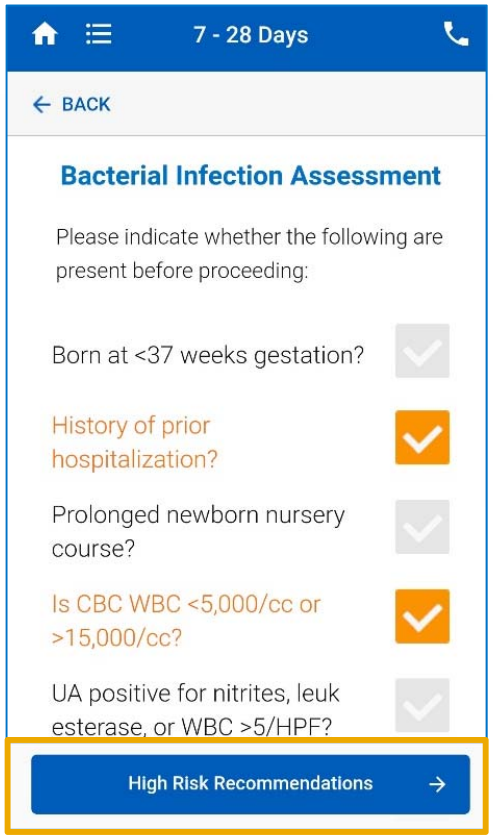
PedsGuide Application



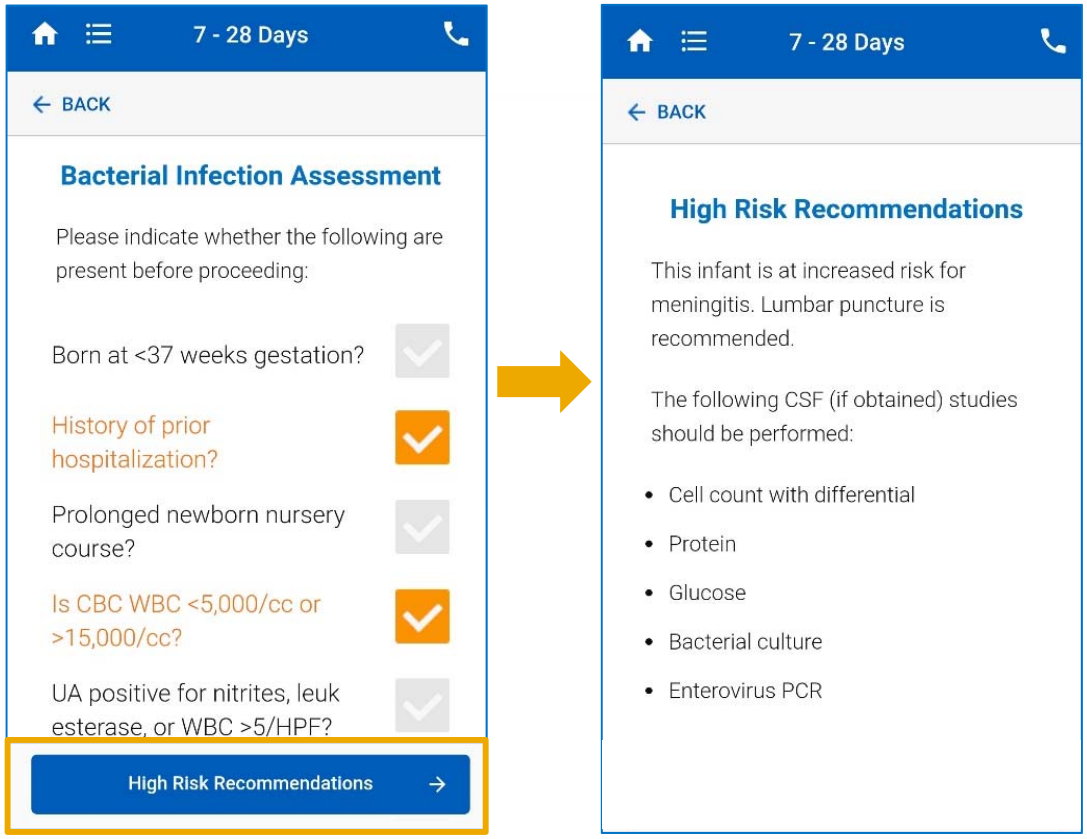
PedsGuide Application



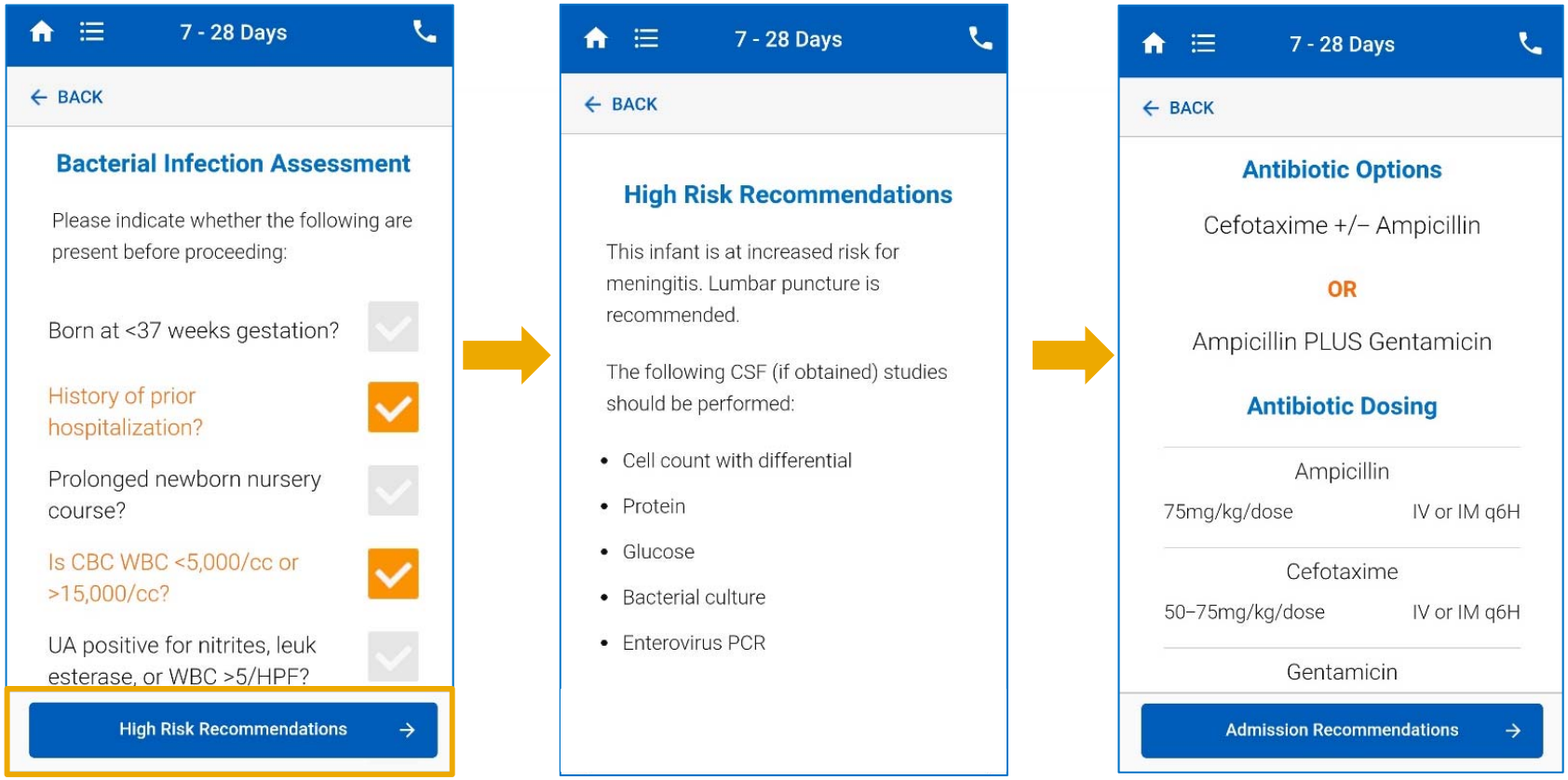
PedsGuide Application



PedsGuide Application



PedsGuide Application



Methods

- Counterbalanced, prospective cross-over simulation study
- PedsGuide™ use in both attending and trainee physicians will be associated with:
  - Increased adherence to evidence-based recommendations
  - Lower cognitive effort

Methods

- November 2017-June 2018
- Subjects:
  - Pediatric emergency medicine and urgent care physicians with >3 years of experience post-training
  - Resident physicians who perform rotations at Children's Mercy
- Recruitment
  - REDCap survey through email
  - Divisional meetings

Goodwin et. al. *JAMA Intern Med* 2018.

Methods

- 2 febrile infant scenarios created with answer key
  - No divergence of recommendations based on condition
- Go through one case with PedsGuide™ and the other with *The Harriet Lane Handbook*
- Block counterbalance was used to determine which case and which condition performed first

Methods

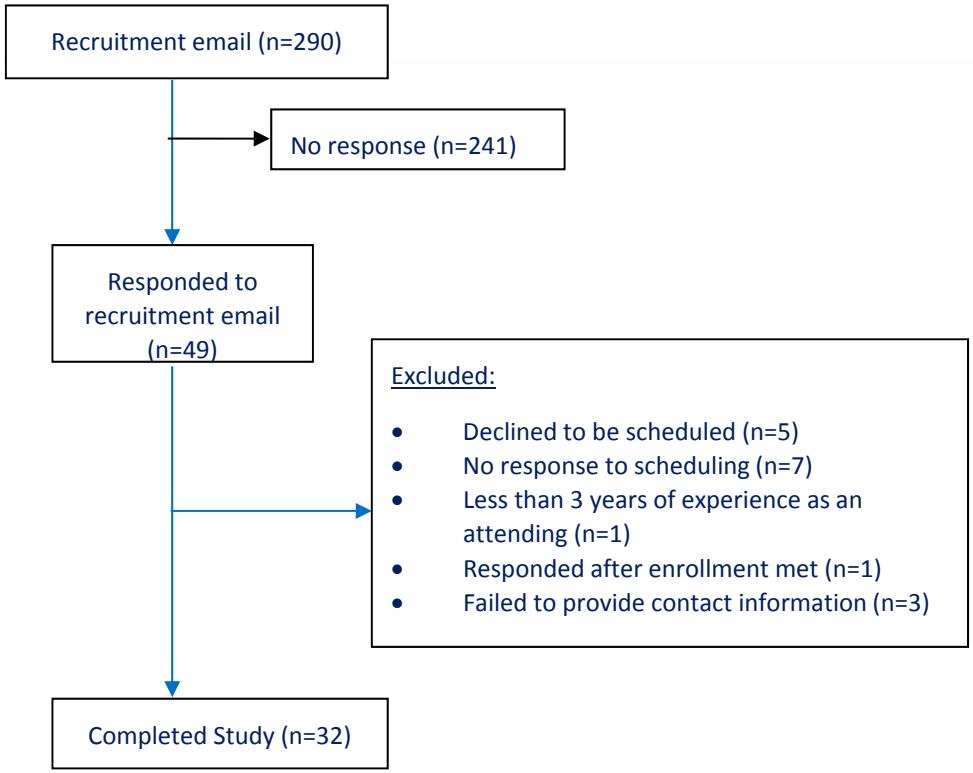
- NASA-TLX performed after each case
  - Validated subjective workload assessment tool
- Feedback provided from participants at the end

Hart SG, Staveland LE. *Advances in Psychology Human Mental Workload* 1988.
Brooke J. *Smart Phone Applications for people with brain injury* 1996.

Methods

- Data analysis performed with SPSS® v. 23.0
- Scores of cases were converted to percentages and averaged
  - Scores were compared by use of ECDS
- NASA-TLX scores averaged by category and compared by condition state
- Scores on cases and NASA-TLX scores were compared by physician level using t-tests with a Bonferroni α-level of 0.1

Results


Recruitment email (n=290)
No response (n=241)
Responded to recruitment email (n=49)
Excluded:
Declined to be scheduled (n=5)
No response to scheduling (n=7)
Less than 3 years of experience as an attending (n=1)
Responded after enrollment met (n=1)
Failed to provide contact information (n=3)
Completed Study (n=32)

Results

Demographics N=32

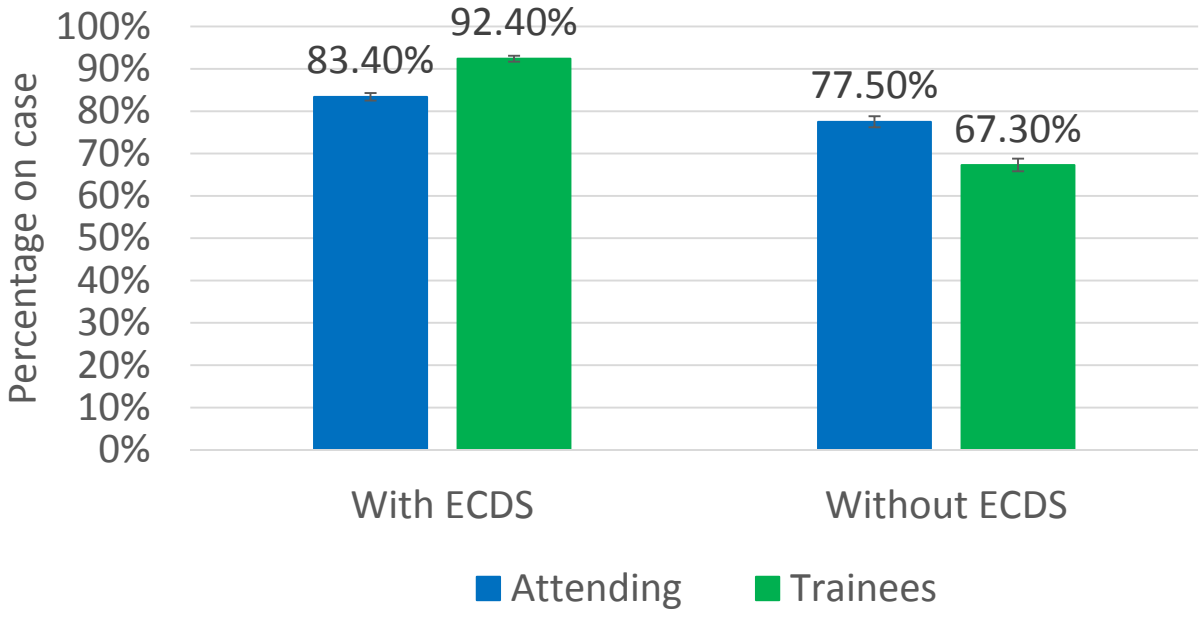
- Gender: Female: 16
- Mean age: 39.3 yrs (24-62 yrs)
- Attendings: 16
  - 75% of attending physicians in practice >10 years
- Primary specialty:
  - Pediatrics: 27
  - Other: 5
    - Internal Medicine-Pediatrics (1), Emergency Medicine (3), Family Medicine (1); PGY=post-graduate year

Results

Familiarity with ECDS tools:

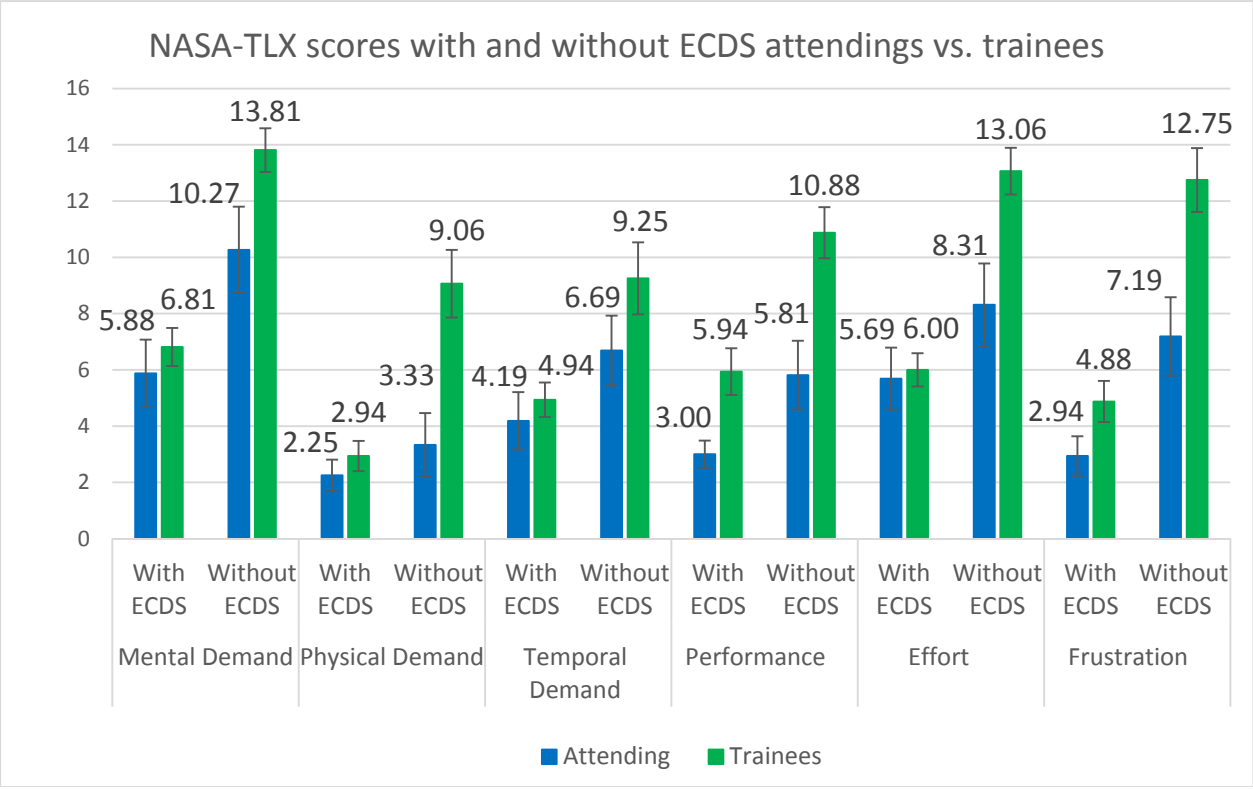
- At least weekly use of ECDS tool: 25 (78%)
- Comfort with ECDS tools: 27 (84%)
- Will use ECDS tools in future: 32 (100%)
- Used PedsGuide™ prior to study: 20 (62.5%)

Scores on cases were higher with use of ECDS



Attendings p=0.16; Trainees p=0.002

Mean scores of NASA-TLX were lower with use of ECDS



Trainees: p<0.01;
Attendings: Mental Demand p=0.07, Physical Demand p=0.45, Temporal Demand p=0.13, Performance p=0.04, Effort p=0.15, Frustration p=0.01

Limitations

- Use of vignettes vs. real patients
- Control using *The Harriet Lane Handbook*™
- Majority of participants had used PedsGuide™
- Majority of participants pediatrics trained

Conclusion

- Use of PedsGuide™ Febrile Infant Decision Support tool led to
  - Increased adherence to guidelines
  - Decreased cognitive workload
- Only significant for trainee physicians
- Use of ECDS tools may be especially helpful for trainee physicians with less experience
- This methodology may be used in future assessments of ECDS

Acknowledgements

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- Sarah Fouquet, PhD
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- Participants

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Download the app

For iPhone

For Android

Questions

Feedback

Only thing I have a hard time with the app is where it's taking me. Where am I going next?

Great for community FPs [family practioners], they call me to ask what to do, and I can tell them to look at the app.

Easy to use, set up one step at a time.

I go through it with rotaters in the ER. I kind of show it to anybody who will listen to me.

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