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An Educational Intervention to Improve Pediatric Inter-rater Reliability of the Hospital Asthma Severity Score (HASS)

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Improvement in Interdisciplinary ED and Hospital Care of Pediatric Asthma

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Background

- Asthma is the leading cause of chronic lung disease in children (Ferrante, 2018).
- Per 2018 CDC Report, 500,000 ER visits in 2017 by children under age 18
- Maine has one of the highest rates of asthma in the US (www.cdc.gov/asthma).
- A growing body of literature suggests childhood asthma is most successfully managed through a multidisciplinary approach.
- Use of a standardized asthma severity tool is critical to determine the proper treatment and disposition for the child with asthma in the emergency room or hospital.
- MMC had yet to implement a consistent pediatric asthma scoring tool.

Objective

- To assess if an inter-professional educational intervention can improve the accuracy and inter-rater reliability of the HASS

Introduction to Pediatric HASS

- The Hospital Asthma Severity Score (HASS) is a validated tool created at Boston Children's Hospital to score asthma exacerbation severity in patients from 2-18yo.
  - Score 5-6: mild
  - Score 7-9: moderate
  - Score 10+: severe

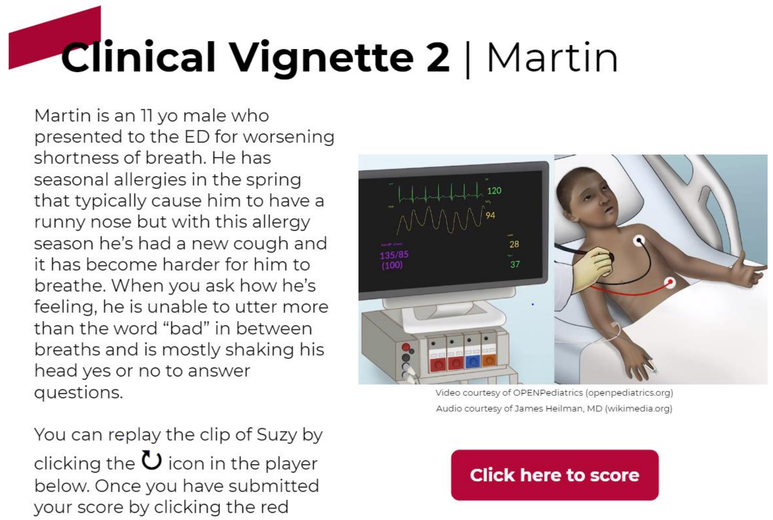
Hospital Asthma Severity Score (HASS)		
SpO_2 (%)		
Score **1**	> 94% room air	
Score **2**	90 - 94% room air	
Score **3**	<90% on room air or requiring O_2 to maintain saturation >94%	
Auscultation		
Score **1**	Clear and or end expiratory wheeze	
Score **2**	Expiratory wheeze	
Score **3**	Inspiratory + expiratory wheezing, diminished breath sounds or both	
Retractions		
Score **1**	One muscle group involved or none	
Score **2**	Two muscle groups	
Score **3**	Three muscle groups	
Muscle groups include: Intercostal, substernal, supraclavicular		
Dyspnea (respiratory effort)		
Score **1**	Speaks in full sentences, normal vocalization	
Score **2**	Speaks in partial sentences or utters short cries	
Score **3**	Speaks in single words or short phrases or grunts	
For sleeping patients: Score of 8 and above without this section necessitates the patient being woken to complete assessment		
Respiratory Rate		
Score **1**	2-5 years	<30 per min
	6-12 years	<25
	>12 years	<20
Score **2**	2-5 years	30-40 per min
	6-12 years	25-30
	>12 years	20-25
Score **3**	2-5 years	>40 per min
	6-12 years	>30
	>12 years	>25
		HASS Total Score

Participants

- Resident Physicians – EM and Pediatric
- Nurses – ER, BBCH, PICU
- Attending Physicians – Pediatric Hospitalists, PICU, EM, Pediatric Pulmonary
- Respiratory Therapists – EM, PICU, BBCH

Methods

- Pre-post intervention trial with stratified randomization
- Participants sent 1 of 2 modules – control or experimental
- Both modules start with HASS tool introduction and 2 clinical vignettes to practice using HASS
- Scores collected via REDCap
- Experimental: additional educational videos from OpenPediatric
- Both modules re-score a 2nd time; no intervention on control

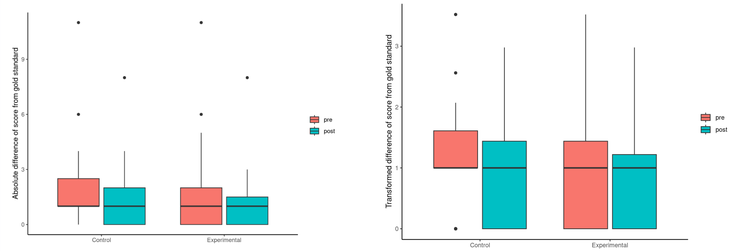


Results

- The absolute value of the difference between the participants' scores and the gold standard score was calculated for use as a continuous outcome and the correct categorization of scores as "mild," "moderate," or "severe" was used as a binary outcome.
- We used random coefficient Poisson models and logistic mixed effects models to calculate if the accuracy of participants' scores improved after training, and if the improvement was affected by which intervention arm

Results

Did deviation from gold standard score improve after training and was improvement affected by intervention?



- The absolute difference between participant scores and the gold standard score for each vignette was calculated and transformed by Tukey's Ladder of Powers transformation to meet normality assumptions.
- A linear mixed effects model was run to test the fixed effects of pre vs. post timing, intervention, and the intervention by pre vs. post interaction. A random effect for participant and vignette was included.

Conclusions

- Training improved score accuracy overall.
- The improvement did not differ between control and experimental groups.
- The overall lower rate of agreement with the gold standard and the frequent outlier also illustrate a clear need for further improved performance.

Next Steps

- Plan to use only experimental module going forward
- Expanding interdisciplinary educational modalities (i.e Sim)
- Disseminate to other MaineHealth Hospitals
- Implement the new pediatric asthma guidelines and weaning protocol using the HASS
- QI project to evaluate effect of using HASS in the ED on time to treatment and disposition

Pediatric Asthma Guidelines

Albuterol Weaning Protocol

Literature Cited

1. Ferrante, G., La Grutta, S (2018). The Burden of Pediatric Asthma. Frontiers in Pediatrics.
2. www.cdc.gov/asthma
3. Abecassis, L. et al. Validation of the Hospital Asthma Severity Score (HASS) in children ages 2-18 years old. 2022 Feb;59(2):315-324. doi: 10.1080/02770903.2020.1852414. Epub 2020 Dec 2.