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Improving and Standardizing Pediatric Asthma Care Across MaineHealth Using the Validated Hospital Asthma Severity Scoring (HASS) Tool

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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 implemented the Hospital Asthma Severity Score (HASS) tool in 2023.

Objective

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

Methods

- Pediatric clinicians involved in acute asthma care across our health system, MaineHealth, were invited to participate in an educational module to assess asthma exacerbation using the HASS tool.
- The module has a basic introduction to the HASS tool followed by two clinical vignettes.
- Using audiovisual components, participants view pediatric patients presenting with asthma exacerbations of differing severities and assign a HASS score.
- Following the initial scores, the module continues with additional education sourced from OpenPediatrics about each aspect of the HASS tool before participants are asked to score the vignettes a second time.

Hospital Asthma Severity Score (HASS)

SpO₂ (%)
Score 1	> 94% room air
Score 2	90 - 94% room air
Score 3	<90% on room air or requiring O₂ 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, Pediatric, Med-Peds, FM
- Nurses – ER, BBCH, PICU
- Attending Physicians – Pediatric Hospitalists, PICU, EM, Pediatric Pulmonary
- Respiratory Therapists – EM, PICU, BBCH

Results

- Forty-five clinicians across our health system, including both tertiary and community hospitals, completed the educational module.
- When vignettes are combined, the accuracy of scores improved, on average, 0.53 points after the module compared to before the module (95% CI = -0.88, -0.18; p = 0.003).
- When vignettes are separated, improvement was significant for Vignette 1, with an average improvement of 0.84 points (95% CI = 0.33, 1.35; p = 0.002), but improvement was not significant for Vignette 2 (95% CI = -0.48, 0.18; p = 0.344).
- Advanced Practice Providers, on average, score 3.2 points further from the correct score compared to Registered Nurses (95% CI = 0.9, 5.9; p = 0.022) before taking the HASS module.

Job Title	N=45
Registered Nurse	4 (8.9%)
Resident physician	3 (6.7%)
Attending physician	13 (29%)
Respiratory Therapist	24 (53%)
Medical Student	0 (0%)
Advanced Practice Provider	1 (2.2%)
Years of Experience	
0-3 years	6 (13%)
3-5 years	5 (11%)
5-10 years	4 (8.9%)
10+ years	30 (67%)
HASS Education	
Heard of HASS before	21 (47%)
Attended Grand Rounds by Dr. Gagnon	3 (6.7%)
Participated in Phase 1 of this study	7 (16%)
Participated in HASS LMS course	4 (8.9%)
Participated in BBCH Annual Nursing Conference 2023	1 (2.2%)
Other HASS education	6 (13%)
No HASS education	31 (69%)
Comfort level with HASS (1=least, 10=most)	8.0 (6.0, 9.0)
Understanding of HASS (1=minimal, 10=very well)	9.0 (7.0, 10.0)

Differences in Pre- and Post- Scores (Vignette 1)	Raw Score (Range)
Difference in PRE score from correct score	2 (1,3)
Difference in POST score from correct score	1 (0,2)
Change in Differences (pre difference - post difference)	0.5 (0,1.25)
Differences in Pre- and Post- Scores (Vignette 2)	
Difference in PRE score from correct score	1 (0,1)
Difference in POST score from correct score	1 (0,1)
Change in Differences (pre difference - post difference)	0 (0,0)

Results
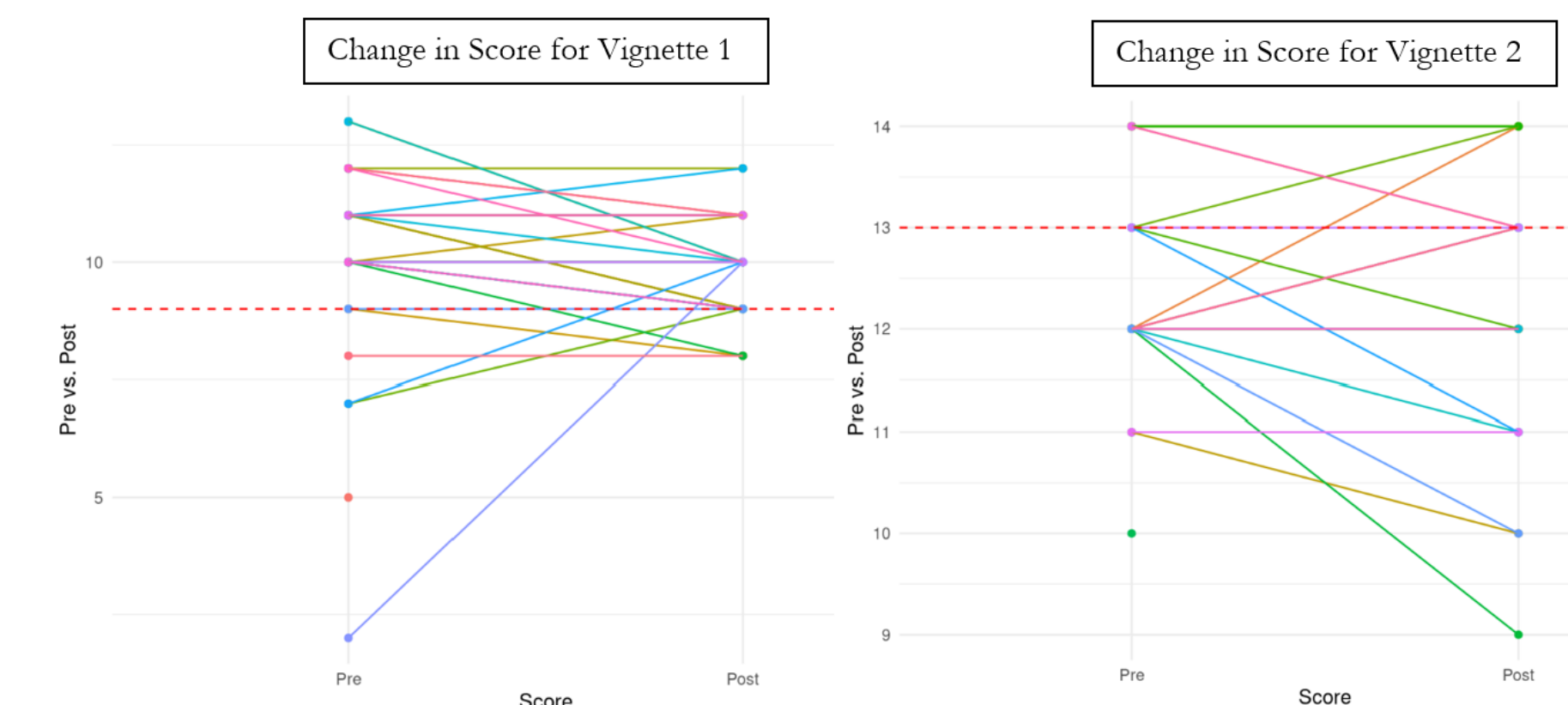
Conclusions

- There was significant improvement between pre- and post- scores in clinical vignette #1.
- These results indicate that educational intervention can improve score accuracy.
- The difference between participant score and the gold standard score further supports the need for additional education with our module, as well as other educational interventions across our health system.

Next Steps

- As we expand participation in this project, we can better evaluate whether both the clinician role and type of hospital contributes to inter-rater reliability.
- Expanding interdisciplinary educational modalities (i.e. Simulation)
- Disseminate to other MaineHealth hospitals.
- Continue to refine the pediatric asthma guidelines and weaning protocol using the HASS.
- Develop a QI project to evaluate effect of using HASS in all MaineHealth EDs 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
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