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Resident-Sensitive Quality Measures in the Pediatric Emergency Department: Exploring Relationships With Supervisor Entrustment and Patient Acuity and Complexity

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Abstract

Purpose

This study explores the associations between resident-sensitive quality measures (RSQMs) and supervisor entrustment as well as between RSQMs and patient acuity and complexity for encounters in the pediatric emergency department (PED) in which residents are caring for patients.

Method

Pediatric residents rotating through Cincinnati Children's Hospital Medical Center PED as well as supervising pediatric emergency medicine faculty and fellows were recruited during the 2017–2018 academic year for the purpose of collecting the following data from the residents' patient encounters for 3

illnesses (acute asthma exacerbation, bronchiolitis, and closed head injury [CHI]): supervisor entrustment decision rating, RSQMs relevant to the care provided, and supervisor patient acuity and complexity ratings. To measure the association of RSQM composite scores with the other variables of interest, mixed models were used.

Results

A total of 83 residents cared for 110 patients with asthma, 112 with bronchiolitis, and 77 with CHI. Entrustment decision ratings were positively associated with asthma RSQM composite scores (beta coefficient = 0.03; $P < .001$). There was no significant association between RSQM composite

scores and entrustment decision ratings for bronchiolitis or CHI. RSQM composite scores were significantly higher when acuity was also higher and significantly lower when acuity was also lower for both asthma ($P < .001$) and bronchiolitis ($P = .01$). However, RSQM composite scores were almost identical between levels of acuity for CHI ($P = .94$). There were no significant differences in RSQM composite scores when complexity varied.

Conclusion

This study found limited associations between RSQM composite scores and entrustment decision ratings but offers insight into how RSQMs could be used for the purposes of resident assessment and feedback.

Many traditional quality measures are not aligned with the work residents complete.^{1,2} This led us to develop resident-sensitive quality measures (RSQMs), which are quality measures developed and prioritized through stakeholder consensus to meet 2 criteria: (1) the task is important to the care of a patient with an illness of interest and (2) the task is likely performed primarily by a resident and not another team member (or by the team collectively).^{3,4} The RSQMs we have developed have largely been shown to both capture resident performance and demonstrate

a wide range of performance across residents and encounters, with some measures being performed often and some measures rarely being performed.⁵ However, we do not yet fully understand the variation in the demonstrated performance of residents or whether this variation leads to different levels of entrustment decision ratings by supervisors. Further elucidating this through understanding the relationships between RSQMs and other variables will be important. This study seeks to begin to address this gap by exploring the associations between RSQMs and supervisor entrustment as well as between RSQMs and patient acuity and complexity.

Understanding the relationship between RSQMs and supervisor entrustment is particularly timely and relevant given recent advances in competency-based assessment that have seen, among other things, the international uptake of the entrustment framework and entrustable professional activities (EPAs).^{6–9} Taking a synthetic view of assessment, EPAs seek to define the foundational activities

of a profession that individuals in that profession must be entrusted to perform. They further specify how much supervision individuals require to perform the activities until they are entrusted to execute them without supervision. Unlike most assessment frameworks, which focus only on the learner, EPAs and entrustment theoretically place the focus on the learner as well as on the outcome of care that patients receive.^{10,11} For example, in assessing a learner's ability to perform the EPA "care for the well newborn," the goal is to determine the level of supervision, including the possibilities of full, partial, or no supervision, that a learner needs to ensure safe and effective care of that newborn. Despite the patient focus of EPAs, the link between entrustment decisions and quality of care has not been demonstrated. Based on our method for developing them, RSQMs have clinical validity evidence built into them because one of the criteria used in developing them is that they must be important to the care of patients with the illnesses of interest. If entrustment decisions have a positive association with RSQM

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performance, that would offer validity evidence for entrustment decision ratings based on Messick's validity criterion of relationship to other variables.¹²

More globally, the relationship between care delivered by residents and the impact of this care on patient outcomes is also not well understood.¹³ This is likely due to the complexities involved, including variability in supervision approaches (e.g., closeness of clinical oversight,^{14–16} the supervisor's propensity to alter resident care before it reaches the patient, the supervisor's trust propensity¹⁷) and the challenge of measuring the impact of care attributed to the resident on patient experiences and outcomes.² This latter consideration is complicated both by extrinsic and intrinsic factors. Examples of extrinsic factors that influence care include contributions to care from other team members and patient acuity and complexity, which in turn can affect the degree of trust that a supervisor places in a resident to provide patient care.¹⁸ Stated differently, in the case of extrinsic factors, a supervisor may assign a lower level of entrustment to a highly performing resident to ensure a sicker patient receives appropriate care. While, in the case of intrinsic factors, such as a poorly performing resident, a supervisor may assign a lower level of entrustment to ensure a routine patient receives appropriate care. Despite these challenges, some findings suggest that resident involvement in care and continuity in care may be beneficial for patients, and large-scale studies show that residency training institutions have a lasting impact on the care provided by their graduates.^{19–25} However, it is not known what characteristics of residency programs or training institutions contribute to better or worse care, and work to unsnarl this quagmire is trying.²⁶ While challenging, we believe the relationship between resident care and patient care quality must be better understood.²⁷

To address this gap, this study seeks to understand the association between RSQMs and supervisor entrustment for encounters in the pediatric emergency department (PED) in which residents are caring for patients. Given their potential ability to modify the relationship between resident performance and supervisor entrustment, we also consider

the relationships between RSQMs and patient acuity and complexity.

Method

Setting, participants, and patient encounters

During the 2017–2018 academic year, we recruited categorical (i.e., not in a combined training program) pediatric residents across all 3 years of training rotating through the Cincinnati Children's Hospital Medical Center (CCHMC) PED as well as supervising pediatric emergency medicine faculty and fellows to participate in this study. To be eligible, residents were required to have at least 4 weeks scheduled in the PED during the study period to allow us to gather multiple encounters for each resident. Five of 105 eligible residents and 1 of 55 eligible faculty members and fellows declined to participate. Additionally, 2 authors (D.J.S. and B.S.) who were supervising pediatric emergency medicine faculty did not participate. For participating residents, we obtained a supervisor entrustment decision and quality measures for encounters they had with patients presenting with 3 common, acute problems: acute asthma exacerbation (hereafter simply asthma), bronchiolitis, and closed head injury (CHI). These were chosen as representative diagnoses for the general pediatrics EPA focused on providing care to patients presenting with common, acute problems.²⁸

Eligible encounters were considered to be those with a participating supervisor in which a participating resident was the resident of record for the patient from the outset of the encounter to the point of disposition being set for the patient in the electronic health record (EHR).

Encounters with patients from 0 to 17 years old were considered eligible for asthma and CHI. For asthma encounters, reactive airway disease in younger children that is treated the same as asthma in older children was included. For bronchiolitis, patients were eligible if they were 12 months old or younger as bronchiolitis overlaps with reactive airway disease after this age.

Measures

Entrustment decision ratings were collected for each encounter.

Supervising pediatric emergency medicine faculty or fellows made entrustment decisions by completing an entrustment assessment based on Chen and colleagues' supervision scale (Question 1 in Supplemental Digital Appendix 1 at <http://links.lww.com/ACADMED/A810>).²⁹ This supervision scale details supervision levels that include 2 gradations of full supervision, 3 gradations of partial supervision, no supervision, and the ability to supervise others.²⁹

To account for patient acuity and complexity, we asked supervisors to respond to 2 additional questions that rated these as standard, higher than usual, or lower than usual (Questions 9 and 10 in Supplemental Digital Appendix 1 at <http://links.lww.com/ACADMED/A810>). Acuity was defined as "severity or how sick the patient is" in the question about acuity, whereas complexity was defined as "challenging to understand and/or manage from a medical, psychosocial, and/or other perspective" in the question about complexity.

After we drafted the initial version of the entrustment assessment form, we conducted 15 cognitive interviews with faculty and fellow supervisors. Cognitive interviews seek to determine if the individuals completing a questionnaire understand the questions as intended, allowing developers to make adaptations to ensure end user understanding and promote intended use.^{30,31} Several changes were made as a result of these interviews. For example, we edited the questions about acuity and complexity to give examples of both to ensure that respondents would clearly understand the difference between these 2 variables. Once the questions were finalized, faculty and fellow development sessions addressing understanding and use of these questions were conducted the month before initiating the study and once monthly for 6 of the first 7 months of the study. Additionally, a badge card (i.e., a card with details on the supervision scale that could be worn on a lanyard along with an employee's badge) and tip sheets focused on question understanding and use were provided to all supervisors in the first few months of the study.

RSQMs were also gathered for each encounter. Each of the 3 illnesses of interest

had a set of previously prioritized RSQMs that were used in this study (Chart 1).^{3,4} An RSQM composite score (possible range: 0.00–1.00) was calculated for each encounter by determining the proportion of individual RSQMs performed divided by the total possible RSQMs that could have been performed for each encounter. This approach was taken due to the varied number of RSQMs within and between the 3 illnesses. That is, while most RSQMs applied in all encounters, some were not applicable based on the clinical context (e.g., some measures applied only to patients who were discharged home and not admitted) and each illness had a different number of RSQMs.

Data collection

When research assistants (individuals assisting with studies in the PED) identified eligible encounters, they approached supervisors to complete the entrustment assessment form once a disposition and diagnosis had been set for the patient. Thus, we enrolled a convenience sample of encounters for 83 eligible residents when research assistants were present in the PED (i.e., 16 hours a day for 6 days each week and 8 hours a day for the final day of the week). The entrustment forms were completed via REDCap (Vanderbilt University, Nashville, Tennessee). To ensure accuracy, 2 individuals (research assistants, including A.M., and lead investigator, D.J.S.) worked independently to manually extract RSQMs from the EHR following each encounter.

We compensated supervisors \$5 for each form completed.

Data analysis

Descriptive statistics were generated for the entrustment decision ratings for the 3 illnesses of interest and for all illnesses combined, as well as for the RSQM composite scores for each condition. To measure the association of the entrustment decisions with RSQM composite scores, we used a mixed models approach to account for observations nested within residents.³² We also developed a model for each illness with the RSQM composite score as the dependent variable and the entrustment decision rating as the independent variable of interest. This was due to the non-normal distribution of the entrustment decisions. We adjusted for patient acuity, patient complexity, and resident postgraduate

year (PGY). Similarly, we combined the RSQM composite scores for the 3 illnesses and developed a model adding diagnosis as a covariate. In addition, we dichotomized the entrustment decision ratings by including the entrustment levels of unsupervised practice and able to supervise others in one category and any supervision level below unsupervised practice in a second category and conducted the same analysis with the dichotomized measures of entrustment decision ratings as the independent variable of interest.

We also used a mixed models approach to measure the associations of RSQM composite scores with patient acuity and complexity. First, we developed models for each illness with the RSQM composite score as the dependent variable and acuity as the independent variable of interest, controlling for PGY. We next conducted the same analysis but with complexity as the independent variable of interest. Finally, we combined the RSQM composite scores for the 3 illnesses and repeated the analyses with diagnosis as an additional covariate.

The CCHMC Institutional Review Board reviewed this study and determined it to be exempt.

Results

A total of 83 residents cared for 110 patients presenting with asthma (59 unique residents), 112 patients presenting with bronchiolitis (64 unique residents), and 77 patients presenting with CHI (46 unique residents). Table 1 details descriptive statistics for the entrustment decision ratings and RSQM composite scores. There were higher average RSQM composite scores for asthma compared with the other 2 illnesses (0.81 vs 0.61 [bronchiolitis] and 0.63 [CHI]).

Association between RSQM composite scores and entrustment decision ratings

As Table 2 shows, entrustment decision ratings exhibited a statistically significant, but modest, positive linear relationship with asthma RSQM composite scores ($P < .001$) and a statistically significant positive linear relationship with all illnesses combined ($P = .006$). For every 1-point increase in entrustment decision ratings (range: 1–7, where 1 = full supervision with work jointly completed

and 7 = able to supervise others), RSQM composite scores for asthma increased by 0.03 (out of 1.00) and scores for all illnesses combined increased by 0.01. The data showed no significant association between RSQM composite scores and entrustment decision ratings for bronchiolitis or CHI.

As Table 3 shows, when entrustment decision ratings are dichotomized to encounters where residents are entrusted with unsupervised practice or the ability to supervise others (the highest 2 levels of the supervision scale) compared with being assigned any supervision level below entrustment with unsupervised practice (the lowest 5 levels of supervision), there are statistically significant differences in RSQM composite scores between groups for asthma ($P = .01$), CHI ($P = .04$), and all illnesses combined ($P = .02$). Bronchiolitis, which did not have significantly different RSQM composite scores between groups, had the lowest average RSQM composite score for residents entrusted with unsupervised practice or the ability to supervise others (0.61, 95% confidence interval [CI]: 0.55, 0.66) and the second lowest average RSQM composite score for residents entrusted below unsupervised practice (0.62, 95% CI: 0.56, 0.67).

Association between RSQM composite scores, patient acuity, and patient complexity

As Figure 1 shows, when controlling for PGY, RSQM composite scores were significantly higher when acuity was also higher and significantly lower when acuity was also lower for both asthma ($P < .001$) and bronchiolitis ($P = .01$). However, RSQM composite scores were almost identical between levels of acuity for CHI ($P = .94$). Controlling for PGY, RSQM composite scores were significantly higher when acuity was also higher and significantly lower when acuity was also lower for all illnesses combined ($P < .001$).

No significant differences were seen in RSQM composite scores when complexity varied for any individual illness or all illnesses combined (Figure 1).

Discussion

This study takes an important step in pursuing the link between educational

Chart 1

RSQMs for Acute Asthma Exacerbation, Bronchiolitis, and Closed Head Injury^a

Acute asthma exacerbation RSQMs	Bronchiolitis RSQMs	Closed head injury RSQMs
Use asthma order set	Follow bronchiolitis pathway	Closed head injury or PECARN ^b best practice advisory used
Correct medication dose ordered for albuterol	Document birth history (preemie or not a preemie)	Appropriate closed head injury or PECARN ^b pathway used
Use of dexamethasone as steroid	Day of illness clearly documented	Mechanism of injury documented
Correct medication dose ordered for dexamethasone	Documentation of previous wheezing	Documentation of time of injury
Time from resident assigning self to patient to resident entering steroid order	Assessment of severity documented	Documentation of presence or absence of loss of consciousness
Correct medication dose ordered for ipratropium	Effort of breathing documented	Documentation of presence or absence of emesis
Documentation of previous intubation or bilevel positive airway pressure for asthma	Documented quality of air entry (normal, decreased, etc.)	Documentation of whether patient is back to baseline or not
Note the acuity of the patient in documentation	Documentation of wheezing	Documentation of presence or absence of other head injury in the history
Documentation of work of breathing	Documentation of crackles	Assessment of severity documented
Documentation of aeration or air exchange	Documented presence or absence of subcostal retractions	Documentation of presence or absence of hematoma on physical exam (if present, location and size also documented)
Presence or absence of wheezing documented	Documented presence or absence of intercostal retractions	Thorough head exam (head, eyes, skull) documented
Ensure at least 3 descriptive words in respiratory exam documentation	Documented presence or absence of suprasternal retractions	Documentation of Glasgow Coma Scale score
Resident documents own Pediatric Respiratory Assessment Measure score	Oxygen saturation clearly documented	Full neurologic exam documented
Resident-assigned Pediatric Respiratory Assessment Measure score matches resident-placed initial medication orders	Hydration status clearly documented	Documentation of presence or absence of other non-head injury on physical exam
Document patient response to intervention	Documentation of patient response to specific therapeutics (i.e., how they responded to suctioning, how they responded to breathing treatment, how they responded to normal saline bolus, etc.)	Appropriate differential diagnosis and medical decision making documented
Documentation of disposition decision	Oral feeding tolerance clearly documented	Reassessments of patient documented
Use of standardized dosing for discharge medication (i.e., dexamethasone)	Documentation of justification for appropriate disposition (sent home vs admitted)	Return to school or play recommendations in discharge papers
Home dexamethasone instructions documented in written discharge instructions	Documentation of worsening respiratory symptoms as a reason to return in written discharge instructions	Use of standard or premade discharge instructions for diagnosis
State who to follow up with and provide their contact information in discharge papers	Use standard or premade discharge instructions for bronchiolitis	Appropriate follow-up (sports medicine, rehabilitation medicine, neurology, etc.) recommended
Documentation of needing albuterol more often than every 4 hours as a reason to return in written discharge instructions	Documentation of poor feeding as a reason to return in written discharge instructions	
Documentation of worsening respiratory symptoms as a reason to return in written discharge instructions	Bulb suction teaching for home ordered	
	State who to follow up with and provide their contact information in discharge papers	
	State appropriate number of days to follow up in discharge papers	

Abbreviation: RSQMs, resident-sensitive quality measures.

^aUsed in a study exploring the associations between RSQMs and supervisor entrustment as well as between RSQMs and patient acuity and complexity, Cincinnati Children's Hospital Medical Center Pediatric Emergency Department, academic year 2017–2018.

^bPECARN is the Pediatric Emergency Care Applied Research Network, which conducted a study that delineated a decision rule for managing closed head injury in Kuppermann N, Holmes JF, Dayan PS, et al. Identification of children at very low risk of clinically-important brain injuries after head trauma: A prospective cohort study. *Lancet*. 2009;374:1160–1170.

Table 1

Descriptive Statistics for Supervisor Entrustment Decision Ratings and RSQM Composite Scores for Acute Asthma Exacerbation, Bronchiolitis, Closed Head Injury, and All Illnesses Combined, Cincinnati Children’s Hospital Medical Center Pediatric Emergency Department, Academic Year 2017–2018^a

Rating or score	Median (IQR)	Range
Entrustment decision rating		
Acute asthma exacerbation	5 (4, 6)	1–7
Bronchiolitis	5 (4, 6)	1–7
Closed head injury	4 (4, 6)	1–7
All illnesses combined ^b	5 (4, 6)	1–7
RSQM composite score		
Acute asthma exacerbation	0.81 (0.74, 0.88)	0.47–1.00
Bronchiolitis	0.61 (0.53, 0.71)	0.35–0.91
Closed head injury	0.63 (0.56, 0.68)	0.44–0.89

Abbreviations: RSQM, resident-sensitive quality measure; IQR, interquartile range.

^aAdjusted for postgraduate year, patient acuity, and patient complexity.

^bAdjusted by diagnosis.

outcomes and patient care outcomes through examining the associations between RSQM composite scores and supervisor entrustment decision ratings as well as between RSQM composite scores and patient acuity and complexity.²⁷

Association between RSQM composite scores and entrustment decision ratings

We found a statistically significant, but modest, positive linear relationship between entrustment decision ratings and RSQM composite scores for asthma. However, asthma RSQM composite scores only increased 0.03 (out of 1.00) for every 1-point increase in entrustment decision ratings (range: 1–7). While statistically significant, this is likely not educationally meaningful. We also

found a statistically significant positive linear relationship between entrustment decision ratings and RSQM composite scores for all illnesses combined, but this seems to be driven by the asthma data because we did not find significant relationships between RSQM composite scores and entrustment decisions for the other 2 illnesses we considered.

RSQM composite scores were significantly higher for residents entrusted with unsupervised practice or the ability to supervise others than for residents entrusted to lower supervision levels for all conditions (asthma, CHI, and all illnesses combined) other than bronchiolitis. This offers validity evidence for RSQM composite scores; however, the absolute difference is modest.

Laying a foundation for future work: RSQMs as assessment data?

While we would expect a positive relationship between RSQM composite scores and entrustment decision ratings across all entrustment decisions and conditions considered, our findings do not demonstrate this. It may be that such a relationship currently does not exist. In this case, 1 of 2 considerations may be important to explore. First, RSQMs may be better suited than entrustment decisions to assess resident performance in a manner that matters for patients. Second, a combination of RSQMs as well as entrustment, or other assessment, decisions around aspects of care not measured by RSQMs may be needed. Unlike entrustment decisions, which are intended to be holistic decisions based on the integration of competencies to deliver care, RSQMs only consider circumscribed tasks thought by stakeholders to be linked with care quality. They do not reflect more complex aspects of care, such as clinical reasoning, thoroughness, and dependability.

At the outset of this Research Report, we noted that entrustment should *theoretically* place focus on learners as well as on the outcomes of the care that patients receive. However, assessment efforts using an entrustment framework have been shown to suffer from the same “frame of reference” problems that other forms of assessment face. Namely, supervisors use variable frames of reference, including themselves, in determining what level of supervision the learner needs rather than what the patient needs to receive safe, effective, patient-centered care.³³ The “self” that is used for comparison could be what the assessor is capable of now, what the assessor was capable of at the same level of training as the learner being assessed, or some other reference point. If entrustment decisions do not align with the delivery of stakeholder-informed optimal care—which this study calls into question, as demonstrated by the lack of or modest, likely educationally insignificant, associations between RSQMs and entrustment decision ratings—other measures to determine whether patients receive such care must be sought. With the noted caveat that RSQMs may not be sufficient to stand alone to assess resident performance, the range of RSQM composite scores alone suggests their potential promise for discerning

Table 2

Association Between RSQM Composite Scores and Supervisor Entrustment Decision Ratings for Acute Asthma Exacerbation, Bronchiolitis, Closed Head Injury, and All Illnesses Combined, Cincinnati Children’s Hospital Medical Center Pediatric Emergency Department, Academic Year 2017–2018^a

Illness	Beta coefficient ^b	95% CI	P value
Acute asthma exacerbation	0.03	(0.01, 0.05)	< .001 ^c
Bronchiolitis	0.0004	(–0.02, 0.02)	.96
Closed head injury	0.01	(–0.01, 0.03)	.19
All illnesses combined ^d	0.01	(0.004, 0.02)	.006 ^c

Abbreviations: RSQM, resident-sensitive quality measure; CI, confidence interval.

^aAdjusted by postgraduate year, patient acuity, and patient complexity.

^bThe change in RSQM composite scores associated with a 1-point increase in entrustment decision ratings (range: 1–7, where 1 = full supervision where work is completed jointly and 7 = able to supervise others). Out of 1.00.

^cSignificant at P < .01.

^dAdjusted by diagnosis.

Table 3

Difference in RSQM Composite Scores for Residents Who Are Entrusted With at Least Unsupervised Practice Compared With Those Who Are Entrusted Below Unsupervised Practice for Acute Asthma Exacerbation, Bronchiolitis, Closed Head Injury, and All Illnesses Combined, Cincinnati Children's Hospital Medical Center Pediatric Emergency Department, Academic Year 2017–2018^a

Illness	RSQM composite score for entrustment with unsupervised practice or the ability to supervise others, average (95% CI)	RSQM composite score for entrustment below unsupervised practice, average (95% CI)	P value
Acute asthma exacerbation	0.83 (0.78, 0.87)	0.76 (0.73, 0.80)	.01 ^b
Bronchiolitis	0.61 (0.55, 0.66)	0.62 (0.56, 0.67)	.65
Closed head injury	0.63 (0.58, 0.69)	0.58 (0.53, 0.62)	.04
All illnesses combined ^c	0.70 (0.67, 0.73)	0.66 (0.64, 0.69)	.02

Abbreviations: RSQM, resident-sensitive quality measure; CI, confidence interval.

^aAdjusted for postgraduate year, patient acuity, and patient complexity. The highest possible RSQM composite score was 1.00.

^bSignificant at $P = .01$.

^cAdjusted by diagnosis.

performance better than traditional assessment efforts that suffer from more range restriction, making them a ready candidate. The significantly higher RSQM composite scores for asthma, CHI, and all illnesses combined for residents entrusted with unsupervised practice or the ability to supervise others than for residents entrusted to lower supervision levels provide additional support for the use of RSQMs as assessment tools given that this positive relationship between RSQM composite scores and entrustment decision ratings is expected. Furthermore, given their primary focus on the provision of optimal care to patients, RSQMs could perhaps be a substantial, or even primary, form of assessment used to inform entrustment decisions for residents. This could lead to entrustment decisions that are associated with measures of quality care, which is a desired outcome in medical education.

Stated differently, the paradox of the entrustment framework, which is intended to place the patient at its core, is that care may worsen if trainees are given more trust than deserved. In this study, our findings suggest that residents may be receiving higher than deserved entrustment decisions, as, based on RSQM composite scores, patients may not be receiving optimal care. The question remains as to why this is the case. Is it due to the need for frame of reference training, as suggested above? Or may it also call into question the supervisory skills of faculty and fellows

if components of care quality are not factored into their entrustment decisions?

Educational value despite noneducationally significant findings.

In addition to potential utility as direct measures of resident performance, we believe RSQMs also have educational value despite their general lack of association with the other variables we considered in this study. Residents report suboptimal training in and understanding of quality improvement as well as the perception that they do not contribute meaningfully to quality improvement efforts.^{34,35} As with other areas of suboptimal training, this may reflect the lack of faculty skills in competencies that were not a focus of medical training in the pre-competency-based medical education era. Furthermore, many traditional quality measures are not aligned with the work residents complete and few efforts have tried to address this gap.^{1,2,36–38} We believe these circumstances send a strong message that we must embrace any efforts to provide residents with feedback about their performance on quality measures and then subsequently determine if such feedback leads to improved RSQM performance. Feedback can be hard to come by in training, even with the advent of competency-based assessment, which places focus on the importance of direct observation and real-time feedback.^{39–41} Therefore, even if RSQM composite scores do not have strong

relationships with other measures of resident performance, they do capture whether residents are completing components of their work that have been deemed important to patient care by fellow residents and supervisors. Moreover, these measures demonstrate a wide range of performance (0.47–1.00 for asthma, 0.35–0.91 for bronchiolitis, and 0.44–0.89 for CHI) and almost no resident in our initial pilot study attained all possible RSQMs in their patient encounters.⁵ Thus, RSQMs can provide residents with feedback about care components they are not providing that have been deemed important to patient care.

There were higher average RSQM composite scores for asthma compared with the other 2 illnesses (0.81 vs 0.61 [bronchiolitis] and 0.63 [CHI]). This is likely because quality improvement efforts at the study site were targeting the care of patients with asthma in the PED during this study period. However, it is striking to note that these efforts still left large gaps in asthma care provided by residents (as the highest possible RSQM composite score was 1.00).

Association between RSQM composite scores, patient acuity, and patient complexity

For asthma and bronchiolitis, RSQM composite scores were higher when caring for patients with higher acuity and lower when caring for patients with lower acuity. This is perhaps the opposite of what might be expected as higher-acuity patients could lead to worse care given the additional cognitive burden they may elicit, and lower-acuity patients may lead to more thorough or complete care given the lower cognitive burden they may elicit. However, our findings suggest that high acuity triggers better performance and more attention to doing the right things in patient care. Acuity may focus the mind by engaging alertness and attention to detail. Conversely, perhaps residents view lower-acuity cases as opportunities to streamline their documentation and care in a manner that helps their overall efficiency at managing multiple patients at once but perhaps lacks the desired depth of care for these patients. Future research should explore this area further as it is important to building further validity evidence for RSQMs and their composite scores.

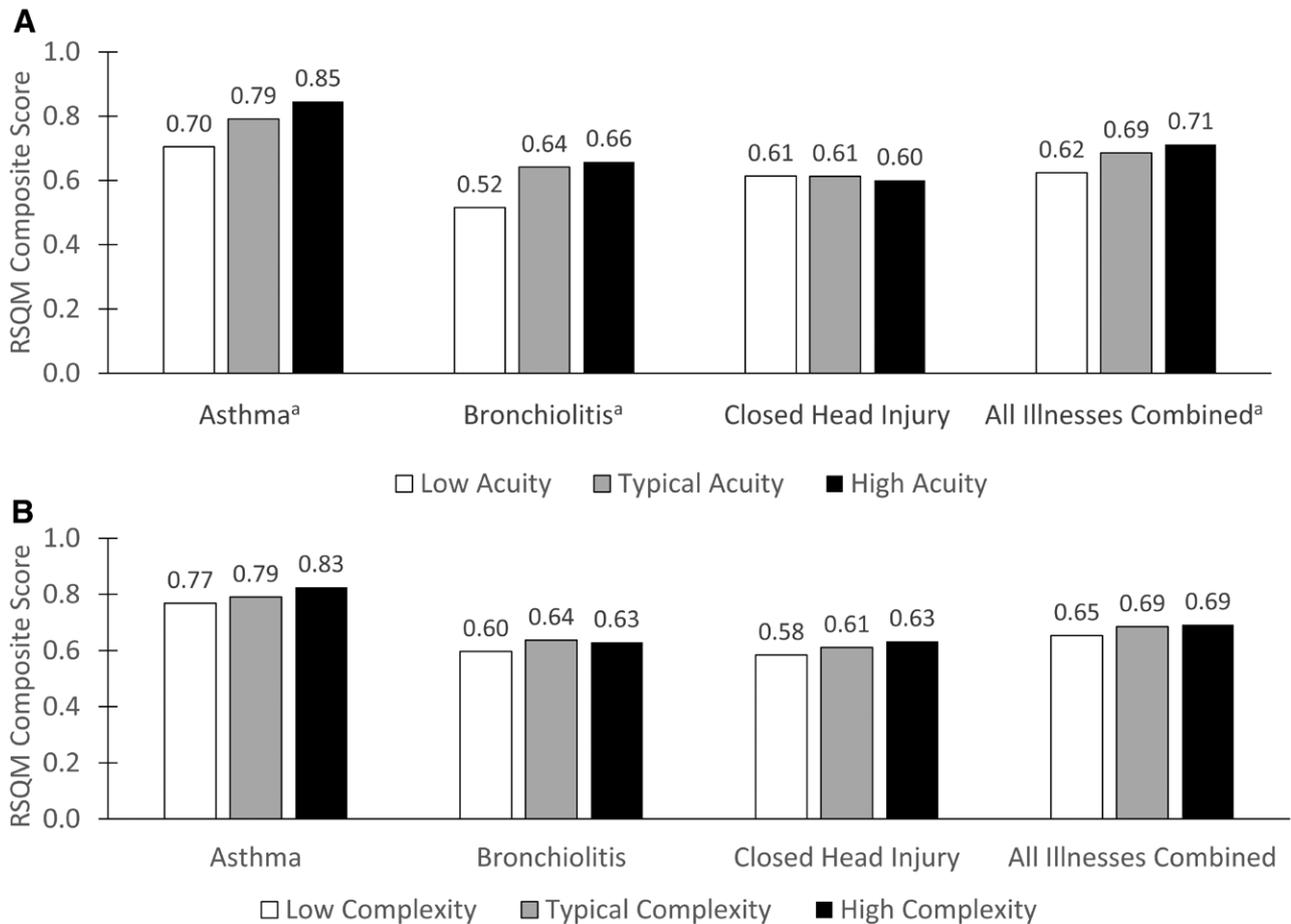


Figure 1 Resident-sensitive quality measure (RSQM) composite scores, adjusted by postgraduate year, by (Panel A) illness and patient acuity and (Panel B) illness and patient complexity, Cincinnati Children's Hospital Medical Center Pediatric Emergency Department, academic year 2017–2018. Illnesses are acute asthma exacerbation (asthma), bronchiolitis, and closed head injury. All illnesses combined, adjusted by postgraduate year and diagnosis, are also shown. Acuity was defined as “severity or how sick the patient is,” whereas complexity was defined as “challenging to understand and/or manage from a medical, psychosocial, and/or other perspective.”
^aSignificant at $P < .05$.

While we found significant relationships between RSQM composite scores and patient acuity, we did not find significant relationships between RSQM composite scores and patient complexity. Acuity was defined as “severity or how sick the patient is” in the entrustment assessment form, whereas complexity was defined as “challenging to understand and/or manage from a medical, psychosocial, and/or other perspective” in the entrustment assessment form (Supplemental Digital Appendix 1 at <http://links.lww.com/ACADMED/A810>). While patients presenting in a manner that makes them more severe or ill seems as though it may activate the learner, it appears that a patient being more challenging to understand or manage may not have the same effect.

Limitations

There are limitations to consider in this study. First, the manual chart extraction

of RSQMs makes extraction errors possible. We sought to minimize errors by employing 2 individuals to perform data extraction. Manual extraction was chosen because some of the RSQMs cannot be automatically extracted from the EHR, limiting their usability beyond the study setting. However, advances in natural language processing may be a forthcoming solution to this limitation. Second, while we completed cognitive interviews during assessment item development to reduce unwanted variability in questionnaire responses, raters likely vary in their trust propensity and supervision style.^{16,17} These variations almost certainly led to variations in assigned supervision levels, which could have impacted the association of entrustment decision ratings with RSQM composite scores. Third, we constructed RSQM composite scores for this study. These are novel and have not had previous validity work focused on

them. Therefore, our findings should be considered with this in mind. However, it should be noted that the RSQMs were developed to have validity evidence built into them as they all met the criteria of being rated highly in terms of their importance to care for the illnesses of interest by supervisors and residents working in the PED.^{3,4} As a result, we did not think it was necessary, nor appropriate, to weight RSQMs differently when determining the RSQM composite scores because all individual RSQMs were rated highly for importance to the illness of interest in consensus group methods before this study.³ Finally, in our analyses, we treat supervision-level assignments, which are ordinal, as continuous data. However, this is a commonplace practice, and psychometric scholars have noted that “parametric methods can be utilized [to treat ordinal data as continuous data] without concern for ‘getting the wrong answer.’”⁴²

Conclusions

The relationship between traditional assessment frameworks, such as entrustment, and care quality is critical but not well understood. As one of the first studies seeking to tackle this, we did not tame this problem in our study. However, we found interesting relationships that should be considered in the current landscape. Addressing the health needs of patients is the foundation of competency-based medical education, which was first advocated more than 40 years ago.^{43,44} The question today is whether we, as medical educators, are committed to determining how new and emerging patient-centered assessment efforts, such as RSQMs and entrustment decisions, interact with one another to ensure education outcomes align with patient outcomes. If we are not, will patients and quality improvement scholars wait another 40 years for us?

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