A Brief Tool to Predict Agitation in Pediatric Emergency Psychiatric Patients

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abstract

OBJECTIVES: To validate the 5-item Brief Rating of Aggression in Children and Adolescents–Short (BRACHA-S) completed by emergency department (ED) nurses at triage for predicting agitation requiring intervention (ARI) among pediatric ED psychiatric or mental and behavioral health (MBH) encounters.

METHODS: We conducted a prospective observational prognostic validation study (October 2024-November 2025) at 2 pediatric EDs. Eligible encounters included children aged 5 to 18 years presenting with MBH concerns. After ED arrival, nurses completed the 5 BRACHA-S items assessing aggression-related history and current agitation (total score, 0–5). ARI was defined as pharmacologic treatment of agitation/aggression and/or physical or mechanical restraint use. Discrimination was assessed with area under the receiver operating characteristic curve (AUROC). Performance characteristics were estimated for a 3-tier model (scores 0–2, 3, and 4–5).

RESULTS: Among 472 encounters, 55 (11.7%) had ARI. BRACHA-S scores were associated with ARI (AUROC, 0.72; 95% CI, 0.64–0.79). ARI incidence increased with score: 0, 3.3% (2/60); 1, 6.3% (6/96); 2, 6.4% (7/110); 3, 12.4% (17/137); 4, 31.8% (14/44); and 5, 36.0% (9/25). Scores 0 to 1 had a negative predictive value of 96.7% but a specificity of 13.9%. Scores 4 to 5 had a specificity of at least 89% and a positive predictive value of greater than 33%. Compared with scores 0 to 2, relative risk of ARI was 2.2 (95% CI, 1.1–4.3) for score 3 and 5.9 (95% CI, 3.3–10.7) for scores 4 to 5.

CONCLUSIONS: In pediatric ED MBH encounters, the nurse-completed triage BRACHA-S demonstrated moderate discrimination and identified clinically meaningful risk gradients for ARI that may support early safety planning.

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Dr Babcock conceptualized and designed the study, secured funding, supervised study conduct and data collection, drafted the initial manuscript, and revised the manuscript. Ms Klein coordinated and supervised data collection, contributed to the interpretation of findings, and drafted and revised the manuscript. Mr Zhang conducted the statistical analyses and contributed to the interpretation of findings and manuscript revision. Dr Daraiseh, Mr Siders, and Mr Murphy contributed to study design/implementation and data acquisition/management and revised the manuscript. Dr Thomas performed medical record reviews, contributed to the interpretation of findings, and revised the manuscript. Dr Pomerantz contributed to study supervision, medical record review, data interpretation, and manuscript drafting and revision. Drs Barzman, Hanson, Tanguay, and Ketabchi contributed to the interpretation of findings and revised the manuscript for important intellectual content. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

WHAT'S KNOWN ON THIS SUBJECT: Agitation in pediatric emergency psychiatric visits can result in medication use or restraints, injury risk, and high resource use. Early risk stratification at arrival could guide proactive safety planning, but few brief triage-feasible tools are validated.

WHAT THIS STUDY ADDS: In a prospective cohort of 472 emergency psychiatric visits, a nurse-completed 5-item triage Brief Rating of Aggression by Children and Adolescents–Short showed moderate discrimination for agitation requiring intervention (area under the receiver operating characteristic curve, 0.72) and identified clinically meaningful 3-tier risk groups (low, medium, high) with stepwise risk.

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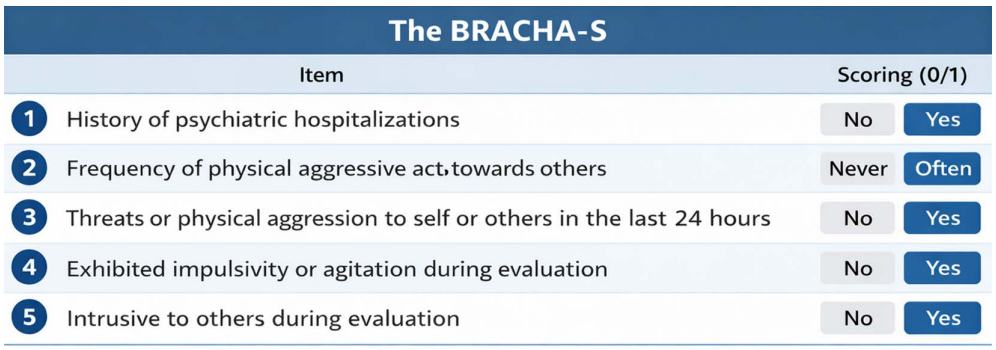

FIGURE 1.

The BRACHA-S items and scoring. Items are scored 0 (no/never) or 1 (yes/often) and summed (range, 0–5). BRACHA-S © 2026 Cincinnati Children's Hospital Medical Center. All rights reserved. Available for licensing through Cincinnati Children's Innovation Ventures (Innovation.Ventures@cchmc.org). Abbreviation: BRACHA-S, Brief Rating of Aggression by Children and Adolescents–Short.

INTRODUCTION

Pediatric emergency department (ED) visits for psychiatric or mental and behavioral health (MBH) concerns have increased dramatically over the past decade, now accounting for more than 13% of all pediatric ED encounters nationally.[1–5] Among these encounters, approximately 10% involve the use of pharmacologic agents or physical/mechanical restraints to manage agitation or aggression.[6–8] These events pose safety risks and psychological distress, consume substantial resources, and prolong ED length of stay (LOS).[8,9] Consensus guidance and ED quality-improvement studies suggest that escalation and restraint use may be mitigated through proactive deescalation, targeted environmental and staffing supports, and early medication planning[9–13]; however, these strategies depend on identifying risk early in the visit to mobilize resources before behaviors intensify. To be clinically useful, early stratification must be brief and feasible within ED workflows and paired with a care pathway that aligns prevention and monitoring intensity with risk of escalation. Despite this burden and clinical need, few validated tools have been assessed for use at ED arrival to stratify agitation/aggression risk among children and adolescents during the ED stay, representing a critical gap in pediatric emergency care.[9,14–18]

The original 14-item Brief Rating of Aggression by Children and Adolescents (BRACHA) tool was designed to assess the risk of inpatient aggression and is typically completed as part of the psychiatric evaluation in the ED by trained MBH specialists after medical clearance. It has demonstrated predictive validity for inpatient aggressive behaviors (area under receiver operating characteristic curve [AUROC], 0.72) and high interrater reliability (intraclass correlation coefficient, 0.91; 95% CI, 0.85–0.95).[19,20] In a retrospective analysis at our institution, the BRACHA predicted an event of agitation requiring intervention (ARI) occurring in the ED, defined as the administration of either oral disintegrating tablet (ODT) or intramuscular (IM) medications typically used for agitation or aggression and/or the application of physical or mechanical restraints, with an AUROC of 0.81.[21] In that same analysis, we identified a 5-item subset of the original instrument (item BRACHA-Short [BRACHA-S]; Figure 1) that retained similar accuracy (AUROC, 0.80).[21] Completion after medical clearance and reliance on MBH specialist raters limit the feasibility of the original BRACHA for early triage screening, and the shortened version has not been prospectively evaluated in ED triage settings.

Building on our prior work, the objective of this study was to prospectively validate the BRACHA-S in the pediatric ED when completed by nurses at triage to identify encounters at risk for an ARI event during the ED visit. We hypothesized that the BRACHA-S would demonstrate strong predictive ability (AUROC $\geq$ 0.70) for ARI in this context. Operating characteristics across score thresholds and tiered risk groupings were also assessed to support clinically actionable early risk stratification.

METHODS

Study Design and Setting

This was a prospective observational prognostic validation study conducted between October 2024 and November 2025 at 2 academic pediatric EDs within a large children's hospital system with dedicated psychiatric intake services, with annual MBH visit volumes of 5272 at site 1 and 2302 at site 2. Both sites use a standardized agitation management pathway with similar staffing and documentation practices. The institutional review board approved the study with a waiver of informed consent. Reporting follows the Strengthening the Reporting of Observational Studies in Epidemiology guideline[22,23] and relevant items from the Transparent Reporting of a multivariable prediction model for Individual Prognosis Or Diagnosis statement.[24,25] Study procedures and analytic plans have been published previously.[26]

Study Participants

Eligible encounters included patients aged 5 to 18 years presenting to the ED with a psychiatric or MBH chief concern and low nursing suspicion for a primary medical etiology. Encounters were excluded if immediate life-saving intervention was required or if severe agitation on arrival precluded the timely completion of the BRACHA-S assessment.

Study Outcomes, Exposure, and Variables

The primary outcome was the first episode of ARI during the ED visit, defined consistently with prior work as the use of pharmacologic agents and/or application of physical or mechanical restraints for agitation or aggression. Events were identified from electronic health record (EHR) and confirmed as agitation or aggression related by independent, anonymized double medical record review, with final classification by consensus. Pharmacologic agents included sublingual olanzapine or risperidone or IM ziprasidone, haloperidol, lorazepam, or midazolam. Physical restraint events were ascertained from restraint orders with corresponding restraint flowsheet documentation.

The primary exposure was the BRACHA-S score, a 5-item nurse-completed assessment of historical and behavioral factors associated with agitation and aggressive behavior risk. Items, response options, and binary scoring were derived from the original 14-item BRACHA, preserving item wording and response structure when feasible and dichotomizing responses for rapid triage use.[19–21] Items were scored 0 or 1, with a total score ranging from 0 to 5. The version shown in Figure 1 was tested. Additional variables, including demographics, mode of arrival (emergency medical services, police, or walk-in) and time, Emergency Severity Index triage category, timing of ARI events, discharge disposition and time, and primary and secondary diagnostic codes associated with the ED encounter, were extracted from the EHR. Race was collected to characterize the study population and contextualize restraint use, given previously reported disparities,[27] and was self-reported at registration. MBH diagnoses were derived from the final *International Classification of Diseases, Tenth Revision* (*ICD-10*) encounter diagnoses codes using the Child and Adolescent Mental Health Disorders Classification System, which maps *ICD-10* codes to *Diagnostic and Statistical Manual of Mental Disorders* (5th Edition) aligned diagnostic groupings.[28] ED *ICD-10* codes suggesting possible medical causes of agitation or aggression were identified.[29,30] Encounters lacking an MBH diagnostic grouping or flagged for a potential medical etiology underwent medical record review to confirm classification.

Study Procedures

Research coordinators identified eligible encounters during prespecified enrollment windows by screening the ED electronic track board. The assigned nurse completed the BRACHA-S during clinical assessment at triage or in the initial treatment room using direct observation, brief questioning, and/or medical record review. Item-level responses were entered into a tablet-based system for research only. Scores were not displayed in real time, did not alter clinical care, and did not trigger any score-based clinical response. All patients received usual care, including standard deescalation by trained ED staff. Time from arrival to tool completion was tracked. At site 1, completion initially occurred after first room placement (median of 45.5 minutes [IQR, 37–56] after arrival; n = 94 encounters) but later shifted to triage (median of 13 minutes [IQR, 9–19] after patient arrival; n = 335). At site 2, the tool was administered at triage throughout the study period.

Analysis

Sample size was based on prior estimates of increasing ARI with increasing BRACHA-S score and the planned evaluation of a prespecified 4-tier model (scores 0–1, 2, 3, and 4–5). We estimated that 472 encounters would provide more than 80% power ($\alpha = 0.05$) to detect differences in ARI incidence across tiers and to determine whether intermediate scores (2 vs 3) represented distinct risk strata.

The unit of analysis was the ED patient encounter. Analyses used complete cases. Patients with repeat encounters were quantified, and a sensitivity analysis was conducted by excluding those within 14 days of the index encounter. Encounter characteristics were summarized as counts (percentages) or medians (IQRs) and compared between encounters with and without ARI using differences with 95% CIs. To assess representativeness, enrolled encounters were compared with all ED encounters with MBH chief concerns during the study period using EHR data on age, sex, race, arrival time, ED LOS, ED disposition, and triage acuity.

For the primary analysis, the BRACHA-S score (0–5) was modeled as a continuous variable (per 1-point increase) in logistic regression, with odds ratios (ORs) reported with 95% CIs. Discrimination was assessed using the AUROC, with 95% CIs estimated by nonparametric U-statistics approach.[31] Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and positive and negative likelihood ratios were calculated for each score threshold. ARI incidence was estimated for each BRACHA-S score (0–5) with rates reported with 95% CIs. Relative risks (RRs) of ARI by tier were estimated using scores 0 to 1 as the reference group in the prespecified 4-tier model (0–1, 2, 3, and 4–5). Scores 2 and 3 were assessed separately. Tier collapse was planned if adjacent tiers showed similar ARI incidence and operating characteristics, with cut points selected using observed ARI incidence to optimize interpretability and risk separation.

Additional analyses estimated BRACHA-S item prevalence and univariable associations with ARI. Sensitivity analyses evaluated discrimination across age group, sex, ED site, and workflow period (initial treatment room vs triage completion) by estimating AUROC. An additional sensitivity analysis restricted the outcome to severe ARI (IM medication and/or physical or mechanical restraints), excluding encounters receiving ODT medications only. Statistical significance was inferred when 95% CIs excluded 0 for differences and 1 for RRs. Analyses were conducted using SAS version 9.4 (SAS Institute Inc).

RESULTS

A total of 472 encounters were enrolled (433 unique patients); 39 (8%) patients contributed more than 1 encounter, including 4 (0.8%) with repeat encounters within 14 days. Supplemental Figure 1 shows the study flow, including the total number of encounters during the study period and those screened, eligible, enrolled, and missed during screening windows. Compared with all other ED encounters with MBH chief concerns during the study period (N = 7102), encounters in the study sample were broadly similar in race/ethnicity, ED LOS, and disposition, with small differences reflecting slightly younger age, a lower proportion of females, and modestly lower triage acuity (Supplemental Table 1). There were no missing BRACHA-S or ARI data, and complete-case analysis included all 472 encounters. Five encounters had a chief concern of "psych eval," but the primary or secondary ED diagnosis codes mapped to medical conditions. Medical record review confirmed that the medical condition was incidental, the MBH diagnosis was identified and mapped to an MBH diagnostic category, and none of these encounters had an ARI event.

Among enrolled encounters, 55 (11.7%) had an ARI event. Patient characteristics by ARI status are shown in Table 1. Encounters with and without ARI were similar in age, sex, race, insurance, arrival mode, and triage acuity. Encounters with ARI had longer ED LOS (median, 5.8 vs 3.9 hours) and were more often admitted (69.1% vs 35.3%) (Table 1). MBH diagnosis distributions were generally comparable among groups; however, anxiety disorders and trauma- and stressor-related disorders were less common among encounters with ARI. Median time to completion of the BRACHA-S from arrival for all encounters was 17 minutes (IQR, 10–29) and did not vary by ARI status (15 minutes with ARI vs 17 without ARI, difference of −2.0 [IQR, −5.5–1.5]). Median time to first ARI event was 162 minutes (IQR, 101–248) after arrival.

The AUROC for BRACHA-S predicting ARI was 0.72 (95% CI, 0.64–0.79) (Figure 2). Observed ARI incidence increased proportionately with each point increase in BRACHA-S score (Table 2). In logistic regression, each 1-point increase in BRACHA-S score was associated with higher odds of ARI (OR, 1.9; 95% CI, 1.5, 2.4). Operating characteristics varied across score thresholds (Table 2). Lower thresholds favored sensitivity and NPV but had low specificity, whereas higher thresholds improved specificity and PPV (Table 2). Likelihood ratios were consistent with these operating characteristics, with lower scores decreasing the likelihood of ARI, and higher scores associated with a moderate increase in risk (Table 2).

In the prespecified 4-tier model (scores 0–1, 2, 3, and 4–5), ARI rates increased across tiers (Table 2). Compared with scores 0 to 1, score 2 was not associated with higher ARI risk, whereas scores 3 and 4 to 5 were associated with higher ARI risk (Table 2). Given similar ARI rates across scores 0 to 2, and to enhance clinical interpretability while preserving the observed inflection at score 3, a 3-tier model (0 to 2, 3, and 4 to 5) was evaluated. ARI risk increased from 5.3% in the low-risk tier (0 to 2) to 12.4% at score 3 (~2-fold higher risk) and 33.3% in the high-risk tier (4 to 5; ~6-fold higher risk) (Table 2). The low-risk tier demonstrated high NPV, whereas the high-risk tier showed substantially increased ARI risk and PPV exceeding 30%. For the 2 encounters with both an ARI event and a BRACHA-S score of 0, the event occurred after inpatient admission notification and just before transfer; both received an ODT medication. In a post hoc 2-tier model (scores 0–2 vs 3–5), ARI risk was higher in the high-risk tier (RR, 3.4; 95% CI, 2.0–6.1). Item-level prevalence and univariable discrimination for ARI across the 5 BRACHA-S items are presented in Table 3. Individual items demonstrated modest discrimination and did not outperform the composite score.

In sensitivity analyses, BRACHA-S discrimination was similar to the primary analysis after excluding encounters within 14 days of a prior visit and across subgroups defined by sex, age group, and tool administration location (Supplemental Table 2). Discrimination at site 1 was similar to the overall results, but at site 2, the AUROC was not estimable because of the limited number of ARI events. Restricting ARI to severe events (IM medication and/or restraints) identified 22 encounters; BRACHA-S remained associated (OR per point, 2.9; 95% CI, 1.9–4.4) with improved discrimination (AUROC, 0.84; 95% CI, 0.78–0.90).

DISCUSSION

In this prospective cohort of children and adolescents presenting to the ED with MBH concerns, the 5-item nurse-completed triage BRACHA-S demonstrated moderate discrimination for ARI and identified a graded increase in risk across scores. Each 1-point increase was associated with higher odds of ARI, and in a 3-tier model, encounters in the highest tier (scores 4–5) had approximately 6-fold higher ARI risk than those in the lowest tier (0–2). These findings support the BRACHA-S as a feasible early risk-stratification tool to inform proportionate safety planning at ED arrival.

TABLE 1. Encounter Characteristics by ARI

Characteristic	All Study Cohort Encounters (N = 472)	Encounters With ARI (n = 55)	Encounters Without ARI (n = 417)	Differences (95% CI)
Age, y, median (IQR)	13.8 (11.3 to 15.9)	14.0 (10.3 to 16.6)	13.8 (11.5 to 15.7)	0.2 (−1.7 to 2.0)
Age group, n (%)				
5–11 y	140 (29.7)	18 (32.7)	122 (29.3)	3.5% (−9.7% to 16.6%)
12–18 y	332 (70.3)	37 (67.3)	295 (70.7)	−3.5% (−16.6% to 9.7%)
Sex, female, n (%)	235 (49.8)	24 (43.6)	211 (50.6)	−7.0% (−20.9% to 7.0%)
Race, n (%)				
White	305 (64.6)	41 (74.5)	264 (63.3)	11.2% (−1.2% to 23.6%)
Black	118 (25.0)	13 (23.6)	105 (25.2)	−1.5% (−13.5% to 10.4%)
Other	49 (10.4)	1 (1.8)	48 (11.5)	−9.7% (−14.4% to −5.0%)
Insurance, n (%)				
Private	126 (26.7)	16 (29.1)	110 (26.4)	2.7% (−10.0% to 15.4%)
Public	334 (70.8)	39 (70.9)	295 (70.7)	0.2% (−12.6% to 12.9%)
Unknown	12 (2.5)	(0)	12 (2.9)	−2.9% (−4.5% to −1.3%)
Mode of arrival, n (%)				
EMS/air	77 (16.3)	12 (21.8)	65 (15.6)	6.2% (−5.2% to 17.7%)
Police	43 (9.1)	4 (7.3)	39 (9.4)	−2.1% (−9.5% to 5.3%)
Walk-in	352 (74.6)	39 (70.9)	313 (75.1)	−4.2% (−16.9% to 8.6%)
ESI triage category, n (%)				
2	313 (66.3)	39 (70.9)	274 (65.7)	5.2% (−7.6% to 18.0%)
3	5 (1.1)	1 (1.8)	4 (1.0)	0.9% (−2.8% to 4.5%)
4	154 (32.6)	15 (27.3)	139 (33.3)	−6.1% (−18.7% to 6.5%)
ED site, n (%)				
Site 1	429 (90.9)	48 (87.3)	381 (91.4)	−4.1% (−13.3% to 5.1%)
Site 2	43 (9.1)	7 (12.7)	36 (8.6)	4.1% (−5.1% to 13.3%)
ED LOS, h, median (IQR)	4.20 (2.82 to 8.04)	5.80 (4.67 to 21.50)	3.92 (2.75 to 7.40)	1.9 (0.5 to 3.3)
ED disposition, n (%)				
Admit	190 (40.3)	38 (69.1)	152 (36.5)	32.6% (19.6% to 45.7%)
Discharged	282 (59.7)	17 (30.9)	265 (63.5)	−32.6% (−45.7% to −19.6%)
MBH diagnosis grouping[a], n (%)				
ADHD	27 (5.7)	2 (3.6)	25 (6.0)	−2.4% (−7.8% to 3.1%)
Anxiety disorders	14 (3.0)	0 (0)	14 (3.4)	−3.4% (−5.1% to −1.6%)
Autism spectrum disorder	29 (6.1)	7 (12.7)	22 (5.3)	7.5% (−1.6% to 16.5%)
Bipolar and related disorders	3 (0.6)	0 (0)	3 (0.7)	−0.7% (−1.5% to 0.1%)
Depressive disorders	177 (37.5)	24 (43.6)	153 (36.7)	6.9% (−7.0% to 20.8%)
Developmental delay/neurodevelopmental disorder	3 (0.6)	1 (1.8)	2 (0.5)	1.3% (−2.3% to 4.9%)
Disruptive/impulse control/conduct disorders	89 (18.9)	14 (25.5)	75 (18.0)	7.5% (−4.6% to 19.6%)
Feeding and eating disorders	1 (0.2)	0 (0)	1 (0.2)	−0.2% (−0.7% to 0.2%)
Mental health symptom	3 (0.6)	0 (0)	3 (0.7)	−0.7% (−1.5% to 0.1%)
Miscellaneous	22 (4.7)	2 (3.6)	20 (4.8)	−1.2% (−6.5% to 4.2%)
Neurocognitive disorders	1 (0.2)	0 (0)	1 (0.2)	−0.2% (−0.7% to 0.2%)
Schizophrenia spectrum/psychotic disorders	8 (1.7)	2 (3.6)	6 (1.4)	2.2% (−2.9% to 7.3%)
Substance-related/addictive disorders	2 (0.4)	0 (0)	2 (0.5)	−0.5% (−1.1% to 0.2%)
Suicide/self-injury	3 (0.6)	1 (1.8)	2 (0.5)	1.3% (−2.3% to 4.9%)

(Continued on next page)

TABLE 1. Encounter Characteristics by ARI (Continued)

Characteristic	All Study Cohort Encounters (N = 472)	Encounters With ARI (n = 55)	Encounters Without ARI (n = 417)	Differences (95% CI)
Trauma and stress-related disorders	90 (19.1)	2 (3.6)	88 (21.1)	−17.5% (−23.8% to −11.2%)
Time from arrival to completion of the BRACHA-S, min, median (IQR)	17 (10 to 29)	15 (10 to 29)	17 (10 to 29)	−2.0 (−5.5 to 1.5)

Abbreviations: ADHD, attention-deficit/hyperactivity disorder; ARI, agitation requiring intervention; BRACHA-S, Brief Rating of Aggression by Children and Adolescents–Short; ED, emergency department; EMS, emergency medical services; ESI, Emergency Severity Index; *ICD-10, International Classification of Diseases, Tenth Revision*; LOS, length of stay; MBH, mental and behavioral health.

[a] Eight encounters lacked a primary or secondary *ICD-10* ED diagnosis that mapped to MBH codes; 5 of these had medical diagnoses in those positions. For these encounters, diagnoses were obtained from psychiatric intake counselor documentation after medical record review.

The operating characteristics suggest BRACHA-S functions best as an early risk-stratification tool to identify patients who may benefit from safety measures rather than as a rule-out screen. Lower thresholds favor sensitivity and NPV but identify many patients who never require intervention; however, lower scores do not rule out ARI, as some patients with low initial scores still had ARI, and risk may evolve during the ED stay. Higher thresholds prioritize specificity and PPV and identify a smaller subgroup at substantially higher risk. The 3-tier structure preserves the inflection at score 3 and identifies a high-risk group (scores 4–5) that may warrant enhanced observation, earlier engagement with trained support staff, or anticipatory medication planning. A post hoc 2-tier structure (0–2 vs 3–5) was also evaluated to fit ED workflows that favor simpler decisions, and scores 3 to 5 had a 3.4-fold higher ARI risk. Classifying score 3 with scores 4 to 5 expands the group for higher-intensity actions and may increase resource use among patients who do not escalate.

Published evaluations of brief, triage-feasible aggression risk tools that include children in ED settings remain limited and heterogeneous.[14,15] Existing evidence often derives from adult populations or nontriage settings, and outcome definitions vary, limiting cross-study comparison and translation to pediatric ED practice.[16–18,32,33] We evaluated BRACHA-S because it was derived from the longer BRACHA, which is routinely used in our ED to assess aggression risk and guide resource allocation, making it a pragmatic candidate for early triage use. Similar to suicide risk screening performed early in ED evaluation,[34,35] agitation risk assessment is not intended to determine diagnosis or disposition but to guide the intensity of early safety planning. With ARI occurring in more than 10% of MBH encounters, early risk stratification can focus higher-intensity supports on those most likely to escalate, reducing harm and conserving ED resources.

The observed AUROC of 0.72 was modestly lower than in prior retrospective analyses of the BRACHA and BRACHA-S (AUROC of 0.81 and 0.80, respectively).[21] This likely reflects differences in timing, rater context, and raters themselves, with triage nurses completing the tool early in the visit vs psychiatric intake counselors assessing later. While ODT medications were included in ARI to match the outcome used to derive BRACHA-S, the outcome likely captures a spectrum of severity, and improved discrimination when restricting to severe ARI suggests BRACHA-S is most informative for identifying risk of severe escalation. Consistent with the multifactorial nature of agitation risk, no single BRACHA-S item outperformed the composite score, supporting use of the full 5-item instrument rather than reliance on any single indicator. BRACHA-S appeared feasible for early ED use, with most assessments completed within 15 minutes of arrival, preceding the median time to first escalation event of approximately 162 minutes. EHR integration could support consistent administration, real-time scoring,

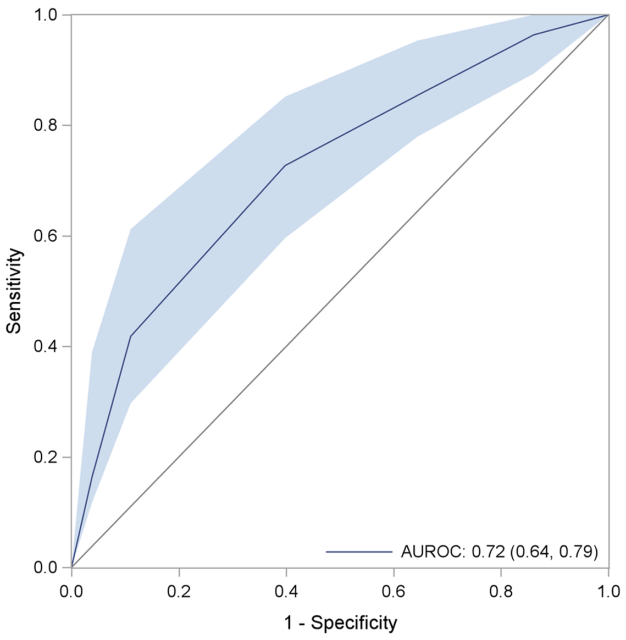

FIGURE 2.
Receiver operating characteristic curve demonstrating Brief Rating of Aggression by Children and Adolescents–Short performance in predicting agitation requiring intervention in the emergency department. The solid line indicates the receiver operating characteristic curve; shading indicates 95% CIs.
Abbreviation: AUROC, area under the receiver operating characteristic curve.

TABLE 2. Performance Metrics by BRACHA-S Score Cutoffs for Predicting ARI

BRACHA-S Cutoff	N	ARI Events, n (%)	Sensitivity, %	Specificity, %	PPV, %	NPV, %	LR+	LR−	Four-Tier Model, RR (95% CI)	Three-Tier Model, RR (95% CI)
0	60	2 (3.3)							Reference	Reference
1	96	6 (6.3)	96.4	13.9	12.9	96.7	1.12	0.26		
2	110	7 (6.4)	85.5	35.5	14.9	94.9	1.33	0.41	1.2 (0.5–3.3)	
3	137	17 (12.4)	72.7	60.2	19.4	94.4	1.83	0.45	2.4 (1.1–5.4)	2.2 (1.1–4.3)
4	44	14 (31.8)	41.8	89.0	33.3	92.1	3.79	0.65	6.5 (3.1–13.8)	5.9 (3.3–10.7)
5	25	9 (36.0)	16.4	96.2	36.0	89.7	4.27	0.87		

Abbreviations: ARI, agitation requiring intervention; BRACHA-S, Brief Rating of Aggression by Children and Adolescents–Short; LR+, positive likelihood ratio; LR−, negative likelihood ratio; NPV, negative predictive value; PPV, positive predictive value; RR, relative risk.

TABLE 3. Prevalence and Univariable Discrimination of BRACHA-S Items for ARI

BRACHA-S Item	Prevalence, N = 472, n (%)	Univariable AUROC (95% CI)
History of psychiatric hospitalizations	262 (55.5)	0.62 (0.56–0.68)
Frequency of physical aggressive acts toward others	272 (57.6)	0.61 (0.54–0.67)
Threats or physical aggression to self or others in the last 24 h	338 (71.6)	0.55 (0.49–0.61)
Exhibited impulsivity or agitation during evaluation	107 (22.7)	0.67 (0.60–0.74)
Intrusive to others during evaluation	49 (10.4)	0.60 (0.53–0.66)

Abbreviations: ARI, agitation requiring intervention; AUROC, area under the receiver operating characteristic curve; BRACHA-S, Brief Rating of Aggression by Children and Adolescents–Short.

and linkage to standardized next steps. Future work should develop and evaluate a BRACHA-S–guided care pathway that combines early risk stratification with risk-tiered interventions while assessing feasibility, patient- and staff-centered outcomes, and unintended consequences.

Limitations

This study had several limitations. Convenience sampling at 2 academic pediatric EDs may limit generalizability and introduce selection bias; however, enrolled encounters resembled all ED MBH encounters at our center and only differed slightly in age, sex, and acuity. ARI episodes may have been missed if undocumented, and misclassification is possible because of differing interpretations of agitation and lack of a standardized severity assessment. Including ODT medications in ARI may have reduced outcome specificity, although discrimination improved when restricting to severe ARI. BRACHA-S item completion did not generate a real-time risk score/label, but completing the items during clinical assessment may have increased recognition of agitation and lowered thresholds for ordering interventions, potentially increasing observed ARI. Some BRACHA-S items require rater interpretation and lack detailed behavioral anchors, and interrater reliability was not assessed in this study. Collapsing tiers to improve clinical interpretability should be confirmed in independent samples. Finally, this study evaluated predictive performance only and did not assess the effect of BRACHA-S–guided workflows on downstream outcomes such as restraint use, ED LOS, or staff injury.

CONCLUSIONS

In this prospective cohort of children and adolescents presenting to the ED with MBH concerns, early nurse-completed BRACHA-S scoring demonstrated moderate discrimination for ARI and stratified encounters into clinically meaningful risk groups. These findings support the feasibility of triage- or early room–based risk stratification to inform proportionate safety planning and resource mobilization. Multicenter validation and implementation studies are needed to assess generalizability and whether BRACHA-S–guided pathways improve patient- and staff-centered outcomes.

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ABBREVIATIONS

ARI: agitation requiring intervention
AUROC: area under the receiver operating characteristic curve

BRACHA: Brief Rating of Aggression by Children and Adolescents
BRACHA-S: BRACHA-Short
ED: emergency department
EHR: electronic health record
ICD-10: *International Classification of Diseases, Tenth Revision*
IM: intramuscular
LOS: length of stay
MBH: mental and behavioral health
NPV: negative predictive value
ODT: oral disintegrating tablet
OR: odds ratio
PPV: positive predictive value
RR: relative risk

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