

Safety of Prehospital Medical Clearance for Pediatric Behavioral Health Emergencies

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Objectives

- Review of pediatric behavioral health emergency (BHE) care
- Describe demographic characteristics and EMS usage in Alameda County, CA
- Examine the safety outcomes of pediatric patients directly transported to pediatric psychiatric emergency services (PES) using an EMS pediatric BHE protocol
- Discuss future steps to improve pediatric BHE care



Background

- 30% of all pediatric Behavioral Health Emergency (BHE) related Emergency Department (ED) visits in the United States arrive by Emergency Medical Services (EMS)
- 15% of EMS transports in US are mental health related
- United States is experiencing an increase in pediatric BHEs outpacing the rate of growth of adult visits for BHEs by 30%
- Majority of ED visits for BHEs are unnecessary since most patients do not receive any medical or psychiatric treatment in ED



Setting

- In Alameda County, CA, patients found to be a danger to self or others are placed on an involuntary hold (IVH)
- Alameda County has the highest rate of IVH detentions in CA
- Alameda EMS uses a field-screening protocol to identify low-risk children with BHE who can be medically cleared in the field and transported directly to a regional pediatric psychiatric emergency services (PES) facility, bypassing ED



Alameda EMS Field Screening Protocol

Required transport to an emergency department if:

- < 12 years old
- Patients with any medical complaint
 - Ingestions
 - Vomiting or report of no food or fluid intake for > 16 h
 - Known chronic medical conditions
- Depressed level of consciousness
- HR > 120
- BP > 190/110
- Outside of adult supervision for > 24 hours



Study Objectives

- Examine the safety outcomes of prehospital medical clearance of pediatric BHE patients and directly transporting to pediatric PES using an EMS BHE field-screening protocol
- Describe the mortality of patients being transported directly to PES



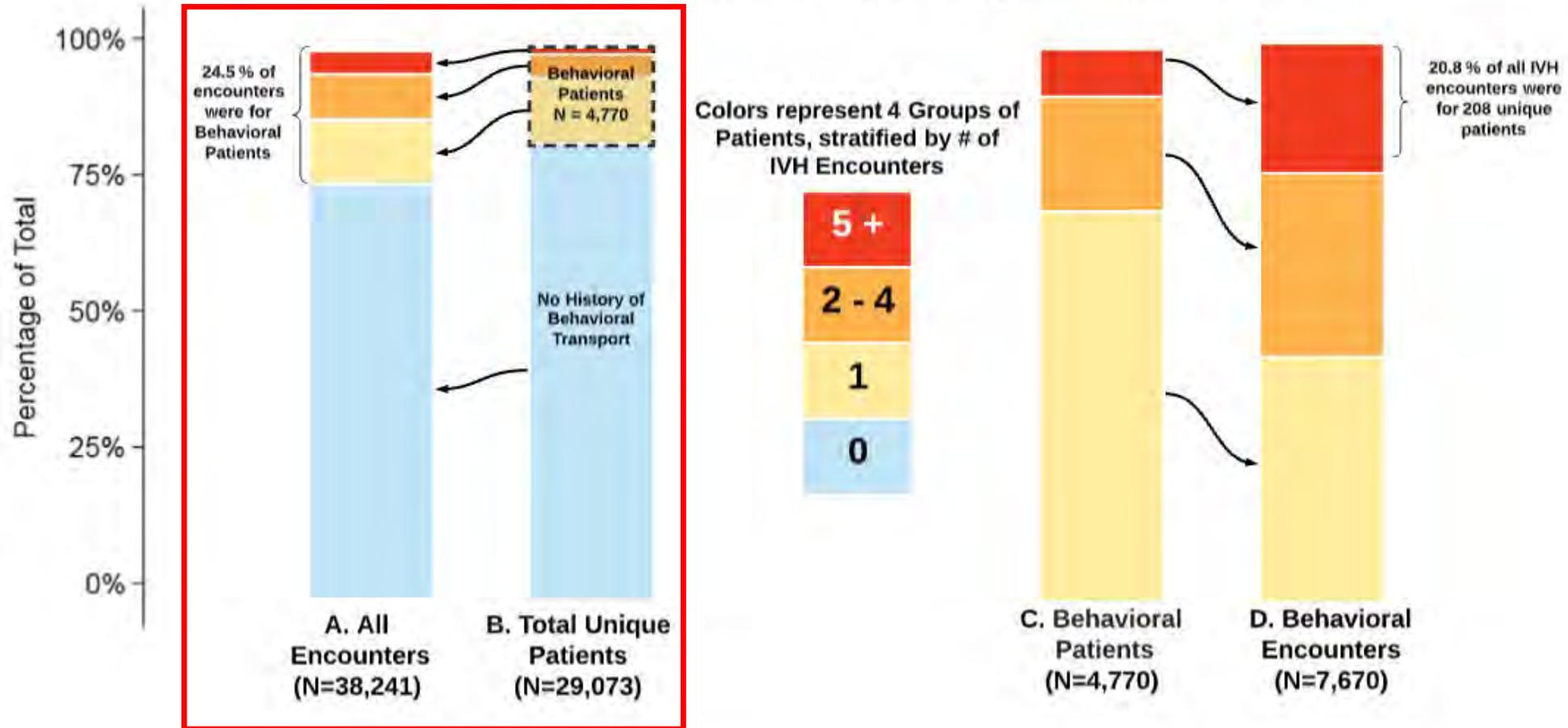
Methodology

- Retrospective review for pediatric (age<18 years) EMS encounters between 2011 to 2016, using Alameda County's EMS data set
- Unique patient identification using a 7-cycle Matching strategy using the MATCHIT tool in Stata
- Data linkage to mortality data from Alameda County Vital Statistics
- Identified the proportion of patients who were found to have a medical issue requiring re-transport to an ED after arriving at PES



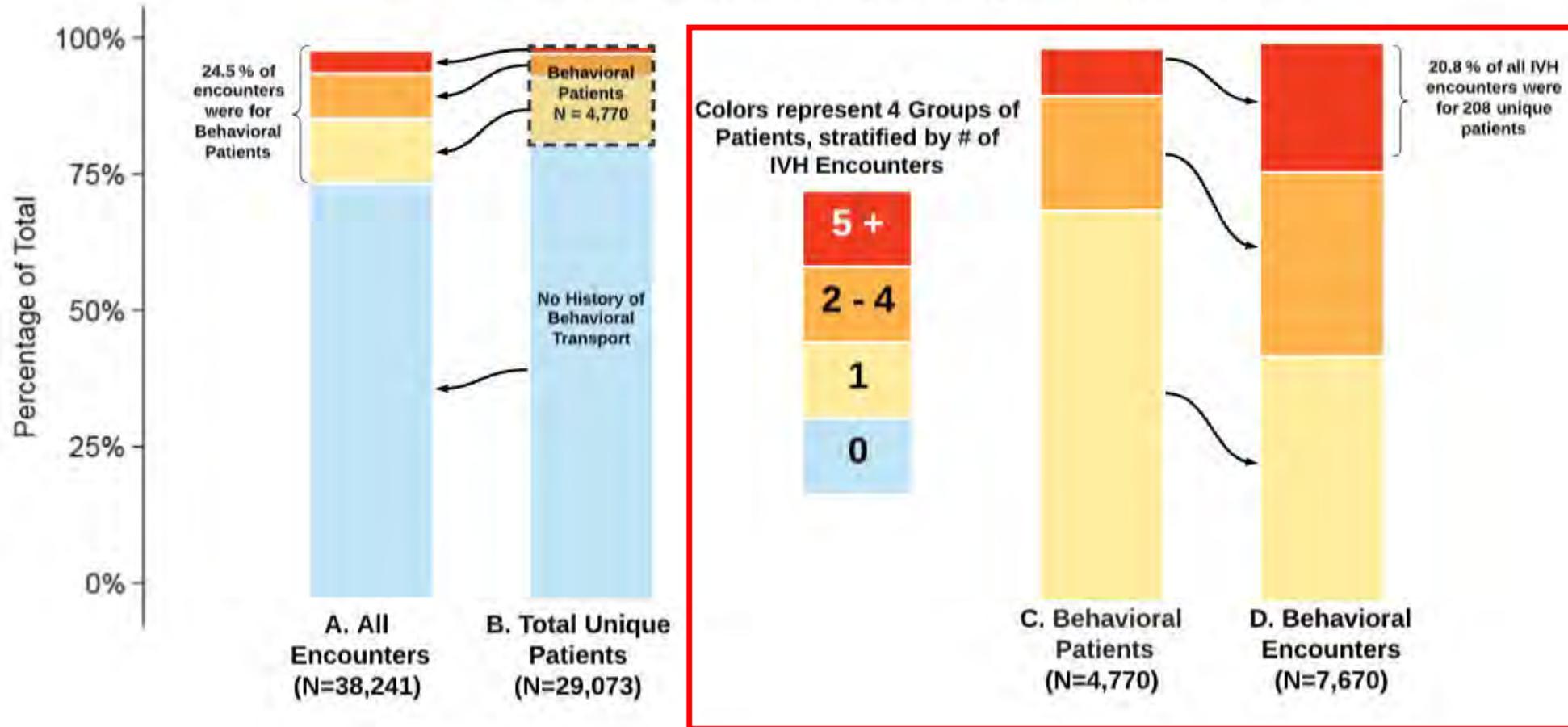
Results

Distribution of Patients, Encounters, and Involuntary Hold (IVH) Encounters



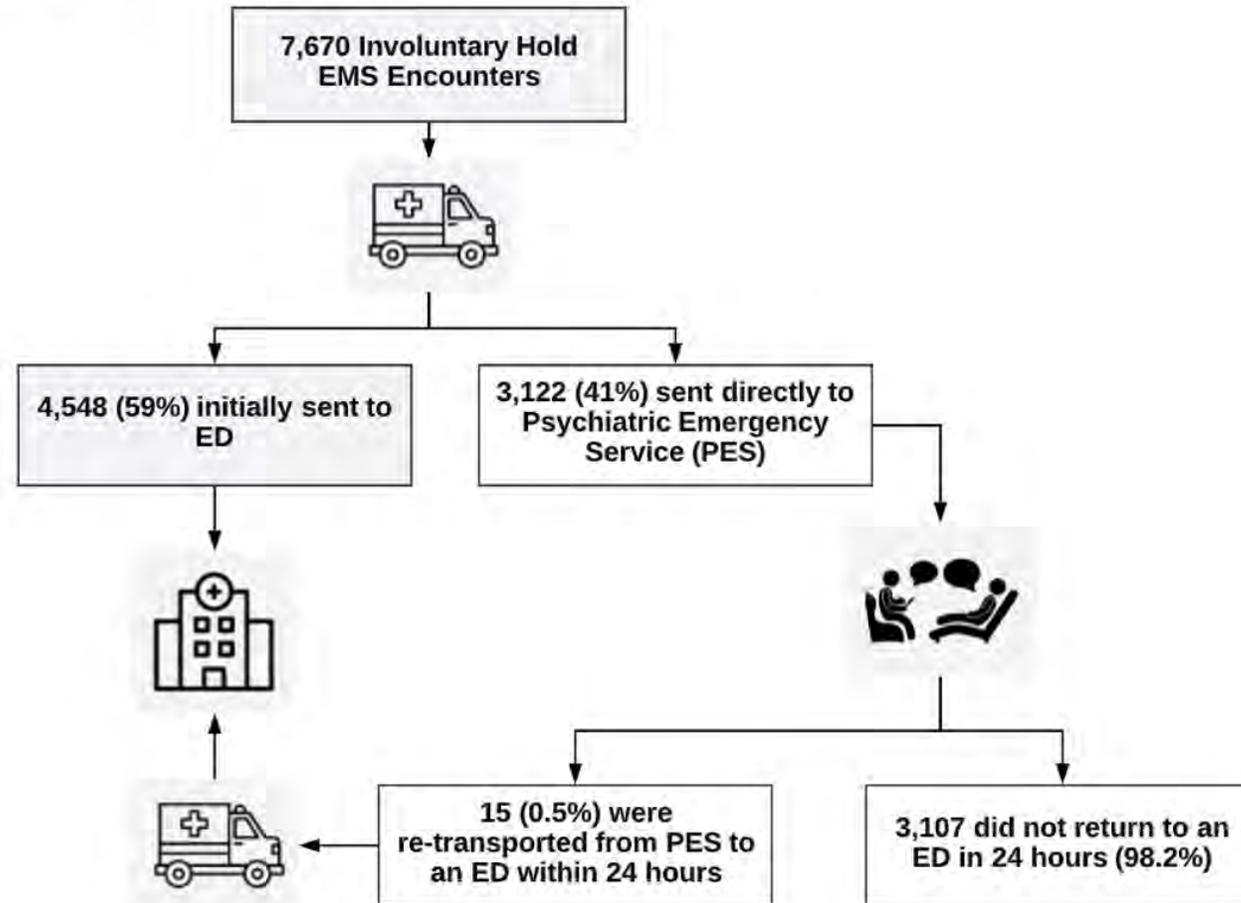
Results

Distribution of Patients, Encounters, and Involuntary Hold (IVH) Encounters



Results

PES Transports:



Staff Request	2
Supervision Issue	2
Combative	2
Ingestion	4
New Symptom	5



Limitations

- Regional differences in the severity and types of pediatric BHEs, which could influence the safety of field medical clearance
- Underreporting in the identification of re-transport (failures in field medical clearance)
- Protocol only allowed for diversion for children ≥ 12 years old leaving 10.7% of all pediatric patients placed on an IVH ineligible for transport to the pediatric PES
- No data on other outcomes after admission or discharge from PES
- Limitations in understanding the cause of death for the 17 pediatric BHE patients who died during the study period due to the inability to obtain the cause of death from Alameda County Vital Statistics



Conclusions

- EMS BHE protocol was safe as measured by low rates of re-transport and death
- Patients who had at least one involuntary hold disproportionately used EMS
- Utilizing the protocols established by Alameda County EMS, 41% pediatric patients with BHEs were directly transported to the regional pediatric PES, bypassing medical clearance in the ED
- Failed diversion, as measured by EMS re-transport to the ED within 24 hours was extremely rare, occurring in 0.5% encounters taken directly to the PES



Next Steps

- This and similar protocols can significantly decrease the burden on local EDs and allow for more timely mental health evaluation
- Need for multi-center study and need to prospectively study EMS field-screening protocol
- Development of Community Assessment Teams might improve field medical clearance rate
- Drive policy and legislature to increase funding for PES for children





Questions

Thank you!
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	Involuntary Hold Patients N= 4,770	Never Held Patients N= 24,303	Absolute Difference
Patient Characteristics			
% Male	45.1%	53.0%	- 8.3% (-9.9% to -6.8%)
% Insured	59.4%	65.2%	-5.8% (-7.3% to -4.3%)
Total # of Encounters per Patient, No. (%)			
1	2945 (61.7%)	21,419 (88.1%)	-26.4% (-27.8% to -25.0%)
2	930 (19.5%)	2,035 (8.4%)	11.1% (9.9% to 12.3%)
3 to 5	662 (13.9%)	747 (3.1%)	10.8% (9.8% to 11.8%)
≥ 6	233 (4.9%)	102 (0.4%)	4.9% (3.8% to 5.1%)
Total Involuntary Hold Encounters per Patient, No. (%)			
1	3,515 (73.7%)	-	-
2 to 4	1,047 (21.9%)	-	-
≥ 5	208 (4.4%)	-	-
		-	-
Total Encounters (%) (N=38,241)	9,369 (24.5%)	28,872 (75.5%)	
Mortality at end of study period	17 (0.4%)	153 (0.6%)	-

**These impressions were recorded by paramedics in either the primary or secondary impression. Behavioral crises are identified using impression, but also using other criteria as detailed in Appendix C, making room for overlap.



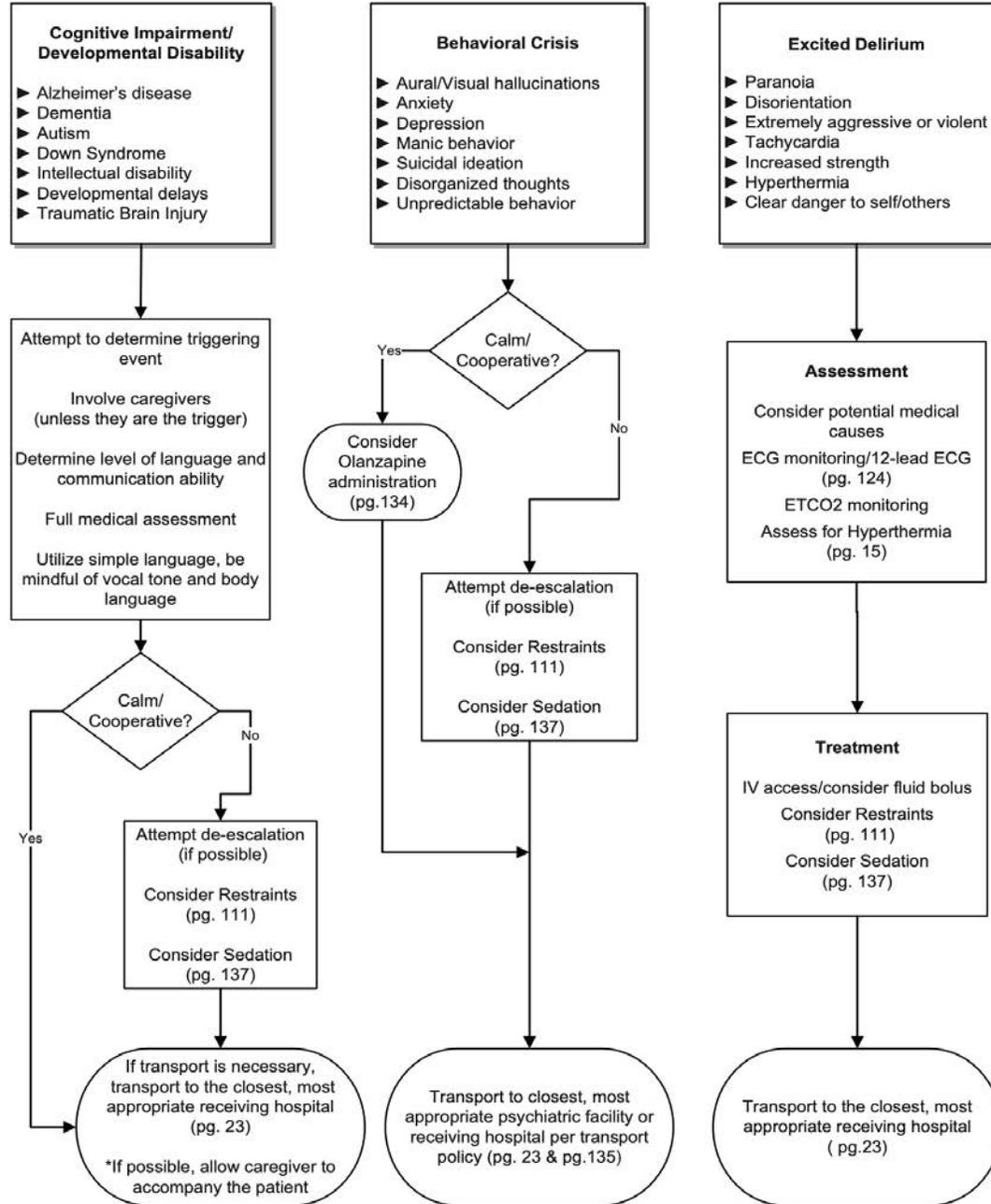
PSYCHIATRIC EVALUATION - 5150 TRANSPORTS

1. **GENERAL INFORMATION:** Any patient who has been, or will be (e.g. - self-committal) placed on a 5150 hold for psychiatric evaluation shall be assessed and transported according to this policy. For minors (age below 18) the hold is called a 5585 hold and is similar to 5150 hold
2. **MEDICAL CLEARANCE CRITERIA:**
 - 2.1 **Age 65 and Above:** Patients with or without acute medical issues, should be transported to the closest most appropriate receiving hospital for evaluation
 - 2.2 **Age 12 to 64:**
 - 2.2.1 Transport patients to a closest most appropriate receiving hospital* if there is a suspected acute medical or traumatic condition requiring emergent or urgent attention in an Emergency Department. Patients with these conditions include:
 - Patients "in extremis" (those with a potential life-threatening illness or injury)
 - Patients who are unconscious, unresponsive, have chest or abdominal pain, significant bleeding, or suspected shock
 - Patients who shows signs of potential significant toxicity from illicit drugs or alcohol, which may include the following findings:
 - ▶ depressed mental status
 - ▶ inability to ambulate
 - ▶ diaphoresis, agitation
 - Patients with combative behavior who require field sedation with Midazolam or whose combativeness prevents assessment (vital signs or examination)
 - Patients with abnormal vital signs or findings:
 - ▶ Systolic blood pressure over 190 mmHg or diastolic blood pressure over 110 mm/Hg
 - ▶ Pulse rate sustained over 120
 - ▶ Blood glucose under 60 mg/dL or over 250 mg/dL
 - Patients with a suspected overdose of medication
 - 2.2.2 Adult patients on 5150 who do not meet medical clearance criteria (see 2.1 and 2.2) should be transported to John George Pavilion, San Leandro. These include:
 - Patients with history of use of drugs or alcohol who do not show signs of significant toxicity
 - Patients with abnormalities in vital signs, but without other significant physical findings or history suggesting an acute medical problem (systolic BP up to 190, diastolic BP up to 110 and pulse up to 120)
 - Patients with minor abrasions or contusions (not needing laceration repair or other complex care or evaluation)
 - Patients who otherwise appear healthy but have communication barriers due to language or developmental disability, or are unwilling to answer questions
 - 2.3 **Adolescents Age 12 to 17**
 - 2.3.1 Criteria for transport to the closest most appropriate receiving hospital for medical clearance listed above (2.2.1) for adults also apply to adolescent patients on 5585 (5150) holds
 - 2.3.2 Additionally, adolescent patients with the following findings should also be transported to receiving hospitals:
 - Patients who have been outside of adult supervision/control for more than 24 hours
 - Patients with recent vomiting over a prolonged period or who report no food or fluid intake for 16 hours or more
 - Patients with known severe chronic medical conditions
 - 2.3.3 Adolescent patients who do not meet medical clearance criteria (see 2.2) should be transported to Willow Rock Center, San Leandro. Notify Willow Rock en route (510) 895-5502
 - 2.4 **Children Age 11 and Under**
 - All children age 11 and under on a 5585 (5150) hold should be transported to Children's Hospital Oakland unless there is a need to divert to another hospital because of medical instability

NOTE: Additional considerations for most appropriate facility are listed in the Transport Guidelines and Abuse/Assault Policies



PSYCHIATRIC AND BEHAVIORAL EMERGENCIES

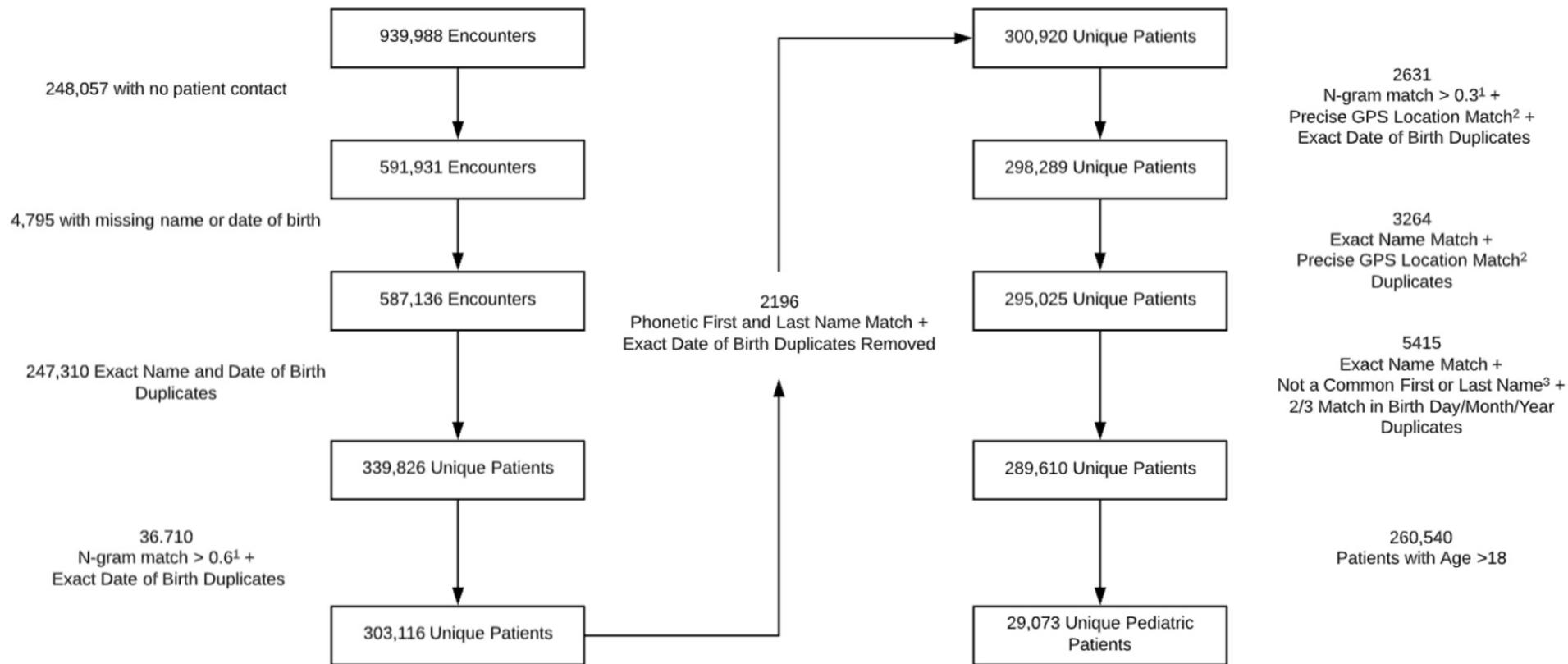


Encounter Characteristics

	IVH Encounters N=7,670	Non-IVH Encounters N=1,699	Absolute difference	All Encounters (Never Held Patients) N=28,872
Age, IQR	15.1 (13.6 - 16.6)	15.7 (14.2-16.9)	-	9.2 (2.6 - 15.2)
Location of EMS Pick-up				
School	1,806 (23.5%)	239 (14.1%)	9.5% (7.6% to 11.4%)	2,689
Home	3,371 (43.9%)	793 (46.7%)	-2.7% (-5.3% to -0.1%)	14,190
Other	2,493 (32.5%)	667 (39.3%)	-6.8% (-9.3% to -4.2%)	11,993
Clinical Information				
Alcohol	138 (1.8%)	59 (3.5%)	-1.7% (-2.6% to -0.8%)	252 (0.9%)
Trauma**	489 (6.4%)	444 (26.1%)	-19.8% (-21.9% to -17.6%)	9062 (31.4%)
Seizure**	88 (1.2%)	222 (13.1%)	-11.9% (-13.5% to -10.3%)	5182 (18.0%)
Overdose/Poisoning**	469 (6.1%)	238 (14.0%)	-7.9% (-9.6% to -6.2%)	975 (3.4%)
Mortality				
30 Day	0	1		105 (0.4%)
30 - 60 Days	0	1		3
60 - 90 Day	1	0		3
90 to 365	2	3		49



7-cycle matching strategy using the MATCHIT tool



1) Two records were considered to be from the same patient if both records shared a birthdate and had full names that met a specific cutoff of similarity using the N-gram3 method. The N-gram3 method provides a way to algorithmically quantify the similarity exhibited by two strings. The cut-offs were very stringent; see Supplementary Table 1 for examples demonstrating the application of n-gram criteria.

2) Records were considered to have a location match if the two records had GPS coordinates that were within 0.005 degrees (latitude and longitude). Not all records had the opportunity to be matched this way because 18.8% (N=110,444) of records were missing GPS coordinates.

3) The top 100 most frequently occurring first and last names were considered common. We made the assumption that if the first and last name were not common and the exact full names matched, the date of birth could be allowed to have one error (in either day, month, or year). See Supplementary Table 2 for the 100 first and last names that were considered common.

