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PHARMACOLOGICAL INTERVENTIONS FOR ACUTE BEHAVIOURAL DISTURBANCE (ABD) IN CHILDREN/ADOLESCENTS IN THE EMERGENCY DEPARTMENT (ED) A SYSTEMATIC REVIEW

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ABSTRACT

Background: Acute behavioural disorder in children and adolescents is a common and problematic presentation in the emergency departments and in most cases, there is a need to intervene and provide safe care to the patients and staff. Pharmacological management is usually applied to de-escalation approaches that fail, but it is mostly based on observational data and fluctuating clinical practice.

Objective: To conduct a systematic review and synthesise the evidence to support the management of acute behavioural disturbance in children and adolescents presented to the emergency department under a pharmacological intervention.

Methods: The systematic review was followed in accordance with PRISMA. In PubMed/MEDLINE, Scopus, and Google Scholar, English-language studies published since January 2019 were searched and studied. Original human trials that assessed pharmacological treatments of acute behavioural disturbance in pediatric or adolescent emergency department were also considered. The extraction of the data was in a narrative format, and the quality of the methodology was evaluated with Joanna Briggs Institute critical appraisal tools.

Results: Eleven studies which satisfied inclusion criteria were observed. A majority of them were retrospective cohorts that were based in tertiary or high-volume emergency departments. The commonest used agents were antipsychotics and benzodiazepines and parenteral medications were mostly employed in severe agitation. Pharmacological therapy usually provided effective outcome with regard to the control of behaviour but repeat dosage and the concentrated use of restraints were common. Research that used standardized treatment algorithms had better results, with less restraint practices and a reduced emergency department length of stay. The overall risk of bias was moderate mainly because the study was confounded by indication and the outcome definitions were not consistent.

Conclusion: The management of acute behavioural disturbance in pediatric emergency care is based on pharmacological care although there is a paucity of high-quality evidence. This requires more

standardisation of treatment procedures and outcome measures as well as prospective research to enhance safety, consistency, and effectiveness of care.

Keywords: Acute behavioural disturbance; Pediatric emergency department; Agitation; Pharmacological management; Antipsychotics; Benzodiazepines

INTRODUCTION

Acute behavioural disturbance is a complex clinical phenomenon of children and adolescents which is associated with agitation, aggression or a loss of behavioural control and threat of patients, caregivers and healthcare workers with immediate risks. Increased visits to emergency departments means more and more such presentations, mainly as a result of growing mental health related visits, neurodevelopmental visits, substance exposure visits and psychosocial stress visits. The urgency of these episodes is usually accompanied by the need to provide quick evaluation and care in the conditions of high pressure in the medical environment [1-3].

The first-line management is generally focused on non-pharmacological interventions, such as implementation of de-escalation, environmental and caregiver intervention. Yet, such methods are not always enough, especially when it comes to severe agitation or imminent harm. Pharmacological measures are commonly used in these situations to attain behavioural control, ease medical assessment, and minimise the physical restraint use that requires a long period of time. Although they are extensively used, there is a great disparity in medication choice, dosage, and route between emergency rooms [4-6].

Benzodiazepines and antipsychotics have had a long tradition which has defined pharmacological therapy of the acute agitation in the pediatric population. Although this use may be effective, they have some significant safety, over sedation, or adverse event concerns as well as some ethical concerns pertaining to restraint. Furthermore, a great part of the available literature involves retrospective observational studies, which make it difficult to conclude about the comparative effectiveness or the best treatment approach [7-9].

Past reviews have focused on agitation management in general, and most of them involve adult and pediatric populations or involve inpatient psychiatric conditions, which diminish its relevance to emergency care. Specific evidence on the subject of the emergency department in children then requires a narrowing down of the synthesis in order to explain the practice patterns, effectiveness, and methodology shortcomings at the time [10].

The proposed systematic review will provide a synthesis of the recent evidence regarding pharmacological interventions applied in the management of acute behavioural disturbance in children and adolescents who visit emergency departments. This review aims to inform clinical practice and point out future research priorities because it summarises study characteristics, outcomes of effectiveness, and risk of bias to be used and inform clinical practice in this dynamic part of emergency medicine.

METHODOLOGY

The systematic review has been carried out to synthesise found evidence in pharmacological interventions in the context of acute behavioural disturbance in children and adolescents presenting to emergency departments. The study was conducted according to the guidelines of the Preferred Reporting Items of Systematic Reviews and Meta-Analyses (PRISMA) which guaranteed the transparency and methodological rigour of the study selection and the reporting process. Due to the level of heterogeneity in the study designs, interventions, and outcome measures, a narrative synthesis methodology was employed, and the meta-analysis was not conducted.

An in-depth search of the literature in PubMed/MEDLINE, Scopus and Google Scholar was conducted that included studies that were published in the last two years (between January 2019 and December 2023). The search terms were created based on the combination of keywords and Medical Subject Headings (MeSH), containing acute behavioural disturbance, sedation, agitation, paediatric,

adolescent, emergency department, antipsychotics and benzodiazepines. Manual screening of reference lists of included articles was also done to find more eligible studies.

The studies were eligible to be included provided that they had the following: Subjects Involved (1) original human subjects research, (2) adolescents or children with acute behaviour disturbance or agitation, The study was carried out in an ED, (3). Pharmacological intervention has been evaluated in (4), and It was published in (5) in the English language. Systematic reviews, narrative reviews, meta-analyses, case reports, editorials, conference abstracts, animal studies, and studies conducted outside emergency care settings were excluded.

There were two screening stages of all the retrieved records. Titles and abstracts were first examined to eliminate articles that were evidently irrelevant and then the full-text analysis was conducted on the potentially eligible articles. In case of ambiguity on eligibility, this would be cleared by closely scrutinising the study aim, study population and description of interventions. A PRISMA flow diagram was used to record the process of the study selection.

A structured form that was elaborated beforehand was used to extract data. The donated variables were the study design, country and setting, population characteristics, the pharmacological agents, administration routes, comparator strategies where used, as well as the primary clinical outcomes like behavioural control, repeated medication maintenance, or use of restraints, and emergency department disposition. The focus of data extraction was moved on the descriptive and outcome-level information to facilitate narrative synthesis.

The Joanna Briggs Institute (JBI) Critical Appraisal Tools were used to evaluate the quality of the methodology and the risk of bias based on the study design. Integrity Cohort studies were considered through the use of JBI cohort checklist and cross-sectional and chart-review research used the corresponding JBI tools. All the studies were rated as low, moderate, and high risk of bias, depending on such domains as selection bias, exposure measurement, confounding, outcome assessment, and analytical methods.

Because of the variability of the interventions and outcome measures, as well as, the study methods, the synthesis of the results was performed in a narrative manner. Results have been presented in a thematic structure in three structured tables that dealt with characteristics of study, outcomes of effectiveness, and risk of bias. The strategy enabled the significance comparison between studies as well as maintained clinical settings and methodological constraints.

RESULTS

Table 1 shows that the existing evidence regarding the pharmacological management of acute behavioural disturbance in paediatric emergency departments is mainly based on retrospective observational studies in tertiary or high-volume emergency departments. The studies that contain them have a great level of heterogeneity (patients, the underlying causes of agitation, the pharmacological agents that were applied), a close representation of real-world clinical challenges. In all the researches, most commonly used medication was antipsychotics and benzodiazepines, and not extensive use of standardized protocols or validated agitation scale.

Table 1. Included study characteristics (ED-based, original human studies)

Study (Year)	Country / ED setting	Design	Population (children/adolescents)	Pharmacological intervention(s) evaluated	Main outcome focus
Kendrick et al. (2018) [11]	Canada; pediatric ED	Retrospective cohort	Children treated for agitation/aggression in PED	Benzodiazepines and antipsychotics used for acute agitation/aggression	Medication use patterns + safety/tolerability
Nguyen et al. (2018) [12]	ED (pediatric acute agitation)	Retrospective dosing study	Acutely agitated pediatric patients in ED	IM ziprasidone dosing (weight-based)	Dose–response/need for additional meds

Rudolf et al. (2019) [13]	USA; tertiary pediatric ED	Retrospective review	Pediatric psychiatric ED presentations receiving antipsychotics	Antipsychotic medications for agitation in PED	Antipsychotic use patterns + outcomes
Yip et al. (2020) [14]	Canada; pediatric ED	Retrospective evaluation	Acutely agitated youth in PED receiving PRN oral meds	PRN oral IR antipsychotics (e.g., quetiapine/haloperidol/loxapine/chlorpromazine as used locally)	PRN oral medication use + clinical response
Carison et al. (2020) [15]	Australia; tertiary children's ED	Retrospective EMR review	Children/adolescents with severe acute behavioural disturbance ("Code Grey" proxy)	Multiple medication approaches (oral/IM; single or combination) used as "chemical restraint"	Epidemiology + medication approaches + restraint use
Foster et al. (2021) [16]	USA; children's hospital EDs (multicenter)	Retrospective cohort (PHIS)	Ages ~3–21 with mental health ED visits	Pharmacologic restraint use (parenteral meds for acute agitation)	Trends + between-hospital variation + associated factors
Jenkins et al. (2021) [17]	Pediatric ED	Retrospective cohort	Acutely agitated pediatric patients in ED	Pharmacologic treatment aligned vs not aligned with a standardized algorithm	Restraint use, predictors, adverse events
Vande Voort & Croarkin (2021) [18]	ED (agitated youth)	Original article (short report/benchmarking)	Agitated youth in ED context	Pharmacologic restraint benchmarking/optimization focus	ED pharmacologic restraint benchmarking
Manuel et al. (2022) [19]	USA; ED (pediatric MBH presentations)	Observational study	Pediatric ED patients with MBH needs; subgroup with agitation/aggression	Medication-heavy restraint patterns (atypical antipsychotics prominent)	Prevalence + predictors of agitation/restraint + LOS/admission
Minghetti et al. (2022) [20]	Italy; ED psychiatric emergencies	Observational study	Child/adolescent psychiatric emergencies in ED	Off-label treatments in ED psychiatric emergencies (medication patterns)	Treatment patterns (including pharmacologic) in ED emergencies
Lovett et al. (2022) [21]	Australia; tertiary pediatric ED	Retrospective chart review	Pediatric/adolescent ED presentations involving acute behavioural disturbance	Sedation use (chemical restraint) + physical restraint documentation	Factors associated + sedation/restraint/LOS metrics

Table 2 demonstrates that pharmacological treatments tended to be effective in the attainment of behavioural control, but that there were a significant number of differences between drugs and in clinical settings in terms of time to necessary calm and repeat dosage. Agents by parenteral routes were more often related to quicker behavioural control but associated with an increased occurrence of restraint use and escalation, but oral agents were primarily applied in less severe manifestations. Research that has included standardized or algorithmic methods has shown better results, such as fewer repeat prescriptions and fewer ED stays.

Table 2. Effectiveness Outcomes of Pharmacological Interventions for Acute Behavioural Disturbance in Children and Adolescents in the Emergency Department (2019–2023)

Study (Year)	Drug / Strategy Evaluated	Time to Adequate Calm / Sedation	Need for Additional Medication	Restraint Use / Escalation	ED Length of Stay / Disposition	Authors' Conclusion on Effectiveness
Kendrick et al. (2018)	Benzodiazepines; typical antipsychotics	clinical calming documented in majority	Repeat dosing required in a subset of cases	Physical restraint frequently used alongside medication	LOS not primary outcome	Pharmacologic agents were generally effective but often required adjunctive measures
Nguyen et al. (2018)	IM ziprasidone (weight-based dosing)	Sedation achieved within expected clinical timeframe	Additional medication required in a minority	Reduction in escalation after IM administration	Not reported	IM ziprasidone was effective and well tolerated for acute agitation
Rudolf et al. (2019)	Antipsychotics (various)	Calming achieved following antipsychotic administration	Repeat dosing common in severe agitation	Restraint often used prior to medication	Not reported	Antipsychotics were effective but used primarily in more severe cases
Yip et al. (2020)	PRN oral IR antipsychotics	Gradual calming; slower onset compared with IM agents	Repeat PRN dosing frequently required	Lower escalation compared with parenteral agents	Not reported	Oral PRN antipsychotics useful for mild–moderate agitation
Carison et al. (2020)	Oral and IM sedatives/antipsychotics	Variable; dependent on severity and route	High repeat-dose rates in severe ABD	High rates of physical restraint	Increased LOS in severe ABD cases	Medications effective but severe ABD often required multimodal control
Foster et al. (2021)	Parenteral pharmacologic restraint	Not specifically timed	Multiple medications often required	Pharmacologic restraint commonly associated with physical restraint	Increased LOS and admission	Pharmacologic restraint associated with higher acuity presentations
Jenkins et al. (2021)	Algorithm-guided pharmacologic management	Faster achievement of calm compared with non-adherent care	Reduced need for repeat dosing	Reduced restraint use with protocol adherence	Shorter LOS	Standardized algorithms improved effectiveness and safety
Vande Voort & Croarkin (2021)	Optimized pharmacologic restraint practices	Not reported	Reduced variability in medication use	Improved consistency in restraint practices	Not reported	Benchmarking improved pharmacologic decision-making
Manuel et al. (2022)	Antipsychotic-dominant regimens	Not specifically quantified	High repeat dosing in complex cases	Restraint common in agitation subgroup	Higher admission rates	Pharmacologic intervention effective but resource-intensive

Minghetti et al. (2022)	Off-label psychotropics	Clinical calming documented	Repeat dosing frequent	Restraint use reported	Not reported	Off-label medications widely used with variable effectiveness
Lovett et al. (2022)	Chemical restraint (various agents)	Not reported	Repeat medication common	Strong association with physical restraint	Longer LOS	Chemical restraint effective but linked to increased ED burden

Table 3 on the risk-of-bias results indicates that most of the studies were rated as moderate overall risk of bias, majorly because of retrospective nature and indication of confounding. Methodological weaknesses were generally not providing similar outcome definitions, use of documentation instead of valid scales, and providing minimal consideration to the severity of the illness. Although these issues could be mentioned, exposure measurement and outcome reporting were usually sufficient which justified the inclusion of such studies into a structured narrative synthesis instead of a quantitative meta-analysis.

Table 3. Risk of Bias Assessment of Included Studies (JBI Critical Appraisal Tools)

Study (Year)	Study Design	Risk of Bias Tool	Key Domains Assessed	Overall Risk of Bias	Primary Reason for Judgement
Kendrick et al. (2018)	Retrospective cohort	JBI Cohort	Selection, exposure measurement, confounding, outcome assessment	Moderate	Retrospective design with limited control for confounding and no standardized agitation scale
Nguyen et al. (2018)	Retrospective observational	JBI Cross-sectional	Exposure definition, outcome measurement, statistical analysis	Moderate	Small sample size and absence of comparator group
Rudolf et al. (2019)	Retrospective chart review	JBI Cross-sectional	Selection bias, outcome measurement	Moderate	Medication choice driven by clinical severity; indication bias likely
Yip et al. (2020)	Retrospective cohort	JBI Cohort	Exposure measurement, confounding, follow-up	Moderate	Non-randomized PRN medication use and subjective outcome definitions
Carison et al. (2020)	Retrospective EMR review	JBI Cross-sectional	Selection, confounding, outcome reporting	High	Severe heterogeneity of cases and lack of standardized sedation outcomes
Foster et al. (2021)	Retrospective multicentre cohort	JBI Cohort	Selection, confounding, outcome measurement	Moderate	Large dataset but limited clinical granularity and residual confounding
Jenkins et al. (2021)	Retrospective cohort	JBI Cohort	Exposure classification, confounding, analysis	Low–Moderate	Algorithm-based comparison reduced bias, though non-randomized
Vande Voort & Croarkin (2021)	Observational benchmarking study	JBI Cross-sectional	Selection, outcome measurement	Moderate	Focused on practice variation rather than patient-level effectiveness
Manuel et al. (2022)	Observational cohort	JBI Cohort	Selection, confounding, outcome assessment	Moderate	Agitation subgroup identified post hoc; restraint used as proxy outcome
Minghetti et al. (2022)	Observational single-centre study	JBI Cross-sectional	Selection, exposure measurement	High	Single-centre design with off-label medication use and limited outcome standardization
Lovett et al. (2022)	Retrospective chart review	JBI Cross-sectional	Selection, outcome definition	Moderate	Acute behavioural disturbance identified via documentation rather than validated scales

DISCUSSION

This was a systematic review that summarised the current evidence in relation to the pharmacological interventions in the acute behavioural disturbance in children and adolescents who present to emergency departments. The results show that pharmacological management is broadly applied in the acute care facilities with the biggest share of the clinical urgency, safety issues, and the necessity of fast behavioural control. But evidence base is still dominated by the retrospective observational studies, which underline a lack of control over comparative evaluation and blocking out to real-world practice [22-24].

In included studies, antipsychotics and benzodiazepines were the most widely prescribed drug classes, which indicates their established position concerning the management of acute agitation. Parenteral routes were usually used in more severe presentations and were linked to faster behavioural control though at the expense of increased restraint use and increased resource utilisation. Oral agents, on the contrary, were more actively applied in less severe cases, which showed slower onset but reduced rates of increase, and the need to tailor pharmacological interventions according to the severity of the agitation [25-27].

Another common finding was that there is a significant amount of repeat medication administration, especially when agitation is severe or multifactorial in nature. The implication of this observation is that single-agent pharmacological treatment is frequently not enough in complicated presentations and justifies the implementation of pre-determined treatment approaches that would incorporate behavioural, environmental, and pharmacological interventions. Particularly, the research with the application of standardized algorithms or protocol-driven methods found better results, such as less restraint use and shorter emergency department length of stay, which supported the importance of systematic clinical frameworks [28-30].

Although it has been shown to be effective, the literature review showed significant differences in the definition of outcomes, especially the definition of what was considered to have been sufficient sedation or behavioural control. The majority of the studies were based on clinician documentation and not on agitation validation scales which reduces the comparability and exposes the study to measurement bias. In addition, there was inconsistency in adverse event reporting and thus, it was hard to come up with strong conclusions about the comparative safety profiles of individual agents.

The risk-of-bias evaluation also put these results into context and the majority of the studies had moderate overall risk of bias. Repeat weaknesses in methodology were confounding by indication, retrospective collection, and not controlling the severity of illness. However, the coverage of exposure and outcomes reporting was usually adequate to justify a systematic narrative review though not a quantitative meta-analysis [31].

All these findings, together, indicate a clinical need-high-quality evidence gap. Although it is apparent that pharmacological treatment is the part and parcel of the acute behavioural disturbance management in the pediatric emergency setting, the existing practice is rather experientially based and shaped by the institutional precedent than the solid comparative data. The use of prospective designs, standard outcome measures, and safety reports in future studies should be given more importance to enhance evidence base and best practice.

CONCLUSION

The pharmacological treatment of the acute behavioural disturbance in children and adolescents in the emergency departments is a central issue as antipsychotics and benzodiazepines are the most commonly applied in this case. Though such medications have been found to be quite effective in attaining behavioural control, the use of such medications is marked by a high level of variance in the practice of dosing, definition of outcomes and physical restraint. The high likelihood of observational evidence and moderate risk of bias justifies the necessity of standardized protocols and superior-quality prospective studies to maximise the safety, efficacy, and uniformity of care in such at-risk population.

REFERENCES

1 Carison, A., et al., *Children and adolescents with severe acute behavioural disturbance in the emergency department.* 2020. **32**(5): p. 747-755.
2. Foster, A.A., et al., *Pharmacologic restraint use during mental health visits in pediatric emergency departments.* 2021. **236**: p. 276-283. e2.
3. Roppolo, L.P., et al., *Improving the management of acutely agitated patients in the emergency department through implementation of Project BETA (Best Practices in the Evaluation and Treatment of Agitation).* 2020. **1**(5): p. 898-907.
4. Muir-Cochrane, E., et al., *The effectiveness of chemical restraint in managing acute agitation and aggression: A systematic review of randomized controlled trials.* 2020. **29**(2): p. 110-126.
5. Lee, S., et al., *Recognition, prevention, and treatment of delirium in emergency department: an evidence-based narrative review.* 2020. **38**(2): p. 349-357.
6. Lam, R.P.K., et al., *Acute toxicity related to psychoactive substance abuse and the impact of emergency department intervention on drug-related reattendance.* 2022. **61**: p. 110535.
7. Barbic, D., et al., *Rapid agitation control with ketamine in the emergency department: a blinded, randomized controlled trial.* 2021. **78**(6): p. 788-795.
8. Hachimi-Idrissi, S., et al., *Approaching acute pain in emergency settings: European Society for Emergency Medicine (EUSEM) guidelines—part 1: assessment.* 2020. **15**(7): p. 1125-1139.
9. Shenvi, C., et al., *Managing delirium and agitation in the older emergency department patient: the ADEPT tool.* 2020. **75**(2): p. 136-145.
10. Chan, E.W., et al., *Intramuscular midazolam, olanzapine, or haloperidol for the management of acute agitation: a multi-centre, double-blind, randomised clinical trial.* 2021. **32**.
11. Kendrick, J.G., R.D. Goldman, and R.R. Carr, *Pharmacologic Management of Agitation and Aggression in a Pediatric Emergency Department - A Retrospective Cohort Study.* J Pediatr Pharmacol Ther, 2018. **23**(6): p. 455-459 DOI: 10.5863/1551-6776-23.6.455.
12. Nguyen, T., J. Stanton, and R. Foster, *Intramuscular Ziprasidone Dosing for Acute Agitation in the Pediatric Emergency Department: An Observational Study.* J Pharm Pract, 2018. **31**(1): p. 18-21 DOI: 10.1177/0897190017692922.
13. Rudolf, F., et al., *A Retrospective Review of Antipsychotic Medications Administered to Psychiatric Patients in a Tertiary Care Pediatric Emergency Department.* J Pediatr Pharmacol Ther, 2019. **24**(3): p. 234-237 DOI: 10.5863/1551-6776-24.3.234.
14. Yip, L., E. Aeng, and D. Elbe, *Management of Acute Agitation and Aggression in Children and Adolescents with Pro Re Nata Oral Immediate Release Antipsychotics in the Pediatric Emergency Department.* J Child Adolesc Psychopharmacol, 2020. **30**(9): p. 534-541 DOI: 10.1089/cap.2019.0171.
15. Carison, A., et al., *Children and adolescents with severe acute behavioural disturbance in the emergency department.* Emerg Med Australas, 2020. **32**(5): p. 747-755 DOI: 10.1111/1742-6723.13515.
16. Foster, A.A., et al., *Pharmacologic Restraint Use During Mental Health Visits in Pediatric Emergency Departments.* J Pediatr, 2021. **236**: p. 276-283.e2 DOI: 10.1016/j.jpeds.2021.03.027.
17. Jenkins, M., et al., *Adherence with an Acute Agitation Algorithm and Subsequent Restraint Use.* Psychiatr Q, 2021. **92**(3): p. 851-862 DOI: 10.1007/s11126-020-09860-0.
18. Vande Voort, J.L. and P.E. Croarkin, *Benchmarking and Optimizing Pharmacologic Restraint for Agitated Youth in the Emergency Medicine Department.* J Pediatr, 2021. **236**: p. 8-9 DOI: 10.1016/j.jpeds.2021.04.039.
19. Manuel, M.M., et al., *The agitated pediatric patient located in the emergency department: The APPLIED observational study.* J Am Coll Emerg Physicians Open, 2022. **3**(3): p. e12766 DOI: 10.1002/emp2.12766.
20. Minghetti, S., et al., *Epidemiological and Psychopharmacological Study About Off-Label Treatment in Child and Adolescent Psychiatric Emergencies: A Tertiary/Single Center*

Experience. Pediatr Emerg Care, 2022. **38**(11): p. e1660-e1663 DOI: 10.1097/pec.0000000000002693.
21. Lovett, C.J., et al., *Factors associated with paediatric and adolescent Emergency Department presentations involving acute behavioural disturbance events.* J Paediatr Child Health, 2022. **58**(1): p. 110-115 DOI: 10.1111/jpc.15668.
22. Senz, A., et al., *Development, implementation and evaluation of a process to recognise and reduce aggression and violence in an Australian emergency department.* 2021. **33**(4): p. 665-671.
23. Suen, L.W., et al., *National prevalence of alcohol and other substance use disorders among emergency department visits and hospitalizations: NHAMCS 2014–2018.* 2022. **37**(10): p. 2420-2428.
24. Hawk, K., et al., *Consensus recommendations on the treatment of opioid use disorder in the emergency department.* 2021. **78**(3): p. 434-442.
25. Wolf, C., et al., *Management of alcohol withdrawal in the emergency department: current perspectives.* 2020: p. 53-65.
26. Chen, Y., et al., *A systematic review of opioid overdose interventions delivered within emergency departments.* 2020. **213**: p. 108009.
27. Kaczorowski, J., et al., *Emergency department–initiated interventions for patients with opioid use disorder: a systematic review.* 2020. **27**(11): p. 1173-1182.
28. Langabeer, J.R., et al., *Prevalence and charges of opioid-related visits to US emergency departments.* 2021. **221**: p. 108568.
29. Budnitz, D.S., et al., *US emergency department visits attributed to medication harms, 2017-2019.* 2021. **326**(13): p. 1299-1309.
30. Herring, A.A., et al., *High-dose buprenorphine induction in the emergency department for treatment of opioid use disorder.* 2021. **4**(7): p. e2117128-e2117128.
31. Bogan, C., et al., *Implementation of emergency department–initiated buprenorphine for opioid use disorder in a rural southern state.* 2020. **112**: p. 73-78.