American Journal of Emergency Medicine 94 (2025) 81–95

Contents lists available at ScienceDirect

American Journal of Emergency Medicine

journal homepage: www.elsevier.com/locate/ajem

Agitation management strategies for older adults in the emergency department or with emergency medical services: A scoping review

Fatima I. Shah [a,b], Grace Lew [a], Zeeshan Chawdhry [a,c], Krista Reich, MD, MSc [a], Kathryn Crowder, MD [d], Diane L. Lorenzetti, PhD [e,f,g], Margaret McGillivray, M.D [h], Zahra Goodarzi, MD. MSc [i,j,*]

[a] Division of Geriatrics, Department of Medicine, Cumming School of Medicine, University of Calgary, Canada
[b] Department of Community Health Sciences, Cumming School of Medicine, University of Calgary, Canada
[c] Department of Neuroscience, Faculty of Science, University of Calgary, Canada
[d] Department of Emergency Medicine, Cumming School of Medicine, University of Calgary, Canada
[e] Health Sciences Library, University of Calgary, Canada
[f] Dept of Community Health Sciences, University of Calgary, Canada
[g] O'Brien Institute for Public Health, University of Calgary, Canada
[h] Cumming School of Medicine, University of Calgary, Canada
[i] Division of Geriatrics, Department of Medicine, Community Health Sciences and Clinical Neurosciences, Canada
[j] Cumming School of Medicine, Hotchkiss Brain Institute, O'Brien Institute of Public Health, University of Calgary, Canada

ARTICLE INFO

Article history:
Received 22 January 2025
Received in revised form 5 April 2025
Accepted 7 April 2025

Keywords:
Agitation
Dementia
Delirium
Restraints
Emergency department

ABSTRACT

Background: Agitation is common in the emergency department (ED) and with emergency medical services (EMS), which can pose significant challenges to safety and patient care. In older adults, agitation is a common symptom of dementia or delirium.
Rationale: Managing agitation in older adults is challenging in emergency care environments. A scoping review of literature for agitation management approaches for older adults in ED/EMS environments was completed.
Methods: We searched Medline, Embase, and APA PsycINFO, combining key words and subject headings for 3 concepts: "older adults, aged 65 and older," "agitation/dementia/delirium," and "ED/EMS." Studies which explored management strategies for older adults with agitation, dementia, or delirium in the ED or EMS were included. Studies with younger populations (<65 years old) and/or lacking patient data specifically from the ED or EMS were excluded.
Results: A total of 7113 studies were screened, of which 22 were included in this review: pharmacological ($n = 8$), non-pharmacological ($n = 5$), multi-component ($n = 3$) treatments, and recommendations ($n = 6$). Most were in the ED, and 5038 older adults were included across all studies. Antipsychotics and benzodiazepines to manage agitation were common. Non-pharmacological and multi-component interventions were less commonly evaluated and lacked exploration of patient outcomes. Recommendations stressed caution with pharmacological medications rather than prioritizing non-restraint strategies.
Discussion: Most studies identified use of pharmacological treatment for agitation amongst older adults in ED/EMS settings, however, are not found to be overly effective and are associated with patient harm. There is a significant gap in evidence specific to EMS settings and evaluation of effectiveness of non-pharmacological interventions, highlighting the need for further research.

1. Introduction

Older adults (aged ≥65 years) commonly present via emergency medical services (EMS) to the emergency department (ED) in critical condition and exhibit high rates of agitation and delirium [1-3]. Despite comprising only 16.8 % of the American population [4], older adults account for around one-fourth of ED presentations (14.7–29.2 %) [5-9], with up to 38.3 % presenting via EMS transport [5-8,10]. The EMS response rate is over four times higher than for older adults than younger populations (167 vs. 39 responses per 1000 people; $p < 0.001$) [7]. As a result, older adults are high users of emergency services with EMS and ED providers being the first point of contact in the most critical part of acute care for this vulnerable population.

* Corresponding author at: University of Calgary, Calgary, Alberta, Canada.
E-mail address: Zahra.goodarzi@ahs.ca (Z. Goodarzi).

https://doi.org/10.1016/j.ajem.2025.04.019

In the general population, 2.6 % of all ED visits involve agitation [11]. Rates of agitation amongst older adults in the ED are even higher given the higher proportion of older adults living with dementia and who present with delirium. In community-dwelling older adults living with dementia, about half have reported agitation [12], and more commonly present to the ED annually compared to older adults who do not have a diagnosis of dementia (54 % vs 31 %) [13]. Additionally, up to 20 % of older adults in the ED have delirium [14], and 8 % of older adults with delirium have been reported to be agitated [1].

Agitation can put patient and healthcare providers' safety at risk and make it difficult to perform necessary medical care, such as diagnostic procedures or therapeutics [15]. Chemical and/or physical restraints are means of acutely managing agitation in the ED, and more than 75 % of agitated patients who are brought to the ED by EMS are restrained [16]. Patients restrained in the ED report feeling dehumanized, mistreated, isolated, confused, and frustrated [17]. Restraint use can also lead to physical harm of patients, such as strangulation, cardiac arrest, falls, fractures, or death [18-21]. Furthermore, the reasons for restraint use may not always be appropriate and are poorly documented [22,23], thereby possibly contributing to harm that is preventable.

Preventative and de-escalation strategies in non-emergent settings have been shown to be effective for agitation [24]. Prevention strategies focus on preventing the occurrence of agitation, which may arise from unmet care needs, such as untreated pain or discomfort, and often go unnoticed in older adults [25]. Meeting patient care needs and patient life story centered approaches, such as personalized care with various therapies to improve wellbeing (e.g., aromatherapy, music therapy, art, gardening, physical activity, doll therapy) [24] may effectively prevent agitation. De-escalation strategies are used as an early response to signs of agitation to curtail further progression, which include practice-based training, communication, and environmental changes [26].

However, these alternative forms of preventative and de-escalation strategies to managing agitation are under-studied in the ED and EMS environments, particularly amongst older adults. The current scoping review investigates the breadth of existing literature for the different modalities of the management of agitated older adults in ED and EMS environments.

2. Methods

2.1. Methodological guidance and framework

We developed and reported the findings of this review according to the JBI scoping review methodology and the PRISMA-ScR [27] (Appendix A). The review was structured based on the Population, Concept, and Context (PCC) framework used for scoping reviews [27]. The population (P) includes older adults, defined as individuals ≥65 years of age with agitation/delirium/dementia. The concept (C) - includes management strategies for agitation/dementia/delirium, including all relevant synonyms. The context (C) is to include all studies conducted in the ED and/or EMS populations.

2.2. Search strategy

We created a pilot search in MEDLINE (Appendix B), and then translated it into EMBASE and APA PSYCINFO databases, using key words and subject headings for 3 cluster of terms: “older adults,” “agitation/dementia/delirium,” and “ED/EMS.” Within each cluster, terms were combined with “OR”; all three clusters were then combined with “AND”. The search was not limited by date, or language. The search strategies were developed in consultation with a medical librarian and reviewed and edited by the rest of the research team, experts in geriatric and emergency medicine.

We identified 6 seed articles (Appendix C), which were used to verify the search accuracy. The review was registered on Open Science Framework (https://doi.org/10.17605/OSF.IO/234C7).

All abstracts and full texts were reviewed in duplicate, and disagreements were resolved by group consensus. A formal risk of bias assessment is not necessary for scoping reviews, as all research is deemed relevant to map existing evidence [27]. Additionally, reference lists of all included articles were also scanned to identify any additional possible research articles that may have been missed through the database search process.

2.3. Inclusion/exclusion criteria

Inclusion criteria for this scoping review were broad: any studies that explored strategies to manage agitation, dementia, or delirium in older adults (≥65 years) were included as long as they were based in the ED or EMS environments. We did not exclude studies based on country of origin, or language of publication. We excluded editorials, letters, case reports, grey literature, commentaries, poster presentations, abstracts, and research protocols. Grey literature was excluded to prioritize high-quality, reliable peer-reviewed research and to minimize the potential for biases, incomplete data, or inconsistent information. Studies that focused on younger populations (i.e., <65 years old) and/or did not provide patient data specifically from the ED or EMS environments were also excluded. Studies that included data from mixed older and younger populations were included if possible (i.e., separate data was available for older adults). Recommendation level articles pertaining to the ED or EMS environments were also included, even if no patient data was reported.

2.4. Data extraction elements

We extracted study level variables such as study design, country, type of setting (ED vs EMS), and duration of the study. Study population data such as patient age, sex/gender, comorbidities, neuropsychological status (e.g., dementia or cognitive impairment) were collected alongside type of management strategy and any reported rates of effectiveness or outcomes (see Appendix C for form).

2.5. Intervention definitions

Treatment categories were classified into three different modalities: pharmacological, non-pharmacological, and multi-component treatments. Pharmacological treatments were classified as the use of medications such as antipsychotics, benzodiazepines, or sedatives. Non-pharmacological treatments were classified as the use of alternative therapies, de-escalation, or physical restraints without the use of medications/drugs. Multi-component interventions combined aspects of pharmacological and non-pharmacological approaches to best fit the patient's needs.

2.6. Data synthesis approach

Data was charted and presented in appropriately constructed matrix tables that display all studies included in the review. This visual representation displays each study, agitation management modality, and type of emergency medicine environment, alongside some high-level demographics to contextualize the results, such as country of origin and gender breakdown.

3. Results

The search (from inception to July 20, 2024) identified 7113 titles and abstracts, after removing duplicates (Fig. 1 PRISMA diagram). We extracted data from 22 articles, of which, 16 contained patient outcomes (Table 1), resulting from pharmacological treatment ($n = 8$; Table 2),

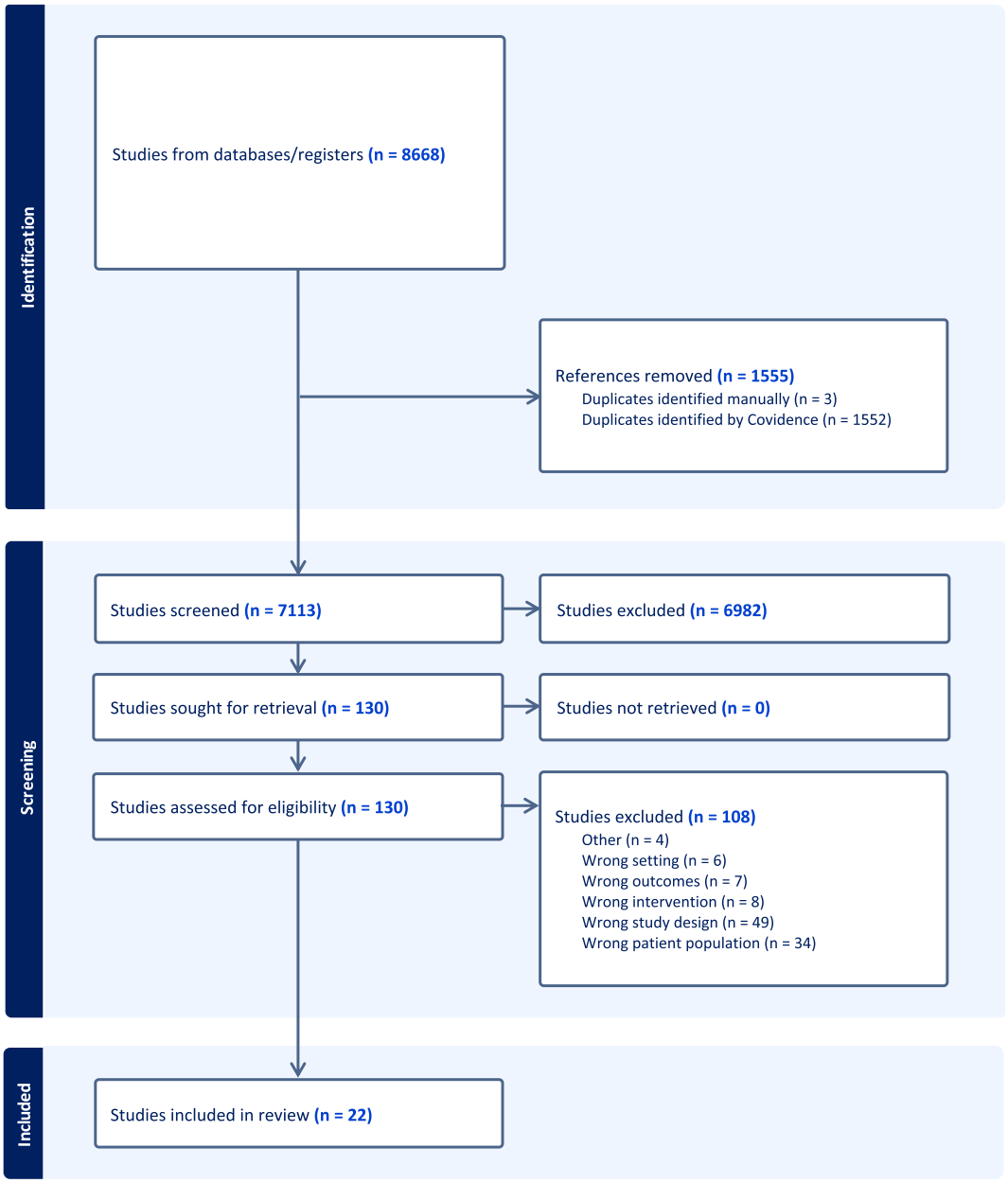

Fig. 1. PRISMA diagram.

non-pharmacological treatment ($n = 5$; Table 3), and multi-component treatment ($n = 3$; Table 4). The majority of studies were conducted in the ED ($n = 15$), and one was in the pre-hospital EMS environment. Across all studies, a total of 5038 older adults were included (ranging from $n = 2$ to $n = 2547$), with more than half of them being female ($n = 3053$), and the age of older adults being well over 65 years (unable to calculate average age due to individual reporting variation). We also included 6 articles which did not include patient level data but were still useful in understanding best practices for agitation management in the ED, which are classified as recommendation level articles.

3.1. Pharmacological treatment

Pharmacological treatments were the most frequently discussed form of agitation/dementia/delirium management. We accepted any definition of agitation/dementia/delirium, including behavioural observation and standardized assessment tools. A total of 4528 patients were administered pharmacological treatment across 11 articles, ranging in sample size from 2 to 2721.

Antipsychotics were administered to 757 patients, such as haloperidol ($n = 134$) [28-32] and droperidol ($n = 101$) [28,29,32,33]. Benzodiazepines were administered to 497 patients, such as lorazepam ($n = 385$) [28-30] and midazolam ($n = 112$) [28-33]. Other pharmacological agents, such as sedatives ($n = 2496$) [34], opiates ($n = 658$) [35], and ketamine ($n = 2$) [36] were also used. Sedatives or dissociative medications (Table 2) (91.7 %) were more frequently administered than antipsychotics (13 %) in the ED for older adults with agitation [34].

Intramuscular ziprasidone was effective for lowering Behavioural Activity Rating Scale (BARS) scores at 45 min (4.0 ± 0.4, $p < 0.05$) and 120 min (2.8 ± 0.4, $p < 0.01$) from baseline (6.8 ± 0.1) [37]. Vitals signs, such as blood pressure (137 ± 9 vs 133 ± 5 mmHg) and heart rate (85 ± 5 vs 83 ± 4 bpm) remained clinically insignificant pre-and-post treatment [37]. However, following ziprasidone, 80 % of patients required physical restraints and 26.7 % of patients required

Table 1
Demographic information of all studies with patient level data ($n = 16$).

Study ID	Intervention type	Intervention targeting	Assessment methods	Setting	Participants, n	Age, years (mean (SD))	Females, n (%)	Males, n (%)
Engstrom et al., 2023 [28]	Pharmacological Treatment	Acute agitation	ED chief complaint: altered mental status, behavioural dyscontrol, or agitation Received a Benzodiazepine or antipsychotic during the ED stay.	ED	$N = 684$ Antipsychotic = 247 (36.1 %) Benzodiazepine = 437 (63.9 %);	Antipsychotic: 79.3 (10.5) Benzodiazepine: 74.9 (9.9)	$N = 343$ Antipsychotic: 111 (44.9 %) Benzodiazepine: 232 (53.1 %)	$N = 341$ Antipsychotic: 136 (55.1 %) Benzodiazepine: 205 (46.9 %)
Kohen et al., 2005 [37]	Pharmacological Treatment	Acute Agitation	Retrospective chart review for IM Ziprasidone use BARS assessment	ED	$N = 35$ Ziprasidone = 15 Conventional Treatment = 20	Ziprasidone: 70 (10) Conventional Treatment: 71 (8)	N = 16 Ziprasidone: 9 (60 %) Conventional Treatment: 7 (35 %)	$N = 19$ Ziprasidone: 6 (40 %) Conventional Treatment: 13 (65 %)
Calver & Isbister, 2013 [33]	Pharmacological Treatment	Acute Behavioural Disturbance (ABD)	Sedation Assessment Tool (SAT)	ED	49	Median: 81 (range 65–93)	16 (33 %)	33 (67 %)
Isenberg & Jacobs, 2015 [31]	Pharmacological Treatment	Agitation; Violence	Agitation: Richmond Agitation-Sedation Scale (RASS)	EMS	4	84	2 (50 %)	2 (50 %)
Hopper et al., 2015 [36]	Pharmacological Treatment	Acute Agitation	Behavioural observation	ED	2	74 (ages 71 and 77)	1 (50 %)	1 (50 %)
Wilson et al., 2017 [38]	Pharmacological Treatment	Psychiatric Agitation	Not Explicitly Stated	ED	48	Not Explicitly Stated	Not Explicitly Stated	Not Explicitly Stated
Yap et al., 2019 [32]	Pharmacological Treatment	Behavioural Emergency	Not Explicitly Stated	ED	$N = 31$ Monotherapy = 28 Combination Therapy = 3	81 (IQR 75–87)	8 (25.8 %)	23 (74.2 %)
Kennedy et al., 2022 [34]	Pharmacological Treatment	Agitation	Antipsychotic or sedative medication administration in ED	ED	2721	Median age (IQR): 76 (70–83)	Estimated 59 % of visits (95 % CI: 57–60)	Estimated 41 % of visits (95 % CI: 40–43)
Swickhamer et al., 2013 [30]	Multi-component Treatment	Acute Agitation	Retrospective chart review for physical restraint use in ED and hospitalized	ED	83	Not Explicitly Stated	41 (49 %)	42 (51 %)
Simpkins et al., 2016 [29]	Multi-component Treatment	Behavioural Emergency	Behavioural observation; Aggression Response Team Calls ("wandering, physical and verbal aggression")	ED	43	81 (7.2)	14 (33 %)	29 (67 %)
Keene et al., 2023 [39]	Non-pharmacological Treatment	Cognitive Impairment Hospital associated delirium	Short Blessed Test (SBT) Confusion Assessment Method (CAM) Retrospective patient chart review	ED	$N = 133$ Music = 33 Light = 33 Music & Light = 35 Control = 32	Median (IQR): Music: 84 (11) Light: 83 (8) Music & Light: 83 (13) Control: 84 (12)	$N = 82$ Music: 17 (51.5 %) Light: 20 (60.6 %) Music & Light: 23 (65.7 %) Control: 22 (68.8 %)	$N = 51$ Music: 16 (48.5 %) Light: 13 (39.4 %) Music & Light: 12 (34.3 %) Control: 10 (31.2 %)
Tan et al., 2022 [40]	Non-pharmacological Treatment	Delirium	Delirium Triage Screen (DTS) Brief Confusion Assessment Method (bCAM)	ED	$N = 186$ Pre-intervention ($n = 128$) Post-intervention ($n = 58$)	Pre-intervention: 80.3 (8.1) Post-intervention: 81.8 (7.8)	$N = 83$ Pre-intervention: 57 (44.5 %) Post-intervention: 26 (44.8 %)	$N = 103$ Pre-intervention: 71 (55.5 %) Post-intervention: 32 (55.2 %)
Park et al., 2022 [41]	Non-pharmacological Treatment	Delirium	Delirium: Confusion Assessment Method (CAM) Early Dementia: Mini Cog- Screening	ED	$N = 712$ Baseline = 442 (62.1 %) Post-implementation = 270 (37.9 %)	81.4 (9.1)	394 (55.3 %)	318 (44.7 %)
Sanon et al., 2014 [42]	Non-pharmacological Treatment	Agitation; Delirium	Confusion Assessment Method (CAM)	ED	462	78.1	303 (66 %)	159 (34 %)
Kroll et al., 2020 [43]	Non-pharmacological Treatment	Agitation; Dementia	Observed Emotion Rating Scale, Dementia Mood Picture Test Medical history, Mini Mental Status Examination; General Deterioration Scale	ED	N = 19 ED = 8 Dementia-specialized geriatric-gerontopsychiatric ward = 11	77.4 (range: 55–93)	9 (47 %)	10 (53 %)
Moreines et al., 2020 [35]	Multi-component Treatment	Agitation; Dementia; Delirium	Mini Mental State Examination (MMSE) Confusion Assessment Method (CAM)	ED	2547	80 (9.89)	1741 (68.41 %)	806 (31.59 %)

Table 2
Pharmacological treatments ($n = 8$).

Study Id	Restraint	n (%)	Efficacy outcomes	Outcome frequency n (%)	Author conclusions
Engstrom et al., 2023 [28]	Antipsychotics:	$n = 247$	Medication Redosing Within 90 min	49(19.8)	The acute use of benzodiazepines and antipsychotics had a high failure rate, with many patients requiring future observation, treatment, or interventions in order to maintain quality of patient health. There was no statistically significant difference in the incidence of adverse outcomes between patients who received benzodiazepines and patients who received antipsychotics. There are however various patient specific factors which vastly impact the effects of benzodiazepines and antipsychotic drugs, and therefore pharmacological management of agitation amongst older patients within the ER should be considered on a case-by-case basis.
			Need for 1:1 observation	230(93.1)	
			Need for physical restraints	68(27.5)	
			Composite treatment failure	233(94.3)	
			Composite treatment failure, without 1:1 observation	95(38.5)	
	Droperidol	36(14.6)			
	Haloperidol	105(42.5)			
	Olanzapine	36(14.6)			
	Quetiapine	56(22.7)			
	Risperidone	6(2.4)			
	Ziprasidone	8(3.2)			
	Benzodiazepines:	$n = 437$	Medication Redosing Within 90 min	90(20.6)	
			Need for 1:1 observation	377(86.3)	
			Need for physical restraints	101(23.1)	
			Composite treatment failure	383(87.6)	
			Composite treatment failure, without 1:1 observation	154(35.2)	
	Alprazolam	12 (2.7)			
	Clonazepam	0 (0)			
	Diazepam	11 (2.5)			
	Lorazepam	350 (80.1)			
	Midazolam	64 (14.7)			
Kohen et al., 2005 [37]	IM Ziprasidone (20 mg)	n = 15	Need for Physical Restraints	12(80)	IM ziprasidone is similarly effective to traditional treatments, and is typically well tolerated by the older adult population within the ED. Due to its lack of negative and adverse outcomes, it may be an effective treatment option for acute agitation amongst the older population presenting to the ED.
			Reduction in BARS score from baseline	6(40)	
			Changes in Blood Pressure	0(0)	
			Changes in Heart Rate	0(0)	
			Abnormal Heart Rhythms	0(0)	
			Rescue Medication Needed	4(26.7)	
			Motor Side Effects	0(0)	
Calver & Isbister, 2013 [33]	Chemical Restraints:	$n = 49$	Additional Sedation Required	18(36.7)	Doses of droperidol between 5 and 20 mg were effective when sedating most older adults within the ED, who were experiencing some form of acute behavioural disturbances. The time to sedation was similar regardless of dose, however patients receiving lower doses often required an additional dose for sedation. The lack of adverse outcomes with lower doses of droperidol supports treating older adults in the ED, initially with lower doses, evaluating their condition, then administering an additional dose if needed.
			Adverse Effects	5(10.2)	
			Myocardial Infarction	1(2.0)	
			Death	1(2.0)	
	Droperidol (10 mg)	30(61.2)			
	Droperidol (5 mg)	15(30.6)			
	Droperidol (2.5 mg)	2(4.1)			
	Midazolam (5 mg)	1(2.0)			

(continued on next page)

Table 2 (*continued*)

Study Id	Restraint	n (%)	Efficacy outcomes	Outcome frequency n (%)	Author conclusions
	Midazolam (2.5 mg)	1(2.0)			
Isenberg & Jacobs, 2015 [31]	Intramuscular Midazolam (2.5 mg): Intramuscular Haloperidol (2.5 mg):	n = 3 n = 1	Repeat Dose Additional Meds Administered RASS Score lowered Adverse Outcomes	0(0) 0(0) 4(100) 0(0)	This study compared the prehospital administration of haloperidol vs midazolam for the sedation of agitation patients. A total of 4 older adults were included in the study, and the sample size was severely limited, highlighted by the lack of outcomes and statistical analysis. Neither medication had any adverse effects, however, again due to the sample size, concluding which medication is superior is not possible at this time, and further research is required.
Hopper et al., 2015 [36]	Case 26: Ketamine (100 mg i.v. then 50 mg i.v. after 15 min) Case 31: Ketamine (40 mg i.v. then 20 mg i.v. after 15 min)	*n* = 1 n = 1	Change in Blood Pressure Change in Heart Rate	2(100) 2(100)	Of the patients included in this study, only two were older adults. Significant further research is yet to be done to uncover various other patterns, statistically significant differences, patient outcomes, and implications of ketamine use for Acute Agitation amongst older adults within the ED.
Wilson et al., 2017 [38]	Risperidone (median dose 1 mg)	*n* = 48	Drop In systolic blood pressure Higher and more frequent rates of Hypotension Decreases in heart rate and oxygen saturation	12(25.0) 3(6.3) Not reported	Although risperidone is known to cause hypotension, further research is required on its acute use in the ED setting, especially amongst older adults. Older patients often had different outcomes, and responded differently to risperidone than other populations, however this difference was not always statistically significant. Clinicians still tend to stay safe by ordering smaller doses of risperidone for geriatric patients, however negative outcomes are still more common in this patient group. In many cases alternatives should be considered.
Yap et al., 2019 [32]	Pharmacological Therapy: Droperidol (median 5 mg [2.5-15 mg]) Olanzapine (median 5 mg [2.5-10 mg]) Midazolam (median 2 mg [1-3 mg]) Haloperidol (median 2.5 mg [2-5 mg]) Droperidol (10 mg) and Midazolam (10 mg) Droperidol (2 mg) and Clonazepam (0.5 mg) Haloperidol (2.5 mg) and Midazolam (1 mg)	n = 31 15(48.1) 5(16.1) 5(16.1) 3(9.7) 1(3.2) 1(3.2) 1(3.2)	Oxygen Desaturation Bradycardia Anticholinergic Side Effects QTc Prolongation Tachycardia Adverse Clinical Outcomes	3(9.7) 2(6.5) 2(6.5) 1(3.2) 1(3.2) 0(0)	Although some adverse events were observed in just over one quarter of older adults, they were all resolved without any adverse clinical outcomes. The older adult population was severely underrepresented in this study. This indicates that parenteral sedation may not be as common in this population group. Overall, the treatment of behavioural emergencies amongst older adults within the ED with pharmacological sedatives is safe. However, patients should undergo ongoing monitoring to maintain safety.
Kennedy et al., 2022 [34]	Antipsychotics and Sedatives: Antipsychotics *Droperidol, Inapsine, Haldol, Haloperidol, Haloperidol Lactate, Abilify, Aripiprazole, Zyprexa Zydis, Zydis, Zyprexa, Olanzapine, Seroquel, Quetiapine Fumarate, Zoridal, Risperidone, Risperdal, Geodon, Ziprasidone HCl* Sedatives *Dizac, Diazepam, Valium, Zetran, Pentyl, Ketaject, Ketalar, Ketamine, Ativan, Lorazepam, Midazolam, Versed, Midazolam HCl*	*n* = 2721 353 (13.0) 2496 (91.7)	No patient outcomes specifically reported.	Not reported	Although this study did not report specific patient outcomes, it instead discussed factors that correlated to restraint usage amongst older adults in the ED. Sedatives were significantly more common than antipsychotics, and there are a variety of preexisting factors and conditions which will impact not only what medication older adults will receive, but which will be most effective. These predictors of administration include dementia, delirium diagnosis, location of residence, gender, imaging effectiveness, and location of ED.

additional rescue medications (other than the study drug) within 2 h of initial (study) drug administration [37].

3.2. Efficacy of pharmacological treatments

Pharmacological interventions for managing agitation in older adults in the ED/EMS environments have high failure rates and require additional treatments to address the agitated behavior. Antipsychotics (94.3 %) and benzodiazepines (87.6 %) had high rates of treatment failure, with approximately 20 % of patients needing redosing or 1:1 observation (~90 %) [28]. No statistical difference in adverse outcomes was observed between the two interventions within 24 h from medication administration [28]. Intramuscular midazolam and haloperidol were effective for sedating agitated older adults and with no adverse events following administration reported, although more data is needed due to very small ($n = 4$) older adult sample sizes [31].

Even though lower doses of intramuscular droperidol (5–20 mg) were effective for sedating older adults in the ED, additional medication was required in 36.7 % of cases, and adverse effects such as myocardial infarction and death occurred in 2 % of patients [33]. Oral risperidone (median dose 1 mg) frequently caused hypotension in older adults [38], whereas parenteral medication administration (e.g., droperidol, olanzapine, midazolam, haloperidol) required close monitoring due to 13.5 % risk of incidence adverse events, such as oxygen desaturation and bradycardia [32].

3.3. Non-pharmacological treatments

Non-pharmacological treatments ($n = 5$) were less frequently discussed than chemical restraints. Interventions such as light and music therapy, triage and intervention protocol, volunteer bedside care, and a non-contact cover and monitoring system are discussed within the

Table 3
Non-pharmacological treatments (n = 5).

Study Id	Intervention	n(%)	Efficacy outcomes	Outcome frequency n(%)	Author conclusions
Keene et al., 2023 [39]	Music Therapy *Wireless speaker with classical or non-vocal jazz music (patient choice; default: classical music)*	*n* = 33	Delirium	2(6.1)	Full spectrum light and music therapy is feasible within the ED environment. There was no statistically significant difference (p = 0.125) in outcomes between patients with the intervention, and without. Implementation may be difficult in many ED environments; however, patient and staff reactions were generally positive.
	Full Spectrum Light Therapy *Full spectrum lightbox designed to mimic natural light (color temperature: 6500 K; brightness: 5000 lx)*	n = 33		3(9.1)	
	Both Light and Music Therapy	n = 35		8(22.9)	
	Control	*n* = 32		7(21.9)	
Tan et al., 2022 [40]	Intervention for Delirium: Caregiver Education Delirium Evaluation by Nurse Medication Reconciliation and Feedback Treatment By Physician and Consult	n = 58	Hospitalized ED Revisit *Re*-hospitalization Death within Month	18(31.0) 0(0) 3(5.2) 1(1.7)	A computerized tool was developed with a delirium triage screen and brief confusion assessment, with the goal of aiding care for older adults. Interdisciplinary care was implemented through specialized care paths. There was no statistical significance to the outcomes, however the system and results show promise for both staff and patients in the future.
Park et al., 2022 [41]	A specialized clinical pathway: comprehensive geriatric assessment within 48 h of admission, 4 M framework, patient and family caregiver preferences. Part of a MDT consensus for order sets, guidelines and escalation protocols.	n = 270	Delirium	50(18.5)	The implementation of a multidisciplinary Geriatric Trauma Care pathway led to a reduction in the incidence of delirium. Overall, the pathway led to improved outcomes within hospitalized older adults. The mean length of stay for baseline patients and patients with the intervention was not statistically significant. Pain scores within the first 24 h however worsened in older adults in the postimplementation group.
Sanon et al., 2014 [42]	Care and Respect for Elders with Emergencies (CARE): having conversations, administering assistance, playing games, keeping them oriented and engaged.	*n* = 462	Not Reported	Not Reported	Further research is required to uncover outcomes, as this is simply a preliminary report. However, the CARE program seems to be promising and a positive advancement in the care of older adults within the ED.
Kroll et al., 2020 [43]	A Charité Dome (ChD) cover and non-contact monitoring system (NCMSys) were developed for use in ED's. The NCMsys monitors vital signs, movement, and sound.	n = 8	Changes in Sound Emissions Changes in Heart Rate Positive Effects On Patient's Mood Wellbeing, Emotion and Alertness Increased Joy and Alertness Deterioration	Not Reported	Although specific frequencies were not always reported. There was a significant difference in various outcomes prior to implementation of the ChD and NCMSys, and post implementation. All healthy test persons responded with a difference in heart rate. However, the sensor mat did not show any difference in respiratory rate. These changes in vital signs might indicate upcoming, or the manifestation of agitations, a crucial piece of information to healthcare providers. Most patients beneath the ChD experienced beneficial outcomes, with better emotions, wellbeing and alertness. Overall, further research is still required to gather more conclusive data, and more patient outcomes. However, the ChD is promising as a tool to detect upcoming agitation, and to prevent further deterioration amongst older adults.

ED. A total of 899 patients were included in the non-restraint category, ranging from a sample size of 8 to 462.

Light (full spectrum lightbox designed to mimic natural light [color temperature: 6500 K; brightness: 5000 lx]) and music (classical or non-vocal jazz music [patient choice; default: classical music]) therapy for the management of delirium showed positive staff and patient reactions but no statistically significant outcomes ($p = 0.125$) [39]. There was a trend towards decreasing incidence of delirium in the light only (9.1 %; RR: 0.41, 95 % CI 0.12–1.46) and music only (6.1 %; RR: 0.27, 95 % CI 0.06–1.23) groups, when compared to the control group (21.9 %) and music and light therapy group (22.9 %; RR: 1.04, 95 % CI 0.42–2.55), however, the differences were not statistically significant [39].

A delirium care intervention that involved caregiver education, nurse evaluations, and medication feedback led to improved patient outcomes, however, were not statistically significant (perhaps due to a small sample size in the post intervention period) [40]. When comparing the pre-intervention ($n = 128$) and post-intervention ($n = 58$) periods, patients had shorter hospital stays (10.7 days vs. 7.9 days, $p = 0.164$), fewer ED revisits within 3 days (11 % vs. 0 %, $p = 0.209$), lower re-hospitalization rates within 14 days (18.7 % vs. 16.7 %, $p > 0.999$), and reduced mortality within 1 month (9.9 % vs. 5.6 %, $p > 0.999$) [40].

A geriatric trauma care pathway consisted of clinical implementations based on best geriatric care practices, such as comprehensive geriatric assessment within 48 h of admission, 4 M framework (medication, mentation, mobility, and what matters), patient and family caregiver preferences, which are part of a multidisciplinary team consensus for order sets, guidelines and escalation protocols [41]. There is a focus on preventing, recognizing, and treating agitation in elderly ED patients. The implementation of this pathway reduced delirium incidence (28.3 % vs 18.5 %, $p = 0.002$), however initial pain scores worsened (11.3 % vs 20 % of patients reported a pain score ≥ 4 in the first 24 h) and there was no significant change in mean length of stay post-implementation [41].

The CARE program was designed to engage older adults in the ED, by means of talking or providing reassurance (71 %), participating in activities like brain games (18 %), and using stress balls (12 %) [42]. Although further research is needed to assess its efficacy, this program was highly valued by patients, volunteers, and ED staff testimonials for preventing the need for pharmacological or restraint-based management of agitation in older adults [42].

A non-contact monitoring system with a sheltering device was utilized for patients with dementia in the ED to detect early signs of agitation; preliminary data shows vitals measurements were accurate, and the sheltering device benefited agitation and wellbeing (53 %) [43].

Table 4
Multi-component treatments (n = 3).

Study Id	Restraint	n(%)	Efficacy outcomes	Outcome frequency n(%)	Author conclusions
Swickhamer et al., 2013 [30]	Chemical restraints: Lorazepam only Haloperidol and Lorazepam Haloperidol Haloperidol and Diazepam Diazepam and Midazolam Midazolam	n = 35 19 (54.3) 9(25.7) 4(11.4) 1(2.9) 1(2.9) 1(2.9)	Adverse Physical Outcomes	0(0)	In this study, 83 elderly patients were placed in physical restraints. 35 (42.2 %) of those patients then required further pharmacological restraining. A variety of drugs were used both alone and in combination with each other, and the lack of negative outcomes is positive. There was no difference in outcomes between those patients only physically restrained and restrained both chemically and physically. Various outcomes were not reported specific to the pharmacologically medicated group of patients, a place where further research may be required to uncover further patient outcomes.
	Physical Restraints: Soft, two-point Restraints Other Physical Restraints	n = 83 76(91.6) 7(8.4)	Additional Restraining Required (Chemical) No Further Restraining Required Death Adverse Physical Outcomes	35 (42.2 %) 48 (57.8 %) 0 (0) 0 (0)	Amongst older adults presenting to the ED, the use of physical restraints of any kind did not lead to adverse physical outcomes, or death. There was no statistically significant difference in outcomes between patients receiving physical restraints, and patients receiving both physical and chemical restraints.
Moreines et al., 2020 [35]	Advanced Practice Registered Nurse (APRN) led GEMs consult service:	n = 2547	Admitted to Hospital Discharged Subsequent ED Visit or *Re*-admission Death within 90 Days New Medications Received	1544 (60.6) 2514 (98.7) 1740 (68.3) 160 (6.3) 875 (34.3)	APRNs led GEM's consult services over a 2-year period, using the 4 M's framework to help create a comprehensive treatment and discharge plan. A total of 2547 unique patients were seen for a GEM consult, with a variety of patient outcomes. ED clinicians considered the GEM Consult model to be satisfactory and felt that GEM team care recommendations often assisted with treating physical injuries, as well as symptoms of dementia.
	Physical Restraints:	*n* = 154	Not Reported	Not Reported	GEM's consultations conducted over a 2-year period between March 2017 and November 2019 within an ED yielded a total of n = 2547 older adults. Of these older adults, 154 (6 %) required some form of physical Restraint during their stay within the ED or Hospital.
	Chemical Restraints[a]: Benzodiazepines Opiates Antipsychotics	*n* = 875 60 (6.9) 658 (75.2) 157 (17.9)	No patient outcomes specifically reported to chemical restraints	Not reported	APRNs led a GEM's consult service over a 2-year period. A total of 2547 unique patients were seen. Although specific outcomes due to chemical interventions were not reported, 875 (34.4 %) patients received a new medication as part of their treatment plan via the GEM care team recommendations. Overall, staff and patients alike were satisfied with the program, and the treatments administered.
Simpkins et al., 2016 [29]	Pharmacological sedation: Midazolam Lorazepam Diazepam Haloperidol Risperidone Olanzapine Droperidol Morphine	*n* = 64 34 (53.1) 7 (10.9) 2 (3.1) 10 (15.6) 5 (7.8) 4(6.3) 1(1.6) 1(1.6)	Further benzodiazepine or antipsychotic administered Adverse Outcomes	Not Specifically Reported	Pharmacological sedation was a common intervention in ART calls, occurring 64 (88 %) times. Specific outcomes to the pharmacological agents were not given, nor their frequencies, however, the vast majority of options available to care providers and patients when being sedated often times leads to complications. Further research is required to draw statistically significant data however. Further guidelines and best practices being researched and put into place would most definitely be beneficial.
	Verbal de-escalation: Family Speaking to Patient Special Nurse Requested Other Form of Verbal De-escalation	n = 31 14(45.2) 16(51.6) 1(3.2)	Not Reported	Not reported	Amongst older adults within the ED who required a specialized ART (aggression response team), verbal de-escalation had already been attempted in 31 calls (42 % of total).

[a] New medications received in the emergency department/during hospitalization.

3.4. Multi-component treatments

A total of three articles included a combination of pharmacological or non-pharmacological treatments. A study of 83 older adults that were physically restrained in the ED over a 2-year period, of which, 42.2 % required further pharmacological treatment to manage agitation [30]. Nearly 92 % of patients were physically restrained with soft two-point restraints; 54.3 % received lorazepam only, whereas 25.7 % received a combination of haloperidol and lorazepam. The average length of hospital stay was 7.2 days for all patients ($p = 0.657$), and only 25 % of patients who came from home were able to return back to home after their hospitalization, whereas the majority were discharged to nursing facilities. No adverse physical outcomes/injuries were reported, nor a statistically significant difference in patient outcomes between patients who only received physical restraints versus the additional chemical restraints [30].

An Advanced Practice Registered Nurse (APRN)-led Geriatric Emergency Management (GEM) service enrolled 2547 older adults, of which 6 % required physical restraints and 34.4 % received chemical intervention, with the vast majority (75.2 %) receiving opiates, antipsychotics (17.9 %), or benzodiazepines (6.9 %) [35]. ED clinicians considered the GEM Consult model to be satisfactory and felt that GEM team care recommendations often assisted with treating physical injuries, as well as symptoms of dementia [35].

An Aggression Response Team (ART) helped manage agitated older adults in the ED, finding that verbal de-escalation was attempted in 42 % of ART calls and pharmacological sedation was used in 88 % of ART calls, such as midazolam (53.1 %), haloperidol (15.6 %), and lorazepam (10.9 %) [29]. Specific patient outcomes were not reported.

3.5. Recommendation level articles

Six articles which did not contain any patient level data were also included in this scoping review; these articles were classified as recommendation level papers analyzing interventions/recommendations for managing agitation, delirium, and cognitive impairment in geriatric ED patients, through cross-sectional surveys, literature reviews, and expert consensus (Table 5).

A survey of chemical restraint trends across three Canadian cities found that 88.3 % of emergency physicians report using haloperidol,

Table 5
Recommendation level articles (n = 6).

Study Id	Study design	Intervention targeting	Assessment methods	Intervention category	Interventions	Author conclusions
Shenvi et al., 2019 [47]	Research Consensus Session	Acute Behavioural Changes	Not Explicitly Stated	Chemical Restraints and Non-Restraint Therapies	Screening and identification; Management strategies; Approach to delirium	
Shenvi et al., 2020 [46]	Review Article	Agitation; Delirium	Delirium Triage Screen, Brief Confusion Assessment Method, 3D-Confusion Assessment Method, RASS (Richmond Agitation Sedation Scale)	Pharmacological and non-pharmacological treatment	ADEPT Tool: Assess; Diagnose; Evaluate; Prevent; Treat Recommendations: • Multi-modal treatment approach • Verbal de-escalation • Start with oral medication (if necessary) • Cautious consideration of IM/IV medication • Avoid benzodiazepines (if possible) • Use caution to avoid harm and minimize side effects	Nonpharmacologic interventions are preferred due to minimal risk. Pharmacologic interventions should only be used for safety reasons. Avoid benzodiazepines (if possible) due to increased risk of prolonged sedation, paradoxic agitation, and worsening delirium.
Sri-On et al., 2014 [45]	Descriptive Cross-Sectional Survey	Delirium	General clinical assessment (41 [74 %]), mini-mental state examination (7 [13 %]), Confusion Assessment Method for intensive care unit (3 [5 %]), delirium rating scale (2 [4 %]), Glasgow coma scale (1 [2 %]), and the Diagnostic and Statistical Manual of Mental Disorders fourth edition (DSM-IV) (1 [2 %]).	Pharmacological and non-pharmacological treatment	IV Diazepam (42 %) was the first choice of emergency physicians for pharmacologic delirium treatment, followed by IV/IM haloperidol (29 %), oral lorazepam (12 %), and oral risperidone (5 %).	Oversedation was the most commonly reported complication of pharmacological restraint use, despite only 1/5 of respondents believing that emergency physicians over sedate older adults in the ED. Physical restraints (42 %) were believed to be more overused in older adult ED patients.
Lucke et al., 2022 [48]	Expert Consensus on Clinical Recommendations and Literature Review	Delirium; Cognitive Impairment	Agitation due to Delirium, Cognitive Impairment	Guidelines	Multicomponent interventions and regular reorientation. Structured assessments, including medication review. Assess pain appropriately. Do not use physical restraints. Attempt non-pharmacological treatments as a first line of treatment. Cautiously approach sedation if non-pharmacological treatments have failed. Start with oral medications and escalate to IM/IV if necessary (according to a senior doctor). Ensure appropriate monitoring and airway support. Link cognitively impaired patients to local inpatient care or to family doctor for further investigation. Tailor delirium diagnostic interventions to each individual patient's history and physical examination.	
Russek et al., 2023 [44]	Survey Study	Agitation; Delirium	Not Explicitly Stated	Pharmacological treatment	Physicians report using: - Haloperidol: 88.3 % - Ketamine: 10.4 % - Lorazepam: 42.9 % - Loxapine: 29 % - Methotrimeprazine: 4 % - Midazolam: 20 % - Olanzapine: 26 % - Quetiapine: 53 % - Risperidone: 36 % - Median starting dose of haloperidol: ≤ 0.5 mg - Median starting dose of loxapine or haloperidol (in haloperidol equivalents): ≤0.5 mg	This study explored usage trends of medications for the management of agitation and delirium in older adults across three Canadian cities (Vancouver, Toronto, and Sherbrook) amongst ED physicians. Physician's choice of medications was similar across cities. Use of benzodiazepines was frequent across Canada, particularly in Vancouver. Recommendations for standardized order sets for older adults in the ED.
Kennedy et al., 2021 [49]	Concept Guidelines	Delirium	Not Explicitly Stated	Guidelines	Delirium Change Package and Toolkit in the Emergency Department (ED-DEL) to provide protocols and guidance for implementing a delirium program in the ED setting.	This article discusses the importance and challenges of delirium management in the ED and proposes a comprehensive toolkit to address these concerns. The TADA (tolerate, anticipate, don't agitate) approach is recommended as an effective non-pharmacological management strategy for agitation in the ED. Recommendations also include delirium management based on the ADEPT tool, as well as the

(continued on next page)

Table 5 (*continued*)

Study Id	Study design	Intervention targeting	Assessment methods	Intervention category	Interventions	Author conclusions
						critical importance of a clinical pharmacist to prevent and manage delirium from delirium-inducing medications.

particularly in Vancouver (median: ≥5 mg), where higher starting doses of antipsychotics were common, indicating that standardization of order sets may improve management of agitation and delirium across sites [44]. Oversedation was a commonly reported complication with the use of pharmacological treatment, yet only 20 % of emergency physicians believed this to be an issue in the older adult population, whereas 42 % believed physical restraints to be overused with older adults [45].

The recommendations of the Assess, Diagnose, Evaluate, Prevent, Treat (ADEPT) tool provided a structured framework for managing delirium and agitation [46]. A multi-modal approach to treatment that prioritizes non-pharmacological interventions (e.g., verbal de-escalation) due to their negligible risks, while recommending cautious use of pharmacological interventions to prevent harm and minimize side effects, was emphasized [46,47].

Expert consensus on clinical recommendations and a literature review underscored the importance of multicomponent interventions, regular reorientation, appropriate pain assessment, and structured assessments including medication review as well as a cautious approach to sedation if non-restraint therapies have failed [48].

Using a comprehensive five step method including a literature review, semi-structured interviews with healthcare professionals, and an expert working group, the Delirium Change Package and Toolkit in the Emergency Department (ED-EDL) provides protocols and guidance for implementing a delirium program in the ED, such as recommending non-pharmacological approaches and highlighting the role of clinical pharmacists in minimizing delirium-inducing medications [49].

Overall, all six recommendation articles in this category emphasized the importance of using caution with pharmacological medications and physical restraints and instead prioritizing non-restraint strategies as a first line of treatment.

4. Discussion

To our knowledge, this is the first study to summarize the existing literature for agitation/dementia/delirium management strategies in older adults in ED and EMS settings. We identified 4 categories of articles: pharmacological treatments, non-pharmacological treatments, multi-component treatments, and consensus recommendations for the management of agitation. Most studies identified in this review were pertaining to pharmacological treatment, however, there are concerns of risk of ineffectiveness and patient harm associated with pharmacological management. Non-pharmacological interventions were explored and appear favorable due to the negligible risk of patient side effects, however, these studies often had smaller sample sizes and minimal reporting of patient outcomes, making it difficult to draw definitive conclusions. A few recommendation level articles offered expert consensus/opinion, however, lacked scientific patient level data. Moreover, there is a significant gap in evidence specific to EMS ($n = 1$) highlighting the need for pre-hospital agitation management research in older adult populations.

Pharmacological treatments were found to be most commonly discussed within emergency setting literature for managing symptoms of agitation/dementia/delirium, but also reported the highest risks. Most interventions involved medications such as benzodiazepines and/or antipsychotics [28,33,37,38]. Engstrom et al. [28] found that 63.9 % of patients received benzodiazepines, and 36.1 % received antipsychotics, indicating a reliance on pharmacology to manage agitation. However, treatment failure rates were high, requiring further agitation management interventions. Pharmacological medications, such as antipsychotics to treat neuropsychiatric symptoms in patients with dementia, are associated with limited efficacy in managing agitation and pose a higher risk of adverse patient outcomes, such as falls, fractures, cerebrovascular events, and even death [50,51]. Reporting of adverse events and patient outcomes was also limited in most studies, perhaps due to small sample sizes or short follow up periods which do not account for long term harms. Given this, a reliance on medications to treat/manage agitation in older adults is prevalent and concerning, and alternative management strategies should be explored.

Non-pharmacological interventions, such as music or light therapy, were often recommended for use prior to using pharmacological treatment in the ED. Keene et al. [39] explored the efficacy of music and light therapy for the prevention of delirium and found these interventions to be feasible within the ED and well received by patients and staff. Other non-pharmacological interventions explored within the literature are varied from specialized screening and assessment tools to environmental changes and care pathways [40–43]. While the efficacy of these interventions requires further exploration, it suggests that non-pharmacological interventions can serve as important adjuncts to chemical interventions in the ED, particularly for patients at risk of delirium or cognitive decline. In general, non-pharmacological therapies targeting agitation in persons with dementia, like multi-disciplinary care, massage and touch therapy, and music are found to be more clinically effective than usual (pharmacological) care, and should be formally evaluated in the ED setting [51].

Multi-component treatment approaches included a combination of therapies (pharmacological and/or non-pharmacological), as well as some sort of personalized care/consult model. Moreines et al. [35] reported a reliance on chemical (34.4 %) and physical (6 %) restraints, although the prevalence of overall restraint use was greatly reduced in this study due to an APRN led GEMs consult service. Similarly, Simpkins et al. [29] reported an ART was using pharmacological intervention (88 %) more than twice as often as verbal de-escalation strategies (42 %), indicating a strong reliance on pharmacological treatment as a first line in agitation management. We found these combination interventions to be favorable in improving patient outcomes in the ED, but further research is required to understand the full scope and validity of these interventions within the older adult population in the ED. Personalized care consult models, such as GEMs, are common within community and hospital care, however, evidence is lacking within acute care, such as within the ED and EMS as GEMs models are still in their infancy in acute care settings. Studies evaluating GEMs effectiveness in outpatient and in-hospital settings have found GEM services to significantly reduce in-hospital mortality and improved overall survival for 24 month follow up [52,53]. Moreover, the timeline of receiving GEM services is crucial; patients who receive GEM services early have a lower (4.9 %) in-hospital mortality rate compared to patients who receive delayed (15.6 %) GEM services during their hospitalization [52].

Recommendations for agitation management centred around guidelines for restraint use and non-restraint therapies. Shenvi et al. [46]

developed the ADEPT tool for a structured pathway in dealing with agitated older adults, which emphasizes caution in proceeding with restraint use without using non-restraint therapies first, such as verbal de-escalation. Similarly, Kennedy et al. [49] created a toolkit to implement a delirium change program in the ED, with management of delirium recommendations based on ADEPT. Lucke et al. [48] also created multicomponent guidelines that advised a cautious approach to restraints and careful monitoring to ensure patient safety. Sri-On et al. [45] and Russek et al. [44] surveyed emergency physicians regarding their preferences for chemical restraints, and found inconsistency in prescribing practices, indicating a need for standardized protocols for agitation and delirium management of older adults in the ED. Given the lack of evidence regarding the expert consensus recommendations, future research is needed to develop a comprehensive understanding of their efficacy and relevance to the management of older adults in acute care.

There is limited evidence for agitation/dementia/delirium in older adults in ED and EMS settings, however, there is more evidence around restraints use in long term care (LTC). The use of antipsychotics in dementia patients is similar in LTC but not without significant risk of harm [51], however, there seems to be a reluctance to adequately explore alternative management strategies in emergent settings. Non-pharmacological treatments for geriatric agitation, such as music and touch therapy, have been shown to be successful and clinically significant in long term care settings [51].

Indeed, long term care settings and emergency care settings, such as the ED and EMS, are very different environments to consider when deciding appropriate course of action. Where in long term care, there may be ample opportunity for time to personalize treatment, the same cannot always be feasible in the ED, where rapid sedation and immediate safety concerns are often an issue which requires healthcare providers to act quickly to stabilize the patient.

4.1. Future directions

The lack of EMS focused articles in this scoping review is striking. We only identified one article addressing the management of agitation in older adults during pre-hospital care [31]. This indicates a significant knowledge gap in geriatric focused pre-hospital care research, given that more than a third of older adults are transported to the ED by EMS [5-8,10]. Future researchers should aim to decrease the knowledge gap within pre-hospital environments.

4.2. Strengths & limitations

There are many strengths and limitations of this research. This was a comprehensive scoping review which searched three different databases. The methods were robust and systematic, ensuring reliability and reproducibility of the review process.

Many studies were limited in reporting patient outcomes following the intervention, which limits the ability to assess the efficacy of different agitation management strategies. Part of this reason may be due to a lack of long-term patient follow up – the studies in this review were inconsistent in follow up periods, which may affect our understanding of long-term treatment outcomes for agitation in older adults. Moreover, there is a gap identified within the literature, particularly in non-pharmacological treatment studies, which fails to account for severity of agitation (or a validated standardized measurement of agitation [score]) as well as time to response. This is a crucial piece of missing information to have a complete understanding of the efficacy and comparison of treatment options.

5. Conclusion

The findings of this scoping review contribute to our understanding of agitation management in emergency care environments, such as the ED and EMS. The results show that chemical restraints are most frequently used and relied upon to manage agitated older patients, which has the potential to cause harmful patient outcomes. Non-restraint therapies are feasible in the ED; however, further research is required to understand efficacy and impact on patient outcomes/adverse events.

CRediT authorship contribution statement

Fatima I. Shah: Writing – review & editing, Writing – original draft, Visualization, Validation, Project administration, Investigation, Formal analysis, Data curation. **Grace Lew:** Writing – review & editing, Visualization, Validation, Investigation, Formal analysis. **Zeeshan Chawdhry:** Writing – review & editing, Visualization, Validation, Investigation, Formal analysis. **Krista Reich:** Writing – review & editing, Supervision. **Kathryn Crowder:** Writing – review & editing, Supervision. **Diane L. Lorenzetti:** Writing – review & editing, Methodology. **Margaret McGillivray:** Writing – review & editing. **Zahra Goodarzi:** Writing – review & editing, Validation, Supervision, Resources, Methodology, Conceptualization.

Sources of funding

This work is not funded. There is no study sponsor. ZC received a 16-week Neuroscience Summer Research Scholarship from the University of Calgary.

Declaration of competing interest

We do not have any conflicts to report. ZG holds grants from the Canadian Institute of Health Research, Weston Foundation, Alberta Health, and the University of Calgary, as well as honoraria from the Canadian Coalition for Seniors' Mental Health and is on the boards for the Canadian Conference on Dementia, and the Canadian Association of Geriatric Psychiatry.

Appendix A. PRISMA-ScR checklist

A.1. Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

Section	Item	PRISMA-ScR checklist item	Reported on page #
Title			
Title	1	Identify the report as a scoping review.	1
Abstract			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	2
Introduction			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	3–4
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements used to conceptualize the review questions and/or objectives.	4
Methods			
Protocol and	5	Indicate whether a review protocol	5

(continued on next page)

(*continued*)

Section	Item	PRISMA-ScR checklist item	Reported on page #
registration		exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	6
Information sources[a]	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	5
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	Appendix B
Selection of sources of evidence[b]	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	6
Data charting process[c]	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	6–7
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	6; Appendix D
Critical appraisal of individual sources of evidence[d]	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	N/A
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	7
Results			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	7; Fig. 1
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	7–13
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	N/A
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	Tables 1–5
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	Tables 1–5
Discussion			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	13–17
Limitations	20	Discuss the limitations of the scoping review process.	17
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	18
Funding			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	1

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

[a] Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

[b] A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

[c] The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

[d] The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMAScR): Checklist and Explanation. Ann Intern Med. 2018;169:467–473. https://doi.org/10.7326/M18-0850

Appendix B. MEDLINE search strategy

#	Query	Results from 11 Mar 2024
1	exp Aged/ or geriatrics/ or aging/ or (geriatric* or elder* or old* or aging or aging or senior* or retired or retiree* or elder* or pensioner* or "nursing home*" or gerontology or Sexagenarian* or septuagenarian* or octogenarian or nonagenarian* or centenarian* or sixties or seventies or eighties or nineties).tw,kf.	5,218,234
2	exp Emergency Service, Hospital/	101,864
3	((emergen* or trauma) adj (department* or service*)).tw,kf.	141,583
4	ED.tw,kf.	86,162
5	EMS.tw,kf.	16,330
6	EMT.tw,kf.	35,758
7	emergency medical service*.tw,kf.	13,636
8	exp Emergency Medical Services/ or exp. Emergency Medical Technicians/ or exp. Paramedics/	175,969
9	paramedic*.tw,kf.	10,411
10	emergency medical technician*.tw,kf.	1444
11	"Accident and emergency".tw,kf.	5184
12	A&E.tw,kf.	32,900
13	("prehospital" or "pre-hospital").tw,kf.	22,258
14	("out of hospital" or "out-of-hospital").tw,kf.	15,234
15	2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14	385,926
16	exp Psychomotor Agitation/ or exp. Delirium/	19,779
17	exp Aggression/	45,168
18	exp Alcohol Withdrawal Delirium/ or exp. Emergence Delirium/	2787
19	delirium*.tw,kf.	22,117
20	agitat*.tw,kf.	24,905
21	aggress*.tw,kf.	261,682
22	deliri*.tw,kf.	22,780
23	neuropsychiatric*.tw,kf.	42,857
24	restraint*.tw,kf.	30,302
25	((safe* or arm* or wrist* or limb* or body*) adj (strap* or tie* or belt* or posie*)).tw,kf.	763
26	((manag* or treat* or therap*) adj2 (agitat* or aggress*)).tw,kf.	37,332
27	16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26	399,454
28	1 and 15 and 27	3386
29	limit 28 to ("all aged (65 and over)" and "humans only (removes records about animals)")	1970

(*continued*)

#	Query	Results from 11 Mar 2024
30	29 not (lecture or autobiography or bibliography or biography or case reports or directory or dictionary or festschrift or legal case or legislation or editorial or "expression of concern" or interactive tutorial or news or newspaper article or portrait or video-audio media or web-cast or periodical index or personal narrative or twin study or letter or patient education handout or periodical index).tw,kf.	1943

Appendix C. Seed articles

Shenvi C, Kennedy M, Austin CA, Wilson MP, Gerardi M, Schneider S. Managing Delirium and Agitation in the Older Emergency Department Patient: The ADEPT Tool. Ann Emerg Med. 2020 Feb;75(2):136–145. https://doi.org/10.1016/j.annemergmed.2019.07.023. Epub 2019 Sep 26. PMID: 31563402; PMCID: PMC7945005.

Engstrom K, Mattson AE, Mara K, Silva LOJE, Bellolio F, Jeffery MM, Stanich J, Brown CS. Safety and effectiveness of benzodiazepines and antipsychotics for agitation in older adults in the emergency department. Am J Emerg Med. 2023 May;67:156–162. https://doi.org/10.1016/j.ajem.2023.02.032. Epub 2023 Mar 1. PMID: 36893629.

Swickhamer, C., Colvig, C., & Chan, S. B. (2013). Restraint use in the elderly emergency department patient. *The Journal of emergency medicine*, *44*(4), 869–874.

Russek, N. S., Skappak, C., Scheuermeyer, F., Brousseau, A. A., McLeod, S. L., Melady, D., & Spencer, M. (2023). Pharmacological Management of Agitation and Delirium in Older Adults: a Survey of Practices in Canadian Emergency Departments. *Canadian Geriatrics Journal*, *26*(3), 405.

Ba, A. B., Cameron-Comasco, L., & Otero, R. (2023). Feasibility of Light and Music Therapy in the Elderly for the Prevention of Hospital-Associated Delirium. *Rhode Island Medical Journal*, *106*(4), 35–39.

Kennedy, M., Koehl, J., Shenvi, C. L., Greenberg, A., Zurek, O., LaMantia, M., & Lo, A. X. (2020). The agitated older adult in the emergency department: a narrative review of common causes and management strategies. *Journal of the American College of Emergency Physicians open*, *1*(5), 812–823.

Appendix D. Extraction form

Name: _____

Intended Use:

- o Prevalence of Agitation calculation
- o Management of agitation scoping review

Publication Year: _____.
Country of Origin: _____.
Language: _____.

Study Design:

- o prospective case-control
- o prospective cohort
- o retrospective cohort
- o retrospective case-control
- o population studies
- o Other: _____

Setting:

- o ED
- o EMS

Acuity Score/CTAS score: _____.

Article evaluation agitation?

- o Yes
- o No

Method of determining agitation?

- o Richmond Agitation-Sedation Scale (RASS)
- o Cohen-Mansfield Agitation Inventory (CMAI)
- o Agitation Behavior Scale (ABS)
- o Behavioural observation
- o Other: _____

Underlying cause of agitation?

- o Dementia
- o Delirium
- o Anxiety
- o Other: _____

Method of Assessing underlying dementia?

- o Mini-Mental State Examination (MMSE)
- o Montreal Cognitive Assessment (MoCA)
- o DSM V or IV criteria
- o ICD-10 or ICD-9 diagnosis
- o NINDS-AIREN
- o Other: _____

Method of assessing underlying delirium?

- o Confusion Assessment Method (CAM)
- o Delirium Rating Scale-Revised-98 (DRS-R-98)
- o 4AT (4 A's Test)
- o Other: _____

Method of assessing underlying anxiety?

- o Generalized Anxiety Disorder 7 (GAD-7)
- o Hospital Anxiety and Depression Scale (HADS)
- o Behavioural observations
- o Physiological measures (cortisol, heart rate, blood pressure)
- o Other: _____

Reason for admission to ED/EMS:

Patient co-morbidities (categorize):

- o Cardiovascular
- o Respiratory
- o Endocrine
- o Renal
- o Gastrointestinal
- o Musculoskeletal
- o Nervous system
- o Psychiatric
- o Hematologic
- o Immune

Baseline use of medications (categorize):

- o Analgesics
- o Antibiotics
- o Antidepressants
- o Antihypertensives
- o Antidiabetics
- o Antipsychotics
- o Anticoagulants and Antiplatelets

- o Antihistamines
- o Bronchodilators
- o Corticosteroids
- o Diuretics
- o Statins
- o Anticonvulsants
- o Antivirals
- o Immunosuppressants
- o Dementia Medications

Total number of participants n(%):

Mean Age and SD of participants:

Proportion of females:

Proportion of males:

Time period of patient inclusion:

Intervention targeting:

- o Agitation/aggression
- o Dementia
- o Delirium
- o Anxiety
- o Other: _____

Mode of Intervention:

- o Chemical Restraints (list drugs reported and dosage): _____
- o Physical Restraints (list restraints used): _____
- o Non-drug/non-restraint therapies (list what strategies used): _____
- o Other: _____

Time period from baseline to follow up: _____.

Follow up method of assessment: _____.

Outcomes: _____.

Intervention successful in the management/treatment of agitation?

- o Yes: _____
- o No: _____
- o Other: _____

Intervention successful in the management/treatment of underlying cause of agitation (e.g., dementia, delirium, anxiety)?

- o Yes
- o No
- o Other: _____

Patient coming from (location):

- o Home
- o Long Term Care/ Nursing home
- o Dementia care facility
- o Supportive living
- o Other: _____

Patient discharged to (location):

- o Back to the same location
- o Admitted to ICU/hospital/general medical ward
- o Admitted to ED *(for EMS focused articles)*
- o Other: _____

ED discharge/hospital admission diagnosis: _____.

Overall Comments/Notes: _____.

References

[1] Han JH, Zimmerman EE, Cutler N, Schnelle J, Morandi A, Dittus RS, et al. Delirium in older emergency department patients: recognition, risk factors, and psychomotor subtypes. Acad Emerg Med. 2009;16(3):193–200.

[2] Deschodt M, Devriendt E, Sabbe M, Bellinck K, Boonen S, Milisen K, et al. Characteristics of older adults admitted to the emergency department (ED) and their risk factors for ED readmission based on comprehensive geriatric assessment: a prospective cohort study. BMC Geriatr. 2015;15:54.

[3] Lee JS, Tong T, Chignell M, Tierney MC, Goldstein J, Eagles D, et al. Prevalence, management and outcomes of unrecognized delirium in a national sample of 1,493 older emergency department patients: how many were sent home and what happened to them? Age Ageing. 2022.;51(2).

[4] Caplan Z, Rabe M. The older population. U.S. Census Bureau; 2020. C2020BR-07. Available from:. https://www.census.gov/programs-surveys/decennial-census/decade/2020/planning-management/process/disclosure-avoidance.html.

[5] Platts-Mills TF, Leacock B, Cabañas JG, Shofer FS, McLean SA. Emergency medical services use by the elderly: analysis of a statewide database. Prehosp Emerg Care. 2010;14(3):329–33.

[6] Lee SB, Oh JH, Park JH, Choi SP, Wee JH. Differences in youngest-old, middle-old, and oldest-old patients who visit the emergency department. Clin Exp Emerg Med. 2018;5(4):249–55.

[7] Shah MN, Bazarian JJ, Lerner EB, Fairbanks RJ, Barker WH, Auinger P, et al. The epidemiology of emergency medical services use by older adults: an analysis of the National Hospital Ambulatory Medical Care Survey. Acad Emerg Med. 2007;14(5):441–7.

[8] Latham LP, Ackroyd-Stolarz S. Emergency department utilization by older adults: a descriptive study. Can Geriatr J. 2014;17(4):118–24.

[9] Ogliari G, Coffey F, Keillor L, Aw D, Azad MY, Allaboudy M, et al. Emergency department use and length of stay by younger and older adults: Nottingham cohort study in the emergency department (NOCED). Aging Clin Exp Res. 2022;34(11):2873–85.

[10] Duong HV, Herrera LN, Moore JX, Donnelly J, Jacobson KE, Carlson JN, et al. National characteristics of emergency medical services responses for older adults in the United States. Prehosp Emerg Care. 2018;22(1):7–14.

[11] Miner JR, Klein LR, Cole JB, Driver BE, Moore JC, Ho JD. The characteristics and prevalence of agitation in an urban county emergency department. Ann Emerg Med. 2018;72(4):361–70.

[12] Halpern R, Seare J, Tong J, Hartry A, Olaoye A, Aigbogun MS. Using electronic health records to estimate the prevalence of agitation in Alzheimer disease/dementia. Int J Geriatr Psychiatry. 2019;34(4):420–31.

[13] LaMantia MA, Stump TE, Messina FC, Miller DK, Callahan CM. Emergency department use among older adults with dementia. Alzheimer Dis Assoc Disord. 2016;30(1):35–40.

[14] Barron EA, Holmes J. Delirium within the emergency care setting, occurrence and detection: a systematic review. Emerg Med J. 2013;30(4):263–8.

[15] Coburn VA, Mycyk MB. Physical and chemical restraints. Emerg Med Clin North Am. 2009;27(4):655–67.

[16] Walia H, Tucker LYS, Manickam RN, Kene MV, Sharp AL, Berdahl CT, et al. Patient and visit characteristics associated with physical restraint use in the emergency department. Perm J. 2023;27(1):94.

[17] Wong AH, Ray JM, Rosenberg A, Crispino L, Parker J, McVaney C, et al. Experiences of individuals who were physically restrained in the emergency department. JAMA Netw Open. 2020.;3(1).

[18] Castle NG, Engberg J. The health consequences of using physical restraints in nursing homes. Med Care. 2009;47(11):1164–73.

[19] Wong AH, Taylor RA, Ray JM, Bernstein SL. Physical restraint use in adult patients presenting to a general emergency department. Ann Emerg Med. 2019;73(2):183–92.

[20] Kersting XA, Hirsch S, Steinert T. Physical harm and death in the context of coercive measures in psychiatric patients: a systematic review. Front Psych. 2019;10:400.

[21] Berzlanovich AM, Schöpfer J, Keil W. Deaths due to physical restraint. Dtsch Arztebl Int. 2012;109(3):27.

[22] Hamers JP, Huizing AR. Why do we use physical restraints in the elderly? Z Gerontol Geriatr. 2005;38(1):19–25.

[23] Mohr WK. Restraints and the code of ethics: an uneasy fit. Arch Psychiatr Nurs. 2010;24(1):3–14.

[24] Richmond JS, Berlin JS, Fishkind AB, Holloman Jr GH, Zeller SL, Wilson MP, et al. Verbal de-escalation of the agitated patient: consensus statement of the American Association for Emergency Psychiatry Project BETA De-escalation Workgroup. West J Emerg Med. 2012;13(1):17.

[25] Cohen-Mansfield J, Dakheel-Ali M, Marx MS, Thein K, Regier NG. Which unmet needs contribute to behavior problems in persons with advanced dementia? Psychiatry Res. 2015;228(1):59–64.

[26] James IA, Reichelt K, Shirley L, Moniz-Cook E. Management of agitation in behaviors that challenge in dementia care: multidisciplinary perspectives on non-pharmacological strategies. Clin Interv Aging. 2023;18:219–30.

[27] Peters MD, Marnie C, Tricco AC, Pollock D, Munn Z, Alexander L, et al. Updated methodological guidance for the conduct of scoping reviews. JBI Evid Synth. 2020;18(10):2119–26.
[28] Engstrom K, Mattson AE, Mara K, Silva LOJ, Bellolio F, Jeffery MM, et al. Safety and effectiveness of benzodiazepines and antipsychotics for agitation in older adults in the emergency department. Am J Emerg Med. 2023;67:156–62.
[29] Simpkins D, Peisah C, Boyatzis I. Behavioral emergency in the elderly: a descriptive study of patients referred to an Aggression Response Team in an acute hospital. Clin Interv Aging. 2016;11:1559–65.
[30] Swickhamer C, Colvig C, Chan SB. Restraint use in the elderly emergency department patient. J Emerg Med. 2013;44(4):869–74.
[31] Isenberg DL, Jacobs D. Prehospital Agitation and Sedation Trial (PhAST): a randomized control trial of intramuscular haloperidol versus intramuscular midazolam for the sedation of the agitated or violent patient in the prehospital environment. Prehosp Disaster Med. 2015;30(5):491–5.
[32] Yap CY, Taylor DM, Kong DC, Knott JC, Taylor SE, Graudins A, et al. Management of behavioural emergencies: a prospective observational study in Australian emergency departments. J Pharm Pract Res. 2019;49(4):341–8.
[33] Calver L, Isbister GK. Parenteral sedation of elderly patients with acute behavioral disturbance in the ED. Am J Emerg Med. 2013;31(6):970–3.
[34] Kennedy M, Koehl J, Gao J, Ciampa KA, Hayes BD, Camargo Jr CA. Use of antipsychotic and sedative medications in older patients in the emergency department. J Am Geriatr Soc. 2022;70(3):731–42.
[35] Moreines LT, Gettel CJ, Hajduk AM, Kukulka S, Lai JM, Ouellet JA. Emergency department clinician satisfaction with an APRN-led geriatric emergency medicine service consult team. J Am Geriatr Soc. 2023.;71(3).
[36] Hopper AB, Vilke GM, Castillo EM, Campillo A, Davie T, Wilson MP. Ketamine use for acute agitation in the emergency department. J Emerg Med. 2015;48(6):712–9.
[37] Kohen I, Preval H, Southard R, Francis A. Naturalistic study of intramuscular ziprasidone versus conventional agents in agitated elderly patients: retrospective findings from a psychiatric emergency service. Am J Geriatr Pharmacother. 2005;3(4):240–5.
[38] Wilson MP, Nordstrom K, Hopper A, Porter A, Castillo EM, Vilke GM. Risperidone in the emergency setting is associated with more hypotension in elderly patients. J Emerg Med. 2017;53(5):735–9.
[39] Keene S, Balasundaram A, Cameron-Comasco L, Otero R. Feasibility of light and music therapy in the elderly for the prevention of hospital-associated delirium. R I Med J. 2023;106(4):35–9.
[40] Tan TH, Yang TY, Chen YM, Chung SY, Liu HH, Yang PC, et al. Computerized tool and interdisciplinary care for older patients with delirium in the emergency department: a novel model in Taiwan. Aging Clin Exp Res. 2022;34(12):3137–44.
[41] Park C, Bharija A, Mesias M, Mitchell A, Krishna P, Storr-Street N, et al. Association between implementation of a geriatric trauma clinical pathway and changes in rates of delirium in older adults with traumatic injury. JAMA Surg. 2022;157(8):676–83.
[42] Sanon M, Baumlin KM, Kaplan SS, Grudzen CR. Care and respect for elders in emergencies program: a preliminary report of a volunteer approach to enhance care in the emergency department. J Am Geriatr Soc. 2014;62(2):365–70.
[43] Kroll L, Böhning N, Müßigbrodt H, Stahl M, Halkin P, Liehr B, et al. Non-contact monitoring of agitation and use of a sheltering device in patients with dementia in emergency departments: a feasibility study. BMC Psychiatry. 2020.;20(1).
[44] Russek NS, Skappak C, Scheuermeyer F, Brousseau AA, McLeod SL, Melady D, et al. Pharmacological management of agitation and delirium in older adults: a survey of practices in Canadian emergency departments. Can Geriatr J. 2023;26(3):405.
[45] Sri-On J, Tirrell GP, Wuthisuthimethawee P, Liu SW. Knowledge and practices of Thai emergency physicians regarding the care of delirious elderly patients. Int J Emerg Med. 2014.;7(1).
[46] Shenvi C, Kennedy M, Austin CA, Wilson MP, Gerardi M, Schneider S. Managing delirium and agitation in the older emergency department patient: the ADEPT tool. Ann Emerg Med. 2020;75(2):136–45.
[47] Shenvi C, Wilson MP, Aldai A, Pepper D, Gerardi M. A research agenda for the assessment and management of acute behavioral changes in elderly emergency department patients. West J Emerg Med. 2019;20(2):393.
[48] Lucke JA, Mooijaart SP, Heeren P, Singler K, McNamara R, Gilbert T, et al. Providing care for older adults in the Emergency Department: expert clinical recommendations from the European Task Force on Geriatric Emergency Medicine. Eur Geriatr Med. 2022;13(5):715–23.
[49] Kennedy M, Webb M, Gartaganis S, Hwang U, Biese K, Stuck A, et al. ED-DEL: development of a change package and toolkit for delirium in the emergency department. J Am Coll Emerg Physicians Open. 2021.;2(2).
[50] Watt JA, Goodarzi Z, Veroniki AA, et al. Safety of pharmacologic interventions for neuropsychiatric symptoms in dementia: a systematic review and network meta-analysis. BMC Geriatr. 2020;20(1):212.
[51] Watt JA, Goodarzi Z, Veroniki AA, Nincic V, Khan PA, Ghassemi M, et al. Comparative efficacy of interventions for aggressive and agitated behaviors in dementia: a systematic review and network meta-analysis. Ann Intern Med. 2019;171(9):633–42.
[52] Hsu CC, Yu PC, Lin MH, Peng LN, Chen LK. Early geriatric evaluation and management services reduced in-hospital mortality risk among frail oldest-old patients. Aging Med Healthc. 2021;12(1):53–61.
[53] Yen PC, Lo YT, Lai CC, Lee CC, Fang CJ, Chang CM, et al. Effectiveness of outpatient geriatric evaluation and management intervention on survival and nursing home admission: a systematic review and meta-analysis of randomized controlled trials. BMC Geriatr. 2023;23(1):414.