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Review Article

Optimal Emergency Department Care Practices for Persons Living With Dementia: A Scoping Review

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ABSTRACT

Objectives: To summarize research on optimal emergency department (ED) care practices for persons living with dementia (PLWDs) and develop research priorities.
Design: Systematic scoping review.
Settings and Participants: PLWDs in the ED.
Methods: The following Patient-Intervention-Comparison-Outcome (PICO) questions were developed: PICO 1, What components of emergency department care improve patient-centered outcomes for persons with dementia? PICO 2, How do emergency care needs for persons with dementia differ from other patients in the emergency department? A scoping review was conducted following PRISMA-ScR guidelines and presented to the Geriatric Emergency care Applied Research 2.0 Advancing Dementia Care network to inform research priorities.
Results: From the 6348 publications identified, 23 were abstracted for PICO 1 and 26 were abstracted for PICO 2. Emergency care considerations for PLWDs included functional dependence, behavioral and psychological symptoms of dementia, and identification of and management of pain. Concerns regarding ED care processes, the ED environment, and meeting a PWLD's basic needs were described. A comprehensive geriatric assessment and dedicated ED unit, a home hospital program, and a low-stimulation bed shade and contact-free monitor all showed improvement in patient-centered or health care use outcomes. However, all were single-site studies evaluating different outcomes. These results informed the following research priorities: (1) training and dementia care competencies; (2) patient-centric and care partner–centric evaluation interventions; (3) the impact of community- and identity-based factors on ED care for PLWDs; (4) economic or other implementation science measures to address viability; and (5) environmental, operational, personnel, system, or policy changes to improve ED care for PLWDs.
Conclusions and Implications: A wide range of components of both ED care practices and ED care needs for PLWDs have been studied. Although many interventions show positive results, the lack of depth and reproducible results prevent specific recommendations on best practices in ED care for PLWDs.

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The number of Americans aged 65 years and older with Alzheimer's disease and related dementias is predicted to increase from 4.7 million in 2010 to 13.8 million in 2050.[1] These persons living with dementia (PLWDs) have complex medical and social needs, with up to 57% of PLWDs experiencing at least 1 emergency department (ED) visit annually,[2] thereby accounting for 20% of all ED visits by individuals aged 65 years and older.[3] Care in the ED focuses on rapid evaluation and stabilization of acute conditions, which is typically not aligned with the needs of PLWDs.[4–6] For example, PLWDs are more likely to be given antipsychotics in the ED and be hospitalized than older adults without dementia.[7,8] Hospitalization results in increased risk for delirium, falls, nosocomial infections, functional decline, and higher health care costs.[9–14] Discharged PLWDs also often suffer high rates of adverse outcomes including repeat ED visits, delirium, falls, increased unsafe behaviors, declines in physical function, and increase in mortality compared to older adults without dementia.[2,15,16]

In 2013, the Geriatric Emergency Department Guidelines were produced and endorsed by key stakeholder groups to improve care of older adults in the ED.[17] Recommended care for PLWDs included evaluating older adults for cognitive impairment, enhanced care coordination, and limited use of both sedation and physical restraints.[17,18] However, at the time, research surrounding optimal care practices for PLWDs in the ED was lacking.

The Geriatric Emergency care Applied Research 2.0—Alzheimer's Dementia Care (GEAR 2.0-ADC) Network is an interdisciplinary group of dementia researchers, clinicians, patients, and care partners that has performed scoping reviews and identified research priorities for 4 components of ED care for PLWDs: communication and decision making, detection, ED care practices, and care transitions. The objective of this systematic scoping review was to identify gaps in the evidence and prioritize research questions for optimal care practices for PLWDs in the ED.

Methods

Study Design

This scoping review adheres to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses—Extension for Scoping Reviews (PRISMA-ScR) reporting guidelines and was registered with Open Science Framework Registries (Registration DOI 10.17605/OSF.IO/VXPRS).[19] Details of the full GEAR 2.0 ADC protocol are reported elsewhere.[20]

PICO Questions

The GEAR 2.0 ADC Optimal ED Care Practices Workgroup derived and refined 22 potential key questions summarized in Supplementary Table 1. The members of the GEAR 2.0-ADC Task Force then prioritized these questions via a web-based survey. The Workgroup selected 2 topics as highest priority and developed the following Population Intervention Comparison Outcomes (PICO) questions based on those stem questions.

Question 1: What components of emergency department care improve patient-centered outcomes for persons with dementia?

We defined components of ED care as aspects of care delivery from entry into until discharge from the ED that impact outcomes for PLWDs. We adapted this definition from the Geriatric ED Guidelines and examined components including staffing and administration, education, quality improvement, and specific policies, procedures, and protocols (eg, patient screening, fall assessment, management of pain/agitation, and palliative care).[17]

Question 2: How do emergency care needs for persons with dementia differ from other patients in the emergency department?

Search Strategy

A medical librarian (A.W.) created electronic search strategies for Ovid MEDLINE, Cochrane Central Register of Controlled Trials, CINAHL (EBSCO), PsycINFO (EBSCO), PubMed Central, Web of Science (Clarivate), and ProQuest Theses & Dissertations. All databases were searched from inception on March 19, 2021. The search combined controlled vocabulary and title/abstract terms related to ED care for PLWDs and was adapted from a search strategy created jointly between GEAR 2.0 ADC librarians and project team members. Searches underwent peer review by partnering librarians. Search details are provided in Supplementary Material 1.

Study Selection and Data Abstraction

Four screeners (S.M.D., Z.T., P.S., M.K.) independently reviewed the titles and abstracts identified from the search strategy for both PICO questions for inclusion using Covidence. Two screeners were assigned to each article. Articles were selected for full-text review for both PICO questions if they studied adults aged $\geq$18 years with dementia or cognitive impairment in the ED as defined by study authors. Articles were included for PICO 1 if they evaluated 1 or more components of care in the ED. Articles were included for PICO 2 if they characterized emergency care needs for PLWDs or compared emergency care needs for PLWDs to persons without dementia or cognitive impairment; articles that were limited to participants with delirium were excluded. Articles that studied components of care limited to detection of dementia, communication, or care transitions were excluded. These topics were addressed by other GEAR 2.0-ADC workgroups. Articles that did not provide original research data or were not available in English language were excluded. Disagreements were resolved by discussion between the 2 screening authors. When questions remained after discussion, a third reviewer was included and consensus was reached.

In the second phase, 44 screening authors independently reviewed the full-text documents for inclusion. Again, 2 screeners reviewed each article. Two authors (Z.T., S.M.D.) reviewed the selected publications and independently abstracted the data.

Development of Research Priorities

The scoping review results, including the abstraction tables and included studies, were presented to the Optimal ED Care Practices workgroup for critical analysis, to identify the gaps in the field, and to provide direction for future research. The workgroup developed 5 key questions that were brought forward for consideration at the GEAR 2.0-ADC Consensus Conference as reported elsewhere.[20] The results of this scoping review and the research objectives were presented at the 2-day virtual consensus conference held on September 10-11, 2021. GEAR 2.0 ADC members who were unable to attend the consensus conference live voted through a REDCap Survey link. There was 100% voting participation by all GEAR 2.0-ADC members.

Results

Evidence Synthesis

After duplicates were removed, 6348 potentially relevant articles were identified. After full-text review, adjudication, and abstraction, 23 articles for PICO 1 and 26 articles for PICO 2 were included in the scoping review (Figure 1). The interrater agreement for inclusion or exclusion during the initial screening of abstracts and titles was fair ($\kappa = 0.27$) and was moderate during the full-text reviews ($\kappa = 0.51$).

PICO-1: Components of ED Care

Study characteristics

Of the 23 selected studies, 4 were reported only as conference abstracts.[21–25] The 23 studies evaluated different categories of components of ED care for PLWDs described below and are detailed in Table 1. Studies recruited participants from 1999 to 2018. Study designs included prospective cohort (11),[22–24,28,33,34,36–39,43] retrospective cohort (3),[21,26,32] qualitative (3),[27,30,44] randomized controlled trial (RCT) (3),[31,41,42] literature review (3),[29,35,40] and psychometric analysis (1).[25]

Components of ED care

Eight components of ED care for PLWDs were identified during the PICO-1 scoping review:

Comprehensive geriatric assessment and dedicated ED unit. One study of a comprehensive geriatric assessment and dedicated ED unit for older adults decreased 30-day admissions for PLWDs after the index ED visit. However, study participants also experienced an increase in hospitalizations during the index ED visit.[26]

Care companions and care partners. One conference abstract reported that hospital staff members serving as a companion for PLWDs in the ED or acute care wards resulted in a 7% reduction in falls and a 40% to 90% reduction in distressing or challenging behavior.[22] Qualitative methods revealed themes of reassurance on patient safety, promoting nutrition and hydration, a calm environment, and releasing professionals' time to deliver effective acute clinical care. Another article reported focus groups with ED nurses regarding the impact of the family care partners of PLWDs in the ED.[30] ED nurses felt that care partners were a valuable information source and helped the nurses better understand their patients. Nurses reported that family/care partners may help reduce confusion and agitation and modify agitated behavior once it starts but they also sometimes challenged the nurses' recommendations around pain management.

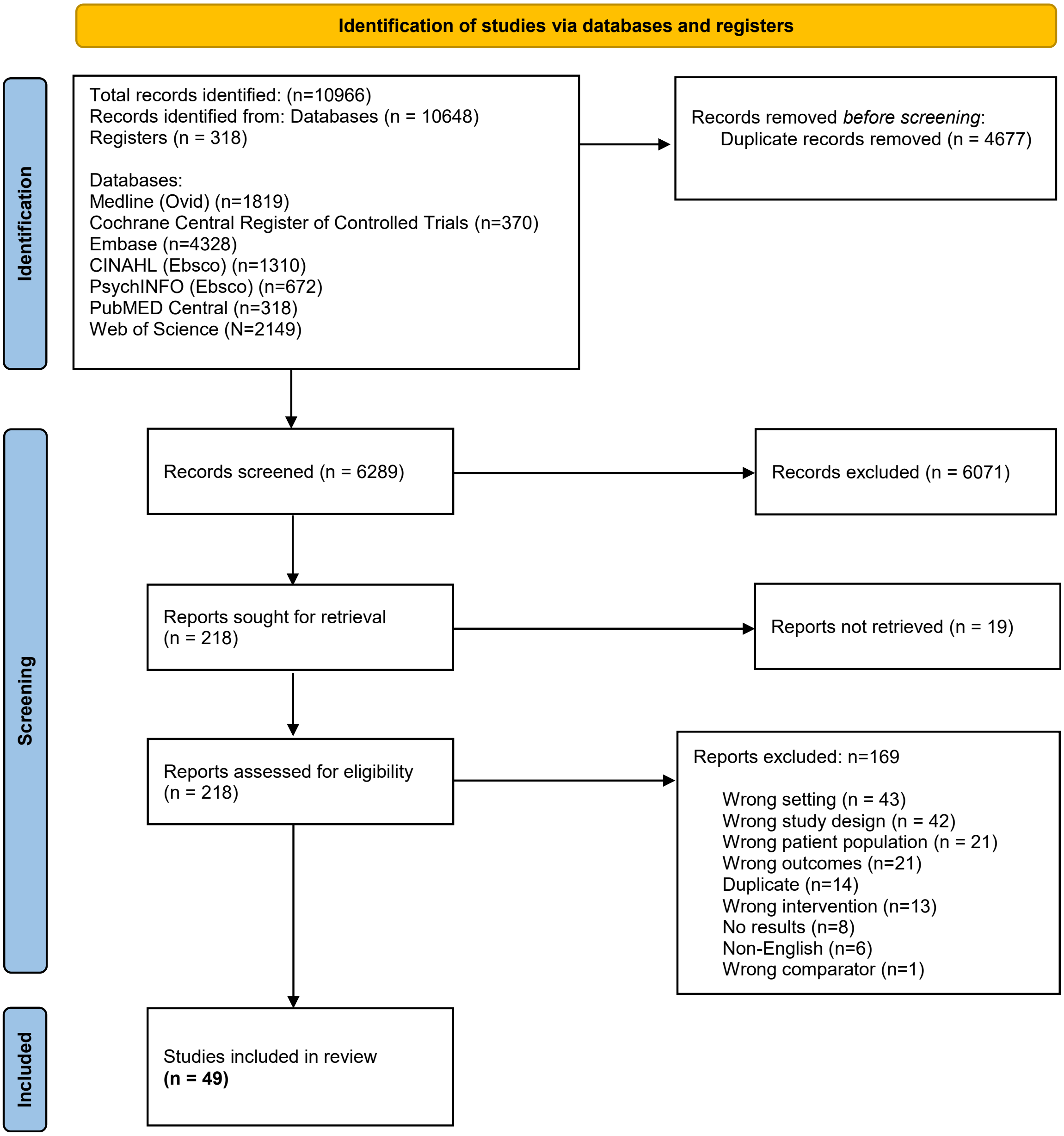

Fig. 1. PRISMA 2020 flow diagram for new systematic reviews that included searches of databases and registers only.

Table 1
Characteristics of Included ED Care Practices Studies for Population Intervention Comparison Outcome (PICO) Question 1

Author Year Location	Sample	Inclusion Criteria	Exclusion Criteria	Study Design	Observation, Comparison, or Intervention	Primary Outcome(s)	Secondary Outcome(s)	Outcomes/Effect Size
Bosetti[26] 2020 France	N = 801 Mean age = 86 y	Age ≥75 y diagnosed with a major neurocognitive disorder	Surgical emergency, admission outside working hours, transferred to another hospital, died in the ED	Retrospective cohort	Comprehensive geriatric assessment in a geriatric ED unit staffed by geriatricians, nurses, and social workers with training and specializing in the care of elderly patients	30-d readmissions	Hospitalization during index ED visit	OR for 30-day readmission = 0.65 (95% CI: 0.46-0.94) OR for hospitalization on index ED visit = 1.39 (95% CI: 1.05-1.85)
Bracken-Scally[27] 2021 Ireland	N = 26 Project designers, n = 3; nurses (preintervention), n = 8; nurses (postintervention), n = 5; care partners, n = 10	Family member or care partner, ED staff, hospital staff, project designers	NR	Qualitative (interviews)	ED environmental modifications: orientation and navigation aids, sensory stimulation reduction, space for family members	Themes around (1) impact of changes to the physical environment for PLWDs and their families, and (2) clinician perspectives of the ED environment for PLWDs and the impact of environmental changes	NA	Qualitative Themes Care partners: positive responses to time and orientation changes, decreased sensory stimulation, adequate space for families Nurses: most beneficial modification was a designated space for PLWDs to increase privacy, allow family to stay with patients, and facilitate faster and easier assessment by doctors
Chang[28] 2020 USA	N = 144 (83.5)	Age ≥65 y in the ED with hip fracture	Multiple trauma, bilateral hip fracture, transferred from another hospital	Prospective cohort	Analgesia: Comparing patients with cognitive impairment to those without cognitive impairment; Cognitive impairment was measured by Telephone Interview for Cognitive Status	Receipt of any parenteral analgesic	Receipt of any opioid, any analgesic, time to receipt of first analgesic, and total dose of opioids received	Any parenteral analgesic: RR = 0.80 (95% CI: 0.63-1.02) Any opioid: RR = 0.85 (95% CI: 0.69-1.05) Any analgesic: RR = 0.85 (95% CI: 0.7-1.04) Time to first analgesic: no cognitive impairment: 159; cognitive impairment: 179 (*P* = .3) IV morphine equivalent units: no cognitive impairment: 4; cognitive impairment: 8 (*P* = .003) Oral morphine milligram equivalents: no cognitive impairment: 24; cognitive impairment: 14 (*P* = .02)
Clevenger[29] 2012	7 articles	Articles specific to care of PLWDs in the ED	Epidemiology of dementia in the ED, staff education, community-based interventions	Literature review	ED care practices for PLWDs	Objective: to examine what clinical practices for the care of PLWDs specific to the ED setting the research supports	NA	7 articles met all inclusion criteria. All low-quality evidence. 5 themes of recommended clinical practice: assessment of cognitive impairment, dementia communication strategies, avoidance of adverse events, alterations to the physical environment, and ED staff education
Fow[21] 2010 USA	N = 305 (20% with cognitive impairment) (Mean age: NR)	All English-speaking adult patients (≥18 y old) with a chief complaint of a painful condition	NR	Retrospective cohort	Pain assessment and analgesia: Comparing patients with cognitive impairment to those without cognitive impairment, cognitive impairment measured by SIS	Documented pain assessment	Receipt of analgesia, opioid analgesia, follow-up pain assessment	95% of patients had documented pain assessment 56% of patients received no analgesia No association was found between cognitive impairment and follow-up pain assessment nor opioid analgesia

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Table 1 (*continued*)

Author Year Location	Sample	Inclusion Criteria	Exclusion Criteria	Study Design	Observation, Comparison, or Intervention	Primary Outcome(s)	Secondary Outcome(s)	Outcomes/Effect Size
Fry[30] 2017 Australia	N = 36 (6 focus groups) Median age: 30.5 y	ED nurses with a minimum of a bachelor's degree or equivalent who had used the PAINAD tool	NR	Qualitative (focus groups)	Pain assessment: Nurses were trained to use PAINAD	Themes identified through constructivist theory	NA	Themes: 1. Cognitive impairment is a barrier to pain management a. Pain is a clinically important issue b. Pain intensity is often more difficult to assess in people with cognitive impairment c. Nurses often relied on family/carers to detect and determine pain intensity 2. PAINAD gives structure to pain assessment a. Having a pain assessment tool for people with cognitive impairment was important b. PAINAD reminded nurses to reassess pain more systematically c. Variable experiences and skills of ED nurses resulted in inconsistent pain management quality 3. PAINAD assists to convey pain intensity a. PAINAD improved consistency to identify and measure pain intensity and for physicians to determine appropriate analgesia b. Medical staff would often order paracetamol in the absence of an appropriate pain intensity measure 4. Comparing PAINAD with the PACSLAC, Abbey Pain Scale and the Doloplus-2 for the ED context a. Abbey Pain Scale required too much information to be collected in the ED b. Participants preferred tools that rated pain on a scale of 0-10. c. At times, nurses felt PAINAD indicated a lower pain score than appropriate
Fry[31] 2018 Australia	N = 602 Mean age: 86 y	Age $\geq$65 y SIS score $<$5 Suspected acute long bone fracture	Australasian triage scale = 1 Polytrauma, systolic blood pressure $<$ 90 mm Hg, Non–English speaking with no interpreter available	Multisite cluster randomized controlled trial	Pain assessment: PAINAD	Time from ED arrival to analgesic administration	Proportion of patients receiving analgesia within 60 min, proportion of patients receiving no analgesia	Median time to analgesia (min): PAINAD, 82; control, 82 ($P = .42$) Analgesia within 60 min: PAINAD, 28%; control, 32% ($P = .19$) No analgesia: PAINAD, 12%; control, 9% ($P = .26$)

Fry[30] 2015 Australia	N = 80 (16 focus groups) Mean age: NR	Nurses with $\geq$1 y ED experience	NR	Qualitative (focus groups)	Impact of care partners on pain assessment and analgesia	Objective: understand emergency nurses' perceptions of the role of family/carers in caring for the older cognitively impaired person experiencing pain	NA	Themes: 1. The role of families and carers in building a clinical picture: a. A valuable information source b. Improve communication c. Provide insight into the patient's conditions and needs 2. Family and carers as a hidden workforce: a. Reduced confusion and agitation b. Advocate for pain management 3. Family and carer roles in pain management decision making: a. Question the nurse's decision making b. Different care and pain management expectations can cause tension
Fry[31] 2018 Australia	N = 181 (139 with SIS <5) Mean age: 85 y	ED patients Age $\geq$65 y Suspected long bone fracture	NR	Prospective cohort	Pain assessment: PAINAD	Assess pain intensity level using the PAINAD and the Numeric Rating Scale (NRS)	Reliability and validity of PAINAD Clinical Usefulness of PAINAD	Correlation between PAINAD and NRS: Pearson $r = 0.39$ All interitem correlations of PAINAD >0.4 Internal consistency: Cronbach $\alpha = 0.80$ Relationship between PAINAD score and any analgesia: Pearson $r = -0.02$ Relationship between PAINAD score and type of analgesia: Pearson $r = -0.01$
Graham[22] 2017 Northern Ireland	NR	NR Interview participants: patients, care partners, staff	NR	Prospective cohort Qualitative (interviews)	Care Companions for PLWDs In "older peoples' ward" and ED	Fall rate	Distressing or challenging behavior rate Qualitative themes	Fall rate: 7% reduction Distressing or challenging behavior: 40%-90% reduction Themes: Reassurance on patient safety Promoting adequate nutrition and hydration Calm environment Releasing professionals' time to deliver effective acute clinical care
Jones[32] 2019 Australia	N = 318 (120 with cognitive impairment) Mean age: 84 y	ED visit for fall Age $\geq$65 y Admitted as inpatient within 12 h of ED arrival. Fracture	NR	Retrospective cohort	Pain assessment: Standardized pain assessment compared with ad hoc assessment for patients with cognitive impairment compared with patients without cognitive impairment	Use of standardized or ad hoc pain assessment	Frequency of pain assessment Time to analgesia after assessment Type of analgesic used	Ad hoc pain assessment: OR = 9.4 (95% CI 4.6-19.1) Median time to analgesia after assessment: 50 min (cognitively impaired) vs 50 min (comparison) ($P = .56$) Time to first standardized pain assessment: 28 min (cognitive impaired) vs 17 min (comparison) ($P < .001$). Time between standardized assessments 104 min (cognitive impaired) vs 70 min (comparison) ($P = .002$).
Kroll[33] 2020 Germany	N = 18 (14 PLWDs) Mean age (PLWDs): 77 y	Age $\geq$55 y Documented dementia diagnosis or MMSE and assessment by general deterioration scale	Acute life-threatening situations or an acute risk of harm to patients themselves or others and a missing ability for consent	Prospective cohort	ED physical environment changes: Noncontact monitoring system (NCMSys) and Charité dome (ChD) stimulation-reducing tent system	Correlation of vital sign monitoring between reference monitor NCMSys	Valid registration of standardized sounds Registration of changes in movement Observed Emotion Rating Scale Dementia Mood Picture Test	Heart rate NCMSys correlation with reference monitor: $R^2 = 0.874$ without ChD, 0.608 with ChD Respiratory rate correlation: $R^2 = 0.84$ without ChD, 0.062 with ChD Acoustic sensor: valid registration of standardized sounds Visual sensor registered changes in movement 53% of the PLWDs had improved agitation and overall well-being with ChD

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Table 1 *(continued)*

Author Year Location	Sample	Inclusion Criteria	Exclusion Criteria	Study Design	Observation, Comparison, or Intervention	Primary Outcome(s)	Secondary Outcome(s)	Outcomes/Effect Size
Mailhot[34] 2020 USA	N = 108 (55 PLWDs) Mean age: 80 y	ED patients Age ≥70 y Have a care partner in the ED English speaking	Head trauma	Prospective cohort	Care partner assessment of delirium superimposed on dementia FAM-CAM	Concurrent validity: FAM-CAM compared to the Confusion Assessment Method (CAM)	6-mo clinical outcomes: ED visits, hospitalization, mortality	Sensitivity in PLWDs: 61% (95% CI: 41-81) Specificity: 74% (95% CI: 60-89). LR+ = 2.2 (95% CI: 0.7-3.6) LR− = 0.6 (95% CI: 0.3-0.9) Clinical outcomes (all patients) adjusted odds ratio (95% CI): Hospital admission: 3.24 (1.2-8.9) ED visit: 1.11 (0.4-2.8) Mortality: 6.24 (0.9-41.0)
Manning[35] 2021 United Kingdom	11 articles reviewed	Articles that are in English language, performed in 2010-2020, ED setting, focused on managing dementia-related behavior that challenges in the ED and strategies to manage this behavior	Not in ED, epidemiology, studies on assessment or screening, end of life, discharge transitions, war veterans theses, dissertations, and conference abstracts	Literature review	BPSD	Themes related to behavior that pose challenges in PLWDs in ED	NR	Four themes: Violence and aggression toward staff Manual and chemical restraint in the ED Identifying delirium and dementia Environment and person-centered care
Morandi[36] 2016 International (ED Cohort USA only)	N = 645 (39 ED patients) Mean age: 84 y	Inclusion varied across sites. For the ED site: Age ≥65 y Documented history of dementia	NR	Prospective cohort	Assessment of delirium superimposed on dementia: Richmond Agitation and Sedation Scale (RASS)	Predictive validity of RASS other than 0	NR	ED cohort: Sensitivity: 92.5% (95% CI: 85.3-99.6) Specificity: 83.0% (95% CI: 75.6-90.4) LR+ = 5.44 (95% CI: 3.50-8.44) LR− = 0.09 (95% CI: 0.04-0.23)
Ouchi[37] 2014 USA	N = 51 Mean age: 85.6 y	Age ≥70 y Advanced dementia by Functional Assessment STaging (FAST) criteria	Clinical instability, could not participate and no surrogate present, non-English speaking, and communicable disease	Prospective cohort	Palliative care (PC) consultation	PC consult (in ED or after admission)	ED physician barriers to initiating PC consults	18 (32%) received PC consult (18/37 admitted patients, 0/14 discharged patients) 11/13 (83%) of physicians felt PC consult was inappropriate 2/13 (13%) of physicians were too busy for a PC consult
Schnitker[38] 2015 Australia	N = 580 (191 with cognitive impairment) Mean age: 83 y	Age ≥70 y Patient in one of 8 Australian EDs	>2 h in the ED prior to research nurse arrival, severely ill, previously enrolled in the study, no interpreter available, unable to participate in follow-up phone calls	3-phase study: 1. Development of process quality indicators 2. Multi-center prospective and retrospective cohort study* 3. Consensus voting	ED care practices which are indicators of quality care for PLWDs	Rates of care that met individual patient quality indicators	None	31/51 (61%) of patients with cognitive impairment were assessed for an acute change in cognition 44/63 (70%) of patients with cognitive impairment had someone close to the patient notified 34/57 (60%) of patients with cognitive impairment where the ED provider obtained collateral history 16/64 (25%) of patients with cognitive impairment involved legally authorized decision maker in the care plan 5/64 (8%) of patients with cognitive impairment were assessed for pain 1/4 (25%) patients with cognitive impairment who were discharged had post-ED follow-up arranged 21/191 (40%) of patients with cognitive impairment had ED LOS > 8 h

Schnitker[39] 2015 Australia	8 EDs	Age ≥70 y Patient in one of 8 Australian EDs	>2 h in the ED prior to research nurse arrival, severely ill, previously enrolled in the study, no interpreter available, unable to participate in follow-up phone calls	3-phase study: 1. Development of structural quality indicators 2. Multicenter prospective and retrospective cohort study* 3. Consensus voting	ED care practices that are indicators of quality care for PLWDs	Rates of EDs had policies meeting structural quality indicators	NA	1. Two of 8 EDs had a policy outlining the management of older people with cognitive impairment in the ED 2. One of 8 EDs had a policy outlining issues relevant to carers of older people with cognitive impairment, encompassing the need to include the carer in the ED care 3. Three of 8 EDs had policies outlining the assessment and management of behavioral symptoms with specific reference to older people with cognitive impairment 4. Three of 7 EDs had policies outlining pain assessment and management for older people with cognitive impairment
Schnitker[40] 2013	43 articles	Articles evaluating ED or inpatient interventions for patients aged ≥65 y with cognitive impairment, English language	Cost-effectiveness analysis, prevalence and incidence studies, descriptive studies, outcomes not associated with interventions, prevention of cognitive impairment in the general population, screening tools not tested in ED or inpatient settings, diagnosis and treatment of dementia to improve long-term outcomes, neuroimaging, interventions exceeding 24 h	Literature review	ED care practices	Aim: to identify relevant evidence-based practice that improves, maintains, or assesses the health of cognitively impaired older persons in the ED	None	4 categories of best practices: 1. Interventions designed to improve recognition of cognitive impairment and subsequent provision of care 2. Interventions designed to prevent acute confusion (delirium) 3. Interventions to enable management of behavioral and/or psychological symptoms 4. Other
Schnitker[25] 2018 Australia	NR	NR	NR	Expert review of intervention for content validity	Multicomponent delirium prevention intervention for PLWDs: Sensory impairment, pain, cognition, malnutrition and dehydration, immobilization, medications, sleep disturbance, environment	Item content validity index (I-CVI)	Scale content validity index/ average (S-CVI/AV)	I-CVI ≥ 0.78 (appropriate and effective) for all protocols except cognition protocol S-CVI/AV ≥0.80 (adequate) for all protocols excluding the cognition protocol

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Table 1 *(continued)*

Author Year Location	Sample	Inclusion Criteria	Exclusion Criteria	Study Design	Observation, Comparison, or Intervention	Primary Outcome(s)	Secondary Outcome(s)	Outcomes/Effect Size
Shaw[41] 2003 United Kingdom	N = 274 Mean age: 84 y	Aged ≥65 y Mini Mental State Examination score <24 in the ED and 2 wk later, ED visit after a fall	Unable to walk, medical diagnosis likely caused the fall, unfit for investigation within 4 mo, inability to communicate for reasons other than dementia, residence outside the recruitment area, no major informant	Randomized controlled trial	Fall prevention: Medical history and examination, cardiovascular, physiotherapy, and occupational therapy assessments	Number of participants who fell at least once in the year after intervention	Number of falls, time to first fall, injury rates, fall-related ED visit, fall-related hospitalizations, mortality	Patients falling in 1 year: RR = 0.92 (95% CI: 0.81-1.05) Number of falls: RR = −0.02 (95% CI: −0.32 to 0.09) Median weeks to first fall (IQR): Intervention: 11 (2-41), control: 11 (2-33) Fall-related ED visit: RR = 1.25 (95% CI 0.91-1.72) Fall-related hospitalization: RR = 1.11 (0.61-2.00) Mortality: RR = 1.03 (0.65-1.64)
Shreves[23] 2015 USA	N = 107 (48 with advanced dementia)	Patients who are actively dying or with advanced dementia as identified by palliative care physician in the ED	NR	Prospective cohort	Palliative care: Palliative care physician introduced the concept of palliative care, attempted to address goals of care, and presented options regarding alternative care pathways, during a brief discussion	Differences in care pathways before and after intervention	NR	Dementia patients: Comfort measures treatment plan chosen preintervention: 23%, postintervention 45% All patients: Likelihood of choosing comfort measures postintervention: OR = 3.1 (95% CI: 1.7-5.7)
Tibaldi[42] 2004 Italy	N = 109 Mean age: 83.5 y	Elderly patients with dementia in the ED for acute illness, stable, diagnosed medical condition needing hospitalization, not expected to need emergency interventions, appropriate care supervision, telephone connection residence in hospital catchment area	NR	Randomized controlled trial	Admission to Geriatric Home Hospitalization Service (GHHS): Medication sanitary material supplied by the hospital, caregivers are instructed in the emergency plan, doctors and nurses are always available for patients by phone, team includes geriatricians, nurses, physiotherapists, dietician, social worker, and counselor	Goal: reducing behavioral problems and caregiver stress	NR	Sleeping disorders: GHHS: 9%, inpatient: 43% Agitation/aggressiveness: GHHS 8.9% vs inpatient 41.5% Feeding disorders: GHHS 8.9% vs inpatient 39.6% Antipsychotic drugs: GHHS 46.4% on admission, 10.7% on discharge Inpatient 32.1% on admission, 24.5% on discharge
Yeon[24] 2017 USA	N = 108 (55 with dementia) Mean age: 81 y	Aged ≥65 y	NR	Prospective cohort	Care partner assessment of delirium superimposed on dementia: FAM-CAM	Delirium detection rates compared to the Confusion Assessment Method (CAM)	NA	In patients with dementia: Sensitivity: 60.8% (95% CI 0.41-0.18) Specificity: 74.3% (95% CI: 0.59-0.88) PPV: 60.8% (95% CI: 0.41-0.81) NPV: 47.3% (95% CI: 0.60-0.89)

FAM-CAM, Family Confusion Assessment Method; LOS, length of stay; LR−, negative likelihood ratio; LR+, positive likelihood ratio; NA, not applicable; NPV, negative predictive value; NR, not reported; OR, odds ratio; PACSLAC, Pain Assessment Checklist for Seniors with Limited Ability to Communicate; PPV, positive predictive value; RR, risk ratio; SIS, Six Item Screener.

*Phase 2 indicators specific to PLWDs or patients with cognitive impairment reported in this table.

Table 2
Characteristics of Included ED Care Practices Studies for Population Intervention Comparison Outcome (PICO) Question 2

Author Title Location Year	Sample	Inclusion Criteria	Exclusion Criteria	Study Design	Observation, Comparison, or Intervention	Primary Aim/Outcome	Secondary Outcome(s)	Results/Effect Size
Benner[45] 2018 USA	N = 63 Mean age: 62 y	Family care partner of PLWDs	Age < 21 y Unable to read and write in English	Survey	Reasons for ED visits	Hospitalizations and ED visits	Reasons for hospitalizations and ED use	≥1 hospitalization within the past month: 11% ≥1 ED visit within the past month: 19% Most common reason for hospitalization: falls Top reasons for ED visits: behavioral issues, fall-related injury, heart-related illness, medication adjustment, urinary tract infection
Björck[46] 2018 Sweden	N = 588 ED visits (366 patients) Mean age: 86 y	Patients with cognitive impairment transferred from nursing homes to the ED	NR	Retrospective cohort	Reasons for transfer to the ED from NH	Reasons for transfer	Examinations and treatments Patient condition Avoidable hospitalizations: (*ICD-10* codes for avoidable hospitalization + patients discharged from the ED, + patients with no complaints in the ED + decision to initiate palliative care in the ED)	Top reasons for transfer: Falls and injury to the musculoskeletal system = 30% Pain = 26% Respiratory problems = 18% Digestive problems = 16% Mental problems = 15% Top examinations and treatments: X-ray = 48% Electrocardiogram = 38% Computed tomography = 18% Oxygen = 16% Surgery = 12% Patient condition: Disoriented = 86% Anxious = 16% Not cooperating = 16% “Avoidable hospitalization” = 58%
Chiovenda[47] 2002 Italy	N = 150 (24 with cognitive impairment) Mean age: 76 y	Patients aged >65 y admitted to the ED Second phase of study: Mini Mental State Exam (MMSE) < 24	Unable to perform MMSE, Alcohol or substance abuse, Hearing impairment, Reading and writing deficits, Non-Italian speaking	Prospective cohort	ADL and IADL: comparing patients with mild, moderate, or severe cognitive impairment	NR	Mental Deterioration Battery (MDB), ADL, IADL, Socioeconomic status	cognitive impairment: 16% Of patients with cognitive impairment: Deficits in MDB: 100% ADL: Mild cognitive impairment: 100% preserved Moderate cognitive impairment: feeding 100% preserved, dressing 100% lost IADL: Mild cognitive impairment: 100% preserved Moderate cognitive impairment: telephone use preserved, 4/7; taking own mediations, 0/7 Lives alone: 6/14 Low socioeconomic level: 9/14
Erel[48] 2013 Israel	N = 140 (94 with cognitive impairment) Mean age: 82.2 y	Aged ≥69 y “Day shift” ED visit	Non-Hebrew speaking, psychiatric diagnosis (other than dementia), unconscious, critically ill	Prospective cohort	BPSDs: Comparing patients with cognitive impairment, cognitive impairment + long ED stay, pain	Purpose: evaluate the effect of exposure to multiple risk factors on seniors’ behavioral disorders in the ED	Prevalence of behavioral disorders	OR (95% CI) for behavioral disorder: Severe pain = 63.06 (10.69-372.06); cognitive impairment = 6.56 (1.40-30.68); age (per year) = 1.11 (1.03-1.20) Behavioral disorders: cognitive impairment = 26%, no cognitive impairment = 4%, pain + cognitive impairment = 36%, cognitive impairment + long ED stay = 33%

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Author Title Location Year	Sample	Inclusion Criteria	Exclusion Criteria	Study Design	Observation, Comparison, or Intervention	Primary Aim/ Outcome	Secondary Outcome(s)	Results/Effect Size
Fry[49] 2016 Australia	N = 80 Mean age: NR	Nurses with ≥1 y of ED experience	NR	Qualitative: Semi-structured interviews and focus groups	Analgesia	Themes related to emergency nurses' perceptions of the management of acute pain for older persons with cognitive impairment and presenting with a long bone fracture	NR	1. Belief in championing pain management 2. Lack of pain assessment tools for the cognitively impaired older person 3. Pain management and the ageing processes 4. Delivering analgesia—a balancing act 5. Policy barriers to nurse-initiated pain management
Holden[50] 2018 USA	N = 279 Mean age: 80 y	Aged ≥60 y With baseline cognitive impairment or dementia ED visit for syncope or near-syncope	Seizure, stroke, transient ischemic attack, or hypoglycemia, acute intoxication, head trauma, persistent confusion relative to baseline mental status, intervention to restore consciousness, significant barriers to follow-up telephone interviews	Prospective cohort	Syncope	Serious conditions related to syncope	Mortality Hospitalization	Serious condition identified during the initial ED evaluation = 19% Hospitalization = 79% Serious condition identified in the hospital = 7.8% Serious condition identified in the subsequent 30 d = 6.7% 30-day mortality = 2.5% no deaths related to syncope or cardiac causes
Hunt[2] 2018 USA	19 articles	Observational studies, US community-based setting, included individuals with age-related dementias, measure of ED use	Non–age-related dementias, nursing home, hospital, or other noncommunity setting	Literature review: integrative review	Reasons for ED use	Compare rates and reasons for ED visits by community-dwelling individuals with and without dementia	Identify other risk factors for increased ED use among community-dwelling individuals with dementia	PLWDs had higher unadjusted ED use than comparison group, except in 2 studies examining ED use toward end of life. PLWDs had a 1.30-1.75 adjusted OR or risk ratio of visiting the ED vs comparison group. Stupor/altered consciousness, disorders of fluid/electrolyte/acid-base balance, and urinary tract infections appeared in the top 10 reasons for the PLWD group but not for the cognitively intact group. Patients with dependence for ADL had increased risk of ED use. PLWDs and dysphagia had higher odds of ED visits than PLWDs without dysphagia
Hunt[51] 2018 USA	N = 281 Mean age: 86.3 y	PLWDs Age ≥65 y Complete National Health and Aging Trends Study (NHATS) interview in 2011, died between 2012 and 2014, last month of life interview completed by a proxy	Patients without Medicare fee-for-service part A and B enrollment in the last 2 mo of life	Prospective cohort	Pain	Association between pain and ED visit count in the last month of life	Unmet need for pain management and any ED visit count in the las month of life	IRR of ED visit for PLWDs with pain in the last month of life = 0.87 (95% CI 0.64-1.17) IRR of ED visit for PLWDs with unmet need for pain management = 1.46 (95% CI 1.07-1.99) 10 most frequent diagnoses for ED visits by PLWDs: (1) septicemia, (2) cardiac arrest, (3) pneumonia, (4) malignancy, (5) congestive heart failure, (6) cerebrovascular disease, (7) urinary tract infection, (8) hip and other bone fracture, (9) stomach/intestinal disorders, and (10) fluid and electrolyte disturbances

Hunter[52] 2017 Canada	N = 12 HCPs	HCPs (nurse, occupational therapist, social worker, physical therapist), experience working in the 2 participating EDs, consulted on cases involving PLWDs	NR	Qualitative: Semistructured interviews	Emergency care needs: safety and harm	Themes related to safety and harm in rural ED transitional care for community-dwelling older adults with dementia from the perspective of health care providers	NR	1. Physical environment: space design and equipment a. Normalcy of the ED atmosphere b. Interaction between older adult (OA) needs, equipment and space design c. Ideal design 2. Work environment: pressure to perform a. Being a lower priority b. Can't control everything c. We discombobulate them d. Troubled by absent care e. Not unaware, just unable f. Doing things that are not good g. The tipping point isn't one factor 3. Practice environment: contribution of the family a. Family caregiving b. Family as part of the team 4. Knowledge a. Knowing b. Rural reality c. Familiarity allows for better care (rural context) d. Complexity of the OAs e. Dementia makes it a complex situation f. Seeing the whole person 5. Processes a. Getting out of the ED b. Doing it together c. Resources d. Policy impact 6. Special care/dementia care
Jacobsohn[53] 2019 USA	N = 27 Informal caregivers: 4, emergency medicine physicians: 5, geriatrics health care providers: 5, aging service providers: 6, community paramedics: 3 Mean age: 46 y	Informal caregivers, emergency medicine physicians, primary care physicians, geriatrics health care providers, aging service providers, community paramedics	NR	Qualitative: Semistructured interviews	Reasons for ED use	Explore stakeholders' perspectives on the decisions and drivers influencing ED use and suggestions for effectively addressing unmet needs	NA	1. System fragmentation influences emergency care use by PLWDs 2. Informational, decision-making, and social support needs influence emergency care use by PLWDs 3. EDs are not designed to optimally address PLWD and caregiver needs 4. Options to prevent and address emergency care needs of PLWDs
Kelly[54] 2016 USA	N = 2972 Mean age: 76 y	Age ≥65 y English or Spanish Speaking	NR	Prospective cohort study	Activities of daily living: Comparing patients with cognitive impairment to those without cognitive impairment as measured by the Short Blessed Test >9	Functional decline (Katz ADL <6) in the ED	Functional decline at 8-week follow-up	Patients with cognitive impairment were more likely to have functional decline (OR = 1.57; 95% CI: 1.30-1.89) At 8 wk: Functional decline for patients with normal function in the ED = 16% Persistent functional decline for patients with functional decline in the ED = 57%

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Table 2 (*continued*)

Author Title Location Year	Sample	Inclusion Criteria	Exclusion Criteria	Study Design	Observation, Comparison, or Intervention	Primary Aim/ Outcome	Secondary Outcome(s)	Results/Effect Size
Kennedy[55] 2020	NR	NR	NR	Literature review: narrative review	Agitation	To review the key causes of agitation in older adults and provide tips for its management, with a focus on geriatric syndromes	NR	Increased distress in a caregiver of a PLWD is associated with increased ED use, hospitalization, and health care–related expenditures. Addressing agitation in PLWDs: 1. Identify contributing factors 2. Use nonpharmacologic mitigation methods
LaMantia[56] 2016 USA	N = 4991 Mean age: 79 y	Age ≥65 y Long-stay nursing home residents (≥90 consecutive days of nursing home residence)	NR	Retrospective cohort study	ED diagnoses stratified by dementia severity: no cognitive impairment, early-moderate dementia, advanced-stage dementia	Time to first ED visit	ED diagnoses	Median time to first ED visit: Advanced-stage dementia = 258 d Early to moderate dementia = 250 d No dementia = 202 days ($P = .003$) Cox proportional hazards regression for time to first ED visit: Advanced dementia vs no cognitive impairment: HR = 1.05 (95% CI 0.87-1.27) Patients with advanced dementia more likely to have diagnosis of UTI ($P < .05$) Patients with no dementia less likely to have diagnosis of injury/poisoning ($P < .01$)
LaMantia[8] 2016 USA	N = 32,697 (11,069 PLWDs) Mean age: 68.2 y	Age ≥65 y	NR	Retrospective cohort study	ED diagnoses comparing PLWDs to patients without dementia	Annual rates of ED use (per year)	Disposition from the ED, ED return rates, mortality Medicare & Medicaid costs, ED diagnoses	Annual rates of ED use: PLWDs = 37%-54%; no dementia = 20%-31% Admission rate: PLWDs = 39.7% No dementia = 29.6% ($P < .001$) Return ED visits within 30 d: PLWDs = 58% No dementia = 38% (OR = 2.29, $P < .001$) Alive 6 mo post ED visit: PLWDs = 92.9% No dementia = 97.7% Top diagnoses: PLWDs: UTI (discharged) Pneumonia (admitted) No dementia: Congestive heart failure (admitted) Chest pain (discharged)

Ledgerd[57] 2016 UK	N = 719 20 academics 563 health sector staff 54 family carers 23 social care sector staff 16 emergency services staff 12 voluntary sector staff 4 people with dementia 28 others	Members of a network of key stakeholders with experience of a crisis while supporting someone with dementia	NR	Survey	Reasons for ED use	Causes for crisis	Interventions for crisis	Top 5 causes of crisis per category (%): Behavioral/psychological - Wandering (84) - Physical aggression (81) - Sleep disturbance (74) - Verbal aggression (71) - Suspicious/paranoid idea (63) Physical health - Falls (88) - Infection (85) - Delirium (76) - Immobility (48) - Incontinence (47) Vulnerability - Inability to identify potential risks (76) - Very poor eating and drinking (69) - Abuse (66) - Declining support services (58) - Outdoor safety (51) Family carer - Burden (80) - Sudden absence (77) - Family carer physical health (74) - Death of family carer (68) - Family carer mental health (62) Environment - Physical hazards at home (75) - Hazards related to daily living tasks (69) - Living alone (68) - Unable to access amenities (8) - Changes in the home environment (67) Using the ED was reported as an intervention by 66% of participants
Lin[58] 2020 Taiwan	N = 149,203 Mean age: 74 y	Aged ≥65 y Attended the study hospitals as an outpatient or inpatient	NR	Retrospective cohort	ED diagnoses: comparing PLWDs to patients without dementia	ED diagnosis	ED treatment, ED cost, length of hospital stay, hospital cost, death	Top 3 ED diagnoses PLWDs: Pneumonia = 8.8% Dementia = 7.7% UTI = 6.7% Nondementia: Pneumonia = 3.9% UTI = 3.7% Abdominal pain = 3.4% Admission rate: Dementia = 35.5% No dementia = 28.0% ($P < .001$) Median hospital length of stay: Dementia = 11 d No dementia = 9 d ($P < .001$) Inpatient costs: Dementia = $1575 No dementia = $1535 ($P = .03$)

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Table 2 *(continued)*

Author Title Location Year	Sample	Inclusion Criteria	Exclusion Criteria	Study Design	Observation, Comparison, or Intervention	Primary Aim/ Outcome	Secondary Outcome(s)	Results/Effect Size
Parke[59] 2019 Canada	N = 14	Caregivers who had an ED visit with an older person living with dementia 12 mo prior to data collection, French or English speaking	NR	Qualitative: focus groups	Communication tool	What are caregivers' perceptions of the strengths and weaknesses of the communication tools	What do caregivers recommend be changed in the communication tools to improve their usability and feasibility? How can access to the communication tools by potential caregiver users be supported and facilitated?	1. Challenges to the feasibility of hospital-readiness tools. a. From whose perspective? b. Communicating what is not obvious c. Being heard d. Lack of knowledge about what is normal in dementia 2. Culture and geographic disparity act as mediating factors
Parke[60] 2013 Canada	N = 34 10 PLWD—care partner dyads, 10 ED nurses, 4 nurse practitioners	PLWD—care partner dyads: PLWDs aged ≥60 y; ED visit within prior 6 mo; able to read, write, and speak in English;MMSE score 18-23; could give consent or have a proxy decision maker; care partner visited ED with patient and willing to participate Registered nurse: ≥2 y of ED experience Nurse practitioner: ≥1 y performing geriatrics consultations in the ED	PLWDs: Nursing home resident, Non-AD or mixed dementia, Care partners: paid caregivers, caregiving role for <1 y	Qualitative: interviews, photographic narrative journal, photo elicitation focus groups	Emergency care needs	Identify factors that facilitate or impede safe transitional care for community-dwelling older adults with dementia in 2 Canadian EDs	Identify practice solutions for nurses	The way it works: how priorities are determined 1. Being undertriaged 2. Waiting: worried about what's wrong 3. Time pressure: lack of attention to basic needs 4. Relationships and interactions: feeling ignored, forgotten, and unimportant
Provencher[61] 2015 Canada	N = 1036 Mean age: 76.5 y	Aged ≥65 y ED visit with a chief complaint of a minor injury, independent in ADL in the 4 wk preceding the injury, discharged home from the ED within 48 h	Significant injuries leading to hospitalization, unable to give verbal consent or attend follow-up evaluations, resided in a long-term care facility before the trauma, unable to communicate in French or English	Prospective cohort	Functional decline comparing patients with cognitive impairment: Montreal Cognitive Assessment (MoCA) < 23 or Telephone Interview for Cognitive Status (TICS-m) <32 And patients with frailty, ie, Clinical Frailty Scale (CFS) score 4-7	Functional decline: Older American Resources and Services (OARS) questionnaire	NR	Functional decline at 3 mo: Frail + cognitive impairment = 50.0% (95% CI: 37.9-66.0) aRR = 1.89 (95% CI: 1.38-2.59) Frail, no cognitive impairment = 36.1% (95% CI: 27.2-48.1) aRR = 1.47 (95% CI: 1.00-2.15) Cognitive impairment, no frailty = 19.8% (95% CI: 14.6-26.7) No cognitive impairment, no frailty = 14.7% (95% CI: 12.0-18.0)

Schnitker[62] 2016 Australia	N = 191 Mean age: NA	Age ≥70 y ED patients	In ED ≥ 2 h prior to a research nurse being available, unable to provide informed consent, previously enrolled, interpreter unavailable, unable to participate in the planned phone follow-up	Prospective cohort	Reasons for ED use	Describe profiles of older people with cognitive impairment in EDs	Demographics, comorbidities, reasons for ED visit, outcomes	Reasons for ED visits: general (23.6%), cardiovascular (15.2%), respiratory (12%), digestive (8.4%) Admitted = 56.5% Fall within 3 d prior to ED visit = 21% had a fall incident 3 d prior to the ED visit. Pain = 45% Required assistance with toileting in the ED = 40% At risk for pressure ulcer = 30% Decrease in food/fluid intake within 3 d of ED visit = 40% BPSD = 3%
Seffo[63] 2020 Sweden	N = 21 Age = 26-55 y	Registered nurse working in the ED, experience with hip fracture patients, experience with dementia patients	NA	Qualitative: focus groups	Pain assessment	Describe the experience of HCPs in assessing pain and communication in patients with hip fractures and dementia on an ED	NR	1. Arrival at the ED: a. First meeting with the dementia patients. b. Communication c. Assessment of pain d. Support from relatives and colleagues 2. Hip track: a. The opportunities of the staff b. Waiting to go to the ward c. Availability of HCPs 3. Handover to the ward: a. Handing over b. Cooperation c. Suggestions for improvement
Tadokoro[64] 2018 Japan	N = 2574 Mean age: 84.9	ED patients Dementia	NR	Retrospective cohort	Reasons for ED use: Comparing dementia subtypes: Alzheimer's disease Vascular dementia (VaD), Dementia with Lewy bodies (DLB), Parkinson's disease with dementia (PDD), Frontotemporal lobar degeneration (FTLD) Secondary dementia, Mixed-type dementia	Clarify the clinical characteristics of patients with dementia in an emergency clinic	Causes of hospital visits	Falls: LBD = 29.3% FTLD = 33.3% Mixed-type = 38.5% Loss of consciousness: PDD = 14.2% Stroke: VaD = 17% Hospitalization: PLWDs = 54.9% No dementia = 23.3% ($P < .01$) Top 3 causes for hospitalization in PLWDs: Infection = 42.4%, Fall = 20.9%, Stroke = 9.1%
Tropea[65] 2017 Australia	N = 100 Mean age: 83 y	Provisional principal diagnostic code for dementia	NR	Retrospective cohort	BPSD	Prevalence of BPSD	Use of chemical and mechanical restraint	Any symptoms of BPSD = 39% Aggressiveness = 35% Wandering = 6% Anxiety = 1% Apathy = 1% Chemical restraint = 20% Mechanical restraint = 3%
Varley[66] 2017 UK	48 observations	Observations in EDs and trauma wards	NR	Qualitative: ethnographic	Emergency care needs	To explore ways of delivering care to PLWDs and admitted to secondary care with hip fracture	NR	Staff in acute care environments can bring an integrated awareness both of policies prioritizing patient-centered care opportunities and policies prioritizing task performance, to moderate their practice in creative ways

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Table 2 (*continued*)

Author Title Location Year	Sample	Inclusion Criteria	Exclusion Criteria	Study Design	Observation, Comparison, or Intervention	Primary Aim/ Outcome	Secondary Outcome(s)	Results/Effect Size
Watkins[67] 2019 Ireland	N = 27 15 family members of PLWDs, 12 nurses	Family members who accompanied an older person with dementia to ED in the previous 12 mo ED nurses	NR	Qualitative: semistructured interviews and participant observation	Emergency care needs	To generate insights about what matters and is valued by family members of older people with dementia in the ED	To explore the experiences of emergency nurses looking after older people with dementia in an episode of care	1. What matters to family members a. Being triaged quickly b. A cubicle space offers sanctuary c. Contact and conversation with ED nurses d. Compassion over technical skills 2. Challenges for family members and nurses in the ED a. Vulnerability b. Keeping vigil
Watkins[68] 2020	5 articles	Articles focused on the experiences of older people with dementia, their carers, and ED nurses	Not focused specifically on experiences in ED, focus on disease patterns, presentation, or tools	Literature review: systematic review	Emergency care needs	Identify the experiences of older people with dementia, their carers, and ED nurses	NR	Themes: 1. Carers and older people with dementia: waiting and worrying 2. Nurses juggling priorities 3. Strategies for improvement; taking a partnership approach
Yourman[69] 2020 USA	N = 321,479 Mean age: 76 y	Age ≥65 y Continuous enrollment in traditional Medicare Fee for Service plans, visited a Medicare-certified ED	NR	Retrospective cohort	UTI: comparing PLWDs with patients without dementia	ED diagnostic claims for UTI	Localizing clinical characteristics of UTI, Nonspecific symptoms	UTI diagnosis: PLWDs = 33.8% No dementia = 13.4%; aOR = 2.27 (95% CI: 2.21-2.33) Characteristics localized to the genitourinary tract: PLWDs = 3.8% No dementia = 8.9% Nonspecific clinical characteristics: PLWDs = 30.6% No dementia = 16.5%

ADL, activities of daily living; aOR, adjusted odds ratio; aRR, adjusted risk ratio; BPSDs, behavioral and psychological symptoms of dementia; HCPs, health care professionals; IADL, independent activities of daily living; *ICD-10*, *International Classification of Diseases, Tenth Revision*; IRR, incident rate ratio; NR, not reported; PLWDs, persons living with dementia; UTI, urinary tract infection.

Delirium superimposed on dementia. Three studies evaluated assessments to detect delirium superimposed on dementia.[24,34,36] The Family Confusion Assessment Method[24,34] demonstrated a sensitivity of 61%, specificity of 74%, and a positive likelihood ratio of 2.2. A positive Family Confusion Assessment Method score was associated with increased hospitalization, ED visit, and mortality. The Richmond Agitation and Sedation Scale demonstrated a 92.5% sensitivity, 83.0% specificity, a positive likelihood ratio of 5.44, and negative likelihood ratio of 0.09.[36]

Falls. One study evaluated an ED-based fall prevention program for PLWDs in the ED after a fall.[41] This RCT showed no improvement in future falls, health services use, or mortality.

Home hospital. One RCT compared admission of PLWDs in the ED to a home hospital program or medical ward. The intervention reduced sleeping disorders, agitation and aggressiveness, feeding disorders, and the use of antipsychotic medications.[42]

Pain. Six articles addressed pain assessment and management for PLWDs in the ED.[21,28,31,32,43,44] One article demonstrated that PLWDs were less likely to be assessed using a standardized pain assessment tool, have longer delay to first pain assessment, and have longer time between pain assessments than other patients in the ED.[32] In another study of patients with hip fractures, patients with cognitive impairment were less likely to receive parenteral analgesia and received lower doses of analgesia than persons without cognitive impairment.[28] However, a different conference abstract demonstrated no difference in follow-up pain assessment or use of opioid analgesia.[21] Three studies described the development, validation, and use of the Pain Assessment IN Advanced Dementia (PAINAD) scale.[31,43,44] The PAINAD tool is well accepted by ED registered nurses, results in earlier and more complete assessments of pain, but did not impact time to analgesia for PLWDs.

Palliative care. Two articles studied palliative care interventions for PLWDs in the ED.[23,37] One conference abstract demonstrated that PLWDs were more likely to choose a treatment plan involving comfort measures after an ED palliative intervention than before.[23] However, another study noted that palliative care consultations were rarely initiated in the ED, and emergency physicians had limited knowledge of the role of palliative care consultations for PLWDs.[37]

Physical environment. Two articles examined changes to the physical environment of the ED.[27,33] One interviewed care partners and reported positive themes of dedicated bays closer to nursing staff and water, as well as approval of soothing colors and adjustable lighting.[27] Though proximity to the nursing station increased noise, this was mitigated by a noise-dampening screen. Additional space for care partners to stay with the patient was invaluable. A study of a noncontact monitoring system and tentlike “Charite Dome” demonstrated that 53% of PLWDs experienced decreased agitation or improved overall well-being. However, most participants were in a geriatric-gerontopsychiatric ward, not the ED.[33]

Patient-centered and health services use outcomes

Five of the above studies evaluated patient-centered or health services use outcomes. A comprehensive geriatric assessment and dedicated ED unit showed improvement in 30-day readmission.[26] A home hospital program demonstrated decreased sleeping disorders, agitation and aggressiveness, antipsychotic use, and feeding disorders.[42] A low-stimulation bed shade and contact-free monitor showed decreased agitation and increased patient well-being.[33] ED staff dementia companions were associated with decreased falls and decreased behavioral disturbances.[22] A fall prevention program showed no reduction in falls, health services use, or mortality.

PICO-2: Emergency Care Needs

Study characteristics

The 26 articles that evaluated emergency care needs of PLWDs are described below and detailed in Table 2. Two were abstracts only.[54,66] Most of the studies were qualitative (8),[49,52,53,59,60,63,66,67] followed by prospective cohort (7),[47,48,50,51,54,61,62] retrospective cohort (7),[8,46,56,58,64,65,69] literature review (3),[2,55,68] and survey (2).[45,57] Participants were recruited from 1999 to 2018.

Acute care needs for PLWDs in the ED

Five areas were identified that compared the needs of PLWDs from other ED patients during the PICO-2 scoping review:

Behavioral and psychological symptoms of dementia. Four articles described behavioral and psychological symptoms of dementia (BPSDs) as a significant problem for PLWDs in the ED, with a range in

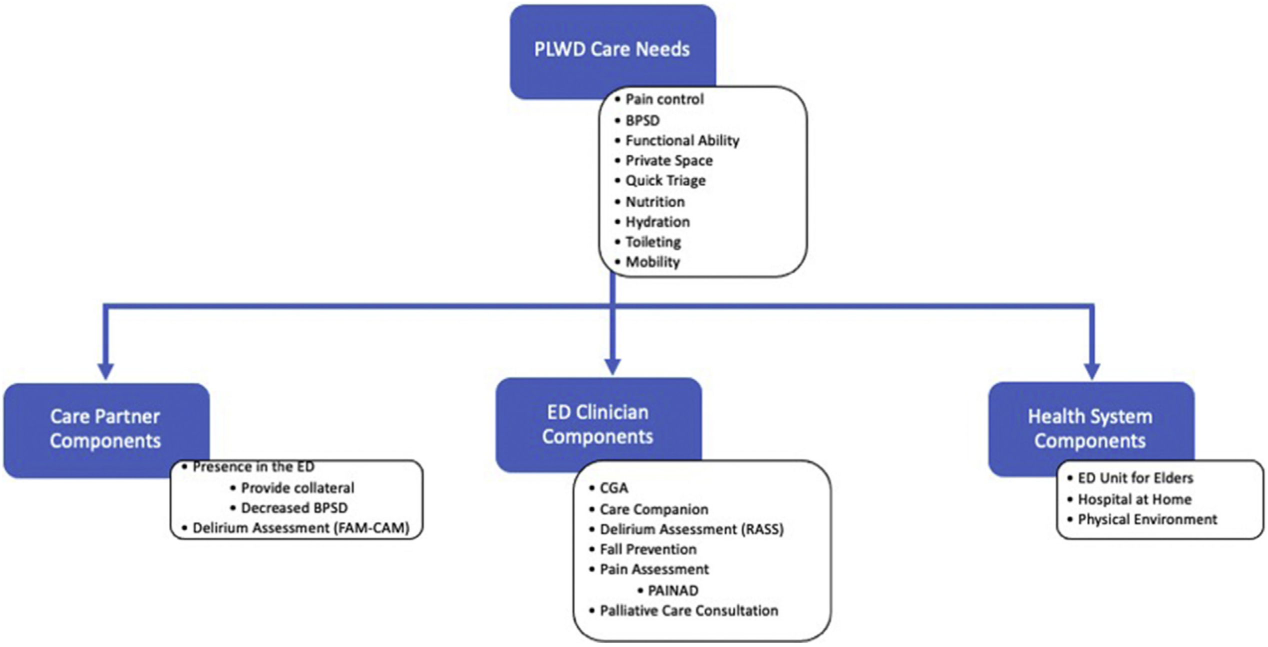

Fig. 2. Summary model of emergency care practices for persons living with dementia. FAM-CAM, FAMily-Confusion Assessment Method.

Table 3
Priority Ranking of Key Research Questions (N = 61)

Research Priorities	Stakeholder Grouping			
	ED Providers (n = 25)	Non-ED Providers (n = 29)	PLWDs/Care Partners (n = 7)	All Stakeholders
How can we best evaluate in a patient-centric and care partner−centric manner the impact of ED interventions for persons living with dementia (PLWDs)?	1	1	2/3	1
Which environmental, operational, personnel, system, or policy changes best improve ED care for PLWDs?	2	2	1	2
How can gaps in training and dementia care competencies among clinical and nonclinical staff be addressed in ways that achieve sustainable improvements in care delivery for PLWDs?	3	4	2/3	3
What economic or other implementation science measures address viability of optimal ED Care practices for PLWDs?	4	5	5	4
How do various community- and identity-based factors, including cognitive impairment, and social determinants of health impact delivery and receipt of ED care for PLWDs?	5	3	4	5

prevalence from 3% to 39%.[48,57,62,65] One study found that 19% of patients with cognitive impairment and 36% of patients with pain and cognitive impairment had behavioral disturbances in the ED.[48] Another study identified wandering, physical aggression, sleep disturbance, verbal aggression, and suspicious/paranoid thoughts as important BPSDs during a crisis.[57]

Physical environment, communication, and staff knowledge. Five articles of PLWDs, family members of PLWDs, ED nurses, and ED physicians revealed concerns regarding vulnerability of PLWDs in the crowded, noisy, ED exacerbated by the inability to determine the time of day.[52,53,59,60,68] They expressed desire for PLWDs to be triaged quickly and to receive a private treatment space. They felt that PLWDs are often “undertriaged” because of their inability to effectively communicate. They noted need for contact and conversation with ED nurses to keep from feeling abandoned or as if nobody cared. The family members desired compassion and relational care from the nurses. Some family members felt that they had to keep vigil and act as an advocate to ensure needs including basic human needs such as nutrition, hydration, toileting, and mobility were appropriately met. In one study, health care providers noted that pressure from conflicting priorities contributed to less-than-optimal care for PLWDs.[52] Care partners reported lack of communication from clinicians and emphasized the importance of discharge instructions. Participants also were concerned that ED staff lacked knowledge about what is the “normal response” of PLWDs.

Common complaints and diagnoses. Seven articles evaluated common reasons for ED use, and diagnoses made in PLWDs.[45,46,50,57,58,64,69] Common reasons for ED visits were pain; falls or injury; altered mental status; fluid or electrolyte imbalance; infection; immobility; medication side effects; respiratory, digestive, or cardiovascular issues; stroke; worsening dementia severity; and nonspecific symptoms. A study of Medicare claims data found that a diagnosis of urinary tract infection was recorded in more than 33% of all ED encounters for PLWDs, compared with 13.4% in older adults without dementia.[69] Additionally PLWDs who were diagnosed with urinary tract infection had a higher prevalence of nonspecific signs of urinary tract infection and lower prevalence of urinary specific signs and symptoms than older adults without dementia.

Functional ability. Four articles described the impact of PLWDs' dependence on assistance to complete their activities of daily living (ADL) and instrumental activities of daily living.[47,51,54,61] One study identified universal need for assistance in dressing and taking their own medications for persons with moderate cognitive impairment.[47] For PLWDs who used the ED in the last month of life, 70% had more than 3 ADL impairments.[51] It is not clear from these studies, however, whether the difficulties in ADL were related to the patients' emergency care needs. One conference abstract reported that patients with cognitive impairment had worsened function 8 weeks after their ED visit. Another study reported that many ED patients with cognitive impairment had a decline in ADL at 3 months and 6 months after an ED visit.[61]

Pain. Four articles identified pain as a significant issue for PLWDs in the ED.[49,51,62,63] One demonstrated that 45% of PLWDs in the ED had pain that contributed to their ED visit.[62] A qualitative study reported PLWDs have difficulty communicating their pain, and in addition, that analgesia often helps to reduce agitation.[49]

Summary Model and Consensus of Research Priorities

Based on the scoping review, we created a summary model of Currently Studied ED Care Practices for PLWDs (Figure 2). The model demonstrates the specific emergency care needs of PLWDs and the components of care that have been studied to address these care needs.

Additionally, the ED Care Practices Workgroup prioritized a list of future research objectives. Table 3 represents the initial and final GEAR 2.0 ADC research recommendations for ED care practices for PLWDs.

Discussion

This scoping review demonstrates the state of research on ED care practices for PLWDs. This review demonstrates that studies of components of ED care and emergency care needs for PLWDs are wide ranging with little depth on any topic. Studies on components of ED care for PLWDs included a comprehensive geriatric assessment and dedicated ED unit,[26] care partners in the ED and hospital care companions for PLWDs,[22,30] identifying delirium,[4,34,36] fall prevention,[41] admission to a home hospital program,[42] pain assessment and management,[21,28,31,32,43,44] palliative care,[23,37] and changes to the physical environment.[27,33] Four studies showed improvement in patient-centered outcomes or health services use: a comprehensive geriatric assessment and dedicated ED unit,[26] stimulation reduction and noncontact monitoring,[33] dementia companions,[22] and hospital at home program.[42] These successful interventions should be considered for future multicentered studies.

Studies on emergency care needs for PLWDs included BPSDs,[48,57,62,65] functional ability,[47,51,54,61] pain,[49,51,62,63] difficulties with ED care,[52,53,59,60,68] and common complaints and diagnoses.[45,46,50,57,58,64,69] These studies suggest that special attention should be paid to BPSDs, functional ability, and pain as common needs leading to ED visits. Decreasing stimulation and improving communication between clinicians, PLWDs, and care partners in the ED would address some of the difficulties PLWDs have with ED care and should be addressed in future studies. Communication between clinicians, PLWDs, and care partners is the focus of a separate GEAR 2.0-ADC review. In that review, the authors noted that ED care often is lacking in communication from clinicians to PLWDs and their care partners. Additionally, PLWDs often misunderstand their ED diagnosis, postdischarge instructions, and plan for follow-up. There is a lack of research that evaluates a communication strategy for clinicians with PLWDs and their care partners despite evidence suggesting that this communication is important to improving the PLWDs' hospital experience and satisfaction with care.

The most rigorously studied component of ED care for PLWDs was pain assessment and specifically the development, implementation, and evaluation of the PAINAD score. The PAINAD had good reliability, validity, and correlation and was shown to increase the frequency with which pain is documented for PLWDs, but the RCT that evaluated the impact of PAINAD on time to analgesia demonstrated no effect.[31] This RCT had significant confounders, which may have influenced the results. Further studies using the PAINAD score as part of a pain management program for PLWDs and measuring patient-centered outcomes such as effective relief of pain are warranted.

This review builds on the reviews by Clevenger, Schnitker, Kennedy, and Manning.[29,35,40,55] The Clevenger review in 2012 did not find any primary research on ED care for PLWDs.[29] The Schnitker review in 2013 did not find any ED interventions that improved quality of care for PLWDs in the ED.[40] However, they discussed how inpatient programs, such as the Hospital Elder Life Program to prevent delirium or a multidisciplinary assessment and personalized treatment plan for PLWDs to reduce BPSDs, could be adapted for the ED.[70,71] Similarly, the Kennedy review in 2020 included causes of and management strategies for BPSDs from multiple health care settings that might be applied to the ED.[55] They advocated for use of the PAINAD score[31] and for the use of activity kits that have implemented in the ED for the general older adult population.[72] The Manning review in 2021 was focused on BPSDs and noted that the busy, noisy, crowded environment of the ED can result in sensory overload and BPSDs.[35] In addition to recommending ED-based strategies of faster triage, private space, and other environmental modifications,[27,68] from articles included in our review, they also included a nursing home–based strategy of introduction of preferred stimuli to address aggression.[73]

After reviewing the results of this review and the initial research priorities, GEAR 2.0-ADC consensus conference participants were concerned that despite the wide-ranging topics studied, research is limited in key areas. Environmental concerns included sensory stimulation, particularly in the waiting room. Additionally, use of medications in the ED was a concern that was not addressed in the systematic review. Medication issues include administration of new medications in the ED, which may lead to adverse effects or drug-drug interactions and delayed or missed doses of home medications. It is critical to include the unique perspectives and priorities of PLWDs and care partners in any changes to ED care practices. There will not be any one-size-fits-all approach, and future ED research should address identity-based factors including social determinants of health. It is important to close the knowledge gaps in emergency care for PLWDs. However, members felt it is important to address ED care for PLWDs by changing the paradigm of emergency care for PLWDs at the system and policy level, rather than relying on improving individual clinician performance. This includes development and use of new technologies, financial incentives for improved ED care, and other implementation science techniques to ensure that changes are durable. It is critical to include the voices and perspectives of PLWDs and care partners. Currently, they feel that they do not have a voice in emergency care.[53,59,60,68] This breeds a lack of trust with clinicians, researchers, administrators, and policy makers involved in ED care.

With the voices of PLWDs and care partners in mind, this scoping review and consensus conference has provided a starting point for developing, funding, and conducting high yield research in improving ED care practices for PLWDs. The final ranked research priorities after the GEAR 2.0 ADC Consensus process reflect the wide-ranging research that is yet to be performed on ED Care practices for PLWDs. These priorities are patient and care partner–centric, look to system and environmental changes, and address gaps in training. They also address dearth of information on the interaction between community and identity-based factors such as social determinants of health on how care is delivered and received in the ED for PLWDs. Finally, the priorities call for the identifying implementation science and economic measures to address the viability of any optimal ED care practices for PLWDs.

The results of this scoping review and evidence-based consensus statement should be evaluated considering its limitations. The PICO questions chosen were broad. The definitions of "emergency care needs" and "components of ED care" are subjective. Additionally, definitions of PLWDs or cognitive impairment may have differed between studies, which makes rating which components of ED care are "best" difficult. However, this was outside the scope of this study. Clear inclusion and exclusion criteria were established for inclusion of studies in each PICO question. The interrater reliability was poor for title and abstract screening and moderate for full-text review. Decisions on all articles ultimately reached consensus between reviewers. A quality assessment was beyond the scope of this scoping review. Further, we did not perform a meta-analysis to determine pooled effectiveness of components of ED care nor the most frequently reported ED care needs for PLWDs.

Conclusions and Implications

The results of this scoping review reveal a wide range of components of both ED care practices and ED care needs for PLWDs. Although many structural and process interventions show positive results, the lack of depth and reproducible results prevent specific recommendations on best practices in ED care for PLWDs. Future research should work to identify improvements in ED care for PLWDs, address gaps in training, identify priority outcomes, address community and identity-based factors, and incorporate economic viability and implementation science.

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Supplementary Table 1
All Proposed Priority Questions

1. How do emergency care needs differ for PLWDs differ from other patients in the ED?
2. What components of ED care improve patient-centered outcomes for PLWDs?
3. Possible components may include ED environment, patient length of stay in the ED, evaluation and identification of delirium, assessment and treatment of pain, management of agitation, scheduling outpatient follow-up, etc
4. What patient-centered metrics best measure the impact of ED interventions for persons with dementia?
5. Does optimal ED care prevent incident delirium for PLWDs in the ED?
6. How does severity of dementia and presence of other health issues impact the optimal delivery of ED care for PLWDs?
7. How do social determinants of health such as race, ethnicity, wealth, and access to medical care impact delivery of optimal ED care for PLWDs?
8. How frequently are PLWDs evaluated for delirium in the ED?
9. How accurately do ED clinicians identify delirium in PLWDs in usual practice?
10. What is the accuracy of delirium identification tools for PLWDs in the ED?
11. How can rapidly progressive dementia be identified in the ED? Should patients with rapidly progressive dementia be admitted for expedited workup?
12. What are the best pharmacological and nonpharmacological strategies to manage agitation and other behavioral concerns for PLWDs in the ED?
13. How adequately is pain controlled in the ED for PLWDs?
14. How frequently are alternative measures for pain assessment such as the Behavioral Pain Scale, or Critical Care Pain Observation Tool used in the ED for PLWDs?
15. How frequently are alternative measures for pain assessment such as the Behavioral Pain Scale or Critical Care Pain Observation Tool taught to emergency clinicians?
16. How accurate are screening techniques which are commonly used ED for PLWDs? Commonly used screening techniques may include techniques to identify delirium, pain, depression, and abuse.
17. What are the knowledge and training gaps for emergency clinicians and nonclinical staff regarding optimal care of PLWDs? Nonclinical staff may include personnel such as security, and registration.
18. How can emergency clinicians best interact with care partners to provide optimal ED care for PLWDs?
19. How does care partner involvement impact ED care for PLWDs? Are these impacts different when care partners are present compared to paid caregivers?
20. What are the impacts of pragmatic approaches to providing acute unscheduled care such as home care, community paramedicine, telemedicine, or 3D telemedicine on patient-centered outcomes for PLWDs?
21. How do emergency clinicians best connect PLWDs with community resources?
22. When concern for dementia or cognitive impairment is identified in the ED, how do clinicians address concerns with patient autonomy and capacity? Should these concerns be reported to anyone, for example, the patient's family, primary care clinician, or adult protective services?

Supplementary Material 1. Search Methods

The review team collaborated with a research librarian (A.B.W.) to develop and execute a comprehensive search of the literature. The search was created in partnership with librarians and project team members from the larger GEAR 2.0 effort to conduct several scoping reviews on various topics related to dementia care in the field of emergency medicine. This search combined controlled vocabulary and title/abstract terms related to the care of dementia patients in the emergency department. The search was adapted from a GEAR 2.0 baseline search to fit the needs of the specific project question and translated for the following databases: MEDLINE (Ovid), Cochrane Central Register of Controlled Trials (CENTRAL), Embase (Embase.com), CINAHL (EBSCO), PsycINFO (EBSCO), PubMed Central, and Web of Science (Clarivate). All searches were performed on March 19, 2021. An exclusion filter from McGill University was used to focus on adult patient populations: https://libraryguides.mcgill.ca/knowledge-syntheses/search-tools. No other publication type, language, or date filters were applied. Results were downloaded to a citation management software (EndNote) and underwent automated deduplication using a system at the Cushing/Whitney Medical Library at Yale University. Unique records were uploaded to a screening platform (Covidence) for independent review by project team members using predetermined inclusion and exclusion criteria.

Database Searched	Date Searched	Results
MEDLINE (OVID)	03/19/2021	1819
Cochrane Central Register of Controlled Trials	03/19/2021	370
Embase	03/19/2021	4328
CINAHL (EBSCO)	03/19/2021	1310
PsycINFO (EBSCO)	03/19/2021	672
PubMed Central	03/19/2021	318
Web of Science	03/19/2021	2149
Total		10,966
After deduplication		6348

10,966 from databases (10648 from databases, 318 from registers).
6289 unique records after deduplications.
4677 total duplicates removed.

Ovid MEDLINE and Epub Ahead of Print, In-Process, In-Data-Review and Other Nonindexed Citations, Daily and Versions

Number	Search	Results
1	exp Emergency Medical Services/	146,791
2	Emergency Medicine/	13,897
3	(emergicenter* or Triage* or unscheduled-acute-care).ti,ab.	20,476
4	((ED or EMS or ER) adj1 (care* OR visit* or stay* or admit* or admission* or evaluation* OR assess*)).ti,ab.	12,282
5	(trauma adj1 (care* or support* or center* or centre* or department* or unit* or room* or ward* or service*)).ti,ab.	23,058
6	((Emergency or emergencies) adj2 (admit* or admission* or care* or treatment* or service* or dispatch* or department* or unit* or ward* or room* or center* or centre* or system* or personnel or physician* or provider* or doctor* or nurs* or patient*)).ti,ab.	169,720
7	1 or 2 or 3 or 4 or 5 or 6	273,632
8	exp Dementia/	172,238
9	(dementia* or amentia* or demention* or CADASIL or Alzheimer* or Creutzfeldt-Jakob or Huntington* or Lewy-Bod*).ti,ab.	248,484
10	((cognit* or neurocognit* or frontotemporal) adj2 (disorder* or defect* or deficit* or decline* or deteriorat* or disabilit* or dysfunction* or disfunction* or impaired or impairment* or interference*)).ti,ab.	138,434
11	8 or 9 or 10	362,016
12	7 and 11	1862
13	((exp infant/or exp child/or adolescent/) NOT (exp adult/))	1,919,374
14	12 not 13	1819

Cochrane Library

No.	Search	Results
1	(emergicenter* or Triage* or unscheduled-acute-care):ti,ab,kw	1757
2	((ED or EMS or ER) near/1 (care* OR visit* or stay* or admit* or admission* or evaluation* OR assess*)):ti,ab,kw	1914
3	((trauma) near/1 (care* or support* or center* or centre* or department* or unit* or room* or ward* or service*)):ti,ab,kw	1400
4	((Emergency or emergencies) near/2 (admit* or admission* or care* or treatment* or service* or dispatch* or department* or unit* or ward* or room* or center* or centre* or system* or personnel or physician* or provider* or doctor* or nurs* or patient*)):ti,ab,kw	19,318
5	#1 OR #2 OR #3 OR #4	21,389
6	(dementia* or amentia* or demention* or CADASIL or Alzheimer* or Creutzfeldt-Jakob or Huntington* or Lewy-Bod*):ti,ab,kw	20,470
7	((cognit* or neurocognit* or frontotemporal) near/2 (disorder* or defect* or deficit* or decline* or deteriorat* or disabilit* or dysfunction* or disfunction* or impaired or impairment* or interference*)):ti,ab,kw	20,493
8	#6 OR #7	35,214
9	#5 AND #8	375
10	MeSH descriptor: [Infant] explode all trees	32,413
11	MeSH descriptor: [Child] explode all trees	56,688
12	MeSH descriptor: [Adolescent] explode all trees	104,818
13	#10 or #11 or #12	149,861
14	MeSH descriptor: [Adult] explode all trees	467,867
15	#13 NOT #14	58,997
16	#9 NOT #15 (in Trials)	370

Embase

No.	Search	Results
#1	’emergency health service’/exp	110,331
#2	’emergency medicine’/de	42,188
#3	’emergency ward’/exp	159,907
#4	’emergency physician’/exp	13,159
#5	’emergency nurse practitioner’/exp	340
#6	’emergency nursing’/exp	6687
#7	’emergency patient’/exp	4078
#8	(emergicenter* or Triage* or unscheduled-acute-care):ti,ab	31,864
#9	((ED or EMS or ER) NEAR/1 (care* OR visit* or stay* or admit* or admission* or evaluation* OR assess*)):ti,ab	24,979
#10	((trauma) NEAR/1 (care* or support* or center* or centre* or department* or unit* or room* or ward* or service*)):ti,ab	29,526
#11	((Emergency or emergencies) NEAR/2 (admit* or admission* or care* or treatment* or service* or dispatch* or department* or unit* or ward* or room* or center* or centre* or system* or personnel or physician* or provider* or doctor* or nurs* or patient*)):ti,ab	259,759
#12	#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10 OR #11	407,708
#13	’dementia’/exp	384,249
#14	(dementia* or amentia* or demention* or CADASIL or Alzheimer* or Creutzfeldt-Jakob or Huntington* or Lewy-Bod*):ti,ab	349,392
#15	((cognit* or neurocognit* or frontotemporal) NEAR/2 (disorder* or defect* or deficit* or decline* or deteriorat* or disabilit* or dysfunction* or disfunction* or impaired or impairment* or interference*)):ti,ab	212,491
#16	#13 OR #14 OR #15	575,567
#17	#12 AND #16	4456
#18	’juvenile’/exp NOT ’adult’/exp	2,634,141
#19	#17 NOT #18	4328

CINAHL Plus with Full Text

No.	Search	Results
S1	(MH “Emergency Medical Services+”)	107,726
S2	(MH “Emergency Medicine”)	12,794
S3	(MH “Physicians, Emergency”)	4436
S4	(MH “Emergency Nurse Practitioners”)	649
S5	(MH “Emergency Nursing+”)	15,465
S6	(MH “Emergency Patients”)	8323
S7	TI ((emergicenter* or Triage* or unscheduled-acute-care)) OR AB ((emergicenter* or Triage* or unscheduled-acute-care))	11,275
S8	TI ((“ED” or “EMS” or “ER”) N1 (care* or visit* or stay* or admit* or admission* or evaluation* or assess*)) OR AB ((“ED” or “EMS” or “ER”) N1 (care* or visit* or stay* or admit* or admission* or evaluation* or assess*))	9203
S8	TI ((trauma N1 (care* or support* or center* or centre* or department* or unit* or room* or ward* or service*))) OR AB ((trauma N1 (care* or support* or center* or centre* or department* or unit* or room* or ward* or service*)))	14,351
S10	TI (((Emergency or emergencies) N2 (admit* or admission* or care* or treatment* or service* or dispatch* or department* or unit* or ward* or room* or center* or centre* or system* or personnel or physician* or provider* or doctor* or nurs* or patient*))) OR AB (((Emergency or emergencies) N2 (admit* or admission* or care* or treatment* or service* or dispatch* or department* or unit* or ward* or room* or center* or centre* or system* or personnel or physician* or provider* or doctor* or nurs* or patient*)))	95,015
S11	S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10	185,401
S12	(MH “Dementia+”)	75,874
S13	TI ((dementia* or amentia* or demention* or CADASIL or Alzheimer* or Creutzfeldt-Jakob or Huntington* or Lewy-Bod*)) OR AB ((dementia* or amentia* or demention* or CADASIL or Alzheimer* or Creutzfeldt-Jakob or Huntington* or Lewy-Bod*))	81,364
S14	TI (((cognit* or neurocognit* or frontotemporal) N2 (disorder* or defect* or deficit* or decline* or deteriorat* or disabilit* or dysfunction* or disfunction* or impaired or impairment* or interference*))) OR AB (((cognit* or neurocognit* or frontotemporal) N2 (disorder* or defect* or deficit* or decline* or deteriorat* or disabilit* or dysfunction* or disfunction* or impaired or impairment* or interference*)))	48,642
S15	S12 OR S13 OR S14	130,218
S16	S11 AND S15	1341
S17	NOT ((MH “Child+”) or (MH “Adolescence”)) NOT (MH “Adult+”)	623,491
S18	S16 NOT S17	1310

PsycINFO

No.	Search	Results
S1	DE “Emergency Services”	8836
S2	DE “Emergency Medicine”	497
S3	DE “Emergency Personnel”	122
S4	TI ((emergicenter* or Triage* or unscheduled-acute-care)) OR AB ((emergicenter* or Triage* or unscheduled-acute-care))	1660
S5	TI ((“ED” or “EMS” or “ER”) N1 (care* or visit* or stay* or admit* or admission* or evaluation* or assess*)) OR AB ((“ED” or “EMS” or “ER”) N1 (care* or visit* or stay* or admit* or admission* or evaluation* or assess*))	2256
S6	TI ((trauma N1 (care* or support* or center* or centre* or department* or unit* or room* or ward* or service*))) OR AB ((trauma N1 (care* or support* or center* or centre* or department* or unit* or room* or ward* or service*)))	2833
S7	TI (((Emergency or emergencies) N2 (admit* or admission* or care* or treatment* or service* or dispatch* or department* or unit* or ward* or room* or center* or centre* or system* or personnel or physician* or provider* or doctor* or nurs* or patient*))) OR AB (((Emergency or emergencies) N2 (admit* or admission* or care* or treatment* or service* or dispatch* or department* or unit* or ward* or room* or center* or centre* or system* or personnel or physician* or provider* or doctor* or nurs* or patient*)))	18,678
S8	S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7	25,014
S9	DE “Dementia”	41,241
S10	TI ((dementia* or amentia* or demention* or CADASIL or Alzheimer* or Creutzfeldt-Jakob or Huntington* or Lewy-Bod*)) OR AB ((dementia* or amentia* or demention* or CADASIL or Alzheimer* or Creutzfeldt-Jakob or Huntington* or Lewy-Bod*))	106,807
S11	TI (((cognit* or neurocognit* or frontotemporal) N2 (disorder* or defect* or deficit* or decline* or deteriorat** or disabilit* or dysfunction* or disfunction* or impaired or impairment* or interference*))) OR AB (((cognit* or neurocognit* or frontotemporal) N2 (disorder* or defect* or deficit* or decline* or deteriorat** or disabilit* or dysfunction* or disfunction* or impaired or impairment* or interference*)))	86,161
S12	S9 OR S10 OR S11	166,907
S13	S8 AND S12	672

PMC

No.	Search	Results
	(((emergency-care*[tiab] OR emergency-treatment*[tiab] OR emergency-service*[tiab] OR emergency-dispatch*[tiab] OR emergency-department*[tiab] OR emergency-unit*[tiab] OR emergency-ward*[tiab] OR emergency-room*[tiab] OR emergency-center*[tiab] OR emergency-centre*[tiab] OR emergency-system*[tiab] OR emergency-personnel[tiab] OR emergency-physician*[tiab] OR emergency-provider*[tiab] OR emergency-doctor*[tiab] OR emergency-nurs*[tiab] OR emergency-patient*[tiab] OR emergency-admission*[tiab] OR emergency-admit*[tiab] OR trauma-care*[tiab] OR trauma-treatment*[tiab] OR trauma-service*[tiab] OR trauma-dispatch*[tiab] OR trauma-department*[tiab] OR trauma-unit*[tiab] OR trauma-ward*[tiab] OR trauma-room*[tiab] OR trauma-center*[tiab] OR trauma-centre*[tiab] OR trauma-system*[tiab] OR trauma-service*[tiab] OR trauma-personnel[tiab] OR trauma-physician*[tiab] OR trauma-provider*[tiab] OR trauma-doctor*[tiab] OR trauma-nurs*[tiab] OR trauma-patient*[tiab] OR emergicenter[tiab] OR unscheduled-acute-care[tiab] OR ED-care[tiab] OR ED-visit*[tiab] OR ED-stay*[tiab] OR ED-admit*[tiab] OR ED-admission*[tiab] OR ED-evaluation*[tiab] OR ED-assess*[tiab] OR ER-care[tiab] OR ER-visit*[tiab] OR ER-stay*[tiab] OR ER-admission*[tiab] OR ER-evaluation*[tiab] OR ER-assess*[tiab] OR EMS-care[tiab] OR EMS-evaluation*[tiab] OR EMS-assess*[tiab]) AND (dementia*[tiab] OR amentia*[tiab] OR demention*[tiab] OR CADASIL[tiab] OR Alzheimer*[tiab] OR Creutzfeldt-Jakob[tiab] OR Huntington*[tiab] OR Lewy-Bod*[tiab] OR cognitive-disorder*[tiab] OR cognitive-defect*[tiab] OR cognitive-deficit*[tiab] OR cognitive-decline*[tiab] OR cognitive-deteriorat**[tiab] OR cognitive-disabilit*[tiab] OR cognitive-dysfunction*[tiab] OR cognitive-disfunction*[tiab] OR cognitive-impaired[tiab] OR cognitive-impairment*[tiab] OR cognitive-interference*[tiab] OR neurocognitive-disorder*[tiab] OR neurocognitive-defect*[tiab] OR neurocognitive-deficit*[tiab] OR neurocognitive-decline*[tiab] OR neurocognitive-deteriorat**[tiab] OR neurocognitive-disabilit*[tiab] OR neurocognitive-dysfunction*[tiab] OR neurocognitive-impairment*[tiab] OR frontotemporal-disorder*[tiab] OR frontotemporal-defect*[tiab] OR frontotemporal-dysfunction*[tiab] OR frontotemporal-impairment*[tiab] OR impaired-cognit*[tiab] OR impaired-neurocogn*[tiab])) NOT (medline[Filter]))	318

Web of Science *Indexes = SCI-EXPANDED, CPCI-S, ESCI Timespan = All years*

#	Search	Result
#1	TS=(emergicenter* or Triage* or unscheduled-acute-care)	21,801
#2	TS=((ED or EMS or ER) NEAR/1 (care* OR visit* or stay* or admit* or admission* or evaluation* OR assess*))	13,328
#3	TS=((trauma) NEAR/1 (care* or support* or center* or centre* or department* or unit* or room* or ward* or service*))	24,357
#4	TS=((Emergency or emergencies) NEAR/2 (admit* or admission* or care* or treatment* or service* or dispatch* or department* or unit* or ward* or room* or center* or centre* or system* or personnel or physician* or provider* or doctor* or nurs* or patient*))	174,534
#5	#1 OR #2 OR #3 OR #4	209,427
#6	TS=(dementia* or amentia* or demention* or CADASIL or Alzheimer* or Creutzfeldt-Jakob or Huntington* or Lewy-Bod*)	355,669
#7	TS=((cognit* or neurocognit* or response or frontotemporal or functional-status) NEAR/2 (disorder* or defect* or deficit* or decline* or deteriorat* or disabilit* or dysfunction** or disfunction* or impaired or impairment* or interference*))	210,232
#8	#6 OR #7	484,290
#9	#5 AND #8	2149