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Emergency Medical Services and Palliative Care: A Scoping Review

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ABSTRACT

Introduction: While Emergency Medical Services (EMS) and palliative care function with unique respective aims, they often intersect. A growing body of literature recommends integration between the two fields to improve palliative care provision.

Objectives: The aim of this study was to map existing EMS and palliative care literature by identifying study types, extracting key findings, and noting limitations, providing a broad summary of current evidence and context for EMS and palliative care integration while highlighting knowledge gaps for future research.

Methods and Analysis: A scoping review of literature was performed with an *a priori* search strategy. The following databases were searched for empirical, English studies published between 2000 and 2022 involving EMS and palliative care: MEDLINE via Pubmed, Web of Science, CINAHL, Embase via Scopus, PsycINFO, the University of Cape Town Thesis Repository and Google Scholar. Two reviewers screened titles, abstracts and full texts for inclusion. Extracted data underwent descriptive content analysis.

Results: In total, 10 725 articles were identified. Following title and abstract screening, 10 634 studies were excluded. A further 35 studies were excluded upon full text screening. The remaining 56 articles were included for review. Four predominant domains arose from included studies: 1) EMS' palliative care role, 2) Challenges faced by EMS in palliative situations, 3) EMS and palliative care integration benefits, 4) Proposed recommendations for EMS and palliative care integration.

Conclusion: EMS have a role to play in out-of-hospital palliative care, however, many challenges must be overcome. EMS provider education, collaboration between EMS and palliative systems, creation of EMS palliative care guidelines/protocols, creation of specialised out-of-hospital palliative care teams and further research have been recommended as solutions. Future research should focus on the prioritization, implementation, and effectiveness of these solutions, particularly in low-to-middle income countries where the need, and potential impact, are most significant.

Key Words: Emergency Medical Services, Palliative Care

ARTICLE SUMMARY

Strengths and Limitations of This Study

- A thorough search string was piloted and employed in conjunction with a wide range of databases, meeting recommendations for optimal combinations, and providing a comprehensive view of contemporary literature.
- The performance and report of this review was completed according to the quality standards of the PRISMA-ScR guidelines.
- Limitations to this review include those common to scoping reviews such as human error in article selection.
- A formal risk of bias assessment was not performed; therefore, data reliability lacks evaluation.

INTRODUCTION

Emergency Medical Services (EMS) and palliative care function with unique respective aims. While EMS are designed to preserve life and limb in emergency situations by immediate intervention and hospital conveyance(1,2), palliative care is focussed on prevention and relief of suffering associated with life-limiting illness.(3) The EMS approach is curative, while the palliative approach is supportive.

Despite these differences, EMS and palliative care often intersect.(4–7) As they progress towards end-of-life (EoL), patients with palliative needs experience worsening symptoms for which EMS are often contacted.(8,9) Furthermore, the role of EMS has expanded in recent years to include additional areas of healthcare such as community-based primary care and palliative care.(10) Global ageing populations and subsequent increases in chronic non-communicable diseases are well documented reasons for this expanded role as demand for palliative care rises and EMS are more frequently confronted with these patients.(11)

Contemporary EMS and palliative care literature recommends integration between the two fields to improve palliative care provision as the two systems may complement one another.(12) Nevertheless, a lack of integration persists, often resulting in poor management of patients with palliative needs by EMS.(12–14) Potential integration benefits include early palliative care delivery, provision of homecare, respect for patient autonomy, improved patient and family satisfaction, confidence, and quality of life (QoL), decreased health care costs and setting correct trajectories of care.(5,15,16)

Given the growing body of EMS and palliative care literature, and potential integration benefits, a need exists to review current evidence. Previous reviews have focussed on singular aspects such as EMS provision of palliative care in community-based settings(11), however, a more extensive review is lacking. This scoping review, therefore, maps existing EMS and palliative care literature by identifying study types, extracting key findings, and noting limitations, providing a broad summary of current evidence and context for EMS and palliative care integration while highlighting knowledge gaps for future research.

METHODS

Design

A scoping review of EMS and palliative care literature was performed, the protocol for which has been published previously,(17) detailing the methodological framework of Arksey and O'Malley used for this review.(18)

Search strategy and eligibility criteria

An *a priori* search strategy, developed in line with the recommendations of Aromataris and Riitano, was used.(19) This strategy employed key word combinations and their synonyms (See Supplementary Material 1). The following databases were originally searched on 28 September 2021 with an updated search on 24 November 2022: MEDLINE via Pubmed, Web of Science, CINAHL, Embase via Scopus and PsycINFO. The University of Cape Town (UCT) Thesis Repository and Google Scholar were searched to identify relevant grey literature. These databases met the recommendation of Bramer, et al. for optimal database combinations.(20) Furthermore, Embase, CINAHL and PsycINFO provided access to unique palliative care literature not indexed in MEDLINE as highlighted by Tieman, et al.(21) Additional relevant articles were sought from hand-searching reference lists of eligible studies. This search strategy was piloted to ensure appropriateness of key word combinations in the selected databases.

Eligible studies were selected based on the following criteria:

- Inclusion: Empirical, English studies involving human populations published between 1 January 2000 and 24 November 2022 concerning EMS and palliative care including relevant grey literature. The EMS and palliative care interface was the primary focus for eligibility.
- Exclusion: Studies involving the in-hospital setting, including emergency departments (EDs), those where the full text was unobtainable, editorial and discussion articles, opinion papers and studies involving exclusively EMS or palliative care.

Data Management

All identified studies were uploaded to Mendeley reference software(22) and duplicates removed. Remaining studies were exported to the Rayyan web application(23) where two authors (CG, CS) independently screened titles and abstracts for inclusion. CG and CS then screened the full texts of included studies for final inclusion in the review. Agreement achieved between authors was >99%. Upon discussion, complete agreement was reached for all studies. This process was overseen by LG and WS. All authors agreed upon the final inclusion list.

Data Extraction and Analysis

An *a priori* data extraction matrix was used to gather the following data from each included study which were charted by CG using *Microsoft Word* (Microsoft Corporation, Redmond, Washington, U.S.A.): Title, authorship, publication year, setting, aims, population and sample, EMS palliative care training, methodology, conclusions, significant findings, limitations. To ensure consistency in application of this extraction matrix, CS double coded 10% of included articles. Extracted data underwent descriptive content analysis where major domains were identified through an inductive-dominant approach. Findings are presented in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for scoping reviews (PRISMA-ScR).(24,25)

Patient and Public Involvement

No patients were involved in this study.

RESULTS

After duplication removal, 10 725 studies were identified. Following title and abstract screening, 10 634 studies were excluded. A further 35 studies were excluded upon full text screening. Of the full text exclusions, 12 full texts were unavailable, the EMS and palliative care interface was not the primary focus in 11 studies, 8 studies presented non-empirical evidence and the remaining 4 studies were previously

undetected duplicates. Hand-searching of included reference lists revealed no further studies. In total, 56 studies were included for analysis. Figure 1 details the selection process while a summary of included studies is provided in Supplementary Material 2.

Study characteristics

Included studies were performed in the United States of America (USA) (n=16),(1,6,26–39) the United Kingdom (UK) (n=9),(7,14,40–46) Germany (n=10),(8,47–55) Australia (n=8),(2,4,11,56–60) Canada (n=4),(15,61–63) France (n=1),(5) Switzerland (n=1),(13) New Zealand (n=2),(64,65) Finland (n=2),(66,67) Czech Republic (n=1),(68) Brazil (n=1)(69) and South Africa (n=1)(16) between 2002 and 2022. Most studies (63%, n=35) were published between 2018 and 2022.

Methodologically, most studies were quantitative (55%, n=31) while the remainder used a qualitative (27%, n=15) or mixed-methods (18%, n=10) approach. Quantitative studies comprised of surveys (n=12),(1,8,30,32,38,41,43,48,49,51,56,58) retrospective cohorts (n=9),(5,33,34,40,52,54,55,57,66) literature reviews (n=5),(11,46,61,64,68) case series/reports (n=3)(6,13,35), a pre- and post-intervention study (n=1)(29) and a prospective cohort (n=1).(8) Qualitative studies contained individual interviews (n=12),(7,14,16,26–28,31,42,44,47,65,69) focus group interviews (n=2),(2,63) and deliberative dialogues (n=1),(62) while the mixed-methods studies(4,15,36,37,39,45,50,59,60,67) made use of various survey and interview combinations.

EMS providers were the primary population in most studies (52%, n=29)(1,2,4,7,8,14,16,26–31,36–39,41,43–45,47–49,51,56,58,67,69) including paramedics, doctors and nurses involved in out-of-hospital emergency care dependant on EMS system model: paramedic-led (Anglo-American), physician-led (Franco-German). Other investigations were performed using patient records (n=10),(5,8,33,34,40,52,54,55,57,66) published literature (n=5),(11,46,61,64,68) case reports/series (n=3),(6,13,35) stakeholders and experts (n=3),(42,50,62) mixed populations including patients, families, paramedics, caregivers, palliative providers and patient records (n=3),(15,59,63), EMS agencies (n=2)(32,60) and family caregivers (n=1).(65)

Study categories were EMS provider knowledge and perspectives (54%, n=30),(1,2,4,7,8,14,16,26–28,30,31,36–39,41–45,47–49,51,56,58,63,67,69) EMS-palliative integration (23%, n=13),(5,6,15,29,32,34,35,40,50,59,60,62,66) EMS-palliative intersection (14%, n=8)(8,13,33,52,54,55,57,65) and literature reviews (9%, n=5).(11,46,61,64,68) Studies concerning EMS provider knowledge and perspectives *vis à vis* palliative care focussed on EMS management and decision-making (n=9),(8,26,27,37,44,48,49,51,58) roles and barriers in palliative situations (n=11),(2,14,16,28,31,42,43,45,47,63,69) understanding and education (n=6),(1,4,30,38,39,67) identification of patients with palliative needs (n=2),(36,41) and potential solutions to overcome barriers (n=2).(7,56) Studies concerning EMS and palliative care integration focussed on effects of integration on patient transport, patient/family satisfaction and EMS provider confidence (n=7),(5,15,34,35,40,59,66) recommendations for integration (n=4)(6,29,50,62) and EMS palliative care protocols (n=2).(32,60) Studies concerning EMS and palliative care intersection focussed on the characteristics and frequency of patients with palliative needs encountered by EMS providers (n=4),(8,33,55,57) EMS provider treatment of these patients (n=3)(13,52,54) and the experience of family caregivers.(65) Literature reviews focussed on attitudes and perceptions of paramedics concerning EoL care (n=1),(46) EMS role in EoL care (n=1),(68) EMS palliative provision in community-based settings(n=1)(11) and rapid reviews of EMS and palliative care literature in Canada (n=1)(61) and New Zealand (n=1).(64)

Four predominant domains arose from included studies: 1) EMS' palliative care role, 2) Challenges faced by EMS in palliative situations, 3) EMS and palliative care integration benefits, 4) Proposed recommendations for EMS and palliative care integration.

EMS' palliative care role

Numerous studies (66%, n=37)(1,2,6,8,11,14–16,26–28,31,34,35,37,41–46,48,51,53–55,57,59–61,63–69) discussed the potential role of EMS in palliative care. Most EMS providers viewed palliative care positively, regarding it as important to their role as demonstrated in studies performed in the UK,(43) Australia,(59) Canada,(15) and South Africa.(16) The EMS' palliative care role was frequently

highlighted due to the intersection between EMS and patients with palliative needs.(8,54,57) For example, an Australian study found palliative situations comprised 0.5% (n=4348) of the annual EMS caseload.(57) Other studies, found palliative situations may represent up to 10% of caseload and most EMS providers had previously encountered palliative situations.(8,47) Commonly documented reasons for EMS calls to palliative situations were sudden, unexpected patient deterioration, caregiver exhaustion and alarming signs and symptoms: dyspnoea, pain, convulsions, severe anxiety.(15,26,47) These calls often occurred out-of-office hours or during holidays when the usual patient caregivers were unavailable.(13) Specific EMS palliative care roles included complex care provision,(68) adjusting patient trajectory,(16) decision-making within limited information environments,(14) therapeutic interventions,(54) 24/7 availability, provision of homecare,(66) and improving patient and family quality of life, comfort, and confidence.(15)

Challenges faced by EMS in palliative situations

Most studies (63%, n=35)(1,2,6–8,11,13,14,16,26,27,30–33,36–38,40,41,43–47,49,51–54,58,61,67–69) highlighted various challenges EMS providers face in palliative situations. These challenges were EMS provider mindset,(1) the out-of-hospital environment,(16) EMS systems,(14) lack of education,(68) medico-legal confusion,(49) and inter-personal conflicts.(2) The EMS provider mindset is to 'save lives' through a curative approach to care, whereas the palliative approach is primarily supportive through prevention and relief of suffering.(1–3) Other common challenges were related to the complex out-of-hospital environment: lack of information, limited time, consequent difficult decision-making.(47)

EMS system barriers to palliative provision were mandated hospital transport,(16) limited scope of practice(47) and lack of alternative care pathways.(14) Despite patient and family wishes and better clinical judgement, EMS providers often conveyed palliative patients to hospital due to system rigidity, fear of consequences and a lack of alternative care pathways.(14) Hospital transport was described as a safety net for EMS providers and, thus, their default decision in palliative situations.(44)

Many studies identified a lack of EMS provider education concerning palliative care(2,16,36,43,47) and only five studies mentioned EMS providers with additional palliative or hospice care training in their samples.(4,8,36,53,56) The additional palliative training ranged from short course to post-graduate diploma level. This lack of education was identified in both physician and paramedic-led EMS systems.(8,16)

Highlighted medico-legal challenges for EMS providers in palliative situations were fear of litigation(47) and confusion surrounding legal documentation such as advance directives (ADs).(13,38,49). EMS providers were sometimes unaware of the presence of legal documentation due to lack of available information at incidents.(6,26,27) Furthermore, where legal documentation was presented, EMS providers were uncertain of legal implications in emergencies.(2,49)

Finally, EMS providers described various conflicts requiring management in palliative situations. Conflicts arose with other health care providers, patients, families and within EMS providers themselves.(2) These conflicts were due to competing interests: patient wishes, family wishes, EMS protocols, EMS provider clinical judgement, medico-legal considerations.(16,26)

EMS and palliative care integration benefits

Many studies (36%, n=20)(5,6,8,11,15,16,29,34,35,40–42,47,53,54,59,61–63,66) described benefits of EMS and palliative care integration: early palliative provision, home-based care, respect of patient autonomy, improved patient and family QoL, increased patient and family satisfaction and confidence, improved EMS provider confidence, and decreased healthcare costs. Conversely, the consequences of non-integration were disregard of patient autonomy, performance of aggressive or futile interventions, and poor management of palliative patients by EMS.(13,14)

Provision of early, home-based palliative care by EMS was found to improve patient and family QoL, satisfaction and confidence as demonstrated by Carter, et al.(15) This study found high patient and family satisfaction with palliative provision from EMS providers, observing their compassion and skill in symptom management.(15) Furthermore, knowledge of the 24/7 availability of EMS providers in this programme

provided confidence and peace of mind.(15) Paramedic comfort and confidence in palliative provision likewise improved during the study.(15)

Collaboration between EMS and palliative care networks was found to improve respect of patient autonomy.(5) An example was provided in a case study by Clemency, et al. where a terminally ill patient was transported home from hospital, extubated and allowed to die at home according to her wishes.(35) This was facilitated by EMS under the guidance of palliative care specialists and in conjunction with a broader multidisciplinary team.(35)

Several studies discussed the potential decreased healthcare costs resulting from EMS and palliative integration.(41,59,61,66) The decreased costs would result from provision of homecare, thus avoiding expensive and unnecessary hospital admissions.(61) A Finish study evaluating the integration of paramedics in EoL care argued that healthcare costs may be diminished through provision of homecare by paramedics in particular.(66)

Proposed recommendations for EMS and palliative care integration

All 56 included studies made recommendations for EMS and palliative care integration. These were EMS provider education,(4) EMS and palliative system collaboration,(5) EMS palliative care guideline/protocol creation,(16) specialised out-of-hospital palliative care teams(34) and further research.(57) The following topics were highlighted as areas for EMS provider education: identifying patients with palliative needs,(41) palliative therapeutic goals,(44) legal documentation and advance care planning, ethics,(13) withholding and withdrawing treatment,(38,51) patient and family communication (including care-giver support),(47) symptom management,(54) interdisciplinary teamwork(59) and current palliative system structures.(58)

Lamba, et al. detailed four steps for EMS and palliative care integration: 1) Identify EMS ‘champions’, 2) Review protocols and literature, 3) Perform a needs assessment, 4) Create an action plan.(6) The authors argued that optimal palliative care begins out-of-hospital and, therefore, palliative and EMS systems should collaborate.(6) Such collaborations between palliative and EMS systems, making

use of newly developed palliative care guidelines and protocols for EMS providers, were successfully deployed in Canada,(15) Finland(66) and the USA.(34)

Concerning further research, the following areas were recommended: educational interventions,(46) development of EMS palliative care protocols,(16) defining the role of EMS in palliative situations,(2) development of EMS palliative care policies and clarifying palliative care referral pathways,(2) cost-effectiveness of EMS and palliative care integration.(40,59,66)

DISCUSSION

This scoping review aimed to map existing EMS and palliative literature by identifying study types, extracting key findings, and noting limitations, thereby providing a summary of current evidence, context for EMS and palliative care integration and identifying knowledge gaps for future research.

The topic of EMS and palliative care has gathered momentum in recent years as the role of EMS systems in out-of-hospital care has expanded; most studies included in this review (63%, n=35) being published between 2018 and 2022. While the body of literature has grown, there remains a relative dearth of empirical evidence, with only 56 such studies identified here since the turn of the millennium. Many of these studies are small in scale, presenting limited findings. Common limitations include small sample sizes, limited external validity, use of unvalidated survey instruments, self-selection bias, recall bias and those resulting from retrospective approaches.

Despite these limitations, the literature, when aggregated, is consistent across various contexts. For example, similar challenges to EMS palliative provision have been documented in both paramedic(26) and physician-led systems.(47) Moreover, findings regarding EMS role, challenges and integration benefits in palliative situations appear similar across high-income countries (HICs)(68) and low-to-middle income countries (LMICs),(16) demonstrating the ubiquitous nature of the out-of-hospital environment.

Of importance, only two studies in this review (3.5%) were performed in LMIC countries,(16,69) revealing a significant knowledge gap as LMIC contexts result in

amplified challenges, require different approaches, and thus have a great need for research.(70,71) Amplified EMS palliative care challenges result from disproportionately high burdens of disease and contemporaneous resource constraints.(71) HICs have reported that 0.5-10% of EMS caseload comprises palliative situations.(47,57) Within LMICs, however, this proportion is likely much larger as greater disease burdens result in more life-limiting illnesses and injuries and, therefore, more patients requiring palliation with which EMS may interact.(16) Subsequent problems are threefold: greater incidence of poor palliative situation management by EMS, increased strain on already limited EMS and hospital resources and overall increased healthcare system costs in these budget-constrained settings.

Due to resource limitations, LMICs require novel approaches to these problems. The development of new, specialised out-of-hospital palliative care teams, for example, may not be feasible in LMICs. Capacitating already existing structures, EMS and palliative, to collaborate via alternative means may represent a more efficient use of scarce resources to achieve integration benefits.(59) Simply improving communication between the two systems may confer benefit as demonstrated by Dent, et al. where palliative telephonic advice was made available to EMS providers.(40) This potentially low-cost intervention was associated with decreased rates of hospital conveyance and should be researched in LMIC settings.(40) Similar integrative approaches have been successfully employed in HICs for mental health emergencies where mental healthcare workers have been linked with EMS and police to provide expert consult at point of care and thereby reduce unnecessary hospital conveyance.(72)

LMICs also represent a unique opportunity for EMS palliative care research globally. Where amplified problems exist, so may amplified benefits from developed solutions. The 1990 Commission on Health Research for Development affirmed that strengthening LMIC research capacity is *"one of the most powerful, cost-effective, and sustainable means of advancing health and development"*.(73) Not only would LMICs benefit greatly from resource efficient solutions, but these unique solutions would likewise benefit HICs where increasing health-care costs remain a challenge.(74) Considering these amplified problems, solutions and the need for

contextually suitable approaches, the need for, and yet lack of, EMS palliative care LMIC research is striking.

While further research, particularly in LMICs, is needed, the existing literature supports, and indeed recommends, the integration of EMS and palliative care services whatever the context (paramedic vs. physician-led, HIC vs. LMIC).(5,16) Such integration would be congruous with the multi-disciplinary approach espoused by palliative care(3) and recommended by the World Health Organization (WHO).(75) The WHO has noted a growing demand for palliative care worldwide, with an insufficient corresponding supply of specialist palliative services.(75) Integration between palliative services and other disciplines is required to meet the need. Given the multi-disciplinary requirement of palliative care and the significant EMS palliative care intersection, integration between the two appears essential.

Though a need for integration exists the question as to precise EMS roles in palliative situations remains. Whatever the specifics, several unique features of EMS may compliment palliative care provision: first-responder role, 24/7 availability, homecare provision and emergency capabilities.(6,10,76,77) The earlier palliative care is implemented, the greater its efficacy.(78) EMS have the capability to both identify palliative needs and initiate palliative care immediately in their role as first responders.(6,76) Often patients with palliative needs wish to be treated at home but lack this option.(15) They may also suffer deleterious symptoms at any time of day or night requiring a hospital visit.(15) Out-of-hospital palliative care services frequently function exclusively during office hours leaving these patients without support.(13) The 24/7 availability of EMS, coupled with their homecare expertise, could ameliorate these gaps within palliative care provision and, in the not unlikely event of patient deterioration, EMS expertise in emergencies would be beneficial.(66)

Various recommendations to promote EMS and palliative care integration have been made. However, the priorities of these recommendations have not been established. It is likewise unclear from the literature whether EMS and palliative care integration itself is of high priority within individual countries or globally. Further research is required not only to prioritise recommendations for integration, but to prioritise EMS and palliative care integration within unique healthcare systems. Priorities will likely vary across disparate contexts; however, the literature suggests integration should

be favourably considered as it has potential to be a low-cost, high impact intervention aligned with WHO priorities. Such integration would result in improved palliative care provision and access,(16) providing these vulnerable patients with dignity through protection of their autonomy and avoidance of non-beneficial treatment. In addition, EMS and palliative care integration may result in cost and resource savings by decreasing hospital burdens.(61,66) This in turn would free resources for additional healthcare interventions. Other causal-sequence benefits may result including a unified healthcare approach and bringing together of siloed systems (EMS, palliative, in-hospital), which would result in further improved patient experience across the healthcare spectrum.

A concern regarding this integration is that this expanded role would strain EMS resources by increasing caseload and time spent per incident.(77) Further investigation into this concern is needed across various contexts. However, existing evidence has shown no increased strain on caseload(66) and while time spent on scene does appear increased in certain palliative situations, these involve provision of homecare without conveyance.(66,76) Total time spent per incident appears to decrease in these situations due to time-saving from avoidance of transport, hospital handover, ambulance cleaning and restocking.(76)

Research priorities regarding palliative care in the ED setting have been established by Quest, et al.:(79) 1) Which patients are in greatest need of palliative care services in the ED? 2) What is the optimal role of emergency clinicians in caring for patients along a chronic trajectory of illness? 3) What are the educational priorities for emergency clinical providers in the domain of palliative care? As EMS represent the out-of-hospital branch of emergency medicine, such priorities are germane.

Based on the included literature of this review, several specific EMS palliative care research gaps exist. There is a need for further epidemiological study, on a larger scale, across various contexts, particularly LMICs, to more accurately describe the burden of patients requiring palliative care upon EMS systems. Further intervention-based studies are required to test the effectiveness of various forms of EMS and palliative care integration, including their cost-effectiveness. Educational interventions require particular analysis as many questions remain unanswered: What EMS qualifications should be targeted? What content is most relevant? What level and type of intervention is required (i.e. undergraduate vs. post-graduate,

informal vs. formal). Qualitative interview studies with palliative patients, family members and palliative specialists concerning EMS use in palliative care are largely lacking and would be beneficial as these are primary role players. Finally, both quantitative and qualitative data is needed from other stakeholders such as medical insurance companies which often cover the costs of both EMS and palliative services.

LIMITATIONS

This review is not without limitation. Some relevant studies, including grey literature, may have been missed due to the selection criteria, databases searched, search string employed and researcher finitude. Furthermore, only English studies were selected. However, it is unlikely many relevant studies were omitted as a comprehensive search string was developed, piloted and employed in conjunction with a broad database range, meeting recommendations for an optimal search strategy. Finally, the conclusions of this review should be observed with equipoise given the limited external validity of many included studies, the need for further contextual and empirical evidence.

CONCLUSION

Current literature suggests EMS and palliative care systems should integrate to improve palliative care provision. EMS have a role to play in out-of-hospital palliative care however, the specifics of this role require further investigation and are likely to differ across disparate contexts. Currently, when performing various functions in palliative situations, EMS providers are faced with several challenges which must be overcome to provide appropriate care. EMS provider education, collaboration between EMS and palliative systems, creation of EMS palliative care guidelines/protocols, creation of specialised out-of-hospital palliative care teams and further research have been recommended as solutions. Future research should focus on the prioritization, implementation, and effectiveness of these solutions cross-contextually; particularly in LMICs where the need, and potential impact, are most significant.

AUTHOR CONTRIBUTIONS

CG, LG and WS designed the protocol. CG and CS collected data. CG drafted the manuscript with input from CS, LG and WS. All authors reviewed and gave final approval of the manuscript.

COMPETING INTERESTS

The authors declare they have no competing interests.

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DATA SHARING STATEMENT

No additional data available.

ETHICS APPROVAL

No participants were involved in the study and selected literature is publicly available, therefore, no ethical approval was required.

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FIGURE LEGEND

Figure 1 – *PRISMA Selection Process Flow Diagram*(25)

CINAHL Search String

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Embase (Scopus) Search String

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Web of Science Search String

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Table 1 – *Summary of Included Studies*

Author, Year, Setting	Aim(s)	Methodology	Population and Sample Size	Outcomes and Significant Findings	Limitations
Anderson, et al. 2022 New Zealand	*"To explore bereaved family members' experiences of emergency ambulance care at the end of life."*	Qualitative Individual Interviews	38 Family Caregivers	Key themes: 1) Supporting living and dying at home. 2) Urgent and unexpected events. 3) Reluctance in calling an ambulance. EMS providers play a vital role in providing palliative care. This should be integrated into policy, practice and training.	Possibility of self-selection and recall biases. Limited external validity.
Ausband, et al. 2002 USA	*"To determine the prevalence of palliative care protocols among EMS agencies in the United States, and to estimate the percentage of the U.S. population covered by such protocols".*	Descriptive Survey	121 EMS Agencies	5.8% of EMS Agencies have palliative care protocols. Thus, there is a lack of EMS palliative care protocols in the USA.	Response rate 60.5%. 'Palliative Care Protocol' was not defined. Thus, EMS palliative care protocols may be more or less prevalent than 5.8%.
Boaventura, et al. 2022 Brazil	*"To identify the perception of health professionals regarding the concept of PC* [Palliative Care] *and their care experiences with this type of patient in a pre-hospital care (PHC) service in Brazil."*	Qualitative Individual Interviews	25 EMS Providers	Key themes: 1) Unpreparedness of the team. 2) Decision Making. 3) Dysthanasia. There is a need for EMS provider palliative care training and policy development in Brazil.	Possibility of self-selection and recall biases. Limited external validity.
Breyre, et al. 2021 USA	*"To provide a descriptive analysis of hospice and comfort care patient EMS utilization in Alameda County* [California, USA]*".*	Retrospective Cohort	534 Patient Records	0.2% (n=534) of EMS calls were for hospice patients. Of these, 468 (87.6%) were transported to hospital. Most commonly encountered symptoms: respiratory distress, altered mental status. Fentanyl	Some hospice patients potentially missed due to incomplete/inaccurate documentation and an inability to identify serial EMS calls from a single patient.

				administration was the most common intervention. Although EMS encountered hospice patients infrequently, they should be prepared for such cases.	
Breyre, et al. 2021 USA	*"To evaluate the effect of a Mobile Integrated Hospice Healthcare (MIHH) program including hospice education and expansion of paramedic scope of practice to use hospice medication kits".*	Retrospective Cohort	523 MIHH Cases	MIHH program reduced emergency department transport rates from 80.3% to 19.6%. The expanded scope medication kit was used only once. This collaboration between hospice and EMS systems was successful in reducing hospice patient transport to the emergency department, possibly improving hospice patient and family care.	No comparison with transport rates in non-hospice patients over the study period. Reasons for patient transport inconsistently documented. Method of screening for hospice patients may not have identified all eligible patients.
Breyre, et al. 2022 USA	*"To explore EMS provider challenges, self-perceived roles and training experiences caring for patients and families with life-limiting illness."*	Qualitative Individual Interviews	15 EMS Providers	Key themes: 1) In the moment decision making dilemmas. 2) Respond to varied grief reactions. 3) Disadvantaged/vulnerable populations have less access to care and advance care planning. 4) Transport people. 5) Holistic care. 6) Lack of formal training. Formal training of EMS providers in palliative care principles would empower them to care for patients with life-limiting illness.	Possibility of self-selection and recall biases. Limited external validity.
Burnod, et al. 2012 France	*"To evaluate whether patient's wishes were respected by prehospital emergency medical teams after implementing*	Retrospective Cohort	40 Patients	Collaboration between prehospital emergency teams and palliative care networks allows prehospital teams to access information relevant to	No limitations listed by the authors; however, the sample size was small.

	collaboration and a standardized process between a community-based palliative network and the Emergency Medical Service (EMS) system".			their patients and results in greater respect of palliative patient wishes (83% of the time compared with 40% where no collaboration exists).	
Carron, et al. 2014 Switzerland	To highlight *"end of-life and palliative care situations that may be encountered by prehospital emergency services".*	Retrospective Case Series	4 Cases	Palliative and prehospital emergency care may be complimentary approaches. Analysed cases demonstrate the need for palliative education in prehospital emergency teams and collaboration between EMS and palliative systems.	Limited review of 4 cases. Findings and suggestions are open to biased interpretations.
Carter, et al. 2022 Canada	*"To describe the essential elements, barriers, and facilitators for implementation, spread, and scale of the Program* [Paramedics Providing Palliative Care at Home] *from two perspectives: one system that implemented the Program and one system that had not, using the Consolidated Framework for Implementation Research (CFIR)."*	Qualitative Deliberative Dialogues	20 stakeholders (9 EMS Providers, 7 Palliative Providers, 2 Program Administrators, 1 Primary Care Provider, 1 Emergency Medicine Provider)	Key elements for implementation of the *Paramedics Providing Palliative Care at Home Program*: 1) Cosmopolitanism (outer setting). 2) Adaptability (intervention). 3) Implementation climate (inner setting). 4) Engagement and Planning (processes). Scaling this program would be beneficial for patient satisfaction and further paramedic confidence in caring for patients with palliative needs.	Possibility of self-selection and group biases. Lack of member-checking. Limited external validity.
Carter, et al. 2022 Canada	*"To explore, from the perspectives of paramedics and palliative health care providers, the alignment of a palliative care role with paramedic professional identity."*	Qualitative Focus Group Interviews	11 Paramedics, 20 Health Care Providers	Key themes concerning EMS provider role: 1) Patient centeredness and job satisfaction. 2) Bridging. 3) Advocate and educator. 4) Psychosocial support. Key themes concerning EMS provider	Possibility of self-selection and group biases. Limited external validity.

				identity: 1) Evolution of paramedicine as a skilled clinical profession. 2) Helping people and communities. 3) Paramedic skill set aligns with work in palliative care. 4) Changing paramedic mindset. Palliative care provision is well-aligned with EMS provider identity.	
Carter, et al. 2019 Canada	*"To determine the impact of the program* [Paramedics Providing Palliative Care at Home] *in two parts: Part A examined patient and family/caregiver satisfaction, and Part B measured paramedic comfort and confidence with the delivery of palliative care support".*	Mixed Methods: Part A: Telephonic Interviews, Surveys. Part B: Pre- vs. Post-Intervention Surveys.	Part A (Patients/Families): 18 Telephonic Interviews and 67 surveys. Part B (Paramedics): 235 Pre-Intervention Surveys and 267 Post-Intervention Surveys.	After programme implementation, paramedic comfort and confidence providing palliative and end-of-life care improved. Paramedics viewed palliative care as important and rewarding in their work. Furthermore, patient/family satisfaction was high. Families particularly highlighted paramedic compassion and professionalism.	Small sample size and low survey response rates. Time-lapse between paramedic arrival and patient/family interview.
Clemency, et al. 2019 USA	To *"describe a terminal extubation performed by a paramedic under the direct supervision of an Emergency Medical Services (EMS) physician".*	Case Report	1 Case	With guidance, terminal extubation is possible out-of-hospital. Allowing for EMS involvement in this and other palliative interventions would simplify logistics and allow patients the option of a home death.	Single case description.
Dent, et al. 2020 UK	To *"report the patient characteristics and outcomes of a*	Retrospective Cohort	45 Telephonic Calls	Telephonic advice service was associated with low rates of patient transport to hospital (16%,	Quality of advice not studied. Small sample size in a paramedic-led system

	24-hour hospice nursing telephone advice service to support an ambulance service".			n=7). Access to palliative advice can support ambulance clinicians and is feasible. Ambulance clinicians viewed this as an invaluable resource.	limiting external validity. Telephonic advice may not have been sought in all cases as EMS do not have a palliative care call-out category.
Donnelly, et al. 2018 USA	*"To assess the knowledge, attitudes, and experiences of EMS providers in the hospice care setting".*	Mixed Methods Cross-Sectional Survey	182 EMS Providers	Majority of EMS providers (84.1%, n=153) have managed a hospice patient at least once. 29.1% (n=53) reported receiving formal education on hospice patient care. EMS providers expressed a need for education and difficulties with communication and information in managing hospice patients.	Single-centre study, limiting external validity. Unvalidated survey.
Eaton-Williams, et al. 2020 UK	*"To assess whether ambulance paramedics currently identify EoLC patients, are aware of identification guidance and believe this role is appropriate for their practice".*	Cross-Sectional Online Survey	1643 Paramedics	Majority of paramedics (97.0%, n=1594) felt they should contribute to identifying end-of-life care needs. Current barriers to this role: lack of access to patient medical records, insufficient education and communication difficulties. Establishing end-of-life referral pathways and receiving education were identified as facilitators of this role.	Possibility of self-selection bias. Impossible to verify participants' qualifications and experience.
Fitzpatrick, et al. 2022 USA	*"To provide structured, evidence-based palliative and hospice education to CPs* [Community Paramedics]*."*	Pre- and Post-intervention Study	14 Community Paramedics	Paramedics play a role in the care of terminal patients. Formal palliative training within community paramedic programs should be implemented. The educational intervention of this	Small sample size. Unclear survey questions.

				study increased community paramedics' knowledge regarding EoL communication.	
Gage, et al. 2020 South Africa	*"To gather the perspectives of advanced life support (ALS) providers within the South African private EMS sector regarding pre-hospital palliative care in terms of its importance, feasibility and barriers to its practice."*	Qualitative Individual Interviews	6 Paramedics	Key themes: 1) Need for pre-hospital palliative care. 2) Function of pre-hospital healthcare providers concerning palliative care. 3) Challenges to pre-hospital palliative care. 4) Ideas for implementing pre-hospital palliative care. Pre-hospital palliative care is needed in South Africa and EMS may play a valuable role.	Possibility of self-selection bias. Limited external validity.
Goodwin, et al. 2021 UK	*"To explore staff stakeholder views on the role of UK paramedics in advance care planning, including the use of the Gold Standards Framework Proactive Identification Guidance for screening and referral of patients".*	Qualitative Individual Interviews	17 Stakeholders (8 Paramedics, 4 General Practitioners, 2 Emergency Department Doctors, 2 Emergency Department Nurses, 1 Community Nurse)	Key themes: 1) A lack of advance care planning. 2) Variation across health conditions. 3) A lack of joined-up care. 4) Poor-quality end of life conversations. UK paramedics are well positioned to screen patients for advance care planning.	Possibility of self-selection and recall biases. Limited external validity.
Hauch, et al. 2021 Germany	To answer the questions: *"Which EMS operations occurred in the patients cared for in the SPHC* [Specialized Home Palliative Care]*, and how frequent were they?*	Retrospective Cohort	172 Paediatric Patient Records	Despite existence of a 24/7 specialised palliative home care service, some parents of children with palliative needs still contacted EMS in emergency situations (12%, n=20). Within	Small sample size. Limited external validity.

	What treatments were given, and what was the outcome? Which possible associated factors can be identified that triggered the emergency call?"			this group, EMS were contacted 27 times. These patients were less likely to have a do not resuscitate order, required more home visits and were under SPHC care for longer when compared to the non-EMS group. Collaboration between palliative and emergency services is needed.	
Hoare, et al. 2018 UK	*"To understand the role of ambulance staff in the admission to hospital of patients close to the end of life".*	Qualitative Individual Interviews	6 Ambulance Staff	Ambulance staff play an important role in end-of-life patient hospital admissions. Their ability to keep patients at home is hindered by: 1) The limited availability and accessibility of additional care support in the community. 2) The limited information ambulance staff had about the patient and their condition. 3) A perceived ambulance service emphasis on hospital care.	Possibility of self-selection and recall biases. Limited external validity.
James, et al. 2021 Australia	*"To understand paramedics' intentions to use a hypothetical Specialist Palliative Care telehealth service, based on their perceptions of the service (i.e. usefulness, ease of use, and attitude toward to the service) and their palliative care self-efficacy".*	Descriptive Online Survey	112 Paramedics	All variables were positively correlated with an intention to use a Specialist Palliative Care telehealth service apart from age and palliative care self-efficacy, which was negatively correlated. Thus, paramedics displayed a desire to use the service despite high palliative care self-efficacy ratings.	Possibility of self-selection bias. Desirability/positivity bias in that attitudes are often positive to new technology in a hypothetical scenario.

Juhrmann, et al. 2022 Australia	*"To examine the quality and content of existing Australian palliative paramedicine guidelines with a sample of guidelines from comparable Anglo-American ambulance services."*	Guideline Quality Appraisal and Qualitative Analysis	8 Palliative Care EMS Guidelines	Overall, guideline quality was poor to moderate according to the AGREE II instrument, however, this does not refer to clinical validity. Key themes from guideline analysis: 1) Audience and approach. 2) Communication is key. 3) Assessing and managing symptoms. 4) Looking beyond pharmaceuticals. 5) Seeking support. 6) Care after death.	Potentially relevant information may have been missed as EMS guidelines not palliative/EoL specific were excluded.
Juhrmann, et al. 2021 Australia	*"To review and synthesise the empirical evidence regarding paramedics delivering palliative and end-of-life care in community based settings."*	Systematic Literature Review	23 Articles	Key themes: 1) Broadening the traditional role. 2) Understanding patient wishes. 3) Supporting families. Paramedics can play an important role in facilitating home-based death and reducing unnecessary hospital admissions.	Selected articles limited to English. Some relevant articles potentially omitted.
Kamphausen, et al. 2019 Germany	*"To investigate challenges faced by emergency physicians (EPs) who provide prehospital emergency care to patients with advanced incurable diseases and family caregivers in their familiar home environment".*	Qualitative Individual Interviews	24 Emergency Physicians	Key themes: 1) Structural conditions of prehospital emergency care. 2) Medical documentation and orders. 3) Finding optimal and patient-centred therapy. 4) Uncertainty about legal consequences. 5) Challenges at the individual (EP) level. 6) Challenges at the emergency team level. 7) Family caregiver's emotions, coping, and understanding of patient's illness. 8) Patient's wishes, coping, and understanding of patient's illness.	Possibility of self-selection and recall biases. Limited external validity.

				9) Social, cultural, and religious background of patients and families.	
Knighting, et al. 2017 UK	To answer the questions, *"do paramedics view end-of-life care as a key part of their role and are they confident in managing this aspect of their clinical practice? Further to this, what are the underlying concerns of paramedics when managing end-of-life care"?*	Descriptive Online Survey	182 Paramedics	Paramedics saw end-of-life care as essential to their function. Fear of litigation and conflict with patient family members were identified as challenges in palliative care provision. Education is needed for paramedic confidence.	Impossible to verify participants' experience and qualifications. Low response rate.
Lamba, et al. 2013 USA	*"To 1) review four case scenarios that relate to palliative care and may be commonly encountered in the out-of-hospital setting and 2) provide a road map by suggesting four things to do to start an EMS-palliative care initiative in order to optimize out-of-hospital care of the seriously ill and increase preparedness of EMS providers in these difficult situations".*	Collaborative Plan of Action (IPAL-EM project) with Case Discussions	Plan of action to integrate palliative and prehospital care. 4 Case Discussions.	Four steps to begin an EMS-palliative initiative: 1) Identify EMS 'champions'. 2) Review protocols and literature. 3) Needs assessment. 4) Create action plan. Ideally, palliative care begins out-of-hospital. This study represents a guideline for the integration of palliative and EMS care.	Requires implementation in various settings as well as study to determine effectiveness. Limited case review.
Leibold, et al. 2018 Germany	*"To determine whether or not a paramedic's decision-making in end-of-life situations is influenced by his/her religious beliefs, how they decide given the current judicial framework, and how they would decide were there legal certainty".*	Descriptive Online Survey	429 Paramedics	Religious beliefs play a role in influencing paramedic decision-making, however, experience, background, special training and legal framework conditions, appear to have greater influence.	Possibility of self-selection bias. Unvalidated survey. Limited religions and beliefs represented across sample.

Lord, et al. 2019 Australia	*"To describe the incidence and nature of cases attended by paramedics and the care provided where the reason for attendance was associated with a history of palliative care".*	Retrospective Cohort	4348 Patient Records	Identified cases were 0.5% of caseload during study period. Most common assessments by paramedics were 'respiratory' (20.1%), 'pain' (15.8%) and 'deceased' (7.9%). Majority of patients were transported (74.4%, n=3237) with hospital the most prevalent destination (99.5%, n=3221).	Emergencies and reasons for paramedic calls may have been unrelated to palliative condition.
Lord, et al. 2012 Australia	*"To identify paramedics' knowledge, beliefs, and attitudes related to the care of patients requiring palliative care in community health settings".*	Qualitative Focus Group Interviews	3 focus group interviews with a total of 26 paramedics	Key themes: conflict in care goals, legal problems, lack of information, system problems. Further research suggested for education, guidelines and defining roles of paramedics in palliative care patient management.	Low response rate possibly resulting in an unrepresentative sample. Possibility of self-selection and group biases.
McCormick, et al. 2019 New Zealand	*"To understand the role New Zealand paramedics have as providers of community and pre-hospital palliative and EOL care, as well as to ascertain whether paramedics are suitably equipped and educated to provide quality palliative care to an increasingly elderly population with non-curable life-threatening illnesses".*	Rapid Literature Review	4 Articles	No New Zealand articles or guidelines were found. New Zealand Ministry of Health documents provide minimal reference to pre-hospital emergency medical providers. Paramedics already provide palliative and end-of-life care. They are willing to continue this provision, with improved education and better integration with other care providers.	Small sample of articles. Two databases searched. Lack of quality appraisal.
McGinley, et al. 2017 USA	*"To describe how medical orders inform EMS providers' decision making during emergencies involving*	Mixed-Methods: Descriptive Cross-Sectional	239 Surveys and 48 Interviews of EMS Providers	Many EMS providers (62.7%) had treated a patient with both an intellectual disability and medical orders directing end-of-life care. Key themes: 1) Provider	Possibility of self-selection bias. Limited external validity. Unvalidated survey.

	people with intellectual disabilities who are near life's end by considering the multiple (individual, organizational, sociocultural) contexts within which these decisions occur".	Survey and Individual Interviews		familiarity. 2) Organizational processes. 3) Sociocultural context.	
Mott, et al. 2020 Australia	*"To explore the experiences and attitudes of ambulance officers in managing pediatric patients with palliative care needs".*	Descriptive Online Survey	22 Ambulance Officers	Many ambulance officers found these cases to be challenging and their confidence levels varied. They were most likely to use correspondence provided by the family as a guide for management. Half of participants felt paediatrics receiving palliative care should have a 'not for resuscitation' order. They suggested support for themselves could be improved through increased patient documentation.	Small sample size. Possibility of self-selection and recall biases.
Murphy-Jones, et al. 2016 UK	*"To explore how paramedics make decisions when asked to transport nursing home residents nearing the end of their lives".*	Qualitative Individual Interviews	6 Paramedics	Key themes: 1) The challenges in understanding patients' wishes. 2) Evaluating patients' best interests. 3) The influence of others on decision making.	Possibility of self-selection and recall biases. Limited external validity.
Patterson, et al. 2019 UK	To investigate *"the extent to which access to, and quality of, patient information affects the care paramedics provide to patients nearing end-of-life, and their views on access to a shared electronic record as a means of*	Qualitative Individual Interviews	10 Paramedics	Key themes: 1) Access to information on patients nearing end-of-life. 2) Views on the proposed Electronic Palliative Care Coordination System (EPaCCS). Lack of access to patient information is a barrier to paramedics delivering end-of-life care. Access to EPaCCS may	Possibility of self-selection and recall biases. Limited external validity.

	improving the information flow around end-of-life care".			assist, but practical and technical challenges must be overcome for implementation.	
Pease, et al. 2019 UK	To *"describe the delivery, outcomes and potential impact of the Serious Illness Conversation project delivered to Welsh Ambulance Service Trust (WAST) staff".*	Mixed-Methods: Open-Ended Question Surveys, Pre- vs. Post-Intervention Surveys, Patient Care Record Review	218 Paramedics and 150 Paramedic Students	Participants view themselves as playing several roles in end-of-life care: 'facilitators' to patient-centred and seamless care, providing support, link between services and practical help. Barriers to providing end of life care centred around communication challenges. The Serious Illness Conversation training resulted in increased participant confidence handing these situations.	Self-assessment of confidence. Review of patient care records not specific to training participants.
Pentaris, et al. 2019 UK	To explore *"current knowledge and evidence about paramedics' attitudes and perceptions about end-of-life care".*	Systematic Literature Review	11 Articles	Key themes: 1) Critical incidents and emotional resilience. 2) Decision making. 3) Communicating death. 4) Recognising dying patients. 5) Death education. A dearth of literature exists concerning paramedics and end-of-life practice.	Selected articles limited to English. Some relevant articles potentially omitted.
Peran, et al. 2021 Czech Republic	To answer the question, *"What is the role of ambulance EMS, EMS dispatch centres, paramedics and emergency medical physicians in the provision of palliative care to terminally ill patients"?*	Scoping Literature Review	31 Articles	Three EMS roles and one contextual factor were identified: 1) Providing complex care. 2) Adjusting patient's trajectory. 3) Being able to make decisions in a time and information limited environment. 4) Health care professionals are insufficiently supported in palliative care.	Selected articles limited to English and German. Some relevant articles potentially omitted.

Rogers, et al. 2015 Australia	*"To identify and measure paramedics' perspectives and educational needs regarding palliative care provision, as well as their understanding of the common causes of death".*	Mixed Methods Survey	29 Paramedics	Paramedics have a good understanding of palliative care. They particularly identified terminal cancer as requiring palliation. Paramedic education is needed in end-of-life communication practices, ethical issues and illnesses requiring palliation.	Low response rate. Possibility of self-selection and recall biases.
Rosa, et al. 2021 Canada	*"To understand the current state of community paramedicine and palliative care"* in Canada.	Rapid Literature Review	Unspecified Number of Articles	Expanded scope of community paramedic practice that provides palliative care has potential benefit in alleviating healthcare system strain while simultaneously improving patient outcomes. Pilot community paramedic palliative care programs in Canada have demonstrated the benefits of reduced emergency department visits and improved patient satisfaction with community paramedic use.	Small sample. Lack of quality appraisal.
Stone, et al. 2009 USA	*"To ascertain paramedics' attitudes and beliefs about end-of-life decision-making; To measure the frequency with which practicing paramedics encounter various end-of-life situations…and the importance they assign to them; To assess the extent to which paramedics report they were trained to address end-*	Descriptive Cross-Sectional Survey	235 Paramedics	Participants perceived end-of-life issues as important, however, they did not feel adequately trained for these situations. Most (95%) agreed that paramedics should honour advance directives. Over half (59%) felt that paramedics should honour verbal wishes to limit on-scene resuscitation. Most (95%) had previously questioned intervention appropriateness in	Small sample size. Possibility of self-selection and recall biases.

	of-life situations; To compare the importance paramedics place on end-of life issues".			terminal patients. Some (26%) reported using personal judgement to withhold or terminate resuscitation in a terminal patient.	
Surakka, et al. 2020 Finland	To answer the questions, *"What is the frequency, reasons and timing of paramedic visits via the end-of-life protocol and do these visits differ between the areas with and without around the clock (24/7) palliative care services"?*	Retrospective Cohort	252 Patients, 306 Paramedic Visits	Most frequent reasons for paramedic visits were symptom control (38%) and transportation (29%). Paramedics visited 43% and 70% of the patients in areas with and without 24/7 palliative home care services, respectively. Over half (58%) of all paramedic visits were done outside office hours. Integration of paramedics into end-of-life care at home is reasonable particularly in rural areas without around the clock palliative care services and outside of office hours.	Efficacy of paramedic management and patient/family perceptions not assessed.
Surakka, et al. 2022 Finland	*"To describe experiences and educational needs of the paramedics included in the end-of-life care protocol."*	Mixed Methods Survey	192 Paramedics	Over 80% of paramedics agreed the protocol helped with care for patients with palliative needs and improved EoL care quality. Patient visits were considered useful (76.5%) and EoL care meaningful (62.5%) by paramedics who expressed challenges in psychosocial aspects, communication, symptom management, and their role in EoL care. They identified symptom management	Some respondents (28%) were inexperienced with the protocol. Potential for self-section and recall biases. Limited external validity.

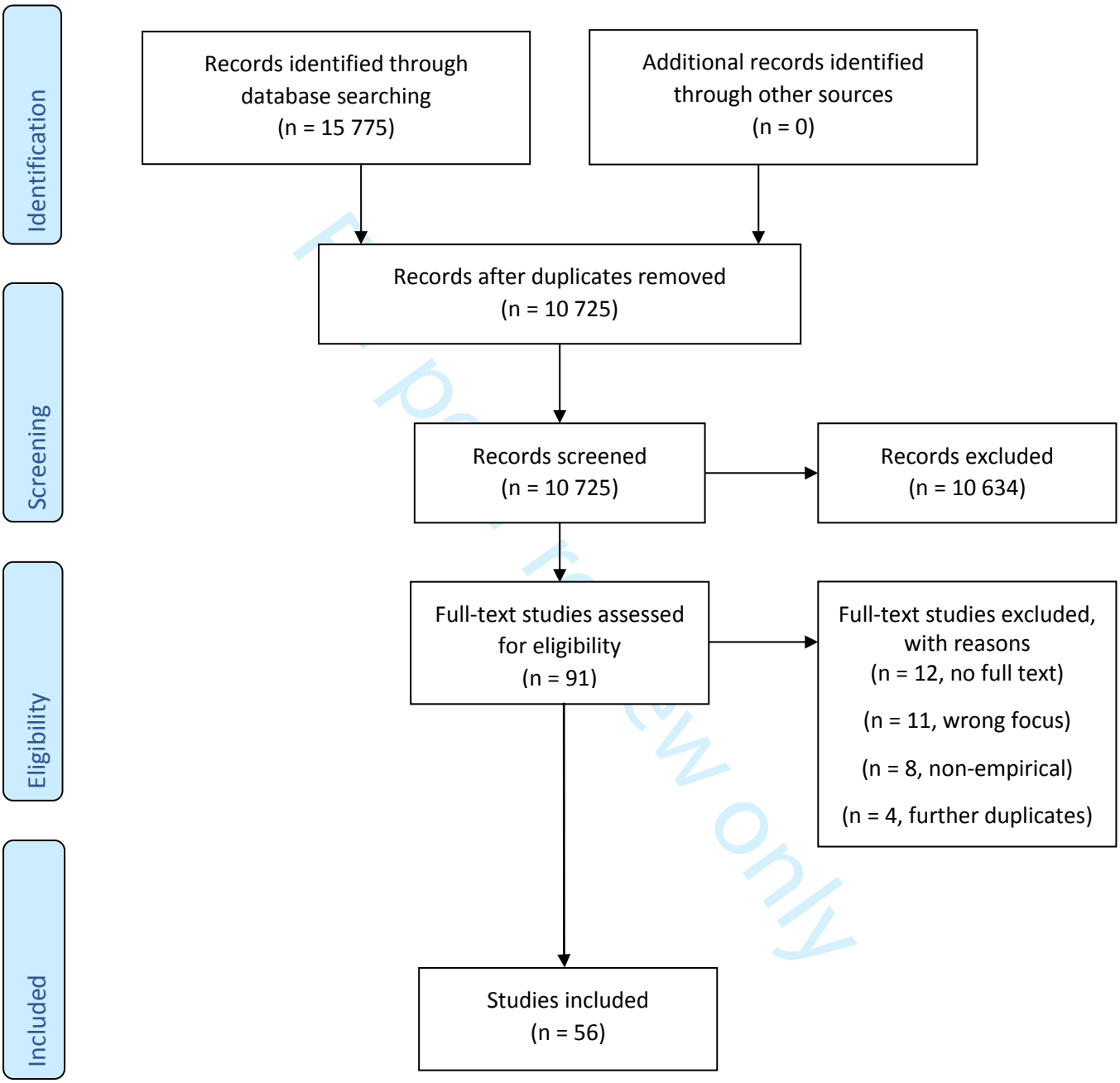
				and communication as areas for education.	
Swetenham, et al. 2013 Australia	*"To explore the introduction of a rapid response team as outlined in the South Australian Palliative Care Services Plan 2009–2016".*	Mixed Methods: Call Log Data, Patient Records, Surveys and Individual Interviews	40 Patients attended by extended care paramedics, 24 Carer Interviews, 2 Patient Interviews, 22 Extended Care Paramedic Surveys	During the study period there were 40 paramedic visits. Of these, 90% received an after-hours visit and remained at their site of care; 5% attended an emergency department and 5% were directly admitted to hospice. Paramedics found palliative care rewarding and contributory towards job satisfaction, however, also demanding. Paramedics appreciated the specialist palliative care service's telephonic support.	Methodology lacking adequate description. Qualitative data without thematic analysis.
Taghavi, et al. 2011 Germany	*"To determine paramedics' practices in regard to withholding and terminating resuscitation, as well as to examine reports of their practical experiences with advance directives and special palliative crisis cards".*	Prospective Self-Administered Survey	728 Paramedics	End-of-life decision-making is challenging for paramedics. Guidelines for these situations are desired. Advance directives should be legally reinforced. Education in palliative care a need for paramedics.	No comparison of respondents vs. non-respondents – possibility of self-selection bias exists. Questionnaire was self-administered and unvalidated.
Waldrop, et al. 2014 USA	*"To identify how a sample of prehospital providers learned about EOL care, their perceived confidence with and perspectives on improved preparation for such calls".*	Mixed Methods Cross-Sectional Survey	178 Prehospital Providers	Key themes: 1) Prehospital provider education. 2) Public education. 3) Educating health care providers on scope of practice. 4) Conflict resolution skills. 5) handling emotional families. 6) Clarification of transfer protocols. Majority of paramedics received formal training on DNR orders (92%) and MOLST (72%). Majority of	Small sample size. Limited external validity.

				paramedics confident in ability to uphold DNR orders (87%) and resolve family conflict (87%).	
Waldrop, et al. 2015 USA	*"To explore prehospital providers' perceptions of (1) the frequencies of different types of end-of life calls, (2) the signs and symptoms of dying in prehospital care, and (3) medical orders for life sustaining treatment (MOLST)".*	Descriptive Cross-Sectional Pilot Survey	178 Prehospital Providers	Calls to nursing homes and dying patients were frequent. MOLST documentation was infrequently encountered. There is synergy between prehospital and palliative medicine, however, further research is needed to develop prehospital end-of-life decision-making and understand how prehospital providers operate when confronted with palliative situations.	Open to participant information recall bias and perceptions. Convenience sampling at a single institution limiting external validity. Unvalidated survey.
Waldrop, et al. 2019 USA	"*To explore prehospital providers' perspectives on how the awareness of dying and documentation of preferences influence decision-making on emergency calls near the end of life".*	Qualitative Individual Interviews	43 EMS Providers	Key themes: 1) Aware of Dying-Wishes are Documented. 2) Aware of Dying—Wishes are Undocumented. 3) Unaware of Dying-Wishes are Documented. 4) Unaware of Dying Wishes are Undocumented. 5) Discordance. EMS providers are well aware of the impact of their decisions at the end of life. EMS providers play a critical role at the end of life.	Possibility of self-selection and recall biases. Limited external validity.
Waldrop, et al. 2018 USA	*"To investigate prehospital providers' perceptions of emergency calls at life's end."*	Qualitative Individual Interviews	43 EMS Providers	Key themes: 1) Care crises. 2) Dying-related turmoil. 3) Staffing ratios. 4) Organizational protocols. EMS providers become mediators between nursing homes and emergency	Possibility of self-selection and recall biases. Limited external validity.

				departments by handling tension, conflict and challenges in patient management.	
Waldrop, et al. 2015 USA	*"To explore and describe how prehospital providers assess and manage end-of-life emergency calls".*	Qualitative Individual Interviews	43 EMS Providers	Key themes: multifocal assessment involving family, patient and surroundings, emotional family responses, conflict between family, patient and practitioner and management of the dying process. Results suggest need for increased ability of prehospital providers to uphold advance directives and patient wishes at end of life.	Possibility of self-selection and recall biases. Limited external validity.
Wenger, et al. 2022 USA	*"To survey the state of Michigan's EMS providers regarding encounters with hospice patients to better understand challenges caring for this population and to identify any need for additional education."*	Self-Administered Survey	706 EMS Providers	Most EMS providers (96%) had at least one encounter with a hospice patient. Only 24% had received formal education in this area. Most (86%) indicated interest in this training. Identified challenges included inaccessible advance directives (72%), pressure from family for aggressive treatment (61%), and difficulty contacting hospice personnel (48%). Empowering EMS providers with training in these areas would bridge the gaps.	Possibility of self-selection and recall biases. Questionnaire was self-administered and unvalidated. Limited external validity.
Wiese, et al. 2013 Germany	*"To determine international recommendations for the treatment and prevention of palliative emergencies".*	Mixed Methods: Prospective Self-Administered Survey	92 Experts	Four standards in the management of palliative emergencies were recommended: 1) Early integration of "Palliative Care Teams" and basic outpatient	Possibility of self-selection bias. Limited external validity. Unvalidated survey.

				palliative care systems. 2) End-of-life discussions. 3) Defined emergency medical documents, drug boxes, and "Do not attempt resuscitation" orders. 4) Emergency medical training for physicians and paramedics.	
Wiese, et al. 2012 Germany	*"To determine paramedics' understanding of their role in withholding or withdrawing resuscitation/EoL-treatment of palliative care patients when an advance directive is present".*	Prospective Self-Administered Survey	728 Paramedics	Majority of paramedics (71%) have dealt with palliative emergencies. Improved training and guidelines for paramedics are necessary. Ethical and legal obligations may conflict for paramedics faced with palliative emergencies.	Possibility of self-selection and recall biases. Questionnaire was self-administered and unvalidated.
Wiese, et al. 2010 Germany	*"To provide information about the strategic and therapeutic approach employed by EMTs in outpatient palliative care patients in cardiac arrest".*	Retrospective Cohort	88 Patient Records	Approaches to prehospital palliative patients with cardiac arrest differ based upon EMS provider qualification. Many resuscitations are initiated contrary to patient wishes due to lack of advance directives. These should be more readily available.	Small sample size. Limited external validity.
Wiese, et al. 2009 Germany	*"To show the importance of palliative medical care competence in the pre-hospital emergency medical care of patients with advanced cancer diseases* [and] *to describe basic approaches to improve the current situation in Germany".*	Prospective Cohort	361 Emergency Calls	Prehospital palliative care improves when prehospital physicians have palliative care expertise. Prehospital palliative care education is recommended.	Limited external validity.
Wiese, et al. 2009 Germany	To interview prehospital emergency physicians (EP) *"about their knowledge of*	Retrospective Self-	104 Emergency Physicians	Most participants (89%) had been confronted with palliative emergencies and expressed	Possibility of self-selection and recall biases. Questionnaire was self-

	palliative care, about their experiences in dealing with palliative care patients in out-of-hospital emergency situations and about their beliefs and interests in palliative care".	Administered Survey		uncertainties in managing these situations. Psychosocial and social care represented frequent challenges. Most participants (80%) were interested in further palliative care training.	administered and unvalidated.
Wiese, et al. 2009 Germany	To investigate and compare *"the emergency medical treatment of acute dyspnoea in palliative care patients affected by advanced (palliative) stages of cancer disease on basis of emergency medical therapy schemes".*	Retrospective Cohort	116 Patient Care Records	Significant relief of acute dyspnoea when using opioids compared to standard treatment. This should be included in emergency physician training. Most emergency physicians (>70%) were uncertain about palliative patient management.	Small sample size. Limited external validity.



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.	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, 5
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	5
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.	5
Information sources*	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.	Supp. Material 1
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	6
Data charting process‡	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
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	6
Critical appraisal of individual sources of evidence§	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.	6

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
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
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	8, 9
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.	9-13
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	Supp.Material2
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.	13-16
Limitations	20	Discuss the limitations of the scoping review process.	16
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.	16
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.	17

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

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

† 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).

‡ 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.

§ 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. doi: 10.7326/M18-0850.

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Emergency Medical Services and Palliative Care: A Scoping Review

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Emergency Medical Services and Palliative Care: A Scoping Review

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ABSTRACT

Objectives The aim of this study was to map existing Emergency Medical Services and palliative care literature by answering the question, what literature exists concerning EMS and palliative care? The sub-questions regarding this literature were, 1) what types of literature exist, 2) what are the key findings and 3) what knowledge gaps are present?

Design A scoping review of literature was performed with an *a priori* search strategy.

Data sources MEDLINE via Pubmed, Web of Science, CINAHL, Embase via Scopus, PsycINFO, the University of Cape Town Thesis Repository and Google Scholar were searched.

Eligibility criteria for selecting studies Empirical, English studies involving human populations published between 1 January 2000 and 24 November 2022 concerning EMS and palliative care were included.

Data extraction and synthesis Two independent reviewers screened titles, abstracts and full texts for inclusion. Extracted data underwent descriptive content analysis and was reported according to the PRISMA-ScR guidelines.

Results: In total, 10 725 articles were identified. Following title and abstract screening, 10 634 studies were excluded. A further 35 studies were excluded upon full text screening. The remaining 56 articles were included for review. Four predominant domains arose from included studies: 1) EMS' palliative care role, 2) Challenges faced by EMS in palliative situations, 3) EMS and palliative care integration benefits, 4) Proposed recommendations for EMS and palliative care integration.

Conclusion: EMS have a role to play in out-of-hospital palliative care, however, many challenges must be overcome. EMS provider education, collaboration between EMS and palliative systems, creation of EMS palliative care guidelines/protocols, creation of specialised out-of-hospital palliative care teams and further research have been recommended as solutions. Future research should focus on the prioritization, implementation, and effectiveness of these solutions in various contexts.

Key Words: Emergency Medical Services, Palliative Care

ARTICLE SUMMARY

Strengths and Limitations of This Study

- A thorough search string was piloted and employed in conjunction with a wide range of databases, meeting recommendations for optimal combinations, and providing a comprehensive view of contemporary literature.
- The performance and report of this review was completed according to the quality standards of the PRISMA-ScR guidelines.
- Limitations to this review include those common to scoping reviews such as human error in article selection.
- A formal risk of bias assessment was not performed; therefore, data reliability lacks evaluation.

INTRODUCTION

Emergency Medical Services (EMS) and palliative care function with unique respective aims. EMS are designed to preserve life and limb in out-of-hospital emergency situations by immediate intervention and hospital conveyance(1,2). Palliative care is, according to the World Health Organization (WHO), *'an approach that improves the quality of life* (QoL) *of patients and their families facing the problem associated with life-threatening illness, through the prevention and relief of suffering by means of early identification and impeccable assessment and treatment of pain and other problems, physical, psychosocial and spiritual.'*(3) This includes a variety of situations such as chronic/life-limiting illnesses, end-of-life (EoL) care and any condition (physical, psychosocial, spiritual) causing suffering.(3) Thus, the EMS approach is curative, whereas the palliative approach is supportive.

Despite these seemingly conflicting approaches, EMS and palliative care often intersect.(4–7) As they progress towards EoL, patients with palliative needs experience worsening symptoms for which EMS are often contacted.(8,9) Furthermore, the role of EMS has expanded in recent years to include more intricate forms of healthcare beyond emergency care such as community-based primary care and palliative care.(10) Global ageing populations and subsequent increases in chronic non-communicable diseases are well documented reasons for this expanded role as demand for palliative care rises and EMS are more frequently confronted with these patients.(11)

Contemporary EMS and palliative care literature recommends integration between the two fields to improve palliative care provision as their differing aims may, in fact, complement one another.(12) Nevertheless, a lack of integration persists. Typically, EMS are not trained in palliative care nor do palliative care systems make formal use of EMS to deliver care.(13) This results in disregarding of patient autonomy, performance of aggressive, futile interventions and overall poor management of those requiring a palliative approach to care by EMS providers.(12–14) However, should the two fields integrate, potential benefits include early palliative care delivery, provision of homecare, respect for patient autonomy, improved patient and family satisfaction, confidence, and quality of life (QoL), decreased health care costs and setting correct trajectories of care.(5,15,16)

Given the growing body of EMS and palliative care literature, and potential integration benefits, a need exists to review current evidence. Previous reviews have focussed on singular aspects such as specialised community paramedic roles in the provision of palliative care in patient homes (11), however, a more extensive review of EMS in the broader out-of-hospital setting is lacking. Thus, this review aimed to map existing EMS and palliative care literature by answering the question, what literature exists concerning EMS and palliative care? The sub-questions regarding this literature were, (i) what types of literature exist, (ii) what are the key findings and (iii) what knowledge gaps are present? For the purposes of this study, EMS are defined as those systems and personnel providing medical care in the out-of-hospital setting using ambulance-based services. The out-of-hospital setting includes all areas to which EMS may be called, from patient homes to any public space.

METHODS

Design

A scoping review of EMS and palliative care literature was performed, the protocol for which has been published previously,(17) detailing the methodological framework of Arksey and O'Malley used for this review.(18) The steps of this employed framework were (i) identifying the research question, (ii) identifying relevant studies, (iii) selecting eligible studies, (iv) charting data, (v) collating, summarising and reporting results.(18) The optional sixth step of expert consultation was not included as this review forms the first part of an overarching investigation in which expert consultation will be subsequently performed. As this review aimed to simply map existing literature, in-depth quality appraisal of eligible studies was not performed, though limitations were noted.

Search strategy and eligibility criteria

An *a priori* search strategy, developed in line with the recommendations of Aromataris and Riitano, was used.(19) This strategy employed key word combinations and their synonyms (See Supplementary Material 1). The following databases were originally searched on 28 September 2021 with an updated search

on 24 November 2022: MEDLINE via Pubmed, Web of Science, CINAHL, Embase via Scopus and PsycINFO. The University of Cape Town (UCT) Thesis Repository and Google Scholar were searched to identify grey literature. These databases met the recommendation of Bramer, et al. for optimal database combinations.(20) Furthermore, Embase, CINAHL and PsycINFO provided access to unique palliative care literature not indexed in MEDLINE as highlighted by Tieman, et al.(21) Additional articles were sought from hand-searching reference lists of eligible studies. This search strategy was piloted to ensure appropriateness of key word combinations in the selected databases.

Eligible studies were selected based on the following criteria:

- Inclusion: Empirical, English studies involving human populations published between 1 January 2000 and 24 November 2022 concerning EMS and palliative care. The EMS and palliative care interface was the primary focus for eligibility.
- Exclusion: Studies involving the in-hospital setting, including emergency departments (EDs), those where the full text was unobtainable, editorial and discussion articles, opinion papers and studies involving exclusively EMS or palliative care.

Data Management

All identified studies were uploaded to Mendeley reference software(22) and duplicates removed. Remaining studies were exported to the Rayyan web application(23) where two authors (CG, CS) independently screened titles and abstracts for inclusion. CG and CS then screened the full texts of included studies for final inclusion in the review. Agreement achieved between authors was >99%. Upon discussion, complete agreement was reached for all studies. This process was overseen by LG and WS. All authors agreed upon the final inclusion list.

Data Extraction and Analysis

An *a priori* data extraction matrix was used to gather the following data from each included study which were charted by CG using *Microsoft Word* (Microsoft Corporation, Redmond, Washington, U.S.A.): Title, authorship, publication year, setting, including country income status divided into high-income countries (HICs) and low-to-middle income countries (LMICs), aims, population and sample, EMS palliative care training, methodology, conclusions, significant findings, limitations. To ensure consistency in application of this extraction matrix, CS double coded 10% of included articles. In line with the recommendations of Arksey and O'Malley, extracted data underwent basic numerical analysis concerning the distribution of studies and descriptive content analysis where the literature was organized according to major domains.(18) These domains were identified through an inductive-dominant approach. Findings are presented in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for scoping reviews (PRISMA-ScR).(24,25)

Patient and Public Involvement

No patients were involved in this study.

RESULTS

After duplication removal, 10 725 studies were identified. Following title and abstract screening, 10 634 studies were excluded. A further 35 studies were excluded upon full text screening. Of the full text exclusions, 12 full texts were unavailable, the EMS and palliative care interface was not the primary focus in 11 studies, 8 studies presented non-empirical evidence and the remaining 4 studies were previously undetected duplicates. Hand-searching of included reference lists revealed no further studies. No grey literature fitting inclusion criteria was identified. In total, 56 studies were included for analysis. Figure 1 details the selection process while a summary of included studies is provided in Supplementary Material 2.

Study characteristics

Included studies were performed in the United States of America (USA) (n=16),(1,6,26–39) the United Kingdom (UK) (n=9),(7,14,40–46) Germany (n=10),(8,47–55) Australia (n=8),(2,4,11,56–60) Canada (n=4),(15,61–63) France (n=1),(5) Switzerland (n=1),(13) New Zealand (n=2),(64,65) Finland (n=2),(66,67) Czech Republic (n=1),(68) Brazil (n=1)(69) and South Africa (n=1)(16) between 2002 and 2022. The majority of studies (96%, n=54) were performed in HICs with only Brazil and South Africa representing LMICs, and most (63%, n=35) were published between 2018 and 2022.

Methodologically, most studies were quantitative (55%, n=31) while the remainder used a qualitative (27%, n=15) or mixed-methods (18%, n=10) approach. Quantitative studies comprised of surveys (n=12),(1,8,30,32,38,41,43,48,49,51,56,58) retrospective cohorts (n=9),(5,33,34,40,52,54,55,57,66) literature reviews (n=5),(11,46,61,64,68) case series/reports (n=3)(6,13,35), a pre- and post-intervention study (n=1)(29) and a prospective cohort (n=1).(8) Qualitative studies contained individual interviews (n=12),(7,14,16,26–28,31,42,44,47,65,69) focus group interviews (n=2),(2,63) and deliberative dialogues (n=1),(62) while the mixed-methods studies(4,15,36,37,39,45,50,59,60,67) made use of various survey and interview combinations.

EMS providers were the primary population in most studies (52%, n=29)(1,2,4,7,8,14,16,26–31,36–39,41,43–45,47–49,51,56,58,67,69) including paramedics, doctors and nurses involved in out-of-hospital emergency care dependant on EMS system model: paramedic-led (Anglo-American), physician-led (Franco-German).(11) Other investigations were performed using patient records (n=10),(5,8,33,34,40,52,54,55,57,66) published literature (n=5),(11,46,61,64,68) case reports/series (n=3),(6,13,35) stakeholders and experts (n=3),(42,50,62) mixed populations including patients, families, paramedics, caregivers, palliative providers and patient records (n=3),(15,59,63), EMS agencies (n=2)(32,60) and family caregivers (n=1).(65)

Study categories were EMS provider knowledge and perspectives (54%, n=30),(1,2,4,7,8,14,16,26–28,30,31,36–39,41–45,47–49,51,56,58,63,67,69) EMS-

palliative integration (23%, n=13),(5,6,15,29,32,34,35,40,50,59,60,62,66) EMS-palliative intersection (14%, n=8)(8,13,33,52,54,55,57,65) and literature reviews (9%, n=5).(11,46,61,64,68) Studies concerning EMS provider knowledge and perspectives *vis à vis* palliative care focussed on EMS management and decision-making (n=9),(8,26,27,37,44,48,49,51,58) roles and barriers in palliative situations (n=11),(2,14,16,28,31,42,43,45,47,63,69) understanding and education (n=6),(1,4,30,38,39,67) identification of patients with palliative needs (n=2),(36,41) and potential solutions to overcome barriers (n=2).(7,56) Studies concerning EMS and palliative care integration focussed on effects of integration on patient transport, patient/family satisfaction and EMS provider confidence (n=7),(5,15,34,35,40,59,66) recommendations for integration (n=4)(6,29,50,62) and EMS palliative care protocols (n=2).(32,60) Studies concerning EMS and palliative care intersection focussed on the characteristics and frequency of patients with palliative needs encountered by EMS providers (n=4),(8,33,55,57) EMS provider treatment of these patients (n=3)(13,52,54) and the experience of family caregivers.(65) Literature reviews focussed on attitudes and perceptions of paramedics concerning EoL care (n=1),(46) EMS role in EoL care (n=1),(68) EMS palliative provision in community-based settings(n=1)(11) and rapid reviews of EMS and palliative care literature in Canada (n=1)(61) and New Zealand (n=1).(64)

Four predominant domains arose from included studies: 1) EMS' palliative care role, 2) Challenges faced by EMS in palliative situations, 3) EMS and palliative care integration benefits, 4) Proposed recommendations for EMS and palliative care integration.

EMS' palliative care role

Numerous studies (66%, n=37)(1,2,6,8,11,14–16,26–28,31,34,35,37,41–46,48,51,53–55,57,59–61,63–69) discussed the potential role of EMS in palliative care. Most EMS providers viewed palliative care positively, regarding it as important to their role as demonstrated in studies performed in the UK,(43) Australia,(59) Canada,(15) and South Africa.(16) The EMS' palliative care role was frequently highlighted due to the intersection between EMS and patients with palliative needs.(8,54,57) For example, an Australian study found palliative situations

comprised 0.5% (n=4348) of the annual EMS caseload.(57) Other studies, found palliative situations may represent up to 10% of caseload and most EMS providers had previously encountered palliative situations.(8,47) Commonly documented reasons for EMS calls to palliative situations were sudden, unexpected patient deterioration, caregiver exhaustion and alarming signs and symptoms: dyspnoea, pain, convulsions, severe anxiety.(15,26,47) These calls often occurred out-of-office hours or during holidays when the usual patient caregivers were unavailable.(13) Specific EMS palliative care roles included complex care provision,(68) adjusting patient trajectory,(16) decision-making within limited information environments,(14) therapeutic interventions,(54) 24/7 availability, provision of homecare,(66) and improving patient and family quality of life, comfort, and confidence.(15)

Challenges faced by EMS in palliative situations

Most studies (63%, n=35)(1,2,6–8,11,13,14,16,26,27,30–33,36–38,40,41,43–47,49,51–54,58,61,67–69) highlighted various challenges EMS providers face in palliative situations. These challenges were EMS provider mindset,(1) the out-of-hospital environment,(16) EMS systems,(14) lack of education,(68) medico-legal confusion,(49) and inter-personal conflicts.(2) The EMS provider mindset is to 'save lives' through a curative approach to care, whereas the palliative approach is primarily supportive through prevention and relief of suffering.(1–3) Other common challenges were related to the complex out-of-hospital environment: lack of information, limited time, consequent difficult decision-making.(47)

EMS system barriers to palliative provision were mandated hospital transport,(16) limited scope of practice(47) and lack of alternative care pathways.(14) Despite patient and family wishes and better clinical judgement, EMS providers often conveyed palliative patients to hospital due to system rigidity, fear of consequences and a lack of alternative care pathways.(14) Hospital transport was described as a safety net for EMS providers and, thus, their default decision in palliative situations.(44)

Many studies identified a lack of EMS provider education concerning palliative care(2,16,36,43,47) and only five studies mentioned EMS providers with additional palliative or hospice care training in their samples.(4,8,36,53,56) The additional

palliative training ranged from short course to post-graduate diploma level. This lack of education was identified in both physician and paramedic-led EMS systems.(8,16)

Highlighted medico-legal challenges for EMS providers in palliative situations were fear of litigation(47) and confusion surrounding legal documentation such as advance directives (ADs).(13,38,49). EMS providers were sometimes unaware of the presence of legal documentation due to lack of available information at incidents.(6,26,27) Furthermore, where legal documentation was presented, EMS providers were uncertain of legal implications in emergencies.(2,49)

Finally, EMS providers described various conflicts requiring management in palliative situations. Conflicts arose with other health care providers, patients, families and within EMS providers themselves.(2) These conflicts were due to competing interests: patient wishes, family wishes, EMS protocols, EMS provider clinical judgement, medico-legal considerations.(16,26)

EMS and palliative care integration benefits

Many studies (36%, n=20)(5,6,8,11,15,16,29,34,35,40–42,47,53,54,59,61–63,66) described benefits of EMS and palliative care integration: early palliative provision, home-based care, respect of patient autonomy, improved patient and family QoL, increased patient and family satisfaction and confidence, improved EMS provider confidence, and decreased healthcare costs. Conversely, the consequences of non-integration were disregard of patient autonomy, performance of aggressive or futile interventions, and poor management of palliative patients by EMS.(13,14)

Provision of early, home-based palliative care by EMS was found to improve patient and family QoL, satisfaction and confidence as demonstrated by Carter, et al.(15) This study found high patient and family satisfaction with palliative provision from EMS providers, observing their compassion and skill in symptom management.(15) Furthermore, knowledge of the 24/7 availability of EMS providers in this programme provided confidence and peace of mind.(15) Paramedic comfort and confidence in palliative provision likewise improved during the study.(15)

Collaboration between EMS and palliative care networks was found to improve respect of patient autonomy.(5) An example was provided in a case study by

Clemency, et al. where a terminally ill patient was transported home from hospital, extubated and allowed to die at home according to her wishes.(35) This was facilitated by EMS under the guidance of palliative care specialists and in conjunction with a broader multidisciplinary team.(35)

Several studies discussed the potential decreased healthcare costs resulting from EMS and palliative integration.(41,59,61,66) The decreased costs would, theoretically, result from provision of homecare, thus avoiding expensive and unnecessary hospital admissions.(61) A Finish study evaluating the integration of paramedics in EoL care argued that healthcare costs may be diminished through provision of homecare by paramedics in particular.(66)

Proposed recommendations for EMS and palliative care integration

All 56 included studies made recommendations for EMS and palliative care integration. These were EMS provider education,(4) EMS and palliative system collaboration,(5) EMS palliative care guideline/protocol creation,(16) specialised out-of-hospital palliative care teams(34) and further research.(57) The following topics were highlighted as areas for EMS provider education: identifying patients with palliative needs,(41) palliative therapeutic goals,(44) legal documentation and advance care planning, ethics,(13) withholding and withdrawing treatment,(38,51) patient and family communication (including care-giver support),(47) symptom management,(54) interdisciplinary teamwork(59) and current palliative system structures.(58)

Lamba, et al. detailed four steps for EMS and palliative care integration: 1) Identify EMS ‘champions’, 2) Review protocols and literature, 3) Perform a needs assessment, 4) Create an action plan.(6) The authors argued that optimal palliative care begins out-of-hospital and, therefore, palliative and EMS systems should collaborate.(6) Such collaborations between palliative and EMS systems, making use of newly developed palliative care guidelines and protocols for EMS providers, were successfully deployed in Canada,(15) Finland(66) and the USA.(34)

Concerning further research, the following areas were recommended: educational interventions,(46) development of EMS palliative care protocols,(16) defining the role

of EMS in palliative situations,(2) development of EMS palliative care policies and clarifying palliative care referral pathways,(2) cost-effectiveness of EMS and palliative care integration.(40,59,66)

DISCUSSION

This scoping review aimed to map existing EMS and palliative literature by identifying study types, extracting key findings, and noting limitations, thereby providing a summary of current evidence, context for EMS and palliative care integration and identifying knowledge gaps for future research.

The topic of EMS and palliative care has gathered momentum in recent years as the role of EMS systems in out-of-hospital care has expanded; most studies included in this review (63%, n=35) being published between 2018 and 2022. While the body of literature has grown, there remains a relative dearth of empirical evidence, with only 56 such studies identified here since the turn of the millennium. Many of these studies are small in scale, presenting limited findings. Common limitations include small sample sizes, limited external validity, use of unvalidated survey instruments, self-selection bias, recall bias and those resulting from retrospective approaches.

Despite these limitations, the literature, when aggregated, is consistent across various contexts. For example, similar challenges to EMS palliative provision, such as a lack of on-scene patient information, have been documented in both paramedic(26) and physician-led systems.(47) Moreover, findings regarding EMS role, challenges and integration benefits in palliative situations appear similar across HICs(68) and LMICs,(16) demonstrating the ubiquitous nature of the out-of-hospital environment.

Of importance, only two studies in this review (3.5%) were performed in LMIC countries,(16,69) revealing a significant knowledge gap. Due to disproportionately high burdens of disease and contemporaneous resource constraints, challenges and integration benefits in LMICs may be amplified when compared with HICs.(70,71) HICs have reported that 0.5-10% of EMS caseload comprises palliative situations.(47,57) With their greater disease burdens, this proportion is likely much larger within LMICs.(16) LMICs require novel approaches to this problem given their

resource constraints. The development of new, specialised out-of-hospital palliative care teams, for example, may not be feasible in LMICs. Capacitating already existing structures, EMS and palliative, to collaborate via alternative means may represent a more efficient use of scarce resources to achieve integration benefits.(59) Simply improving communication between the two systems may confer benefit as demonstrated by Dent, et al. where palliative telephonic advice provided to EMS resulted in decreased rates of hospital conveyance.(40) Similar integrative approaches have been successfully employed in HICs for mental health emergencies, linking mental healthcare worker with EMS and police to provide consult at point of care.(72)

The 1990 Commission on Health Research for Development affirmed that strengthening LMIC research capacity is *"one of the most powerful, cost-effective, and sustainable means of advancing health and development"*.(73) Not only would LMICs benefit greatly from further research, but the cost-effective solutions developed would likewise benefit HICs where increasing health-care costs remain a challenge.(74) Considering amplified LMIC problems, solutions and the need for contextually suitable approaches, the need for, and yet lack of, EMS palliative care LMIC research is striking.

While further research is needed, the existing literature supports, and indeed recommends, the integration of EMS and palliative care services whatever the context (paramedic vs. physician-led, HIC vs. LMIC).(5,16) Such integration would be congruous with the multi-disciplinary approach espoused by palliative care(3) and recommended by the World Health Organization (WHO).(75) The WHO has noted a growing demand for palliative care worldwide, with an insufficient corresponding supply of specialist palliative services.(75) Integration between palliative services and other disciplines is required to meet the need. Given the multi-disciplinary requirement of palliative care and the significant EMS palliative care intersection, integration between the two appears essential.

Though a need for integration exists the question as to precise EMS roles in palliative situations remains. Whatever the specifics, several unique features of EMS may compliment palliative care provision: first-responder role, 24/7 availability, homecare provision and emergency capabilities.(6,10,76,77) The earlier palliative

care is implemented, the greater its efficacy.(78) EMS have the capability to both identify palliative needs and initiate palliative care immediately in their role as first responders.(6,76) Often patients with palliative needs wish to be treated at home but lack this option.(15) They may also suffer deleterious symptoms at any time of day or night requiring a hospital visit.(15) Out-of-hospital palliative care services frequently function exclusively during office hours leaving these patients without support.(13) The 24/7 availability of EMS, coupled with their homecare expertise, could ameliorate these gaps within palliative care provision and, in the not unlikely event of patient deterioration, EMS expertise in emergencies would be beneficial.(66)

Various recommendations to promote EMS and palliative care integration have been made. However, the priorities of these recommendations have not been established. It is likewise unclear from the literature whether EMS and palliative care integration itself is of high priority within individual countries or globally. Further research is required not only to prioritise recommendations for integration, but to prioritise EMS and palliative care integration within unique healthcare systems. Priorities will likely vary across disparate contexts; however, the literature suggests integration should be favourably considered as it has potential to be a low-cost, high impact intervention aligned with WHO priorities. Such integration would result in improved palliative care provision and access,(16) providing these vulnerable patients with dignity through protection of their autonomy and avoidance of non-beneficial treatment. In addition, EMS and palliative care integration may result in cost and resource savings by decreasing hospital burdens.(61,66) This in turn would free resources for additional healthcare interventions. Other causal-sequence benefits may result including a unified healthcare approach and bringing together of siloed systems (EMS, palliative, in-hospital), which would result in further improved patient experience across the healthcare spectrum.

A concern regarding this integration is that this expanded role would strain EMS resources by increasing caseload and time spent per incident.(77) Further investigation into this concern is needed across various contexts. However, existing evidence has shown no increased strain on caseload(66) and while time spent on scene does appear increased in certain palliative situations, these involve provision of homecare without conveyance.(66,76) Total time spent per incident appears to

decrease in these situations due to time-saving from avoidance of transport, hospital handover, ambulance cleaning and restocking.(76)

Research priorities regarding palliative care in the ED setting have been established by Quest, et al.:(79) 1) Which patients are in greatest need of palliative care services in the ED? 2) What is the optimal role of emergency clinicians in caring for patients along a chronic trajectory of illness? 3) What are the educational priorities for emergency clinical providers in the domain of palliative care? As EMS represent the out-of-hospital branch of emergency medicine, such priorities are germane.

Based on the included literature of this review, several specific EMS palliative care research gaps exist. There is a need for further epidemiological study, on a larger scale, across various contexts, particularly LMICs, to more accurately describe the impact of patients requiring palliative care upon EMS systems. Further intervention-based studies are required to test the effectiveness of various forms of EMS and palliative care integration, including their cost-effectiveness. The potential benefit of decreased healthcare costs remains theoretical and requires investigation. Educational interventions require particular analysis as many questions remain unanswered: What EMS qualifications should be targeted? What content is most relevant? What level and type of intervention is required (i.e. undergraduate vs. post-graduate, informal vs. formal). Qualitative interview studies with palliative patients, family members and palliative specialists concerning EMS use in palliative care are largely lacking and would be beneficial as these are primary role players. Finally, both quantitative and qualitative data is needed from other stakeholders such as medical insurance companies which often cover the costs of both EMS and palliative services.

LIMITATIONS

This review is not without limitation. Some relevant studies, including grey literature, may have been missed due to the selection criteria, databases searched, search string employed and researcher finitude. Furthermore, only English studies were selected. However, it is unlikely many relevant studies were omitted as a comprehensive search string was developed, piloted and employed in conjunction with a broad database range, meeting recommendations for an optimal search

strategy. Finally, the conclusions of this review should be observed with equipoise given the potential risk of bias, limited external validity of many included studies, and the need for further contextual and empirical evidence.

CONCLUSION

Current literature suggests EMS and palliative care systems should integrate to improve palliative care provision. EMS have a role to play in out-of-hospital palliative care however, the specifics of this role require further investigation and are likely to differ across disparate contexts. Currently, when performing various functions in palliative situations, EMS providers are faced with several challenges which must be overcome to provide appropriate care. EMS provider education, collaboration between EMS and palliative systems, creation of EMS palliative care guidelines/protocols, creation of specialised out-of-hospital palliative care teams and further research have been recommended as solutions. Future research should focus on the prioritization, implementation, and effectiveness of these solutions cross-contextually; particularly in LMICs where the need, and potential impact, are most significant.

AUTHOR CONTRIBUTIONS

CG, LG and WS designed the protocol. CG and CS collected data. CG drafted the manuscript with input from CS, LG and WS. All authors reviewed and gave final approval of the manuscript.

COMPETING INTERESTS

The authors declare they have no competing interests.

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DATA SHARING STATEMENT

No additional data available.

ETHICS APPROVAL

No participants were involved in the study and selected literature is publicly available, therefore, no ethical approval was required.

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FIGURE LEGEND

Figure 1 – *PRISMA Selection Process Flow Diagram*(25)

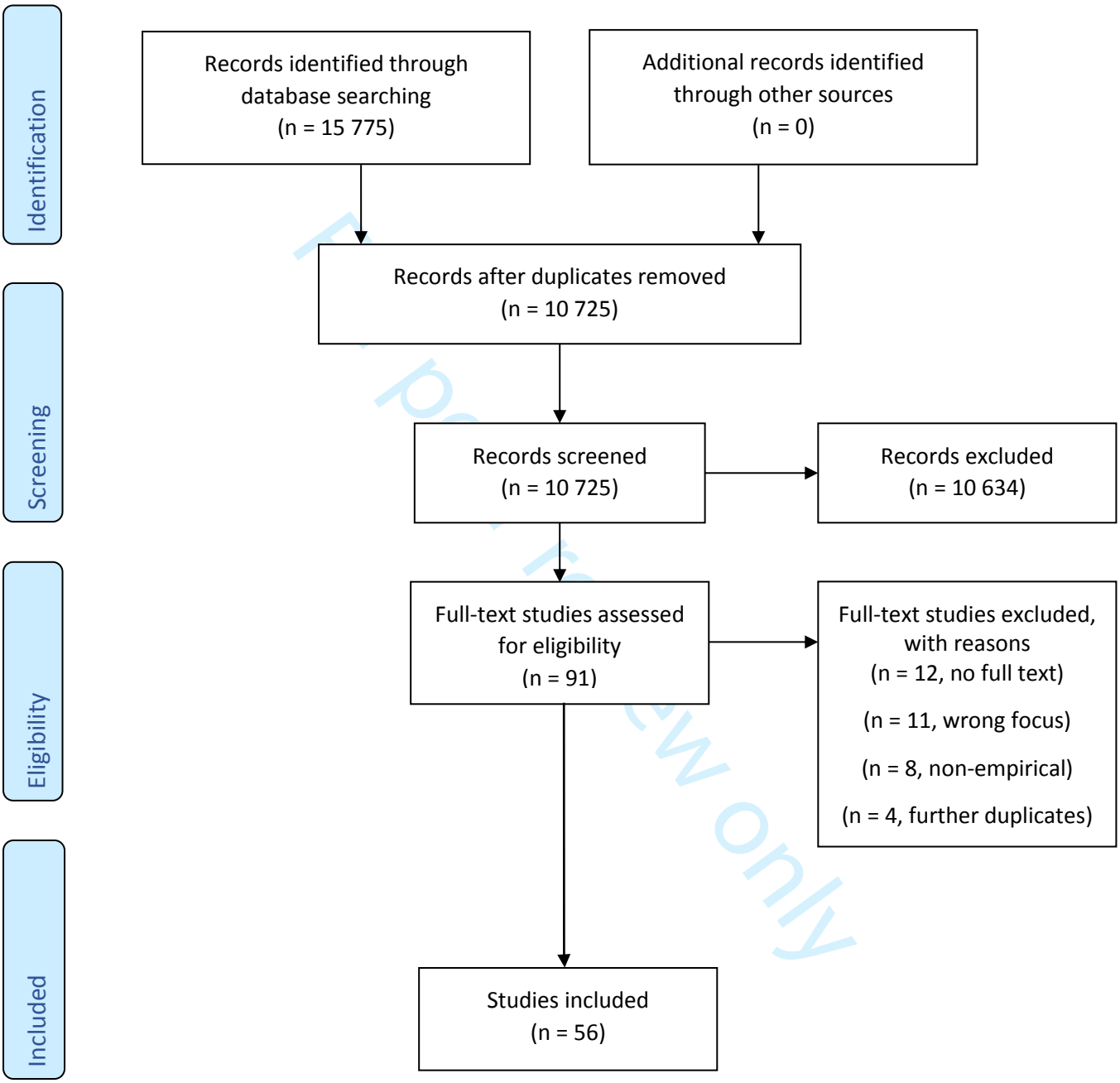

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Table 1 – *Summary of Included Studies*

Author, Year, Setting, Country Income Status	Aim(s)	Methodology	Population and Sample Size	Outcomes and Significant Findings	Limitations
Anderson, et al. 2022 New Zealand - HIC	*"To explore bereaved family members' experiences of emergency ambulance care at the end of life."*	Qualitative Individual Interviews	38 Family Caregivers	Key themes: 1) Supporting living and dying at home. 2) Urgent and unexpected events. 3) Reluctance in calling an ambulance. EMS providers play a vital role in providing palliative care. This should be integrated into policy, practice and training.	Possibility of self-selection and recall biases. Limited external validity.
Ausband, et al. 2002 USA - HIC	*"To determine the prevalence of palliative care protocols among EMS agencies in the United States, and to estimate the percentage of the U.S. population covered by such protocols".*	Descriptive Survey	121 EMS Agencies	5.8% of EMS Agencies have palliative care protocols. Thus, there is a lack of EMS palliative care protocols in the USA.	Response rate 60.5%. 'Palliative Care Protocol' was not defined. Thus, EMS palliative care protocols may be more or less prevalent than 5.8%.
Boaventura, et al. 2022 Brazil - LMIC	*"To identify the perception of health professionals regarding the concept of PC* [Palliative Care] *and their care experiences with this type of patient in a pre-hospital care (PHC) service in Brazil."*	Qualitative Individual Interviews	25 EMS Providers	Key themes: 1) Unpreparedness of the team. 2) Decision Making. 3) Dysthanasia. There is a need for EMS provider palliative care training and policy development in Brazil.	Possibility of self-selection and recall biases. Limited external validity.
Breyre, et al. 2021 USA - HIC	*"To provide a descriptive analysis of hospice and comfort care patient EMS utilization in Alameda County* [California, USA]*".*	Retrospective Cohort	534 Patient Records	0.2% (n=534) of EMS calls were for hospice patients. Of these, 468 (87.6%) were transported to hospital. Most commonly encountered symptoms: respiratory distress, altered mental status. Fentanyl	Some hospice patients potentially missed due to incomplete/inaccurate documentation and an inability to identify serial EMS calls from a single patient.

				administration was the most common intervention. Although EMS encountered hospice patients infrequently, they should be prepared for such cases.	
Breyre, et al. 2021 USA - HIC	*"To evaluate the effect of a Mobile Integrated Hospice Healthcare (MIHH) program including hospice education and expansion of paramedic scope of practice to use hospice medication kits".*	Retrospective Cohort	523 MIHH Cases	MIHH program reduced emergency department transport rates from 80.3% to 19.6%. The expanded scope medication kit was used only once. This collaboration between hospice and EMS systems was successful in reducing hospice patient transport to the emergency department, possibly improving hospice patient and family care.	No comparison with transport rates in non-hospice patients over the study period. Reasons for patient transport inconsistently documented. Method of screening for hospice patients may not have identified all eligible patients.
Breyre, et al. 2022 USA - HIC	*"To explore EMS provider challenges, self-perceived roles and training experiences caring for patients and families with life-limiting illness."*	Qualitative Individual Interviews	15 EMS Providers	Key themes: 1) In the moment decision making dilemmas. 2) Respond to varied grief reactions. 3) Disadvantaged/vulnerable populations have less access to care and advance care planning. 4) Transport people. 5) Holistic care. 6) Lack of formal training. Formal training of EMS providers in palliative care principles would empower them to care for patients with life-limiting illness.	Possibility of self-selection and recall biases. Limited external validity.
Burnod, et al. 2012 France - HIC	*"To evaluate whether patient's wishes were respected by prehospital emergency medical teams after implementing*	Retrospective Cohort	40 Patients	Collaboration between prehospital emergency teams and palliative care networks allows prehospital teams to access information relevant to	No limitations listed by the authors; however, the sample size was small.

	collaboration and a standardized process between a community-based palliative network and the Emergency Medical Service (EMS) system".			their patients and results in greater respect of palliative patient wishes (83% of the time compared with 40% where no collaboration exists).	
Carron, et al. 2014 Switzerland - HIC	To highlight *"end of-life and palliative care situations that may be encountered by prehospital emergency services".*	Retrospective Case Series	4 Cases	Palliative and prehospital emergency care may be complimentary approaches. Analysed cases demonstrate the need for palliative education in prehospital emergency teams and collaboration between EMS and palliative systems.	Limited review of 4 cases. Findings and suggestions are open to biased interpretations.
Carter, et al. 2022 Canada - HIC	*"To describe the essential elements, barriers, and facilitators for implementation, spread, and scale of the Program* [Paramedics Providing Palliative Care at Home] *from two perspectives: one system that implemented the Program and one system that had not, using the Consolidated Framework for Implementation Research (CFIR)."*	Qualitative Deliberative Dialogues	20 stakeholders (9 EMS Providers, 7 Palliative Providers, 2 Program Administrators, 1 Primary Care Provider, 1 Emergency Medicine Provider)	Key elements for implementation of the *Paramedics Providing Palliative Care at Home Program*: 1) Cosmopolitanism (outer setting). 2) Adaptability (intervention). 3) Implementation climate (inner setting). 4) Engagement and Planning (processes). Scaling this program would be beneficial for patient satisfaction and further paramedic confidence in caring for patients with palliative needs.	Possibility of self-selection and group biases. Lack of member-checking. Limited external validity.
Carter, et al. 2022 Canada - HIC	*"To explore, from the perspectives of paramedics and palliative health care providers, the alignment of a palliative care role with paramedic professional identity."*	Qualitative Focus Group Interviews	11 Paramedics, 20 Health Care Providers	Key themes concerning EMS provider role: 1) Patient centeredness and job satisfaction. 2) Bridging. 3) Advocate and educator. 4) Psychosocial support. Key themes concerning EMS provider	Possibility of self-selection and group biases. Limited external validity.

				identity: 1) Evolution of paramedicine as a skilled clinical profession. 2) Helping people and communities. 3) Paramedic skill set aligns with work in palliative care. 4) Changing paramedic mindset. Palliative care provision is well-aligned with EMS provider identity.	
Carter, et al. 2019 Canada - HIC	*"To determine the impact of the program* [Paramedics Providing Palliative Care at Home] *in two parts: Part A examined patient and family/caregiver satisfaction, and Part B measured paramedic comfort and confidence with the delivery of palliative care support".*	Mixed Methods: Part A: Telephonic Interviews, Surveys. Part B: Pre- vs. Post-Intervention Surveys.	Part A (Patients/Families): 18 Telephonic Interviews and 67 surveys. Part B (Paramedics): 235 Pre-Intervention Surveys and 267 Post-Intervention Surveys.	After programme implementation, paramedic comfort and confidence providing palliative and end-of-life care improved. Paramedics viewed palliative care as important and rewarding in their work. Furthermore, patient/family satisfaction was high. Families particularly highlighted paramedic compassion and professionalism.	Small sample size and low survey response rates. Time-lapse between paramedic arrival and patient/family interview.
Clemency, et al. 2019 USA - HIC	To *"describe a terminal extubation performed by a paramedic under the direct supervision of an Emergency Medical Services (EMS) physician".*	Case Report	1 Case	With guidance, terminal extubation is possible out-of-hospital. Allowing for EMS involvement in this and other palliative interventions would simplify logistics and allow patients the option of a home death.	Single case description.
Dent, et al. 2020 UK - HIC	To *"report the patient characteristics and outcomes of a*	Retrospective Cohort	45 Telephonic Calls	Telephonic advice service was associated with low rates of patient transport to hospital (16%,	Quality of advice not studied. Small sample size in a paramedic-led system

	24-hour hospice nursing telephone advice service to support an ambulance service".			n=7). Access to palliative advice can support ambulance clinicians and is feasible. Ambulance clinicians viewed this as an invaluable resource.	limiting external validity. Telephonic advice may not have been sought in all cases as EMS do not have a palliative care call-out category.
Donnelly, et al. 2018 USA - HIC	*"To assess the knowledge, attitudes, and experiences of EMS providers in the hospice care setting".*	Mixed Methods Cross-Sectional Survey	182 EMS Providers	Majority of EMS providers (84.1%, n=153) have managed a hospice patient at least once. 29.1% (n=53) reported receiving formal education on hospice patient care. EMS providers expressed a need for education and difficulties with communication and information in managing hospice patients.	Single-centre study, limiting external validity. Unvalidated survey.
Eaton-Williams, et al. 2020 UK - HIC	*"To assess whether ambulance paramedics currently identify EoLC patients, are aware of identification guidance and believe this role is appropriate for their practice".*	Cross-Sectional Online Survey	1643 Paramedics	Majority of paramedics (97.0%, n=1594) felt they should contribute to identifying end-of-life care needs. Current barriers to this role: lack of access to patient medical records, insufficient education and communication difficulties. Establishing end-of-life referral pathways and receiving education were identified as facilitators of this role.	Possibility of self-selection bias. Impossible to verify participants' qualifications and experience.
Fitzpatrick, et al. 2022 USA - HIC	*"To provide structured, evidence-based palliative and hospice education to CPs* [Community Paramedics]*."*	Pre- and Post-intervention Study	14 Community Paramedics	Paramedics play a role in the care of terminal patients. Formal palliative training within community paramedic programs should be implemented. The educational intervention of this	Small sample size. Unclear survey questions.

				study increased community paramedics' knowledge regarding EoL communication.	
Gage, et al. 2020 South Africa - LMIC	*"To gather the perspectives of advanced life support (ALS) providers within the South African private EMS sector regarding pre-hospital palliative care in terms of its importance, feasibility and barriers to its practice."*	Qualitative Individual Interviews	6 Paramedics	Key themes: 1) Need for pre-hospital palliative care. 2) Function of pre-hospital healthcare providers concerning palliative care. 3) Challenges to pre-hospital palliative care. 4) Ideas for implementing pre-hospital palliative care. Pre-hospital palliative care is needed in South Africa and EMS may play a valuable role.	Possibility of self-selection bias. Limited external validity.
Goodwin, et al. 2021 UK - HIC	*"To explore staff stakeholder views on the role of UK paramedics in advance care planning, including the use of the Gold Standards Framework Proactive Identification Guidance for screening and referral of patients".*	Qualitative Individual Interviews	17 Stakeholders (8 Paramedics, 4 General Practitioners, 2 Emergency Department Doctors, 2 Emergency Department Nurses, 1 Community Nurse)	Key themes: 1) A lack of advance care planning. 2) Variation across health conditions. 3) A lack of joined-up care. 4) Poor-quality end of life conversations. UK paramedics are well positioned to screen patients for advance care planning.	Possibility of self-selection and recall biases. Limited external validity.
Hauch, et al. 2021 Germany - HIC	To answer the questions: *"Which EMS operations occurred in the patients cared for in the SPHC* [Specialized Home Palliative Care]*, and how frequent were they?*	Retrospective Cohort	172 Paediatric Patient Records	Despite existence of a 24/7 specialised palliative home care service, some parents of children with palliative needs still contacted EMS in emergency situations (12%, n=20). Within	Small sample size. Limited external validity.

	What treatments were given, and what was the outcome? Which possible associated factors can be identified that triggered the emergency call?"			this group, EMS were contacted 27 times. These patients were less likely to have a do not resuscitate order, required more home visits and were under SPHC care for longer when compared to the non-EMS group. Collaboration between palliative and emergency services is needed.	
Hoare, et al. 2018 UK - HIC	*"To understand the role of ambulance staff in the admission to hospital of patients close to the end of life".*	Qualitative Individual Interviews	6 Ambulance Staff	Ambulance staff play an important role in end-of-life patient hospital admissions. Their ability to keep patients at home is hindered by: 1) The limited availability and accessibility of additional care support in the community. 2) The limited information ambulance staff had about the patient and their condition. 3) A perceived ambulance service emphasis on hospital care.	Possibility of self-selection and recall biases. Limited external validity.
James, et al. 2021 Australia - HIC	*"To understand paramedics' intentions to use a hypothetical Specialist Palliative Care telehealth service, based on their perceptions of the service (i.e. usefulness, ease of use, and attitude toward to the service) and their palliative care self-efficacy".*	Descriptive Online Survey	112 Paramedics	All variables were positively correlated with an intention to use a Specialist Palliative Care telehealth service apart from age and palliative care self-efficacy, which was negatively correlated. Thus, paramedics displayed a desire to use the service despite high palliative care self-efficacy ratings.	Possibility of self-selection bias. Desirability/positivity bias in that attitudes are often positive to new technology in a hypothetical scenario.

Juhrmann, et al. 2022 Australia - HIC	*"To examine the quality and content of existing Australian palliative paramedicine guidelines with a sample of guidelines from comparable Anglo-American ambulance services."*	Guideline Quality Appraisal and Qualitative Analysis	8 Palliative Care EMS Guidelines	Overall, guideline quality was poor to moderate according to the AGREE II instrument, however, this does not refer to clinical validity. Key themes from guideline analysis: 1) Audience and approach. 2) Communication is key. 3) Assessing and managing symptoms. 4) Looking beyond pharmaceuticals. 5) Seeking support. 6) Care after death.	Potentially relevant information may have been missed as EMS guidelines not palliative/EoL specific were excluded.
Juhrmann, et al. 2021 Australia - HIC	*"To review and synthesise the empirical evidence regarding paramedics delivering palliative and end-of-life care in community based settings."*	Systematic Literature Review	23 Articles	Key themes: 1) Broadening the traditional role. 2) Understanding patient wishes. 3) Supporting families. Paramedics can play an important role in facilitating home-based death and reducing unnecessary hospital admissions.	Selected articles limited to English. Some relevant articles potentially omitted.
Kamphausen, et al. 2019 Germany - HIC	*"To investigate challenges faced by emergency physicians (EPs) who provide prehospital emergency care to patients with advanced incurable diseases and family caregivers in their familiar home environment".*	Qualitative Individual Interviews	24 Emergency Physicians	Key themes: 1) Structural conditions of prehospital emergency care. 2) Medical documentation and orders. 3) Finding optimal and patient-centred therapy. 4) Uncertainty about legal consequences. 5) Challenges at the individual (EP) level. 6) Challenges at the emergency team level. 7) Family caregiver's emotions, coping, and understanding of patient's illness. 8) Patient's wishes, coping, and understanding of patient's illness.	Possibility of self-selection and recall biases. Limited external validity.

				9) Social, cultural, and religious background of patients and families.	
Knighting, et al. 2017 UK - HIC	To answer the questions, *"do paramedics view end-of-life care as a key part of their role and are they confident in managing this aspect of their clinical practice? Further to this, what are the underlying concerns of paramedics when managing end-of-life care"?*	Descriptive Online Survey	182 Paramedics	Paramedics saw end-of-life care as essential to their function. Fear of litigation and conflict with patient family members were identified as challenges in palliative care provision. Education is needed for paramedic confidence.	Impossible to verify participants' experience and qualifications. Low response rate.
Lamba, et al. 2013 USA - HIC	*"To 1) review four case scenarios that relate to palliative care and may be commonly encountered in the out-of-hospital setting and 2) provide a road map by suggesting four things to do to start an EMS-palliative care initiative in order to optimize out-of-hospital care of the seriously ill and increase preparedness of EMS providers in these difficult situations".*	Collaborative Plan of Action (IPAL-EM project) with Case Discussions	Plan of action to integrate palliative and prehospital care. 4 Case Discussions.	Four steps to begin an EMS-palliative initiative: 1) Identify EMS 'champions'. 2) Review protocols and literature. 3) Needs assessment. 4) Create action plan. Ideally, palliative care begins out-of-hospital. This study represents a guideline for the integration of palliative and EMS care.	Requires implementation in various settings as well as study to determine effectiveness. Limited case review.
Leibold, et al. 2018 Germany - HIC	*"To determine whether or not a paramedic's decision-making in end-of-life situations is influenced by his/her religious beliefs, how they decide given the current judicial framework, and how they would decide were there legal certainty".*	Descriptive Online Survey	429 Paramedics	Religious beliefs play a role in influencing paramedic decision-making, however, experience, background, special training and legal framework conditions, appear to have greater influence.	Possibility of self-selection bias. Unvalidated survey. Limited religions and beliefs represented across sample.

Lord, et al. 2019 Australia - HIC	*"To describe the incidence and nature of cases attended by paramedics and the care provided where the reason for attendance was associated with a history of palliative care".*	Retrospective Cohort	4348 Patient Records	Identified cases were 0.5% of caseload during study period. Most common assessments by paramedics were 'respiratory' (20.1%), 'pain' (15.8%) and 'deceased' (7.9%). Majority of patients were transported (74.4%, n=3237) with hospital the most prevalent destination (99.5%, n=3221).	Emergencies and reasons for paramedic calls may have been unrelated to palliative condition.
Lord, et al. 2012 Australia - HIC	*"To identify paramedics' knowledge, beliefs, and attitudes related to the care of patients requiring palliative care in community health settings".*	Qualitative Focus Group Interviews	3 focus group interviews with a total of 26 paramedics	Key themes: conflict in care goals, legal problems, lack of information, system problems. Further research suggested for education, guidelines and defining roles of paramedics in palliative care patient management.	Low response rate possibly resulting in an unrepresentative sample. Possibility of self-selection and group biases.
McCormick, et al. 2019 New Zealand - HIC	*"To understand the role New Zealand paramedics have as providers of community and pre-hospital palliative and EOL care, as well as to ascertain whether paramedics are suitably equipped and educated to provide quality palliative care to an increasingly elderly population with non-curable life-threatening illnesses".*	Rapid Literature Review	4 Articles	No New Zealand articles or guidelines were found. New Zealand Ministry of Health documents provide minimal reference to pre-hospital emergency medical providers. Paramedics already provide palliative and end-of-life care. They are willing to continue this provision, with improved education and better integration with other care providers.	Small sample of articles. Two databases searched. Lack of quality appraisal.
McGinley, et al. 2017 USA - HIC	*"To describe how medical orders inform EMS providers' decision making during emergencies involving*	Mixed-Methods: Descriptive Cross-Sectional	239 Surveys and 48 Interviews of EMS Providers	Many EMS providers (62.7%) had treated a patient with both an intellectual disability and medical orders directing end-of-life care. Key themes: 1) Provider	Possibility of self-selection bias. Limited external validity. Unvalidated survey.

	people with intellectual disabilities who are near life's end by considering the multiple (individual, organizational, sociocultural) contexts within which these decisions occur".	Survey and Individual Interviews		familiarity. 2) Organizational processes. 3) Sociocultural context.	
Mott, et al. 2020 Australia - HIC	*"To explore the experiences and attitudes of ambulance officers in managing pediatric patients with palliative care needs".*	Descriptive Online Survey	22 Ambulance Officers	Many ambulance officers found these cases to be challenging and their confidence levels varied. They were most likely to use correspondence provided by the family as a guide for management. Half of participants felt paediatrics receiving palliative care should have a 'not for resuscitation' order. They suggested support for themselves could be improved through increased patient documentation.	Small sample size. Possibility of self-selection and recall biases.
Murphy-Jones, et al. 2016 UK - HIC	*"To explore how paramedics make decisions when asked to transport nursing home residents nearing the end of their lives".*	Qualitative Individual Interviews	6 Paramedics	Key themes: 1) The challenges in understanding patients' wishes. 2) Evaluating patients' best interests. 3) The influence of others on decision making.	Possibility of self-selection and recall biases. Limited external validity.
Patterson, et al. 2019 UK - HIC	To investigate *"the extent to which access to, and quality of, patient information affects the care paramedics provide to patients nearing end-of-life, and their views on access to a shared electronic record as a means of*	Qualitative Individual Interviews	10 Paramedics	Key themes: 1) Access to information on patients nearing end-of-life. 2) Views on the proposed Electronic Palliative Care Coordination System (EPaCCS). Lack of access to patient information is a barrier to paramedics delivering end-of-life care. Access to EPaCCS may	Possibility of self-selection and recall biases. Limited external validity.

	improving the information flow around end-of-life care".			assist, but practical and technical challenges must be overcome for implementation.	
Pease, et al. 2019 UK - HIC	To *"describe the delivery, outcomes and potential impact of the Serious Illness Conversation project delivered to Welsh Ambulance Service Trust (WAST) staff".*	Mixed-Methods: Open-Ended Question Surveys, Pre- vs. Post-Intervention Surveys, Patient Care Record Review	218 Paramedics and 150 Paramedic Students	Participants view themselves as playing several roles in end-of-life care: 'facilitators' to patient-centred and seamless care, providing support, link between services and practical help. Barriers to providing end of life care centred around communication challenges. The Serious Illness Conversation training resulted in increased participant confidence handing these situations.	Self-assessment of confidence. Review of patient care records not specific to training participants.
Pentaris, et al. 2019 UK - HIC	To explore *"current knowledge and evidence about paramedics' attitudes and perceptions about end-of-life care".*	Systematic Literature Review	11 Articles	Key themes: 1) Critical incidents and emotional resilience. 2) Decision making. 3) Communicating death. 4) Recognising dying patients. 5) Death education. A dearth of literature exists concerning paramedics and end-of-life practice.	Selected articles limited to English. Some relevant articles potentially omitted.
Peran, et al. 2021 Czech Republic - HIC	To answer the question, *"What is the role of ambulance EMS, EMS dispatch centres, paramedics and emergency medical physicians in the provision of palliative care to terminally ill patients"?*	Scoping Literature Review	31 Articles	Three EMS roles and one contextual factor were identified: 1) Providing complex care. 2) Adjusting patient's trajectory. 3) Being able to make decisions in a time and information limited environment. 4) Health care professionals are insufficiently supported in palliative care.	Selected articles limited to English and German. Some relevant articles potentially omitted.

Rogers, et al. 2015 Australia - HIC	*"To identify and measure paramedics' perspectives and educational needs regarding palliative care provision, as well as their understanding of the common causes of death".*	Mixed Methods Survey	29 Paramedics	Paramedics have a good understanding of palliative care. They particularly identified terminal cancer as requiring palliation. Paramedic education is needed in end-of-life communication practices, ethical issues and illnesses requiring palliation.	Low response rate. Possibility of self-selection and recall biases.
Rosa, et al. 2021 Canada - HIC	*"To understand the current state of community paramedicine and palliative care"* in Canada.	Rapid Literature Review	Unspecified Number of Articles	Expanded scope of community paramedic practice that provides palliative care has potential benefit in alleviating healthcare system strain while simultaneously improving patient outcomes. Pilot community paramedic palliative care programs in Canada have demonstrated the benefits of reduced emergency department visits and improved patient satisfaction with community paramedic use.	Small sample. Lack of quality appraisal.
Stone, et al. 2009 USA - HIC	*"To ascertain paramedics' attitudes and beliefs about end-of-life decision-making; To measure the frequency with which practicing paramedics encounter various end-of-life situations…and the importance they assign to them; To assess the extent to which paramedics report they were trained to address end-*	Descriptive Cross-Sectional Survey	235 Paramedics	Participants perceived end-of-life issues as important, however, they did not feel adequately trained for these situations. Most (95%) agreed that paramedics should honour advance directives. Over half (59%) felt that paramedics should honour verbal wishes to limit on-scene resuscitation. Most (95%) had previously questioned intervention appropriateness in	Small sample size. Possibility of self-selection and recall biases.

	of-life situations; To compare the importance paramedics place on end-of life issues".			terminal patients. Some (26%) reported using personal judgement to withhold or terminate resuscitation in a terminal patient.	
Surakka, et al. 2020 Finland - HIC	To answer the questions, *"What is the frequency, reasons and timing of paramedic visits via the end-of-life protocol and do these visits differ between the areas with and without around the clock (24/7) palliative care services"?*	Retrospective Cohort	252 Patients, 306 Paramedic Visits	Most frequent reasons for paramedic visits were symptom control (38%) and transportation (29%). Paramedics visited 43% and 70% of the patients in areas with and without 24/7 palliative home care services, respectively. Over half (58%) of all paramedic visits were done outside office hours. Integration of paramedics into end-of-life care at home is reasonable particularly in rural areas without around the clock palliative care services and outside of office hours.	Efficacy of paramedic management and patient/family perceptions not assessed.
Surakka, et al. 2022 Finland - HIC	*"To describe experiences and educational needs of the paramedics included in the end-of-life care protocol."*	Mixed Methods Survey	192 Paramedics	Over 80% of paramedics agreed the protocol helped with care for patients with palliative needs and improved EoL care quality. Patient visits were considered useful (76.5%) and EoL care meaningful (62.5%) by paramedics who expressed challenges in psychosocial aspects, communication, symptom management, and their role in EoL care. They identified symptom management	Some respondents (28%) were inexperienced with the protocol. Potential for self-section and recall biases. Limited external validity.

				and communication as areas for education.	
Swetenham, et al. 2013 Australia - HIC	*"To explore the introduction of a rapid response team as outlined in the South Australian Palliative Care Services Plan 2009–2016".*	Mixed Methods: Call Log Data, Patient Records, Surveys and Individual Interviews	40 Patients attended by extended care paramedics, 24 Carer Interviews, 2 Patient Interviews, 22 Extended Care Paramedic Surveys	During the study period there were 40 paramedic visits. Of these, 90% received an after-hours visit and remained at their site of care; 5% attended an emergency department and 5% were directly admitted to hospice. Paramedics found palliative care rewarding and contributory towards job satisfaction, however, also demanding. Paramedics appreciated the specialist palliative care service's telephonic support.	Methodology lacking adequate description. Qualitative data without thematic analysis.
Taghavi, et al. 2011 Germany - HIC	*"To determine paramedics' practices in regard to withholding and terminating resuscitation, as well as to examine reports of their practical experiences with advance directives and special palliative crisis cards".*	Prospective Self-Administered Survey	728 Paramedics	End-of-life decision-making is challenging for paramedics. Guidelines for these situations are desired. Advance directives should be legally reinforced. Education in palliative care a need for paramedics.	No comparison of respondents vs. non-respondents – possibility of self-selection bias exists. Questionnaire was self-administered and unvalidated.
Waldrop, et al. 2014 USA - HIC	*"To identify how a sample of prehospital providers learned about EOL care, their perceived confidence with and perspectives on improved preparation for such calls".*	Mixed Methods Cross-Sectional Survey	178 Prehospital Providers	Key themes: 1) Prehospital provider education. 2) Public education. 3) Educating health care providers on scope of practice. 4) Conflict resolution skills. 5) handling emotional families. 6) Clarification of transfer protocols. Majority of paramedics received formal training on DNR orders (92%) and MOLST (72%). Majority of	Small sample size. Limited external validity.

				paramedics confident in ability to uphold DNR orders (87%) and resolve family conflict (87%).	
Waldrop, et al. 2015 USA - HIC	*"To explore prehospital providers' perceptions of (1) the frequencies of different types of end-of life calls, (2) the signs and symptoms of dying in prehospital care, and (3) medical orders for life sustaining treatment (MOLST)".*	Descriptive Cross-Sectional Pilot Survey	178 Prehospital Providers	Calls to nursing homes and dying patients were frequent. MOLST documentation was infrequently encountered. There is synergy between prehospital and palliative medicine, however, further research is needed to develop prehospital end-of-life decision-making and understand how prehospital providers operate when confronted with palliative situations.	Open to participant information recall bias and perceptions. Convenience sampling at a single institution limiting external validity. Unvalidated survey.
Waldrop, et al. 2019 USA - HIC	"*To explore prehospital providers' perspectives on how the awareness of dying and documentation of preferences influence decision-making on emergency calls near the end of life".*	Qualitative Individual Interviews	43 EMS Providers	Key themes: 1) Aware of Dying-Wishes are Documented. 2) Aware of Dying—Wishes are Undocumented. 3) Unaware of Dying-Wishes are Documented. 4) Unaware of Dying Wishes are Undocumented. 5) Discordance. EMS providers are well aware of the impact of their decisions at the end of life. EMS providers play a critical role at the end of life.	Possibility of self-selection and recall biases. Limited external validity.
Waldrop, et al. 2018 USA - HIC	*"To investigate prehospital providers' perceptions of emergency calls at life's end."*	Qualitative Individual Interviews	43 EMS Providers	Key themes: 1) Care crises. 2) Dying-related turmoil. 3) Staffing ratios. 4) Organizational protocols. EMS providers become mediators between nursing homes and emergency	Possibility of self-selection and recall biases. Limited external validity.

				departments by handling tension, conflict and challenges in patient management.	
Waldrop, et al. 2015 USA - HIC	*"To explore and describe how prehospital providers assess and manage end-of-life emergency calls".*	Qualitative Individual Interviews	43 EMS Providers	Key themes: multifocal assessment involving family, patient and surroundings, emotional family responses, conflict between family, patient and practitioner and management of the dying process. Results suggest need for increased ability of prehospital providers to uphold advance directives and patient wishes at end of life.	Possibility of self-selection and recall biases. Limited external validity.
Wenger, et al. 2022 USA - HIC	*"To survey the state of Michigan's EMS providers regarding encounters with hospice patients to better understand challenges caring for this population and to identify any need for additional education."*	Self-Administered Survey	706 EMS Providers	Most EMS providers (96%) had at least one encounter with a hospice patient. Only 24% had received formal education in this area. Most (86%) indicated interest in this training. Identified challenges included inaccessible advance directives (72%), pressure from family for aggressive treatment (61%), and difficulty contacting hospice personnel (48%). Empowering EMS providers with training in these areas would bridge the gaps.	Possibility of self-selection and recall biases. Questionnaire was self-administered and unvalidated. Limited external validity.
Wiese, et al. 2013 Germany - HIC	*"To determine international recommendations for the treatment and prevention of palliative emergencies".*	Mixed Methods: Prospective Self-Administered Survey	92 Experts	Four standards in the management of palliative emergencies were recommended: 1) Early integration of "Palliative Care Teams" and basic outpatient	Possibility of self-selection bias. Limited external validity. Unvalidated survey.

				palliative care systems. 2) End-of-life discussions. 3) Defined emergency medical documents, drug boxes, and "Do not attempt resuscitation" orders. 4) Emergency medical training for physicians and paramedics.	
Wiese, et al. 2012 Germany - HIC	*"To determine paramedics' understanding of their role in withholding or withdrawing resuscitation/EoL-treatment of palliative care patients when an advance directive is present".*	Prospective Self-Administered Survey	728 Paramedics	Majority of paramedics (71%) have dealt with palliative emergencies. Improved training and guidelines for paramedics are necessary. Ethical and legal obligations may conflict for paramedics faced with palliative emergencies.	Possibility of self-selection and recall biases. Questionnaire was self-administered and unvalidated.
Wiese, et al. 2010 Germany - HIC	*"To provide information about the strategic and therapeutic approach employed by EMTs in outpatient palliative care patients in cardiac arrest".*	Retrospective Cohort	88 Patient Records	Approaches to prehospital palliative patients with cardiac arrest differ based upon EMS provider qualification. Many resuscitations are initiated contrary to patient wishes due to lack of advance directives. These should be more readily available.	Small sample size. Limited external validity.
Wiese, et al. 2009 Germany - HIC	*"To show the importance of palliative medical care competence in the pre-hospital emergency medical care of patients with advanced cancer diseases* [and] *to describe basic approaches to improve the current situation in Germany".*	Prospective Cohort	361 Emergency Calls	Prehospital palliative care improves when prehospital physicians have palliative care expertise. Prehospital palliative care education is recommended.	Limited external validity.
Wiese, et al. 2009 Germany - HIC	To interview prehospital emergency physicians (EP) *"about their knowledge of*	Retrospective Self-	104 Emergency Physicians	Most participants (89%) had been confronted with palliative emergencies and expressed	Possibility of self-selection and recall biases. Questionnaire was self-

	palliative care, about their experiences in dealing with palliative care patients in out-of-hospital emergency situations and about their beliefs and interests in palliative care".	Administered Survey		uncertainties in managing these situations. Psychosocial and social care represented frequent challenges. Most participants (80%) were interested in further palliative care training.	administered and unvalidated.
Wiese, et al. 2009 Germany - HIC	To investigate and compare *"the emergency medical treatment of acute dyspnoea in palliative care patients affected by advanced (palliative) stages of cancer disease on basis of emergency medical therapy schemes".*	Retrospective Cohort	116 Patient Care Records	Significant relief of acute dyspnoea when using opioids compared to standard treatment. This should be included in emergency physician training. Most emergency physicians (>70%) were uncertain about palliative patient management.	Small sample size. Limited external validity.

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.	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, 5
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	5
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.	5
Information sources*	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.	Supp. Material 1
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	6
Data charting process‡	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
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	6
Critical appraisal of individual sources of evidence§	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.	6

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
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
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	8, 9
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.	9-13
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	Supp.Material2
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.	13-16
Limitations	20	Discuss the limitations of the scoping review process.	16
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.	16
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.	17

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

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

† 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).

‡ 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.

§ 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).

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