Palliative and end-of-life care in intensive care units in low- and middle-income countries: A systematically constructed scoping review

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Purpose: Death is common in intensive care units, and integrating palliative care enhances outcomes. Most research has been conducted in high-income countries. The aim is to understand what is known about the type and topics of research on the provision of palliative care within intensive care units in low- and middle-income countries

Materials and methods: Scoping review with nine databases systematically searched for literature published in English on palliative care in intensive care units in low- and middle- income settings (01/01/1990 to 31/05/2021). Two reviewers independently checked search results and extracted textual data, which were analyzed and represented as themes.

Results: Thirty papers reported 19 empirical studies, two clinical case reports and six discussion papers. Papers originated from Asia and Africa, primarily using observational designs and qualitative approaches, with no trials or other robust evaluative or comparative studies. No studies directly sought data from patients or families. Five areas of research focus were identified: withholding and withdrawing treatment; professional knowledge and skills; patient and family views; culture and context; and costs of care.

Conclusions: Palliative care in intensive care units in low-and middle-income countries is understudied. Research focused on the specific needs of intensive care in low- and middle-income countries is required to ensure optimal patient outcomes.

Keywords: Palliative care; Terminal care; end of life care; Intensive Care Units; Developing countries; Asia; Africa;

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Introduction

Death is common within intensive care units. It is estimated that around 20% of all deaths in the United States of America occur in intensive care units, and mortality rates for those admitted to intensive care vary from around 7% to 19%, rising to over 35% during parts of the COVID-19 pandemic [1-4]. Some form of palliative care provision is therefore likely to be essential to delivering high-quality intensive care. Research exploring the contribution of palliative care to intensive care has typically explored issues such as the importance of communication, ethical consultations, education and training, models of palliative care provision, and advance care planning[5].

Palliative care approaches and provision within intensive care units can significantly impact care outcomes. For example, communication tools can increase documentation of goals of care discussions and reduce resource utilization such as duration of mechanical ventilation[6]. A particular focus of studies to date has been the impact of palliative care on mortality and length of stay, with several systematically constructed reviews finding that palliative care has an effect on lowering mortality of those who are terminally ill within an intensive care unit and decreasing length of stay within the intensive care unit or hospital stay per se[7-11].

An examination of recent systematically constructed reviews of studies investigating this intersection between palliative and intensive care reveals that the geographical areas from which this evidence is generated are limited. Most reviews primarily report studies from North America, Europe, or Australia, with a preponderance of studies from the United States of America[1, 5, 7-9, 12]. Whilst a few systematic reviews did not report the countries of included studies[10, 11], only two recent reviews found studies that met their inclusion criteria from outside these regions, with one review of physician-related barriers to end-of-life decision making in intensive care, including two studies from China and the West Indies[13], and a review of terminal withdrawal of mechanical ventilation including a study from Japan[14]. It is clear that the evidence base for care within these systematically constructed reviews is not only Western-centric but also derived primarily from high-income countries. It is critically important to understand whether these benefits from the integration of palliative and intensive care can be replicated in different cultures and contexts, and in particular what the challenges of achieving this in resource-poor countries might be. As a first step, it is crucial to understand the scope and topics of research on the provision of palliative care within intensive care units in low- and middle-income countries to enable planning of appropriately positioned research and facilitate future policy and practice developments in a context-specific manner.

Materials and methods

Review question

What is known from the literature about the type and topics of research on the provision of palliative care within intensive care units in low- and middle-income countries?

Review design

A scoping review design was chosen as this addresses an exploratory research question, enabling mapping of key concepts across a field of research using a systematic approach[15-17]. They are commonly used where a body of literature needs to be broadly understood in an understudied field, and where a range of papers and study types can contribute to mapping understanding in a topic area. It is reported here using the PRISMA ScR checklist extension for scoping studies[18]. The review followed the Arksey, O'Malley [16] framework stages for the conduct of scoping reviews combined with the Levac, Colquhoun, O'Brien [17] enhancements: identifying the research question, identifying relevant studies, study selection, charting the data, and collating results[15]. A formal assessment of the methodological quality of included studies is usually not performed[16, 19].

Search strategy:

A comprehensive search across nine electronic citation databases (PubMed (MEDLINE); EMBASE; Cochrane Central; PsychINFO; CINAHL; Scopus; Google Scholar; Web of Science and Cochrane Library) was conducted from January 1, 1990, to May 25, 2021, with the earlier date chosen as preliminary searches identified few studies before this date. Search terms for "palliative care" AND "intensive care" AND "low- and middle-income countries" were combined. Each term was entered as a key word, combined using relevant Boolean operators and corresponding subject headings. Full search strings are presented in Appendix 1. Reference lists of included studies and existing reviews were searched to identify any additional relevant studies.

Inclusion and Exclusion Criteria:

Articles were determined eligible for inclusion if they met the criteria outlined in table 1. Typical of scoping reviews, these criteria are broad to enable mapping of knowledge in a research area, enabling inclusion of a range of paper types.

<Insert table 1 around here >

Data extraction and analysis:

All identified articles yielded from the searches were exported to a reference manager software (Mendeley), and duplicate entries removed. The Mendeley database file was then transferred to an online systematic review software Rayyan[20], for screening. Team members (UJ, JP, BR) independently screened titles and abstracts to identify studies that met inclusion criteria or where eligibility could not be determined from the given information. All entries deemed as not meeting inclusion criteria were reviewed by another team member to confirm exclusion (SR). Full-text articles were then retrieved and scrutinized for inclusion by two team members (UJ, JP), with discussion with a third team member (SR) if required. Difficulties concerning inclusion were resolved in consultation with the coauthors' consensus.

Data were extracted using a standardized template and charted to describe and summarize information. Extracted data included author(s), year of publication, country of origin, study aim, study design and sample, population characteristics, intensive care unit type, intensive care unit and palliative care definition, description of intervention and main findings. The details were summarized in tables and were reviewed by all members of the team to ensure accuracy. Following data extraction, data were summarized across studies, and a content analysis approach[21] was used to identify and code broad thematic areas across the included studies.

Results

Thirty papers are included in the review (Figure 1, Table 2).

< Insert Figure 1 around here>

<Insert Table 2 around here>

Twenty-four papers report 19 empirical studies (one study is reported across three papers, another across two papers) and two clinical case reports. Six are discussion or position papers. Whilst the six discussion/position papers are all from India; the empirical and clinical studies are from India (8), Egypt (4), Pakistan (2) and single papers from Nigeria, Rwanda, Tunisia, Uganda, and Vietnam. Three papers report data from one multi-national study, two presenting multi-national data, and one just the data from Bangladesh. The empirical and clinical papers are primarily observational studies using routinely collected patient-level data (7), but other designs include surveys (primarily surveying doctors and/or nurses) (6), qualitative approaches (5), case reports (2), consensus methods (1) and mixed methods (1). There are no trials or other robust evaluative or comparative studies and no studies that directly seek data from patients or families themselves (rather than using routinely collected patient data). Years of publication (Figure 2) ranged from 2005 to 2021, albeit without the typical growth over time seen in other research areas in the field[22].

<Insert Figure 2 around here>

Assessment of the content of included papers to identify the breadth and scope of research on the provision of palliative care within intensive care units in low- and middle-income identified five broad areas: (1) Withholding and/or withdrawing treatment and issues associated with futile treatment or legal issues; (2) Professionals' roles, care provision, knowledge and skills; (3) Patient and family views and their involvement in decision making; (4) Culture, context, and values; (5) Costs of care. Table 3 gives a high-level summary of contribution of each included paper to these areas.

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The breadth and scope of each area of research is now presented in turn.

Withholding, withdrawing treatment, futility and legal issues

This was the most common area of study and discussion, with 22 of the 30 included papers addressing some aspect associated with this area. In nine of the empirical studies (12 papers), exploring these aspects was one of the primary goals of the study[23-34]. In the one multi-national study across Asia, respondents from low- and middle-income countries were generally less likely than those in high-income countries to limit aggressive life support such as cardiopulmonary resuscitation, mechanical ventilation, vasopressors, inotropes, tracheostomy, and haemodialysis, although they were more likely to limit routine treatments such as enteral nutrition, intravenous fluid therapy and oral suctioning[23, 24]. Withholding new treatment is more commonly practiced than withdrawing already commenced treatments. For example, one study in India found therapy was limited in 34% of intensive care unit deaths but withdrawn in only 8%[26], mirrored in another Indian study which found that 58% had withholding of treatment, and 7% withdrawal[30]. Indian nurses felt it correct to continue hydration and feeding until death, but not to initiate invasive procedures[35], with a high threshold for treatment initiation has been found[36]. Such findings are mirrored in studies in other countries such as Egypt and Tunisia[31, 37], and a study in Pakistan found that 16% would not withdraw life support under any circumstances[29].

A primary concern expressed in multiple studies related to the legality of such practices within the systems of their country (or a sense of not being protected by the legal system)[24, 25, 33, 38, 39], but also issues of personal care philosophies, family requests, and cultural values[29]. Some felt that discussions of withdrawal from treatment could be the worst part of their job[40]. However, studies also explored concerns about what were perceived to be unnecessary procedures and interventions, sometimes perceived unnecessary because of medical futility or quality of life[33], but also because of an anticipated high-cost burden to families[32]. Care quality was also a concern, with one study in Rwanda suggesting concerns that patients with do-not-resuscitate orders received sub-optimal care[34].

Professional roles, care provision, knowledge, and skills

Concerns were raised in several studies about the knowledge and skills about palliative and end-of-life care of those working in intensive care units in low- and middle-income countries. A number of Egyptian studies concluded that the knowledge and skills of intensive care nurses about palliative care were poor or inadequate, with scores on a number of knowledge and practice domains across these studies at or below half the expected level[41-43]. A study of Indian doctors found that most felt comfortable discussing prognosis and goals of care, identifying a dying patient, managing their symptoms and discussing organ donation, although they were unaware of the existing guidelines on end-of-life care[44]. However, whilst over 60% had cared for ten or more dying patients, almost half had never communicated regarding organ donation to people who were diagnosed with brain death, and fewer than 1% had had ten or more such discussions with family members[44]. A desire to receive training to handle particular dilemmas was strongly felt, and that discussion of ethical dilemmas were uncommon[40]. Respondents in one study highlighted how they worked hard to maintain patient dignity in challenging situations, but this was not consistently seen in the care of those who were sedated, but with challenges of resources and adequate training[45].

Few studies explored clinical aspects of care provision, but one study in India did find that earlier commencement of end-of-life care once medical futility was recognized did lead to a higher number of antibiotic-free days and fewer medical and surgical interventions[28], with lesser drug consumption for those who were younger[27].

Patient and family views, involvement in decision making

No studies sought the views of patients or their families directly, but some studies did report the proxy views of clinicians about their interactions with patients and families and their views of what patients and families desire from care. In one comparative study, doctors in low- and middle-income countries were more likely to involve families in end-of-life care decisions than those in high-income Asian countries but less likely to consider patient's wishes[24]. Doctors in low- and middle-income countries also perceived a higher frequency of inappropriate requests for life-sustaining treatments from patients or family members than those in high income countries[24].

There were challenges explored about when and whether to accede to or override a family's wishes. For example, in one Nigerian study, respondents felt the importance of discussing with families if care was considered futile, but experienced pressure to continue treatment from relatives who were high profile or clinically qualified themselves[32]. In one Vietnamese study, 72% of providers surveyed would be willing to override a family's wish to withdraw life-sustaining treatment, although most agreed that the family should be involved in different aspects of care[33]. Clinician's expressed a great sense of responsibility, and doctors in two Indian studies in neonatal intensive care felt responsibility for a family's future, with a duty to protect family and child, having to take financial, familial and societal concerns into account[36, 40]. They felt there were communication problems with parents with poor education and low socio-economic status, and little understanding of medical terminology. Whilst they wanted to involve families, the power differential, with doctors being revered, made this challenging[40].

Culture, context, and values

Issues explored included cultural issues associated with considerations such as gender, cultural traditions and values, and religious beliefs. Gender was highlighted as an issue with some identifying that it was easier to consent to withdrawal of treatment with female children[40]. Clinicians could feel a strong duty to protect female newborns against culturally entrenched discrimination but powerless to change long-standing prejudices[36]. At least one study also highlighted feelings that care given by a gender opposite nurse is culturally insensitive[45].

It was felt that the continuation of futile care could be fueled by religious factors (e.g., afterlife) or cultural factors (e.g., traditional medicine efficacy). A sense of wishing to be intact in the afterlife may affect aspects of care[32]. Religion itself was infrequently identified as an issue within the empirical papers included, although the discussion papers argue that religious biases should not affect care[38]. Cultural and contextual factors were argued to be important in the discussion documents, highlighting that most evidence is based on Western medico-ethical standards, and there is an urgent need to contextualize existing recommendations[46].

Costs of care

Costs were explored with reference to complex socio-economic reasons influencing treatment decisions, based primarily on the appraisal of the financial burden and consequences for families and the scarcity of institutional resources. The included pan-Asian comparative study found that doctors from low- and middle-income countries were more likely to consider the personal financial burdens of treatment than those from high-income countries[24]. When considering the financial burdens on families, respondents across studies referred to issues such as the costs to the family of raising a disabled child, which may affect the ongoing care of other siblings or family members[40]. There was a future focus as well as the immediate cost burden, not just thinking of the unaffordability of treatment in the here and now but about adding to the future financial and emotional burdens on families[32]. Where payment could be made, providers valued the family's ability to pay to continue life-sustaining treatment[33].

The second issue raised was one of the scarcity of resources, both in terms of not offering the best treatment but having to ration treatment amongst those who may be able to benefit[40]. Lack of functional equipment is a challenge, high workload, and can lead to unsafe care[45].

Discussion

This scoping review of research exploring the breadth and scope of research on the provision of palliative care within intensive care units in low- and middle-income countries identified 30 papers across 19 empirical studies, two clinical case reports, and six discussion papers. Papers from South Asia and Africa predominated, with most studies using observational, routine data, surveys, or qualitative approaches to explore issues. No studies directly sought data from patients or families themselves, and there were no trials or other robust evaluations of interventions or outcomes. Key areas addressed in the studies included those of withdrawing and withholding treatment, knowledge and skills, patient and family views, culture and context, and costs of care.

The focus of the papers from low- and middle-income countries scoped in this review appear to differ in topic and design from the wider literature on the intersection between palliative and intensive care, that mostly derives from high-income countries. Typical topics of study in high-income countries that were not found or under-represented in the studies from low- and middle-income countries include areas such as models of palliative care integration in intensive care, advance care planning, effectiveness of interventions, impact of palliative care on mortality, and bereavement care[5, 7-11, 47]. Areas of commonality include communication, costs of care, and withdrawal or limitation of treatment. However, whilst some areas of interest were common, the focus of the studies differed. Thus, for example, communication issues in low- and middle-income countries discussed were typically those of priorities in communication or poor preparation for this role[33-35, 44], in contrast, in high-income countries there appears a greater focus on barriers to communication and interventions to improve or facilitate communication[6, 13, 48]. Cost focus in low-and middle-income countries was primarily on the family ability to pay, rather than cost-reductions to the organization as found in studies in high-income countries[11].

A major focus of research attention in low- and middle-income countries was the withholding or withdrawal of treatment within the intensive care unit and the challenges of, and some reluctance to doing this, given particular cultural or religious contexts. The focus of reporting in high-income countries appears to be on the increasing acceptability of these approaches, albeit still with some cultural differences. A survey across Western Europe found much support for do-not-resuscitate orders, although with variation in applying do not resuscitate orders from 8% in Italy to 91% in the Netherlands[49]. As with the studies in low- and middle-income countries, withholding of treatment was more common than withdrawing treatment, but typically more acceptable within Western Europe, with 93% of respondents sometimes withholding treatment[49]. A more recent study found a shift in end-of-life practices in European intensive care units, comparing patients who had treatment limitations or died in 22 European intensive care units in 2015-2016 with data reported from the same units in 1999-2000. Limitations in life-prolonging therapies occurred significantly more frequently, and death without limitations in life-prolonging therapies occurred significantly less frequently over time[50].

Methodologically, the studies from low- and middle-income countries are primarily observational, descriptive studies rather than interventional or determining cause and effect. Studies typically appraise the current state of play of palliative care within intensive care units. Such studies are important, they help to describe what is happening as the basis for future planning and they can provide long-term information on care outcomes relatively inexpensively and easily, with large cohorts studied. Observational studies can be possible when a randomized controlled trial would be unethical, and there are methodological developments such as organized registries, propensity score matching and data linkages that enable more robust studies, able to address a wider range of questions[51]. However, there are important questions within this area that require a wider range of study designs. Randomized controlled trials are needed to test the effect of new or established interventions in the low- and middle-income context. Broader, robustly conducted qualitative studies using a range of approaches are needed to explore perceptions and experiences, both to (for example) understand the impact of an intervention in a trial context[52], but also as an important study design in their own right to explore issues such as the complexity of decision making processes in these contexts[53].

Strengths and limitations of this review

This review was systematically constructed and robustly conducted, such that there is relatively high confidence that much of the research published in English in this area has been identified in a way that is transparent and reproducible. The challenges of any such review are in identifying what precisely is meant by palliative care, but a broad and inclusive approach was taken to take account of this. A major limitation was that only papers in English were included, and it may be that many studies or papers of relevance about this topic are available in other languages, or in national language journals, but not found nor included. However, the Scopus list indicates that most journals in this field publish in English (90 of 98 journals) so the impact of this is likely limited. There was insufficient robust data to enable any form of meta-analysis or stratification by patient/provider characteristics. Most studies were conducted in low- and middle-income countries only, just one study provided a direct comparison with high-income countries.

Conclusions and recommendations

The provision of palliative care within intensive care in low- and middle-income countries is important, but under-studied, with little change in the number, type or focus of studies over time. The importance of culture and context in the way that care is or could be provided is, however, critically important and it is imperative that future research is conducted that is relevant to, and takes account of, the multiple contexts of care in different low- and middle- income countries. Results from studies in high-income countries are unlikely to be directly transferrable to other contexts. Attention should be paid to providing funding to support robust research in low- and middle- income country contexts so that findings are germane and culturally appropriate to influence care and improve outcomes.

Declarations

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Table 1. Inclusion and exclusion criteria

Inclusion criteria	
Focus	The focus was the intersection of palliative care and intensive care, including palliative care interventions within intensive care. We defined palliative care intervention as any intervention involving patient and family centered care; symptom management and comfort care; communication; continuity of care; emotional and practical support for patient and families; spiritual support; emotional and organizational support for intensive care clinicians; effect of interventions on patient/family/clinician systems and different palliative care models in intensive care. Studies could also describe care within the intensive care unit where the focus was on those anticipated to be at the end of life, where care was known to be medically futile, or could focus on exploring the palliative care skills, knowledge and attitudes of those working within intensive care.
Population	The study population could include adult or child patients, family or other informal carers, health care professionals, or volunteers.
Setting	Any literature where the setting or context for discussion was low- and middle-income countries.
Type of paper	As a scoping review the breadth included peer-reviewed empirical research studies, narrative summaries, commentaries, discussion pieces and editorials published in English.
Dates	Papers published from 1990 onwards.
Exclusion criteria	
Type of paper	Conference abstracts, letters to editors, grey literature, newspaper articles. Abstracts for which a full-text article could not be retrieved. Systematically constructed reviews were excluded, however if found the reference list would be scrutinized for any relevant additional studies.

Table 2. Summary of included papers

Author/date/ country	Research question/Objective	Design	Setting	Population	Data collection	Findings
Empirical studies - surveys						
Azab et al. 2020. Egypt[31]	To investigate physician's attitudes towards end of life care and reported practice in adult ICUs in Cairo.	Survey	ICU settings in Ain Shams University Hospitals, Cairo	Doctors. N=100	Self administered questionnaire.	Most agreed to implementaton of DNR orders (61%), byt only 13% always or often order DNR for terminally ill patients. 52% agreed to utility of limiting life-sustaining therapies, but with fear of legal consequences. 47% found withholding treatment more ethical than withdrawal.
Eltaybani et al. 2020. Egypt[41]	To assess palliative care education, practice and perceived competence among adult ICU nurses in Egypt.	Cross-sectional survey	33 adult ICUs in Egypt	Nurse managers (n=33) and staff nurses (n-403)	Self-administered questionnaires to assess practice and competence.	On 0-100 scale mean scores for education (54), practice (49) and perceived competence (54) were inadequate. Practice related to receiving in service training, competence to older age and higher education.
Fadadu et al. 2019. Vietnam[33]	To explore pediatric intensivists attitudes and practices surrounding end of life care in Vietnam.	Mixed methods (survey and interview)	Tertiary pediatric and neonatal intensive care unit in Hanoi.	Physicians (n-33) and nurses (n=35) completed survey, 18 interviewed.	Survey and interviews.	Factors influencing decision making process to escalate or withdaw treatment (e.g. 40% valued ability to pay); communication dynamics (72% would overrride a families wishes to withdraw treatment); providers perceptions of death (68% regard death as personal failure).
*Faruq et al. 2019. Bangladesh[25]	To describe attitude of physicians in ICUs towards witholding and withdrawal of life sustaining treatments in	Survey	ICUs in Bangladesh n=38	Physicians working in ICU in Bangladesh n=101	Self administered pre-set structured and scenario based survey.	72% would implement DNR orders. Perceived more legal risk with limitation of life sustaining treatments. 20/101 would withold treatment, 18/101 would withdraw

Author/date/ country	Research question/Objective	Design	Setting	Population	Data collection	Findings
	end of life care.					treatments.
Tripathy et al., 2017. India[35]	To investigate knowledge, attitude and beliefs of intensive care nurses in Eastern India towards end of life.	Survey	Delegates in two regional critical care nurses training programmes	Nurses (n=138)	Self-administered quesetionnaire.	82% felt that nurese should be involved in and initiate end of life discussions. Terms end of life or palliative care were new for 20%. 21% disagreed with allowing peaceful death in terminal patients and 56% unrestricted family visits.
Mohamed et al. 2016. India[44]	To survey the attitudes, training and skills of intensive care residents in relation to end of life care.	Survey	Adult intensive care in India	Residents (doctors) n=120	Questionnaire deploying Likert scales.	Residents in internal medicine have have had more experience with caring for the dying, and conducted more end of life discussions. 48% of respondents had never discussed organ donation. Males were more comfortable with end of life discussions.
*Phua et al. 2016. 10 LMIC and 6 HIC countries and regions in Asia[24]	To compare the attitudes of physicians towards witholding and withdrawing life-sustaining treatments in ICUS in LMIC and HIC Asian countries.	Survey	255 ICUS in 10 LMICS and 211 ICUS in 6 HIC countries.	Doctors in LMIC (n=847) and HIC (n=618) countries	Self-administered structured and scenario based survey	Physicians from LMIC were less likely to limit CPR, mechanical ventilation, vasopressors and inotropes, tracheostomy and haemodialysis. They were more likely to involve families in end of life care discussions and to perceive legal risks with limitation of life-sustaining treatments and DNR orders.
*Phua et al. 2015. 16 Asian countries and regions[23]	To describe physicians attitudes towards witholding and withdrawal of life sustaining treatments in end of life care and to evaluate factors associated with observed	Survey	466 ICUs across 16 Asian countries and regions	Doctors (n=1465)	Self-administered structured and scenario based survey	Where patients had no real chance of a meaningful life, 70% reported almost always or often witholding, and 21% withdrawing life-sustaining treatments. 74% deemed withholding and withdrawing ethically different. Attitudes and practice varied across countries and

Author/date/ country	Research question/Objective	Design	Setting	Population	Data collection	Findings
	attitudes.					regions. Refusal to implement DNR orders was more likely in low to middle income countries.
Salahuddin et al. 2008. Pakistan[29]	To document the comprehensions of physicans and nurses regarding the recognition and practice of end-of-life care for critially ill patients on life support in ICU	Cross-sectional survey	Three hospitals in Karachi, Pakistan.	Physicians and critical care nurses (n=137)	Survey assessing typical practices and knowledge	Withdrawal of life support practiced by 83%: physicians more likely to withdraw mechanical ventilation, nurses who would withdraw vasopressors. 16% never withdraw life support, 28% felt responsibility to sustain life at all costs, but only 8% gave religious beliefs as reason.
Empirical studies – observational studies						
+Choudhuri et al. 2021. India[27]	To measure the prevalance and identify and compare the risk factors for the delayed initiation of end of life care in terminally ill young adults.	Retrospective, observational.	Medical-surgical ICU in India	Terminally ill young adults between 20-40yrs admitted in 4 year period (n=66)	Routine data from medical records of those who were ’treatment futile’. Commencement of end of life care divided into normal or late group.	38% in normal group, 61% in late group. In normal group the education level, social and family support were higher. No difference in duration of ventilation, ICU stay or satisfaction
+Choudhuri et al. 2020. India[28]	To compare early vs. late initiation of end of life care in terminally ill ICU patients after the recognition of treatment futility.	Retrospective, observational study.	Mixed surgical medical ICU of teaching hospital in India.	Terminally ill patients (n=107) were recognised for treatment futility.	Retrospective analysis of medical notes with assessment of early initiation of end of life care if recognised within 48 hrs of recognition of treatment futility.	54% underwent early initiation of end of life against delayed initiation for 40%. Late initiation patients were younger. Late initiation caused by prognostic dilemma(30%), family reluctance (44%), physician ambivalence (18%).
Basal et al. 2017. Egypt[43]	To assess critical care nures knowledge and practice towards palliative care.	Descriptive, observational study.	Medical and oncology ICUs in Tanta, Egypt.	Nurses (n=70)	Structured interview, observational practice checklist, nurses perceptions of obstacles and helpful	Unsatisfactory knowledge scores from 77% of medical and 48% of oncology ICU nurses. More than half (51% and 25%) had poor practice.

Author/date/ country	Research question/Objective	Design	Setting	Population	Data collection	Findings
					measures towards palliative care.	
Youssef et al. 2014. Egypt[42]	To assess nurses knowledge and practices of palliative care among cancer patients.	Descriptive, observational study	National Cancer Institute, Egypt	Nurses working in the intensive care unit n=30	Structured knowledge assessment questionnaire and performance observational checklist	Studied nurses had unsatisfactory knowledge and practice levels with means scores of 57.7% and 51.09%.
Ouanes et al. 2012. Tunisia[37]	To report the frequency and types of end of life decisions in dying patients in two Tunisian ICUs.	Retrospective observational study	Two ICUs in same teaching hospital in Tunisia	Consecutive patients that died in participating ICUs over a two year period (n=326 deaths of 1733 patinets)	Decisions prospectively recorded by physicians, subjects characteristics retrospectively collected.	Decision to provide full support in 69%, withold (22.1%) or withdraw (8.9%). Severe underlying disease associated with withdrawal or witholding treatment.
Mani et al. 2009. India[30]	To document the end of life and full support decisions among patients dying in an ICU	Retrospective, observational study.	Medical-surgical ICU of a tertiary care private hospital in India	Consecutive admitted patients (88 deaths of 830 admissions).	Routine data including demographic, APACHE, ICU outcome, functional status, etc.	49% of deaths preceded by end of life decisions. Of these 58% had witholding of treatment, 35% DNR, 7% withdrawal decision. Functional dependence predicted end of life decisions.
Kapadia et al. 2005. India[26]	To describe the practices in intensive care units in Mumbai hospitals regarding limitation and withdrawal of care at end of life.	Review of prospectively collected data.	ICUs in four Mumbai hospitals	Hospital and intensive care unit patients who died during the study period (n=1045 deaths, 282 27% in ICU, and 143 in ICUs participating in study)	Prospective data from three hospitals as part of Simplified Acute Physiology Score III study (% of deaths in ICU, incidence witholding intubation, other therapy, withdrawing therapy)	ICU deaths 14% in cancer hospital, 23% in public hospital, 58-73% in two private hospitals. Limitation of care occurred in 49/143 patients who died.
Empirical studies - qualitative						
Rafiq et al. 2021.	To explore nurses	Qualitative	Tertiary care	Intensive and	In depth interviews.	Four themes: two sides of

Author/date/ country	Research question/Objective	Design	Setting	Population	Data collection	Findings
Pakistan[45]	perceptions about the dignity of intubated patients in the intensive and critical care units.	descriptive exploratory study	hospital, Pakistan	Critical Care nurses. N=14		conttemporary practice; benefits of dignified care; challenges to dignity of patients; strategies for promoting dignity
Onyeka et al., 2019. Nigeria[32]	To explore the concept of medically futile care as perceived by health care providers in a low-middle income ICU	Qualitative	ICUs in South-East Nigeria	Resident doctors (n=15)	Phenomenological in-depth interviews (IPA).	Five core themes: unecessary procedures; medically futile care; family caregiver influences; negative notions of medical futility; ICU outcomes.
Nankundwa and Brysiewicz, 2017, Rwanda[34]	To explore lived experiences of nurses caring for a patient with a DNR order in an ICU.	Qualitative	ICU in Kigali, Rwanda	Nurses (n=6)	Two phenomenological interviews per participant.	Categories: Feeling emotional distress; barrier to optimal care; not part of decision making.
Miljeteig et al. 2009. India[36]	To describe how providers in an Indian NICU reach life or death treatment decisions	Qualitative study	Indian non-profit tertiary institution	Key informants (doctors, obstetricians, heads of nursing, referral doctors) n=23.	Interviews, field observation of daily routines. Examination of key documents.	High threshold for treatment initiation and continuation. Providers wished to protect families, avoid harm. Openly factored issues of scares resources. Powerless to prevent gender discrimination.
Miljeteig and Norheim. 2006. India[40]	To explore and describe how Indian doctors experience ethical dilemmas concerning withdrawal of treatment among critically sick or premature neonates.	Qualitative study	Two state owned NICUs in India	Doctors with various levels of neonatal experience n=14	Interviews, analysed using Georgi's phenomenological approach.	Reported situations where withdrawal of treatment was experienced as worst part of job. Lacked training in how to handle dilemmas. Had a sense of responsibilty to families economy and reputation.
Empirical studies - other						
Eltaybani et al. 2020. Egypt[54]	To examine content validity and reliability of a proposed instrument to assess the palliative and end of life care education -practice-	Consensus methods	ICUs in Egypt	Nurses n=43	eDelphi and cross-sectional pilot questionnaire survey	Content validity confirmed, comprehensible.

Author/date/ country	Research question/Objective	Design	Setting	Population	Data collection	Findings
	competence triad among ICU nurses.					
Case reports						
Nakwagala and Nakbuuka, 2009, Uganda[55]	To describe a case of refusal by relatives to terminate life support in the ICU of Mulago Hospital, Kampala, Uganda	Case report	ICU in Uganda	Report of care of a 72 year old female Ugandan. Previous aneurysm. Managed for hypertensive stroke. Diagnosed with cerebral haemorrhage	Presentation of case data.	Case reveals differencees between developed and developing nations with lack of advance directives in developing nations, conflict among proxy decision makers, rationing issues, medical futility in the context of scarce resources and lack of institutional guidance documents and bedside ethics committees.
Ghoshal et al., 2017, India[56]	To 'present a glimpse' for neonatal intensive care in India, and 'build a case' for palliative care in a tertiary care hospital.	Case report	NICU in India	Report of care of premature (23wks) baby to a 20 year old mother.	Presentation of case data	Case reveals issues with pain management in the NICU, end of life care management, bereavement support, ethical dilemmas, parental stress, the involvement of health care professionasl and the cost of neonatal care.
Discussion and position papers						
Sengupta and Chatterjee. 2017. India[46]	To critically examine available policy guidelines on integration of palliative and end of life care in Indian intensive care units to appraise their congruene with Indian reality.	Six position statements and guidelines issued by Indian Society for Critical Care Medicine and Indian Association of Palliative Care. Policy documents confirm to set norms of introducing palliative care in intensive care units, they do not suit Indian reality. There are local complexities not addressed including difficulties in arriving at consensus decisions, challenges in death prognostication, hurdles in providing compassionate care, providing culture specific religious and spiritual care, barriers in effective communication, limitations of documenting end of life decisions, and ambiguity in defining modalities of palliative care.				
Kumar et al. 2015. India[57]	To present a structured approach to sensitive decisions.	Explores their experience of using 'allow natural death in ICU' document from New Zealand, and adaptation to Indian context.				

Author/date/ country	Research question/Objective	Design	Setting	Population	Data collection	Findings
Datta et al. 2012. India[58]	To examine concepts related to end of life care in ICUs to inform care	*Magnitude of the problem:* Paucity of data on end of life decisions in Indian ICUs. Studies limited because approaches such as DNR orders, living wills, advance directives are not legally acceptable. Fears of punitive action. Families value doctors decision making, and prefer to avoid conflicts. *Concept of euthanasia and medical futility*: Presents the consensus statement of the Indian Society of Critical Care Medicine's Ethics committee regarding futile treatment in ICUs e.g. moral obligation to inform family, communicate interventions and options, discuss implications, continue therapy until consensus decision reached, document discussions. Overall responsibility with doctor. *Witholding or withdrawal*: Even with legal sanction only some interventions are withdrawn or witheld. Challenges of cost. *Advance directives and DNR orders*: No legal sanction in India. *Transplantation and other legal issues*: Constitution guarantees right to live.				
Mani et al. 2012. India[38]	To present the ISCCM consensus ethical position statement on end of life and palliative care in Indian intensive care units.	*Guidelines summary:* • Moral and legal oplication to disclose prognosis, and initiate open discussions. • When informed capable patient/family wants only 'comfort care', physician shoul dcommunicate standard modalities of limiting life-prolonginginterventions. • Must elicit and responce patient/family choices and work towards shared decision making. Respect autonomy. • Continue all life supporting interventions pending consensus decisions or in event of conflict with family/patient. Not morally or legally obliged to institute new therapies against clinical judgement. • Documentation must be transparent and accurate • Overall responsibility for an end of life decision rests with intensivist/attending physician. • If capable patient/family consistently desires that life support be withdrawn, treating team is ethically bound to consider withdrawing. • Withdrawal or witholding decision should be implemented after completing a life support limitation form. Physician is obliged to proeide compassionate and effective palliative care to the patient.				
Dighe et al., 2011. India[59]	To 'build a case' for palliative care in the Indian NICU setting.	Medical issues: Pain management in ICU, end of life care, bereavement support. Ethical issues: Discussion of two scenarios around resuscitation at birth and witholding or withdrawing futile treatments in NICU. Stress of parents, and costs of NICU.				
Mani. 2006. India[39]	To explore ethical and legal implications of foregoing life support in Indian context.	*Limiting life support in Indian ICUs:* Impact of continuing futile therapies, in the context of rapidly expanding and improving healthcare, but with variable standards (and costs) between hospital types. Indians are fatalistic, but limitation of therapy precedes only around 20-50% of deaths. *Impediments to limiting therapies in India:* Large numbers of patients, but no culture of withdrawing or witholding support. DNR orders rarely written. Market forces and demand for 'the best'. Paternalistic medicine shields patients.				

Author/date/ country	Research question/Objective	Design	Setting	Population	Data collection	Findings
		Can be legal action, so ’safer’ to continue treatment. ’left against medical advice’ is therefore prevalent, where doctor/hospital absolved of responsibility. Withdrawing treatment can be seen as akin to suicide, an offence. *Legal precedents*: Few, and limited in scope. *Professional guidelines:* Consensus statement written, but with scant empirical data to support.				

* Indicates data from the same study reported across three papers.

\+ Indicates data from the same study reported across two papers

Abbreviations: Intensive Care Unit (ICU), Do not resuscitate (DNR), Cardio-pulmonary resuscitation (CPR), Neonatal intensive care unit (NICU), Low- and middle-income country (LMIC), High-income country (HIC).

Table 3 Topic areas of included studies

	Withdrawing, witholding treatment. Futility. Legal issues	Professional roles, care provision, knowledge and skills, communication	Patient and family views, involvement in decision making.	Culture, context, and values	Costs of care
Empirical papers					
+Choudhuri et al. 2021. India[27]	X	X	X		
Rafiq et al. 2021. Pakistan[45]		X	X	X	
Azab et al. 2020. Egypt[31]	X			X	
+Choudhuri et al. 2020. India[28]	X	X			
Eltaybani et al. 2020. Egypt[54]		X			
Eltaybani et al. 2020. Egypt[41]		X			
Fadadu et al. 2019. Vietnam[33]	X	X	X	X	X
*Faruq et al. 2019. Bangladesh[25]	X	X		X	
Onyeka et al., 2019. Nigeria[32]	X		X		X
Basal et al. 2017. Egypt[43]		X			
Nankundwa and Brysiewicz, 2017, Rwanda[34]		X	X	X	
Tripathy et al., 2017. India[35]		X		X	
Mohamed et al. 2016. India[44]	X	X			
*Phua et al. 2016. 10	X	X	X		X

	Withdrawing, witholding treatment. Futility. Legal issues	Professional roles, care provision, knowledge and skills, communication	Patient and family views, involvement in decision making.	Culture, context, and values	Costs of care
LMIC and 6 HIC countries and regions in Asia[24]					
*Phua et al. 2015. 16 Asian countries and regions[23]	X	X		X	
Youssef et al. 2014. Egypt[42]		X			
Ouanes et al. 2012. Tunisia[37]	X				
Mani et al. 2009. India[30]	X				
Miljeteig et al. 2009. India[36]	X	X	X	X	X
Salahuddin et al. 2008. Pakistan[29]	X	X		X	
Miljeteig and Norheim. 2006. India[40]	X	X	X	X	
Kapadia et al. 2005. India[26]	X				
Case reports					
Nakwagala and Nakbuuka, 2009, Uganda[55]	X		X	X	X
Ghoshal et al., 2017, India[56]		X	X	X	X
Discussion and position papers					
Sengupta and Chatterjee. 2017. India[46]	X	X	X	X	
Kumar et al. 2015. India[57]	X		X		
Datta et al. 2012.	X				

	Withdrawing, witholding treatment. Futility. Legal issues	Professional roles, care provision, knowledge and skills, communication	Patient and family views, involvement in decision making.	Culture, context, and values	Costs of care
India[58]					
Mani et al. 2012. India[38]	X	X	X	X	X
Dighe et al., 2011. India[59]	X	X	X	X	X
Mani. 2006. India[39]	X		X		X

Figure legends

Figure 1. Flow diagram of studies included in scoping review

Figure 2. Year of publication for papers included in the review (n=30).

Appendix 1 Search terms

Key terms used in MEDLINE & PubMed

Search	**Search Terms**
#1 **(ICU)**	"Intensive Care Units"[Mesh] OR "Respiratory Care Units"[Mesh] OR "Coronary Care Units"[Mesh] OR "Burn Units"[Mesh] OR "Critical Care"[Mesh] OR "Critical Illness"[Mesh] OR "Emergency Medical Services"[Mesh] OR "Trauma Centers"[Mesh] OR (ICU) OR (icu) OR ("intensive care unit") OR ("critical care units") OR ("high dependency unit") OR (HDU) OR (hdu) OR ("cardiac care unit") OR (critical*) OR ("pulmonary care unit") OR (intensive*)
#2 **(Palliative Care)**	"Palliative Care"[Mesh] OR "Hospice and Palliative Care Nursing"[Mesh] OR "Palliative Medicine"[Mesh] OR "Terminal Care"[Mesh] OR "Hospice Care"[Mesh] OR ("end of life care") OR (EOLC) OR terminally ill[MeSH] OR ("terminal patient*") OR ("life-limiting illness") OR ("life-limiting condition*") OR ("terminal phase") OR ("terminal stage") OR ("EOL care") OR ("comfort care") OR ("hospice program") OR (hospice*) OR hospice[MeSH] OR ("supportive care") OR ("supportive treatment") OR ("supportive therapy") OR ("bereavement care") OR ("bereavement counselling") OR ("symptom management") OR ("symptomatic treatment") OR ("symptomatic therapy") OR ("advanced illness") OR (palliat*) OR ("end of life")
# 3 **(Low and Low Middle Income Countries [Based on World Bank Atlas 2021])**	"Afghanistan"[Mesh] OR "Burkina Faso"[Mesh] OR "Burundi"[Mesh] OR "Central African Republic"[Mesh] OR "Chad"[Mesh] OR "Congo"[Mesh] OR "Democratic Republic of the Congo"[Mesh] OR "Eritrea"[Mesh] OR "Ethiopia"[Mesh] OR "Gambia"[Mesh] OR "Guinea"[Mesh] OR "Guinea-Bissau"[Mesh] OR "Papua New Guinea"[Mesh] OR "Haiti"[Mesh] OR "Democratic People's Republic of Korea"[Mesh] OR "Liberia"[Mesh] OR "Madagascar"[Mesh] OR "Malawi"[Mesh] OR "Mali"[Mesh] OR "Mozambique"[Mesh] OR "Niger"[Mesh] OR "Rwanda"[Mesh] OR "Sierra Leone"[Mesh] OR "Somalia"[Mesh] OR "Sudan"[Mesh] OR "South Sudan"[Mesh] OR "Syria"[Mesh] OR "Tajikistan"[Mesh] OR "Togo"[Mesh] OR "Uganda"[Mesh] OR "Yemen"[Mesh] OR "Angola"[Mesh] OR "Algeria"[Mesh] OR "Bangladesh"[Mesh] OR "Benin"[Mesh] OR "Bhutan"[Mesh] OR "Bolivia"[Mesh] OR "Cabo Verde"[Mesh] OR "Cambodia"[Mesh] OR "Comoros"[Mesh] OR "Cote d'Ivoire"[Mesh] OR "Djibouti"[Mesh] OR "Egypt"[Mesh] OR "El Salvador"[Mesh] OR "Eswatini"[Mesh] OR "Ghana"[Mesh] OR "Honduras"[Mesh] OR "India"[Mesh] OR "Micronesia"[Mesh] OR "Kyrgyzstan"[Mesh] OR "Lesotho"[Mesh] OR "Mauritania"[Mesh] OR "Moldova"[Mesh] OR "Mongolia"[Mesh] OR "Morocco"[Mesh] OR "Myanmar"[Mesh] OR "Nepal"[Mesh] OR "Nicaragua"[Mesh] OR "Nigeria"[Mesh] OR "Pakistan"[Mesh] OR "Philippines"[Mesh] OR "Sao Tome and Principe"[Mesh] OR "Senegal"[Mesh] OR "Melanesia"[Mesh] OR "Sri Lanka"[Mesh] OR "Tanzania"[Mesh] OR "Timor-Leste"[Mesh] OR

"Tunisia"[Mesh] OR "Ukraine"[Mesh] OR "Uzbekistan"[Mesh] OR "Vanuatu"[Mesh] OR "Vietnam"[Mesh] OR "Middle East"[Mesh] OR "Zambia"[Mesh] OR "Zimbabwe"[Mesh] OR "Developing Countries"[Mesh] OR “low resource settings” OR “low income population” OR “resource poor settings” OR “resource limited settings” OR developing OR low-income OR "low income" OR "low resource" OR low-resource OR resource-poor OR "resource poor" OR "resource limited" OR resource-limited N3 (population* OR country OR countries OR setting* OR nation*)

Key terms used in CINHAL

Search	Search Terms
#1 **(ICU)**	(MM "Intensive Care Units+") OR (MM "Intensive Care Units, Neonatal") OR (MM "Intensive Care Units, Pediatric+") OR (MM "Coronary Care Units") OR (MH "Visitors to Patients") OR (MM "Oncology Care Units")
#2 **(Palliative Care)**	(MH "Hospice and Palliative Nursing") OR (MM "Advanced Trauma Life Support Care") OR (MM "Life Support Care") OR (MM "Palliative Care") OR (MH "Terminal Care (Saba CCC)+") OR (MM "Terminal Care") OR (MM "Hospice Care") OR (MH "National Association for Home Care & Hospice") OR (MH "Pregnancy Termination Care (Iowa NIC)") OR (MH "Palliative Medicine") OR (MM "Intensive Care Units")
# 3 **(Low and Low Middle Income Countries [Based on World Bank Atlas 2021])**	(MM "Low and Middle Income Countries") OR "Developing Countries"[Mesh] OR “low resource settings” OR “low income population” OR “resource poor settings” OR “resource limited settings” OR developing OR low-income OR "low income" OR "low resource" OR low-resource OR resource-poor OR "resource poor" OR "resource limited" OR resource-limited N3 (population* OR country OR countries OR setting* OR nation*)

Key terms used in EMBASE & Psych Info

Search	Search Terms
#1 **(ICU)**	("Intensive Care Units" or "Respiratory Care Units" or "Coronary Care Units" or "Burn Units" or "Critical Care" or "Critical Illness" or "Emergency Medical Services" or "Trauma Centers" or ICU or icu or "intensive care unit" or "critical care units" or "high dependency unit" or HDU or hdu or "cardiac care unit" or critical* or "pulmonary care unit" or intensive*).mp.
#2 **(Palliative Care)**	("Palliative Care" or "Hospice and Palliative Care Nursing" or "Palliative Medicine" or "Terminal Care" or "Hospice Care" or "end of life care" or EOLC or terminally ill or "terminal patient*" or "life-limiting illness" or "life-limiting condition*" or "terminal phase" or "terminal stage" or "EOL care" or "comfort care" or "hospice program" or hospice* or hospice or "supportive care" or "supportive treatment" or "supportive therapy" or "bereavement care" or "bereavement counselling" or

	"symptom management" or "symptomatic treatment" or "symptomatic therapy" or "advanced illness" or palliat* or "end of life").mp.
# 3 **(Low and Low Middle Income Countries [Based on World Bank Atlas 2021])**	("Afghanistan" or "Burkina Faso" or "Burundi" or "Central African Republic" or "Chad" or "Congo" or "Democratic Republic of the Congo" or "Eritrea" or "Ethiopia" or "Gambia" or "Guinea" or "Guinea-Bissau" or "Papua New Guinea" or "Haiti" or "Democratic People's Republic of Korea" or "Liberia" or "Madagascar" or "Malawi" or "Mali" or "Mozambique" or "Niger" or "Rwanda" or "Sierra Leone" or "Somalia" or "Sudan" or "South Sudan" or "Syria" or "Tajikistan" or "Togo" or "Uganda" or "Yemen" or "Angola" or "Algeria" or "Bangladesh" or "Benin" or "Bhutan" or "Bolivia" or "Cabo Verde" or "Cambodia" or "Comoros" or "Cote d'Ivoire" or "Djibouti" or "Egypt" or "El Salvador" or "Eswatini" or "Ghana" or "Honduras" or "India" or "Micronesia" or "Kyrgyzstan" or "Lesotho" or "Mauritania" or "Moldova" or "Mongolia" or "Morocco" or "Myanmar" or "Nepal" or "Nicaragua" or "Nigeria" or "Pakistan" or "Philippines" or "Sao Tome and Principe" or "Senegal" or "Melanesia" or "Sri Lanka" or "Tanzania" or "Timor-Leste" or "Tunisia" or "Ukraine" or "Uzbekistan" or "Vanuatu" or "Vietnam" or "Middle East" or "Zambia" or "Zimbabwe").mp.

Key terms used in Scopus

"Intensive Care Units" OR "critical care units" OR "ICU" AND "Palliative Care" OR "Terminal Care" OR "Hospice Care" OR "end of life care" AND (LIMIT-TO (PUBYEAR,2022) OR LIMIT-TO (PUBYEAR,2021) OR LIMIT-TO (PUBYEAR,2020) OR LIMIT-TO (PUBYEAR,2019) OR LIMIT-TO (PUBYEAR,2018) OR LIMIT-TO (PUBYEAR,2017) OR LIMIT-TO (PUBYEAR,2016) OR LIMIT-TO (PUBYEAR,2015) OR LIMIT-TO (PUBYEAR,2014) OR LIMIT-TO (PUBYEAR,2013) OR LIMIT-TO (PUBYEAR,2012) OR LIMIT-TO (PUBYEAR,2011) OR LIMIT-TO (PUBYEAR,2010) OR LIMIT-TO (PUBYEAR,2009) OR LIMIT-TO (PUBYEAR,2008) OR LIMIT-TO (PUBYEAR,2007) OR LIMIT-TO (PUBYEAR,2006) OR LIMIT-TO (PUBYEAR,2005) OR LIMIT-TO (PUBYEAR,2004) OR LIMIT-TO (PUBYEAR,2003) OR LIMIT-TO (PUBYEAR,2002) OR LIMIT-TO (PUBYEAR,2001) OR LIMIT-TO (PUBYEAR,2000) OR LIMIT-TO (PUBYEAR,1999) OR LIMIT-TO (PUBYEAR,1998) OR LIMIT-TO (PUBYEAR,1997) OR LIMIT-TO (PUBYEAR,1996) OR LIMIT-TO (PUBYEAR,1995) OR LIMIT-TO (PUBYEAR,1994) OR LIMIT-TO (PUBYEAR,1993) OR LIMIT-TO (PUBYEAR,1992) OR LIMIT-TO (PUBYEAR,1991) OR LIMIT-TO (PUBYEAR,1990)) AND (LIMIT-TO (DOCTYPE,"ar") OR LIMIT-TO (DOCTYPE,"re")) AND (LIMIT-TO (AFFILCOUNTRY,"India") OR LIMIT-TO (AFFILCOUNTRY,"Argentina") OR LIMIT-TO (AFFILCOUNTRY,"Pakistan") OR LIMIT-TO (AFFILCOUNTRY,"Ghana") OR LIMIT-TO (AFFILCOUNTRY,"Philippines") OR LIMIT-TO (AFFILCOUNTRY,"Uganda") OR LIMIT-TO (AFFILCOUNTRY,"Tunisia") OR LIMIT-TO (AFFILCOUNTRY,"Ethiopia") OR LIMIT-TO (AFFILCOUNTRY,"Malta") OR LIMIT-TO (AFFILCOUNTRY,"Viet Nam") OR LIMIT-TO (AFFILCOUNTRY,"Bangladesh") OR LIMIT-TO (AFFILCOUNTRY,"Rwanda") OR LIMIT-TO (AFFILCOUNTRY,"Sudan") OR LIMIT-TO (AFFILCOUNTRY,"Tanzania") OR LIMIT-TO (AFFILCOUNTRY,"Malawi") OR LIMIT-TO (AFFILCOUNTRY,"Mongolia") OR LIMIT-TO (AFFILCOUNTRY,"Moldova") OR LIMIT-TO (AFFILCOUNTRY,"Nepal") OR LIMIT-TO (AFFILCOUNTRY,"Sri Lanka") OR LIMIT-TO (AFFILCOUNTRY,"Afghanistan") OR LIMIT-TO (AFFILCOUNTRY,"Algeria") OR LIMIT-TO (AFFILCOUNTRY,"Congo") OR LIMIT-TO (AFFILCOUNTRY,"Guinea") OR LIMIT-TO (AFFILCOUNTRY,"Yemen") OR LIMIT-TO (AFFILCOUNTRY,"Zambia") OR LIMIT-TO (AFFILCOUNTRY,"Angola") OR LIMIT-TO (AFFILCOUNTRY,"Belarus") OR LIMIT-TO (AFFILCOUNTRY,"Bhutan") OR LIMIT-TO (AFFILCOUNTRY,"Bolivia") OR LIMIT-TO (AFFILCOUNTRY,"Cote d'Ivoire") OR LIMIT-TO (AFFILCOUNTRY,"Honduras") OR LIMIT-TO (

AFFILCOUNTRY,"Liberia") OR LIMIT-TO (AFFILCOUNTRY,"Myanmar") OR LIMIT-TO (AFFILCOUNTRY,"Papua New Guinea") OR LIMIT-TO (AFFILCOUNTRY,"Sierra Leone") OR LIMIT-TO (AFFILCOUNTRY,"Togo"))

Key terms used in Google Scholar

Search	Search Terms
#1 **(ICU)**	"Intensive Care Units" OR "critical care units" OR "ICU"
#2 **(Palliative Care)**	Palliative Care" OR "Terminal Care" OR "Hospice Care" OR "end of life care"
# 3 **(Low and Low Middle Income Countries [Based on World Bank Atlas 2021])**	LMIC" OR "Low and middle income countries" OR "developing countries" OR "low resource country"

Key terms used in Web of Science

Search	Search Terms
#1 **(ICU)**	TI=(ICU OR "intensive care unit" OR "critical care units" OR "high dependency unit" OR HDU OR "cardiac care unit" OR critical* OR "pulmonary care unit" OR intensive*) AB=(ICU OR "intensive care unit" OR "critical care units" OR "high dependency unit" OR HDU OR "cardiac care unit" OR critical* OR "pulmonary care unit" OR intensive*)
#2 **(Palliative Care)**	TI=("end of life care" OR EOLC OR "terminal patient*" OR "life-limiting illness" OR "life-limiting condition*" OR "terminal phase" OR "terminal stage" OR "EOL care" OR "comfort care" OR "hospice program" OR hospice* OR "supportive care" OR "supportive treatment" OR "supportive therapy" OR "bereavement care" OR "bereavement counselling" OR "symptom management" OR "symptomatic treatment" OR "symptomatic therapy" OR "advanced illness" OR palliat* OR "end of life") AB=("end of life care" OR EOLC OR "terminal patient*" OR "life-limiting illness" OR "life-limiting condition*" OR "terminal phase" OR "terminal stage" OR "EOL care" OR "comfort care" OR "hospice program" OR hospice* OR "supportive care" OR "supportive treatment" OR "supportive therapy" OR "bereavement care" OR "bereavement counselling" OR "symptom management" OR "symptomatic treatment" OR "symptomatic therapy" OR "advanced illness" OR palliat* OR "end of life")

# 3 **(Low and Low Middle Income Countries [Based on World Bank Atlas 2021])**	TI=("Afghanistan" OR "Burkina Faso" OR "Burundi" OR "Central African Republic" OR "Chad" OR "Congo" OR "Democratic Republic of the Congo" OR "Eritrea" OR "Ethiopia" OR "Gambia" OR "Guinea" OR "Guinea-Bissau" OR "Papua New Guinea" OR "Haiti" OR "Democratic People's Republic of Korea" OR "Liberia" OR "Madagascar" OR "Malawi" OR "Mali" OR "Mozambique" OR "Niger" OR "Rwanda" OR "Sierra Leone" OR "Somalia" OR "Sudan" OR "South Sudan" OR "Syria" OR "Tajikistan" OR "Togo" OR "Uganda" OR "Yemen" OR "Angola" OR "Algeria" OR "Bangladesh" OR "Benin" OR "Bhutan" OR "Bolivia" OR "Cabo Verde" OR "Cambodia" OR "Comoros" OR "Cote d'Ivoire" OR "Djibouti" OR "Egypt" OR "El Salvador" OR "Eswatini" OR "Ghana" OR "Honduras" OR "India" OR "Micronesia" OR "Kyrgyzstan" OR "Lesotho" OR "Mauritania" OR "Moldova" OR "Mongolia" OR "Morocco" OR "Myanmar" OR "Nepal" OR "Nicaragua" OR "Nigeria" OR "Pakistan" OR "Philippines" OR "Sao Tome and Principe" OR "Senegal" OR "Melanesia" OR "Sri Lanka" OR "Tanzania" OR "Timor-Leste" OR "Tunisia" OR "Ukraine" OR "Uzbekistan" OR "Vanuatu" OR "Vietnam" OR "Middle East" OR "Zambia" OR "Zimbabwe" OR "Developing Countries" OR "low resource settings" OR "low income population" OR "resource poor settings" OR "resource limited settings" OR developing OR low-income OR "low income" OR "low resource" OR low-resource OR resource-poor OR "resource poor" OR "resource limited" OR resource-limited NEAR/3 (population* OR country OR countries OR setting* OR nation*)) AB=("Afghanistan" OR "Burkina Faso" OR "Burundi" OR "Central African Republic" OR "Chad" OR "Congo" OR "Democratic Republic of the Congo" OR "Eritrea" OR "Ethiopia" OR "Gambia" OR "Guinea" OR "Guinea-Bissau" OR "Papua New Guinea" OR "Haiti" OR "Democratic People's Republic of Korea" OR "Liberia" OR "Madagascar" OR "Malawi" OR "Mali" OR "Mozambique" OR "Niger" OR "Rwanda" OR "Sierra Leone" OR "Somalia" OR "Sudan" OR "South Sudan" OR "Syria" OR "Tajikistan" OR "Togo" OR "Uganda" OR "Yemen" OR "Angola" OR "Algeria" OR "Bangladesh" OR "Benin" OR "Bhutan" OR "Bolivia" OR "Cabo Verde" OR "Cambodia" OR "Comoros" OR "Cote d'Ivoire" OR "Djibouti" OR "Egypt" OR "El Salvador" OR "Eswatini" OR "Ghana" OR "Honduras" OR "India" OR "Micronesia" OR "Kyrgyzstan" OR "Lesotho" OR "Mauritania" OR "Moldova" OR "Mongolia" OR "Morocco" OR "Myanmar" OR "Nepal" OR "Nicaragua" OR "Nigeria" OR "Pakistan" OR "Philippines" OR "Sao Tome and Principe" OR "Senegal" OR "Melanesia" OR "Sri Lanka" OR "Tanzania" OR "Timor-Leste" OR "Tunisia" OR "Ukraine" OR "Uzbekistan" OR "Vanuatu" OR "Vietnam" OR "Middle East" OR "Zambia" OR "Zimbabwe" OR "Developing Countries" OR "low resource settings" OR "low income population" OR "resource poor settings" OR "resource limited settings" OR developing OR low-income OR "low income" OR "low resource" OR low-resource OR resource-poor OR "resource poor" OR "resource limited" OR resource-limited NEAR/3 (population* OR country OR countries OR setting* OR nation*))