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Mixed-methods study protocol: do national reporting and learning system medication incidents in palliative care reflect patient and carer concerns about medication management and safety?

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ABSTRACT

Introduction Approximately 20% of serious safety incidents involving palliative patients relate to medication. These are disproportionately reported when patients are in their usual residence when compared with hospital or hospice. While patient safety incident reporting systems can support professional learning, it is unclear whether these reports encompass patient and carer concerns with palliative medications or interpersonal safety.

Aim To explore and compare perceptions of (un)safe palliative medication management from patient, carer and professional perspectives in community, hospital and hospice settings.

Methods and analysis We will use an innovative mixed-methods study design combining systematic review searching techniques with cross-sectional quantitative descriptive analysis and interpretative qualitative metasynthesis to integrate three elements: (1) Scoping review: multiple database searches for empirical studies and first-hand experiences in English (no other restrictions) to establish how patients and informal carers conceptualise safety in palliative medication management. (2)Medication incidents from the England and Wales National Reporting and Learning System: identifying and characterising reports to understand professional perspectives on suboptimal palliative medication management. (3) Comparison of 1 and 2: contextualising with stakeholder perspectives.

Patient and public involvement Our team includes a funded patient and public involvement (PPI) collaborator, with experience of promoting patient-centred approaches in patient safety research. Funded discussion and dissemination events with PPI and healthcare (clinical and policy) professionals are planned.

Ethics and dissemination Prospective ethical approval granted: Cardiff University School of Medicine Research Ethics Committee (Ref 19/28). Our study will synthesise multivoiced constructions of patient safety in palliative care to identify implications for professional learning and actions that are relevant across health and social care. It will also identify changing or escalating patterns in palliative medication incidents due to the COVID-19 pandemic. Peer-reviewed publications, academic presentations, plain English summaries, press releases and social media will be used to disseminate to the public, researchers, clinicians and policy-makers.

Strengths and limitations of this study

- There is a moral imperative to learn from data about potentially unsafe healthcare, as advocated by WHO.
- This study addresses patient and carer concerns about medication management and safety in palliative care, which is complex, poorly defined and under-researched.
- This is an innovative mixed-method study combining systematic review searching techniques with cross-sectional quantitative descriptive analysis and interpretative qualitative meta-syntheses.
- When data are drawn from existing published literature and from a national incident reporting database thereby focusing on what people choose to say or report, it remains possible that some specific elements may be under-represented or over-represented.
- The addition of an 'expert by experience' voice into the study design is helping to ensure the research remains focused on patient needs and experiences.

PLAIN ENGLISH ABSTRACT (WRITTEN WITH OUR PPI COLLABORATOR)

We know that people only have high quality healthcare experiences if they feel safe. This relies on their concerns being heard, and decisions about their care being made with them. It is more than just being technically safe, but even that is not always achieved. The National Reporting and Learning System (NRLS) is a system for people working in the National Health Service (NHS) to report safety incidents. Medication safety incidents account for more than 10% of NRLS reports. In Supportive, Palliative and End-of-Life Care, medicines are commonly used to help with

symptoms such as pain, nausea, vomiting, chest secretions and restlessness. Patient and carers views on good medicines safety in palliative care have not been compared with what people working in healthcare report to the NRLS. In this study we are going to compare patient and carer views (taken from published research) with a sample of NRLS incidents. This will help us to better understand what is meaningful to patients in palliative care and what is needed to ensure medication and patient safety works. We will look for gaps that can be addressed by targeting support for learning and change. The way we are doing this study (methods) has not been done before and so we will also contribute to new ways for doing safety and healthcare improvement research.

INTRODUCTION

The third WHO Global Patient Safety Challenge 'Medication Without Harm' is an initiative seeking to halve severe avoidable harm due to medication-related patient safety incidents by 2022.[1] In England, such incidents account for more than 10% of the total National Reporting and Learning System (NRLS) patient safety incident reports (eg, Most up to date version referenced. This is updated every 6 months. Published data are only ever for England as data collected on behalf of Wales is not part of National Health Service (NHS) England's remit for publication),[2] while approximately 20% of serious incident reports involving palliative patients in England and Wales in the Strategic Executive Information Management System relate to prescribing or prescription medication management (eg, In the NHS distinctions are made between patient safety incidents (any unintended or unexpected incident which could have, or did, lead to harm for one or more patients receiving healthcare) and serious incidents (which can extend beyond incidents which affect patients directly and include incidents which may indirectly impact patient safety or an organisation's ability to deliver ongoing healthcare) although the two categories are not mutually exclusive).[2 3] Prescribing and medication are well-acknowledged sources of risk-prone healthcare activity.[4–11] Yet, despite an accumulation of evidence regarding the size of the problem nationally and internationally,[3 12–21] the circumstances, actions or influences that play a part in their origin or development of such incidents[22] ('contributing factors') are not well understood. Practice etiquette[23] shapes prescribing far more than protocols, guidelines and scientific evidence, even when available and often evidence is lacking for normative practice in palliative care.[24]

'Safety' describes the notion of reducing the risk of unnecessary harm to an acceptable minimum, where acceptable minimum refers to the collective notions of given current professional knowledge, resources available and the context in which care is delivered weighed against the risk of non-treatment, treatment or other intervention.[22] Viewed in these terms, healthcare is an inherently risky and potentially unsafe endeavour. Both acts and omissions have high stakes with potentially serious unintended consequences. Agreement that a person is receiving safe care depends on multiple interconnected system components that are mediated through dynamic human interactions and interventions.[25] Recognising this within healthcare, patient safety is defined as 'the avoidance of unintended or unexpected harm to people during the provision of healthcare'.[26]

Patients receiving palliative care are vulnerable to safety incidents in community (ie, home or usual residence), hospital and hospice settings yet often these patients are considered differently to other populations when risks are assessed.[3 27] Medication errors are disproportionately reported when patients are being cared for in their own homes.[3] Expectations of primary and acute care professionals to prescribe for symptom control contrast with reported hindrances of lack of time, confidence and skills.[18 28–30] The predominant strategy for palliative care coordination relies on informal personal relationships between professionals, shared norms, values and mutual trust.[31] Under-resourcing and poor service coordination contribute to a situation where the healthcare system is perfectly designed for patient safety incidents to occur.[29] This makes it unlikely that patients will universally receive the 'right care at the right time' from the right person despite only 'one chance to get it right'.[32 33]

Assumptions that safety, or care quality, are lesser concerns in the context of progressive life-limiting illness are not justifiable. Safety remains important to patients and their families in the context of life-limiting illness.[34] Patients and carers experience harm as an unfolding series of negative events creating lack of interpersonal safety rather than simply being limited to technical-clinical care.[34 35] Actual harm is compounded by being 'inextricably linked with feeling unsafe'.[34] There is, however, a surprising paucity of research in this area.[18]

Patient safety incident reporting systems, such as the NRLS, are intended to support the generation of learning from incidents and near misses to inform strategies to reduce harm to future patients. We do not know if patient safety incidents reported, predominantly by healthcare professionals, encompass or resonate with patient and carer concerns about 'safe use of medications' in palliative care,[36] or whether reported incidents can be reviewed for learning taking into account the broader context of interpersonal safety.[34] Through analysis of multiple perspectives from routine patient safety data sources, we anticipate identifying patient-centred priorities to inform targeted quality improvement interventions.

This protocol has been reviewed and revised in the light of the COVID-19 pandemic. Evidence is now emerging of a rapidly evolving model of clinical practice occurring in palliative care, with new ways of shared working between specialists and generalists and greater use of remote monitoring.[37 38] In addition, both numbers of deaths and place of death is undergoing rapid change, with a massive escalation in deaths everywhere except in hospices.[39] There is a greater dependency on families

Box 1 Perspectives for synthesis

1. Front-line healthcare professionals[1]: identified through reporting of clinical incidents.[1]
2. Patient/informal carer and general public constructions of medication management and safety: identified through a scoping review.

and friends with respect to medication management and in some cases administration, including controlled and injectable medicines. Anticipatory prescribing guidance and practice changes have occurred with alterations in route, choice of drug, quantities, doses and dose ranges all reported.[38 40] Clinicians are also exploring alternative uses of medications and alternative routes of administration, with which many professionals outside of specialist palliative care would be less familiar.[41] Given the expectation of repeated waves of COVID-19, 'the marathon not a sprint', and potential for practice evolutions to have impact long beyond the pandemic, it is of critical importance we gain a better understanding of current safe and unsafe palliative medication management in all forms and settings. This study will allow us to identify early any changing or escalating patterns in medication safety incidents due to the pandemic.

Aim

The aim of this study is to explore and compare perceptions of (un)safe palliative medication management from patient, carer and professional perspectives in community, hospital and hospice settings (see box 1).

The objectives are to:

1. Conceptualise how patients, carers and others important to themiii make sense of safety in palliative care; specifically identifying their concerns about medication management in palliative care.
2. Identify, characterise and analyse professional perspectives on suboptimal palliative care in front-line healthcare practice in relation to medication-related patient safety incidents.
3. Compare and contrast patients' and carers' perspectives on medication management with those of healthcare professionals, to identify areas for further research and quality improvement activities.
4. Identify any early signs of changing or escalating patterns in palliative medication safety incidents in the context of COVID-19.

Patient and public involvement methods

This study addresses issues identified by the James Lind Alliance Palliative and End-of-Life Care Priority Setting Partnership which included public, patient and carer consultation.[42] All members of the research team and patient and public involvement (PPI) groups will be required to ensure everyone respects and values the contribution of all collaborating in our research.[43] Integral to the study is the belief that it is only by everyone working together, can we identify priority targets for meaningful change to achieve effective prescribing and medication management.

Our core study team includes a PPI collaborator. The addition of a PPI 'expert by experience' voice into the study design and processes is helping to ensure the research remains focused on patient needs and experiences as well as clinical practice. He has been involved from the inception of the study and throughout its design, contributing to the development of this protocol alongside the academic and professional team members. He will be fully engaged in study team meetings during the analytical and interpretative stages as well as contributing to the outputs of the work.[44]

The PPI collaborator has provided a specific advice on the methods for further PPI and will be an additional contact for PPI group members to discuss any aspect of the study, including ethical concerns.[45] Two PPI group events will be held (n=10, either face to face or remotely, pending pandemic restrictions). People with experience of palliative care either as patients or carers will be invited to attend and discuss the emerging study findings to help focus the work on issues and priorities most important to them and others like them. Attendees will be invited to co-produce conference submissions and academic publications, with flexible approaches to involvement in order to support inclusivity.[46] Communications will be welcomed between all involved in the research and conducted as far as possible in Plain English, with explanations of any necessary technical terms.[47 48] This will broaden and strengthen the PPI perspective in the research.

Conceptual model

This study is theoretically aligned to sociocultural constructionist and interpretivist approaches,[49–51] accepting that people act based on how they have made sense of lived experience, including interactions with other people within a system, and that prior learning impacts on future experience and capacity for further learning. We will bring together analysis of patient and informal carer perspectives and professionals reports of potential or actual harms. In doing so, we will be able to identify opportunities where shared understanding and priorities can be capitalised and where differences of perspective may bring about concerns, conflict or communication breakdowns in patient-centred care. This is an important starting point for developing a holistic view of patient safety within palliative care given its reliance on informal carers as well as generalist and specialist professional providers.

METHODS AND ANALYSIS

The study will draw on an innovative mixed-method combination of systematic review searching techniques with published literature and cross-sectional quantitative descriptive analysis and interpretative qualitative meta-syntheses of incident data from the England and Wales NRLS, contextualised in stakeholder perspectives.[52 53]

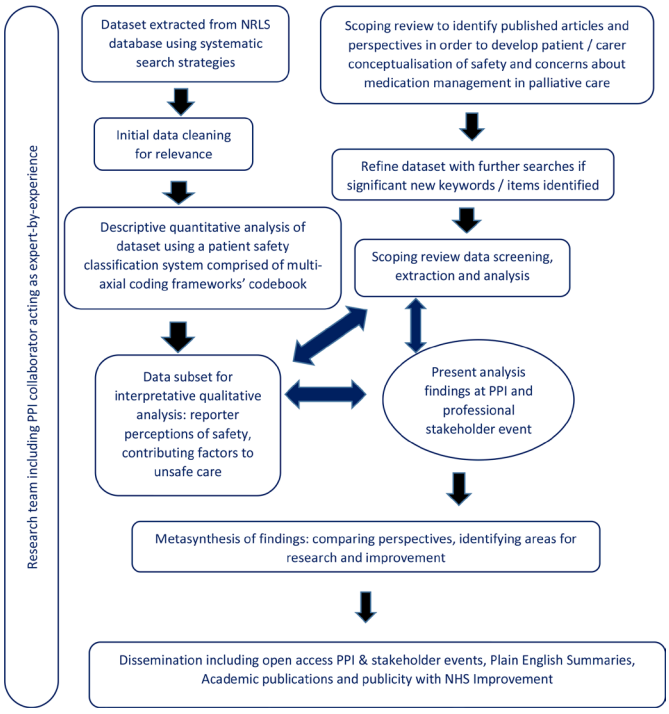

Figure 1 Study flow diagram. NHS, National Health Service; NRLS, National Reporting and Learning System; PPI, patient and public involvement.

An overview of the study, showing order and timing of data analysis and integration is given in figure 1. Details of the systematic search strategy for the scoping review are given in tables 1–4 and Boxes 2 and 3. Details of the systematic search strategy for the NRLS database are given in figure 2 and tables 5 and 6. In line with the study methodology, iterative changes will be documented if made as the work progresses.

Study design

Scoping review

A scoping review provides 'knowledge synthesis that addresses an exploratory research question aimed at mapping key concepts, types of evidence, and gaps in research related to a defined area or field by systematically searching, selecting, and synthesising existing knowledge'[54–56] We will use standard systematic search techniques (aligned to PRISMA for Scoping Reviews (PRISMA ScR)) to identify existing literature, drawing on principles from the Joanna Briggs Institute[57] and interpretative approaches to data synthesis.[58–60] A minimum of two reviewers will be involved at each stage of the work. The scoping review protocol has been peer reviewed by an academic librarian. The planned steps in our search, inclusion and exclusion criteria are provided in box 2.

The search thread was created using 'Population, Concept, Context' (PCC) as per table 1 with PCC combined as ((Population: patients; informal carers) AND (Concept: safety OR Concept: medication management) AND Context: palliative care)). Table 2 shows our first translation of this thread into search terms for each concept. We used these as a starting point for preliminary searches to develop our initial limited search, thereby ensuring the final search would be appropriately sensitive and specific.

After testing V.1 of our search terms we refined this to create the initial limited Medline search strategy that we will use (see online supplemental file 1).

In developing this, we drew on Brooks *et al*[61] to refine the chosen population search terms. We also reviewed Collier *et al*[34] for keywords (all included). During this process, some search terms were added/removed (see box 2).

Once the initial limited search had been refined in Medline we translated terms suitable for Embase. Initially running the refined Medline version with simple translation of MESH to SH terms produced a vast and unmanageable number of records. We, therefore, tested focusing (rather than exploding) and limiting keywords to titles/abstracts in either the safety search concept or the population search. Table 3 shows the final search strategy using focused searches in Embase.

Overall, this has given us an estimated total of N=9995 records to screen for the initial limited search.

Quality assessment

As we want to scope the available evidence, exclusions will not be made on the basis of quality. Quality assessment will, instead, be conducted using an adapted 5-point strength score[58] with each published manuscript being independently scored by two members of the research team and where the scores differ the lower score being accepted. Scores will be presented alongside the synthesis.

This approach allows us to draw on the framework of principles set out in Gough's Weight of Evidence[62]; making separate judgements on different types of data from different study criteria before combining these to make a global judgement of the contribution of a particular piece of evidence to answering our scoping review research questions. In doing so, assessment will be made of the coherence and integrity of each piece of evidence in their own terms, that is, using the 'generally accepted criteria for evaluating the quality of this type of evidence by those who generally use and produce it'.[62] We will also consider how appropriate the methods and focus of each piece of evidence are for answering our questions. When possible we will use appropriate checklists to support our assessment, for example, Equator guidelines.[63] A summary of our global quality assessment scoring system is in table 4.

Synthesis

Given the nature of our research questions, the necessity for first person data from patients and informal carers, and from our knowledge of the field, we anticipate most inclusions will be qualitative, mixed-methods or descriptive quantitative data. We, therefore, anticipate qualitative metasynthesis will be the best method for our analysis and synthesis. This will be achieved by conducting a thematic analysis of first, second and third order data, and drawing

Table 1 Population, concept, context

Criteria	Search strands (see next table for details)	Definitions
Population	Patients Carers Relatives Others significant to the patient excluding healthcare and social care professionals General public	People who receive or are otherwise involved in healthcare in the last phase of life. Including anyone within a patient's informal social network (eg, relatives, friends, volunteer carers, other persons of significance to the patient except those providing a professional role). General public taking an interest in palliative care.
Concept 1	Safety	Patient safety is the reduction of risk of unnecessary harm associated with healthcare to an acceptable minimum. An acceptable minimum refers to the collective notions of given current knowledge, resources available and the context in which care was delivered weighed against the risk of non-treatment or other treatment.[22]
Concept 2	Medication use/management	'Getting the right medication to the right person at the right time'. Encompassing the whole multi-step task of: ► Decision making/starting a medication. ► Prescribing/taking/adding a medication. ► Monitoring and supply/reviewing a medication. ► Administration. ► Stopping medications. ► Moving across healthcare contexts.[74 75]
Context	Last phase of life palliative care ► Of any type (eg, specialist or generalist). ► In any location.	Last phase of life defined as having potentially life-limiting irreversible or progressive condition requiring general or specialist palliative care for symptom control, social, psychological and/or spiritual support. Given the challenges of prognostication, and tendency for this to be overestimated we have chosen not to include a time frame in this definition. 'Palliative care is an approach that improves the quality of life 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. Palliative care: ► Provides relief from pain and other distressing symptoms. ► Affirms life and regards dying as a normal process. ► Intends neither to hasten or postpone death. ► Integrates the psychological and spiritual aspects of patient care. ► Offers a support system to help patients live as actively as possible until death. ► Offers a support system to help the family cope during the patients illness and in their own bereavement. ► Uses a team approach to address the needs of patients and their families, including bereavement counselling, if indicated. ► Will enhance quality of life, and may also positively influence the course of illness. ► Is applicable early in the course of illness, in conjunction with other therapies that are intended to prolong life, such as chemotherapy or radiation therapy, and includes those investigations needed to better understand and manage distressing clinical complications.' https://www.who.int/cancer/palliative/definition/en/

on meta-ethnographic methods to express the final synthesis.[59] First order data refers to empirical data (eg, participant verbatim quotations) within published works, second order is the interpretation of the original study research team and third order is the interpretation of the synthesis team (ie, this study team). In addition, for all studies we will chart: authors; year of publication; origin of study; aims/purpose; population and sample size; methodology and methods; summary of key findings related to our scoping review questions and if applicable, intervention details, outcomes. Data extraction, analysis and synthesis will be completed as a team with independent coding of themes by at least two researchers, and cross-checking of all aspects of the process between team members.

NRLS incident report dataset

Context and database population

The NRLS is a central database set up to facilitate learning from incidents occurring within the NHS in England and Wales. Reporting is voluntary and encouraged for 'any unintended or unexpected incident that resulted in or could have resulted in harm to one or more patients receiving state funded care'.[64] The NRLS can also be used by NHS trusts as a mandatory reporting route for certain deaths and other incidents to fulfil the regulatory requirements made of them by the Care Quality Commission. Approximately 150 000–200 000 incidents are reported per month (more than 2 million per year) providing descriptive categorical information (incident details including reported type and location, patient demographics and reporter-rated severity of harm) and free-text reporter or organisational perspectives on what happened, perceived contributing factors and plans to minimise risk of reoccurrence.

Sampling to generate the study population

Our population of interest is all patients receiving medication for palliative purposes involved in a patient safety incident which has been reported to the NRLS. It is not limited to specialist palliative care settings or teams.

Table 2 Search strands tested (V.1)

	Initial MesH terms—all to be exploded to include subheadings	Initial keywords	Notes
Population	– Patients – Caregivers – carers – Spouses – Volunteers – Family – Friends – Interpersonal relations	– Partner* – 'Significan*(within 3 words)patient' – 'Others(within 2 words) significan*' – Relative – 'General Public' (Patient* or inpatient* or care* or care?giver*or family).tw. care giver* or care-giver* or caregiver* or carer* (family or families or parent? or friend? or relative? or spouse? or partner? or husband? or wife or wives or child or children or close person? or significant other?).tw.	Relevant MeSH terms selected from MeSH Browser 'Persons' subtree To combine each exp MeSH term and keyword with OR to create search string
Safety	– Patient safety – Patient harm – Safety management – Risk management – Risk – Harm reduction – Medical errors – Quality of healthcare – Medication errors – Drug-related side effects and adverse Reactions	- Safe*	To combine each exp MeSH term and keyword with OR to create search string
Medication management	– Drug dosage calculations – Drug prescriptions – Inappropriate Prescribing – Polypharmacy – Self-administration – Self-medication – Drug Prescriptions – Prescription drugs – Off-label use – Analgesics – Narcotics – Anti-inflammatory agents – Acetaminophen – Diclofenac – Naproxen – Ibuprofen – Codeine – Tramadol – Gabapentin – Pregabalin – Amitriptyline – Heroin – Oxycodone – Morphine – Alfentanil – Buprenorphine – Fentanyl – Methadone – Hydromorphone – Antiemetic – Hyoscine hydrobromide – Hyoscine butylbromide – Glycopyronium – Cyclizine – Haloperidol – Methotrimeprazine – Metoclopramide – Ondansetron – Domperidone – Aprepitant – Antianxiety Agents – Midazolam – Lorazepam – Diazepam – Ketorolac – Diuretics – Furosemide – Steroids – Dexamethasone – Octreotide – Phenobarbital – Baclofen – Infusion pumps – Infusions, subcutaneous – Delayed action Preparations – Injections, Subcutaneous – Psychomotor Agitation – Nausea – Breakthrough Pain – Nocieptive Pain – Pain Management – Intestinal Secretions – Vomiting	Medication* Drug* Analgesic* NSAID* Opiate* Opioid* Paracetamol Dihydrocodeine Diamorphine Antisecret* 'Hyoscine Hydrobromide' 'Hyoscine Butylbromide' Glycopyr* Levomepromazine Anticipat* 'Terminal restlessness' Agitat* 'Incident Pain' Secretion* CSCI 'Continuous subcutaneous infusion' 'Just in case medic*' 'Symptom control' 'Syringe pump' 'Syringe Driver' Adjuvant* McKinley	To combine each exp MeSH term and keyword with OR to create search string Common drugs prescribed for palliative care are listed including both generic names and all BNF listed alternative formulations

Continued

Table 2 Continued

	Initial MesH terms—all to be exploded to include subheadings	Initial keywords	Notes
Palliative care	Terminally Ill Terminal care Palliative care Hospice and palliative care nursing Hospice care Supportive care Palliative medicine Advance* care planning Resuscitation orders	'Last phase of life' 'Last days of life' 'Care of the dying' 'Liverpool Care Pathway' 'Electronic Palliative Care Co-ordination Systems' 'End of life' End-of-life Dying 'Expected death' 'Inappropriate admission' 'Karnovsky score' 'living will' 'Marie Curie' 'Macmillan' 'Phase of illness' 'preferred place of care' 'unplanned admission' Palliat* DNACPR PPD PPC PPD EPACCS ACP ADRT ('last year of life' or LYOL or 'end of life' or 'end of their lives' or 'last 6 months of life' or 'last 6 months of life')	To combine each exp MeSH term and keyword with OR to create search string

A study-specific search strategy using systematic review principles has been designed drawing on our collective expertise in incident reporting, informatics, pharmacology, clinical practice, lived experience and mixed-methods research for patient safety and palliative care (see figure 2). This was developed and tested via a scoping exercise in the 2003–2015 (approximately 14 million reports) NRLS dataset in order to establish the most effective combination of search terms, balancing rigour, robustness, sensitivity and specificity.

Table 3 Revised Embase initial limited search

Search 1: Combine population AND (safety or medication management) AND Palliative care	
V.1 for Embase	506 622
Revised Medline run direct in Embase	53 008
Revised Medline with Embase thesaurus	38 347
Final SEARCH 1 with focused 'safety' strand (remainder of search as before)	1492
Duplicates: N=375	
Ready for title and abstract screening	1117
Search 2: Combine Population AND (safety or medication management) AND Palliative care	
V.1 for Embase	506 622
V.3 (Medline) rerun in Embase	53 008
Revised V.3 for Embase with Embase thesaurus	38 347
Final search 2 with focused 'population' strand—remainder of search as before	5262
Duplicates: N=458	
Ready for title and abstract screening	4804
Final Embase Search	
Focused 'safety' (search 1)+focused 'population' (search 2)=1492 + 5262	6754
Duplicates removed: N=833 (=375+458)	
Ready for title and abstract screening=1117+4804	5921

Initially we ran a test search (PALLCARE GENERAL) using the pre-existing codes routinely applied within the NRLS database of (specialty=palliative care) AND (incident=medication). This identified 28 000 specialty incidents (A, figure 2) and 75 114 medication incidents (B, figure 2) with an overlap of 4435 incidents (C, figure 2).

We then ran a systematically designed search (PALLMED SPECIFIC) using free-text keyword variations in conceptual search strands (see table 5 for a summary of these, the full SQL codes will be made available on completion of the study) to link:

[[Keyword search: drug categories and individual drug names] OR [Keyword search: symptoms, medication delivery route or purpose]] AND [Population: Palliative Phase of illness]

In doing so, we established that relying on standardised categorisations would result in significant underestimating of incident reports as only 449 (J, figure 2) of the resultant hits were also contained in PALLCARE GENERAL (specialty=palliative AND incident=medication).

Our PALLMED SPECIFIC search identified 28 091 (H, figure 2) incidents of which 26 926 were not formally coded as specialty=palliative and 22 023 were not formally coded as incident=medication. Despite this, review of the first 1000 of each of these non-matched sets demonstrated

Table 4 A researcher-derived strength score descriptors adapted for use in quality assessment for secondary analysis

Strength score	Adapted score descriptors used for secondary analysis	Outcome
S1	No clear methods leading to results and conclusions: not significant	Summary description to be included in the results only and flagged as low quality
S2	Methods lack detail, although results may suggest a trend (eg, article covers something unique)	Include
S3	Methods appropriate for our research question (population, data generated, data presented)	Include
S4	Methods are very clear and very likely to yield important data	Include and consider as key paper
S5	Methods have produced data that are unequivocal	Include and consider as key paper

Box 2 Scoping review strategy—search steps,[1] inclusion and exclusion criteria

1. Initial search of two databases relevant to the topic: Ovid Medline & Ovid Embase. The background preliminary work to develop our initial limited search in Medline and Embase has been completed and we are now in a position to re-run this search and screen.
2. Analysis of text words in titles and abstracts plus index terms (to produce refined keywords/MeSH terms) of included records.
3. All keywords/MeSH terms of relevance identified run across multiple databases (Ovid Medline, Ovid Embase, Ovid Emcare, Scopus, CINAHL Plus, PsycINFO) and evidence repositories (PROSPERO, Cochrane, NICE Evidence). At this point, search alerts will be set up to ensure any new publications during the course of our study will be identified.
4. Review of reference lists of hits plus forward citation searching.
5. Author contact for clarifications/additional publications if required (eg, to follow-up publications of protocols).
6. Additional grey literature searches: Healthtalk online, UK Palliative Care Organisations (listed at http://www.ncpc.org.uk/uk-palliative-care-organisations), NHS (England, Wales, Scotland and Northern Ireland), International and UK Palliative Care conference abstracts (EAPC, HUK, population, concept, context), plus consideration of searches in other organisations cited in identified literature.

Inclusion criteria

- Empirical studies, with quantitative, qualitative or mixed-methods data directly from the population of interest.
- Opinion pieces, editorials, commentaries, letters and other non-empirical academic publications which report first-person experience from the population of interest.
- Focus of item is an aspect of medication management or patient safety in the context of palliative care.
- No restriction by location of patient.
- English language.
- No date of publication restrictions or publication status restrictions.
- No restriction by country of origin for study or researchers.

Exclusion criteria

- Not a first-person account or no first-person data included.
- Account from the perspective of healthcare professional caregivers or social care professional caregivers only.
- Paid agency carer accounts.
- Does not meet concept definitions.

that these reports were still within scope. Furthermore, in PALLCARE GENERAL there were 3986 hits (D, figure 2) that were not identified in PALLMED SPECIFIC.

An additional 716 hits (I, figure 2) shared between specialty=palliative (but not incident=medication) and PALLMED SPECIFIC and 6068 (K, figure 2) shared between incident=medication (but not specialty=palliative) and PALLMED SPECIFIC. Therefore, overall

Box 3 Additions/removals in Medline and Embase with reasons for changes

Terms added: medicine* and secret*

Terms removed: carers, volunteers, interpersonal relations, significan* patient, others significan*, relative, general public, patient*, inpatient*, care*, care?giver*, family, care giver*, care-giver*, caregiver*, families, parent?, friend?, relative?, spouse?, partner?, husband?, wife, wives, child, children, close person?, significant other.

Reasons

a. If searched as a MESH term, then not used as a keyword (once duplication confirmed) for example, patient* removed because covered by patient as a MESH term
b. Volunteers and general public were removed because not connected to patient/not specific enough.
c. Interpersonal relations, quality of healthcare, drug*, analgesic, adjuvant*, antisecret*, secretion, bereave*, attitude to death—removed as not specific enough to be useful.
d. significan*/relative/families/advocate/unsafe/harm/adverse event/hospice*, palliative*, advanced, morphine AND cancer, cancer pain were all tested as exploded terms. This did not add any relevant records to the results beyond other selected terms and so these were removed.

In Embase removal of the following terms were made during testing as these were not providing any additional relevant records: inpatient*, care*, care?giver*, care giver*, care-giver*, caregiver*, parent?, friend, spouse?, partner?, husband?, wife, wives, child, children, close person?, significant other, attitude to death. In addition, 'Macmillan' keyword was removed since its yield was 34 188 of which most were included if Macmillan Publishers Ltd related and 'ACP' as a keyword was removed as it yielded 10 590 and it is an abbreviation for many terms; advanced care planning as a SH term continued to be included and has been exploded.

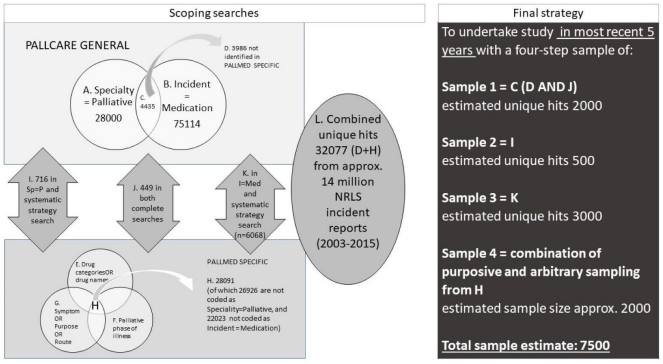

Figure 2 Database scoping and search design.

hits from all our searches of potentially relevant reports=28 091+3986=32 077 (L, figure 2)

We suspect the findings of our scoping exercise are largely because palliative care is a complex and poorly defined field with a long history of debate surrounding what 'counts' as palliative care, when and where this should be delivered (home or usual place of residence, hospital, hospice), which aspects of care should be delivered by who (specialists or generalists), and if it should be defined by time frame (days, weeks, months or years) or intention (end-of-life care, palliative or curative, symptom control or disease modifying). Clearly this presents challenges for trained coders, and even more so for front-line clinical staff when entering data into local systems that then map to the NRLS.

The right-hand box of figure 2 'Final strategy' shows the further detail of our sampling strategy for the study. We will initially draw three samples designed to ensure rigour and sensible use of resource by balancing sensitivity with specificity focusing on the reports most likely to provide rich data. To include all of L, figure 2 would be sensitive but unmanageable. We will therefore use C (encompassing D and J), followed by I and then K, before sampling further from H. The details of the purposive part of this sampling will be developed once samples 1–3 are analysed to ensure sample 4 is designed to capture a combination of the richest data, providing depth and breadth to the study sample. A total of 1000 arbitrarily selected reports from within H will also be used.

The search strategy will initially be applied to the most recent 60 months from the current NRLS database. With the above strategy we estimate this will produce approximately 7500 reports to analyse. If this results in less than 7500 individual incidents it will be extended back year by year to reach this target sample size which is based on our prior knowledge of reporting frequency and trends.

Data cleaning

As with many large routinely generated datasets, data cleaning will be required to ensure the final dataset only contains incidents pertaining to the study aim and objectives. NRLS data entry by front-line healthcare professionals is already reviewed centrally to anonymise it, removing specific names of people, places and organisations. Our cleaning process (at least 2 members of the research team, with a third in cases of uncertainty) will ensure study inclusion and exclusion criteria are met. These are given in table 6 and have been previously used successfully to select palliative care incidents in similarly constructed databases.[3]

Once a clean dataset is obtained new unique identifiers (by setting) will be allocated to each incident report to ensure anonymity alongside traceability during the analytical process.

Analysis

The extracted sample of reports will be reviewed and accurately reclassified (coded) using the PISA classification system for the purposes of descriptive quantification.

The PISA classification system has been used in over 30 health service research studies and is aligned with key concepts for understanding patient safety described in the WHO International Classification for Patient Safety[53 65] The system is comprised of multiaxial frameworks developed using a constant comparative methods to describe incidents, contributing factors (circumstances, actions or influences perceived to play a part in the origin or development of an incident), type and severity of harm. It has been successfully applied to other areas of palliative care.[27 66] PISA will be used to quantitatively characterise (context, setting, patient-related features, severity of harm) the data, identifying frequencies of occurrence and characteristics of incident thematic groupings (by setting, task etc).

A modified framework analysis[67–69] will be used to qualitatively analyse free-text within the data, in order to interpret how the reporters perceived each incident, including the meanings attributed to it, and develop depth of understanding regarding how and why incidents might occur (including underlying sociocultural factors).[70] Attention will be paid to language, metaphors and indicators of interaction between people and artefacts within the complexities of the healthcare systems delivering palliative care across different settings (hospitals, hospices, community) and providers (specialist and generalist services). This analysis will be used to build a richer picture of professional conceptualisations of what is worthy of reporting and hence what constitutes unsafe care, contributing factors, when blame (directed to self or others)[71] or other value judgements are attributed to systems or human error.

We will document if any part of the analysis has not been possible due to missing information. We know from previous studies that it is likely approximately 15%–20% of reports will not contain free text data for qualitative analysis.[27] If the available reports containing suitable free text data exceed 2000, we will purposively sample within our dataset for the qualitative work, drawing on the quantitative findings to do so. While we have taken great care to produce a representative sample of medication-related patient safety incidents it remains possible that some specific elements may be under or over-represented due

Table 5 Search threads for PALLMED SPECIFIC

Step 1- Keyword search	Search whole database for drug categories and individual drug names as listed Search run in: ▶ MD05 approved name (Drug 1) ▶ MD06 proprietary name (Drug 1) ▶ MD30 approved name (Drug 2) ▶ MD31 proprietary name (Drug 2) plus free text categories: ▶ IN05 incident category-Free Text ▶ INO7 description of what happened ▶ IN10 actions preventing reoccurrence ▶ IN11 apparent causes ▶ DE01 type of device	Analgesic* OR antiemetic* OR antisecret* OR anxiolytic* OR diuretic* OR NSAID* OR opiate* OR opioid* steroid* OR **Paracetamol** OR **diclofenac** OR Dicloflex OR Diclomax OR Econac OR Enstar OR Fenactol OR Motifine OR Volterol OR **Naproxen** OR Feminax OR Naprosyn OR **Ibuprofen** OR Anadin OR Brufen OR Calprofen OR Cuprofen OR Flarin OR Hedex OR Ibucalm OR Numark OR Nurofen OR **Codeine** OR **Dihydrocodeine** OR DHC OR **Tramadol** OR Brimisol OR Invodol OR Mabron OR Maneo OR Marol OR Maxitram OR Tilodol OR Tradorec OR Tramquel OR Tramulief OR Zamadol OR Zeridame OR Zydol OR Zytram OR **Gabapentin** OR Neurontin OR **Pregabalin** OR Alzain OR Axalid OR Lecaent OR Lyrica OR **Amitriptyline** OR **Diamorphine** OR **Oxycodone** OR Abtard OR Carexil OR Leveraxo OR Longtec OR Lynlor OR Onexila OR Oxeltra OR OxyContin OR Oxylan OR OxyNorm OR Reltebon OR Renocontin OR Shortec OR Zomestine OR **Morphine** OR Morphgesic OR MST OR MXL OR Oramorph OR Severdol OR Zomorph OR **Alfentanil** OR Rapifen OR **Buprenorphine** OR Bunov OR Bupeaze OR Buplast OR Bupramyl OR Busiete OR Butec OR BuTrans OR Carlosafine OR Espranor OR Hapoctasin OR Natzon OR Panitaz OR Prefibin OR Reletrans OR Sevodyne OR Subutex OR Temgesic OR Tephine OR Transtec OR Turgeon OR **Fentanyl** OR Abstral OR Actiq OR Durogesic OR Effentora OR Fencino OR Fentalis OR Instanyl OR Ketalar OR Ketamin* OR Matrifen OR Mezolar OR Opiodur OR Osmanil OR PecFent OR Sublimaze OR Victanyl OR Yemex OR **Methadone** OR Physeptone OR **Midazolam** OR Buccolam OR Epistatus OR **Lorazepam** OR Ativan OR **Diazepam** OR Diazemuls OR Stesolid OR '**Hyoscine Hydrobromide'** OR Joy-rides OR Kwells OR Scopoderm OR Travel Calm OR '**Hyoscine butylbromide'** OR Buscopan OR **Glycopyronium** OR Glycopyralate OR **Cyclizine** OR **Haloperidol** OR Haldol OR Halkid OR Serenace OR **Levomepromazine** OR Levinan OR Nozinan OR **Metoclopramide** OR Maxolon OR **Ondansetron** OR Ondemet OR Setofilm OR Zofran OR **Domperidone** OR Motilium OR **Aprepitant** OR Emend OR **Rolapitant** OR Varuby OR **Dexamethasone** OR Glensoludex OR Neofordex OR **Furosemide** OR **Ketorolac** OR Toradol OR **Octreotide** OR Sandostatin OR **Lanreotide** OR **Phenobarbital** OR **Baclofen**
Step 2—Keyword search	Search whole database for the most common symptoms requiring medication (nausea and/or vomiting, pain, secretions, agitation), medication delivery route/purpose as listed Search run in: ▶ IN05 Incident Category—Free Text ▶ IN07 Description of what happened ▶ IN10 Actions Preventing Reoccurrence ▶ IN11 Apparent Causes DE01 Type of device—free text	*'terminal restlessness' OR agitat* OR nause* OR pain OR secretions OR vomit* OR 'anticipat* OR 'continuous subcutaneous infusion' OR 'just in case med*' OR 'symptom control' OR 'syringe pump' OR 'syringe driver' OR adjuvant* OR CSCI OR McKinley OR Graseby OR CME OR OR Saf-T OR patch OR oral OR T34*
Step 3—combine step 1 and step 2 using OR		
Step 4—Keyword search	Search whole database for phase of illness as listed Search run in: ▶ IN05 Incident Category—Free Text ▶ IN07 Description of what happened ▶ IN10 Actions Preventing Reoccurrence IN11 Apparent Causes	*ACP OR ADRT OR 'advance care planning' OR 'advance directive' OR 'Care Decisions Tool for the Last Days of Life' OR 'care of the dying' OR 'care pathway' OR 'Coordinate my care' OR DNACPR OR DNAR OR DNR OR 'do not attempt*' OR dying OR 'EAPCCS' OR 'electronic palliative care coordination system' OR 'end of life' OR end stage OR 'expected death' OR hospice OR 'inappropriate admission' OR 'Karnovsky score' OR 'last days of life' OR 'last phase of life' OR 'Liverpool Care Pathway' OR 'living will' OR 'Marie Curie' OR Macmillan OR palliat*OR 'phase of illness' OR PPC OR 'preferred place of care' OR 'preferred place of death' OR PPD OR resus* OR terminal OR 'unplanned admission' OR TEP OR 'Treatment escalation plan' OR Respect OR Fastrack OR Continuing Health Care OR CHC OR rapid discharge OR Bereave/d/ment*
Step 5—combine step 3 with step 4 using AND		

OR, AND are Boolean operators.
NPSA codes: Medical process error, MD01; medical error, MD02; process of prescribing, MD05; error type, MD06; incident type, IN05 medication; IN05 failure of device.
List of drugs created from the BNF palliative section combined with clinical practice knowledge and exemplar quick reference guides for drugs for end-of-life care[1]
All drug names have been cross-checked in the BNF for variants.

Table 6 Three stages of data extraction for analysis

1. Codes and associated free text data to be extracted from the NRLS database	
Unique anonymised incident ID	Numerical
Date of incident	Date
Incident type	Structured
Degree of harm (severity)	Structured
Incident location	Structured
Specialty data/professions involved	Structured
Description of what happened	Unstructured/free text
Actions preventing reoccurrence	Unstructured/free text
Apparent causes	Unstructured/free text

2. Categorisation using the Primary care patient safety classification (PISA) coding framework

- Initial screening (with 20% checked by a second independent coder) before decision include/exclude on study scope.
- Reason for exclusion or final decision for quantitative analysis include/exclude.

Exclusions

- Patient not in last phase of life (defined as having potentially life-limiting irreversible or progressive condition requiring general or specialist palliative care for symptom control, social, psychological and/or spiritual support).
- Not a medication process.
- Medications used without palliative intent (eg, for anaesthetic procedures, incident solely related to disease-modifying treatment for example, chemotherapy drug errors).
- Incident not related to patient care.

Inclusions

1. Incident report includes any of the following:Care provided in a hospice inpatient unit.
2. Care provided by a specialist palliative medicine team.
   A clear statement of a decision to treat with palliative (as opposed to life-prolonging) intent prior to the incident occurring in any other setting.

If included:

PISA incident types

- PISA contributing factors
- PISA outcomes
- Setting of Occurrence*
- Informal carers involved
- Drugs involved
- Medication process—point of error or risk**
- Harm outcome
- Harm severity physical
- Harm severity emotional/psychological
- Coder notes

*Setting of occurrence will be coded as: hospice/acute hospital/usual place of residence (own home)/usual place of residence (residential care)/usual place of residence (nursing care)/general practice surgery/other institutional setting/other non-institutional setting (home of relative/friend/informal carer) unknown/other

**Medication process will be coded as:

- Decision making/starting a medication.
- Prescribing/taking/adding a medication.
- Monitoring and supply/reviewing a medication.
- Administration.
- Stopping medications.
- Moving across healthcare contexts.
- Other.

3. Inclusion for qualitative analysis (yes/no—only if insufficient free text)

Interpretative analysis including:

- Use of language, metaphors, the reporters' stance and construction of the incident.
- Who is reporting what, when, why and for what purpose.

NRLS, National Reporting and Learning System.

to the nature of the primary data being dependent on what people choose to report. We will account for major changes in practice (eg, withdrawal of the Liverpool Care Pathway, COVID-19 pandemic impact) in the analysis by reviewing incidents with attention to the chronological timeline of reporting. We also recognise that social care providers and private companies will not be represented unless NHS organisations (services or staff) are also involved. To investigate this, issue will require another study.

Integration of study components

Given the data diversity, we will use narrative methods to integrate findings of the scoping review with those from analysis of NRLS reports. This will compare and contrast what front-line healthcare professionals have chosen to report, and why, with known patient and informal carer views on what is important. We will also explore the range of potential impact of both rare and common types of incidents in a holistic sense by drawing on both study components. We will use this to develop a conceptual model

(representing the integrated findings) for meaningful learning from incidents that integrate patient and carer perspectives, to inform professional training to enhance safety and quality. We anticipate drawing on conceptual models for whole system and human factor issues within the wider field of patient safety to achieve this.

Ethics and dissemination

Ethical approval and study governance

Prospective ethical approval for the study has been granted from Cardiff University School of Medicine Research Ethics Committee (Ref 19/28). A data sharing agreement exists between Cardiff University and NHS Improvement. Data released to the research team will be anonymised based on in-house data cleaning processes led by the NHS Improvement team. Should the research team recognise identifiable content in a report, we will follow strict Information Governance procedures to notify NHS Improvement.

Anticipated outcomes

This work will provide evidence for meaningful patient safety initiatives in palliative medication management.[72] Our study will, for the first time, bring together multivoiced constructions of patient safety in palliative care in order to identify the implications for professional learning and actions. These lessons are relevant across health and social care, particularly in the context of an ageing multimorbid population increasingly in need of palliation alongside disease-modifying interventions. New knowledge of how patients and professionals construct ideas of what constitutes (un)safe care from this study will underpin targeted quality improvement projects and prioritisation of further research. For example, identifying the most frequent or highest impact incidents, and their underlying contributory factors, provides signals to pinpoint where and how healthcare services and teams can focus resources to design safer systems for patients.

Generation of the dataset using methods originating from best practice for systematic reviews is a novel methodological approach. The methodological developments will be transferable and contribute to the evidence base for safety work in palliative care and other clinical areas.

Dissemination

The study team includes academic clinicians (doctors and a pharmacist) who have access through their professional networks to share emerging findings with clinical/professional groups through internal/external seminars and conference presentations. Open-access dissemination events (according to pandemic restrictions) will be held at the end of the study in collaboration with our NHS funding partner and with advertising to NHS and charitable providers of specialist/generalist palliative care and the public including patients and informal carers. We will continually monitor and record the impact of our PPI involvement methods throughout the study processes so that we can evaluate and further learn from it. The PPI collaborator and stakeholder dissemination events are funded.[73]

We anticipate publication of the final findings within 12 months of completion of the study, which we will complete within 12 months of receiving the complete NRLS sample dataset for the study.

The study team will submit the results to high-impact peer-reviewed journals and undertake national and international oral presentations to researchers, clinicians and policymakers. Throughout, the research updates will be shared via press releases and social media. Plain English summaries will be prepared for the general public. We will work with NHS England to achieve this.

The findings of this research will be directly relevant to front-line clinical practice and professional learning, with implications for prevention and mitigation of patient safety incidents. Findings will help inform targeted education and quality improvement initiatives by providing evidence for synergies and dissonance between patients, informal carers and professionals' views of what makes (un)safe care. The work will also inform methods in practice for coding and reporting patient safety in palliative care.

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Contributors SY conceived the idea for the study and developed the full protocol from the initial stages to final version in close collaboration with AC-S and AC. AC is our PPI collaborator. He is an expert by experience in both providing PPI input to a significant number of research projects within patient safety and the wider NHS research remit. S-AF and SY created and tested the systematic search strategy for the scoping review. SH and SY developed the systematic search for the NRLS database which was then refined in collaboration with JA. All authors contributed to the writing of this manuscript.

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Supplementary File

Refined limited search strategy for Medline with indicative numbers of records [as of 16.01.20]

	POPULATION SEARCH STRANDS	**RESULTS**	
	Initial MeSH terms. All exploded to include sub headings. Individually searched		
1	exp Patients/	62200	
2	exp Caregivers/	34291	
3	exp Spouses/	9728	
4	exp Family/	307533	
5	exp Friends/	4865	
	Keywords searched		
6	Partner*.mp.	172387	
7	Carer*.mp.	13992	
138	Care giv*.mp.	5642	
139	Caregiv*.mp.	75712	
	Combine POPULATION using OR		
144	1 or 2 or 3 or 4 or 5 or 6 or 7 or138 or 139	591,571	597,483
#	**SAFETY SEARCH STRANDS**	**RESULTS**	**16.01.20**
	Initial MeSH terms. All exploded to include sub headings. Individually searched		
8	exp Patient Safety/	18278	
9	exp Patient Harm/	146	
10	exp Safety Management/	19713	
11	exp Risk Management/	288518	
12	exp Risk/	1161417	
13	exp Harm Reduction/	2846	
14	exp Medical Errors/	110011	
15	exp Medication Errors/	16475	
	Drug-related side effects and adverse reactions		
16	(Drug-related side effects and adverse reactions).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept	31160	

	word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]		
	Keywords searched		
17	safe*.mp.	869316	
	Combine SAFETY using OR		
140	8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17	2,084,508	2,106,700
#	**MEDICATION MANAGEMENT SEARCH STRANDS**	**RESULTS**	**16.01.20**
	Initial MeSH terms. All exploded to include sub headings. Individually searched		
145	exp Drug dosage calculations	2153	
18	exp Drug Prescriptions/	32393	
19	exp Inappropriate Prescribing/	2835	
20	exp Polypharmacy/	4673	
21	exp Self Administration/	11037	
22	exp Self Medication/	4608	
23	exp Drug Prescriptions/	32393	
24	exp Prescription Drugs/	5507	
25	exp “Off-Label Use”/	2326	
26	exp Analgesics/	526724	
27	exp Narcotics/	120089	
28	exp Anti-Inflammatory Agents/	502295	
29	exp Acetaminophen/	17602	
30	exp Diclofenac/	7618	
31	exp Naproxen/	4013	
32	exp Ibuprofen/	8554	
33	exp Codeine/	6791	
34	exp Tramadol/	3009	
35	exp Gabapentin/	3617	
36	exp Pregabalin/	1856	
37	exp Amitriptyline/	6510	
38	exp Heroin/	5518	
39	exp Oxycodone/	2144	

40	exp Morphine/	37629
41	exp Alfentanil/	1652
42	exp Buprenorphine/	4998
43	exp Fentanyl/	15423
44	exp Methadone/	12098
45	exp Hydromorphone/	1248
46	exp Antiemetics/	153248
47	exp Cyclizine/	272
48	exp Haloperidol/	15571
49	exp Methotrimeprazine/	784
50	exp Metoclopramide/	4771
51	exp Ondansetron/	2997
52	exp Domperidone/	1757
53	exp Aprepitant/	574
54	exp Anti-Anxiety Agents/	68518
55	exp Midazolam/	8619
56	exp Lorazepam/	2830
57	exp Diazepam/	17651
58	exp Ketorolac/	1427
59	exp Diuretics/	78586
60	exp Furosemide/	11739
61	exp Steroids/	839626
62	exp Dexamethasone/	50355
63	exp Octreotide/	7424
64	exp Phenobarbital/	18467
65	exp Baclofen/	5500
66	exp Infusion Pumps/	13573
67	exp Infusions, Subcutaneous/	1139
68	exp Delayed-Action Preparations/	45937
69	exp Injections, Subcutaneous/	39628
70	exp Psychomotor Agitation/	6215
71	exp Nausea/	19314

72	exp Breakthrough Pain/	289
73	exp Nociceptive Pain/	1260
74	exp Pain Management/	31644
75	exp Intestinal Secretions/	2970
76	exp Vomiting/	30558
	Keywords searched	
77	medication*.mp.	327681
78	NSAID*.mp.	24581
79	Opiate*.mp.	26914
80	opioid*.mp.	113528
81	paracetamol.mp.	11156
82	dihydrocodeine.mp.	484
83	diamorphine.mp.	463
84	'hyoscine hydrombromide'.mp.	56
85	'hyoscine butylbromide'.mp.	209
86	Glycopyr*.mp.	2055
87	levomepromazine.mp.	508
88	anticipat*.mp.	83264
89	terminal restlessness.mp.	43
90	agitat*.mp.	21347
91	'incident pain'.mp.	110
92	CSCI.mp.	265
93	'Continuous subcutaneous infusion'.mp.	597
94	Just in case medic*.mp.	2
95	symptom control.mp.	4435
96	syringe pump.mp.	997
97	syringe driver.mp.	139
98	McKinley.mp.	172
141	secret*.mp.	592345
142	medicine*.mp.	849004
	Combine MEDICATION MANAGEMENT using OR	

146	18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 or 60 or 61 or 62 or 63 or 64 or 65 or 66 or 67 or 68 or 69 or 70 or 71 or 72 or 73 or 74 or 75 or 76 or 77 or 78 or 79 or 80 or 81 or 82 or 83 or 84 or 85 or 86 or 87 or 88 or 89 or 90 or 91 or 92 or 93 or 94 or 95 or 96 or 97 or 98 or 141 or 142 or 145	3,458,951	3,481,792
	Combine [SAFETY OR MEDICATION MANAGEMENT] using OR		**16.01.20**
147	140 OR 146	5,219,159	5,260,587

♯	**PALLIATIVE CARE SEARCH STRANDS**	**RESULTS**	**16.01.20**
	Initial MeSH terms. All exploded to include sub headings. Individually searched		
99	exp Terminally Ill/	6366	
100	exp Terminal Care/	49688	
101	exp Palliative Care/	51920	
102	Hospice and palliative care nursing	686	
	(Hospice and palliative care nursing).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]		
103	exp Hospice Care/	6228	
104	exp Palliative Medicine/	292	
105	exp Advance Care Planning/	8863	
106	exp Resuscitation Orders/	3729	
	Keywords searched		
107	'Last phase of life'.mp.	110	
108	'Last days of life'.mp.	192	
109	'care of the dying'.mp.	2015	
110	'Liverpool care pathway'.mp.	215	
111	'Electronic palliative care'.mp.	13	
112	'End of life'.mp.	22072	
113	End-of-life.mp.	22072 as above	
114	Dying.mp.	33547	

115	'Expected death'.mp.	187	
116	Inappropriate admission.mp.	87	
117	Karnovsky score.mp.	8	
118	living will.mp.	796	
119	Marie Curie.mp.	275	
120	Macmillan.mp.	392	
121	phase of illness.mp.	672	
122	preferred place of care.mp.	67	
123	preferred place of death.mp.	132	
124	unplanned admission.mp.	271	
125	palliat*.mp.	92702	
126	DNACPR.mp	63	
127	PPD.mp.	9394	
128	PPC.mp.	3365	
129	EPACCS.mp.	8	
130	ACP.mp.	8756	
131	ADRT.mp.	14	
132	Last year of life.mp.	599	
133	LYOL.mp.	8	
134	End of their lives.mp.	366	
135	Last six months of life.mp.	75	
136	Last 6 months of life.mp.	170	
137	supportive care.mp.	14854	
	Combine PALLIATIVE CARE using OR		
143	99 or 100 or 101 or 102 or 103 or 104 or 105 or 106 or 107 or 108 or 109 or 110 or 111 or 112 or 113 or 114 or 115 or 116 or 117 or 118 or 119 or 120 or 121 or 122 or 123 or 124 or 125 or 126 or 127 or 128 or 129 or 130 or 131 or 132 or 133 or 134 or 135 or 136 or 137	200,393	202,065
Combine Population AND [safety or medication management] AND Palliative care			
Version 3 (16-01-20)		**4316**	
144 and 143 AND 147			
Duplicates: N= 242			
Ready for title and abstract screening		**4074**	