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Administration of medicines in care homes (with nursing) for older people by care assistants: Developing evidence-based guidance for care home providers

Summary of evidence

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Introduction

Older people in care homes are among the most vulnerable members of our society, reliant on care home staff for many of their everyday needs; including taking their prescribed medications (Centre for Policy on Ageing, 2011). The importance of adopting appropriate medication procedures in care homes has been highlighted by a key research report, the Care Homes' Use of Medicines (CHUMS) Study (Alldred et al., 2009). A cross partnership improvement project (funded by the Department of Health) identified the importance of (i) training and development and (ii) clarity of roles and responsibilities to reduce the risk of harm associated with medications in care homes (National Care Forum 2011 and 2013). Subsequently, NICE (2014) published guidance on all aspects of managing medicines in care homes. However, the role of the care assistant in medicine administration in care homes (with nursing) is poorly articulated.

There is considerable overlap in dependency levels and care needs amongst residents in care homes with and without nursing (Lievesley et al., 2011), but there are important differences in the ways in which care is provided. In homes with nursing care, registered nurses are employed by the homes to provide continuous care (24/7), whereas in care homes without nursing, registered nurses from community and primary care services visit to provide nursing care when required. Both settings employ care assistants and registered nurses (employed by the care home or the NHS) offer guidance and support to this assistant workforce. To meet the requirements of the brief, our focus is medicine administration by ***care assistants in care homes (with nursing) for older people*** in England.[1] There is clearer guidance on the role of care assistants in medicine administration in care homes without nursing (see below - Main headlines from literature). When developing and reporting on this work we have considered the relevance of this literature (care homes without nursing) for care homes with nursing.

[1] By training care assistants to administer medications, the registered nurse could be freed up to focus on case management of residents with complex needs, undertaking assessments of need and the supervision of care staff in the provision of care.

This review was requested by the Department of Health Care Sector Nursing Taskforce to develop guidance on the administration of medicines by care assistants in care homes (with nursing) for older people that is informed by evidence, policy and legislation.

Aims

The aims of the review were to:

1. identify and appraise literature on the administration of medicines in care homes (with nursing) by care assistants focusing specifically on safety, training needs and processes; and
2. consider the context for the administration of medicines in care homes (with nursing) by care assistants through relevant legislation and policy documents

Approach for the review

We have conducted a 'rapid review' (Ganann et al., 2010) of literature on the administration of medicines in care homes (with nursing) for older people by care assistants and related relevant legislation and policy documents. Our focus, for the purposes of the review and the development of subsequent guidance, is UK literature. We have focused on this particular care home setting in response to the brief. However, we acknowledge the complexities of distinguishing between care homes with and without nursing and the registered and non-registered workforce due to ill-defined terms in the literature. Therefore, we have pursued relevant lines of inquiry to address the evidence for this review, promote transparency in our approach to the review and the subsequent development of guidance. Our framework for conducting the review ensures that the methods deployed are conducted in a rigorous and transparent way (Centre for Reviews and Dissemination, 2001).

Searches

Working with an information specialist, we have developed search strategies tailored to individual electronic databases (Appendices 1 to 6). Databases searched included (in order): Social Care Online, Medline, ASSIA, Embase (and Embase Classic), CINAHL and Health Management Information Consortium (HMIC) (Table 1). A total of 692 references (after deduplication) were identified by the search.

Grey literature

A search for grey literature and policy documents has been carried out using Google, Open Grey, websites of relevant organisations (including NMC, RCN, The Kings Fund, Nuffield Trust, Health Foundation, Social Care Institute for Excellence, NICE). A total of 22 documents (considered relevant for the review) have been included through this 'open' search of grey literature and policy documents.[2]

[2] We retrieved 'Good Practice' documents written by NHS Clinical Commissioning Groups through this open search (see included references 24-26). These documents provided very similar guidance and so after reviewing these three we made the decision to not include further NHS CCG guidance as these were not adding new information to the review.

Table 1: Details of search

Database	Platform	Date searched (date final download done)	Searched from (yr)	Database last updated: year/month/ week if applicable	Number of results before deduplication
Social care online	scie	16/09/2015	2000	16/09/2015	26
Medline 1947-	OVID	16/09/2015	2000	2015 Sept Week	229
ASSIA	Proquest	16/09/2015	2000	16/09/2015	218
Embase +Embase Classic 1946-	OVID	16/09/2015	2000	14/09/2015	418
CINAHL	EBSCO	16/09/2015	2000	14/09/2015	154
HMIC	OVID	16/09/2015	2000	16/09/2015	14
				TOTAL REFS	1059
				TOTAL REFS after deduplication	**692**

Reference management

The references generated by the search of electronic databases have been imported into an Endnote Library for management of the screening of titles and abstracts. Screening of titles and abstracts was undertaken by one reviewer (JB). References that appeared to be within the scope of the review (n=135) were obtained in full text for a final decision to be made about inclusion (KS).

The following ***inclusion criteria*** have been applied to the screening of titles and abstracts:

- UK focus and English language only
- Older people (aged 65 years or older) living in UK care homes (with nursing)
- Medicine administration by care assistants[3]
- Focus on medicine safety, training needs and processes
- Empirical study (range of designs)
- Descriptive article or policy document or legislation
- Published 2000 to present date

Nine UK papers were included from the electronic search and subsequent screening process, plus 22 papers obtained through open searching. Electronic (and open) searching has been supplemented by informal methods: checking references of included papers (no

[3] A range of titles are used to describe these roles which are non-registered and this has been considered in the review

additional papers) and contact with experts (one local policy document not identified through our electronic or open search was provided by an advisory group member). Figure 1 provides a summary of the review and selection process for inclusion of the 32 UK papers.

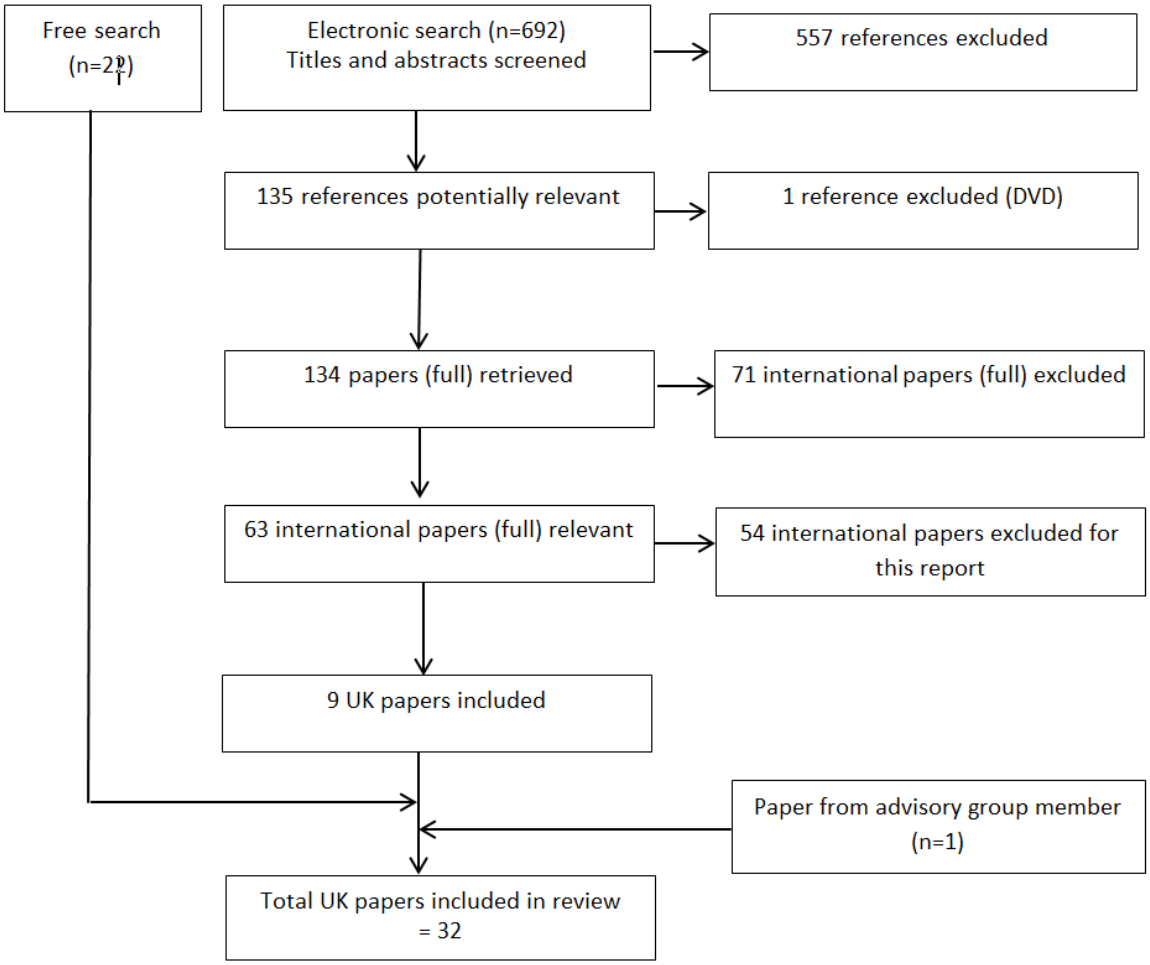
Data extraction

Data has been extracted from each included paper (study or other) into a summary table (see Tables 3 and 4). The charting of these data has enabled us to identify commonalities, themes and gaps in the literature.

Data analysis

Content analysis has been used to synthesise the findings (Pope et al., 2007, p. 48). This approach provides a systematic technique for categorising data and producing narrative summaries of the findings for the evidence report.

Figure 1: Review and selection process



Descriptive summary of evidence

The review focuses on UK literature published from 2000 onwards.[4] A total of 32 papers originating from the UK have been included in this review. A range of literature has been included (Table 2) which was relevant to the understanding the administration of medicines by care assistants in care homes (with nursing) for older people. However, it should be noted that the role of care assistants in medicine administration was not the main focus of much of this literature but rather an area covered that we considered added understanding to the review.

The majority of the included literature (n=23) comprises a range of documents that provide insights for the focus of the review: legislation, regulation, professional standards, standards and guidance from national bodies and organisations, improvement projects and audit, descriptive articles from the care sector and news items. Nine research papers provided findings of relevance to the focus of this review. The aims of the included research broadly focused on medication errors (prevalence, types and underlying causes), medicine administration, and support for medicine administration in care homes. Five of the papers [Box 1: 1, 2, 3, 8, 9], report on two large studies of medicines use in care homes. We did not apply criteria to assess the methodological quality of the included papers because the studies were not directly focused on the role of care assistants in medicine administration but included relevant findings or discussion related to our review focus. We therefore considered these research papers to be relevant to the scoping review. We note that the included research literature reports on observational and descriptive studies.

Table 2: Types of literature included in the review

Type of paper	Reference number	Frequency
Other literature		**23**
- Description/ opinion	12, 15, 16, 18, 19, 20	6
- Guidance (organisational)	23, 24, 25, 26, 28	5
- Improvement project/ audit	11, 14, 21, 30, 32	5
- Quality statement	17, 29, 32	3
- News item	10, 13	2
- Legislation	22	1
- Professional standard	27	1
Research		**9**
- Observational	1, 2, 3, 8, 9	*5*
- Census	4	*1*
- Review	5	*1*
- Survey	6, 7	*2*
	TOTAL PAPERS	**32**

[4] We plan to review the international literature at a later stage and produce an article for publication which considers the UK context within the broader international literature.

Main headlines from literature

The management and administration of medicines in care homes is currently covered by regulations of the ***Health and Social Care Act 2008*** (Regulated Activities) and these are ***regulated by the Care Quality Commission*** under Regulations 2014 (part 3) [Box 2: 22]. Key regulations related to the management and administration of medicines in care homes includes the following:

- People using the service and/or those lawfully acting on their behalf must be given opportunities to manage as much of their care and treatment as they wish and are able to, and should be actively encouraged to do so. This includes managing their medicines (Regulation 9:3:e)
- The registered provider must provide safe care and treatment, including medicines (Regulation 12)
- Medication reviews must be part of, and align with, people's care and treatment assessments, plans or pathways and should be completed and reviewed regularly when their medication changes (Regulation 12:2:b)
- Staff responsible for the management and administration of medication must be suitably trained and competent and this should be kept under review. Staff must follow policies and procedures about managing medicines, including those related to infection control. These policies and procedures should be in line with current legislation and guidance and address: (i) Supply and ordering; (ii) Storage, dispensing and preparation; (iii) Administration; (iv) Disposal; and (v) Recording (Regulation 12:2:g).

The regulations do not provide detail with regard to the nature of staff training for medicine administration, assessment of competence or the frequency of reviews but we have located literature (discussed below) which provides further detail of how these can be achieved in the sector.

An important starting point when considering medicine administration in care homes is to acknowledge that first and foremost ***residents in care homes (with nursing) have the same rights (unless detained under the Mental Health Act or lacking capacity) to choose to manage their own medications (including the right to refuse medication)*** as people living in their own home or in care homes (without nursing) [Box 2: 17, 21, 25]. Medicines management sits in the context of person-centred care, human rights and mental capacity legislation [Box 2: 28]. The Mental Capacity Act 2005 states that *'a person must be assumed to have capacity unless it is established that s/he lacks capacity.'* If a person is believed to lack capacity then the principles and processes of the Mental Capacity Act must be adhered to when arrangements for medication administration are being decided [Box 2: 25]. Adults who live in care homes and have been assessed as lacking capacity must only be administered medicine covertly if a management plan is agreed after a best interests meeting [Box 2: 17].

In care homes with nursing, i.e. that employ registered nurses (RN), the literature indicates that medicines are often managed and administered by a RN. This has important implications for the RN role in the care home and can also de-skill residents who may be able to manage their own medications if these were available in, for example, individualised room lockers. Whilst the RN assumes responsibility for the management and administration

of medicines to residents in care homes with nursing, ***the RN can delegate this to a care assistant*** [Box 2: 28].

The Nursing and Midwifery Council's (NMC) (2007) Standards for Medicine management [Box 2: 27] requires each registered nurse to be individually accountable for making sure that all medicines are administered correctly and to be personally accountable for up-to-date practice. The registered nurse can decide when to delegate the administration of medicines to a care assistant and in doing so is ***confident that the assistant is competent to undertake the delegated task*** [Box 2: 27]. The NMC [Box 2: 27] is clear that this will require ***education, training and assessment*** of the care assistant and further support if necessary. Further, the competence of the person to whom the task has been delegated should be assessed and reviewed periodically and records of the training received and outcome of any assessment should be recorded and be available [27]. The importance of training is highlighted across the range of included literature [Box 1: 1, 2, 3, 7, 8, 9] [Box 2: 11, 14, 15, 16, 17, 19, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32]. In delegating the administration of medicinal products to care assistants, ***it is the registrant who must apply the principles of administration of medicinal products*** [Box 2: 27] and may then delegate to a care assistant to assist the patient in the ingestion or application of the medicinal product. Any ***care assistant accepting the delegated task of administering or assisting with medicines must take responsibility*** for ensuring that their actions are carried out carefully, safely and correctly [Box 2: 23]. This extends to controlled drugs where a care assistant can, at the request of the RN, be a second signatory but should witness the whole administration process or can administer the controlled drug and ingestion by the resident under the direct supervision of the RN [Box 2: 27]. The principle of the 5 'Rs' of correct medication should be followed: right resident, right medication and right dose by the right route at the right time [Box 2: 21].

In care homes (without nursing), residents who are unable to manage their own medicines are entitled to have someone who is adequately trained and knowledgeable to give medicines to them [Box 2: 22, 29]. Guidance is clear that only care staff who have been given appropriate training and have demonstrated they are competent should do this [Box 2: 29]. The Royal Pharmaceutical Society [Box 2: 29] state that, as a minimum, the training should cover: the supply, storage and disposal of medicines; safe administration of medicines; quality assurance and record-keeping; and accountability, responsibility and confidentiality. Care workers should only give medicines that they have been trained to give and this will generally include assisting people in: taking tablets, capsules, oral mixtures; applying a medicated cream/ointment; inserting drops to ear, nose or eye; and administering inhaled medication [Box 2: 29]. Administering inhaled medication is becoming increasingly complex: there are now 19 different inhaler devices on the market. This further emphasises the importance of training for care assistants *and* nurses in administration of inhaled medication. ***It could be inferred that in care homes (with nursing), care assistants could support RNs with administration of medicines through these routes as long as appropriate training and assessment of competence has been undertaken by the care home provider and that the provider considers investment in this training and assessment will better support resident care and needs***. A partnership project to promote medication safety in care homes led to the development of a guide for employers and a learners' workbook (reviewed by Skills for Care) [Box 2: 30, 31]. However,

when used by the sector, these were considered to have greater utility in care homes without nursing because of the presence of registered nurses in care homes (with nursing) [Box 2: 31].

The administration of medicines by invasive or specialised techniques will normally involve a registered nurse [Box 2: 25]. In care homes (with nursing), the care provider is responsible for making sure that a registered nurse who gives medicines by a specialised technique has relevant and up-to-date training [Box 2: 25]. Medication that care assistants should not normally administer in care homes include: rectal administration, for example suppositories, diazepam (for epileptic seizure); injectable drugs such as insulin; administration through a gastrostomy, for example percutaneous endoscopic gastrostomy (PEG) or percutaneous endoscopic jejunostomy (PEJ); and giving oxygen. However, additional training in these can be undertaken by senior care staff in care homes (without nursing) to support resident care [Box 2: 27]. Therefore, care home providers could decide whether or not to provide this level of training for senior care assistants in a care homes (with nursing). However, given that these homes employ registered nurses then this extra training for assistants may not be desirable or appropriate. The literature does not address the administration of medications in care homes by care assistants that require titration, for example warfarin therapy.

Care home providers have a key role in ensuring policies and procedures for medicine administration are in place and these should be in line with current legislation and guidance and address: (i) supply and ordering; (ii) storage, dispensing and preparation; (iii) administration; (iv) disposal; and (v) recording [Box 2: 22]. The roles and responsibilities of care assistants in medicine administration should be clear in these policies. In addition***, the service provider should ensure systems are in place that support their staff to report incidents, as well as encouraging a no blame culture*** [Box 2: 29]. The importance of policies, procedures and processes for safe medicine administration in care homes is highlighted across the range of included literature.

The literature highlights a number of ***common issues associated with medication administration errors*** which should be used to inform any training of care assistants involved in medication administration to heighten their awareness and insights. These include: incorrect crushing or cutting of medication; not supervising the intake of medication, particularly for residents with dementia; incorrect timing; omissions due to medication being unavailable; and wrong drug or wrong dose [Box 2: 21]. Inhalers and liquid medications are much more likely to give rise to medication errors than tablets or capsules [Box 1: 2] [Box 2: 21]. Antibiotics may be particularly prone to error with a number of doses being missed over the course of treatment [Box 2: 21]. It has also been observed that medication administration errors are more common in the morning [Box 2: 21]. A commonly cited cause for medication errors is interruptions during the preparation and administration of medicine [Box 2: 21]. When considering issues associated with medication errors there appears to be a gap in the literature with regard to knowledge and understanding of prescription dosage norms. Ensuring the correct dosage is administered is a crucial component of medicine administration by the practitioner, whether they are a registered nurse (RN) or care assistant, and ***ultimately the accountability rests with the RN when delegating this activity to a care assistant***. Delegation, accountability, liability and criminal responsibility need to be well understood by RNs and care assistants.

It is unclear whether monitored dosage systems (MDS) or technology-based solutions are inherently safer for medicine administration [Box 1: 3, 8, 9]. The authors of the study of bar code technology use cautioned that further research was required prior to adoption across the care home sector [Box 1: 8, 9] [Box 2: 10].

Limitations of the review

We have conducted a rapid scoping review of the literature, reported to promote transparency of our methods and conclusions. While this approach was appropriate for the purposes of the review (and to deliver within the time frame) it is worth noting potential limitations of this review. We have reviewed recently published UK literature, legislation and policy (from 2000 to present date) to inform the subsequent development of guidance on the administration of medicines in care homes (with nursing) by care assistants. It is possible that there may be relevant literature published pre-2000. It is important to point out the paucity of high-quality empirical evidence in relation to administration of medicines by care assistants in UK care homes (with nursing). The majority of literature included in the review originates from organisational documents, improvement projects or descriptive articles. The specific UK context for the guidance makes our decision to focus on UK literature appropriate but there may be relevant international evidence and guidance that could have usefully informed the guidance. We plan to review the international literature for a separate paper which we will submit to an international peer-reviewed journal.

Summary of the literature

The following should be taken into consideration to determine the role of the care assistant in medicine administration in care homes (with nursing) for older people:

- The law does not prevent care assistants from administering medicines in care homes
- The registered provider must provide safe care and treatment, including medicines
- Care home providers have a key role in ensuring policies and procedures for medicine administration are in place and these should be in line with current legislation and guidance
- Staff responsible for the management and administration of medication must be suitably trained and competent and this should be kept under review
- Residents in care homes (with nursing) have the same rights (unless detained under the Mental Health Act or lacking capacity) to choose to manage their own medications, including the right to refuse medication, as people living in their own home or in care homes (without nursing).
- The Mental Capacity Act (2005) states that ‘a person must be assumed to have capacity unless it is established that s/he lacks capacity’. Care home staff should regularly assess whether an individual resident has capacity to make decisions about their care and treatment (including medicines).
- Whilst the RN assumes responsibility for the management and administration of medicines to residents in care homes with nursing, the RN can delegate this to a care assistant but must be confident that the care assistant is competent to take on a delegated task

- Any care assistant accepting the delegated task of administering or assisting with medicines must take responsibility for ensuring that their actions are carried out carefully, safely and correctly
- The administration of medicines by invasive or specialised techniques will normally involve a registered nurse, however, suitably trained and competent senior support staff may administer certain medications when it has been deemed in the best interest of the patient
- Research studies have highlighted a number of areas that are associated with medication errors and so training for care assistants should highlight these areas to heighten awareness and insights for their role in medicine administration
- Where care assistants are involved with the administration of medications in care homes then the RN needs to ensure the continuing assessment of care home residents and their medications to manage the complexity of their health care needs and comorbidities

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Table 3: UK primary studies and reviews with findings related to medicine administration by care assistants in care homes

Reference number	Author, Year	Aim	Setting, participants, methods	Findings related to care assistants	Implications
1	Alldred et al., 2010	Establishing the prevalence, types and underlying causes of medication errors, estimating the ensuing harm and developing solutions to reduce the prevalence of error.	Care homes residential and nursing. 256 residents recruited in 55 care homes (30 residential; 25 nursing) and 59 staff for interviews. Ethnographic approach - observation, interview and checking records (in homes, pharmacies and practices).	Administration errors could result from poorly trained staff. Staff giving medicines had many distractions.	Care homes need to ensure: - staff are competent to administer medicines - processes are in place to support safe administration
2	Alldred et al., 2011	To investigate the influence of formulation and monitored dosage systems (MDS) on administration errors.	Care homes residential and nursing. 233 residents in 55 care homes (30 residential; 25 nursing). All older people over 80 years. Administration errors were identified by pharmacists (using	Inhalers and liquid medicines were associated with significantly increased odds of administration errors.	Training of staff in safe administration of these formulations (inhalers and liquid medicines) needs implementing. Future research should be conducted to develop and test educational interventions designed to improve the

			validated definitions) observing two drug rounds of residents randomly selected from a purposive sample of UK nursing and residential homes. Errors were classified and analysed by formulation and medicine delivery system and analysed by formulation and medicine delivery system		administration of these formulations in this setting.
3	Barber et al., 2009	To determine the prevalence and potential harm of prescribing, monitoring, dispensing and administration errors in UK care homes, and to identify their causes	Care homes residential and nursing. 256 residents recruited in 55 care homes (30 residential; 25 nursing) and 59 staff for interviews. A prospective study of a random sample of residents from a purposive sample of care homes. Errors were identified by patient	System factors: - No one took responsibility for the whole system; care was uncoordinated. - Communication (written and verbal) was problematic, within and among the home, GP practice and pharmacy. Resident factors: - Residents' physical condition could make it hard to administer	That two thirds of residents were exposed to one or more medication errors is of concern. The will to improve exists, but there is a lack of overall responsibility. Action is required from all concerned. Within homes the use and accuracy of the medication

			interview, note review, observation of practice and examination of dispensed items. Causes were understood by observation and from theoretically framed interviews with home staff, doctors and pharmacists. Potential harm from errors was assessed by expert judgement.	medicines properly. - Some patients had fears about medicines, such as feeling they were being poisoned, and some were consequently aggressive. Task factors: - an inability to find the medicine - failure to order the right quantity of ‘‘as required medicines’’ - the special requirements that some medicines had (e.g. ‘take on an empty stomach’’) - the difficulty many staff had in correctly administering inhalers - a lack of adequate protocols. Individual staff factors: - lack of knowledge about inhalers and the timing of medicines with respect to food - staffing problems in the	administration record requires constant review. The lack of protocols and adequate staff training remains an issue. Drug rounds are very busy, and often interrupted in the morning. Some medicines should be prescribed for different times to ease this. The commonest administration errors were omissions because the drug was not available, so omissions need to be monitored and ordering, particularly of ‘as required’’ medicines, needs to be improved.

				morning round (when most medicines were given and when staff also had most other tasks) - staff were frequently interrupted and did not have dedicated time to order medicines The odds of a medication administration error occurring were higher in residential care than in nursing care residents (not statistically significant). The higher apparent risk of administration errors in residential compared with nursing residents was largely attributable to more 'omissions'' (38 vs 19) and ''wrong doses'' (18 vs 7)	
4	Cooper et al., 2009	To investigate medical errors occurring in care homes (and other settings) over a 12-	Care homes. Records of all telephone enquiries during 12	263 out of 6946 calls were from care homes (~4%).	Errors should be avoided by improving documentation of notes, more thorough systems

		month period using call data from the UK National Poisons Information Service	month period (1 April 20017 to 31 March 2008) and details of nature of error noted.	Majority of errors in care homes regarded administration of an excess of medication (39.2%) or a patient being given someone else's medication (39.5%).	for checking medication, and writing prescriptions clearly.
5	Parsons et al., 2011	To provide an overview of the literature in the area of prescribing and use of medicines in care homes (nursing and residential)	Literature review to identify key issues associated with prescribing and medication use in care homes. Not a systematic review. Papers not rejected based on method. 126 publications identified (international): these predominantly employed observational methodologies	Key issues include: - inconvenient medication administration times for nursing home staff - competing demands on staff time, and difficult or time-consuming medication administration procedures may result in erratic medication compliance - no UK papers identified on impact of staff qualifications and/or experience on medication administration errors	Prescribing and use of medicines in the care home setting is suboptimal and this paper highlights the six key themes, reported most frequently in the literature, that impact upon the quality of care for residents: 1. polypharmacy; 2. inappropriate use of medications; 3. medication-related adverse events; 4. compliance/adherence with medication; 5. medication issues for staff; 6. communication across boundaries of care.

6	Rivers et al., 2014	To determine whether stress or anxiety when administering medicines might have an impact on the extent to which staff believe they may be blamed for making a mistake	Random sample of 800 care homes. Questionnaire for care home manager and a senior or junior carer with responsibility for administering medicines. Questionnaire was an attitudinal (Likert-style) self-completion questionnaire . 124 homes (16% response rate) returned 223 valid questionnaires (manager n=126; senior carer n=75; junior carer n=22).	Nearly all staff were confident of administering medicines correctly, although approximately 20% fewer junior staff 'strongly agreed' with this statement compared with senior colleagues. One in five was worried about being blamed for making a mistake and this figure rose to one in three for junior staff. Eleven per cent of carers stated that they were often stressed when administering medicines.	A noteworthy minority of care workers were concerned about being blamed for making a mistake. This trend was exaggerated in junior staff compared with senior colleagues. Some care homes may not always operate within a blame free culture with respect to the administration of medicines.
7	Schweizer & Hughes, 2001	To gain more detailed information on the current pharmaceutical service provision in nursing and residential homes in Northern Ireland and to assess the views of care staff on	All nursing and residential homes (n=586) in Northern Ireland. A structured questionnaire (with 16 questions) mailed care	Training in the care home by a pharmacist was strongly supported by the respondents. Areas of training identified include: - safe handling of	This work demonstrates that those responsible for care in nursing and residential facilities strongly support further involvement by the pharmacist in these care facilities.

		future pharmacy services	home managers. A response rate of 68% (n=396) was obtained.	medicines - correct administration of medicines - medicine record keeping and recognition of problems caused by medicines. Care homes would be supportive of paying for this training by a pharmacist.	Pharmacy policy makers must ensure that such services are developed to meet the needs of these vulnerable elderly residents.
8	Szczepura et al., 2011	To measure the incidence of medication administration errors in nursing and residential homes using a barcode medication administration (BCMA) system	13 care homes: nursing (n=4) and residential (n=9). Data on all medication administrations for a cohort of 345 older residents during a 3-month period: 188,249 medication administration attempts. A prospective study recording medicine administration in real time using BCMA system to determine the	2,289 potential MAEs were recorded for the 345 residents 90% of residents were exposed to at least one error. The most common (n = 1,021, 45% of errors) was attempting to give medication at the wrong time. Over the 3-month observation period, half (52%) of residents were	More research is required into the decision-making of nurses during medication rounds before delegation to care staff in a nursing home setting can be recommended.

			incidence and types of potential medication administration errors (MAEs) and whether errors were averted. Error classifications included attempts to administer medication at the wrong time, to the wrong person or discontinued medication. Further analysis compared data for residential and nursing homes. In addition, staff were surveyed prior to BCMA system implementation to assess their awareness of administration errors.	exposed to a serious error such as attempting to give medication to the wrong resident. The pre-study survey revealed that only 12/41 staff administering drugs reported they were aware of potential administration errors in their care home. Nearly all staff identified 'interruptions during round' as a contributory cause for administration errors. The pre-study survey suggests that errors are linked to system and behaviour factors rather than a lack of education or training.	
9	Wild et al., 2011	To evaluate the effects of a pharmacy-led barcode medication system in care homes	13 care homes: with nursing (n=4) and without on-site registered nursing staff	The new system raised awareness of the issues around medicine safety.	It could be argued that care staff in nursing homes who use the bar code system could be

			(n=9). Qualitative: 43 interviews and five focus groups. A pre- and post-intervention design. Before the bar code system was introduced all staff who administer medication had training in its use. Before training, a convenience sample of care home staff, including managers, social carers and nurses, completed questionnaires and interviews to assess their awareness of medication errors when using the medicine administration record. A second questionnaire was completed and interviews undertaken, 12 weeks after training	None of the nurses and only a small percentage of care staff cited 'lack of training' or their old system being 'confusing and open to error' as leading to medication administration errors. 'Interruptions to the round' most common cited problem leading to an error. Care staff believed that their sense of stress and pressure was exacerbated by staff shortages. Staff were asked if some medications could be given by care staff in nursing homes using the bar code system. Nurses held mixed views about this; some of the issues raised were about the legality of nurses' delegating to non-	just as effective as their counterparts in residential homes when giving basic medications, leaving nurses more time to focus on complex medications and other tasks. However, this would require further research into nurses' and care staff's approaches to medication administration, in particular differences in behaviour and clinical judgement, and the nature of interruptions.

			once staff had used the new system. Staff were asked to compare the old (administration record) and new (bar code) systems in terms of benefits and limitations.	nurses, and the difference between nurses' and carers' levels of knowledge and professional judgement. Residential home care staff were more positive, as long as a boundary could be drawn between medications appropriate for administration by care staff and those requiring registered nurses' skills. Negative attitudes were based mainly on nurses' perceptions that care staff have a lower level of medication knowledge. However, at follow-up interviews, care staff did not perceive their medication training or knowledge as deficient and said that medication checks and updates for	

				residential homes and staff were in excess of those undertaken by nursing homes and nurses.	

Table 4: UK audit, policy, legislation and opinion with key points related to medicine administration by care assistants in care homes

Reference number	Author, Year	Type of paper and setting	Key points	Implications
10	Ford, 2012	NEWS ITEM reporting on study in care homes by Wild et al. 2011 (reference 9)	Nurses and care assistants working in care homes must be protected from interruption during drug rounds to reduce the "serious safety issue" posed by high error rates. The study reported on the potential for increasing patient safety by using technology such as barcodes in medicine administration.	Major causes of drug administration errors were lack of time and interruptions, rather than lack of training. Quote from research lead: *'This should not be perceived as an opportunity to reduce valuable registered nursing time in favour of employing more care staff at less cost.'*
11	Commission for Social care Inspection, 2006	AUDIT reporting on investigation of the management of medications in care homes to determine if homes had improved their performance since the previous audit in 2004	In 2004 audit report, poor performance in care homes related to medicines in 4 areas: 1. wrong medication being given to residents; 2. poor recording of medicines received and administered; 3. medicines being inappropriately handled by unqualified staff; and 4. medicines being stored inappropriately. In 2006, some slight improvement	All care homes need to urgently review their policies and practices in managing medication and demonstrate progress by supporting and closely monitoring the practices of their care workers. Councils should continue to support improvement in homes' practice through staff training programmes, joint initiatives with NHS primary care organisations

			in performance overall, with the exception of nursing homes for older people (also audited children's homes). However, the rate of improvement in such a crucial area of care was documented as 'disappointingly slow', with nearly half the care homes for older people still not meeting the minimum standard relating to management of medications.	and through service commissioning plans. Councils should hold discussions with homes and training providers in their area to ensure that available training grants are being directed to rectifying performance deficiencies relating to the management of medication. NHS primary care organisations need to acknowledge and act on their responsibility to support health care provision within private and voluntary care homes. The Healthcare Commission needs to monitor primary care organisations' performance against this expectation. Care homes need to address how medication is administered to people from different cultures. Learning resources developed by National Patient Safety Agency should be actively promoted to the private and voluntary care

				sector where NHS patients are cared for. Inspections need to address this important area of care to promote standards.
12	Griffith, 2006	DESCRIBES how the law seeks to minimize harm from medicines by imposing a duty on care staff in four key legal areas	Four interlinked areas of law regulating the supply and administration of medicines: 1. duty to employer (under contract of employment) 2. duty under civil law (the person's right to self-determination and the practitioner's duty to be careful when administering medicines to those in their care, also referred to as negligence) 3. duty to the profession (only applies to a registered nurse with NMC) 4. duty under the public law (Consumer Protection Act 1987, Medicines Act 1968, Care Standards Act 2000) Older people in care homes are being given the wrong medicine, someone else's medicine or doses	The law seeks to protect residents by imposing a duty on care staff to manage medicines safely. This is achieved by regulating the right to administer medicines and imposing standards for the administration of medicines.

			that are potentially dangerous. Care homes failing to meet minimum standards (CSCI) for managing medicines prescribed by GPs for residents.	
13	Harrison, 2015	NEWS ITEM reporting on dismissal of care home registered nurse after care worker gave medication to wrong resident.	Registered Nurse dismissed for not reporting the error rather than delegation to the care worker.	Delegation is appropriate if care worker considered competent. Policies and procedures following a medication error should be adhered to.
14	Health Foundation, 2011	TESTIMONIES given by family and carers of people living in a care home, specifically around issues of medication safety.	Main issues raised include: - A lack of communication and information sharing around medication. - Only qualified and designated staff should be tasked with administering medication. Ideally they should have a certified level of awareness of drug treatments and common adverse drug reactions, and be trained to NVQ level three or above. - Training needs for staff were considered necessary for drugs	This work has been taken forward in an integrated programme led by the National Care Forum, funded by the Department of Health, working as part of a wider cross sector partnership. This partnership approach recognises that improving medication management in care homes is a system-wide issue, which needs to be tackled together. Resources have been produced[5]

[5] http://www.nationalcareforum.org.uk/medsafetyresources.asp [accessed 16 November 2015]

			knowledge, safety issues around dispensing drugs, holistic interaction with residents, and the difference between caring for the mentally impaired and those who are frail or have a lack of physical coordination but are mentally fit. - Agreement that staff want to offer best practice care, but are often prevented from doing so by the system or by lack of time.	
15	Hughes-Cook, 2015	DESCRIBES the main principles of the administration and management of medication and the ways in which care home staff can be supported to be competent in these processes	Draws on findings of CHUMS study (reference number 1) which highlights the following medication errors in care homes: - incorrect crushing of medication - not supervising the intake of medication, particularly in residents with dementia - incorrect timings, omissions and dose - staff interrupted when administering medicines RPS Guideline (2007) requires care staff to be appropriately trained and competent to help with medicine administration and the care provider is responsible for	The focus on the home manager is reinforced by Outcome 9 of the CQC outcomes (2010) - *'The registered person must protect service users against the risks associated with the unsafe use and management of medicines, by means of the making of appropriate arrangements for the obtaining, recording, handling, using, safe keeping, dispensing, safe administration and disposal of medicines used for the purposes of the regulatory activity.'*

			ensuring this competence. However, there are no national guidelines for a consistent approach to training and support. Care Standards Act (2001) states that training in medicines administration and management should be accredited and include 1. Basic knowledge of how medicines are used and how to deal with and recognise problems in use 2. The principles behind all aspects of the homes policy on medicines handling and records. The Mental Capacity Act (2005) states that 'a person must be assumed to have capacity unless it is established that s/he lacks capacity'. This brings up a fresh set of challenges for the care worker as capacity can fluctuate.	
16	Johnson, 2012	CASE STUDY description of improving medicine administration in a care home following an unannounced care inspection.	The following areas were highlighted following the inspection: - Administration of controlled drugs: timing of recording in	Lessons learnt include: 1. An audit trail should be maintained so there is no mishandling of medication 2. Training must be provided to all

			controlled drug book is important to ensure there are no inaccuracies and at the same time medication administration record (MAR) sheet should be signed. Changes implemented to address inspection report: - Documentation: introducing a medication incident form. - Training: training from pharmacist for all staff and annual update introduced. A knowledge test of side effects has to be passed by staff administering medications. - Audits: weekly audit with action plans for addressing faults. - Individual medicine cabinets introduced in each resident's room. The CQC inspector advised that all staff with an NVQ level 2 and above could be trained in medication administration. This enabled more staff on each shift to be able to assist residents with their medication making it more person-centred and less open to	staff involved with handling of medication 3. The correct documentation must be filled out and checked to ensure residents receive the correct drugs

			error. Two clinical leads were appointed, who were qualified general nurses, to help give continued support and guidance to the residential areas.	
17	NICE, 2015	QUALITY STANDARD which focuses on ensuring that a person-centred approach to medicines in care homes is taken – with care home residents supported to take an active role in decisions about their treatment and, wherever possible, to self-administer their medicines. The quality standard aims to support 3 outcomes frameworks - Adult Social care Outcomes Framework (2015-16), NHS Outcomes Framework (2015-16), Public Health Outcomes framework (2103-16).	Main areas considered in the report: - It should be assumed that people who live in a care home can take and look after their medicines themselves, unless a risk assessment has indicated otherwise. - It is important to take into account a person's choice over whether or not they wish to self-administer their medicine and also to consider if self-administration will be a risk to them or others. - Support may include practical help to self-administer medicine, such as providing a glass of water with which to take medicine, reminder charts, large-print labels, hearing labels, easy-to-open containers, help measuring liquids, devices to help with the	Six quality statements: 1. People who transfer into a care home have their medicines listed by the care home on the day that they transfer. 2. Providers of health or social care services send a discharge summary, including details of the person's current medicines, with a person who transfers to or from a care home. 3. People who live in care homes are supported to self-administer their medicines if they wish to and it does not put them or others at risk. 4. Prescribers responsible for people who live in care homes provide comprehensive instructions for using and monitoring all newly prescribed medicines.

			use of inhalers, colour coding of labels (for example, for different times of day) and providing prompts for when medicines should be taken, (for example, with or after food or on an empty stomach). - Support may also involve providing the person with suitable information about the medicine, information on how to take the medicine and advice on any potential side effects. - Adults who live in care homes and have been assessed as lacking capacity are only administered medicine covertly if a management plan is agreed after a best interests meeting.	5. People who live in care homes have medication reviews undertaken by a multidisciplinary team. 6. Adults who live in care homes and have been assessed as lacking capacity are only administered medicine covertly if a management plan is agreed after a best interests meeting.
18	Nazarko, 2007	DESCRIBES the benefits of prescribers, pharmacists and staff working together for effective medication management in care homes. Aims to (1) enable care home staff to understand national minimum standards on medication, (2) be aware of common problems in medication	Standard nine of the national minimum standards relate to medication and there are eleven elements to this standard. The most important aspects are that: - care homes have a medication policy and procedures in place - older people who have been assessed as suitable to self-	Medication management is changing. New standards and the extension of non-medical prescribing should improve medication management in the future.

		and management, and (3) to manage medication effectively	medicate should be enabled to do so - nurses must observe the person for adverse reactions to medication and request medication reviews - nurses must also be able to track medication and balance stocks - care homes must retain medicines for seven days after the death of a resident	
19	Weaver, 2005	DESCRIBES assisting in administering the client's medication with reference to 4 areas: - legislation - clients taking their own medication - labels and - training.	*'There is a duty of care that requires medication to be safely handled so that people who are cared for in care are supported to take their medicines safely.'* (Royal Pharmaceutical Society, 2003). The standards for the administration of medicines are now an integral part of the Care Standards Act 2000. The training for care staff must be accredited and must include: *'Basic knowledge of how medicines are used and how to recognize and deal with problems in use; and the principles behind*	Key points for support staff: 1. Establish the level of support the person requires before administering medication 2. Adherence to standard precautions is necessary in drug administration 3. Details and instructions on the medicine label should be checked and confirmed as correct for the individual. 4. Medicine is administered using the correct techniques, at the appropriate time, according to the care plan.

			all aspects of the home's policy on medicines handling and records.' (Standard 9.7). Training should cover: - how medicines work - adverse reactions and minimising side effects and - ensuring medicines are for individuals (not to be shared)	
20	Whitehead, 2006	DESCRIBES administration of medicines by care staff.	Each care home will have a medicines policy that will cover the ordering, safe locked storage and the safe disposal of any drugs that are not used. The administration of drugs has five check areas: 1.Correct drug 2. Correct service user 3. Correct time of day 4. Correct route of the drug 5. Correct dose of the drug	Issues highlighted for care staff: 1. Always read and follow the employer's policy. If any error then occurs, the employer will take responsibility for the outcome. 2. Do not give the individual any drug that has not been prescribed by the doctor. 3. Check the side-effects of any drug that you give the individuals in your care. 4. Check the information about a drug for the contraindications before giving it. 5. If in doubt always contact the doctor or pharmacy before giving the drug.

21	Centre for Policy on Ageing, 2012	REPORT on administration of medicines in care homes focusing on the prevalence of error, common causes and how these can be addressed, through simple, low cost changes in practice, appropriate training and more substantive changes in care home systems. The report draws together information from a variety of sources and is written for care home owners, managers and senior staff.	- Respect for the older resident and their dignity and rights as an individual should remain at the heart of the medication process with medication being administered on behalf of the resident rather than to the resident. - The principle of the 5 'Rs' of correct medication administration in care homes remains sound, right resident, right medication and right dose by the right route at the right time - The most common types of medication administration error are incorrect crushing of medication, not supervising the intake of medication particularly for residents with dementia, incorrect timing, omissions and wrong dose and errors are more common in the morning - There is conflicting evidence of whether medication administration errors are more likely in residential or nursing home care, and there is no obvious relationship between medication errors and type of care home ownership, public, private or voluntary - Inhalers and liquid medications are much more likely to give rise to	Wide ranging implications for care homes when managing, administering and monitoring medications. Care workers have a key role and should have appropriate level of training.

			medication errors than tablets but it is unclear whether monitored dosage systems (MDS) are inherently safer. Antibiotics may be particularly prone to error with a number of doses being missed over the course of treatment - A commonly cited cause for medication errors is interruptions during the preparation and administration of drugs - Another commonly cited cause is a breakdown in communication during a period of transition, when the resident first enters a care home or returns to the care home after a period in hospital - Residents should be involved in the medication process. A mentally alert resident, or fully informed relative or friend may be the final check against medication error - The administering of medications in care home is currently (October 2011) covered by regulation 13 of the Health and Social care Act 2008 (Regulated Activities) Regulations 2010 and compliance is monitored by the Care Quality Commission - Standards and guidance on the handling and administering of medication in care homes are available from a number of sources	

			(RPS 2007 and 2011; NMC 2008; SCA 2008) - Simple, low cost options may reduce the chance of administration error: water available for resident; staff wearing a vest requesting not to be interrupted; considering timing of medications – only essential medication in the morning; MAR chart and maintaining levels of required medication (particularly PRN); printed (rather than written) MAR chart; provision of medication leaflets from pharmacists - Other suggested changes: photo of resident on chart; training and refresher training for staff; medication cupboard in resident's room (rather than medication trolley); IT link between GP and care home - Responsibility of medication processes and management in care home allocated to an individual -Technology based solutions may help if easy to use, reliable and do not increase staff workload	
22	Health and Social Care Act 2008 (Regulated Activities)	LEGISLATION on the management and administration of medicines in care homes	The management and administration of medicines in care homes is currently covered by regulations of the Health and	Staff responsible for the management and administration of medication must be suitably trained and competent and this

	Regulations 2014 (part 3)		Social Care Act 2008 (Regulated Activities) Regulations 2014 (part 3). This states that: - People using the service and/or those lawfully acting on their behalf must be given opportunities to manage as much of their care and treatment as they wish and are able to, and should be actively encouraged to do so. This includes managing their medicines (Regulation 9:3:e) - The registered provider must provide safe care and treatment, including medicines (Regulation 12) - Medication reviews must be part of, and align with, people's care and treatment assessments, plans or pathways and should be completed and reviewed regularly when their medication changes (Regulation 12:2:b) - Staff responsible for the management and administration of medication must be suitably trained and	should be kept under review. Policies and procedures should be in place for medicine management and administration.

			competent and this should be kept under review. Staff must follow policies and procedures about managing medicines, including those related to infection control. These policies and procedures should be in line with current legislation and guidance and address: (i) Supply and ordering. (ii) Storage, dispensing and preparation. (iii) Administration. (iv) Disposal. (v) Recording. (Regulation 12:2:g)	
23	Health Social Care and Housing Committee, 2015	POLICY STATEMENT to establish standards of work which protect the safety and well-being of service users and provide safeguards for staff. Written for managers, staff, carers and service users about the safe handling of medicines in Health and Social Care.	Principles of good practice related to care worker's role in administering medicines: - Every service user has the right to manage and administer their medicine and should be assessed to do so - Each worker who administers or assists with medicines must take responsibility for ensuring that their actions are carried out carefully, safely and correctly - Administering medicines or	Focuses on care homes (without nursing) In the United Kingdom, any person can lawfully administer prescribed medication to another; this includes prescribed medication and controlled drugs. The administration must only be in accordance with the prescriber's directions (Authorisation to Administer Medicines, Care Commission June 2008).

			assisting services users with their own medicines should be carried out in a manner which promotes the individual's independence and respects their rights, dignity, privacy, cultural and religious beliefs - Every adult who has the capacity to make a decision regarding their medicine has the right to refuse medicine even if refusal will adversely affect their health - Information relating to a service user's medicine should be treated in the same way as other personal care information and remain confidential - Work practices should be regularly audited to ensure that safe standards in the management and administration of medicines are maintained within the care service - In order to maintain the safety of service users and to improve and promote good practice, discrepancies and	Policy statement informed by relevant legislative requirements (UK and Scottish) and takes into account good practice guidance.

			medication errors must be reported and investigated - Medicines should never be used purely as a means to control behaviour - Medicines prescribed for one service user must not be administered to anyone else. This also applies to wound dressings and nutritional supplements.	
24	NHS Northern, Eastern and Western Devon Clinical Commissioning Group and South Devon and Torbay Clinical Commissioning Group, 2014	GUIDANCE on using the medication administration record (MAR) by care workers	Care workers who give medication must have a MAR chart which details: a. Which medication(s) are prescribed for the patient b. When they must be given c. What the dose is d. Any special information, i.e. should the medication be given with food Carers administrating medication in the care home setting should be suitably trained and competent to do so. This should be documented and recorded by a senior carer or manager	Focus on care homes providing personal care rather than nursing care.

25	NHS Yorkshire and Humber Commissioning Support Unit, 2015	GUIDANCE PAPER on medicine administration in care homes	Regulations and guidance: - The fundamental care standard in H&SC Act 2008 (regulated activities) that providers must ensure '*the proper and safe management of medicines'* (Regulation 12). Further information in CQC guidance Who should administer medicines: - The fundamental standard "Person centred care" (Regulation 9) states it is important to establish with the person what their wishes are regarding the administration of their medication. It must not be automatically assumed that medication must be given by a care worker - Community pharmacists may be able to adjust the way that medicines are packed or labelled for individual people in order to promote self-administration - If a person is believed to lack capacity then the principles and processes of the Mental Capacity Act must be adhered to when arrangements for	The role of care workers in administering medications in care homes with personal care has clear guidance. The role of care workers administering medications in care homes with nursing is less clear but the following principles would inform the guidance on this matter: - The RN is individually accountable for making sure that all medicines are administered correctly and to be personally accountable for up-to-date practice - The RN may delegate the administration of *some medicines* to care workers - The administration of medicines by invasive or specialised techniques will *normally* involve a registered nurse. An example of this is intravenous administration of medicines and the care provider is responsible for making sure that a registered nurse who gives medicines by a specialised technique has relevant and up-to-date training

			medication administration are being decided - Residents in care homes (with nursing) have the same rights to choose as those in care homes (without nursing) - People may choose not to keep their own medicines, preferring instead to allow the care staff to take the responsibility for them What are the issues with self-administration: - Care staff should be aware that the needs of a person may change over time or fluctuate with illness - There are situations when people are keen to look after some medicines and not others (for example inhalers but not tablets) Managing equality and diversity issues: - People have certain preferences and these may relate to equality and diversity. These need to be recognised and accommodated through the care planning process Care workers administering medicines:	

			- Care workers may, with the consent of the person, administer prescribed medication in accordance with the prescriber's directions - Care workers must have clear directions of what to give and when, using a MAR chart - In care homes (without nursing), basic training is essential before a care worker gives medicines to people (to cover administration of tablets, capsules, liquid medicines, cream, ointment (or other external application), eye, ear or nose drops, inhalers and patches - There must be enough suitable trained workers to cover all of the times people may need medicines - When medicines must be administered by specialised techniques (such as rectal, administration, injections, medicines through a Percutaneous Endoscopic Gastrostomy (PEG) or oxygen) then the community nursing service supports people who live in care homes (without	

			nursing) or care workers require additional training and be assessed as competent by a health care professional. Care workers can refuse to administer by specialised techniques if they do not consider themselves competent Safeguards: - Providers should have a written procedure for the administration of medicines, which is monitored to make sure that care workers follow safe practice - Care workers should have the correct level of training and have their competency assessed before giving any medicines - Care workers can only give prescribed medicines to people from the container that the pharmacist or dispensing GP has provided: 'secondary dispensing' is unsafe practice Covert administration: - A care worker should not mix medicine with food or drink if the intention is to deceive someone who does not want to take the medicine - If the decision is taken to give	

			medicines covertly, advice should be sought from a pharmacist on the best way to do this - When a person has difficulty swallowing, advice should be sought from a pharmacist on the methods to be used and the agreement of the GP sought Difference between care homes that offer nursing or personal care: - A care home (with nursing) employs registered nurses. The Nursing and Midwifery Council (NMC) Code of Professional Conduct requires each nurse to be individually accountable for making sure that all medicines are administered correctly and to be personally accountable for up-to-date practice - The code sets out how a registered nurse may delegate the administration of some medicines to care workers - The administration of medicines by invasive or specialised techniques will normally involve a registered nurse. An example of this is intravenous administration of medicines. The care provider is responsible	

			for making sure that a registered nurse who gives medicines by a specialised technique has relevant and up-to-date training Monitored dosage systems (MDS) in care homes: - MDS are merely a convenient form of packaging for a limited group of medicines. Safe practice is not guaranteed by use of a system alone but is promoted by only allowing staff who are trained and competent to give medicines Medicines that a doctor has not prescribed: - Care staff can administer a person's own bought medication but before they do so they should check with the GP that there is no interaction with any prescribed medication or medical problems Good practice: - Policy and procedure for medicine administration should explain to care workers what to do and how to do it safely - An individual's choice must feature in arrangements for medicine administration	

			- A care home should have evidence that care workers are trained and assessed as competent before they are expected to give medicines	
26	NHS Oxfordshire Clinical Commissioning Group, 2013	GUIDANCE on administration of medicines in care homes	- Resident choice should be promoted - Risk assessment should be carried out with regard to self-administration by residents - With resident consent, care workers can administer prescribed medication - Care home staff should have clear instructions of what medicines to give and when - Care home staff must have the correct level of training prior to administration of medicines and there should be enough suitably qualified staff available in the care home to administer medications - Care workers can be trained to administer medicines by specialised techniques - The care home's procedures must include that care home staff can refuse to assist with	Focus on care homes providing personal care rather than nursing care. Similar points made as Ref 25.

			the administration of medication by specialised techniques if they do not feel competent to do so	
27	NMC, 2010		Section 5, Standard 17: Delegation A registrant is responsible for the delegation of any aspects of the administration of medicinal products and they are accountable to ensure that the patient, carer or care assistant is competent to carry out the task (point 1). Guidance: This will require education, training and assessment of the patient, carer or care assistant and further support if necessary. The competence of the person to whom the task has been delegated should be assessed and reviewed periodically. Records of the training received and outcome of any assessment should be clearly made and be available (point 2) Although normally the second signatory should be another	

			registered health care professional (for example doctor, pharmacist, dentist) or student nurse or midwife, in the interest of patient care, where this is not possible a second suitable person who has been assessed as competent may sign. It is good practice that the second signatory witnesses the whole administration process. (Section 4 Standard 8) Standard 19: Unregistered practitioners In delegating the administration of medicinal products to unregistered practitioners, it is the registrant who must apply the principles of administration of medicinal products as listed above. They may then delegate an unregistered practitioner to assist the patient in the ingestion or application of the medicinal product. Guidance: Registrants may only delegate the ingestion or application of a controlled drug	

			where the unregistered practitioner remains under the direct supervision of the registrant whether that is in a primary care, secondary care or independent sector setting. In care homes (without nursing), health care assistants, support workers and care workers will not be skilled in giving medicines by invasive techniques and appropriate delegation is essential. (point 2)	
28	RCN, 2012	GUIDANCE on medicine administration in care homes with and without nursing	Medicines management sits in the context of person centred care, human rights and the mental capacity legislation. All aspects of how medicines are managed in the care home should be covered in the written policy. The policy should include procedures for: obtaining medicines; storing and disposing of medicines; recording medicines; action to be taken if a medicine administration error is identified; specialist procedures involving medicines relevant to that home (for example, the	In care home with nursing, medicines administered by RN but can be delegated to a care worker. Registered nurses undertake administration by specialised and invasive techniques. Such techniques include: sub-cutaneous injection of insulin; medicines administered by rectal or vaginal route; giving oxygen; giving medicines through a percutaneous endoscopic gastrostomy (PEG) tube.

			administration of percutaneous endoscopic gastrostomy (PEG) feeds/nutritional supplements, and self-administration). The home must have a policy in place so that they can identify which members of staff have signed the Medication Administration Record (MAR chart) following the administration of a medicine. Where residents are receiving nursing care, all medicines including controlled drugs, are administered by a medical practitioner or registered nurse. On occasion health care assistants (HCAs) and assistant practitioners (APs) administer medicines. Where residents are not receiving nursing care, and not administering their own medicines, all medicines including controlled drugs, are administered by designated staff who are appropriately trained and	

			competent. The administration of controlled drugs is witnessed by another designated, appropriately trained member of staff. Registered nurses undertake administration by specialised and invasive techniques. Such techniques include: sub-cutaneous injection of insulin; medicines administered by rectal or vaginal route; giving oxygen; giving medicines through a percutaneous endoscopic gastrostomy (PEG) tube.	
29	Royal Pharmaceutical Society of Great Britain, 2007	CORE PRINCIPLES of medicine administration in social care, including care homes (residential)	Eight core principles related to medicines in social care (includes care homes). 1. People who use social care services have freedom of choice in relation to their provider of pharmaceutical care and services including dispensed medicines. 2. Care staff know which medicines each person has and the social care service keeps a complete account of medicines.	Clear guidance on training and medicines that care workers can administer in care homes (residential)

			3. Care staff who help people with their medicines are competent. 4. Medicines are given safely and correctly, and care staff preserve the dignity and privacy of the individual when they give medicines to them. 5. Medicines are available when the individual needs them and the care provider makes sure that unwanted medicines are disposed of safely. 6. Medicines are stored safely. 7. The social care service has access to advice from a pharmacist. 8. Medicines are used to cure or prevent disease, or to relieve symptoms, and not to punish or control behaviour. In relation to principle 3: In social care settings, people who are unable to manage their own medicines are entitled to have someone who is adequately trained and knowledgeable to give medicines to them. Only staff who have been given appropriate training and have demonstrated	

			they are competent should do this. Care providers are responsible for assessing a care worker's competence to give medicines to the people they care for. They should not make assumptions based on that care worker's previous experience. As a minimum training should cover: - The supply, storage and disposal of medicines - Safe administration of medicines - Quality assurance and record-keeping - Accountability, responsibility and confidentiality. Care workers should only give medicines that they have been trained to give. Care workers can give or assist people in: - Taking tablets, capsules, oral mixtures - Applying a medicated cream/ointment - Inserting drops to ear, nose or eye	

			- Administering inhaled medication. Care workers should not undertake the following unless they have satisfactorily completed additional training: - Rectal administration, e.g. suppositories, diazepam (for epileptic seizure) - Injectable drugs such as insulin - Administration through a Percutaneous Endoscopic Gastrostomy (PEG) - Giving oxygen.	
30	The National Ceare Forum, 2011	An IMPROVEMENT PROJECT involving the National Care Forum, the Royal College of General Practitioners, the Royal College of Physicians, the Royal College of Psychiatrists, the Royal Pharmaceutical Society, the Royal College of Nursing, the Health Foundation and Age UK. Funded by the Department of Health.	Partnership working is recognised as important to find practical solutions to reduce the risk of harm associated with medications in care homes and to find 'system-wide' solutions. Key areas of work related to care workers include: - Training and development - Defining roles and responsibilities within the team, including care staff A number of tools developed from	Clear training materials for medicine administration by staff in care homes.

			the project, including a training guide for employers and learner workbook. The Learner's workbook has been reviewed by Skills for Care to ensure it is consistent with other training materials and standards.	
31	The National care Forum, 2013	An IMPROVEMENT PROJECT involving the National Care Forum, the Royal College of General Practitioners, the Royal College of Physicians, the Royal College of Psychiatrists, the Royal Pharmaceutical Society, the Royal College of Nursing, the Health Foundation and Age UK. Funded by the Department of Health.	Reports on work aimed to provide evidence about how well the tools developed by the cross-partnership working group address the problems identified and how they will help to improve medication safety in care homes. Of the homes that tested the guide for employers and learner workbook, 72% indicate they would continue to use the employer guide and 70% would continue to use the learner workbook. A few areas were highlighted as missing from the workbook, including PRN medication and issues around recording. Considered more suitable for care homes without nursing.	Training materials considered particularly useful for care homes without nursing.

32	The Partnership in care Medicine Administration Policy (personal correspondence)	Policy provided by RNHA	Care Quality Commission (CQC) Outcome 9: Management of medicines, states that people using a service regulated by CQC: - Will have their medicines at the times they need them and in a safe way - Wherever possible will have information about the medicine being prescribed made available to them or others acting on their behalf. This is because providers who comply with the regulations will: - Handle medicines safely, securely and appropriately - Ensure that medicines are prescribed and given by people safely - Follow published guidance about how to use medicines safely. Key principal underpinning this policy is: - Medication belongs to the resident for whom they are prescribed and residents must be informed about their	Clear guidance related to training and medicine administration by nurses and senior carers, with carers working under supervision and limited involvement with medicine administration.

			medicines and be fully involved in decisions concerning them and how to take them The registered manager is responsible for: - Ensuring that the senior staff on duty are trained to take responsibility for the management of medicines within the home - Ensure that all care staff involved in medication administration have received training appropriate for their level of administration, and competency assessments It is the responsibility of Nursing/Senior Care Staff to: - Follow the care plan and policy. - Provide the level of support specified in the care plan It is the responsibility of Care staff to: - Follow the care plan and policy.	

			- Provide the level of support specified in the care plan - Work under the supervision of nurse/ senior carer Three different levels of training for care staff are identified in the policy: Level 1 – Training for all care staff during their period of induction addressing topical application of external preparations and controlled drug checking Level 2 – Training for all senior care staff /nursing staff in the administration of medication. Level 3 – Nursing and Senior staff will be supported to access additional learning. Only Senior care staff who have received medicines management training incorporating the requirements of this policy, a period of supervision, and successfully completed the competencies detailed on the competency forms which must be signed off by the Manager/Deputy Manager are authorised to	

			administer medication. Competency assessments should be revisited on a yearly basis. Nursing staff who delegate duties to Senior Carers must provide training and be satisfied that they are competent to carry out the task. A record of such delegation must be retained by the care home and the nurse. This includes administration of medicines through a Percutaneous Endoscopic Gastrostomy (PEG) or giving oxygen.	

Box 1: UK primary studies and reviews with findings related to medicine administration by care assistants in care homes

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Box 2: UK audit, policy, legislation and opinion with key points related to medicine administration by care assistants in care homes

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Appendix 1: Search strategy Social Care Online (16.09.15)

- AllFields:'"care home*"'
- OR AllFields:'"nursing home"'
- OR AllFields:'"long term care"'
- AND AllFields:'"care assistant*"'
- OR AllFields:'"healthcare worker*"'
- OR AllFields:'"care worker*"'
- OR AllFields:'"staff"'
- AND AllFields:'"medication* administration*"'
- OR AllFields:'"drug administration*"'
- OR AllFields:'"medication error*"'
- OR AllFields:'"medication safety"'

Note: search reduced due to limited functionality of database. A wider search was returning hundreds of irrelevant articles

Appendix 2: Search strategy Ovid MEDLINE(R) <1946 to September Week 1 2015> (16.09.15)

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1 Homes for the Aged/ (11659)
2 exp Nursing Homes/ (33426)
3 nursing home?.tw. (22129)
4 care home?.tw. (1922)
5 or/1-4 [nursing home terms] (45187)
6 long-term care/ (22721)
7 (convalescent adj (home? or cent* or facilit*)).tw. (83)
8 (residential adj2 (facility or facilites or home?)).tw. (1523)
9 Institutionalization/ (4899)
10 assisted living facilities/ (1007)
11 Residential Facilities/ (4864)
12 (life care cent* or continuing care cent* or extended care facility or extended care facilities).tw. (394)
13 ((residential or long-term or longterm or long-stay) adj5 (care or facility or facilities or ward? or institution)).tw. (23365)
14 ((sheltered or retirement or residential) adj5 (hous* or home? or accommodation)).tw. (2687)
15 ((skilled or intermediate) adj2 (nursing facility or nursing facilities)).tw. (1555)
16 or/6-15 [other instituional care terms] (49414)
17 exp aged/ (2505684)
18 geriatrics/ (27466)
19 (gerontol* or ageing or aging or elder* or geriatric* or seniors or old age or older or late* life).tw. (553683)
20 (older adj (person* or people or adult* or patient*)).tw. (80783)
21 or/17-20 [older people terms] (2757186)
22 16 and 21 [institutional care and elderly] (24075)
23 5 or 22 [nursing home or other institutional care of elderly terms] (60721)
24 Nursing, Team/ (2250)
25 healthcare assistant*.tw. (204)
26 Licensure, Nursing/ (4412)
27 Allied Health Personnel/ (10465)
28 care assistant*.tw. (351)
29 healthcare worker*.tw. (5249)
30 nurs* aide*.tw. (917)
31 Nurses' Aides/ (3667)
32 (nurs* adj1 auxiliar*).tw. (460)
33 nurs* assistant*.tw. (1304)
34 care worker*.tw. (9934)
35 Nursing Staff/ (18160)
36 staff*.tw. (110976)
37 unlicensed caregiver*.tw. (8)
38 non registered nurs*.tw. (9)
39 or/24-38 [heathcare worker terms] (157540)
40 (drug? or medication? or medicine?).tw. (1520708)

41 drug therapy/ (29054)
42 or/40-41 [medication terms] (1539430)
43 inservice training/ (17979)
44 ((training or learning or education*) adj3 (intervention* or strateg* or program* or initiative* or need*)).tw. (97928)
45 (continuing adj2 (education or development)).tw. (16427)
46 exp Education, Continuing/ (55894)
47 ((staff or professional) adj1 develop*).tw. (6609)
48 Staff Development/ (7741)
49 competency based education/ (2997)
50 ((clinical or professional) adj2 (develop* or improv* or practice)).tw. (182062)
51 exp education, nursing/ (73075)
52 nursing, practical/ed (1538)
53 cpd.tw. (3463)
54 geriatric nursing/ed (2004)
55 or/43-54 [training terms] (392659)
56 42 and 55 [medication and training terms] (58811)
57 ((drug? or medication? or medicine?) adj2 administration).tw. (42632)
58 drug* round*.tw. (44)
59 *Pharmaceutical Preparations/ad [Administration & Dosage] (4469)
60 exp drug administration routes/ (527585)
61 drug administration schedule/ (89575)
62 drug delivery systems/ (40548)
63 drug dosage calculations/ (1269)
64 drug therapy, computer-assisted/ (1532)
65 medication systems/ (766)
66 exp Medication Errors/ (12426)
67 (medication safety or medication incident? or medication error?).tw. (3980)
68 ((dispens* or dosing) adj2 (mistake? or error? or miscalculat?)).tw. (564)
69 ((drug? or medication? or medicine? or dose or dosage? or dosing) adj2 wrong$).tw. (393)
70 (medication? adj2 misadventure?).tw. (38)
71 (accident$ adj2 overdose?).tw. (433)
72 ("medication? related" adj2 (issue? or problem?)).tw. (288)
73 ((excess$ or inadequat$) adj2 (dosage? or dose? or dosing)).tw. (2159)
74 (medication? adj2 (reconciliation? or audit? or quality improvement)).tw. (585)
75 *Drug Therapy/co, ed, nu, st [Complications, Education, Nursing, Standards] (1877)
76 Drug Therapy, Combination/ (146358)
77 Adverse Drug Reaction Reporting Systems/ (6075)
78 "Drug-Related Side Effects and Adverse Reactions"/ (23281)
79 or/57-78 [medication administration terms] (825709)
80 56 or 79 [medication training or medication admin terms] (875420)
81 23 and 39 and 80 [nursing home and healthcare workers and drug training or admin] (325)
82 limit 81 to (yr="2000-current" and english) (238)
83 remove duplicates from 82 (229)

Appendix 3: Search Strategy ASSIA (16.09.15)

(("care home*" OR "long term care" OR "longterm care" OR "institutional* care" AND gerontol* OR ageing OR aging OR elder* OR geriatric* OR seniors OR "old age" OR older OR "late* life") OR "nursing home*" AND ("healthcare assistant*" OR "healthcare assistant*" OR "care assistant*" OR "healthcare worker*" OR "nurs* aide*" OR "nurs* auxiliar*" OR "auxillar* nurs*" OR "nurs* assistant*" OR "care worker*" OR staff* OR "unlicensed caregiver*" OR "non registered nurs*") AND (drug? OR medication? OR medicine? OR dose OR dosage OR dosing)) AND ("healthcare assistant*" OR "healthcare assistant*" OR "care assistant*" OR "healthcare worker*" OR "nurs* aide*" OR "nurs* auxiliar*" OR "auxillar* nurs*" OR "nurs* assistant*" OR "care worker*" OR staff* OR "unlicensed caregiver*" OR "non registered nurs*") AND (drug? OR medication? OR medicine? OR dose OR dosage OR dosing) AND la.exact("English")

Appendix 4: Search strategy Embase Classic+Embase <1947 to 2015 September 14> (16.09.15)

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1 Home for the Aged/ (11784)
2 Nursing Home/ (45080)
3 nursing home?.tw. (30161)
4 care home?.tw. (2812)
5 or/1-4 [nursing home terms] (59665)
6 long-term care/ (101188)
7 (convalescent adj (home? or cent* or facilit*)).tw. (230)
8 (residential adj2 (facility or facilites or home?)).tw. (2179)
9 Institutionalization/ (7700)
10 assisted living facility/ (1476)
11 Residential Facility/ (1)
12 (life care cent* or continuing care cent* or extended care facility or extended care facilities).tw. (604)
13 ((residential or long-term or longterm or long-stay) adj5 (care or facility or facilities or ward? or institution)).tw. (32229)
14 ((sheltered or retirement or residential) adj5 (hous* or home? or accommodation)).tw. (3952)
15 ((skilled or intermediate) adj2 (nursing facility or nursing facilities)).tw. (2329)
16 or/6-15 [other instituional care terms] (133027)
17 exp aged/ (2380962)
18 geriatrics/ (41548)
19 (gerontol* or ageing or aging or elder* or geriatric* or seniors or old age or older or late* life).tw. (824252)
20 (older adj (person* or people or adult* or patient*)).tw. (117410)
21 or/17-20 [older people terms] (2843831)
22 16 and 21 [institutional care and elderly] (42962)
23 5 or 22 [nursing home or other institutional care of elderly terms] (93304)
24 Nursing/ (209597)
25 healthcare assistant*.tw. (280)
26 Licensing/ (20303)
27 paramedical personnel/ (12561)
28 healthcare assistant*.tw. (280)
29 care assistant*.tw. (534)
30 healthcare worker.tw. (877)
31 nurs* aide*.tw. (1072)
32 nursing assistant/ (4830)
33 (nurs* adj1 auxiliar*).tw. (551)
34 nurs* assistant*.tw. (1675)
35 care worker*.tw. (12789)
36 Nursing Staff/ (60072)
37 staff*.tw. (170408)
38 unlicensed caregiver*.tw. (8)
39 non registered nurs*.tw. (10)
40 or/24-39 [healthcare assistant terms] (445641)

41 (drug? or medication? or medicine?).tw. (2422365)
42 drug therapy/ (408155)
43 or/41-42 [medication terms] (2670918)
44 in service training/ (14517)
45 ((training or learning or education*) adj3 (intervention* or strateg* or program* or initiative* or need*)).tw. (144635)
46 (continuing adj2 (education or development)).tw. (22103)
47 continuing education/ (28401)
48 ((staff or professional) adj1 develop*).tw. (9194)
49 personnel management/ (52110)
50 curriculum/ (69190)
51 ((clinical or professional) adj2 (develop* or improv* or practice)).tw. (289803)
52 exp nursing education/ (78656)
53 practical nursing/ (75)
54 cpd.tw. (5307)
55 or/44-54 [training terms] (628712)
56 43 and 55 [medication and training terms] (109758)
57 ((drug? or medication? or medicine?) adj2 administration).tw. (59231)
58 drug* round*.tw. (75)
59 *drug/ad, do [Drug Administration, Drug Dose] (2085)
60 exp drug administration routes/ (1143993)
61 drug administration/ (53494)
62 drug delivery system/ (87409)
63 drug dosage calculation/ (15452)
64 computer assisted drug therapy/ (881)
65 hospital organization/ (10485)
66 medication error/ (13910)
67 (medication safety or medication incident? or medication error?).tw. (7239)
68 ((dispens* or dosing) adj2 (mistake? or error? or miscalculat?)).tw. (1039)
69 ((drug? or medication? or medicine? or dose or dosage? or dosing) adj2 wrong$).tw. (821)
70 (medication? adj2 misadventure?).tw. (81)
71 (accident$ adj2 overdose?).tw. (620)
72 ("medication? related" adj2 (issue? or problem?)).tw. (583)
73 ((excess$ or inadequat$) adj2 (dosage? or dose? or dosing)).tw. (3827)
74 (medication? adj2 (reconciliation? or audit? or quality improvement)).tw. (1598)
75 drug combination/ (54724)
76 drug surveillance program/ (20436)
77 adverse drug reaction/ (171364)
78 or/60-77 [drug administration terms] (1444477)
79 56 or 78 [medication and training or drug administration terms] (1543504)
80 23 and 40 and 79 [nursing home and healthcare assistant and medication training or admin terms] (571)
81 limit 80 to (yr="2000-current" and english) (428)
82 remove duplicates from 81 (418)

Appendix 5: Search strategy CINAHL (16.09.15)

#	Query	Limiters/Expanders	Last Run Via	Results
S80	**S23 AND S40 AND S79**	**Limiters - English Language; Published Date: 20000101-20151231 Search modes - Boolean/Phrase**	**Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL**	**154**
S79	S56 OR S78	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	79,345
S78	S57 OR S58 OR S59 OR S60 OR S61 OR S62 OR S63 OR S64 OR S65 OR S66 OR S67 OR S68 OR S69 OR S70 OR S71 OR S72 OR S73 OR S74 OR S75 OR S76 OR S77	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	75,849
S77	(MH "Drug Therapy/AE")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	902
S76	(MH "Drug Therapy, Combination")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	14,604
S75	(MH "Drug Therapy/ED/ST/NU")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	545
S74	TI ((medication? N2 (reconciliation? or audit? or quality improvement))) OR AB ((medication? N2 (reconciliation? or audit? or quality improvement)))	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	4
S73	TI (((excess* or inadequat*) N2 (dosage? or dose? or dosing))) OR AB (	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search	123

	((excess* or inadequat*) N2 (dosage? or dose? or dosing)))		Database - CINAHL	
S72	TI (("medication? related" N2 (issue* or problem*))) OR AB (("medication? related" N2 (issue* or problem*)))	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	0
S71	TI (accident* N2 overdose?) OR AB (accident* N22 overdose?)	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	31
S70	TI medication? N2 misadventure? OR AB medication? N2 misadventure?	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	0
S69	TI (((drug? or medication? or medicine? or dose or dosage? or dosing) N2 wrong*)) OR AB (((drug? or medication? or medicine? or dose or dosage? or dosing) N2 wrong*))	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	105
S68	TI (((dispens* or dosing) N2 (mistake? or error? or miscalculat?))) OR AB (((dispens* or dosing) N2 (mistake? or error? or miscalculat?)))	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	167
S67	TI ("medication safety" or "medication incident?" or "medication error?") OR AB ("medication safety" or "medication incident?" or "medication error?")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	3,050
S66	(MH "Medication Errors+")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	9,050

S65	(MH "Medication Systems")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	1,147
S64	(MH "Drug Therapy, Computer Assisted")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	260
S63	(MH "Dosage Calculation")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	2,142
S62	(MH "Drug Delivery Systems")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	2,323
S61	(MH "Drug Administration Schedule")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	6,265
S60	(MH "Drug Administration Routes+")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	40,345
S59	(MH "Drug Administration")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	5,014
S58	TI "drug* round*" OR AB "drug* round*"	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	58
S57	TI (((drug? or medication? or medicine?) N2 administration)) OR AB (((drug? or medication? or medicine?) N2 administration))	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	971

S56	S43 AND S55	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	4,264
S55	(S44 OR S45 OR S46 OR S47 OR S48 OR S49 OR S50 OR S51 OR S52 OR S53 OR S54)	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	140,402
S54	(MH "Gerontologic Nursing/ED")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	1,185
S53	TI "cpd" OR AB "cpd"	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	1,129
S52	(MH "Education, Nursing, Practical")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	509
S51	TI (((clinical or professional) N2 (develop* or improv* or practice))) OR AB (((clinical or professional) N2 (develop* or improv* or practice))	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	54,202
S50	(MH "Education, Competency-Based")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	1,691
S49	TI (((staff or professional) N1 develop*)) OR AB (((staff or professional) N1 develop*))	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	8,350
S48	(MH "Education, Nursing, Continuing")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	10,279

S47	(MH "Education, Continuing")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	6,932
S46	TI ((continuing N2 (education or development))) OR AB ((continuing N2 (education or development)))	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	11,512
S45	TI (((training or learning or education*) N3 (intervention* or strateg* or program* or initiative* or need*))) OR AB (((training or learning or education*) N3 (intervention* or strateg* or program* or initiative* or need*)))	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	52,483
S44	(MH "Staff Development")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	19,747
S43	S41 OR S42	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	70,852
S42	(MH "Drug Therapy")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	6,396
S41	TI ((drug? or medication? or medicine?)) OR AB ((drug? or medication? or medicine?))	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	65,923
S40	S24 OR S25 OR S26 OR S27 OR S28 OR S29 OR S30 OR S31 OR S32 OR S33 OR S34 OR S35 OR S36 OR S37 OR S38 OR S39	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	82,824

S39	TI "non registered nurs*" OR AB "non registered nurs*"	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	17
S38	TI "unlicensed caregiver*" OR AB "unlicensed caregiver*"	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	10
S37	TI staff* OR AB staff*	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	65,118
S36	(MH "Nursing Home Personnel")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	2,683
S35	TI "care worker*" OR AB "care worker*"	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	4,273
S34	TI "nurs* assistant*" OR AB "nurs* assistant*"	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	1,212
S33	TI (nurs* N1 auxiliar*) OR AB (nurs* N1 auxiliar*)	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	300
S32	(MH "Nursing Assistants")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	5,279
S31	TI "nurs* aide*" OR AB "nurs* aide*"	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	535
S30	TI "healthcare worker*" OR AB "healthcare worker*"	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced	2,634

			Search Database - CINAHL	
S29	TI "care assistant*" OR AB "care assistant*"	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	550
S28	TI "healthcare assistant*" OR AB "healthcare assistant*"	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	508
S27	(MH "Allied Health Personnel")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	2,104
S26	(MH "Licensure, Nursing")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	3,532
S25	TI "healthcare assistant*" OR AB "healthcare assistant*"	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	508
S24	(MH "Team Nursing")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	337
S23	S4 OR S21	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	42,555
S22	S4 OR S21	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	42,555
S21	S15 AND S20	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	16,332

S20	S16 OR S17 OR S18 OR S19	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	410,391
S19	TI (older N1 (person* or people or adult* or patient*)) OR AB (older N1 (person* or people or adult* or patient*))	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	44,030
S18	TI (gerontol* or ageing or aging or elder* or geriatric* or seniors or "old age" or older or "late* life ") OR AB (gerontol* or ageing or aging or elder* or geriatric* or seniors or "old age" or older or "late* life")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	142,046
S17	(MH "Geriatrics")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	2,712
S16	(MH "Aged+")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	364,044
S15	S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	31,609
S14	TI ((skilled or intermediate) N2 (nursing facility or nursing facilities)) OR AB ((skilled or intermediate) N2 (nursing facility or nursing facilities))	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	1,020
S13	TI ((sheltered or retirement or residential) N5 (hous* or home? or accommodation)) OR AB ((sheltered or	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	1,143

	retirement or residential) N5 (hous* or home? or accommodation))			
S12	TI ((residential or long-term or longterm or long-stay) N5 (care or facility or facilities or ward? or institution)) OR AB ((residential or long-term or longterm or long-stay) N5 (care or facility or facilities or ward? or institution))	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	14,530
S11	TI ("life care cent*" or "continuing care cent*" or "extended care facility" or "extended care facilities") OR AB ("life care cent*" or "continuing care cent*" or "extended care facility" or "extended care facilities")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	160
S10	(MH "Residential Facilities")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	2,818
S9	(MH "Assisted Living")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	2,060
S8	(MH "Institutionalization")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	1,464
S7	TI (residential N2 facility or residential N2 facilites or residential N2 home*) OR AB (residential N2 facility or residential N2 facilites or residential N2 home*)	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	1,184

S6	TI (convalescent N1 home* or convalescent N1 cent* or convalescent N1 facilit*) OR AB (convalescent N1 home* or convalescent N1 cent* or convalescent N1 facilit*)	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	20
S5	(MH "Long Term Care")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	17,227
S4	(S1 OR S2 OR S3)	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	33,479
S3	TX "care home*" OR AB "care home*"	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	3,033
S2	TX "nursing home*" OR AB "nursing home*"	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	30,501
S1	(MH "Nursing Homes+")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL	17,572

Appendix 6: Search strategy HMIC Health Management Information Consortium <1983 - present> (16.09.15)

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1 care homes/ (965)
2 Nursing Homes/ (1558)
3 nursing home?.tw. (2063)
4 care home?.tw. (1531)
5 or/1-4 [nursing home terms] (4118)
6 long-term care/ (1692)
7 (convalescent adj (home? or cent* or facilit*)).tw. (65)
8 (residential adj2 (facility or facilites or home?)).tw. (1319)
9 Institutionalisation/ (45)
10 assisted community homes/ (13)
11 Residential care/ (4264)
12 (life care cent* or continuing care cent* or extended care facility or extended care facilities).tw. (11)
13 ((residential or long-term or longterm or long-stay) adj5 (care or facility or facilities or ward? or institution)).tw. (5818)
14 ((sheltered or retirement or residential) adj5 (hous* or home? or accommodation)).tw. (2573)
15 ((skilled or intermediate) adj2 (nursing facility or nursing facilities)).tw. (43)
16 or/6-15 [other instituional care terms] (10194)
17 older people/ (16663)
18 geriatrics/ (124)
19 (gerontol* or ageing or aging or elder* or geriatric* or seniors or old age or older or late* life).tw. (22107)
20 (older adj (person* or people or adult* or patient*)).tw. (7567)
21 or/17-20 [older people terms] (25860)
22 16 and 21 [institutional care and elderly] (3877)
23 5 or 22 [nursing home or other institutional care of elderly terms] (6886)
24 Nursing Team/ (113)
25 Health care assistants/ (391)
26 healthcare assistant*.tw. (166)
27 professional registration/ (234)
28 Allied Health Personnels/ (0)
29 care assistant*.tw. (295)
30 healthcare worker*.tw. (584)
31 nurs* aide*.tw. (44)
32 Nursing Assistants/ (92)
33 (nurs* adj1 auxiliar*).tw. (118)
34 nurs* assistant*.tw. (98)
35 care worker*.tw. (1130)
36 staff*.tw. (29310)
37 unlicensed caregiver*.tw. (0)
38 non registered nurs*.tw. (9)

39 or/24-38 [health care workers] (31414)
40 (drug? or medication? or medicine?).tw. (25309)
41 drugs/ (4497)
42 drug therapy/ (1462)
43 or/40-42 [medication terms] (27535)
44 in service training/ (134)
45 ((training or learning or education*) adj3 (intervention* or strateg* or program* or initiative* or need*)).tw. (7255)
46 (continuing adj2 (education or development)).tw. (1390)
47 ((staff or professional) adj1 develop*).tw. (1714)
48 human resources development/ (374)
49 ((clinical or professional) adj2 (develop* or improv* or practice)).tw. (7125)
50 nursing education/ (3334)
51 cpd.tw. (170)
52 or/44-51 [training terms] (17747)
53 43 and 52 [drug training] (1759)
54 ((drug? or medication? or medicine?) adj2 administration).tw. (484)
55 drug* round*.tw. (28)
56 drug administration/ (716)
57 drug delivery systems/ (74)
58 oral administration of drugs/ (58)
59 medication systems/ (39)
60 Medication Errors/ (388)
61 (medication safety or medication incident? or medication error?).tw. (341)
62 ((dispens* or dosing) adj2 (mistake? or error? or miscalculat?)).tw. (37)
63 ((drug? or medication? or medicine? or dose or dosage? or dosing) adj2 wrong$).tw. (18)
64 (medication? adj2 misadventure?).tw. (1)
65 (accident$ adj2 overdose?).tw. (5)
66 ("medication? related" adj2 (issue? or problem?)).tw. (13)
67 ((excess$ or inadequat$) adj2 (dosage? or dose? or dosing)).tw. (17)
68 (medication? adj2 (reconciliation? or audit? or quality improvement)).tw. (17)
69 Adverse Drug Reactions/ (799)
70 or/54-69 [drug admin terms] (2379)
71 53 or 70 [drug training or admin] (4032)
72 23 and 39 and 71 [nursing homes and healthcare workers and drug admin or training] (20)
73 limit 72 to (yr="2000-current" and english) (14)
74 remove duplicates from 73 (14)