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Guidance on the management of pain in older people

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Executive summary

This guidance document reviews the epidemiology and management of pain in older people via a literature review of published research. The aim of this document is to inform health professionals in any care setting who work with older adults on best practice for the management of pain and to identify where there are gaps in the evidence that require further research.

The assessment of pain in older people has not been covered within this guidance and can be found in a separate document (http://www.britishpainsociety.org/pub_professional.htm#assessmentpop).

Substantial differences in the population, methods and definitions used in published research makes it difficult to compare across studies and impossible to determine the definitive prevalence of pain in older people. There are inconsistencies within the literature as to whether or not pain increases or decreases in this age group, and whether this is influenced by gender. There is, however, some evidence that the prevalence of pain is higher within residential care settings.

The three most common sites of pain in older people are the back; leg/knee or hip and 'other' joints. In common with the working-age population, the attitudes

and beliefs of older people influence all aspects of their pain experience. Stoicism is particularly evident within this cohort of people.

Evidence from the literature search suggests that paracetamol should be considered as first-line treatment for the management of both acute and persistent pain, particularly that which is of musculoskeletal origin, due to its demonstrated efficacy and good safety profile. There are few absolute contraindications and relative cautions to prescribing paracetamol. It is, however, important that the maximum daily dose (4 g/24 h) is not exceeded.

Non-selective non-steroidal anti-inflammatory drugs (NSAIDs) should be used with caution in older people after other safer treatments have not provided sufficient pain relief. The lowest dose should be provided, for the shortest duration. For older adults, an NSAID or cyclooxygenase-2 (COX-2) selective inhibitor should be co-prescribed with a proton pump inhibitor (PPI), and the one with the lowest acquisition cost should be chosen. All older people taking NSAIDs should be routinely monitored for gastrointestinal, renal and cardiovascular side effects, and drug–drug and drug–disease interactions.

Opioid therapy may be considered for patients with moderate or severe pain, particularly if the pain is causing functional impairment or is reducing their quality of life. However, this must be individualised and carefully monitored. Opioid side effects including nausea and vomiting should be anticipated and suitable prophylaxis considered. Appropriate laxative therapy, such as the combination of a stool softener and a stimulant laxative, should be prescribed throughout treatment for all older people who are prescribed opioid therapy.

Tricyclic antidepressants and anti-epileptic drugs have demonstrated efficacy in several types of neuropathic pain. But, tolerability and adverse effects limit their use in an older population.

Intra-articular corticosteroid injections in osteoarthritis of the knee are effective in relieving pain in the short term, with little risk of complications and/or joint damage. Intra-articular hyaluronic acid is effective and free of systemic adverse effects. It should be considered in patients who are intolerant to systemic therapy. Intra-articular hyaluronic acid appears to have a slower onset of action than intra-articular steroids, but the effects seem to last longer.

The current evidence for the use of epidural steroid injections in the management of sciatica is conflicting and, until further larger studies become available, no firm recommendations can be made. There is, however, a limited body of evidence to support the use of epidural injections in spinal stenosis.

The literature review suggests that assistive devices are widely used and that the ownership of devices increases with age. Such devices enable older people with chronic pain to live in the community. However, they do not necessarily reduce pain and can increase pain if used incorrectly. Increasing activity by way of exercise should be considered. This should involve strengthening, flexibility, endurance and balance, along with a programme of education. Patient preference should be given serious consideration.

A number of complementary therapies have been found to have some efficacy among the older population, including acupuncture, transcutaneous electrical nerve stimulation (TENS) and massage. Such approaches can affect pain and anxiety and are worth further investigation.

Some psychological approaches have been found to be useful for the older population, including guided imagery, biofeedback training and relaxation. There is also some evidence supporting the use of cognitive behavioural therapy (CBT) among nursing home populations, but of course these approaches require training and time.

There are many areas that require further research, including pharmacological management where approaches are often tested in younger populations and then translated across. Prevalence studies need consistency in terms of age, diagnosis and terminology, and further work needs to be done on evaluating non-pharmacological approaches.

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Foreword

Population ageing is a 'game changer' for our health services. Life expectancy at birth in England is now 82 for women and 77 for men. Nearly a quarter of our population is over 65 and the fastest growing group is the over 80 s—whose numbers have doubled over the past two decades. This represents a success for society and wider determinants of health, but also for healthcare—both preventative and interventional. And most older people report high levels of happiness and of satisfaction with their own health, wellbeing and independence.

For all this good news, if people live long enough, they are more likely to develop multiple long-term conditions, a degree of disability or frailty, dementia or cognitive impairment and worsening mobility. They are also at risk of chronic and life-limiting pain from a variety of causes, of acute pain associated with injury or illness and of pain towards the end of life. Poor control of pain has consistently been identified as an issue for older people and their carers in hospital settings and as a life-limiting factor which can trigger a spiral of dependence and depression.

As people over 65 account for 65% of admissions to hospital, 40% of primary care spend and the overwhelming majority of long-term care residents and users of community health services, clinicians need to adjust to this reality and to ensure they have the right skills, knowledge and evidence-base to deliver effective care. This evidence base needs to take into account the similarities in effective assessment and management of pain between older and younger people, but also the differences in approach sometimes required to take into account poor reserve, altered pharmacokinetics and dynamics, drug–drug and drug–disease interactions, adherence and the difficulty in assessing pain in those with atypical presentations or impaired cognition or communication. We have substantive evidence to show that pain in our older patients is not recognised or managed as well as it would be in younger adults.

These comprehensive guidelines, developed by a multidisciplinary team, provide a superb, user-friendly resource for clinicians treating pain in older patients in all settings and I have certainly learned a lot by reading them that will inform my own clinical practice. They deserve a wide audience.

***Professor David Oliver*, National clinical director for older people department of health**

It is a privilege to provide a foreword for this landmark publication on the management of pain in older adults: a most important field of practice, and currently an area of significant unmet need in the community, secondary and social care settings. There is a need to improve awareness and implement assessment tools and appropriate treatments, to alleviate suffering and improve the quality of life.

This definitive work is the culmination of a colossal effort by a multi-disciplinary working group (comprising expertise in epidemiology, geriatric medicine, pain medicine, nursing, physiotherapy, occupational therapy, psychology, pharmacy and patient representation) to gather, digest and sift the evidence, to review the epidemiology of pain in older adults and underpin recommendations for best practice.

The important influences of attitudes and beliefs of older people in relation to pain and the presence of stoicism in this age group are discussed.

The biopsychosocial aspects of pain are further addressed by way of the document's comprehensive review of the evidence for or against a wide range of treatments specifically for the management of pain in older adults, including complementary therapies, the benefits of patient education and self-management techniques, psychological and physical as well as pharmacological options and interventional techniques.

The focus on the management of pain in older adults continues by examining the place of a variety of commonly employed procedures for pain, from simpler interventions such as intra-articular injections to sophisticated approaches such as spinal cord stimulation. These are usefully and appropriately reviewed together with some of the common and bothersome painful conditions affecting older people, such as back pain, post-herpetic neuralgia and trigeminal neuralgia.

Assistive devices, often overlooked in research and guidelines documents, are critically appraised and highlight the small amount of evidence available in this area, that suggests benefit in supporting community living and reduction in functional decline, care costs and pain intensity.

The British Pain Society is very pleased to endorse these authoritative evidence-based guidelines, which promise to tangibly improve the lives of the increasing number of older adults living with painful conditions.

***Richard Langford*, President of the British Pain Society**

I welcome this guidance. It offers advice and information valuable to a wide range of readers. This is important as although pain is common, it may be under-reported, and make itself apparent in a variety of ways to a variety of clinical and social care staff. So a broad perspective is needed, and the broad array of disciplines and experts has made this possible. I am delighted that British Geriatrics Society is included. The therapeutic advice is clear and accessible. The scholarly reviews show, however, that there is need for further research on nearly every aspect of the issue. For example, frail older people, such as care home residents or older people with cognitive impairment, are particularly likely to get a poor deal at present. We need to develop ways to enable their experience to be better noticed and understood, and then their needs better addressed. Interdisciplinary work is our best way forward.

***Professor Finbarr Martin*, President of the British Geriatrics Society**

Methodology

A group was formed of key personnel from either care of older people, pain or both. The professional groups included epidemiology, geriatric medicine, pain medicine, nursing, physiotherapy, occupational therapy, psychology, pharmacy and service users. Each group member identified initial approaches to the management of pain in older adults that would enable searching. They then provided key terms to allow the information scientist to conduct the review. These key terms can be found in Appendix 1. Reference lists were given to each group member, who reviewed the lists and selected appropriate papers to include. Papers were rejected that did not meet the following inclusion criteria:

- *Studies in English language.*
- *Types of study:* randomised controlled trials (RCTs), cohort studies, non-experimental studies and descriptive studies.
- *Types of participants:* all adults over 65 years with chronic pain, living in the community.
- *Interventions and specific comparisons to be made:* all drug and non-drug intervention studies, including comparisons with placebo, standard care and waiting list control.

Outcomes

The primary outcomes included measure of pain, for example, visual analogue scales or the McGill Pain Questionnaire (MPQ). Secondary outcomes included reductions in pain-related distress, disability, depression, quality of life and self-efficacy.

Following acceptance of papers, each author graded the papers according to the following system, as proposed by Harbour and Miller [1]:

1++	High-quality meta-analyses, systematic reviews of RCTs or RCTs with a very low risk of bias.
1+	Well-conducted meta-analyses, systematic reviews of RCTs or RCTs with a low risk of bias.
1−	Meta-analyses, systematic reviews or RCTs or RCTs with a high risk of bias.
2++	High-quality systematic reviews of case–control or cohort studies or high-quality case control or cohort studies with a very low risk of confounding, bias or chance, and a high probability that the relationship is causal.
2+	Well-conducted case–control or cohort studies with a low risk of confounding, bias or chance and a moderate probability that the relationship is causal.
2−	Case–control or cohort studies with a high risk of confounding, bias or chance, and a significant risk that the relationship is not causal.
3	Non-analytic studies, e.g. case reports, case series.
4	Expert opinion.

A score was assigned to each paper and the papers were then exchanged among the group and another reviewer independently assigned a score. Any disagreements between scoring would be mediated by another group member. There were no disagreements. All papers that were considered to be acceptable were incorporated into the matrices (Appendix 3) and were then included in the commentary which follows.

Results

Approximately 5,000 records were found. The main PubMed search found 3,691 records and the CINAHL search found a further 837 records, giving a total of 4,528 returned by the core searches. Further non-PubMed and non-CINAHL results were found in PsycInfo and AMED, but exact numbers are not available. A separate search of Scopus, which found 7,472 records, was used only to refine the results of one of the search topics, and may have found items missed by the other databases.

Databases searched

The two main databases searched were PubMed and CINAHL. AMED, PsycInfo and Scopus were also used to refine some of the searches.

Inclusion/exclusion criteria

A publication date range of 1997–2009 was used. No other inclusion/exclusion criteria were used during the searching stage. Further inclusion and exclusion criteria were decided during the appraisal stages.

Number of papers by themes
Prevalence = 444
Barriers, attitudes and education = 0
Communication and self-management = 333
Pharmacology = 191
Intervention and invasive = 194
Psychiatry = 553
Physiotherapy and rehabilitation = 260
Complementary therapies = 171
Guidelines = 162
Specific pathologies = 0
Palliative care = 225

Note that these totals include duplicates in those searches where more than one database was used. Similarly, each total includes references found in other topics' totals.

Search strategy

The search used in PubMed was (((older person*[TIAB]) OR (GERIATRIC*[TIAB]) OR (elderly[TIAB])) OR (SENIOR CITIZEN*[TIAB])) AND (PAIN[TIAB]).

The search used in CINAHL was elderly or older or geriatric* or 'senior citizen*'.

Separate, specific search strategies were used for each of the nine sub-topics for which searches were conducted.

Background

Pain is described as an 'unpleasant sensory or emotional experience associated with actual or potential tissue damage or described in terms of such damage' [2]. Millions of people in the UK live with chronic pain. As we go into older age, it is suggested that many people have pain which is often 'expected as part of ageing' or something that they have to 'learn to live with'. One of the fundamental issues regarding pain management in any age group is the assessment of pain. With older adults this can be particularly challenging due to age-related changes in vision, hearing and cognition. The assessment of pain has been addressed elsewhere (http://www.britishpainsociety.org/pub_professional.htm#assessmentpop); this document focuses on the management of pain. The emphasis, however, is on chronic pain management.

These guidelines will be updated in 3 to 5 years.

Prevalence of pain in older people

Until recently, our knowledge of the prevalence of pain in older people, particularly those in the oldest age group, was relatively poor. Pain tended to be considered to be part of the ageing process and was rarely investigated in its own right. There have, however, been an increasing number of studies into the prevalence of pain in older people in the last decade or so.

Methodological challenges to measuring pain prevalence

There are several methodological challenges to measuring pain prevalence. Since pain is a subjective phenomenon, it is extremely difficult to measure. Reliance on self-reporting of the experience means there are no gold standard tools by which the experience can be verified. Wide variations in prevalence are often found due to differences between studies, including country and date of study; type of study; population studied; type of pain examined; pain definitions used; sites of pain examined; methods used and time period of prevalence examined.

Studies included in the review

A total of 64 studies were included in the final review. The majority of studies had taken place in Europe (27 studies) and North America (17 studies). The remaining studies were from Asia (6 studies); Australia (4 studies); South America (3 studies); Africa (2 studies) and multiple countries (5 studies). The majority of studies had focused on a community population sample (40 studies), although studies of residential care populations (12 studies) and mixed residential and non-residential care studies (12 studies) had also been undertaken.

None of the studies reviewed had used exactly the same definition of pain. Types of pain studied included 'any pain', 'acute pain', 'chronic pain', 'severe pain', 'episodic pain', 'persistent pain', 'regional pain' and 'widespread pain'. The time period of prevalence examined also varied and included: current pain; pain in the last week, 2 weeks, 1 month, 3, 6 and 12 months and lifetime prevalence. In addition, some studies examined pain at only one site, whereas others examined pain at multiple sites, and the rest examined pain at any site. Overall, 16 different pain sites were examined across the studies in the review.

Such differences in published research make it difficult to compare studies and impossible to determine the definitive prevalence of pain in older people.

Prevalence of pain shown in studies

The crude prevalence of any type of pain reported in the papers ranged from a low of 0% to a high of 93%, clearly illustrating how variations in the population, methods and definitions used can affect prevalence estimates.

Eight studies had examined the prevalence of current pain (i.e. studies examining current pain anywhere in the body, but excluding studies examining current pain at specific sites). The prevalence of current pain in older people living in the community ranged from 20 to 46% [3, 4]. The prevalence of current pain in older people living in residential care was higher and ranged from 28 to 73% [5–10].

Ten studies had examined the prevalence of chronic pain (i.e. studies examining pain which had persisted for 3 months anywhere in the body, but excluding studies examining chronic pain at specific sites or specific types of chronic pain such as chronic widespread pain). The prevalence of chronic pain in older people living in the community ranged from 25 to 76% [3, 11–16]. The prevalence of chronic pain in older people living in residential care was higher and ranged from 83 to 93% [6, 10, 17].

Gender differences in pain prevalence in older people

Of the 41 studies that looked at the prevalence rates of pain in men and women separately, the vast majority of studies found that women had a higher prevalence than men [3–5, 8, 12–16, 18–45]. One study reported that men had a higher prevalence of pain than women [7] and three studies reported no difference between the genders [17, 46, 47].

Age differences in pain prevalence in older people

A total of 39 studies had examined how the prevalence of pain varied with age in older people. Different age patterns were seen in men and women, and in different sites of

pain. The age differences could be broadly categorised into four groups:

(i) a continual increase in pain prevalence with age [7, 9, 13, 27, 28, 31, 33, 34, 37, 38, 41, 48, 49];
(ii) an increase in pain prevalence with age up to 75–85 years and then a decrease with age [22, 32, 45, 50, 51];
(iii) a decrease in pain prevalence with age [5, 12, 16, 29, 36, 40, 42, 45, 52, 53];
(iv) no difference in pain prevalence with age [9,14,17,24,46, 54].

Sites of pain in older people

Of the 22 studies that examined pain at different sites, the three most common sites of pain in older people were the back; [3, 4, 6, 7,9–11,14–17,21,32,33,37,43,49] leg, knee or hip; [4–10,14,15,17,23,32,37,42,43, 55] and 'other' joints [8, 9, 11, 37, 55].

Summary statements

- Substantial differences in the population, methods and definitions used in published research make it difficult to compare across studies and impossible to determine the definitive prevalence of pain in older people.
- The prevalence of pain in older people living in residential care is consistently higher than the prevalence of pain in older people living in the community, regardless of the definition of pain used.
- Older women have higher prevalence rates of pain than older men.
- The reported effect of age on pain prevalence in older people is inconsistent, with some studies reporting an increase in prevalence with age and others reporting a decrease in prevalence with age. The effect also varies by gender and site of pain.
- The three most common sites of pain in older people are the back, leg/knee or hip and other joints.

Attitudes and beliefs

A biopsychosocial model of pain and evidence for cognitive behavioural approaches to its management provide a rationale for examining the attitudes and beliefs of people with pain, their friends and relatives and professionals they come into contact with. There is evidence to support the hypothesis that attitudes and beliefs play an important role in mediating the way in which patients engage with treatment and the pain experience in general (pain intensity, psychological distress, functional impairment and coping strategies utilised) [56, 57].

Attitudes can be defined as affective responses to an object (thing, idea, person or activity). Beliefs can be conceptualised as ideas held by individuals about the world that also act as a framework for interpreting experiences and using coping strategies (cognitive or behavioural) to manage challenges to day-to-day living [58]. This review focuses on pain-related attitudes and beliefs, and uses the definitions set out above.

A limitation of the review and of existing research is that while study samples often include older people, there are few studies that focus specifically on older cohorts or conduct subgroup analyses by age.

Review

Some attitudes and beliefs that are relevant to pain (but not pain-specific) operate at the level of the patients' 'world view', and research into such ontological beliefs is limited. Investigation into 'just world' beliefs (beliefs around the degree to which people 'get what they deserve') indicates that, in the sample reported, compared with working-age adults, older participants had stronger beliefs in a 'personal' and 'general' just world and experienced less pain, disability and psychological distress [59]. The influence of spiritual/religious beliefs (and coping) has been the subject of more investigation, but with mixed findings regarding positive outcomes for different elements of the pain experience, and the importance of cultural differences in degrees of religiosity have been highlighted [60–62].

Attitudes of stoicism have been implicated in the under-reporting of pain in older people [50], although pain-related stoicism has been subject to limited empirical investigation. There is some evidence from qualitative and quantitative research to support the existence of age-related differences in attitudes of stoicism in the face of pain, its role in influencing pain reporting and in mediating the chronic pain experience in general [63–66].

Research with mixed-age samples and older people has demonstrated the association of self-efficacy beliefs for managing pain (i.e. the degree to which people believe they can exercise control over their pain), with lower scores on measures of functional impairment and psychological distress [67]. Related to the construct of self-efficacy is the locus of control: the degree to which an individual believes events and experiences are under their own control, or the control of chance or others. Research with working and mixed-age populations has indicated that an internal locus of control is associated with lower scores on measures of pain intensity, psychological distress and functional impairment [68, 69]. Research specific to older people (in common with other research into pain attitudes and beliefs) is limited, although findings are consistent with work undertaken with mixed-age samples [70].

Research has highlighted the role of fear of movement and re-injury as predictive of avoidance of activity and psychological distress [71]. The fear-avoidance model of pain has been shown to be valid and relevant to a range of chronic pain conditions in older people [72, 73]. Fear-avoidance beliefs should not be assumed or viewed in isolation from other beliefs as, contrary to what might be expected, one study found lower levels of fear-avoidance and harm beliefs in older people relative to those aged 45–64; this may be due to higher levels of stoicism [74].

A biopsychosocial model of pain and a cognitive behavioural approach to its management highlights in particular the potentially important role of the attitudes and beliefs of informal caregivers and professionals in mediating the pain experience. There has been little research conducted into the attitudes and beliefs of these groups; although it would appear that key beliefs held by patients are also important in significant others and health professionals; that is to say, for example, that belief in the ability of the person to control pain and function despite pain are adaptive, while beliefs that hurt equals harm and function requires the absence of pain are maladaptive.

The evidence that does exist supports this, indicating that where spousal beliefs about pain are maladaptive, increased psychological distress in the person with pain may be evident [75, 76]. While investigation of health and social care professionals' attitudes has been more extensive, it has focused on attitudes and beliefs in relation to working-age populations and low back pain; has suffered from a lack of conceptual clarity; has not differentiated between cancer and non-cancer pain and is limited by the absence of well established, robust measures [77, 78]. The available studies point towards an adherence to biomedically orientated beliefs about pain and negative perceptions of chronic pain patients in general; in some clinicians, beliefs that activity may increase pain (indicating harm) result in practice contrary to established guidelines that emphasise remaining active [79–83].

Summary statements

- In common with the working-age population, older peoples' attitudes and beliefs influence all aspects of the pain experience.
- Stoicism appears to be more evident in current generations of older people and may contribute to the underreporting of pain. This may not be the case for future generations.
- Spouse beliefs can have a negative impact on the development of adaptive responses to chronic pain.
- Professionals may share or inculcate patients' maladaptive beliefs that hurt equals harm, and consequently recommend or reinforce behaviours such as activity avoidance.

Communication

A total of 406 articles were identified by a search of relevant databases. However, many of these did not relate to communication and were, therefore, not included in the review. A total of five papers specifically related to communication met the inclusion criteria [84–88]. The same author had published three of these papers. There is thus a dearth of information on this important, yet hitherto neglected, area. The articles reviewed highlighted issues regarding conveying and communicating pain information in various settings. Studies were mainly non-randomised studies and a cross-sectional survey.

Pain in older adults is associated with a variety of conditions and is prevalent in both community-dwelling and nursing home residents. A number of barriers to the effective identification and management of chronic pain in older people have been identified in studies of the assessment and management of chronic pain in older people [84]. These barriers are related to both the older people themselves and the professionals caring for them. Often these barriers are in the form of communication, particularly with those who experience sensory or cognitive impairment [89], which has been shown to be a particular issue for nursing home residents [86].

There may also be professional misconceptions about the nature of pain in older people and educational deficits on the part of health professionals [85, 90]. Further, older people themselves may hold attitudes, beliefs and expectations about pain which may also affect their pain reporting or lack of it [84].

Although many studies report health professionals identifying issues of communication in pain assessment and management, there are few studies that specifically relate to communication of pain information in older adults with chronic pain. Deficiencies in pain communication between patients and health professionals are evident, yet there is a paucity of research in this area.

Reasons for inadequate pain communication may also be attributable to the way that practitioners speak with patients. Communication accommodation theory describes the motivations and behaviours of people as they adjust their communication in response to their own needs and the perceived behaviour of the person with whom they are communicating [91, 92]. US-based studies of communication between older adults and nurses [93] and physicians [94] have found a lack of accommodation towards their patients.

Communication content and techniques have been tested in only a few studies of pain. Therefore, pain communication strategies need to be identified and tested for older adults in a variety of settings.

- Assessment of pain information should be multidimensional and include eliciting pain treatment information as well as location and sensory aspects of pain information. There is a need to develop assessment tools that can specifically assess these aspects of communication (see assessment guidelines: http://www.britishpainsociety.org/pub_professional.htm#assessmentpop).
- More pain information is elicited by the use of open-ended rather than closed-ended questions, which is a consideration in any form of pain communication assessment and has implications for the assessment and the use of pain assessment instruments.
- Health professionals should not interrupt when patients are conveying pain information, as this disrupts the amount and nature of pain information conveyed.
- Information regarding prognosis is considered important by older adults with chronic musculoskeletal pain, but this

is reported to be provided in only about one-third of general practice consultations.

Summary statements

- There is a need to conduct further research into issues of communicating pain information as there is a paucity of research upon which to base any recommendations.
- The level of cognitive impairment should be considered in the assessment of pain as patients with severe cognitive impairment are unable to convey pain information by self-report methods of assessment.

Pharmacology

Results

Few studies investigating the effects of analgesic drugs have been performed specifically in older people (those over 65 years).

Physiological changes in older people that affect drug handling

Older people represent a heterogeneous population. However, as adults grow older, changes occur in body composition and the ability to handle drugs. These effects are summarised in Table 1 below.

General principles of pharmacological management of pain in older people [95]

- Physiological changes in older people increase the sensitivity to some analgesic drugs, resulting in them sometimes requiring lower doses. Analgesics should, however, always be titrated to response.
- Although the incidence of side effects with drug therapy is higher in older people, analgesics can still be safe and effective when comorbidities and other concomitantly prescribed medicines are carefully considered.
- Use the least invasive route of administration. As a general rule, the oral route is preferred due to its convenience.
- Timing of medication administration is important. Severe, episodic pain requires treatment with medicines with a rapid onset of action and short duration. However, if a patient is experiencing continuous pain, regular analgesia is the most effective, possibly using modified release formulations.
- Only one drug should be initiated at a time using a low dose, and this should be followed by slow dose titration.
- Allow sufficiently long intervals between introducing drugs to allow the assessment of effect.
- Combination therapy using drugs with complementary mechanisms of action may have synergistic effects to provide greater pain relief with fewer side effects than higher doses of a single drug.
- Consider the use of non-pharmacological strategies such as physiotherapy, cognitive behavioural approaches and acupuncture, in combination with medication.
- Treatment should be monitored regularly and adjusted if required to improve efficacy and limit adverse events.
- When choosing an analgesic for an individual, both co-morbidity and other medication must be considered to minimise the chance of drug–disease and drug–drug interactions.

Paracetamol

The literature search did not identify any primary studies specifically relating to paracetamol use in older people. However, it is an effective analgesic for the symptoms of musculoskeletal pain, including osteoarthritis and low back pain, and is recommended as a first choice analgesic in

Table 1. Physiological changes in older people that affect drug handling

Physiological	Change with normal ageing	Clinical consequence of change
Absorption and function of the gastrointestinal (GI) tract	Delayed gastric emptying and reduced peristalsis	Alteration of drug absorption has little clinical effect
	Reduced blood flow to the GI tract	Increased risk of GI-related side effects including opioid-related gut mobility disturbance
Distribution	Decreased body water	Reduced distribution of water soluble drugs
	Increased body fat that causes lipid soluble drugs to accumulate in reservoirs	Lipid soluble drugs have longer effective half-life
	Lower concentration of plasma proteins and increased free fraction of drugs that are highly bound to proteins	Increased potential for drug–drug interactions
Hepatic metabolism	Decreased hepatic blood flow	Reduced first pass metabolism
	Reduced liver mass and functioning liver cells	Oxidative reactions (phase I) may be reduced, resulting in prolonged half-life
		Conjugation (phase II metabolism) usually preserved
		Difficult to predict precise effects in an individual
Renal excretion	Reduced renal blood flow	Reduced excretion of drugs and metabolites eliminated by kidney leading to accumulation and prolonged effects
	Reduced glomerular filtration	
	Reduced tubular secretion	
Pharmacodynamic changes	Decreased receptor density	Increased sensitivity to the therapeutic and side effects
	Increased receptor affinity	

consensus guidelines [95–98] and National Institute for Health and Clinical Excellence (NICE) clinical guidelines for low back pain [99] and osteoarthritis [100]. Regular administration of paracetamol may improve social engagement in patients with dementia [101].

Adverse effects are rare and paracetamol use is not associated with significant GI side effects, adverse effects on the renal and central nervous systems or cardiovascular toxicity. There is increasing concern regarding the hepatic effects of prolonged use of the maximum recommended doses of paracetamol. Transient increases in alanine aminotransaminase have been reported, but these do not translate into liver failure when maximum daily doses are avoided [95]. A case series published recently reports acute liver failure in malnourished patients (weight <50 kg) and recommends dose reduction (maximum 2 g/24 h) if paracetamol is used regularly in these patients [102].

Patients should be educated not to exceed the recommended maximum daily dose (4 g/24 h) of paracetamol, including that contained in combination products (e.g. co-codamol and co-dydramol) and over the counter preparations (such as cold and influenza remedies).

Paracetamol is an effective analgesic, particularly for musculoskeletal pain and is generally well tolerated with few side effects. It is important that the recommended maximum daily dose is not exceeded.

Non-steroidal anti-inflammatory drugs

The literature search did not identify any primary studies relating to NSAIDs or COX-2 selective agents (selective COX-2 inhibitors or coxibs) use in older people.

NSAIDs are one of the most widely prescribed classes of drugs for pain and inflammation, particularly musculoskeletal pain. NSAIDs are more effective for persistent inflammatory pain than paracetamol [95]. For osteoarthritis, NICE recommends that oral NSAIDs/selective COX-2 inhibitors may be considered, where paracetamol or topical NSAIDs are ineffective for pain relief, or provide insufficient pain relief for people with osteoarthritis [100]. NSAIDs are suggested as a treatment option when paracetamol alone provides insufficient pain relief in the early management of low back pain [99], taking into account the individual risk of side effects and patient preference.

Despite good efficacy, NSAIDs must be used with caution in older people because of a high risk of potentially serious and life-threatening side effects, as prostaglandins have a pivotal role in the normal human physiological functions of the GI tract, and renal and cardiovascular systems, among others. NSAIDs have been implicated in up to a quarter (23.5%) of hospital admissions due to adverse drug reactions in older people [95].

Gastrointestinal effects

GI toxicity, including bleeding and ulceration, increases in frequency and severity with increasing age [95], and may be dose related and time dependent. There is increased likelihood of adverse GI effects when an NSAID is co-administered with low-dose aspirin, which is often used for its anti-thrombotic effect in cardiovascular disease.

GI adverse effects may be reduced by prescribing either misoprostol, a prostaglandin analogue, or a PPI, such as omeprazole or lansoprazole, together with an NSAID [95]. Whilst both misoprostol and PPIs are effective intolerable side effects often prevent the optimal use of misoprostol.

Renal effects

Renal vasoconstriction and increased tubular sodium reabsorption may cause fluid retention, oedema and worsening of congestive cardiac failure. Most NSAIDs can contribute to worsening of chronic renal failure, particularly in patients with co-existing renal damage or patients prescribed diuretics or angiotensin converting enzyme inhibitors [103].

Cardiovascular effects

Administration of NSAIDs may produce an increase in a mean arterial blood pressure of 5 mmHg [104].

It was hoped that selective COX-2 inhibitors would have similar efficacy but fewer side effects than non-selective NSAIDs, but this has not been borne out in clinical practice. Selective COX-2 inhibitors are contraindicated in patients with established ischaemic heart disease and cerebrovascular disease, and should be used with caution in patients with risk factors for cardiovascular disease, such as hypertension, hyperlipidaemia, smoking and diabetes mellitus.

Medicines and Healthcare products Regulatory Agency (MHRA) guidance on NSAID use suggests that the lowest effective dose of NSAID or COX-2 selective inhibitor should be prescribed for the shortest time necessary. The need for long-term treatment should be reviewed periodically. More specifically, MHRA guidance recommends:

- Prescribing should be based on the safety profiles of individual NSAIDs or COX-2 selective inhibitors, and on individual patient risk profiles (e.g. GI and cardiovascular).
- Prescribers should not switch between NSAIDs without careful consideration of the overall safety profile of the products and the patient's individual risk factors as well as the patient's preferences.
- Concomitant aspirin (and possibly other antiplatelet drugs) greatly increases the GI risks of NSAIDs and severely reduces any GI safety advantages of COX-2 selective inhibitors. Aspirin should only be co-prescribed if absolutely necessary [105].

Although NSAIDs are effective analgesics, their side effect profile means that they must be used with great caution in older people. If NSAID therapy is considered essential, the lowest dose should be used for the shortest period and therapy should be reviewed on a regular basis.

As older people are at an increased risk of GI side effects, a PPI or misoprostol should be prescribed together with an NSAID.

Opioids

The literature search found a small number of primary studies relating to opioid use in older people, although the numbers of patients enrolled were still extremely small. Some studies were undertaken in patients with cancer pain, while other studies were performed in non-cancer pain.

In carefully selected and monitored patients, opioids may provide effective pain relief as part of a comprehensive pain management strategy [106]. Use of strong opioids in the management of chronic, severe cancer and non-cancer pain in older people has been reviewed [107]. RCTs have demonstrated short-term efficacy in persistent musculoskeletal pain, including osteoarthritis and low back pain, and various neuropathic pains, such as post-herpetic neuralgia (PHN; a neuropathic condition most common in older people) and diabetic peripheral neuropathy. However, longer-term efficacy and safety data are lacking.

Although older people tend to require lower doses than younger individuals, opioid effects do not appear to vary with age [108] and careful dose titration based on individual response is required.

Using the Minimum Data Set, a longitudinal study in the USA of nursing home residents found that the use of modified-release opioids improved functional status and social engagement compared with short-acting opioids [109].

Having a similar mechanism of action, opioids share similar side effect profiles. Many side effects, such as sedation, nausea and vomiting, may be worse around opioid initiation or dose escalation, and may resolve after 2 or 3 days [110]. On the other hand, constipation does not readily improve and may be managed with laxative therapy [111] or a peripheral opioid antagonist (such as oral prolonged-release naloxone). Central side effects of opioids include drowsiness and dizziness. This may be associated with an increased incidence of falls and fractures [111]. Opioid therapy had no effect on mood or increased risk of respiratory depression [110]. Cognitive function is relatively unaffected in patients taking stable opioid doses, but it may be impaired for up to 7 days after a dose increase.

Fear of addiction can be a major barrier to long-term opioid therapy. However, epidemiological data suggest this to be unfounded. In a review of three studies including over 25,000 patients taking long-term opioids without a history of drug dependence, only seven cases of iatrogenic addiction were identified [110].

Opioid use in older people may be associated with less risk than that of NSAIDs, particularly in those older people who are at particular risk of NSAID-related events [95]. As there is marked inter-patient variability in efficacy and tolerability of individual opioids, if there is no analgesic response or significant adverse events with one opioid, switching or rotation may be considered. It is important to have a good knowledge of the pharmacological properties and relative analgesic potencies of the opioids used.

Weak opioids

The literature search did not identify any primary studies relating to the use of weak opioids in older people.

Weak opiods, such as codeine and dihydrocodeine, are recommended for use in moderate pain in the World Health Organization's (WHO) pain ladder. Use is limited by adverse effects, particularly constipation or as prescribed in combination with non-opioids as in co-codamol preventing adequate titration of the individual components. As an alternative, a low dose of a more potent opioid such as morphine may be better tolerated [112].

Tramadol. The literature search did not identify any primary studies relating to the use of tramadol in older people.

Tramadol is a centrally acting analgesic with two mechanisms of action: weak opioid agonist activity and inhibition of monoamine uptake. It may have less effect on respiratory and GI function than other opioids; however, confusion may be a problem for older people. Tramadol may reduce the seizure threshold and is contraindicated in patients with a history of seizures and should be used with caution in patients taking other serotonergic drugs [113].

A prospective, age-controlled study suggests older people require 20% less tramadol than younger adults, although the pharmacokinetics remained unaffected by age [112].

Strong opioids

Morphine. No studies relating to the use of morphine have been undertaken specifically in older people.

Morphine has been used to treat cancer pain for many years and has been the subject of a large number of trials, generally involving small numbers of patients. Similar efficacy to newer opioids, such as oxycodone, fentanyl and methadone has been demonstrated. Morphine has been used for the management of persistent non-cancer pain too, often as a comparator to newer opioids where similar efficacy has been demonstrated.

Morphine undergoes substantial hepatic metabolism. Morphine-6-glucuronide (M6G) contributes to the overall analgesic effect and morphine-3-glucuronide (M3G) may cause neuroexcitatory effects. Enterohepatic recirculation of M3G and M6G results in these metabolites being excreted in bile and then faeces and urine for several days after the last dose is administered. Renal impairment produces accumulation of the metabolites that may cause side effects requiring dose adjustment or switching to an alternative opioid.

A combination of morphine and gabapentin produces better analgesia than the individual drugs or placebo in the

management of post-herpetic neuralgia and peripheral diabetic neuropathy, but side effects are common.

Oxycodone. Several randomised double-blind trials comparing oxycodone and morphine or different oxycodone formulations have demonstrated that oxycodone has similar efficacy to morphine and is well tolerated in the management of cancer pain. Studies of short duration have demonstrated the efficacy of oxycodone in low back pain, osteoarthritis, PHN and peripheral diabetic neuropathy. Like morphine, no studies have been undertaken specifically in older people.

It has been estimated that in patients aged over 65 years, oral oxycodone was associated with seven times more constipation than transdermal fentanyl [114].

Fentanyl. One randomised, double-blind, placebo-controlled trial studied transdermal fentanyl in cancer pain, in which it was found to provide effective analgesia and be well tolerated, with low incidences of constipation, nausea and drowsiness. Similar results have been found in several other open label studies. Transdermal fentanyl has also been used for persistent musculoskeletal and neuropathic pains.

Clinical experience suggests that the use of transdermal fentanyl, as measured by the need for dose adjustments and use of oral morphine for breakthrough pain, is similar in older people with cancer compared with an adult population [115]. Patient global assessment of transdermal fentanyl therapy was greater in older people (aged over 65) than younger adults [116].

Transdermal fentanyl may be associated with less constipation than oral oxycodone in older people [114]. The convenience of a transdermal preparation that requires changing every 72 h reduces administration time and staffing requirements in residential and nursing homes [113]. However, because of the high potency of transdermal fentanyl, it must not be used for opioid initiation and should only be used in the context of opioid rotation or switching.

Buprenorphine. Buprenorphine is available in several formulations for sublingual, parenteral and, more recently, transdermal administration. In several double-blind, placebo-controlled studies, patients with either cancer or non-cancer pain were randomised to receive buprenorphine or placebo patches. Pain relief, pain intensity and duration of pain-free sleep all improved from baseline. Limited data relating specifically to older people exist, although a post-marketing surveillance of transdermal buprenorphine in over 13,000 patients (mean and median age 68 years) demonstrated efficacy and sustained and dose-dependent analgesia.

The pharmacokinetics of buprenorphine are not altered in patients with renal failure [117]. In a small number of patients, transdermal buprenorphine has similar analgesic efficacy for moderate to severe pain in older people (aged over 65 years) compared with two groups of younger people (patients aged ≤50 years and patients aged been 51 and 64 years) [118]. The reduction in pain intensity was similar in all age groups and there was an increase in the duration of sleep. Incidence and severity of side effects was similar in all groups; dizziness and nausea being most commonly reported.

The convenience of a transdermal preparation that requires changing every 7 days reduces administration time and staffing requirements in residential and nursing homes [113].

Hydromorphone. Hydromorphone has been used in both cancer and non-cancer pain, although has not been specifically studied in older people.

Methadone. Methadone has been available for many years and evidence exists for efficacy in both cancer and persistent non-cancer pains. Owing to its multiple mechanisms of action and unusual pharmacokinetics, prescribing should be restricted to those with experience of its use.

Opioids have short-term efficacy in non-cancer pains such as musculoskeletal pain and neuropathic pain, as well as cancer pain, and may be considered as a treatment option for older people with moderate to severe pain. Evidence for long-term efficacy is more limited and hence patients prescribed opioids should have regular review, both for efficacy and tolerability. The formulation chosen should reflect the time course of each person's pain. Side effects, particularly constipation, should be anticipated and prophylactic treatments prescribed.

Adjuvant drugs

The term 'adjuvant drug' was originally used in the cancer pain literature, although the term is now used regardless of pain aetiology, and describes drugs that were developed for other indications and then found to have analgesic effects. Some adjuvant drugs are particularly beneficial for neuropathic pain, such as the tricyclic antidepressants and some anti-epileptic medicines.

Antidepressants

The literature search did not identify any primary studies relating to antidepressants for pain in older people.

The tricyclic antidepressants, such as amitriptyline and imipramine, were the first adjuvant drugs to be used in the management of PHN and painful peripheral diabetic neuropathy. However, the adverse effects, including urinary retention, postural hypotension and sedation (both increasing the risk of falls), glaucoma and cardiac arrhythmias, mean that these drugs should be prescribed with caution or are contraindicated in older people. One in five people discontinue treatment because of adverse effects [113].

Nortriptyline may produce less anticholinergic adverse effects [103].

Although the tolerability of serotonin reuptake inhibitors (SSRIs) is better than tricyclic antidepressants, the evidence for pain relief is controversial [103]. More recent advances, including the serotonin noradrenaline reuptake inhibitors (SNRIs) such as duloxetine, have demonstrated efficacy in some neuropathic pain conditions and may have better tolerability than tricyclic antidepressants.

The NICE clinical guideline for the pharmacological management of neuropathic pain in the non-specialist setting recommends duloxetine as an option for the initial management of diabetic peripheral neuropathy [119].

Anti-epileptic drugs

The literature search did not identify any primary studies relating to anti-epileptic drugs for pain in older people. Historically, older anti-epileptic drugs, such carbamazepine, sodium valproate and phenytoin, were used in the management of neuropathic pain. Use of these drugs in older people was not without problems because of central adverse effects, the need for regular blood monitoring and potential for drug–drug and drug–disease interactions.

Newer anti-epileptic drugs, such as gabapentin and more recently pregabalin, have become more widely used in neuropathic pain states, as several studies have demonstrated analgesic efficacy and fewer adverse effects than older anti-epileptic drugs. Efficacy has been demonstrated in PHN, diabetic peripheral neuropathy and central pain syndromes [113]. Although the potential for drug–drug interactions is lower, elimination of gabapentin and pregabalin is dependent on renal function [112] and dose adjustment is required in renal impairment.

Dose titration is required during the initiation of gabapentin or pregabalin, although for PHN, initiation of therapy with gabapentin 200 mg administered three times daily had similar efficacy and side effects to lower doses studied [120].

Adjuvant analgesic drugs should be considered for older people with neuropathic pain. Although tricyclic antidepressants have good efficacy, anticholinergic side effects are often problematic for older people. Anti-epileptic drugs, such as gabapentin or pregabalin, are effective for neuropathic pain and are probably better tolerated if titrated appropriately. When indicated, treatment should start with the lowest possible dose and be increased very slowly based on response and side effects.

Topical therapies

Topical administration may have improved tolerability than other routes of administration and may be preferable for older people.

Lidocaine

Several studies have demonstrated the efficacy of topical lidocaine, especially the lidocaine 5% medicated plaster, predominantly in PHN, and less so in other types of neuropathic pain. Ease of use, the absence of toxicity and the lack of drug interactions have meant that it has been used for other indications too. One study has compared the lidocaine 5% medicated plaster and pregabalin in PHN and diabetic polyneuropathy [121]. More patients with PHN responded to lidocaine 5% medicated plaster. For patients with diabetic polyneuropathy, responses were comparable for both treatments. Fewer patients in the lidocaine 5% medicated plaster group experienced drug-related adverse events and discontinuations.

NICE guidelines recommend that lidocaine 5% medicated plasters should be considered as third-line treatment of localised neuropathic pain for people who are unable to take oral medication because of medical conditions and/or disability, while awaiting referral to an appropriate specialist [119].

NSAIDs

Several NSAIDs have been formulated for topical administration. These preparations are effective in reducing pain [111] and may reduce (but not eliminate) the incidence of systemic adverse effects. Several studies have demonstrated the efficacy of topical NSAIDs in non-neuropathic persistent pain [95].

Capsaicin

Topical capsaicin cream is available for the management of osteoarthritis and neuropathic pain, although a substantial proportion of patients are unable to tolerate the intense burning after application. A patch containing 8% capsaicin has recently been approved for use. A 1 hour application may provide pain relief for over 13 weeks for PHN [122].

Some analgesics have been formulated as topical treatments and may be beneficial for localised pain. Topical lidocaine and capsaicin have limited efficacy in the management of localised neuropathic pain, and topical NSAIDS may be suitable for older people with non-neuropathic pain.

Summary statements

- *Paracetamol* should be considered as first-line treatment for the management of both acute and persistent pain in older people, particularly of musculoskeletal origin, due to demonstrated efficacy and good safety profile.
  There are relatively few relative cautions and absolute contraindications to prescribing paracetamol.
  It is important that the maximum daily dose (4 g/24 h) is not exceeded.

- *Non-selective NSAIDs and selective COX-2 inhibitors* should be used with caution in older people after other safer treatments have not provided sufficient pain relief.
  The lowest dose should be used for the shortest duration.
  For older people, an NSAID or selective COX-2 inhibitor should be co-prescribed with a PPI, choosing the one with the lowest acquisition cost.
  All older people taking NSAIDs or COX-2 inhibitors should be routinely monitored for GI, renal and cardiovascular side effects, and drug–drug and drug–disease interactions.
- *Opioids* have demonstrated efficacy in the short term for both cancer and non-cancer pains, but long-term data are lacking.
  Patients with moderate and severe pain should be considered for opioid therapy, particularly if pain is causing functional impairment or reducing quality of life.
  Patients with continuous pain should be treated with modified release oral or transdermal opioid formulations aimed at providing relatively constant plasma concentrations.
  As there is marked variability in how individual patients respond to opioids. Treatment must be individualised and carefully monitored for efficacy and tolerability.
  Opioid side effects (including nausea and vomiting) should be anticipated and suitable prophylaxis considered.
  Appropriate laxative therapy, such as the combination of a stool softener and a stimulant laxative, should be prescribed throughout treatment for all older people prescribed opioid therapy.
  Regular patient review is required to assess the therapeutic benefit and to monitor adverse effects.
- *Tricyclic antidepressants* have demonstrated efficacy in several types of neuropathic pain.
  Adverse effects and contraindications limit the use of tricyclic antidepressants in older people.
  Duloxetine has been shown to be effective for the treatment of neuropathic pain and some studies suggest efficacy for non-neuropathic pain such as osteoarthritis and low back pain.
  Other antidepressants (e.g. SSRIs) have very limited evidence of analgesic efficacy and should not be used as analgesics.
  The lowest dose should be initiated and the dose increased slowly as tolerated.
  Regular patient review is required to assess therapeutic benefit and to monitor adverse effects.
- *Anti-epileptic* drugs have demonstrated efficacy in several types of neuropathic pain.
  Adverse effects and the need for blood monitoring limit the use of older anti-epileptic drugs in older people.
  Dose adjustment of gabapentin and pregabalin is required in renal impairment.
  Regular patient review is required to assess therapeutic benefit and to monitor adverse effects.
- *Topical treatments.* Topical NSAIDs may provide an alternative to oral NSAIDs, particularly if pain is localised.

Interventional therapies in the management of chronic, non-malignant pain in older people

The most commonly employed modality for pain control in older people is pharmacotherapy. However, Ozyalcin suggests in his review that when weak opioids were ineffective, therapeutic nerve blocks or low-risk neuro-ablative pain procedures should be employed prior to strong opioids [123]. Furthermore, he considered that a combination of invasive procedures and systemic medications had the distinct advantage of reducing medication intake and its side effects. Freedman concurred that effective pain management in the older patient could be achieved through a multimodality approach, including invasive techniques [124].

Therapeutic interventional therapies in the management of chronic pain include a variety of neural blocks and minimally invasive procedures. 'Interventional pain therapies' can be defined as the discipline of medicine devoted to the diagnosis and treatment of pain and related disorders by the application of interventional techniques in managing chronic and intractable pain, independently or in conjunction with other modalities of treatment.

The controversy regarding the effectiveness of interventional pain therapies is well recognised. Although significant progress has been made over the last 20 years, the quality of medical literature on the efficacy of many interventional therapies in older people remains poor.

For the purpose of these guidelines, the authors opted to restrict the review to the following interventional therapies and specific indications:

- Epidural injections
- Epidural adhesiolysis
- Facet joint interventions
- Spinal cord stimulation
- Sympathetic nerve blocks
- Intrathecal (continuous neuraxial) infusions
- Vertebroplasty and kyphoplasty
- Peripheral intra-articular (IA) injections
- Post-herpetic neuralgia
- Radiofrequency denervation of Gasserian ganglion

Epidural steroid injections in spinal stenosis and sciatica

Spinal stenosis in older people is most commonly caused by degenerative lumbar disease leading to a narrowing of the vertebral canal, which may result in spinal nerve compression. The condition commonly occurs in older adults with symptoms of neurogenic claudication and restriction of walking distance. Spinal stenosis may be managed conservatively with analgesia, surgically with spinal decompression and there is some evidence to support the use of spinal nerve blocks to reduce symptoms on a short-term basis [125].

A recent randomised single-blind controlled trial in patients with lumbar spinal stenosis found both epidural steroid and physical therapy to be effective in reducing pain and improving function for up to 6 months. The mean ages of the treatment groups were 60 years and the authors acknowledged the low numbers included in the study. Koc *et al.* [126] and Tadokoro *et al.* [127] treated 89 patients over 70 years of age with lumbar stenosis with inpatient conservative therapy, including epidural steroid injections, and reported improvement of symptoms and function. However, Shabat *et al.* [128] reported failure of conservative management including lumbar steroid injections for spinal stenosis in an uncontrolled study in patients over 65 years.

Epidural steroid via the fluoroscopcally guided transforaminal route was reported to be effective with a >50% reduction in pain scores in 75% of older patients (mean age 77 years) with unilateral radicular pain due to lumbar stenosis. The authors of this prospective cohort study acknowledged the small patient population and the need for a randomised double-blind trial [129].

Sciatica is a frequent and often debilitating event causing radicular pain from herniation of an intervertebral disc. The incidence is related to age and peaks in the fifth decade. Although most episodes of acute sciatic neuralgia respond to conservative management, some require surgery. In older people, surgery may be contraindicated or declined.

The injection of various agents into the epidural space to relieve pain has been employed since the 1990s, but the role of epidural steroid in the management of sciatica has generated much discussion and debate over the last 50 years. Despite the lack of consistent evidence, epidurals are widely undertaken for radicular pain.

Many of the earlier published studies have methodical flaws and overall evidence is variable. Our search found no data specific to older people, although most studies included all age groups. There are three ways to access the epidural space: caudal, interlaminar and transforaminal approaches; the latter two can be used at all levels of the spine. Some studies have identified the technique of 'blind' injections (epidurals undertaken without fluoroscopic guidance) to be associated with a high rate (9–70%) of false positive outcomes [130, 131].

Recent meta-analyses of pooled data from studies have produced favourable results [132, 133]. Using an endpoint of near or total pain relief, the odds ratio for short-term benefit up to 60 days was 2.61 (95% confidence intervals 1.9–3.77) and for long-term benefit, 1.87 (CI: 1.31–2.68) for epidural steroid compared with placebo. Using numbers needed to treat (NNT), short-term benefit for >75% pain relief was 7.3 and for short-term benefit for >50% pain relief, the NNT was 3. Studies looking at long-term benefit up to 1 year report an NNT for 50% pain relief of 13. However, in contrast, European guidelines for the management of chronic low back pain concluded that there was conflicting evidence for the effectiveness of epidural steroid injections for radicular pain [134].

Transforaminal epidural steroids have been found to decrease the rate of surgical interventions compared with interlaminar epidurals [135] and in a head-to-head controlled trial, they were found to be clinically superior to interlaminar epidurals [136]. Many pain clinicians currently consider transforaminal epidural steroids for radicular pain (or significant exacerbation) <1 year.

There is limited evidence to support epidural steroid injections for spinal stenosis in older patients, but the evidence is not strong for its use in radicular pain or sciatica.

Epidural adhesiolysis

Percutaneous epidural adhesiolysis is a technique used to treat patients with refractory spinal pain considered the result of either epidural scarring following spinal surgery or spinal stenosis due to compression of intraspinal vascular and neural structures, with physical displacement of neural elements by injected fluids.

Manchikanti *et al.* [137] reported that the results of surgical decompression for lumbar stenosis were mixed and undertook a retrospective evaluation in a small sample of older people (mean age >65 years) undergoing epidural adhesiolysis with hypertonic saline neurolysis over a 3-year period. The results showed significant reduction in pain, improvement of physical and psychological health, and a decrease in narcotic intake. The authors concluded that this was a safe and probably effective modality of treatment in managing moderate to severe lumbar spinal stenosis. Similarly, Igarashi *et al.* [138] evaluated the technique of lysis of adhesions and epidural steroid during epiduraloscopy in a group of older patients with a mean age of 71 years. Low back pain was relieved up to 12 months after treatment, with relief of leg symptoms varying from 3 to 12 months, depending on the number of involved segmental spinal levels.

A 2010 assessment by NICE, concluded that 'current evidence on therapeutic endoscopic division of epidural adhesions is limited to some evidence of short-term efficacy, and there are significant safety concerns. This procedure therefore should only be used with special arrangements for consent and audit or research' [139].

There is limited evidence to support epidural adhesiolysis for spinal stenosis and radicular symptoms in the older adult. NICE recommends the use of special arrangements.

Facet joint injections

Spinal pain is a common complaint in older people and is often associated with functional limitations. While facet arthrosis and osteoarthritis are common radiological findings, controlled studies of chronic low back pain have shown a prevalence of facet joint involvement in 15–45%. Manchikanti *et al.* [140] assessed 100 patients and found the prevalence of lumbar facet joint-mediated pain confirmed by diagnostic nerve blocks to be 52% in the elderly, compared with 30% in all adults. Conversely, in a later

retrospective analysis of 424 patients undergoing comparative nerve blocks, the author concluded that cervical pain of facet joint involvement was similar in all age groups [141].

Our search found no studies specifically conducted in older patients, although many included older patients in their populations. Facet joint-mediated pain may be managed with interventional therapy of IA injections, medial branch nerve blocks or medial branch nerve radiofrequency denervation, which inactivates the afferent nerve supply to the joint for a period of time. The efficacy of IA facet joint injections remains controversial and, at best, provides immediate-term relief in only a proportion of people with an inflammatory component [142].

The Cochrane review of injection therapy for subacute and chronic low back-pain included 18 RCTs of injections into the epidural space, facet joints and tender ligaments and muscles in a population from 18 to 70 years [143]. They concluded that there was no strong evidence for or against their use in subacute or chronic low back pain.

The evidence for radiofrequency denervation of the medial branch nerves, although mixed, is more supportive. The correct diagnosis of the condition is considered paramount, with rigorous pre-assessment of diagnostic facet nerve blocks. False positive rates have been reported from 25 to 40%. Dreyfus and Dreyer, Manchikanti *et al.* and Niemisto *et al.* concluded that there was limited evidence that radiofrequency denervation offered short-term relief for chronic neck pain and conflicting evidence for lumbar zygapophyseal joint pain [144–146]. Serious complications and side effects are rare.

Two RCTs demonstrated >50% pain relief after uncontrolled lumbar medial branch blocks were positive [147, 148]. van Eerd *et al.* reviewed the evidence for the treatment of cervical facet pain and concluded that radiofrequency treatment of the medial branch nerve could be considered for degenerative facet joint pain [149]. All authors highlight the need for further randomised controlled studies.

The evidence in all age groups for facet joint interventions is mixed, although more supportive for radiofrequency denervation of the medial branch nerves. Until further studies in the older population become available, no firm recommendations can be made in this age group.

Spinal cord stimulation

Spinal cord stimulation (SCS) was first described by Shealy in 1967 [150]. The procedure involves the delivery of a pulsed electrical field to the dorsal columns of the spinal cord from an electrical generator, supplied by an implanted battery or external radiofrequency transmitter. The electrodes are implanted into the dorsal epidural space by laminectomy, or percutaneously. The mechanism of action remains poorly understood.

A consensus document published in 2009 (*Spinal cord stimulation for the management of pain: recommendations for best clinical practice*) prepared by the British Pain Society in consultation with the Society of British Neurological Surgeons [151], stated that SCS was more effective for radicular (limb) pain following spinal surgery than axial pain and that there was clinical evidence from RCTs to support its use in failed back surgical syndrome, complex regional pain and neuropathic and ischaemic pain.

Evidence exists to support SCS in the treatment of pain of ischaemic origin [152], although in 2008 NICE issued guidance in relation to SCS for neuropathic and ischaemic pain that recommended it as a treatment for chronic neuropathic pain not of ischaemic origin [153].

A placebo-controlled RCT by Eddicks *et al.* found SCS improved functional status and angina symptoms in patients with refractory angina [154]. The Cochrane review on spinal cord stimulation for chronic pain [155] considered SCS in a variety of chronic pain conditions, but found only two RCTs of this intervention; one in failed back surgery syndrome [156] and the other in complex regional pain syndrome type I [157]. The authors excluded angina and peripheral vascular disease. The North *et al.* trial [156] did not report age and the Kemla *et al.* trial [157] included participants up to the age of 65 years.

No studies of SCS specifically targeting the older population exist, but evidence from RCTs in mixed-age groups, including over 65s, support its use in failed back surgical syndrome, complex regional pain and neuropathic and ischaemic pain.

Sympathectomy for neuropathic pain

Neuropathic pain is pain initiated or caused by a primary lesion or dysfunction in the nervous system. Examples include phantom limb pain, post-stroke pain and complex regional pain syndromes; the former two having prevalence among the older population. Treatment options are multimodal. The concept that many neuropathic pain syndromes include 'sympathetically mediated' pain has historically led to treatments directed at the sympathetic nervous system with local anaesthesia, chemical agents and surgical ablation.

Our searches failed to find studies specifically undertaken in the older population. However, a Cochrane review by Mailis-Gagnon and Furlan in 2009 [158] included studies with older patients and concluded that the evidence for the effectiveness of sympathectomy for neuropathic pain was weak and that complications of the procedure may be significant.

There is weak evidence to support consideration of sympathectomy for neuropathic pain in the older population.

Continuous neuraxial infusions

The technique of delivering medications centrally followed the discovery of central opioid receptors in the 1970s. Since then, neuraxial infusions have been used in the treatment of both malignant and non-malignant pain. We found no studies undertaken specifically in the elderly population.

Erdine and de Andres [159] reviewed contemporary studies and concluded that intrathecal drug delivery (IDD) was an effective treatment alternative in carefully selected patients with chronic pain that cannot be controlled by a well-tailored drug regime and/or spinal cord stimulation. They considered that many studies with follow-up periods of up to 5 years achieved good to excellent pain relief. The evidence to support IDD systems for non-malignant pain is less robust than the evidence for cancer pain. Thimineur *et al.* [160], Anderson and Burchiel [161, 162], Kumar *et al.* [162] and Raphael *et al.* [163] support the notion of IDD as an effective treatment of refractory non-malignant pain.

Recommendations for best practice on IDD systems published in 2008 by the British Pain Society in consultation with the Association of Palliative Medicine and Society of British Neurological Surgeons noted that there was no RCT evidence, but supportive prospective open studies for chronic non-malignant pain [164].

There is no RCT evidence for the use of continuous neuraxial infusions in older people, but supportive prospective open studies in all age groups. The authors consider continuous neuraxial infusions may be useful in appropriately selected older people.

Vertebroplasty and balloon kyphoplasty

Osteoporotic vertebral fractures are a common cause of acute pain in older people that may persist for weeks or months, even after the fracture has healed.

Two procedures, namely vertebroplasty (VP) and kyphoplasty (KP), have been advocated as the preferred treatment for painful osteoporotic vertebral fractures [165]. Both VP and KP involve minimal invasive surgery. The procedures are done under imaging by a radiologist or orthopaedic surgeon. VP consists of percutaneous needle placement into the fractured vertebra under imaging and injection of bone cement. Kyphoplasty involves inflation of a percutaneously delivered balloon in the vertebral body followed by percutaneous injection of bone cement into the cavity created by the balloon. KP also offers the advantage of partial restoration of vertebral height and correction of angular deformity. Single or multiple level VP may be done in one session [166].

These two treatments have gained wide acceptance based on many case series, and open non-randomised and randomised studies reported over the last decade [166–175]. These studies, among others, have shown that VP resulted in substantial and immediate pain relief, and an improved functional status in patients with osteoporotic compression fractures. The majority of patients in the reported studies were women aged 60 years and over.

Not all patients are amenable to VP and the procedure may, rarely, be complicated by cement leakage, neurologic injury (root pain and radiculopathy) and pulmonary embolism. Nonetheless, the reported benefits have been consistent, increasing the attraction for the procedures. Significant pain relief is noted within 24 h after the procedure and patients are able to leave hospital on the same day or following an overnight stay; thereby reducing the length of hospital stay. Analgesic use is also reduced for 6 months [176] and up to 1 year, and quality of life notably improved [172, 177].

Similar results have been reported with KP. Three studies, one RCT [178] and two earlier small open studies [179, 180], showed that KP was associated with greater improvement in back pain, physical function, mobility and quality of life than conventional medical treatment for at least 6–12 months. However, the differences between the KP and medical treatment groups diminished after 12 months [178].

In a recent systematic review of the available literature on VP and KP for osteoporotic vertebral fractures [181], the authors concluded that, compared with conventional medical management, VP resulted in superior pain control within the first 2 weeks of intervention (level I evidence) with less use of analgesics, less disability and greater improvement in general health within the first 3 months (level II–III evidence). The study also reported that evidence for VP and KP for better pain relief in tumour-associated vertebral fractures was poor.

More recently, two high-quality trials have challenged this widely accepted increasing practice. Both were blinded RCTs with sham surgery as the control comparator, rather than conventional medical treatment [182, 183]. Rapid improvement in pain in both VP (active) and control 'sham-treated' groups was noted in both studies, but no significant benefit of VP was found at 1 week; and 1, 3 and 6 months after intervention, compared with the control group. The control group in both trials underwent infiltration of the periosteum with a local anaesthetic, raising the possibility that either the placebo effect of injection and/or local anaesthetic on its own is as effective. It is important to note that the magnitude of improvement in pain in the VP-treated groups was similar in these two trials and consistent with the benefits reported in previous uncontrolled and controlled trials [184]. The results of the two trials have raised serious concerns about the effectiveness of the procedure.

The current evidence in favour of VP and KP is, therefore, conflicting. Compared with conventional medical therapy, VP and KP are both beneficial and significantly reduce pain and improve the quality of life in acute painful vertebral fractures in the short term and up to one year. However, these benefits are equally produced through a sham procedure [182, 183].

The current evidence in favour of VP and KP is conflicting. Until further larger studies become available, no firm recommendations could be made regarding VP and KP in the treatment of painful vertebral fractures.

Intra-articular peripheral joint injections

Osteoarthritis (OA) is commonly the result of 'wear and tear' that accompanies ageing. Any joint may be affected. The knee is the site most affected and is a common cause

of pain in older people. Knee pain is associated with considerable reduction in functional ability, which in turn strongly predicts future disability and dependency [184].

In contrast to the knee, the literature evidence for IA injection of other joints (e.g. hip, sacro-iliac, shoulder) in older people is sparse. Therefore, the following recommendations will be limited to the knee.

Corticosteroids

Although IA corticosteroid injections have been used in OA for over 50 years [185], concern regarding the deleterious effect it may have on the underlying disease process has been raised over the years and the effectiveness of local injections repeatedly questioned. More recently, several RCTs have demonstrated its effectiveness, and the role of IA steroid injection for short-term pain relief in OA of the knee is now well established. In a small systematic review, the authors concluded that there is a significant reduction in pain within the first week following the injection, and lasting for a period of 3 to 4 weeks [186]. Side effects were minimal. A larger meta-analysis, which included 10 trials [187], confirmed the short-term benefits (evidence level 1) and suggested that there may also be a significant long-term response noted at 16–24 weeks, although higher doses of corticosteroids (equivalent to 50 mg prednisolone) may be needed to obtain a long-term response.

A comprehensive Cochrane review and meta-analysis [188] looked at 26 RCTs comparing IA corticosteroids against placebo, IA hyaluronic acid (HA) preparations and joint lavage. The majority of patients in these trials were older patients with the mean age of 50–71 years. Of these, 13 trials compared IA corticosteroids with placebo, of which eight studies reported on pain relief. The analysis concluded that steroids were more effective than placebo in reducing pain in week one (NNT = 3–4). The effect continued for 3 weeks but thereafter the evidence for its effect on pain was poor. Interestingly, comparisons between IA corticosteroid and joint lavage showed no differences in efficacy.

The type of corticosteroid preparation used varied among the trials included in the meta-analyses. In a comparative study between triamcinolone hexacetonide (THA) and methylprednisolone acetate (MPA), it was noted that both gave significant pain relief at Week 3 ($P < 0.01$), but only MPA showed an effect at Week 8 compared with baseline ($P < 0.05$). THA was more effective than MPA in reducing pain at Week 3 ($P < 0.01$), but this difference was lost at Week 8. The mean age of the patients in this study was 62.5 years [189].

IA corticosteroid injections in OA of the knee are effective in relieving pain in the short term, with little risk of complications and/or joint damage.

Viscosupplementation (intra-articular hyaluronic acid injection)

The use of IA HA preparations for pain relief has gained wide acceptance in patients with knee pain from OA. The practice is supported by several systematic reviews [190–194] and guidelines [96,98,195], and is refuted by only one review [196].

Many HA formulations exist. These preparations vary in molecular weight, pharmacodynamics, treatment schedule and time–effect response. The Cochrane review provides a comprehensive by-product and by-class analysis [193]. Compared with lower molecular weight HA, the highest molecular weight HA may be more efficacious [197].

The evidence shows that, compared with placebo, viscosupplementation is efficacious in providing pain relief with beneficial effects on pain, function and patient global assessment. The Cochrane review also concluded that the effect of IA HA is not only statistically significant, but also clinically important. The benefits are achieved with very low incidence of systemic adverse effects. Minor local reactions have been reported, most common of which are pain and swelling at the site of injection. However, HA acid may be slow to produce an effect and may not be seen in the first 3 to 4 weeks, but is significant by Week 5–11 and Week 8–12, depending on the formulation used [197].

Viscosupplements are comparable in efficacy to systemic forms of active intervention. In an effectiveness trial, HA lessened pain and reduced costs for other therapy and devices at 1 year [198].

IA HA is effective and relatively free of systemic adverse effects. It should be considered in patients intolerant to systemic therapy.

In comparison trials between corticosteroids and HA products, the Cochrane review concluded that no statistically significant differences were in general detected at 1–4 weeks post-injection. Between 5 and 13 weeks post-injection, HA products were more effective than corticosteroids. In general, the onset of effect was similar, but HA products had more prolonged effects than IA corticosteroids [191].

IA HA appears to have a slower onset of action than IA steroids, but the effects seem to last longer.

Post-herpetic neuralgia

Acute herpes zoster and PHN are common in older people. It is estimated that, at the median age of 70 years, between two-thirds to 50% of patients develop PHN following an attack of herpes zoster, defined as pain persisting for >3 months, [199] or for >1 month [200], respectively.

Case series [201, 202] and controlled trials [203, 204] have demonstrated the benefits of nerve block for pain in both acute herpes zoster and PHN.

The use of intrathecal methylprednisolone as a treatment for long-standing intractable PHN was investigated in a randomised controlled study [205]. The study enrolled 277 patients randomly assigned to receive either intrathecal methylprednisolone and lignocaine, lignocaine alone or no treatment, once weekly for up to 4 weeks. Patients were followed up for 2 years. In the methylprednisolone–lidocaine group, the intensity and area of pain decreased and the use

of the NSAID declined by >70% 4 weeks after the end of treatment. Approximately 90% of patients in the methylprednisolone–lidocaine group had good or excellent global pain relief at all the follow-up evaluations, which was significantly better than in the control group ($P < 0.001$). Evaluation of treatment effect showed that one out of two patients will benefit from intrathecal steroid and local anaesthetic combination (NNT = 2). In contrast, there was minimal change in the degree of pain in the lignocaine only and control groups during and after the treatment period. No complications related to intrathecal methylprednisolone were observed. The results of this trial indicate that the intrathecal methylprednisolone—local anaesthetic is an effective treatment for PHN.

The effectiveness of epidural injection in the acute phase has been evaluated in two large RCTs [204, 205]. The first study [204] enrolled 600 patients over 55 years of age with a herpetic rash of <7 days duration, and severe pain. Patients were randomised to receive either intravenous acyclovir for 9 days and prednisolone for 21 days (group A), or bupivacaine 6–12 hourly and methylprednisolone every 3 to 4 days through an epidural catheter for a period ranging from 7 to 21 days (group B). Efficacy was evaluated at 1, 3, 6 and 12 months. The results showed epidural administration of local anaesthetic and methylprednisolone to be significantly more effective in preventing PHN throughout the 12 months of the study ($P < 0.0001$). The incidence of pain after 1 year was 22.2% (51 patients of 230) in group A and 1.6% (four patients of 255) in group B.

The second study employed a more simplified approach, comprising single epidural injection of steroid and local anaesthetic. There were 598 patients with acute herpes zoster randomly assigned to receive either standard therapy (oral antivirals and analgesics) or standard therapy with one additional epidural injection of methylprednisolone and bupivacaine. At 1 month, 137 (48%) patients in the epidural group reported pain, compared with 164 (58%) in the control group ($P = 0.02$). The NNT was 10. However, there was no difference in pain control between the two groups at 3 and 6 months. The mean age of patients was 66 (58–75) years [206]. The two trials confirm the effectiveness of epidural injection of steroids and local anaesthetics in reducing pain the acute phase.

An earlier systematic review to evaluate the evidence [207] has shown that nerve blocks using lignocaine alone, or lignocaine and corticosteroids, in controlling pain during the acute phase or for PHN is effective in 80% (grade A). Reduction of pain in PHN has been reported in 60% of trials included in the review when the block is administered within 2 months of acute zoster infection. The evidence is in favour of combined local anaesthetic and corticosteroid injection, rather than either given alone.

Evidence for the use of pulsed radiofrequency is sparse. An early trial suggests that it may be useful in refractory cases, [208] but further studies are needed.

The effectiveness of botulinum toxin type A in PHN in doses not exceeding 300 IU has been demonstrated in two pilot studies, the first involving seven patients [209] and the second which recruited 11 patients [210] (level 4 evidence). More recently, a double-blind, randomised placebo-controlled trial was reported involving 29 patients with chronic neuropathic pain (PHN, post-traumatic and post-operative) [211] using a once-only intradermal injection of botulinum toxin A, at multiple sites corresponding to the area of pain and followed up for 24 weeks. Significant sustained improvement in pain was noted (NNT for 50% pain relief tree at 12 weeks) (level 1 evidence). No systemic adverse effects were noted. However, it should be noted that of the 29 patients in the study, only four patients had underlying PHN. The initial pilot studies did not report the age of the patients, but the study by Ranoux *et al.* recruited patients between the ages of 27 and 78 years, five of who were >70 years [211].

In older people, nerve blocks using a combination of local anaesthetic and corticosteroid are effective in acute herpes zoster and PHN.

There is also some evidence for the use of botulinum toxin in these patients.

Radiofrequency denervation of Gosserian ganglion to treat trigeminal neuralgia

Trigeminal neuralgia (TGN) is a debilitating condition characterised by intermittent bouts of moderate to severe stabbing pain in the distribution of one or more branches of the fifth cranial nerve, with an annual incidence of four to five in 1,000,000. The condition is usually incurable and many patients are older. The peak age of the onset of classical TGN is 60 years [212]. Medical management is considered the first-line treatment and there is a lack of evidence as to when this should be abandoned and interventional treatment considered.

Interventional treatments may be directed at three levels: peripheral nerve branches, Gasserian ganglion and posterior fossa with microvascular decompression and stereotactic radiosurgery (gamma knife). Peters and Turo [213] reviewed the literature on interventional treatments directed at the first two levels with peripheral nerve procedures of peripheral neurectomy, cryotherapy, alcohol block, radiofrequency thermocoagulation and other injections, and with Gasserian ganglion procedures of radiofrequency thermocoagulation, balloon compression and glycerol gangliolysis. They found that many studies looking at treatments to the Gasserian ganglion were retrospective, with more information on radiofrequency thermocoagulation techniques. Unfortunately, age was not reported, although many of the studies included follow-up periods of several years. They considered that long-term success rates for ganglion level procedures were broadly similar with initial pain relief of >95% in most studies, and one report of a recurrence rate of 25% at 14 years. It was noted that all could cause sensory loss to varying degrees, with balloon compression least likely to impair corneal sensation or to cause anaesthesia dolorosa. The reports on interventional treatments of peripheral nerves tended to involve a small series with the shorter-term follow-up.

Recurrence levels within 2 years were high (70%), but complications were minor. The authors concluded that peripheral procedures should be reserved for emergency use or in patients with significant medical problems restricting other procedures. Gronsth *et al.* [212] reached similar conclusions in their review, noting that for patients with TGN refractory to medical therapy, percutaneous procedures to the Gasserian ganglion, gamma knife and microvascular decompression could be considered.

Tronnier *et al.* [214] retrospectively analysed information obtained from patients undergoing 316 radiofrequency lesion procedures and 378 microvascular decompressions, although only 62% of patients were included due to the loss to follow-up or inability to complete questionnaire. They noted that age corresponded to literature data and found a 50% recurrence rate at 2 years for the first group and reported that 64% of patients undergoing surgery remained pain free for up to 20 years. They considered that microvascular decompression was the treatment of choice for TGN in healthy people because it was curative and non-destructive, and that percutaneous procedures were indicated for older patients with high comorbidity or multiple sclerosis.

In a study evaluating the effectiveness of percutaneous radiofrequency of the Gasserian ganglion in 1,600 patients with a follow-up time of 1 to 25 years and a mean age of 57 years, Kanolat *et al.* [215] reported immediate pain relief in 98% of patients continuing for 5 years in 58% of those. They noted that there was no single, standard method of treatment of TGN. They considered that selection of suitability of each patient was important and concluded radiofrequency denervation of the Gasserian ganglion to be minimally invasive, effective and especially indicated in older patients.

A review of the clinical efficacy and safety of stereotactic radiosurgery (gamma knife) for the treatment of TGN reported that the current evidence appeared adequate to support the procedure, although noted a paucity of directly comparable data [216]. Between 33 and 90% of patients achieved initial complete pain relief, with a recurrence rate of 14% at 18 months. Operative mortality and major morbidity was low and it was considered suitable for older patients with concurrent medical illnesses or comorbidity.

The evidence suggests that microvascular decompression is the treatment of choice for TGN in healthy patients and percutaneous procedures are indicated for older patients with high comorbidity. There is evidence to support stereotatic radiosurgery.

Summary statements

- There is limited evidence to support epidural steroid injections for spinal stenosis in older patients but the evidence is not strong for its use in radicular pain or sciatica.
- There is limited evidence to support consideration of epidural adhesiolysis for spinal stenosis and radicular symptoms in the older adult.
- The evidence in all age groups for facet joint interventions is mixed, although there is some evidence to support radiofrequency lesioning in appropriately selected patients. Until further studies in the older population become available, no firm recommendations can be made.
- No studies of SCS specifically targeting the older population exist, but evidence from RCTs in mixed-aged groups, including over 65s, support its use in failed back surgical syndrome, complex regional pain and neuropathic and ischaemic pain.
- There is weak evidence to support consideration of sympathectomy for neuropathic pain in the older population.
- There is no RCT evidence for the use of continuous neuraxial infusions in older people, but supportive prospective open studies in all age groups. The authors consider continuous neuraxial infusions may be useful in appropriately selected older people.
- The current evidence in favour of VP and KP is conflicting. Until further larger studies become available, no firm recommendations can be made regarding VP and KP in the treatment of painful vertebral fractures.
- IA corticosteroid injections in OA of the knee are effective in relieving pain in the short term with little risk of complications and/or joint damage. IA HA is effective and relatively free of systemic adverse effects. It should be considered in patients intolerant to systemic therapy. IA HA appears to have a slower onset of action than IA steroids, but the effects seem to last longer.
- In older people, nerve block using a combination of local anaesthetic and corticosteroid is effective in acute herpes zoster and PHN. There is also evidence for the use of botulinum toxin in these patients.
- The evidence suggests that microvascular decompression is the treatment of choice for TGN in healthy patients and percutaneous procedures are indicated for elderly patients with high comorbidity. There is some evidence to support stereotatic radiosurgery.

Psychological interventions

Pain is not just a physical sensation. The biopsychosocial model reinforces how psychological factors may influence the way in which people interpret, respond to and cope with pain. Although pharmacological therapy can be helpful in managing pain, it may not be completely effective [216] and older people may be particularly susceptible to side effects and drug interactions [217]. In addition, psychological techniques may be helpful, not just when pharmacological therapy is ineffective, but as an adjunct to medication or as a first-line therapy if the patient prefers.

Depression is common in older people and, although its treatment is beyond the scope of this review, it is important to acknowledge the close association between chronic pain and clinical depression. Depression in patients with chronic diseases is not well understood; it may be an emotional

response to the diagnosis of illness or to the limitation of activities of daily living, mobility and consequent social isolation. For example, it has been found that treatment of depression in older people with osteoarthritis may have a significant impact on function and pain [218].

Cognitive behavioural therapy

Cognitive and behavioural therapies use a broad range of psychological techniques to alter dysfunctional ways of thinking, modify beliefs and attitudes and increase a person's control over pain and how they interpret and manage this [219].

Residents in long-term care facilities commonly experience pain. Cipher *et al.* [220] used a pre-treatment to post-treatment design to examine the effect of standardised Multi-modal Cognitive Behavioural Therapy. This intervention consists of a comprehensive initial evaluation of a range of domains, including level of dementia, emotional distress and pain. The therapist worked collaboratively with the residents, their families and others involved in their care. They established motivating themes and values which were congruent with the resident's background, for example, 'being independent' or 'being well-groomed', and used structured and individualised treatment plans incorporating these to encourage behavioural change. The 44 participants (mean age 82 years) received an average of 7.9 sessions each and showed a significant decrease in pain as measured on the Geriatric Multidimensional Pain and Illness Inventory.

Cook *et al.* [221] used a group approach to deliver 10 weekly sessions of a cognitive behavioural pain management programme to elderly nursing home residents (mean age 77.2 years) who had chronic pain. The study had a randomised pre-/post-comparison group design, with follow-up until 4 months. CBT was compared with an attention/support control treatment. Of those patients who received CBT, 80% showed an improvement, compared with 34% in the control group. These effects remained at 4 months, with 86% of the CBT group maintaining the improvement in pain, compared with 33% in the control group; indicating that the benefits of CBT for pain management are not purely mediated through increased attention and support.

These two CBT treatment studies took place in nursing homes; we do not know the effect of such interventions on community-dwelling older people. Study methodologies were not particularly rigorous and sample sizes in both were small. In contrast to randomised double-blind placebo controlled drug trials, researchers evaluating outcomes of these studies may not have been blind to treatment group allocation.

There is some evidence that psychological interventions such as CBT or behavioural therapy may be effective in decreasing chronic pain in adults and improving disability and mood [222]. However, few studies or trials have focused on older adults.

Mindfulness and meditation

One qualitative study examined the effects of mindfulness meditation on older adults (27 participants; mean age 74 years) with chronic back pain and concluded that they experienced 'numerous benefits' including less pain, better sleep and improved quality of life [223].

Guided imagery and biofeedback

Guided imagery is an approach whereby the attention is focused on sights, sounds, music and words to create feelings of empowerment and relaxation [224].

Relaxation and guided imagery may be effective strategies for pain management [224, 225], although most studies have not included control groups. Positive outcomes have been demonstrated for pain relief and decreased length of stay [226] in a small study of older adults following joint replacement surgery.

Biofeedback training may be used as part of multidisciplinary pain management programmes and generally includes relaxation training [227]. Studies comparing older versus younger adults using biofeedback appear to show comparable results in both groups [228, 229].

Older adults appear to readily acquire the physiological self-regulation skills taught in biofeedback-assisted relaxation training, and achieve comparable decreases in pain [230]. There has been little research on specific groups of older adults, such as the oldest, frail, cognitively impaired and those living in long-term care facilities and whether guided imagery and biofeedback are effective in these populations.

Summary statements

- Elderly nursing home residents with chronic pain may benefit from CBT pain management interventions.
- There is limited/weak evidence that mindfulness, meditation and enhancing emotion regulation have an impact on chronic pain in older people.
- Guided imagery may useful for patients following joint replacement surgery.
- There is limited evidence that biofeedback training and relaxation can be a useful approach for some groups of older adults with chronic pain.

Assistive devices

Assistive devices are prescribed to prevent further impairment, compensate for a range of motion restrictions, promote safety and manage pain during self-care and other activities of daily living [231]. For the purposes of this guideline, devices designed to assist in 'personal activities of daily living' (daily activities associated with personal hygiene, dressing and eating) are included, as is technology

for 'instrumental activities of daily living' (cooking, shopping, leisure etc). Equipment directly related to function (bath and toilet rails and frames) is included in this review; mobility aids (wheelchairs, walking frames, sticks and crutches) and sensory aids (hearing, speech and vision) are not. Devices used or operated by others in the process of assisting an individual (hoists and other technology for assisting in transfers) are also excluded.

The outcomes for assistive device use may be related to the specific design of the device (of which there are many makes and models); therefore, this guideline focuses on outcomes in general and does not recommend any specific piece of equipment. Design build and quality, user preference and cost will influence the selection and use of a particular device.

Review

Most research into assistive devices is descriptive in nature and very few consider pain reduction or functional outcomes in older people identified as having chronic pain. There is some evidence that assistive devices support maintaining independence, that use of devices increases with age, and that levels of satisfaction with devices are high [232, 233]. Only two systematic reviews and one piece of primary research of relevance to this guideline were identified.

A systematic review of occupational therapy for older people living in the community found strong evidence for the efficacy of advising assistive devices as part of a home hazard assessment on functional ability. A Cochrane review of occupational therapy for rheumatoid arthritis found insufficient data to determine the effectiveness of advice/instruction of assistive devices [234].

Mann *et al.* conducted an RCT in the USA of an assistive devices/environmental adaptations service designed to maintain independence and reduce care costs for the frail older adult over an 18-month period [235]. The service, led by an occupational therapist (assisted by a nurse and technician), provided a comprehensive functional assessment, provision of devices and home modifications as required, training in their use and continued follow-up and additional assessment and provision as required. The functional status, as measured by the functional independence measure (FIM) identified a significant decrease in function for the intervention group, but there was significantly more decline for the control group. Pain, as measured by the functional status instrument, increased significantly more for the control group.

There is some evidence that assistive devices may:

- support community living,
- reduce functional decline,
- reduce care costs and
- reduce pain intensity relative to older people not provided with devices.

Exercise and physical activity

Increasing and maintaining physical activity is important in the management of persistent pain in older people. Physical inactivity is common in this population and it can endanger their independence and quality of life, with reduced levels of fitness and function leading to increased levels of disability.

Studies exclusively focused on people over 65 with chronic pain are scarce and the available evidence base lacks high-quality RCT findings. Consistent with recommendations by American guidelines on persistent pain management, [236] evidence from reviews of RCTs on populations of people with chronic pain that include, but are not exclusive to, people over 65 [237, 238] support the use of programmes that comprise strengthening, flexibility and endurance activities to increase physical activity. There is also RCT evidence of improvement in function and pain with exercise for older people over 65 with chronic pain [239–241].

Persistent pain is also a strong risk factor for falls in older people [242]. Balance exercises can be incorporated successfully into a programme with strength and flexibility exercises for people over 65 years [241].

There are many different forms of exercise and which to select can pose a dilemma. A guideline on the management of persistent low back pain for adults (not older adults) recommended that the specific type of exercises should be determined by the patient together with the therapist [243]. Given that there is, as yet, no compelling evidence in any age group, and certainly within people over 65, that one type of exercise is better than another for people with chronic pain, the preference of the patient should be a key factor. Another consideration is the level of function of the person. The aims and method of delivery of the exercise/activity programme should also be related to the level of function of the person. For some, professional-led rehabilitation of basic function will be required, whereas for others, maintenance of exercise and/or activity will be important. The American guidelines offer some recommendations on this [236].

There is a large range of options that can be discussed with the person, such as progressive resistance exercise and aerobic exercise, including walking and water-based exercise/hydrotherapy. Based on studies of populations with older people with persistent pain, Tai-Chi [244–246] and yoga [247], appropriately delivered, may be considered as options: research to investigate their specific use for older people with pain is certainly indicated, and advances in gaming technology such as Wii and Kinect are opening up new possibilities.

Motivation is an essential factor to consider [248]. Likewise, barriers to exercise need to be taken into consideration [249]. In other age populations, it is recommended that a cognitive behavioural approach be used in exercise therapy to address such issues [243]. Again, until shown to

be otherwise, that should be considered in older people with chronic pain.

Supervision is important in younger populations [250] and is highlighted by the American Geriatrics Society (AGS) guidelines [236]. Until otherwise demonstrated, it should also be considered to be important in exercise for older people with chronic pain. Technology offers the potential for relatively low-cost supervision during self-management periods.

- Increasing activity by way of exercise should be considered.
- Exercise should involve strengthening, flexibility, endurance and balance.
- The preference of the person for the type of exercise should be given serious consideration.
- Motivation and barriers to exercise and activity should be discussed and planned for.
- Exercise should be customised to the individual capacity and needs of the person.
- Maintenance of productive activity and/or exercise should be facilitated.

Self-management of pain

Self-management covers a wide range of techniques, including relaxation, coping strategies, exercise, adaptations to activities and education about pain and its effects [251, 252]. By definition, the person with pain takes the lead role in carrying out the intervention, independently or with varying levels of support from health professionals. Older people with persistent pain can be open to the idea of self-management [251, 252]. Barriers to older people's self-management include: conflicting demands of dealing with comorbidities; inadequate access to information and resources; time; cost; lack of confidence in ability; motivation and unhelpful attitudes of others [249, 253]. It is important to identify these and overcome them if possible.

Bespoke self-management practices present a challenge to investigation because of their variability and individuality. Structured group-based programmes are available to facilitate self-management. Those with a strong focus on improving self-efficacy, such as the Arthritis Self Management Programme, the Chronic Disease Self-Management Programme and their close derivatives such as the Expert Patient Programme in England and Wales, have been investigated. Reviews have challenged bold claims of effectiveness for pain and function in adults: they report, at best, small, short-term changes of clinically questionable benefit [254–257]. Two good quality RCTs, with samples of people exclusively or almost exclusively over 65 years, showed no statistically significant effects at 6-month follow-up [258, 259]. An adaptation of this approach specifically for older housebound adults has been shown to be feasible and there was a clinically small though statistically significant, improvement in self-reported function 2 weeks after the intervention had ended: there were no effects on pain [260].

A statistically significant effect on pain at 6-month follow-up was demonstrated in a good-quality RCT, in which participants were mostly over 65, which investigated an intervention with different features to those described above. It combined aspects of self-management training with a programme of supervised exercise sessions and, rather than ending after the programme, it incorporated a degree of follow-up support [261]. The effect on pain at 12 months was no longer statistically significant and there were no statistically significant effects on function [261].

Other approaches, such as those used by Pain Association Scotland, include components that allow for integrated working with other services and provide more long-term support and maintenance of skills: these are as yet untested.

Summary statements

- A range of self-management techniques and practices should be considered as an option to be carried out in conjunction with other methods of pain management.
- Arthritis self-management/chronic disease self-management programmes and close derivatives, such as the Expert Patient Programme, delivered in isolation, without on-going support, cannot yet be recommended to decrease pain and increase function.
- Self-management programmes with mechanisms for longer-term support/maintenance may have a benefit.
- Increasing activity by way of exercise should be considered.
- Exercise should involve strengthening, flexibility, endurance and balance.
- The preference of the person for the type of exercise should be given serious consideration.
- Motivation and barriers to exercise and activity should be discussed and planned for.
- Exercise should be customised to the individual capacity and needs of the person.
- Maintenance of productive activity and/or exercise should be facilitated.
- There is some evidence that assistive devices may:
  - support community living,
  - reduce functional decline,
  - reduce care costs and
  - reduce pain intensity relative to older people not provided with devices.

Complementary therapies

There is evidence of some types of complementary therapy use among older adults for the management of painful conditions. However, many of the studies are related to specific therapies or specific pain types.

The House of Lords select committee [262] has organised complementary therapies into four main categories, as follows:

The first group embraces what may be called the principal disciplines, two of which are already regulated in their professional activity and education by Acts of Parliament (osteopathy and chiropractic). The others are acupuncture,

herbal medicine and homeopathy. These therapies claim to have a diagnostic approach.

The second group contains therapies which are most often used to complement conventional medicine and do not purport to embrace diagnostic skills. It includes aromatherapy; the Alexander Technique; body work therapies, including massage; counselling; stress therapy; hypnotherapy; reflexology and probably shiatsu; meditation and healing.

The third group purport to offer diagnostic information as well as treatment, in general favour a philosophical approach and are indifferent to the scientific principles of conventional medicine, and through which various and disparate frameworks of disease causation and its management are proposed. These therapies can be split into two subgroups:

Group 3a includes long-established and traditional systems of healthcare such as Ayurvedic medicine and Traditional Chinese medicine.

Group 3b covers other alternative disciplines which lack any credible evidence base, such as crystal therapy, iridology, radionics, dowsing and kinesiology.

Therapies reviewed for these guidelines tend to fall into the first group as they are the approaches with the most evidence underpinning their use, as highlighted by the House of Lords report mentioned above.

Acupuncture

There are a number of RCTs which suggest the positive benefits associated with the use of acupuncture [263–269]. However, there appear to be methodological weaknesses within many of these studies. Acupuncture does seem to provide improvement in function and pain relief as an adjuvant therapy for osteoarthritis of the knee, when compared with credible sham acupuncture and education control groups [270, 271], but the duration of effect is short term [272] and uncertain beyond 26 weeks. When compared with TENS, acupuncture shows a small but significant improvement in pain above that of TENS which lasted beyond the treatment period [273].

Pain intensity and quality of life appears to improve greater with deep needling to trigger points than standard acupuncture or superficial needling in older patients with chronic low back pain [274]. However, while the results are not statistically significant, they suggest that deep needling is a safe procedure to be used with older adults [275].

Combining acupuncture with other modalities, such as TENS, does seem to also have an effect [236, 276, 277]. Therefore, combining acupuncture and TENS does provide a reduction in pain intensity along with an improvement in quality of life, over and above the improvement in pain and function normally seen with TENS and acupuncture applied singularly [278].

TENS/PENS (transcutaneous/percutaneous electrical nerve stimulation)

There has been some suggestion that age-related changes can limit the use of TENS among the older population [279]. Furthermore, the AGS [236] recommend that the use of TENS alone, or in combination with other pharmacological strategies, can be an effective approach. Age does not have a significant impact on pain or TENS comfort. Conventional and burst TENS do not differ in their ability to decrease pain [278]. PENS combines systematically placed acupuncture needles with the delivery of an electrical current. Combined with physiotherapy, PENS can reduce pain intensity and self-reported disability in community-dwelling older adults with low back pain. This is maintained at 3-month follow-up, after 6 weeks of intervention (twice weekly) [278].

Massage

Massage therapy has a long history of demonstrating positive effects on musculoskeletal pain [279–281] and chronic pain in general [282]. It is proposed that massage can increase serotonin and dopamine levels, and enhance the local blood flow while ‘closing the pain gate’. Ten minutes of slow stroke back massage has been shown to reduce shoulder pain and anxiety in older adults with a stroke, and this effect continues for 3 days after the massage. Older adults found this helped them to relax and sleep better. An alternative form of massage known as ‘Tender Touch’ (gentle massage) does improve pain and anxiety among older adults with chronic pain living in a long-term care facility. Furthermore, this approach is said to improve communication among staff and residents [282].

The addition of aromatherapy does have limited evidence, although it has been proposed that use of ginger oil does relieve pain and stiffness among older adults with knee pain. This improvement was maintained for 1 week following treatment, but the improved pain and enhanced physical function was not maintained at 4 weeks following six massage sessions over a period of 3 weeks [283].

Reflexology

Foot reflexology is a form of foot massage which is designed to ‘harmonise’ bodily functions, producing a healing and relaxing effect [284]. The principles behind reflexology suggest that areas of the feet correspond to all of the glands, organs and parts of the body [285]. Reflexology is said to promote relaxation and relieve stress and tension [286].

Thirty minutes use of foot reflexology to both feet can reduce anxiety and descriptive words in the short-form MPQ [287].

There were no studies found supporting the use of homeopathy.

Summary statement

There is limited evidence to support the use of complementary therapies with older adults. What evidence does exist is generally weak and based upon small-scale studies without proper use of controls or randomisation procedures.

Guidelines

The intention of this section is not to compare the guidelines. It is aimed to be more of a summary of available evidence that has been graded by other authors.

The AGS provided the first clinical practice guideline on the management of chronic pain in older people in 1998, [288] later updated in 2002 [236]. The two versions concentrated on the assessment of pain and pharmacological management. Many of the surgical interventions were not explored in this document, although non-pharmacological strategies, including physical and behavioural therapies, were discussed. More recently, in 2009, the AGS revised their earlier recommendation on pharmacological management of persistent pain to include advice on the use of newer pharmacologic approaches [95]. In their guideline, the panel highlighted the paucity of rigorous, well-controlled studies involving only older people; a problem that became only too obvious to us when searching the pain literature. Like the AGS, we also had little choice but to extrapolate, where appropriate, some of the evidence from studies on younger adults.

In 2010, the American Society of Anesthesiologists Task Force on Chronic Pain Management and the American Society of Regional Anesthesia and Pain Medicine released practice guidelines on the management of chronic pain excluding cancer, degenerative major joint disease, headache and other facial pain syndromes. The guideline graded the evidence and included interventional therapies as well as pharmacological management, physical therapy and psychological treatment. This guideline was not specifically designed for older people, although it may be argued that the recommendations could be on occasions, extrapolated to this population [289].

The American guidelines made recommendations for people with different degrees of problems. They recommended that health professionals should consider an initial period of appropriate professional-led rehabilitation, again focusing on improving strength, flexibility and stamina, for people who had severe physical problems. For people who were not yet capable of more strenuous exercise, they recommended routine consideration of moderate exercise over a period of 8–12 weeks, under the supervision of a professional with knowledge of the needs of older people. They recommended exercise classes for people who were considered otherwise healthy but unfit. Finally, maintenance of moderate levels of productive and/or leisure activity should be advised. We did not find any specific evidence that classified people over 65 years with chronic pain based on levels of disability to add to these recommendations.

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Appendices

Appendix 1: Specific search strategy for each section

Summary of review process for prevalence

In addition to the standard terms used to identify older adults outlined previously, the keywords 'prevalence' and 'pain' were included in the search strategy.

Four hundred and forty-four papers were produced by the literature search focusing on pain, prevalence and the elderly between 1997 and 2009.

On first read-through, 77 titles/abstracts appeared relevant to the focus of the search. The following criteria were then used when re-reviewing the abstracts initially identified. Exclusion criteria applied:

- non-English;
- did not include >60 s;
- focused on chronic condition rather than pain, e.g. osteoarthritis, angina;
- focused on pain associated with conditions, e.g. prevalence of those with cancer who had pain;
- focused on specific subgroups, e.g. pain clinic attendees, veterans.

Of the 77 abstracts initially identified as potentially useful:

- Non-English—7
- Duplicates—3
- Focus on chronic condition, e.g. osteoarthritis, TMD—17
- Not general population—4
- Focus not on prevalence/elderly—2
- Total excluded—33
- Total included—44 full-papers sought.

A further nine papers were added which did not appear in the literature search, but were known to the reviewer (Bergman, Blyth, Boardman, Elliott, Frankel, Jinks, Macfarlane, Pope and Sandler). Most of these additional papers did not appear in the literature review because they do not focus on an elderly population, but do provide age-specific prevalences for the >60s as part of a larger general population survey.

In addition, a further 11 papers were included which came from second references from the reviewed papers.

The final review, therefore, contains 64 papers.

Search: barriers, attitudes and education

Types of outcomes: impact of attitudes and beliefs on pain intensity, psychological distress, functional impairment and coping strategies; the impact of interventions designed to change attitudes and beliefs.
Search terms:

- Attitudes;
- Beliefs;
- elderly/frail elderly/old* people/aged/geriatric/senior*;
- health care professional.

This strategy returned few results specifically relating to older people and a large number of hits with age limits removed. As a result, the evidence reviewed has focused on key papers that incorporate older people in the sample under investigation. In addition, reference lists of studies selected as relevant were scanned to identify further papers.

Search: communication

A total of 406 articles were identified by a search of relevant databases. However, many of these did not relate to communication and were, therefore, not included in the review. A total number of five papers specifically related to communication met the inclusion criteria. The same author had published three of these papers. There is thus a dearth of information on this important, yet hitherto neglected, area.

The articles reviewed highlighted issues regarding conveying and communicating pain information in various settings.

Studies were mainly non-randomised studies and a cross-sectional survey.

Communication + Older person/Geriatric/Elderly/Senior Citizen + Pain
Number of articles = 406
Exclude: cancer = 369
Psychometric = 350
Sleep = 327
Review = 226
Depression = 162
Non-English = 136
Not specifically communication = 4
Added papers: 1 from reference list
Final review: 5

Search: pharmacology

Few studies investigating the effects of analgaesic drugs have been performed specifically in older people (age <65 years).

Inclusion criteria

The following keywords were used in the title or abstract fields:

- Non-steroidal anti-inflammatory drugs or NSAID*, opioid*, antidepressant*, anti-depressant*, anti-epileptic*, local anaesthetic* or local anaesthetic*
- Paracetamol, nefopam, gabapentin, pregabalin, carbamazepine, lidocaine

The literature search undertaken identified 192 papers published between 1999 and 2009. The titles and abstracts of papers identified were read independently by two people (R.K. and N.A.) and then discussed to identify papers that were excluded.

Exclusion criteria

	Number of papers
Not written in English	29
Animal study	1
Case report	5
Other indication and not pain related	20
Not UK practice or unavailable in the UK	4
Not focused on older people	44
Not relevant to treatment of pain	4
Non-pharmacological interventions	2
Prescribing practice	14
Peri-operative pain management or anaesthesia	37
Review but not focused on pharmacological interventions	12
Total	172

As the literature search was primarily undertaken according to age, some papers that may have been relevant to older people may not have been identified if categorised according to the condition being treated, due to limitations in indexing. Many of the included papers were reviews or expert opinion; however, the majority of these still extrapolated data from a younger population and did not cite studies undertaken in older people.

Reviews or consensus statements were included when specifically relating to older people, however many of the conclusions or references cited in these papers did not specifically relate to older people and were extrapolated from research including younger patient cohorts.

A further three papers were identified by personal knowledge of the reviewers.

Search: psychiatry/psychology

(psychiat* or psycholog*).sh,ab,ti. (325,733)
2 (elderly or geriatric* or 'senior citizen*' or 'older').sh,ab,ti. (79,795)
3 pain.sh,ab,ti. (33,628)
4 1 and 3 and 2 (391)
5 limit 4 to yr='1997—Current' (308)
6 from 5 keep 1–10 (10)
7 from 5 keep 1–308 (308)
Search strategy:
Searched CINAHL (medline records excluded)
Psychiat* or psycholog*
Searched Psycinfo

Five hundred and fifty-three papers were initially identified for this section. However, 545 were rejected as not being appropriate and eight papers were included in the final review.

Search: physiotherapy/ occupational therapy

Types of outcomes: increased, maintained or improved function in self-care or activities of daily living (including work and leisure) or reduction in pain intensity.
Search terms:

- assistive devices/assistive technology/equipment/aid*/adaptation
- pain/chronic pain
- elderly/frail elderly/old* people/aged/geriatric/senior*

This strategy returned between 3 and 24 'hits'. In addition, reference lists of studies selected as relevant were scanned to identify further papers.

Search: assistive devices

Types of outcomes: increased, maintained or improved function in self-care or activities of daily living (including work and leisure) or reduction in pain intensity.

Search strategy

Searches conducted using MEDLINE, CINAHL, Cochrane, OT Seeker until December 2009 using the search terms:

- assistive devices/assistive technology/equipment/aid*/adaptation
- pain/chronic pain
- elderly/frail elderly/old* people/aged/geriatric/senior*

This strategy returned between 3 and 24 'hits'. In addition, reference lists of studies selected as relevant were scanned to identify further papers.

Abstracts

Each section author reviewed the abstracts and selected papers according to their selection criteria. Papers were read and then graded, and read and graded by a second author to agree the scores. Hand searching was carried out by the authors by searching reference lists of all of the papers.

Peer/consensus review

After development of the first full draft, a consensus panel was identified by the team who were considered to be representative of the stakeholders and experts in the field. The consensus panel consists of the following members:

Professor Peter Passmore—Professor of Geriatric Medicine
Dr Beverley Collett, Consultant in Pain Management, Leicester
Professor Peter Crome, Professor of Geriatric Medicine
Ms Kristine Pedersen-Clinical Standards Advisor CEEU UNIT RCP (London)
Dr Amanda Williams, Reader in Clinical Health Psychology
Dr Lucy Gagliese, Clinical Psychologist
Dr David Lussier, Assistant Professor
Dr Gisele Pickering, MD Clinical Pharmacology
Professor Lynn Turner-Stokes, Chair of Academic Rehabilitation
Ms Jo Cummings, Patient Liaison, British Pain Society

Appendix 2: Level of evidence

(from Harbour and Miller [1])

1++	High-quality meta-analyses, systematic reviews of RCTs or RCTs with a very low risk of bias
1+	Well-conducted meta-analyses, systematic reviews of RCTs or RCTs with a low risk of bias
1	Meta-analyses, systematic reviews or RCTs or RCTs with a high risk of bias
2++	High-quality systematic reviews of case–control or cohort studies or High-quality case–control or cohort studies with a very low risk of confounding, bias or chance and a high probability that the relationship is causal
2+	Well-conducted case–control or cohort studies with a low risk of confounding, bias or chance and a moderate probability that the relationship is causal
2	Case–control or cohort studies with a high risk of confounding, bias, or chance and a significant risk that the relationship is not causal
3	Non-analytic studies, e.g. case reports, case series
4	Expert opinion

Appendix 3: Matrices

Abbreviations used in Appendix 3:

qnr	questionnaire
NH	nursing home
COM	community
MED PRACT	medical practice
CMS	chronic musculoskeletal pain
CMS	chronic widespread pain
CRS	chronic regional pain
MS	musculoskeletal
CBP	chronic back pain
sig	Special interest group
LBP	lower back pain
FIM	Functional Independence Measure
PHN	post-herpetic neuralgia
OA	osteoarthritis

Prevalence

Ref. no	First author	Year	Country	Study design	Methods	Population studied	Sample/response	Age group	Type of pain	Prevalence	Grade
[5]	Asghari	2006	Iran	Cross-sectional	Face-to-face interview using qnr	NH All residents of two private nursing homes	114/124 (92%)	Mean 69 Range 56–90	Current pain, pain by site and chronic persistent pain	Current pain: 72.8 Legs/hips: 43, Abdomen: 9, Chest: 7, Head/neck: 6, Arms/shoulder: 5, Back: 4 Severe pain: 29.0 Chronic persistent pain: 66.7	2+
[3]	Bergh	2003	Sweden	Cross-sectional	Postal qnr, nurse administered qnr and neuropsych examination	COM Random sample of 70 year olds from community in Gothenburg	508/778 (65%) for full study 241 randomly drawn for pain study	70 year olds	Current pain, pain in last 14 days, pain by site, chronic pain	Current pain: M-20, F-42 In last 14 days: M-53, F-79 Head: M-9.1, F-18 Face: M-0, F-0.9 Teeth: M-0.8, F-2.6: Neck: M-4.1, F-10 Shoulders: M-6.6, F-20 sig Arms: M-2.5, F-11 sig Hands: M-2.5, F-16 sig Upper back: M-2.5, F-13 sig Lower back: M-17, F-25: M-2.5, F-5.2 Abdomen: M-8.3, F-11 Legs: M-15, F-16 Knees: M-5.8, F-23 sig Feet: M-6.6, F-11 Chronic pain: M-38, F- 68	2+
[18]	Bergman	2001	Sweden	Cross-sectional	Postal qnr	COM Representative random sample of general adult population of 2 municipalities of Sweden	2,425/3,928 (61.7%)	20–74 (age-specific rates for 60+)	CMS, CWP and CRP. Chronic defined as pain for >3 of last 12 months	For 60–64 year olds—CMS: M-46, F-51; CWP: M-19.5, F-25.0; CRP: M-27.6, F-27.8 For 65–69 year olds – CMS: M-37, F-53; CWP: M-12.5, F-22.0; CRP: M-25.0, F-31.0 For 70–74 year olds—CMS: M-34, F-48; CWP: M-10.4, F-21.8; CRP: M-27.1, F-23.8 CMS increased with age up to 55–64 for M and 65–69 for F then declined. CWP increased with age up to 60–64 for M and F then declined. CRP less clear association with age.	2++
[11]	Blay	2007	Brazil	Cross-sectional	Face-to face survey/ interview assessed	COM Representative probability sample of non-institutional population of Brazilian state	6,963/7,000 (99%)	60 years or older	5 chronic pain sites: joint, back, chest, gastrointestinal(all in last 6 months), headaches in last month,	Prevalence of any chronic pain was 76.2 (74.2–78.2) Joint: 43.1, Back: 43.0 Headaches: 32.3, Chest: 28.1 GI: 18.3. Joint pain was most prevalent among F (49.5%) and back pain was most prevalent among M (34.7%)	2++

[12]	Blyth	2001	Australia	Cross-sectional	Telephone interviews	COM Random sample of 17,000 residents of New South Wales	17,543 (70.8%)	16+ Mean 43 (age-specific rates for older ages given)	Chronic pain (pain experienced every day for 3 months in the 6 months prior to interview).	20.0% of females and 17.1% of males had chronic pain. 60–64: M-23, F-28 65–69: M-27, F-29 70–74: M-21, F-27 75–79: M-22, F-26 80–84: M-19, F-31 For males, it was generally highest in 55–69 years. For females, it was consistently higher after the age of 50.	2++
[19]	Boardman	2003	England	Cross-sectional	Postal self-completion qnr	COM Adults randomly selected from 5 representative practices	2,662/4,757 (56%)	Median 52, Range 18–98 (specific data for >65s reported)	Head pain (3 months and lifetime)	3 month prevalence for >65s: M: 40.6, F: 49.7 Lifetime prevalence for >65s: M: 77.6, F: 83.3% Headaches decreased with age	2++
[6]	Boerlage	2008	Holland	Cross-sectional	Face-to-face interviews by nurse using standard qnr	NH All residents in three public nursing homes in Rotterdam not cognitively impaired	157/202 (77.7%)	Median 88 IQR 83–92	Current pain or pain in last week, pain by site, chronic pain, episodic/ persistent pain	Current pain: 69.4. Most common sites—legs: 32, lower back: 27, shoulders and arms: 13. Chronic pain: 93%, unstable continuous pain: 54, episodic pain: 27, stable continuous pain: 16	2+
[20]	Bressler	1999	Various	Systematic review	5 databases (Medline, Embase, Cinahl, Age-line, Mantis	MIXED Adults 65 and over with back pain of any type and duration, localised to the lumbar spine	Of 534 titles, 152 reviewed and 12 included in review	65+	Back pain (various timelines)	10 cross-sectional/ 2 cohorts Community studies: 12.8 to 49% (9 studies) Medical practice setting: 23.6 to 51% (2 studies) Nursing home: 40% (1 study) General trend of decreasing prevalence with age. Women higher prevalence than men, even among very old (>80)	2++
[21]	Brochet	1998	France	Cross-sectional	Face-to face interview by psychologist using closed qnr	COM Random sample from electoral register of elderly. Third year follow-up of subgroup. Sample was representative of area	741	65+ Mean 74.2	Pain in last year (pain anywhere during the previous year) Persistent pain (daily pain for >6 months)	71.5% had pain in last year M: 66.8, F: 74.7. Main sites: limb joints—44.5%, back—29.6%, non-joint leg—17.3% 32.9% had persistent pain M: 23.7, F: 40.1. Main sites: limb joints—19.4%, back—12.0%, non-joint leg—10.4%. 65–74: M-19.7, F-33.3 75–84: M-25.4, F-42.8 85+: M-34.5, F-48.4	2+
[22]	Carmaciu	2007	England	Secondary analysis of baseline data from RCT	Postal self-completion qnr	COM 3 large practices selected for interest in care for elderly. All adults living at home, non-disabled and without cognitive impairment	2,620/4,075 (64%) gave consent for trial. Of 1,240 due to get qnr, 88% responded	65+	Pain in the last 4 weeks, pain every day, pain several times a week, pain that never goes away	39.9% had pain in past 4 weeks. Prevalence significantly associated with female sex and advancing age up to 84 years >85 years reported far less pain Of those with pain 53.2% had it every day, 73.6% had it several times a week and 40.4% had pain that 'never goes away'	2-

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Ref. no	First author	Year	Country	Study design	Methods	Population studied	Sample/response	Age group	Type of pain	Prevalence	Grade
[23]	Cavlak	2008	Turkey	Cross-sectional	Face-to-face interview	MIXED Elderly in retirement home (16%) or own residence (84%)	900	Mean 71, Range 65–94	MS (current pain)	All MS:72.1 (M:61.8, F:85.5) Neck: 17.0 Upper extremities: 24.9 Low back: 27.6 Lower extremities: 51.1 Severe: 61.7 (M:53.5, F:69.5)	2-
[46]	Chaplin	2000	England	Cross-sectional	Semi-structured clinical face-to-face interview	COM Random sample of elderly from community drawn from one large practice sent qnr and invited for follow-up	596/842 (71%) agreed to interview	65+	Abdominal pain (in past year)	Abdominal pain in past year: 25.2 (21.8–28.9) Abdominal pain 6+ times in past year: 19.5 (16.5–22.6) No significant differences with age or sex. Of those with frequent pain, 24% rated it as severe or worse. Most abdominal pain was chronic, with only 16% developing frequent pain in the past year	2+
[290]	Chen	2003	Australia	Cross-sectional	Qnr and physical exam	COM Population-based random sample of whole population of women 70+, derived from electoral roll	1,486/24,800 (6.2%)	70+ Mean 75.1 46% aged 70–74, 46% aged 75–79, 8% aged 80+	Lower extremity pain (hip, knee and foot). Based on current pain	The prevalence of any pain at the hip, knee, and foot was 39, 52 and 34%, respectively. 72% had pain at one or more sites. 14% experienced pain at all sites and 28% had no pain at any of the sites	2+
[24]	Christmas	2002	USA	Cross-sectional	Face-to-face interviews in participants homes and clinical exam	COM Part of NHANES III study. Nationally representative sample of civilian non-institutional US population	6,596 elderly adults included	60+	Significant hip pain on most days over the preceding 6 weeks	14.3% (13.1–15.5) reported hip pain. Less common in men than women (11.9% versus 16.2%). Similar prevalence in men aged 60–70, 70–80 and older than 80. Similar prevalence in women aged 70–80 and 80+, but women aged 60–70 reported less hip pain	2++
[291]	Chung	2004	Korea	Cross-sectional	Qnr data collected via telephone interview	COM Selected randomly from the cohort of the Korean Oral Health Study. Sample stratified for age and sex	1,032 elders	Median 66.2 Range 55–85	Five orofacial pain symptoms during the last 6 months for 3 age groups: 55–64, 65–74, 75+	42% reported 1 or more of the 5 orofacial symptoms. Joint pain: 13.2, 17.7, 17.9 Face pain: 8.9, 10.3, 8.3 Toothache: 29.3, 26.9, 18.6 Oral sores: 25.8, 27.7, 23.7 Burning mouth:13.6,15.2,14.1 Only toothache significant differences by age	2+
[25]	Clausen	2005	Botswana	Cross-sectional	Face-to-face interview and clinical exam	COM Cluster sample nationally representative for main study. 50% random subsample used for paper	393/543 (72%)	60–109 Mean 73.2	MS pain	83% had MS pain in at least one location. 60–69: M-69, F-83 70–79: M-79, F-91 80+: M-85, F-100 The four most common sites were shoulders, neck, lower back and knees	2+

[292]	Cox	2000	Various	Review article	Basic review (databases not listed)	MIXED Orofacial pain in elderly adults (no specific criteria given)	4 papers: Lipton last 6 m, Riley last 12 m, Lester/Locker last 4 w	Lipton 55–74 and 75 +, Riley 65+ Lester 60+ Locker 50+	Five orofacial pain symptoms for Lipton and Riley, one measure of oral pain for Lester and Locker	Joint pain: 4.0 (55–74), 3.9 (75+), 7.7 (65+), Face pain: 1.0 (55–74), 1.6 (75 +), 6.9 (65+), Toothache: 6.8 (55–74), 3.4 (75+), 12.0 (65+), Oral sores: 6.8 (55–74), 6.2 (75+), 6.4 (65+), Burning mouth: 0.8 (55–74), 1.2 (75+), 1.7 (65+) Oral pain: 22.0 (60+)	2-
[26]	Dahaghin	2005	Holland	Prospective cohort study	Face-to-face interviews	COM Population-based sample of all inhabitants of a single are aged 55 and over	Full sample 7,983 (78%)	55+ Mean 70.6	Hand pain in the last month	16.9 (M: 9.7, F: 21.6) Prevalence not significantly higher in people aged 70+ compared with 55–69. The prevalence of hand disability was 13.6 (M: 7.2 F: 17.8). This was increased in people aged 70+ compared with those 55–69 (OR=6.4; 5.4–7.6)	2+
[27]	Dawson	2004	England	Cross-sectional	Postal self-completion qnr	COM Random sample of community-dwelling elderly residents	3,341/5,039 (66.3%)	65+	Hip and knee pain (during the past 12 months pain in the hips/knees on most days for one month or longer)	Hip pain 65–74: M—14.7, F – 23.1 75–84: M—18.0, F—20.7 85+: M—18.8, F – 21.0 Knee pain: 65–74: M—26.1, F –36.2 75–84: M—31.0, F—37.4 85+: M—32.3, F – 35.5	2++
[52]	Dionne	2006	Various	Systematic review	Four databases (Web of Science, Medline, Embase, Cinahl)	MIXED Papers on the prevalence of back pain, back ache or neck pain in elderly adults	Of 299 titles, 51 included in review	Had to include age of 65 or above	Back pain (various timelines)	Increase in back pain prevalence with age (five papers) Decrease in back pain prevalence with age (seven papers) Curvilinear relationship—an increase until about 55 years and then a decrease (nine papers) No change in prevalence of back pain with age (13 papers) Mild back pain prevalence increased with age up to a peak in the sixth decade and then declined, but severe back pain continues to increase with age	2++
[28]	Donald	2004	England	Cohort	Postal qnr at baseline and 1-year follow-up	MED PRACT Subjects recruited as part of RCT and had accepted offer of health screening. Practices chosen based on over 75 screening expertise	4,804 (77%)	Over 75s Mean: 80.7	Joint pain (current pain)	Any joint pain: 83% Constant pain: 26%(higher in F & >85s) Pain increased with age Episodic joint pain 75–79: M-24.1 , F-26.7 80–84: M-23.9 , F-27.6 85–89: M-19.6 , F-27.7 >89: M-36.6 , F-32.5 Constant joint pain 75–79: M-19.2 , F-26.5 80–84: M-21.7 , F-31.5 85–89: M-24.5 , F-36.8 >89: M-25.3 , F-28.0	2-

Continued

Continued

Ref. no	First author	Year	Country	Study design	Methods	Population studied	Sample/response	Age group	Type of pain	Prevalence	Grade
[7]	Dos Reis	2008	Brazil	Cross-sectional	Face-to-face interviews and qnr	NH All institutionalised elderly patients in one Brazilian care unit. No serious cognitive impairments	60	60–104 Mean 77.6	Any pain (timeline not clear)	73.3% reported pain. 65.7% of those 60–80 and 84% of those 80+. The prevalence was higher among men (38.3) than women (35%). The most common location was back pain (31%), followed by lower limbs (28.2%) and upper limbs (14.1%). 61.4% reported their pain as severe	2+
[29]	Edmond	2000	USA	Cross-sectional	Interview and exam	COM Secondary analysis of data from the 22nd exam of the Framingham heart study (a population-based cohort study of heart disease)	1,037/1,710 (61%) had data on back pain	68–100 Mean 78	Back pain (pain, aching or stiffness in their back excluding their neck on most days current and in last year)	Current pain: 22.3% 68–80: M-17.6, F-25.1 81–100: M-13.4, F-26.6 Pain in last year: 48.6% 68–80: M-42.9, F-53.4 81–100: M-38.1, F-51.5 F higher rates than M, but no significant difference by age Low back pain more prevalent than mid or upper in all sex/age groups Review of 10 other papers on back pain in elderly reported. Prevalence ranged from 16–56 for women and 7–51 for men	2+
[13]	Elliott	1999	Scotland	Cross-sectional	Postal self-completion qnr	COM Random sample of patients from 29 practice lists in Grampian region	3,605/4,379 (82.3%)	Six stratified age groups 25–34 35–44 45–54 55–64 65–74 75+	Chronic pain (pain or discomfort in any location lasting for 3 months or longer)	50·4% had chronic pain. After standardisation equivalent to 46·5% of general population. No significant differences between men and women (48·9 versus 51·8%) Proportion significantly increased with age: 31.7% (25–34) to 62.0% (75+). 55–64: M-53.9, F-60.2 65–74: M-56.6, F-57.9 75+: M-59.9, F-64.3	2++
[293]	Fox	1999	Canada	Systematic review	Medline, Health, Cinahl, Ageline, Cochrane and secondary refs. All methods and languages included	NH All papers providing data on prevalence of pain in residents of a nursing home or other long-term care institution	Of 91 titles, 14 included in review (only 6 provided direct measures of pain)	No age details given, although intro focuses on over 65s	Pain in nine studies. Chronic pain in five studies	The prevalence of pain as determined by direct measure (self-report or chart review—six studies) ranged from 49 to 83%. The 49% study asked only about arthritic pain	2++
[30]	Franceschi	1997	Italy	Cohort	Qnr, interview and physical exam	COM Random sample stratified for age and gender	312	65–84 Mean 73	Head pain in the previous year	6% reported headaches in the previous year (3.6% of men and 0.8% of women)	2+
[31]	Frankel	1999	USA	Cross-sectional	Postal self-completion qnr	COM Stratified random sample from 40 practices	22,978 (88.2%) for full sample. 6,818: 65 +	35+ Specific data for: 65–74 = 4,052 75–84 = 2,274 85 += 492	Hip pain (In past 12 months pain in hips on most days for 1 month or more)	65–74: 17.8, M-13.2, F-21.4 75–84: 19.0, M-13.8, F-30.8 85+: 19.3, M-14.0, F-21.1	2++

[32]	Grimby	1999	Sweden	Cohort	Face-to-face interview, qnr and brief health examination	MIXED Population based sample of all adults born before 1,912 living in one area—including home and institution residents	1,810/2,368 (76%)	75+	MS pain (including back pain, joint pain, pain in shoulders and extremities) (timeline not clear)	62% had MS pain. Most common in shoulders/extremities: 41.3, back: 35.3, joint: 30.4. Pain prevalence was higher in F than M in all locations. Women 90 + reported pain less often than younger women. The prevalence of joint pain decreased with age All MS pain: 75–79: M-46.0 , F-66.8 80–84: M-48.3, F-69.8 85–89: M-42.9, F-67.1 90+: M-37.5, F-58.6 All ages: M-45.9, F-67.2	2++
[50]	Helme	2001	Various	Review (not systematic)	No details on specific databases or keywords used. No inclusion or exclusion criteria reported	MIXED Reviewed papers of community and nursing homes	11 papers detailed	55–64 65–74 75–84 85+	Pain (various definitions, sites, durations)	Prevalence ranged from 20–88%. Pain peaks or plateaus by age 65 and declines in the old (75+). Joint pain doubles in over 65s, but declines in over 75s. Foot and leg pain increase into ninth decade. Head pain decreases after a peak at 45–50. Abdominal, facial and visceral pain decrease with age. Chest pain peaks during late middle age then declines. Back pain peaks in late middle age then declines	2-
[33]	Jacobs	2006	Jerusalem	Cohort	Face-to-face interview, qnr and brief health exam	COM Age homogenous community-dwelling elderly cohort of West Jerusalem residents born in 1920–21 identified through election register.	461 in phase 1 309 (67%) of phase 1 in phase 2	70 at phase1 77 at phase2	CBP (based on reporting back pain on a frequent basis)	The prevalence of CBP significantly increased from 44% at 70 to 58% at 77 For males: 34–43% For females: 55–63% Females had significantly higher CBP at both time points. Pain slightly decreased in frequency with age with daily/weekly pain in 68% of 70s versus 61% of 77s (NS). Pain slightly decreased in severity with age with moderate/severe pain in 87% of 70s versus 82% of 77s (NS). Low back pain was most common site, present in 69% of 70s versus 91% of 77s	2+
[48]	Jacobbson	2003	Sweden	Cross-sectional	Postal self-completion qnr	MIXED Random stratified sample of community dwelling, serviced homes and nursing homes	4,278/8,500 (50.3%)	75–105 Mean 83.7	Chronic pain Pain (MS pain or other pain) for the last 3 months	40.4% had pain. 29.4% had MS pain, 22.4% had other/unspecified pain and 34% reported both. 75–79: 34.1% 80–84: 34.5% 85–89: 41.5% 90+: 50.1%	2+
[34]	Jinks	2002	England	Cross-sectional	Postal self-completion qnr	COM Population-based sample of all adults aged over 50 years registered with three general practices	6,792/8,995 (77%)	Mean 65.4 Range 50–100	Knee pain (12 month period prevalence)	1-year period prevalence of 47% (M: 44%, F: 49%). There were clear significant trends of rising severity with increasing age	2-

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Ref. no	First author	Year	Country	Study design	Methods	Population studied	Sample/response	Age group	Type of pain	Prevalence	Grade
[47]	Landi	2005	Italy	Cross-sectional	Face-to-face interviews by multi-disciplinary team	COM WITH HOME CARE Population-based database on frail elderly patients living in the community, but receiving home care programmes	5,372	Mean 78.5	Daily pain and Pain less than daily (pain in any part of the body in the preceding 7 days)	Daily pain: 40% (M:38, F:42) Pain less than daily: 15% (M:15, F: 14)	2-
[294]	Leong	2007	Singapore	Cross-sectional	Face-to-face interviews	NH All residents 65 years or over in three nursing homes in Singapore of variable cognitive status	305/382	65+	Any pain, acute pain and chronic pain	The prevalence of any pain was 40% and did not differ between those with normal cognition (48.7%), mildly impaired cognition (46.5%) or severely impaired cognition (42.9%). However, the impaired groups reported more acute pain (M-14.1, S-7.9) than those with normal cognition (2.5%) but less chronic pain (M-32.3, S-34.9 versus 46.2). Those with impaired cognition reported constant pain more often, fewer total sites of pain, and had more frequent and more severe pain. Those with chronic pain were significantly older than those with no pain	2+
[35]	Leveille	2005	USA	Cross-sectional	Interview and exam	COM Secondary analysis of data from the 22nd exam of the Framingham heart study (a population-based cohort study of heart disease)	1,166 left in study from original 5,209, 104 had no pain data so $n = 1,062$	72–99	MS joint pain (pain, aching or stiffness in any joints on most days)	There was a higher age-adjusted prevalence of MS pain in women (63.5%) compared with men (51.6%). There was a marked difference in the proportions with widespread pain (M: 5.0%, F: 15.2%). There were similar proportions reported regional pain (M:29.3%, F:28.6%) and multi-site pain that did not meet criteria for widespread Pain (M: 17.1%, F: 19.9%)	2+
[4]	Lichtenstein	1998	USA	Cross-sectional	Face-to-face interview with validated qnrs	COM Americans form the community-based San Antonio Longitudinal Study of Aging	833	65–79	Pain in the last week.	46% reported pain in the last week. Women more likely to report pain than men (50 versus 40.5%). Most common sites of pain were knees (23.9), lower back (20.9), shoulders (17–19), upper back (18.2) and right leg (16.6). 32.7% reported pain rarely/some of the time, 34.3% a moderate amount of time, 33.0% most of the time	2-
[295]	Linsell	2005	England	Cross-sectional	Postal qnr	COM A random sample of community residents in Oxfordshire	3,341/5,039 (66.3%)	65+	Hip and knee pain (during past 12 months pain in hips on most days for 1 month or longer).	8.3% reported hip pain only 65–74 (63.7%), 75–84 (29.7%), 85+ (6.6%)—decrease with age 21.8% reported knee pain only 65–74 (55.7%), 75–84 (36.6%), 85+ (7.7%)—decrease with age 11.3% reported both hip and knee pain	2+

[53]	Macfarlane	2008	Europe	Cross-sectional	Postal qnr	COM Population based prospective study of 8 European countries. Analysis of baseline qnr	3,963/8,416 (48.7%)	40–79	CWP (pain in the past month which has lasted for one day or more and has been present >3 months)	The overall prevalence of CWP was 8.3%, 95% CI 7.5–9.3%). Prevalence was broadly similar across the four decades of study increasing slightly from 40 to 49 years (7.4%) to 50–59 years (9.6%) and then decreasing at 60–69 years (8.5%) and 70 years and over (7.8%)	2+
[36]	Makela	1999	Finland	Cross-sectional	Qnrs, interviews and clinical tests	COM Two stage cluster sample of population representative of Finland	7,217/8,000 (90%)	30+	Shoulder pain (self-reported during previous month)	There was a steady increase with age in the prevalence of shoulder pain from age 30–34 (M: 13%, F: 18%) up to age 60–64, after which shoulder pain decreased with age. 60–64 (M: 44%, F: 45%) 65–69 (M: 37%, F: 37%) 70–74 (M: 31%, F: 42%) 75–79 (M: 25%, F: 32%) 80+ (M: 25%, F: 36%)	2++
[49]	Mantyselka	2004	Finland	Cross-sectional	Structured face-to-face interview and clinical exam	COM Population-based random sample of home-dwelling elderly, 75 with dementia and 446 without	601/700 (86%)	75+ Mean age for non-demented 79 Mean for demented 84 (ND and D)	Any pain in the last month and any daily pain in the last month	Any pain: All—65.1% (ND: 68.8%, D: 42.7%) Daily pain: All—37.6% (ND: 40.1%, D: 22.7%) or 40% and 21% for D when restricted to self-report only Pain significantly lower for those with dementia. Prevalence of daily pain increased with age in both D and ND	2+
[14]	McCarthy	2009	USA	Cross-sectional	Telephone interview administered qnr	COM Data from the Einstein Aging Study a representative community sample from electoral roll	840	70–101 Average 80	Any pain and chronic pain	74.6% reported any pain. More women than men reported any pain (79.1 versus 70.3). The prevalence of chronic pain was 52.0% (58.9% in women and 39.7% in men). Common pain locations were legs/feet: 44.8%, back: 39.8% and neck/shoulders: 31.2%. Prevalence of chronic pain did not vary significantly by age	2+
[8]	McClean	2002	Australia	Cross-sectional	Face-to-face interviews and medical record review	NH Residents of 15 nursing homes in New South Wales. Non-communicative excluded	917/932 (98.4%) Only 544 residents gave pain info	M-81.0 F-84.5	Present pain (any ache, pain or discomfort at the moment)	27.8% were in current pain (M-21% versus F-31%). Main sites of pain were limbs (24%), joints (20%), back (18%), abdomen (12%), head (11%). 25% reported mild pain, 34% moderate and 41% severe	2+
[286]	Meyer	2007	USA	Cohort	Postal survey	COM Random sample of community dwelling from Health Outcomes Survey. Proxy responses and institutionalised adults excluded	172,314 (62%) completed baseline qnr 91,347 in this analysis	65+	Low back pain (within last 2 weeks)	At baseline 47.5% had some kind of disabling back pain within the last 2 weeks. 9.8% reported disabling low back pain most or all of the time. Prevalence and degree of back pain did not differ between baseline and follow-up	2+

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Ref. no	First author	Year	Country	Study design	Methods	Population studied	Sample/response	Age group	Type of pain	Prevalence	Grade
[37]	Miro	2007	Spain	Cross-sectional	Face-to-face interview	MIXED Random representative sample of Catalonia. Those with dementia excluded	592/600 (94.9%)	65+ Mean 74.9	Any pain (in the past 3 months, pain that has lasted for 1 day or longer in any part of the body) Chronic pain (pain as above present for >3 months). Various site specific pains by age group	73.5% reported any pain (M-62.0%, F-83.3%). 65–74: 72.7 (M-63.6, F-81.4) 75–84: 73.4 (M-56.4, F-87.7) 85+: 78.2 (M-78.9, F-80.0) 66.0% had chronic pain. 65–74: 70.8 (M-61.1, F-80.0) 75–84: 71.9 (M-54.2, F-87.0) 85+: 72.1 (M-73.3, F-57.5) Joints (65.6, 63.8, 51.2) Upper limbs (33.0, 34.4, 32.6) Lower limbs (59.2, 62.6, 58.1) Lower back (61.0, 62.6, 44.2) Neck (52.6, 56.4, 53.5) Head (32.0, 35.0, 34.9) Abdomen (23.8, 20.2, 11.6) Hip (30.3, 31.5, 30.2) Foot (37.4, 44.1,55.8) Thoracic (15.0, 12.9, 11.6)	2++
[38]	Pope	2003	England	Cross-sectional	Postal self-completion qnr	COM Random population survey of adults from two practices in Cheshire	3,385/3,847 (88%) for full sample Only 936 aged 60+	18–85 Specific rates for 60+	Hip pain in the past month (hip pain, during the past month, lasting at least 24 hours)	One-month period prevalence for full sample was 10.5% 18–39: 5.3% 40–59: 10.4% 60+: 15.5% So hip pain prevalence increased with age	2+
[296]	Riley	1998	USA	Cross-sectional	Telephone interviews	COM Stratified random sample of community-dwelling older adults from Florida	1,636 (75.3%)	65–100 Mean 73	Orofacial pain symptoms during the past 12 months	Joint pain: 7.7% (F sig >) Face pain: 6.9% (F sig >) Toothache: 12.0% (M = F) Oral sores: 6.4% (M = F) Burning mouth: 1.7% (M = F)	2+
[55]	Ross	1998	Canada	Cross-sectional	Personal standardised face-to-face interviews	COM Community-dwelling cognitively functioning elders receiving home nursing services	66/81 (81%)	64–99 Mean 78	Pain in last 2 weeks (experienced any noteworthy pain within the previous 2 weeks)	75.7% were frequently troubled with pain or had experienced pain of a noteworthy nature within the past 2 weeks. The three most frequently reported sites were multiple joint pain (40%), knee (30%) and foot/ankle pain (18%)	2-
[15]	Sa	2008	Brazil	Cross-sectional	Face-to-face interviews using qnrs	COM Structured stratified sample in 34 research areas in Salvador	2,297 in whole sample, 197 >65	>20 for full sample Specific quotes for >65	Chronic pain (longer than 6 months)	41.4% of full study population 20–34: M-22.6%, F-39.8% 35–64: M-39.0%, F-51.6% >65: M-44.6%, F-63.4% Pain significantly increased with age in both sexes The lumbar region was most commonly affected (16.3%), followed by the knee (11.2%) and dorsal region (9.2%).	2+

[39]	Sandler	2000	USA	Cross-sectional	Telephone interview survey	COM Semi-random sample of adults across USA. Sampling methods not fully random	2,510/4,120 (60.9%) 441 aged 60+	18–75 Specific estimates for 60+	Lower abdominal pain in the last month (excluding menstrual pain)	Abdominal pain for 60+: M—7.1%, F—20.3% Abdominal pain was lowest in the 60+ age group. Men highest 18–39 (19.6%). Women highest 40–59 (26.0%)	2+
[297]	Sheffield	1998	Various	Systematic review	Medline reviewed using keywords migraine, headache and prevalence	MIXED Papers on the population-based 1 year prevalence estimates of migraine	15 papers included in review	All adult age groups included	Migraine (1-year period prevalence)	One-year prevalence ranged from 1to 25%. Migraine prevalence peaked 35–50 years in women and 25–35 in men. Women outnumbered men 3:1 in 35–54 age groups, and 2:1 in 60–64 age group.	2++
[51]	Smalbrugge	2007	Holland	Cohort	Face-to-face interviews at baseline and at 6 months	NH Subjects from 14 Dutch nursing homes. Lots of exclusions (e.g. cognitively impaired, language problems)	350/592 eligible (59%) at baseline 229 (65.4% of baseline at follow-up	55–99 Mean 79.3	Pain in the past 2 weeks	Pain prevalence was 68.0% at baseline: 40.5% (mild) and 27.5% (serious) pain. 23.1% reported constant pain and 13.4% unbearable pain. The >80's had less mild and less severe pain than <80s but the differences were not significant. 79% of those with pain at baseline still had it after 6 months	2+
[40]	Thomas	2004	England	Cross-sectional	Postal self-completion qnr	MIXED All adults 50+ registered with three general practices in one area	7,878/11,055 (71.3%) Mean 66.3 50–59:2,521 60–69: 2,352 70–79: 2,030 80+: 975	50+	Any pain in the past 4 weeks that has lasted one day or longer in any part of the body (data for various sites shown), and widespread pain	Any pain: 66.2%; 50–59: M-66.3, F-69.2; 60–69: M-68.4, F-69.0; 70–79: M-60.9, F-64.3 80+: M-57.4, F-65.6. Similar across age groups but higher in women. Some regional pains declined in prevalence in the elderly (abdomen, forearm, hand, head, low back, neck, shoulder) while others similar/increased (foot, hip, knee) Widespread pain: 12.5%; 50–59: M-9.5, F-16.3; 60–69: M-12.5, F-15.6; 70–79: M-8.3, F-11.7; 80+: M-6.6, F-14.0 Prevalence of widespread pain declined in the >70s, higher in women	2++
[9]	Tsai	2004	Taiwan	Cross-sectional	Face-to-face interviews	NH Stratified random sample of elderly adults without cognitive impairment in eight nursing homes	150/156 (96.2%)	65+	Current pain	65.3% pain prevalence. There was no significant difference in the mean ages of those with and without pain (80.7 versus 80.6). The average number of pain sites was 3.24. Knees (27.6%), lower back (24.5%), and hips (18.4%) were the most common pain sites	2+

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Ref. no	First author	Year	Country	Study design	Methods	Population studied	Sample/response	Age group	Type of pain	Prevalence	Grade
[41]	Tsang	2008	Various	Cross-sectional	Face-to-face interviews	COM 18 surveys in 17 countries across Americas, Europe, Middle East, Asia and New Zealand. All surveys were based on multi-stage, clustered area probability household samples	85,052 adults Average response rate of 71%	16–21+	Chronic pain in joint, neck, back or head	Prevalence of all chronic pain combined increased with age. Developed countries: 18–35: M-20.9, F-30.4 36–50: M-31.5, F-42.6 51–65: M-42.5, F-55.0 66+: M-47.2, F-63.1 Developing countries: 18–35: M-22.0, F-35.2 36–50: M-30.8, F-47.2 51–65: M-43.8, F-59.4 66+: M-59.8 , F-73.3 More females than males had chronic pain in all ages	2+
[42]	Urwin	1998	England	Cross-sectional	Postal self-completion qnr	COM An age and sex stratified random sample from three general practices	4,506/5,752 (78.5%) Approximately 2,500 from over 65s.	16+ eight age/sex groups including (a) 65–74 (b) 75+	MS pain (pain for >1 week in the past month in the back, neck, shoulder, elbow, hip, hand and knee)	Prev: 65–74 M, F; 75+ M, F Back: 20, 32; 17, 30 Neck: 17, 23; 18, 21 Shoulder: 16, 26; 20, 24 Elbow: 6, 6; 6, 9 Hip: 13, 20; 11, 20 Knee: 27, 32; 27, 35 Hand: 14, 21; 12, 20 In over 65s, knee pain most common. Women had more pain. Pain tended to increase with age up 65–74 and then plateau, except elbow and back pain in men, which peaked at 45–64. The gradient of pain increase with age was steeper for women. In women, the number of pain sites increased with age up to 65–74, while in men, they were similar after 45. 34% had pain in one site. 1% had pain in all eight sites	2++
[54]	Vogt	2003	USA	Cross-sectional	Face-to-face interview using standard qnr and clinical exam	COM Random sample of well-functioning Medicare beneficiaries from Health ABC study	3,075 (no response detailed)	70–79	Neck and shoulder pain (lasting at least 1 month during the previous year)	The prevalence of neck pain was 11.9%. 7.7% had moderate or severe neck pain. The prevalence of shoulder pain was 18.9%. 12.7% had moderate or severe shoulder pain. There were no differences in the median age between no, mild, moderate or severe neck or shoulder pain (73)	2+

[10]	Weiner	1999	USA	Cross-sectional	Face-to-face interview	NH Residents of two nursing homes (one veteran affairs [VANH] and one community [CNH]). Numerous groups excluded	137 patients included 93% of VANH, 52% of CNH recruited	VANH 35–99 Mean 74.4 CNH 63–99 Mean 86.5	Pain or discomfort, every day or almost every day. Chronic pain (above pain for > 3 months)	VANH: 58% had pain. Pain was chronic in 91%. Legs/ hips (33%), Back (20%-16 lower/4 upper), Abdomen (14%), Arm/shoulder (12%), Hands (8%), Head (8%), Multiple joints (2%). CNH: 45% had pain. Pain was chronic in 93%. Legs/hips (25%), Back (28.6%-14.3 lower/14.3 upper), Abdomen (25%), Arm/shoulder (21%), Hands (7%), Head (4%), Multiple joints (11%)	2-
[298]	Weiner	2003	USA	Cross-sectional	Face-to-face interview using standard qnrs and clinical exam	COM Random sample of well-functioning Medicare beneficiaries from Health ABC study	3,075 (no response detailed)	70–79 Mean 73.6	Low back pain (any back pain in the last 12 months)	The prevalence of back pain was 35.7%. 13.1% had mild pain, 22.6% had moderate/severe pain	2+
[43]	Westerbotn	2008	Sweden	Cross-sectional	Face-to-face interview using semi-structured qnrs	COM Fourth follow-up of a cohort of the oldest old living at home in a Stockholm community	333 All those remaining in the cohort who lived at home	84–101 Mean 88.6	Pain (no specific info on wording used)	Overall—46% reported pain 84–89: 46% and 90–100: 46% Prevalence significantly higher in women than men (49 versus 35%). Worst pain came from legs (24%), back (23%), arms (13%), neck (4%), head (3%) and abdomen (2%)	2-
[44]	Won	1999	USA	Cross-sectional	Face-to-face interview	NH Medicaid residents from nursing homes in four US states who had participated in previous study (severe cognitively impaired and cancer patients excluded)	49,971 included in analysis	65+	Daily non-malignant pain (any type of physical pain or discomfort in any part of the body occurring daily over the previous 7 days)	26.3% had daily non-malignant pain 65–74: 30.1% 75–84: 27.4% 85+: 23.6% Lower pain prevalence observed in older individuals Pain generally observed to be higher in women than in men	2-
[45]	Won	2004	USA	Cross-sectional	Face-to-face interview	NH Elderly residents admitted to Medicare nursing homes over a 3-year period from 10 states	21,380	65+	Persistent pain (presence of any pain recorded in at least two of three quarterly assessments over a 6-month period)	48.5% had persistent pain 65–74: 46.0% 75–84: 49.6% 85+: 48.6% Females had more pain than males (51.6 versus 37.9).	2-
[16]	Yu	2005	Taiwan	Cross-sectional	Face-to-face interview	COM Multi-stage random sampling of 4/12 Taiwan districts	219 (RR not given)	65+ Mean 74.3	Chronic pain	42% had chronic pain. Females had higher proportion than males (60.9 versus 39.1) 65–70: 32.6%, 70–75: 17.4%, 75–80: 29.3%, 80+: 20.7% Most had pain in the lower limbs (47.8%) and back (35.9%), upper limbs (16.3%)	2-
[17]	Zanocchi	2008	Italy	Cross-sectional	Face-to-face interview	NH All eligible elderly patients living in two nursing homes in Torino, Italy	129/334 eligible. 105/129 (81.4%) took part	Mean 82.2	Chronic pain (pain that lasted for > 3 months)	Chronic pain was present in 82.9%. There were no significant differences in prevalence by age or sex Chronic pain was persistent in 49.4%, episodic in 44.8%, momentary in 5.7%. Chronic pain was most common in the knees (19.5%), hip (16.5%) and back (11.5%)	2+

CRP, chronic regional pain; CWP, chronic widespread pain.

Pharmacology

Ref No	First author	Year	Country	Study design	Methods	Population studied	Sample/ response	Age group	Type of pain	Results	CASP Grade
[113]	Barber	2010	Australia	Review	Not stated					Review of pharmacological management of persistent non-cancer pain with emphasis on drug safety.	4
[95]	American Geriatric Society	2009	US	Systematic review						Reviews pharmacological treatments for persistent non-cancer pain in older people, including, paracetamol, NSAIDs, opioids, adjuvants and topical treatments	1++
[117]	Kress	2009	Austria	Review	Not stated					Reviews pharmacology, efficacy and safety of transdermal buprenorphine Short section on use in elderly. Unaltered pharmacokinetics in renal impairment or older people	4
[118]	Likar	2008	Austria	Cohort study	Open label study 28 day duration	Moderate to severe pain Prior treatment with non-opioid or weak opioid and unsatisfactory response	82 patients	>65 years 30 patients 51–64 years 27 patients <50 years 25 patients	MS(65%); Nervous system (13%); Injury (8%); Cancer (5%)	Transdermal buprenorphine has similar efficacy, tolerability and safety in patients aged over 65 years compared with younger patients	3
[107]	Pergolizzi	2008	Worldwide	Review	Not stated					Reviews evidence for 6 of the most commonly used strong opioids in cancer and non-cancer pain Many recommendations are extrapolated from studies undertaken in younger populations	4
[108]	Mercadante	2007	Italy	Review	Not stated				Cancer pain	Review of pharmacological management of cancer pain in older people Majority of paper describes use of strong opioids. Non-opioids and adjuvants discussed also.	4
[112]	Mercadante	2006	Italy	Prospective cohort study		Patients already receiving opioids admitted to palliative care unit for inadequate pain control	100 consecutive patients	58 patients aged <65 years; 37 patients aged 65—4 years; 10 patients aged >75 years	Cancer pain	Lower mean opioid dose at stabilisation in older patients No difference in number of opioid changes or route of administration between groups	3

[109]	Won	2006	US	Cohort study	Used minimum data set	Nursing home residents with persistent non-cancer pain	10,372	Residents aged >65 years		No change in analgesia prescription for 35% of residents Use of non-opioids, shorting acting opioids and MR opioids was 38, 19 and 3%, respectively Improved functional status and social engagement with MR opioids compared with short acting opioids Trend to fewer falls with analgesic use Incidence of other adverse effects not higher among long-term opioid users.	3
[116]	Otis	2006	US	Open label cohort study		Persistent pain >6 months	227	Mean 52.0 years 44 patients aged >65 years	Inflammatory pain (57.7%) Neuropathic pain (20.3%) Multiple pain (22%)	Average duration of treatment 25.6 days Overall average TD fentanyl daily dose 15.1 µg/h Dose stabilised within 2–3 weeks of starting treatment Efficacy, tolerability and safety similar in older people to younger population	3
[114]	Ackerman	2004	US	Retrospective cohort study	Patients prescribed TD fentanyl or oxycodone CR identified from Medicare pharmacy	Patients prescribed TD fentanyl or Oxycodone CR	2,095	All age groups	Any	75 patients received constipation diagnosis (TD fentanyl 28; oxycodone CR = 417). Among patients who were 65 years or older, oxycodone CR patients were 7.33 times more likely to be constipated thon TD fentanyl patients (OR = 7.33; 95%CI = 1.98–27.13; $P = 0.003$)	2+
[120]	Jean	2005	Taiwan	Open label, randomised trial	Patients randomised to 200 mg, 400 mg or 600mg gabapentin for 3 days Analgesic benefit and adverse effects studied		61 patients	Not stated	Post-herpetic neuralgia	Moderate analgesic benefit and few treatment related adverse effects similar in all groups	1-
[103]	Nikolaus	2004		Review	Not stated					Reviews pharmacological treatments for persistent non-cancer pain in older people, including, paracetamol, NSAIDs, opioids and adjuvants	4
[110]	Podichetty	2003	USA	Review	Although systematic analysis was undertaken no search strategy was identified				MS pain	Review, with focus on clinical issues and opioid intervention	4
[115]	Menten	2002	Belgium	Cohort study	Opioid naive patients or patients converted from po morphine stabilised on TD fentanyl	Cancer patients requiring opioid therapy for pain control	651 341 patients aged over 60 years	18–91 years	Cancer pain	Lower initial morphine doses in older people (>70 years) Similar mean duration of treatment to younger patients Similar adverse effect profile	3

Assistive devices

Ref No	First author	Year	Country	Methods	Population and Sample	Age	Type of pain	Intervention(s)	Results	Grade
[232]	Mann	1999	USA	RCT	104 home-based frail older people	Mean 73 (SD 8.4)	Not specified	An assistive devices/environmental adaptations service delivered over 18-month period. The service led by an occupational therapist (assisted by a nurse and technician)	After the 18-month intervention period, the treatment groups showed significant decline for FIM total score and FIM motor score, but there was significantly more decline for the control group Functional Status Instrument pain scores increased significantly more for the control group In a comparison of healthcare costs, the treatment group expended more than the control group for AT and EIs. The control group required significantly more expenditures for institutional care. There was no significant difference in total in-home personnel costs, although there was a large effect size The control group had significantly greater expenditures for nurse visits and case manager visits	1 Assessor not blinded
[233]	Stueltjens	2004	n/a	Systematic review	Articles concerning community-dwelling older people until July 2002 Some participants has multiple pathologies others had non-specified	≥60	Not specified	Provision, advice and instruction on assistive device use	Strong evidence for the efficacy of advising assistive devices on functional ability from three high-quality RCTs (two reported statistically significant effect sizes) and two low-quality CCTs.	1 Assumed but not explicit presence of chronic pain in the participants in studies included in the review
[234]	Steultjens	2004	n/a	Systematic review	Articles concerning adults with rheumatoid arthritis until 2002	Not specified	Chronic RA pain	Advice and instruction in the use of assistive devices	Insufficient data to determine the effectiveness of advice/instruction of assistive devices	1

Ref. no.	First author	Date	Country	Method	Intervention	Population and sample	Age	Type of rain	Results	CASP Score
[299]	Kaasalainen and Crook	2004	Canada	Design: Comparative descriptive design of four groups: no cognitive impairment; mild cognitive impairment; moderate cognitive impairment; severe cognitive impairment Analytic approach: descriptive statistics	N/A To examine the differences in completion rates and self-report skills to measure their pain across groups of residents with varying levels of cognitive impairment	*n* = 130 long-term care residents Resident for more than 3 months, English speaking, no significant visual or hearing impairment	≥65	Various chronic	No one in group 4 (severe cognitive impairment) able to complete pain verbal self-report scales. 60% of moderate cognitive impairment group able to complete verbal self-report scales. 100% in groups 1 and 2 (no cognitive impairment and mild cognitive impairment) able to complete verbal self-report scales Findings offer some support for use of self-report pain scales in seniors, however, not for those with severe cognitive impairment	2
[87]	McDonald	2009	USA	Design: Non-randomised two-group design. Secondary analysis from a randomised post-test double-blind study Interrupted versus non-interrupted Analytic approach: content analysis	Auditory interruption whilst communicating. To assess whether older adults who were interrupted as they communicated about their pain described less pain information than a non-interrupted group	*n* = 312 community-dwelling residents *n* = 96 interrupted group *n* = 216 non-interrupted group English speaking No malignant pain	60+	Osteoarthritis	Older adults in the uninterrupted group responded with significantly more pain information Interrupted group described 56% less information about source of pain 41% less about quality of pain 29% less about pain treatments 24% less about timing of pain 15% less about pain intensity Interruption diminishes the amount of important information communicated by older adults. Deliberate interruptions by practitioners may thus reduce communication of pain information	2
[92]	McDonald	2009	USA	Design: randomised post-test double-blind two-group study Analytic approach: content analysis	To describe the types of pain information described by older adults with OA pain when asked closed versus open-ended pain questions	*n* = 207 community-dwelling older adults *n* = 111 open-ended pain questions group *n* = 96 in closed-ended pain questions group English speaking No malignant pain	60+	Osteoarthtitis	Older adults most frequently described information about pain location, timing and intensity in response to the open-ended questions Pain treatment information elicited only after repeated questioning There is a need to ensure multi-dimensional pain assessment that measures functional interference, current pain treatments, treatment effects and side effects to ensure more complete pain management discussion.	2

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Ref. no.	First author	Date	Country	Method	Intervention	Population and sample	Age	Type of rain	Results	CASP Score
[300]	McDonald	2009	USA	Design: post-test double-blind design using 3 groups Analytic approach: content analysis	To test how practitioners pain communication affected pain information provided by older adults	*n* = 312	≥60	Osteoarthritis	Participants described more pain information in response to open-ended questions without a social desirability bias	2
[88]	Mallen	2009	UK	Design: cross-sectional survey Analytic approach: frequencies and logistic regression, content analysis	N/A To gauge whether and why older patients with MS pain think prognostic information is important and how often they felt prognosis was discussed in the general practice consultation	*n* = 502 recruited from primary care Non-inflammatory conditions	50+ Mean 65	MS pain	33% recalled discussing prognosis in consultation with GP 82% thought prognosis important Perceived importance of prognostic information strongly associated with recalled prognostic discussion Over 80% of older people feel prognosis is important but prognosis was only recalled as being discussed in one third of consultations	3

Self-management

Ref no.	First author	Year	Country	Study design	Intervention	Sample	Age	Main result
[258]	Ersek	2008	USA—Community	RCT	Self-management versus control Self-management: 7 group sessions, one per week for 7 weeks. Akin to ASMP in content Control: education by way of book on managing pain	Persistent pain interfering with function Total = 256 Intervention *n* = 133 Control *n* = 123	Intervention mean (SD) 81.9 (6.3) Control mean (SD) 81.8 (6.7)	At 6 and 12 months follow-up no statistically significant differences between groups in pain or function
[259]	Haas	2005	USA—Community	RCT	Self-management versus control Self-management: CDSMP, six group sessions, one per week for 6 weeks Control: 6 month wait list	Chronic low back pain. Total = 109 Intervention *n* = 60 Control *n* = 49	Intervention mean (SD) 78.6 (7.5) Control mean (SD) 75.5 (7.5)	At 6 months follow-up no statistically significant difference between groups in pain or function Statistically significant difference between groups in SF36 emotional health in favour of intervention, but not in energy/fatigue or general health
[261]	Hughes	2006	USA—Community	RCT	Self-management versus control Self-management: 'Fit and Strong', group sessions, three per week for 8 weeks. CDSMP Control: 6 month wait list	Hip and/or knee OA Total = 215 Intervention *n* = 115 Control *n* = 100	Intervention mean (SD) 73.3 (7.5 SD reported in interim paper) Control mean (SD) 73.4 (7.5 SD reported in interim paper)	At 6 months statistically significant decrease in pain but not function At 12 months no statistically significant difference between groups in pain or function

Exercise

Ref. no.	First author	Year	Country	Study design	Intervention	Sample	Age	Main result
[240]	Dias	2005	Brazil outpatient rehabilitation	RCT	Exercise versus control Exercise: educational lecture plus 24 supervised group sessions, two per week, plus 40 minutes walking 3 times per week, for 12 weeks, advised to continue walking up to 6 months Control: educational lecture	OA knee. Total = 50 Intervention *n* = 25 Control *n* = 25	Intervention median (IQR) 76 (70–78) Control median (IQR) 74 (70–78)	At 6 months follow-up statistically significant difference between groups in favour of intervention showing decreased pain and increased function No statistically significant difference between groups in SF36 emotional health
[241]	Hasegawa	2010	Japan Community-based.	RCT	Exercise versus control Exercise: supervised group sessions focused on strength, balance and flexibility, one per week plus home exercise, for 12 weeks Control: customary levels of activity	Knee pain. Total = 28 Intervention *n* = 14 Control *n* = 14	Intervention mean (SD) 77 (4) Control mean (SD) 77 (4)	At post-intervention statistically significant differences between groups in favour of intervention showing decreased pain and increased function

Psychology

Ref. no.	First author	Date	Country	Methods	Intervention	Population and sample	Age	Type of pain	Results	Grade
[220]	Cipher	2007	USA	Pre-/post-treatment	Multimodal CBT	44 residents with dementia in a long-term care facility	82	Chronic	Pain decreased pre- to post-treatment.	2-
[221]	Cook	1998	Canada	Randomised pre-/post-comparison group design	Group CBT	22 nursing home residents	77	Chronic	CBT, 80% in CBT group improved versus 34% controls	1-
[223]	Green	1998	Canada	Secondary data analysis	None	43 community dwelling	72	Chronic	Neuroticism, openness and agreeableness predictive of satisfaction with CBT.	2-
[225]	Morone	2008	USA	Qualitative	Mindfulness meditation	27 community dwelling	74	Chronic low back pain	Less pain	3

Interventional studies in post-herpetic neuralgia in older people

Ref. no.	First author	Date	Type of intervention	Study type	Population and sample	Results	Level of evidence
[203]	Tenicela	1985	Sympathetic block	RCT, double-blind	20 patients with acute herpes zoster, 10 patients received sympathetic nerve blocks using a local anaesthetic and 10 received a placebo	Active treatment (local anaesthetic) was effective in resolving acute herpetic neuralgia in 90% of the patients while the placebo (control) was effective in 20%. ($P < 0.01$).	1
[301]	Pasqualucci	2000	Acyclovir and prednisolone versus epidural local anesthetic and methylprednisolone	RCT	Active treatment group received epidural injection of methylpred and local anaesthetic ($n = 290$); control group received acyclovir and oral prednisolone ($n = 279$). Active group received treatment every 3–4 days for 7–21 days.	Incidence of PHN at 1 year 22% in control group versus 1.6% in active group	1
[206]	van Wijck	2006	Epidural steroids and local anaesthetic	RCT	Single epidural injection of 80 mg methylprednisolone and bupivacaine, ($n = 301$) versus standard oral antiviral therapy and analgesics ($n = 297$) The primary endpoint was the proportion of patients with zoster-associated pain 1 month after inclusion Patients older than 50 years	Significantly less patients in active group had pain at 1 month ($P = 0.02$) but not at 3 and 6 months where pain was reduced in both groups. At 1 month, 137 (48%) patients in the epidural group reported pain, compared with 164 (58%) in the control group. After 3 months these values were 58 (21%) and 63 (24%), respectively ($P = 0.47$) and at 6 months, 39 (15%) and 44 (17%; 0.85, 0.57–1.13, $P = 0.43$) Authors concluded that although a single epidural injection of steroids and local anaesthetics in the acute phase of herpes zoster has a modest effect in reducing zoster-associated pain for 1 month, the treatment is not effective for prevention of long-term PHN.	1
[205]	Kotani	2000	Intrathecal methylprednisolone and lignocaine	RCT, double-blind	Intrathecal injection of methylprednisolone and 3% lignociane weekly for up to 4 weeks ($n = 89$), versus lignocaine only($n = 91$) or no treatment ($n = 90$). Mean age 63 ± 8 years	Minimal change in the degree of pain in the lidocaine-only and control groups during and after the treatment period In the methylprednisolone–lidocaine group, the intensity and area of pain significantly decreased, compared with the control group and the use analgesia declined at 4 weeks	1
[207]	Kumar	2004	Neuraxial and sympathetic blocks in herpes zoster and post-herpetic neuralgia: an appraisal of current evidence	Systematic review	Electronic literature search of Medline, EMBASE and Cochrane Clinical Trial electronic databases from 1966 to 2001 An appraisal of 21 trials including 4 RCTs, 6 cohort studies and other case series No age limits applied	There is strong evidence for epidural administration of local anaesthetic–steroid combination for pain control during the acute phase (grade A). There is also evidence for the use of intrathecal steroid–local anaesthetic for PHN studies Evidence for use of nerve blocks in the acute phase of HZ in the prevention of PHN appears to be strong (grade A)	
[209]	Freund and Schwartz	2001	Botulinum toxin type A	Case series	Seven patients with trigeminal, thoracic, and lumbar PHN lasting longer than 6 months No age reported	The mean pain score before injection for the group was 8/10 (0 = no pain, 10 = worst pain), and after treatment was 5/10	3
[210]	Argoff	2002	Intramuscular botulinum toxin type A (BTX-A) injection	Case series	11 patients were treated with up to 300U of BTX-A injected intramuscularly based on the patient's report of maximal pain and the presence of myofascial trigger points on examination. A total of 25–50U was injected, depending on the size of the muscle. Patients asked to report the effects of treatment at 6 and 12 weeks No age reported.	All patients reported substantial relief of their burning and dysesthetic pain in the affected extremities, as well as normalisation of skin colour and reduction of any oedema that existed before treatment. In addition, the thermal and mechanical allodynia present in all patients before treatment lessened appreciably.	3

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Ref. no.	First author	Date	Type of intervention	Study type	Population and sample	Results	Level of evidence
[211]	Ranoux	2008	Intradermal Botulinum toxin type A (BTX-A) versus placebo	RCT, double-blind	29 patients with chronic painful neuropathy (PHN, post-traumatic and post-operative) Patients received intradermal BTX-A (20–190 units) into the painful area and evaluated at baseline, then at 4, 12 and 24 weeks Patients aged between 27 and 78 years, 5 above the age of 70 years	BTX-A treatment, relative to placebo, was associated with persistent effects on spontaneous pain intensity from 2 weeks after the injection to 14 weeks. These effects correlated with the preservation of thermal sensation at baseline ($P < 0.05$) BTX also improved allodynia to brush and decreased pain thresholds to cold, without affecting perception thresholds. There were sustained improvements in the proportion of responders (NNT for 50 % pain relief: 3 at 12 weeks), neuropathic symptoms and general activity Most patients reported pain during the injections, but there were no further local or systemic side effects	1

Guidelines

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