



# **Evaluation of standards of care for osteoporosis and falls in primary care**

**Final Report to The Information Centre for health  
and social care  
July 2007**

## **Authors**

Julia Hippisley-Cox  
Jonathan Bayly  
Jonathan Potter  
Justin Fenty  
Chris Parker

# 1. Table of contents

<b>1. Table of contents</b>	<b>1-2</b>
<b>2. Executive summary</b>	<b>2-5</b>
2.1 <i>Background</i>	2-5
2.2 <i>Methods</i>	2-7
2.3 <i>Summary of findings</i>	2-7
2.3.1 <i>Main Findings</i>	2-7
2.3.2 <i>The indicators:</i>	2-8
2.3.3 <i>Coding systems:</i>	2-10
2.3.4 <i>Recording:</i>	2-11
2.3.5 <i>Management of osteoporosis:</i>	2-11
2.3.6 <i>Management of Falls:</i>	2-12
2.4 <i>Key implications</i>	2-12
<b>3. Background</b>	<b>3-14</b>
<b>4. Aims and objectives</b>	<b>4-17</b>
<b>5. Methods and study population</b>	<b>5-18</b>
5.1 <i>Database version</i>	5-18
5.2 <i>Study population</i>	5-18
5.3 <i>Protocol development</i>	5-18
5.4 <i>Guidelines and evidence base</i>	5-19
5.5 <i>Clinical Audit Criteria</i>	5-21
5.6 <i>Clinical Indicators</i>	5-23
<b>6. Results</b>	<b>6-25</b>
6.1 <i>Overview</i>	6-25
6.2 <i>Indicator 1 – prevalence of diagnosed osteoporosis in the total practice population</i>	6-32
6.3 <i>Indicator 2 – % of patients with diagnosed osteoporosis who have evidence of current osteoporosis treatment in the last 6 months or specific osteoporosis assessment within the last 15 months</i>	6-35
6.4 <i>Indicator 3 – % of patients on osteoporotic treatment who also have a computer recorded diagnosis of osteoporosis</i>	6-38
6.5 <i>Prevalence of clinically apparent osteoporosis</i>	6-41
6.6 <i>Indicator 4 - % of patients on specific osteoporosis treatments with evidence of a co-prescribed combined calcium and vitamin D3 preparation</i>	6-43
6.7 <i>Indicator 5 - % of patients aged 65+ years with at least 2 prescriptions for systemic glucocorticoids in the last 6 months with evidence of current treatment with a preparation licensed for the prevention of glucocorticoid induced osteoporosis</i>	6-46

6.8	<i>Indicator 6 - % of patients aged 65+ years with two or more prescriptions for systemic glucocorticoids in the past 6 months and a Read code indicating long term steroid use who also have evidence of current treatment with a preparation licensed for the prevention of glucocorticoid induced osteoporosis</i>	6-49
6.9	<i>Indicator 7 - % of patients aged 75+ years living in a residential or nursing care home environment with evidence of current treatment with a combined calcium and vitamin D preparation</i>	6-50
6.10	<i>Indicator 8 - % of females aged 75+ years with a history of fragility fracture with evidence of a currently prescribed bone sparing agent</i>	6-53
6.11	<i>Indicator 9 - % of females aged 65-74 with a history of fragility fracture with evidence of referral for bone densitometry</i>	6-55
6.12	<i>Indicator 10 - % of females aged 65-74 with a history of fragility fracture and a diagnostic code for osteoporosis with evidence of a currently prescribed bone-sparing agent</i>	6-57
6.13	<i>Indicator 11 - % of males aged 65+ years with a history of fragility fracture with evidence of referral for bone densitometry</i>	6-59
6.14	<i>Indicator 12 - % of males aged 65+ years with a history of fragility fracture and a diagnostic code for osteoporosis with evidence of currently prescribed alendronate</i>	6-61
6.15	<i>Indicator 13 - % of females aged 65+ years with recorded strong clinical risk factors for osteoporosis with evidence of either a referral for bone densitometry in the last three years or osteoporosis assessment in the last three years</i>	6-63
6.16	<i>Indicator 14 - % of patients aged 65+ years with recorded strong clinical risk factors for osteoporosis and a diagnostic code for osteoporosis with evidence of a currently prescribed bone sparing agent</i>	6-65
6.17	<i>Indicator 15 - % of all registered patients who are aged 75+ years and at high risk of falls</i>	6-68
6.18	<i>Indicator 16 - % of patients aged 75+ years who contacted a healthcare professional in the previous 12 months and have a record of an enquiry about the number of falls they have experienced in the preceding 12 months</i>	6-71
6.19	<i>Indicator 17 - % of patients aged 75+ years who reported a single fall in the previous 12 months and have been observed for a disorder of gait and balance</i>	6-74
6.20	<i>Indicator 18 - % of patients aged 75+ years who are at a high risk of falls and have been offered a referral to a falls service or an exercise programme</i>	6-77
6.21	<i>Indicator 19 - % of patients aged 75+ years with osteoporosis or a history of a fragility fracture who have evidence of a falls assessment</i>	6-80
6.22	<i>Indicator 20 - % of patients aged 75+ years at high risk of falls who have evidence of an assessment for osteoporosis in the last three years</i>	6-83
6.23	<i>Summary of practice-level 'zero returns' on eligibility and achievement</i>	6-86
<b>7.</b>	<b>Interpretation</b>	<b>7-89</b>
7.1	<i>Context</i>	7-89
7.2	<i>Prevalence of osteoporosis</i>	7-89
7.3	<i>Aspects of management and prescribing for patients with osteoporosis</i>	7-90
7.4	<i>Glucocorticoid induced osteoporosis (GCIO) in over 65 year olds</i>	7-90
7.5	<i>The residential and nursing care home setting</i>	7-91
7.6	<i>Secondary fracture prevention</i>	7-91

7.7	<i>Primary Prevention</i>	7-93
7.8	<i>Integration of bone health with falls' risk assessment or intervention</i>	7-93
7.9	<i>Implications for a potential Quality Outcomes Framework domain</i>	7-94
<b>8.</b>	<b>References</b>	<b>8-95</b>

## 2. Executive summary

In 2007, The Information Centre for health and social care commissioned the first national evaluation of standards of care for osteoporosis and falls in primary care, using the QRESEARCH general practice database (<http://www.qresearch.org>). This document reports the findings of the evaluation.

The project has been completed in collaboration with the following:

- University of Nottingham
- University of Derby
- Clinical Effectiveness and Evaluation Unit, Royal College of Physicians
- Gloucestershire Primary and Community Care Audit Group
- Nottinghamshire County Teaching PCT

The project has been discussed with and endorsed by the National Osteoporosis Society and its Primary Care Forum as well as the multi-professional Steering Group for the National Audit of Falls and Bone Health hosted by the Clinical Effectiveness and Evaluation Unit of the Royal College of Physicians. The Health Care Commission and NICE are aware of this project so that it can inform related developments as appropriate.

The main aims of the project were:

1. To conduct the first national evaluation of standards of care in the primary care setting for older people at risk of falls and osteoporotic fractures.
2. To scope the feasibility and implications of including osteoporosis and falls within the Quality Outcome Framework (QOF) in the new GP contract.
3. To advise on the feasibility of extending this evaluation to additional practices in the UK and providing feedback to practices aimed at improving clinical care (ie undertake a full audit cycle).

### 2.1 Background

Gradual reductions in bone mass and strength are part of the normal ageing process, but for some individuals the resulting bone fragility (osteoporosis) brings a substantial increase in risk of fragility fractures, particularly in association with a number of well described skeletal and extra-skeletal risk factors. The clinical importance of osteoporosis lies in the resultant fractures most commonly experienced at the hip, wrist and spine. Risk factors for osteoporosis or fragility fracture include age, female gender, Caucasian ethnicity, a history of prior fracture, a parental history of hip

fracture, low body mass index, premature untreated menopause, lack of dietary calcium, hypovitaminosis D, immobility, smoking, alcohol excess, a sedentary lifestyle, and a number of medical conditions and medications (in particular, long-term treatment with steroids).

Bone mineral density can be measured by a DXA scan (Dual Energy X-ray Absorptiometry), and osteoporosis is diagnosed if the density is more than 2.5 standard deviations below the young adult mean value (T score less than -2.5). Medications including biphosphonates, strontium ranelate, oestrogens, recombinant parathyroid hormone and raloxifene are available to increase bone mass and/or reduce the risk of future fractures, and are commonly co-prescribed with calcium and vitamin D supplements. Appropriate lifestyle measures to improve bone health and/or reduce fracture risk include increased exercise, smoking cessation, moderation in alcohol consumption and prevention of falls.

The combined cost of social and hospital care for patients with osteoporotic fractures has been reported as more than £1.8 billion per year in the UK. Fractures in over 60 year olds involve more than two million bed days in England alone, and another two million are taken up by frailty related falls in patients over the age of 75. Half of people suffering an osteoporotic hip fracture can no longer live independently as a result of the injury. The increasing number of people aged 65 and over will result in a marked increase in prevalence of these conditions.

The link between falls, bone health and fracture is recognised in the National Service Framework for Older People, and relevant guidance has recently been produced by a number of bodies including the National Institute for Health and Clinical Excellence (NICE). There is a large evidence base for the effectiveness of pharmaceutical and other interventions in the primary and secondary prevention of osteoporotic fractures. However, repeated studies have shown that even the highest risk patients such as those with prior fracture, those living in residential or nursing care homes, and those on long-term steroid therapy rarely receive optimal care.

There is also good evidence for the efficacy of multi-professional, multi-factorial falls interventions and strength and balance training in reducing the risk of a fall (which precedes over 90% of low trauma peripheral fractures). Work in other clinical areas such as coronary heart disease, asthma and diabetes has shown that both the quality of data recording and the level of care for these conditions can be greatly improved by incorporation in the Quality Outcome Framework (QOF) which is part of the General Medical Services (GMS) contract in primary care.

## 2.2 Methods

Existing national guidelines relating to osteoporosis, falls and fragility fractures were identified, and used as the evidence base to derive comprehensive evaluation criteria for best practice and clinical standards within primary care. A set of clinical indicators for these criteria was developed, each specifying both a numerator and a denominator population, in line with the existing indicator sets in the Quality Outcomes Framework. Finally the QRESEARCH database, which covers 525 general practices and 30 million person years of observation, was used to investigate the recording of relevant information and the current levels of achievement of the proposed indicators.

## 2.3 Summary of findings

### 2.3.1 *Main Findings*

Current achievement of best practice appears highest in prescribing appropriate drugs to people with diagnosed osteoporosis, for example

- Almost three quarters of older women with diagnosed osteoporosis and a previous fragility fracture receive appropriate drugs

For other aspects of care, current achievement appears low, for example:

- Only one in ten older women with a previous fragility fracture has a referral for bone density assessment in her electronic medical record
- for older men this proportion is even lower, at one in fifty
- less than one in fifty older people recorded as having a high risk of falling has a recorded referral to a falls service or exercise programme
- Low levels of achievement arise in part from practices not entering on the electronic medical record the assessments or referrals that have been carried out
- A computer search to identify those eligible for care is likely to under-estimate numbers, given the low level of recording osteoporosis diagnoses, falls history and care home residence in the electronic record
- Incorporating an appropriate set of codes in the QOF could rapidly improve both provision of care and recording of relevant information, as has been seen in other clinical areas

- The workload of falls services would increase substantially if all older people at high risk were identified and referred to them

### **2.3.2 *The indicators:***

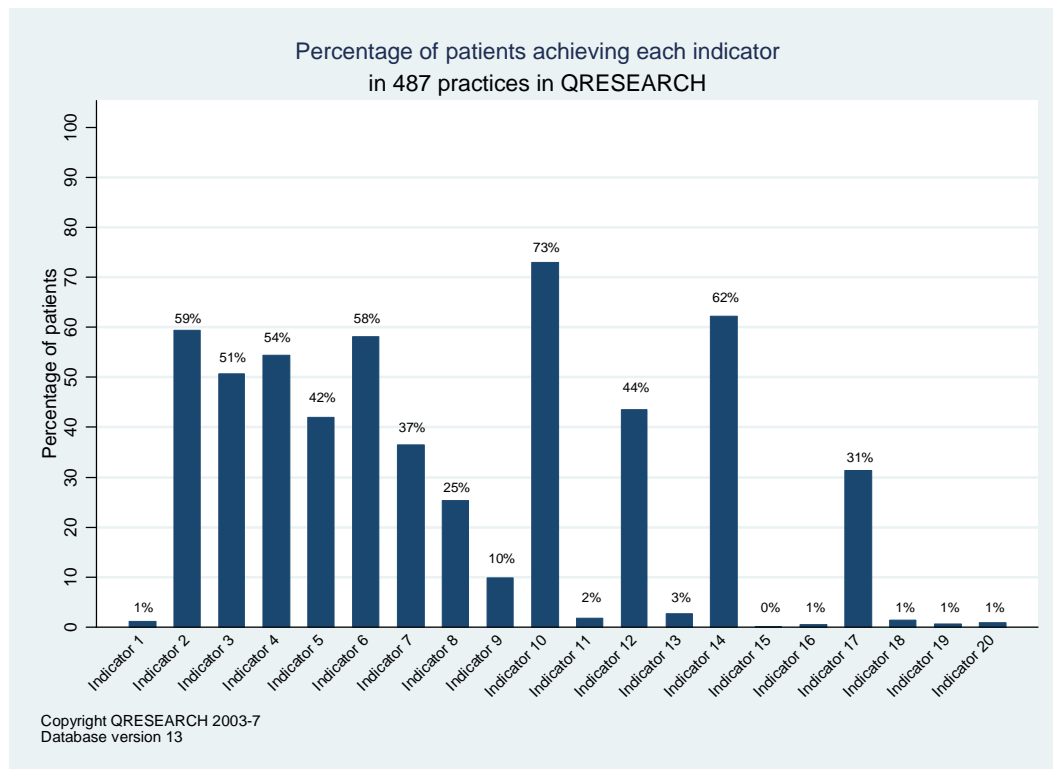
A set of 11 evaluation criteria were derived from the national guidelines, and to measure these a set of 20 clinical indicators was developed. The indicators are defined in Summary Table 1 below, and their current levels of achievement in the QRESEARCH database are shown in Figure 1.



**Summary table 1: indicators for osteoporosis and falls**

1	Computer recorded prevalence of osteoporosis per 100 patients of all ages
2	% of patients with osteoporosis with evidence of current osteoporosis treatment in the last 6 months or specific osteoporosis assessment within the last 15 months
3	% of patients on specific osteoporosis treatment with evidence of an appropriate diagnostic code for osteoporosis
4	% of patients on specific osteoporosis treatments with evidence of a co-prescribed combined calcium and vitamin D3 preparation
5	% of patients aged 65+ years with at least 2 prescriptions for systemic glucocorticoids within last 6 months at any dose (denominator) with current treatment with a preparation licensed for the prevention of glucocorticoid induced osteoporosis
6	% of patients aged 65+ with at least one prescription for systemic glucocorticoids within the last 6 months AND Read code group 376 (denominator) with current treatment with a preparation licensed for the prevention of glucocorticoid induced osteoporosis
7	% of patients aged 75+ recorded as living in a residential or nursing care home environment (denominator) with current treatment with a combined calcium and vitamin D preparation
8	% of females aged 75+ with a history of fragility fracture (denominator) with a prescribed bone sparing agent
9	% of females aged 65-74 with a history of fragility fracture (denominator) with a referral for bone densitometry to determine their risk for future fracture
10	% of females aged 65-74 with a history of fragility fracture and a diagnostic code for osteoporosis (denominator) who have a currently prescribed bone-sparing agent
11	% of males aged 65+ with a history of fragility fracture (denominator) with a referral for bone densitometry to determine their risk for future fracture
12	% of males aged 65+ with a history of fragility fracture and a diagnostic code for osteoporosis (denominator) with a currently prescribed alendronate
13	% of females aged 65+ with strong clinical risk factors for osteoporosis (denominator) who have evidence of either a referral for bone densitometry in the last three years or osteoporosis assessment in the last three years
14	% of patients aged 65+ with strong clinical risk factors for osteoporosis and a diagnostic code for osteoporosis (denominator) with a currently prescribed bone sparing agent
15	% of the total practice population who are aged 75+ and at high risk of falls
16	% of patients aged 75+ who have contacted a healthcare professional in the previous 12 months (denominator) who have enquired about the number of falls they have experienced in the preceding 12 months
17	% of patients aged 75+ who have reported a single fall in the previous 12 months (denominator) who have been observed for a disorder of gait and balance
18	% of patients aged 75+ at high risk of falls (denominator) who have been offered a referral to a falls service or an exercise programme
19	% of patients aged 75+ with osteoporosis or a history of a fragility fracture (denominator) who have evidence of a falls assessment
20	% of patients aged 75+ at high risk of falls who have been assessed for osteoporosis in the last 3 years

**Figure 1: Percentage of patients in QRESEARCH achieving each of the indicators**



The figure shows that in general, current achievement of the proposed indicators is higher for osteoporosis (indicators 1-14) than for falls (indicators 15-20). Failure to achieve 100% compliance could arise in part from appropriate patient exclusions, in part from inadequacies in recording, and in part from inadequacies in care. The following sections highlight some of the main study findings relating to recording and care.

### 2.3.3 Coding systems:

Developing the indicators identified the challenges in coding both for falls and for osteoporosis.

- To define fragility fracture required a composite of a range of fracture codes
- To define prolonged glucocorticoid usage required searching for multiple prescriptions
- To define a disorder of gait or balance required a composite range of relevant codes

### **2.3.4 Recording:**

The study found a substantial shortfall in electronic recording of the information needed to identify patients eligible for care for falls and osteoporosis. For example

- Half the prescriptions for osteoporosis medications are going to patients without a documented diagnosis of osteoporosis (indicator 3). This suggests that either there is substantial under-recording of diagnostic codes for osteoporosis on the electronic computer system, or that some patients are receiving treatment inappropriately.
- An appropriate Read code for long-term use of steroids, normally referred to as glucocorticoids (8B62, Steroid prophylaxis) is almost never used, and an alternative search strategy based solely on recent prescriptions may fail to distinguish effectively between long-term and other users (indicators 5,6)
- Older patients are very unlikely to have a computer recorded history of falls (indicators 15, 16),
- Where the denominator information for an indicator appears to be substantially under-recorded, great caution is needed in interpreting the level of achievement. Particular care is needed at individual practice level, where percentage achievement can range between 0% and 100% but is often based on very small numbers, even a single eligible patient

### **2.3.5 Management of osteoporosis:**

Some aspects of osteoporosis management have been well developed, for example

- Almost three quarters of females aged 65-74 with a history of fragility fracture and a diagnostic code for osteoporosis have a currently prescribed bone-sparing agent (indicator 10)

However, other aspects appear to fall well short of guideline standards

- Older patients recorded as having a previous fracture since the age of 45 (a proxy for a fragility fracture) are unlikely to have a record of appropriate investigations and/or treatment, particularly if they are male (indicators 8,9,11).
- Only a third of older patients recorded on the computer as living in residential or nursing care homes are receiving combined calcium and vitamin D, a simple evidence-based, cost-effective therapy to reduce their risk of fractures (indicator 7).

### 2.3.6 *Management of Falls:*

- Those with evidence of high risk for future falls are very unlikely to have a computer record of appropriate referral or assessment (indicators 18, 20).

## 2.4 Key implications

- Computer recording of diagnoses of osteoporosis needs to be improved so that patients with osteoporosis and who are at risk of osteoporotic fracture can be identified easily using electronic searches, and their care and/or treatment reviewed.
- There is evidence of a shortfall not only in the identification of patients at high risk of osteoporotic fracture and falls but also in the interventions and assessments which have been recorded as having been delivered.
- It is likely that the quality of recorded information aimed at reducing the risk of fragility fracture and falls could be improved rapidly by incorporating in the QOF a set of indicators aimed at:
  - Prevention of osteoporotic fracture in patients who have had a prior event
  - Management of fracture prevention in nursing or residential care homes
  - Identification of patients at high risk of fragility fracture due to long-term use of steroids
  - Identification and appropriate referral of patients at high risk of falling
- A number of relevant criteria would benefit from further development, ideally involving the adoption or use of single codes to avoid the need to search through large code sets. These include:
  - Distinguishing long-term steroid use from intermittent or one-time use
  - Distinguishing fragility fractures from high trauma fractures
  - Recording the presence or absence of any gait or balance disorders in fallers
- A systematic, opportunistic identification of high risk fallers through the QOF would have significant implications for the work load of existing falls services.

- The numbers of patients in the over 65 year old age group who could currently be identified as eligible for investigation or treatment as a result of a NICE Technology Appraisal for the primary prevention of osteoporotic fractures can be estimated from this study.
- Completing the audit cycle could best be achieved by feeding back the results of this study to primary care practices using comparisons with their peers. At the same time reports would ideally be backed up with contextual knowledge management, links to relevant on-line resources and a dataset of patients in whom record or clinical review was indicated.

### 3. Background

This is a report on the first national evaluation of standards of care for older patients at risk of falls and osteoporotic fracture in primary care.

The project was funded by The Information Centre for health and social care using the QRESEARCH database (<http://www.qresearch.org>) and has been completed in collaboration with:

- University of Nottingham (Professor Julia Hippisley-Cox, Mr Justin Fenty)
- University of Derby (Dr Jonathan Bayly, Professor Tahir Masud)
- Clinical Effectiveness and Evaluation Unit, Royal College of Physicians (Dr Jonathan Potter, Professor Mike Pearson)
- Gloucestershire Primary and Community Care Audit Group
- Nottinghamshire County Teaching PCT (Ms Chris Parker)

The project has been discussed with and endorsed by the National Osteoporosis Society and its Primary Care Forum as well as the multi-professional Steering Group for the National Audit of Falls and Bone Health hosted by the Clinical Effectiveness and Evaluation Unit of the Royal College of Physicians. The Health Care Commission and NICE are aware of this project so that it can inform related developments as appropriate.

The combined cost of social and hospital care for patients with osteoporotic fractures has been reported as more than £1.8 billion per year in the UK<sup>1</sup>. This is probably a conservative estimate as the apparent cost of the hospital component may be more than twice the tariff price<sup>2</sup>. Fractures in over 60 year olds involve more than two million bed days in England alone. More than two million more are taken up by frailty-related falls in patients over the age of 75. Hip fracture admissions have been rising by a mean of 2.1% per year since 1999-2000. Falls admissions in over 60 year olds have been rising by more than 5% per year over the same time period and have exceeded 10% in the last two years<sup>3</sup>. The disease burden to patients is well documented. Half of people suffering an osteoporotic hip fracture can no longer live independently as a result of the injury, 64% of people need a walking aid and half can no longer move about outside on their own<sup>4</sup>. The increasing number of people aged 65 and over will result in a marked increase in prevalence of these conditions.

National Service Framework for Older People Chapter 6 [Falls - including bone health] recognizes the crucial link between falls, bone health and fracture<sup>5</sup>. When both risk factors for fracture exist together it can greatly magnify the gradient of risk for fracture<sup>6</sup>. The following bodies have also recently produced guidelines relating to falls and bone health: the National Institute for Health and Clinical Excellence<sup>7</sup>, the Scottish Intercollegiate Guideline Network<sup>8</sup>, the American and British Geriatrics Societies<sup>9</sup> and the British Orthopaedic Association<sup>10</sup>.

The Clinical Effectiveness and Evaluation Unit [CEEU] of the Royal College of Physicians in London has been commissioned by the Healthcare Commission to carry out a national audit of falls and bone health in older people. The first phase of the project has been an audit of the organization of services. It achieved a 90% response from acute Trusts in England and Ireland. It demonstrated that there are structures in place to provide assessment and interventions for older people who fall, however there is evidence that they are not being fully accessed and that services for bone health lag consistently behind those for falls. The CEEU is now moving on to carry out a national audit of the clinical care of older people with falls and bone health. This project includes older people attending Accident & Emergency Departments with a fragility fracture following a fall. The study looks at the service provided both in hospital and in the community. The steering group for the national audit wish to complement this work with a parallel study looking at the management of falls and bone health in primary care.

There have been many large randomised controlled trials demonstrating that primary and secondary prevention of osteoporotic fractures is effective and these have been incorporated into the National Guidelines that underpin the criteria in this study. Multi-professional multi-factorial falls' interventions and strength and balance exercise has also been shown to reduce the rate of falls in community-dwelling older people and again incorporated in to National Guidance. Despite this, repeated studies have shown that even the highest risk patients such as both women and men with a prior fracture<sup>11-13</sup>, those in the extended care setting<sup>14</sup> and those on glucocorticoids<sup>15</sup> rarely receive optimal care. There is a need therefore to ensure that clinically effective care for falls and bone health is being instituted for older people to enhance their quality of life and reduce the burden on the NHS.

Work in other clinical areas has shown that the level of care can be monitored and can be shown to increase using practice evaluation methods based on primary care coding systems. As a result the Quality Outcome Framework [QOF] has been established as part of the General Medical Services [GMS] contract in primary care to monitor benchmark and enhance the quality of care. Data relating to coronary heart disease, asthma and diabetes demonstrate that the quality of coding can be greatly improved resulting in data that can be used to evaluate practice.

This proposal builds on a local audit conducted by the Gloucestershire Primary and Community Care Audit Group [PCCAG] in collaboration with the Faculty of Education, Health and Science at the University of Derby<sup>16</sup> (see also <http://www.glospccag.co.uk/F&OP.htm>). The pilot demonstrated that while data quality in these clinical areas is currently poor and very variable, useful data could be collected, however, which provided a valuable indication of practice against national guidelines. The results indicated that there is potential for further development of this approach and a larger national study is required to assess the performance on a wider scale and to determine whether such coding might be suitable for QOF.

We have conducted the first national evaluation of standards in the management of osteoporosis and falls in older people in primary care using the QRESEARCH database. We identified nine separate documents or guidelines which we used as our evidence base. We then defined 11 evaluation criteria – statements about best practice or clinical standards of care relevant to primary care. We then developed a set of clinical indicators which could be used to measure each evaluation criterion. The clinical indicators were composed of numerator and denominator populations so that each clinical indicator was expressed as a percentage. Finally we investigated the current level of achievement of these indicators in a large representative database of general practice medical records.

### **Data source used for this project**

QRESEARCH is now one of the largest aggregated general practice databases in the world consisting of 525 practices and 30 million person years of observation extending back over 18 years. Version 13 of the database was used for this report and the analysis was based on 487 practices in England contributing data for the study period. The total population covered was approximately 3.4 million patients. The data quality of QRESEARCH has been examined and found to be of good quality. Reports are available at <http://www.qresearch.org/>.



## 4. Aims and objectives

The aims of the project were:

1. To conduct the first national evaluation of standards of care in the primary care setting for older people at risk of falls and osteoporotic fractures using the QRESEARCH database.
2. To scope the feasibility and implications of including osteoporosis and falls within the Quality Outcome Framework [QOF] in the new GP contract.
3. To advise on the feasibility of extending this evaluation to additional practices in the UK and providing feedback to practices aimed at improving clinical care (i.e. undertake a full audit cycle).

The specific objectives of the project were:

- To assess the data quality in relation to falls and bone health
- To assess standards in some aspects of the rationale for prescribing
- To assess documented primary and secondary prevention of osteoporotic fractures in:
  - Patients in residential and nursing care homes
  - Older women with prior fragility fractures
  - Older women with osteoporotic risk factors
  - Older patients on systemic glucocorticoids
- To assess standards of care for older patients at risk of falls
  - Register of fallers and those at high risk of falls
  - Recorded enquiry of falls history
  - Recorded assessment of gait and balance
  - High risk fallers offered falls assessment
  - Patients with osteoporosis or prior fragility fracture assessed for falls risk
- To assess the primary prevention of osteoporotic fractures in older people with recurrent falls and no fractures
- To assess the standards of care for older men with fragility fractures
- To derive a national dataset for measuring and monitoring standards of care for patients at high risk of falls, osteoporosis and fragility fracture in the UK and appropriate reporting formats

## **5. Methods and study population**

### **5.1 Database version**

The study was conducted using version 13 of the QRESEARCH database. All UK practices with complete data for the calendar year 2006 were included in the analysis.

### **5.2 Study population**

Patients were included if they were registered for the whole of 2006. Temporary residents were excluded.

### **5.3 Protocol development**

This next section describes how we developed the methodology for the project including the national guidelines, criteria and indicators to be used for the proposed evaluation of standards in the management of osteoporosis and falls in the primary care.

We identified nine separate documents or guidelines and used these as the evidence base to inform this protocol.

We then defined 11 evaluation criteria – these are statements about best practice or clinical standards of care relevant to primary care. We have linked each criterion to the guidelines from which it was derived.

We then developed a set of clinical indicators which was used to measure each evaluation criteria. The clinical indicators were composed of denominator populations (i.e. the patients eligible to receive care) and numerators (i.e. the patients who actually received the care). In this way, each clinical indicator was expressed as a proportion. These clinical indicators are analogous to the clinical indicators included in the new GMS Quality and Outcomes Framework (which currently includes other disease topics apart from osteoporosis and falls).

## 5.4 Guidelines and evidence base

This table lists the national guidelines and gives them a reference number which is then used in the next table.

Guideline reference number	Document title	URL	Comments (including whether this is supported by professional opinion)
1	Royal College of Physicians (RCP) Clinical Guidelines on Osteoporosis (2000)	<a href="#">RCP London website</a>	Expert opinion and professional consensus: will be superseded by NICE
2	NSF for Older People (standard 6)	<a href="#">DH website link</a>	DH policy document
3	RCP Clinical Guidelines on Glucocorticoid induced Osteoporosis (2002)	<a href="#">RCP website link</a>	Expert opinion and professional consensus: intervention thresholds may be modified by NICE
4	SIGN Clinical Guidelines (2003)	<a href="#">SIGN website link</a>	Expert opinion and professional consensus – update of RCP 2000 – will be superseded by NICE
5	British Orthopaedic Association Blue Book	<a href="#">BOA website link</a>	Expert opinion and professional consensus on fracture management and secondary prevention
6	NICE Technology Assessment Guidance 87	<a href="#">NICE website link</a>	TA covering bisphosphonates, raloxifene and PTH in the secondary prevention of fractures in post-menopausal women: under review
7	NICE Clinical Guidelines on Falls	<a href="#">NICE website link</a>	Defines the role of primary care in case-finding high risk fallers
8	Guideline for the Prevention of Falls in Older	<a href="#">National Library for Health</a>	Defines the role of primary care in case-

	Persons American Geriatrics Society, British Geriatrics Society, and American Academy of Orthopaedic Surgeons Panel on Falls Prevention (2001, updated 2006)	<a href="#">website link</a>	finding high risk fallers
9	The Musculoskeletal Services Framework Department of Health, (2006)	<a href="#">National Library for Health website link</a>	Highlights strategies for secondary fracture prevention and the integration of bone health care with falls services

## 5.5 Clinical Audit Criteria

Primary prevention and secondary prevention criteria are listed in the table below. This is a set of statements about what optimum care should consist of (some might refer to these as standards).

<b>Criterion number</b>	<b>Criterion (English description of criterion)</b>	<b>Is this nationally agreed Yes/no</b>	<b>Guideline number or Evidence based medicine</b>	<b>Related indicators</b>
1	Practices should be able to accurately identify their prevalent population of diagnosed osteoporotic patients	No	Good practice point Necessary denominator	1
2	Patients with a diagnosis of osteoporosis should have either treatment or appropriate follow up	No	Guidelines 1 and 4 Good practice point	2
3	Patients on specific osteoporosis treatment should have evidence of an appropriate diagnostic code	No	Good practice point Data quality standard	3
4	Patients on specific osteoporosis treatments should be co-prescribed calcium and vitamin D unless the clinician is confident they are replete	Yes	Guidelines 1,4,6 (NICE) Evidence-based medicine	4
5	Patients 65 years or older at risk of glucocorticoid induced osteoporosis should receive appropriate preventative therapy	Yes	Guidelines 3 and 4 Evidence-based medicine	5, 6
6	Patients over 75 years in the residential and nursing care home environment should have treatment with a combined calcium and vitamin D3 preparation	Yes	Guideline 1 and 4 Evidence-based medicine	7
7	Patients over 65 years who have sustained a fragility fracture should receive appropriate management and treatment for the secondary prevention of future fracture	Yes	Guideline 1-6 (NICE) and 9 Guideline 4 (men) Evidence-based medicine	8-12

8	Women over 65 years with strong clinical risk factors for osteoporosis but no prior fragility fracture should receive appropriate management and treatment to prevent their first fragility fracture	Yes	Guideline 2 and 4	13, 14
9	Older people in contact with healthcare professionals should be asked routinely whether they have fallen in the past year and asked about the frequency, context and characteristics of the fall/s	Yes	Guideline 2, 7 and 8	16
10	Older people who are considered high risk fallers should be considered for their ability to benefit from interventions to improve strength and balance or referred as appropriate to a multifactorial falls risk assessment.	Yes	Guideline 2, 7, 8 and 9	15, 17, 18
11	Older patients should receive integrated health care to reduce the number of falls that result in serious injury.	Yes	Guideline 2 and 9 Evidence-based medicine	19, 20

## 5.6 Clinical Indicators

This section lists the indicators which will be used to measure standards (or criteria). Reporting will be by appropriate Health Survey for England age bands. In all cases exemptions on the grounds of allergy, contra-indication, intolerance, informed dissent and absence of indication will be reported separately.

Indicator reference number	English description of indicators
1	The percentage of the total practice population (denominator) with a diagnostic code for osteoporosis (numerator)
2	Percentage of patients with a diagnostic code for osteoporosis (denominator) who have evidence of current osteoporosis treatment in the last 6 months or specific osteoporosis assessment within the last 15/12 (numerator)
3	Percentage of patients on specific osteoporosis treatment (denominator) who have evidence of an appropriate diagnostic code (numerator)
4	Percentage of patients on specific osteoporosis treatments (denominator) who have evidence of a co-prescribed combined calcium and vitamin D3 preparation (numerator)
5	The percentage of patients 65 years or older on systemic glucocorticoids for more than 3 months at any dose within the last 6 months (denominator) with evidence of current treatment with a preparation licensed for the prevention of glucocorticoid induced osteoporosis (numerator)
6	The percentage of patients 65 years or older on systemic glucocorticoids for more than 3 months at any dose within the last 6 months (denominator) with evidence of current treatment with a preparation licensed for the prevention of glucocorticoid induced osteoporosis (numerator)
7	The percentage of patients over 75 years recorded as living in a residential or nursing care home environment (denominator) with evidence of current treatment with a combined calcium and vitamin D preparation (numerator)
8	The percentage of females over 75 years with a history of fragility fracture (denominator) with evidence of a currently prescribed bone sparing agent (numerator)
9	The percentage of females aged 65-74 with a history of fragility fracture (denominator) with evidence of referral for bone

	densitometry to determine their risk for future fracture (numerator)
10	The percentage of females aged 65-74 with a history of fragility fracture and who also have a diagnostic code for osteoporosis (denominator) who have evidence of a currently prescribed bone-sparing agent (numerator)
11	The percentage of males over 65 years with a history of fragility fracture (denominator) with evidence of referral for bone densitometry to determine their risk for future fracture (numerator)
12	The percentage of males over 65 years with a history of fragility fracture (denominator) and who also have a diagnostic code for osteoporosis who have evidence of currently prescribed alendronate (numerator)
13	The percentage of females over the age of 65 with recorded strong clinical risk factors for osteoporosis (denominator) who have evidence of either a referral for bone densitometry in the last three years or osteoporosis assessment in the last three years (numerator)
14	The percentage of patients over the age of 65 with recorded strong clinical risk factors for osteoporosis and who also have a diagnostic code for osteoporosis (denominator) who have evidence of a currently prescribed bone sparing agent (numerator)
15	The percentage of the total practice population (denominator) who are patients 75 years or older at high risk of falls (numerator) defined as those with a history of two or more falls in the last 12 months or one fall in the last 12 months and a disorder of gait and balance
16	The percentage of patients over 75 years with a record of a contact with a healthcare professional in the previous 12 months (denominator) who have a record of an enquiry about the number of falls they have experienced in the preceding 12 months (numerator)
17	The percentage of patients over 75 years who are recorded as reporting a single fall in the previous 12 months (denominator) who are documented as having been observed for a disorder of gait and balance (numerator)
18	The percentage of patients over 75 years who are at a high risk of falls (denominator) who have a record of having been offered a referral to a falls service or an exercise programme (numerator)
19	The percentage of patients over 75 years who have osteoporosis or a history of a fragility fracture (denominator) who have evidence of a falls assessment (numerator)
20	The percentage of patients over 75 years at high risk of falls (denominator) who have evidence of an assessment for osteoporosis in the last three years (numerator)



## 6. Results

### 6.1 Overview

Table 1 shows the distribution of 487 practices and 3.4 million patients included in the analysis, by Government Office Region and county. Of these patients, 557 thousand (16.5% of total) were aged 65 or over and 1.7 million (50.2% of total) were female.

**Table 1: Distribution of practices and patients registered with QRESEARCH**

<b>Region</b>	<b>No. of QRESEARCH practices</b>	<b>Total population coverage</b>	<b>No. females aged 65+ years</b>	<b>No. males aged 65+ years</b>
North East	26	199,570	18,735	14,056
North West	54	324,686	28,543	22,244
Yorkshire & Humberside	54	372,390	36,607	28,330
East Midlands	80	500,540	45,802	36,719
West Midlands	37	264,262	28,283	22,064
East of England	38	283,106	26,477	21,273
London	58	390,463	23,292	17,251
South East	67	523,392	48,270	37,673
South West	60	422,950	45,494	36,055
Wales	12	104,117	10,980	8,638
Scotland	1	658	34	37
Northern Ireland	0	0	0	0
<b>Totals</b>	<b>487</b>	<b>3,386,134</b>	<b>312,517</b>	<b>244,340</b>

Figure 2 shows the age-sex distribution of the study population compared with ONS mid-year population estimates for 2005 (ONS estimates for 2006 were not available at the time of writing). Overall, patients in QRESEARCH practices were marginally older than national estimates. For example, 16.5% of QRESEARCH patients were aged 65+ years compared with 16.0% of the UK population.

**Figure 2: Age-sex population distribution in QRESEARCH and the UK**

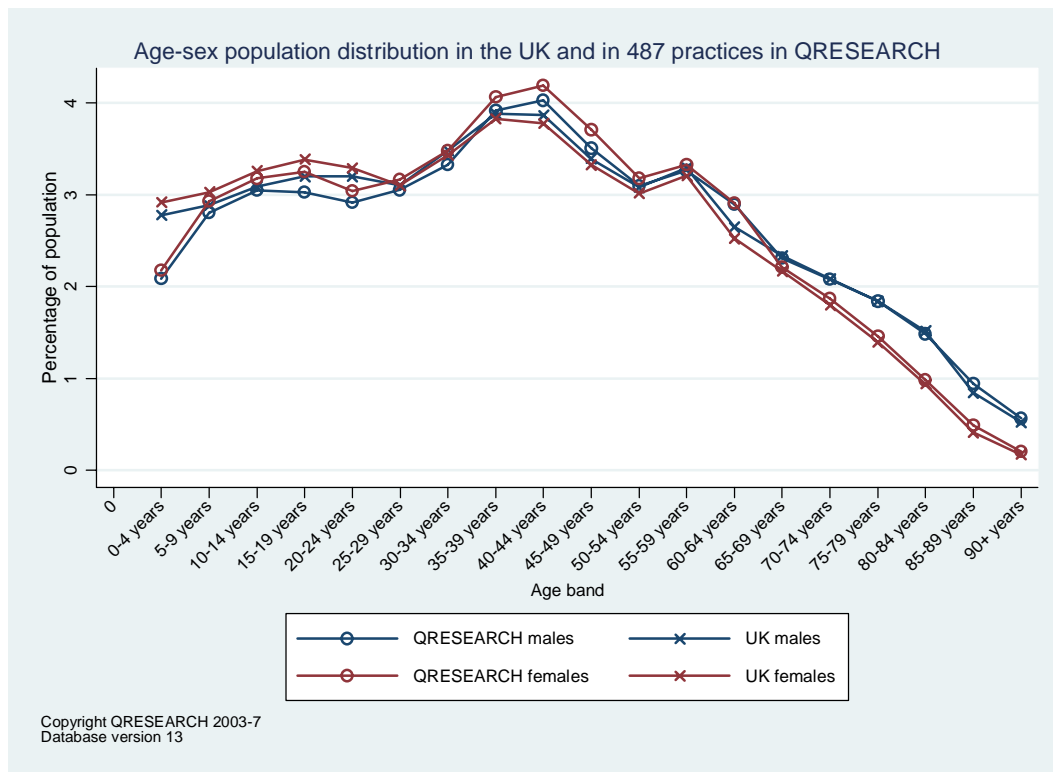


Figure 3 shows the percentage of patients achieving each of the indicators. The indicator with the highest achievement was indicator 10 (73%) i.e. 73% of females aged 65-74 with a history of fragility fracture and a diagnostic code for osteoporosis also had a record of a currently prescribed bone-sparing agent.

**Figure 3: Percentage of patients in QRESEARCH achieving each of the indicators**

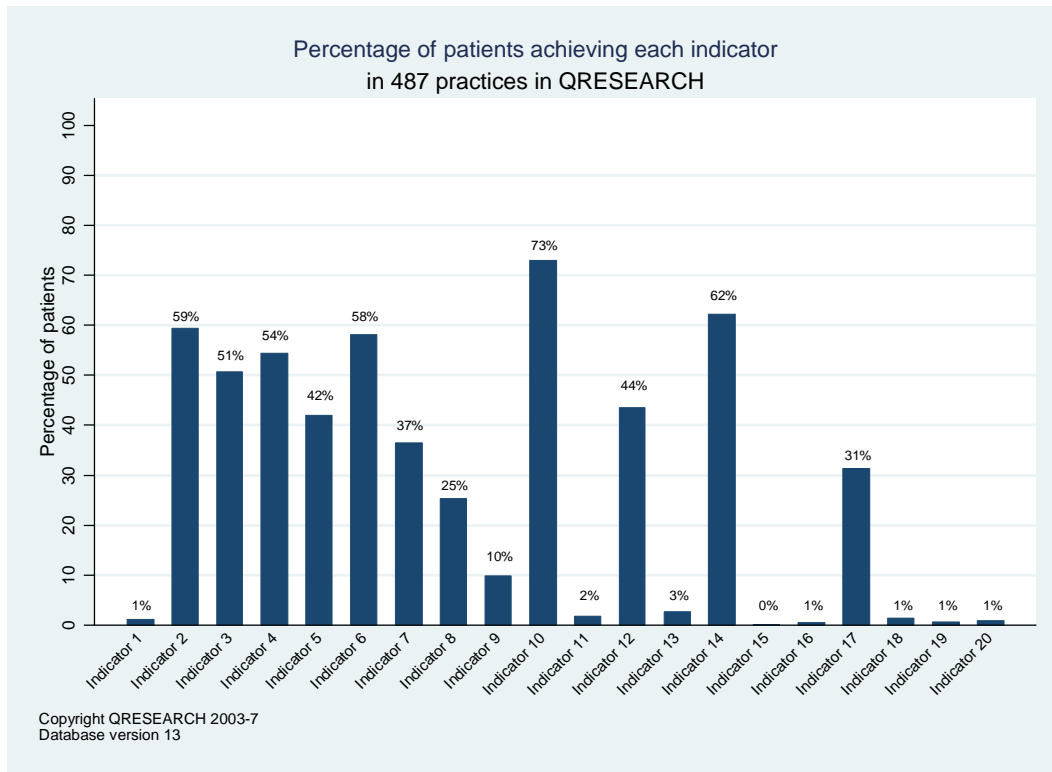


Table 2 shows the summary statistics for the percentage of patients achieving each of the indicators.

**Table 2: Summary statistics for the percentage of patients achieving each indicator**

Indicator		Overall statistics					Practice-level statistics				
Code	Description	Number of patients achieving indicator	Number of eligible patients	Percentage of patients achieving indicator	95% CI		Median practice %	Lower quartile %	Upper quartile %	Minimum %	Maximum %
1	% of patients diagnosed with osteoporosis	39,538	3,386,134	1.17	1.16	1.18	1.1	0.7	1.5	0.0	3.9
2	% of patients with osteoporosis with evidence of current osteoporosis treatment in the last 6 months or specific osteoporosis assessment within the last 15 months	23,462	39,538	59.3	58.9	59.8	60.3	52.4	66.7	0.0	100.0
3	% of patients on specific osteoporosis treatment with evidence of an appropriate diagnostic code	23,354	46,113	50.6	50.2	51.1	49.7	41.4	59.1	0.0	94.1
4	% of patients on specific osteoporosis treatments with evidence of a co-prescribed combined calcium and vitamin D3 preparation	25,104	46,113	54.4	54.0	54.9	54.7	42.5	66.1	4.8	96.9
5	% of patients aged 65+ years on systemic glucocorticoids for more than 3 months at any dose* with current treatment with a preparation licensed for the prevention of glucocorticoid induced osteoporosis	7,256	17,280	42.0	41.3	42.7	40.0	31.8	50.0	0.0	100.0

Indicator		Overall statistics					Practice-level statistics				
Code	Description	Number of patients achieving indicator	Number of eligible patients	Percentage of patients achieving indicator	95% CI		Median practice %	Lower quartile %	Upper quartile %	Minimum %	Maximum %
6	% of patients aged 65+ years on systemic glucocorticoids for more than 3 months at any dose** within the last 6 months with current treatment with a preparation licensed for the prevention of glucocorticoid induced osteoporosis	72	124	58.1	48.9	66.9	50.0	0.0	100.0	0.0	100.0
7	% of patients aged 75+ living in a residential or nursing care home environment (denominator) with current treatment with a combined calcium and vitamin D preparation	1,248	3,418	36.5	34.9	38.2	20.7	0.0	43.8	0.0	100.0
8	% of females aged 75+ with a history of fragility fracture (denominator) with a prescribed bone sparing agent	7,860	31,094	25.3	24.8	25.8	25.0	18.2	32.0	0.0	85.7
9	% of females aged 65-74 with a history of fragility fracture (denominator) with a referral for bone densitometry to determine their risk for future fracture	1,476	15,025	9.8	9.4	10.3	5.3	0.0	12.5	0.0	75.0
10	% of females aged 65-74 with a history of fragility fracture and a diagnostic code for osteoporosis (denominator) who have a currently prescribed bone-sparing agent	1,862	2,551	73.0	71.2	74.7	75.0	60.0	100.0	0.0	100.0
11	% of males aged 65+ with a history of	261	14,651	1.8	1.6	2.0	0.0	0.0	2.1	0.0	33.3

	fragility fracture (denominator) with a referral for bone densitometry to determine their risk for future fracture										
12	% of males over 65+ with a history of fragility fracture and a diagnostic code for osteoporosis (denominator) with a currently prescribed alendronate	305	700	43.6	39.9	47.3	50.0	0.0	100.0	0.0	100.0
13	% of females aged 65+ with strong clinical risk factors for osteoporosis (denominator) who have evidence of either a referral for bone densitometry in the last three years or osteoporosis assessment in the last three years	1,143	41,606	2.8	2.6	2.9	1.0	0.0	3.1	0.0	61.5
14	% of patients aged 65+ with strong clinical risk factors for osteoporosis and a diagnostic code for osteoporosis (denominator) with a currently prescribed bone sparing agent	3,255	5,230	62.2	60.9	63.6	63.6	50.0	76.2	0.0	100.0
15	% of the total practice population who are aged 75+ and at high risk of falls	1,076	3,386,134	0.032	0.030	0.034	0.0	0.0	0.0	0.0	1.0
16	% of patients aged 75+ who have contacted a healthcare professional in the previous 12 months (denominator) who have enquired about the number of falls they have experienced in the preceding 12 months	1,335	251,409	0.53	0.50	0.56	0.0	0.0	0.2	0.0	51.3
17	% of patients aged 75+ who have reported a single fall in the previous 12 months (denominator) who have been observed for a disorder of gait and balance	32	102	31.4	22.5	41.3	31.9	7.1	43.2	0.0	75.0

Indicator		Overall statistics					Practice-level statistics				
Code	Description	Number of patients achieving indicator	Number of eligible patients	Percentage of patients achieving indicator	95% CI		Median practice %	Lower quartile %	Upper quartile %	Minimum %	Maximum %
18	% of patients aged 75+ at high risk of falls (denominator) who have been offered a referral to a falls service or an exercise programme	15	1,076	1.4	0.8	2.3	0.0	0.0	0.0	0.0	100.0
19	% of patients aged 75+ with osteoporosis or a history of a fragility fracture (denominator) who have evidence of a falls assessment	319	50,522	0.63	0.56	0.70	0.0	0.0	0.0	0.0	32.4
20	% of patients aged 75+ at high risk of falls who have been assessed for osteoporosis in the last 3 years	10	1,076	0.93	0.45	1.70	0.0	0.0	0.0	0.0	100.0

\* defined as at least two prescriptions of systemic glucocorticoids in the past 6 months

\*\* defined as at least one prescription of systemic glucocorticoids in the past 6 months AND Read code 376

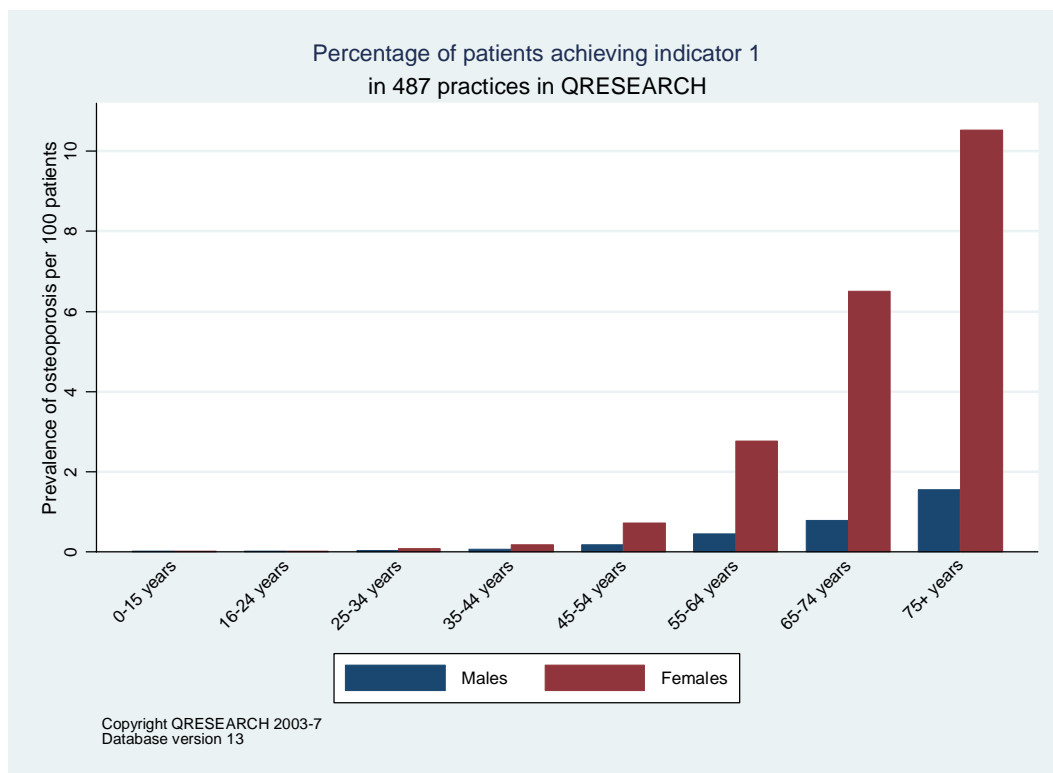
## 6.2 Indicator 1 – prevalence of diagnosed osteoporosis in the total practice population

Overall, across all 487 practices, there were 3.4 million registered patients. Of these 39,538 patients had a computer diagnostic code for osteoporosis giving a crude prevalence of 1.17 (95% CI 1.16 to 1.18) per 100. The prevalence standardized by sex and five-year age bands was 1.14 (95% CI 1.13 to 1.15) per 100.

We estimate there are 686,300 (95% CI 679,500 to 693,100) patients in the UK with computer recorded diagnosis of osteoporosis within the electronic primary care record.

Figure 4 and Table 3 show the prevalence by age and sex – as expected osteoporosis was most common in females aged 75 and over where the prevalence was 10.5 (95% CI 10.4 to 10.7) per 100. The prevalence rises steeply with age – the prevalence almost doubles in women across each ten year age band. The lowest rates occurred in males aged under 15 years, where the prevalence was 3.0 (95% CI 1.4 to 5.6) per 100,000.

**Figure 4: Percentage of patients in QRESEARCH diagnosed with osteoporosis by age and sex**



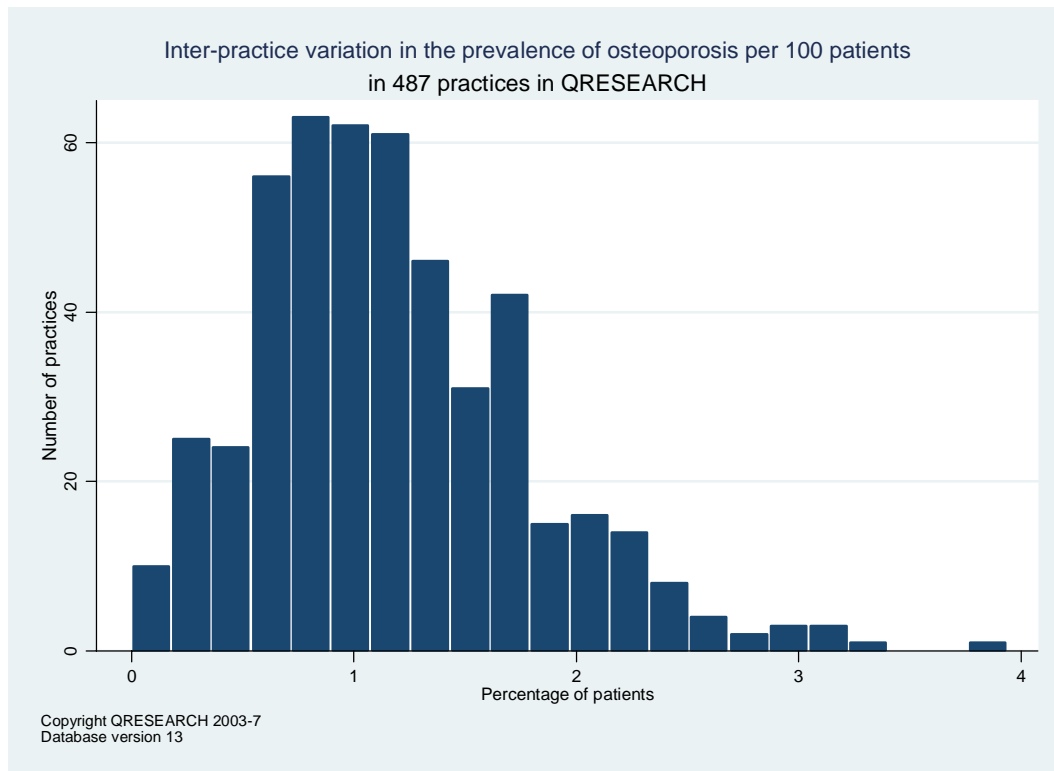


**Table 3: Percentage of patients in QRESEARCH diagnosed with osteoporosis by age and sex**

Sex	Age band	Numerator	Denominator	Percentage	95% Confidence interval	
<b>Females</b>	<b>0-15 years</b>	13	290,414	0.00	0.00	0.01
	<b>16-24 years</b>	51	179,162	0.03	0.02	0.04
	<b>25-34 years</b>	179	216,075	0.08	0.07	0.10
	<b>35-44 years</b>	485	269,020	0.18	0.16	0.20
	<b>45-54 years</b>	1,623	223,593	0.73	0.69	0.76
	<b>55-64 years</b>	5,775	208,558	2.77	2.70	2.84
	<b>65-74 years</b>	9,672	148,571	6.51	6.39	6.64
	<b>75+ years</b>	17,267	163,946	10.53	10.38	10.68
<b>Males</b>	<b>0-15 years</b>	9	303,582	0.00	0.00	0.01
	<b>16-24 years</b>	36	189,862	0.02	0.01	0.03
	<b>25-34 years</b>	96	225,076	0.04	0.03	0.05
	<b>35-44 years</b>	200	279,476	0.07	0.06	0.08
	<b>45-54 years</b>	430	233,369	0.18	0.17	0.20
	<b>55-64 years</b>	953	211,090	0.45	0.42	0.48
	<b>65-74 years</b>	1,095	138,258	0.79	0.75	0.84
	<b>75+ years</b>	1,654	106,082	1.56	1.49	1.64

Figure 5 shows the variation between practices in the percentage of patients diagnosed with osteoporosis. The median practice achievement was 1.1% (IQR 0.7% to 1.5%). The minimum was 0% and the maximum was 3.9%. Of the 487 practices, only 1 practice had no patients with a diagnostic code for osteoporosis.

Figure 5: Inter-practice variation in percentage of patients diagnosed with osteoporosis



**6.3 Indicator 2 – % of patients with diagnosed osteoporosis who have evidence of current osteoporosis treatment in the last 6 months or specific osteoporosis assessment within the last 15 months**

Overall there were 39,538 registered patients who were eligible for indicator 2. Of these 23,462 (59.3%, 95% CI 58.9% to 59.8%) achieved the indicator. In other words, of all patients with a diagnostic code for osteoporosis, 59% had evidence of current osteoporosis treatment in the last 6 months or specific osteoporosis assessment within the last 15 months.

Figure 6 and Table 4 show the percentage of patients achieving indicator 2 by age and sex. The highest percentage was 63.6% (95% CI 62.6% to 64.6%) which occurred in females aged 65-74 years. Treatment rates in patients under 55 years were particularly low and the rates were lower in females than males.

**Figure 6: Percentage of patients in QRESEARCH who achieved indicator 2, by age and sex**

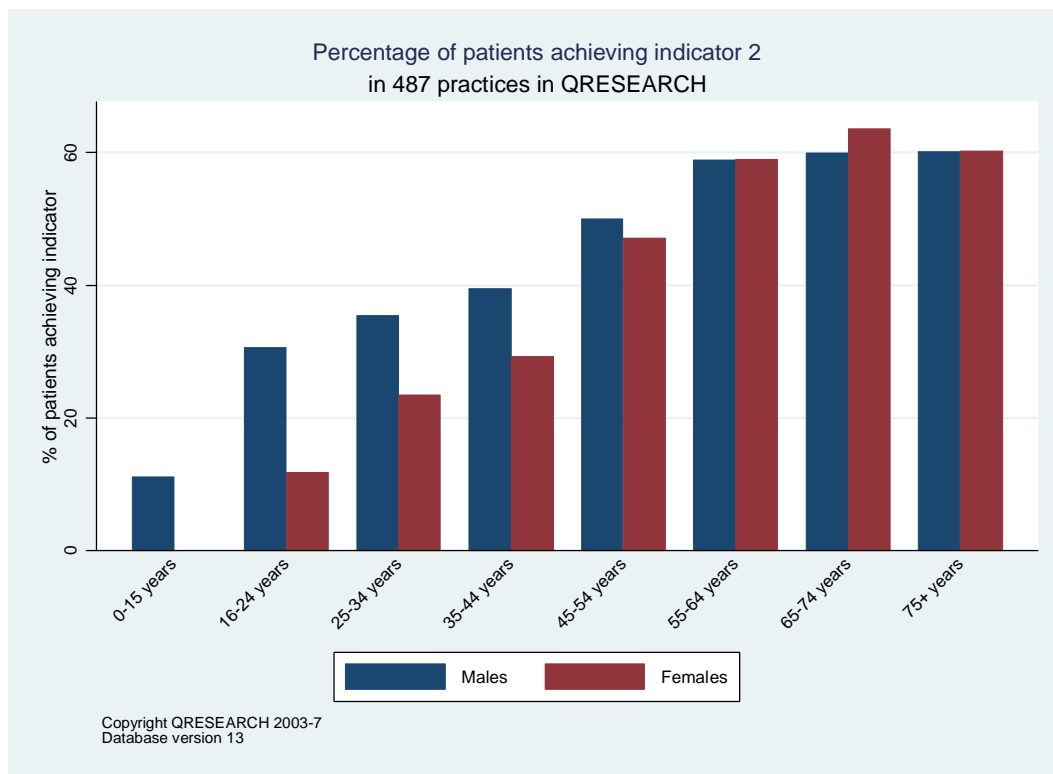
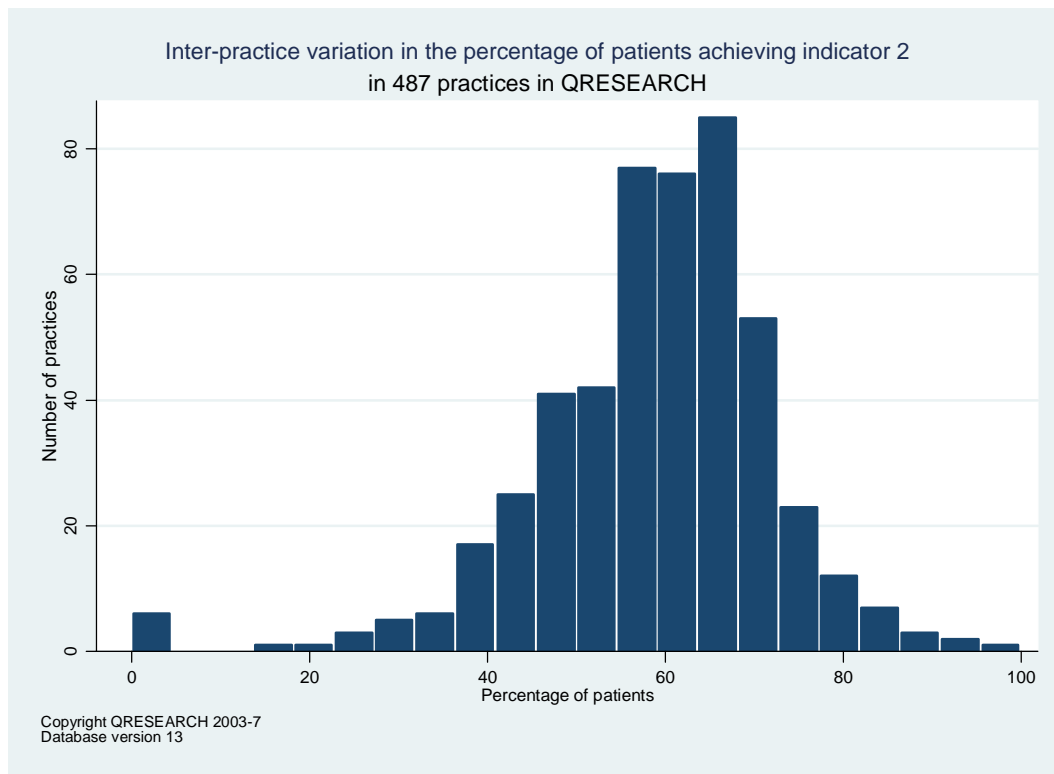


Table 4: Percentage of patients in QRESEARCH achieving indicator 2 by age and sex

Sex	Age band	Numerator	Denominator	Percentage	95% Confidence interval	
<b>Females</b>	<b>0-15 years</b>	0	13	0.00	0.00	24.71
	<b>16-24 years</b>	6	51	11.76	4.44	23.87
	<b>25-34 years</b>	42	179	23.46	17.46	30.36
	<b>35-44 years</b>	142	485	29.28	25.26	33.55
	<b>45-54 years</b>	764	1,623	47.07	44.62	49.54
	<b>55-64 years</b>	3,404	5,775	58.94	57.66	60.22
	<b>65-74 years</b>	6,152	9,672	63.61	62.64	64.57
	<b>75+ years</b>	10,401	17,267	60.24	59.50	60.97
<b>Males</b>	<b>0-15 years</b>	1	9	11.11	0.28	48.25
	<b>16-24 years</b>	11	36	30.56	16.35	48.11
	<b>25-34 years</b>	34	96	35.42	25.92	45.84
	<b>35-44 years</b>	79	200	39.50	32.68	46.64
	<b>45-54 years</b>	215	430	50.00	45.17	54.83
	<b>55-64 years</b>	561	953	58.87	55.67	62.01
	<b>65-74 years</b>	656	1,095	59.91	56.94	62.83
	<b>75+ years</b>	994	1,654	60.10	57.69	62.47

Figure 7 shows the variation between practices in the percentage of patients achieving indicator 2. The median achievement was 60.3% (IQR 52.4% to 66.7%). The minimum was 0% and the maximum was 100%. Of the 487 practices 1 practice had no eligible patients and a further 6 practices had no patients achieving the indicator. Only 1 practice had 100% achievement and this was based on a single eligible patient.

Figure 7: Inter-practice variation in percentage of patients achieving indicator 2



**6.4 Indicator 3 – % of patients on osteoporotic treatment who also have a computer recorded diagnosis of osteoporosis**

Overall there were 46,113 registered patients on osteoporosis medication and of these 23,354 (50.6%, 95% CI 50.2% to 51.1%) also had a computer recorded diagnosis of osteoporosis. In other words, of all patients on osteoporosis treatment only half had an appropriate diagnosis code in their electronic records.

Figure 8 and Table 5 show the percentage of patients achieving indicator 3 by age and sex. The highest percentage was 57.9% (95% CI 57.0% to 58.9%) which occurred in females aged 65-74 years. The results for this indicator demonstrate a significant under recording of the diagnosis of osteoporosis among patients on specific osteoporosis treatment – this is particularly noticeable in elderly males where the diagnosis is only recorded in one third of patients. The implication of this is that osteoporosis registers are incomplete and prevalence estimates based on osteoporosis diagnoses alone are likely to significantly under-estimate the prevalence of clinically apparent osteoporosis.

**Figure 8: Percentage of patients in QRESEARCH achieving indicator 3, by age and sex**

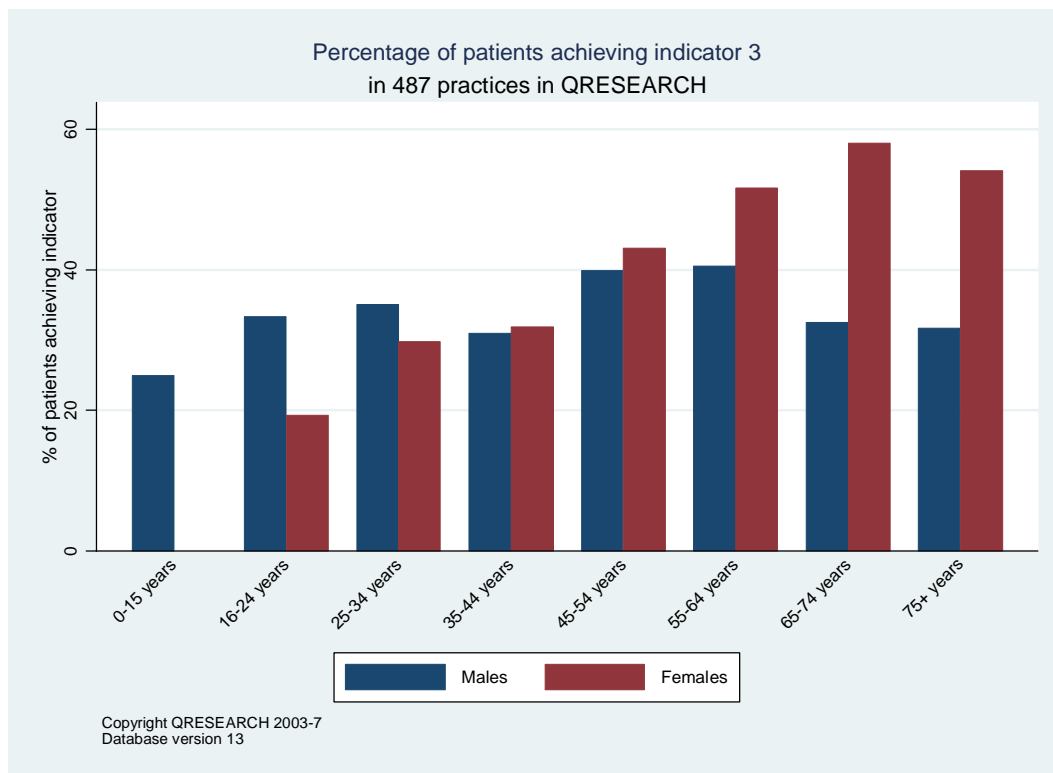
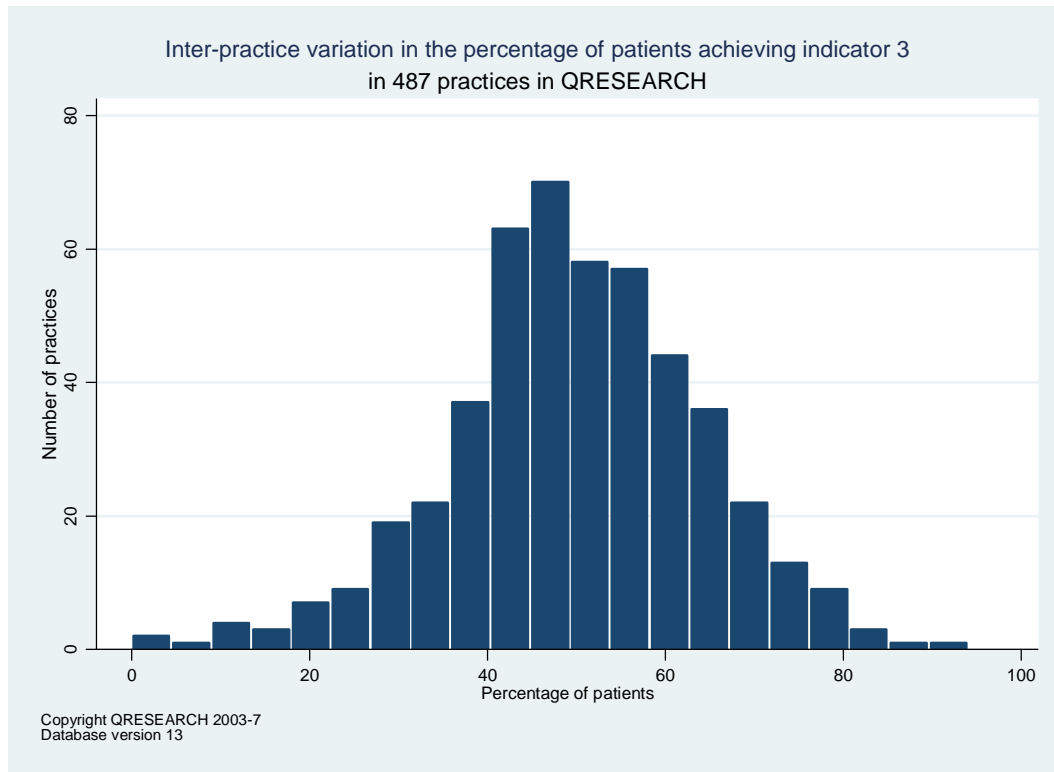


Table 5: Percentage of patients in QRESEARCH achieving indicator 3, by age and sex

Sex	Age band	Patients achieving indicator	Patients eligible for indicator	Percentage	95% Confidence interval	
Females	0-15 years	0	3	0.00	0.00	70.76
	16-24 years	6	31	19.35	7.45	37.47
	25-34 years	42	141	29.79	22.38	38.06
	35-44 years	141	443	31.83	27.51	36.39
	45-54 years	762	1,769	43.08	40.75	45.42
	55-64 years	3,382	6,559	51.56	50.35	52.78
	65-74 years	6,128	10,578	57.93	56.98	58.87
	75+ years	10,351	19,150	54.05	53.34	54.76
Males	0-15 years	1	4	25.00	0.63	80.59
	16-24 years	11	33	33.33	17.96	51.83
	25-34 years	34	97	35.05	25.64	45.41
	35-44 years	79	255	30.98	25.36	37.05
	45-54 years	212	532	39.85	35.66	44.15
	55-64 years	558	1,378	40.49	37.89	43.14
	65-74 years	656	2,016	32.54	30.50	34.63
	75+ years	991	3,124	31.72	30.09	33.39

Figure 9 shows a wide variation between practices in the percentage of patients achieving indicator 3. The median achievement was 49.7% (IQR 41.4% to 59.1%). The minimum was 0% and the maximum was 94.1%. Of the 487 practices, only 6 had no eligible patients and 1 further practice had no patients achieving the indicator.

Figure 9: Inter-practice variation in the percentage of patients achieving indicator 3





### 6.5 Prevalence of clinically apparent osteoporosis

Figure 10 shows the prevalence of clinically apparent osteoporosis (defined as either treatment or a diagnosis of osteoporosis). We identified 39,538 patients with a diagnostic code for osteoporosis and a further 22,759 patients with evidence of osteoporosis treatment only. Therefore of the 3,386,134 total registered patients there were 62,297 with either a diagnostic code or evidence of treatment for osteoporosis, i.e. the prevalence of clinically apparent osteoporosis was 1.84 (95% CI 1.83 to 1.85) per 100.

**Figure 10: Prevalence of clinically apparent osteoporosis by age and sex**

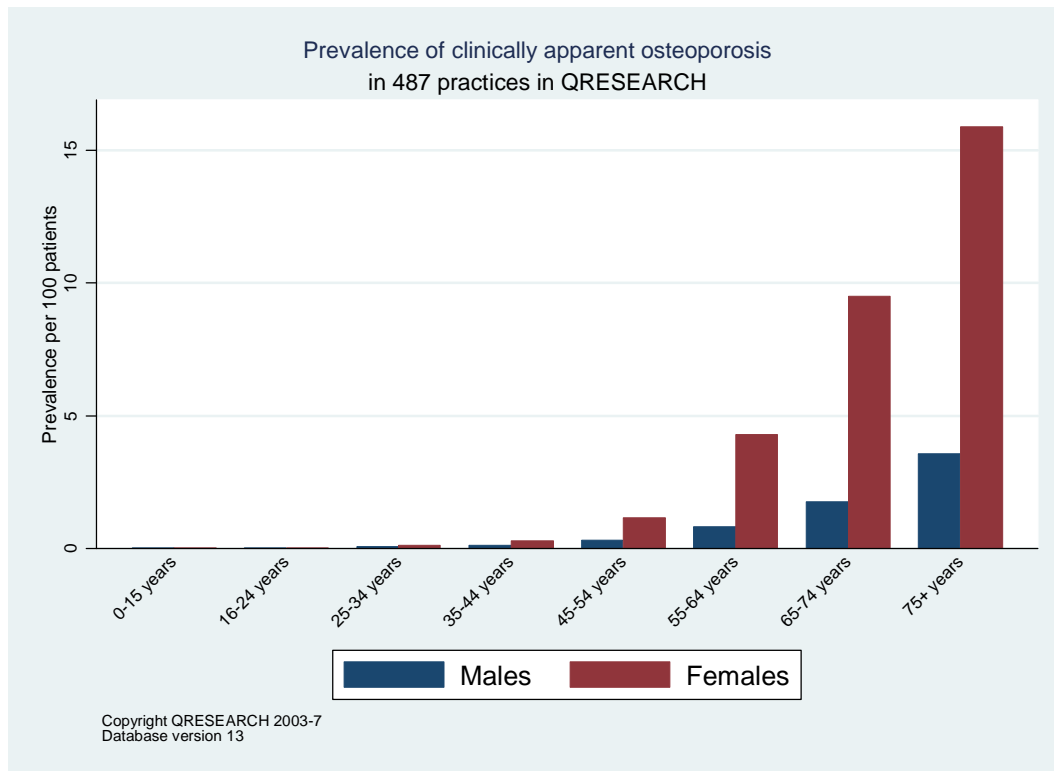


Table 6 shows the prevalence of clinically apparent osteoporosis per 100 patients by age and sex. The distribution is very similar to indicator 1.

**Table 6: Prevalence of clinically apparent osteoporosis by age and sex**

Sex	Age band	Patients achieving indicator	Patients eligible for indicator	Percentage	95% Confidence interval	
<b>Females</b>	<b>0-15 years</b>	16	290,414	0.006	0.003	0.009
	<b>16-24 years</b>	76	179,162	0.042	0.033	0.053
	<b>25-34 years</b>	278	216,075	0.129	0.114	0.145
	<b>35-44 years</b>	787	269,020	0.29	0.27	0.31
	<b>45-54 years</b>	2,630	223,593	1.18	1.13	1.22
	<b>55-64 years</b>	8,952	208,558	4.29	4.21	4.38
	<b>65-74 years</b>	14,122	148,571	9.51	9.36	9.66
	<b>75+ years</b>	26,066	163,946	15.90	15.72	16.08
<b>Males</b>	<b>0-15 years</b>	12	303,582	0.00	0.00	0.01
	<b>16-24 years</b>	58	189,862	0.03	0.02	0.04
	<b>25-34 years</b>	159	225,076	0.07	0.06	0.08
	<b>35-44 years</b>	376	279,476	0.13	0.12	0.15
	<b>45-54 years</b>	750	233,369	0.32	0.30	0.35
	<b>55-64 years</b>	1,773	211,090	0.84	0.80	0.88
	<b>65-74 years</b>	2,455	138,258	1.78	1.71	1.85
	<b>75+ years</b>	3,787	106,082	3.57	3.46	3.68

**6.6 Indicator 4 - % of patients on specific osteoporosis treatments with evidence of a co-prescribed combined calcium and vitamin D3 preparation**

Overall there were 46,113 registered patients on osteoporosis treatments of whom 25,104 (54.4%, 95% CI 54.0% to 54.9%) had been co-prescribed a calcium/Vitamin D3 preparation. In other words, of all patients on specific osteoporosis treatments just over half had evidence of a co-prescribed combined calcium and vitamin D3 preparation.

Figure 11 and Table 7 show the percentage of patients achieving indicator 4 by age and sex (the percentages for patients under the age of 15 are based on extremely small numbers).

**Figure 11: Percentage of patients in QRESEARCH achieving indicator 4, by age and sex**

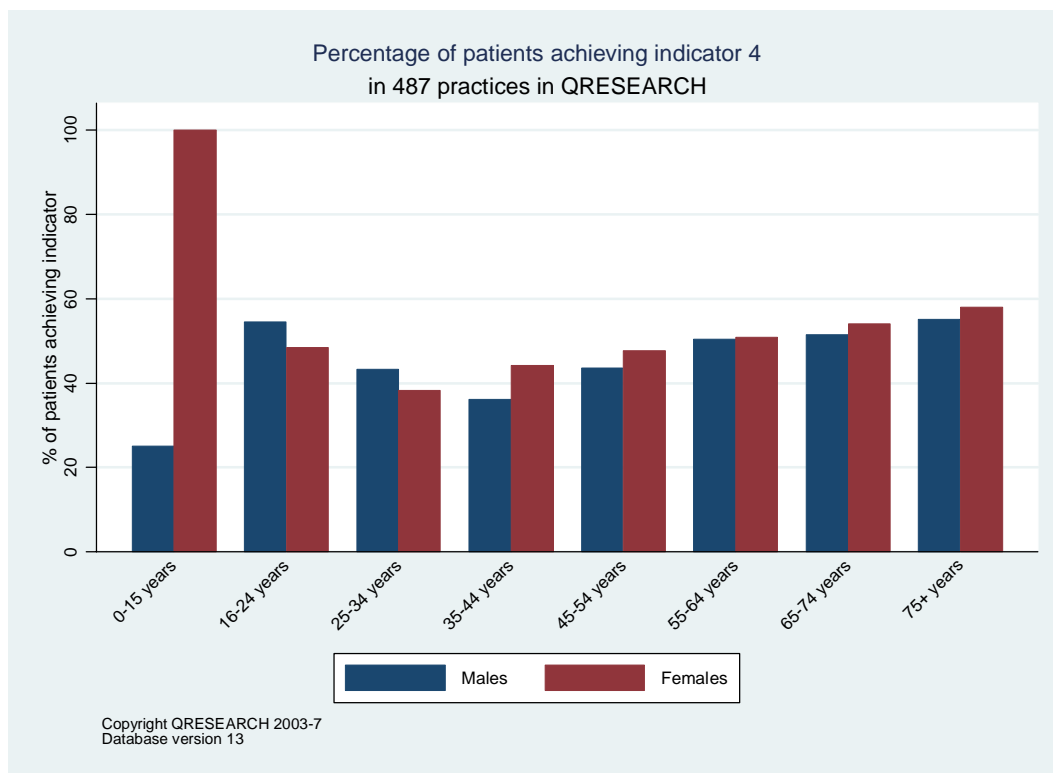
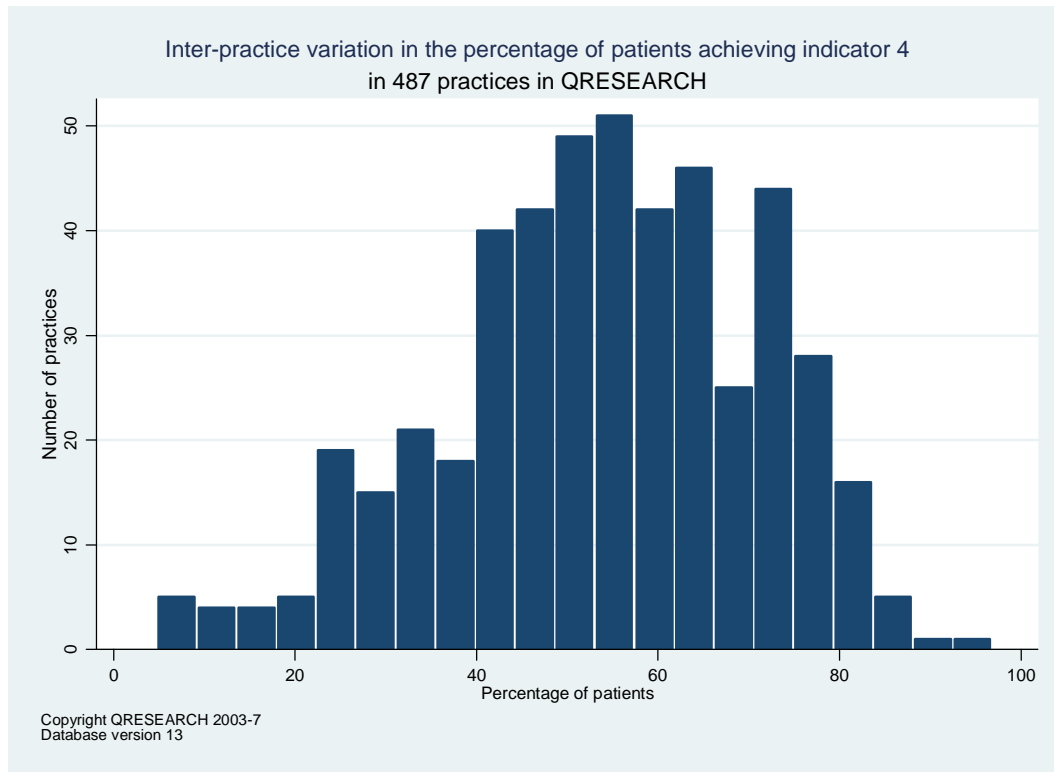


Table 7: Percentage of patients in QRESEARCH achieving indicator 4 by age and sex

Sex	Age band	Patients achieving indicator	Patients eligible for indicator	Percentage	95% Confidence interval	
Females	0-15 years	3	3	100.00	29.24	100.00
	16-24 years	15	31	48.39	30.15	66.94
	25-34 years	54	141	38.30	30.24	46.85
	35-44 years	196	443	44.24	39.56	49.01
	45-54 years	842	1,769	47.60	45.25	49.96
	55-64 years	3,330	6,559	50.77	49.55	51.99
	65-74 years	5,721	10,578	54.08	53.13	55.04
	75+ years	11,109	19,150	58.01	57.31	58.71
Males	0-15 years	1	4	25.00	0.63	80.59
	16-24 years	18	33	54.55	36.35	71.89
	25-34 years	42	97	43.30	33.27	53.75
	35-44 years	92	255	36.08	30.18	42.30
	45-54 years	232	532	43.61	39.35	47.94
	55-64 years	694	1,378	50.36	47.69	53.04
	65-74 years	1,036	2,016	51.39	49.18	53.59
	75+ years	1,719	3,124	55.03	53.26	56.78

Figure 12 shows the variation between practices in the percentage of patients achieving indicator 4. The median achievement was 54.7% (IQR 42.5% to 66.1%). The minimum was 4.8% and the maximum was 96.9%. Of the 487 practices 6 practices had no eligible patients. All other practices had at least 1 patient achieving the indicator.

Figure 12: Inter-practice variation in percentage of patients achieving indicator 4

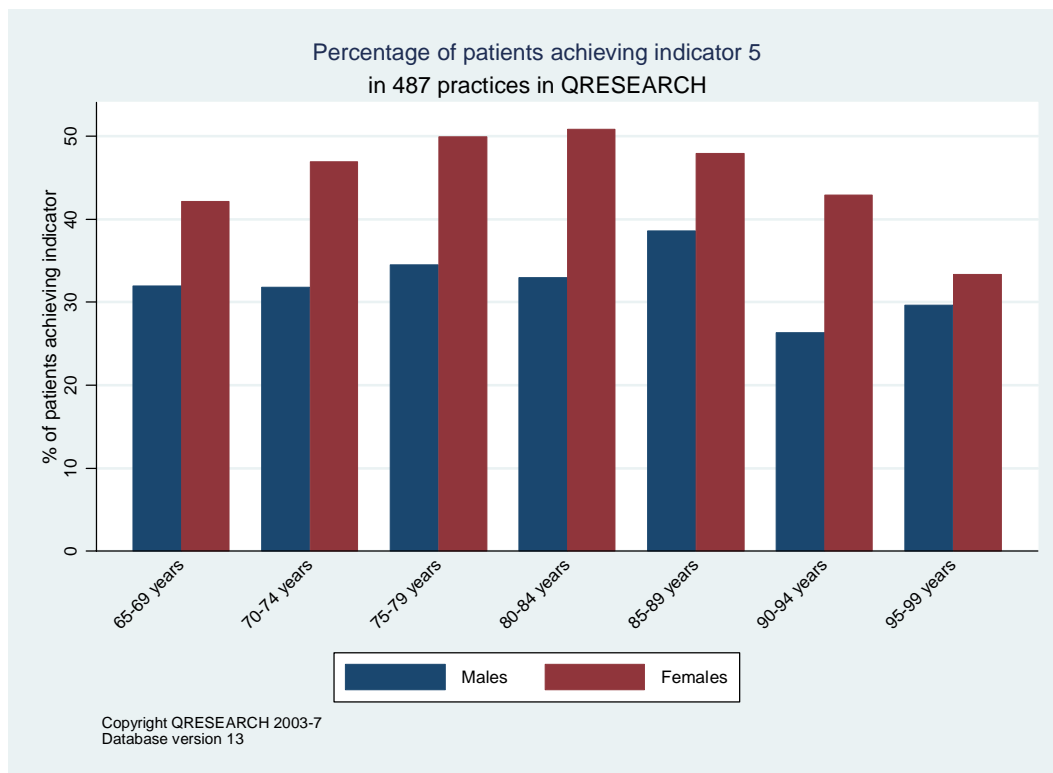


**6.7 Indicator 5 - % of patients aged 65+ years with at least 2 prescriptions for systemic glucocorticoids in the last 6 months with evidence of current treatment with a preparation licensed for the prevention of glucocorticoid induced osteoporosis**

Overall there were 17,280 registered patients aged 65 plus who had at least two prescriptions for systemic glucocorticoids in the last six months. Of these 7,256 (42.0%, 95% CI 41.3% to 42.7%) achieved the indicator. In other words, of all patients aged 65+ years on systemic glucocorticoids for more than 3 months at any dose just under half had evidence of current treatment with a preparation licensed for the prevention of glucocorticoid induced osteoporosis.

Figure 13 and Table 8 show the percentage of patients aged 65 plus achieving indicator 5 by age and sex. The highest percentage was 50.9% (95% CI 48.8% to 53.0%) which occurred in females aged 80-84 years. Treatment levels among females were consistently higher than among males, although the overall rates are low. Only one quarter of males aged 90-94 years achieved the indicator.

**Figure 13: Percentage of patients in QRESEARCH achieving indicator 5, by age and sex**

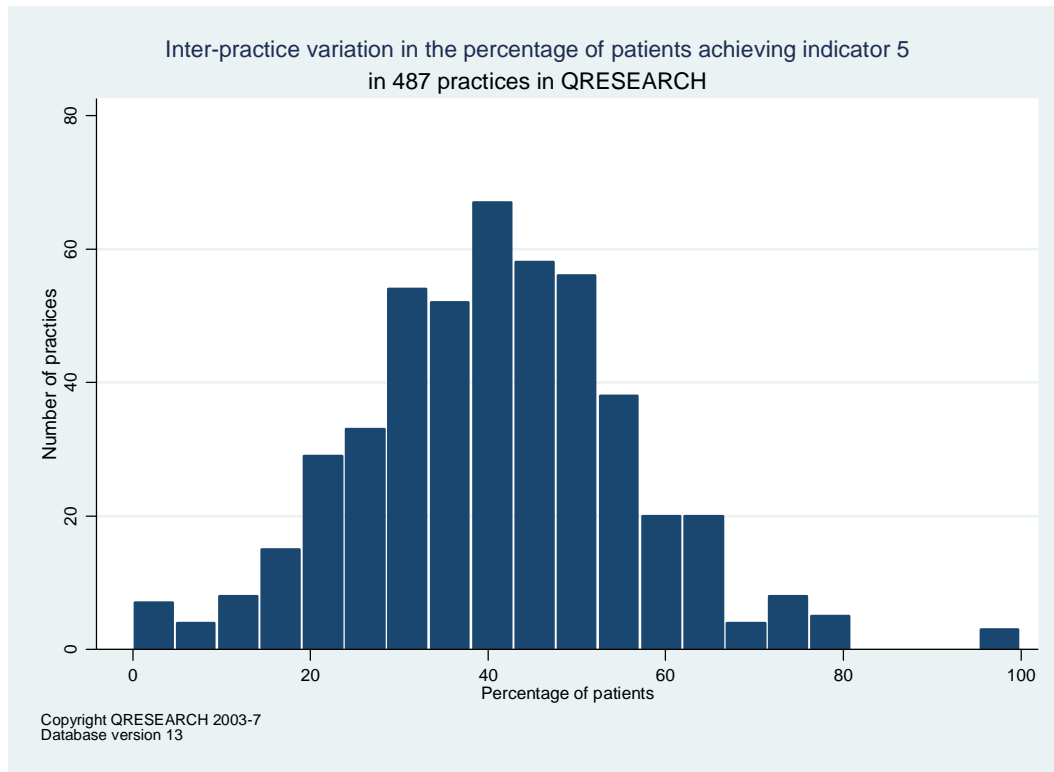


**Table 8: Percentage of patients in QRESEARCH achieving indicator 5, by age and sex**

Sex	Age band	Patients achieving indicator	Patients eligible for indicator	Percentage	95% Confidence interval	
<b>Females</b>	<b>65-69 years</b>	836	1,984	42.14	39.95	44.35
	<b>70-74 years</b>	1,080	2,300	46.96	44.90	49.02
	<b>75-79 years</b>	1,248	2,499	49.94	47.96	51.92
	<b>80-84 years</b>	1,084	2,130	50.89	48.75	53.04
	<b>85-89 years</b>	617	1,288	47.90	45.14	50.67
	<b>90-94 years</b>	189	440	42.95	38.28	47.73
	<b>95-99 years</b>	29	87	33.33	23.58	44.25
<b>Males</b>	<b>65-69 years</b>	469	1,468	31.95	29.57	34.40
	<b>70-74 years</b>	506	1,589	31.84	29.56	34.20
	<b>75-79 years</b>	538	1,558	34.53	32.17	36.95
	<b>80-84 years</b>	391	1,186	32.97	30.30	35.73
	<b>85-89 years</b>	221	572	38.64	34.63	42.76
	<b>90-94 years</b>	40	152	26.32	19.51	34.07
	<b>95-99 years</b>	8	27	29.63	13.75	50.18

Figure 14 shows the variation between practices in the percentage of patients achieving indicator 5. The median achievement was 40.0% (IQR 31.8% to 50.0%). The minimum was 0% and the maximum was 100%. Of the 487 practices 6 practices had no eligible patients and a further 7 practices had no patients achieving the indicator. Three practices had 100% achievement although none of these had more than 2 eligible patients.

Figure 14: Inter-practice variation in percentage of patients achieving indicator 5





**6.8 Indicator 6 - % of patients aged 65+ years with two or more prescriptions for systemic glucocorticoids in the past 6 months and a Read code indicating long term steroid use who also have evidence of current treatment with a preparation licensed for the prevention of glucocorticoid induced osteoporosis**

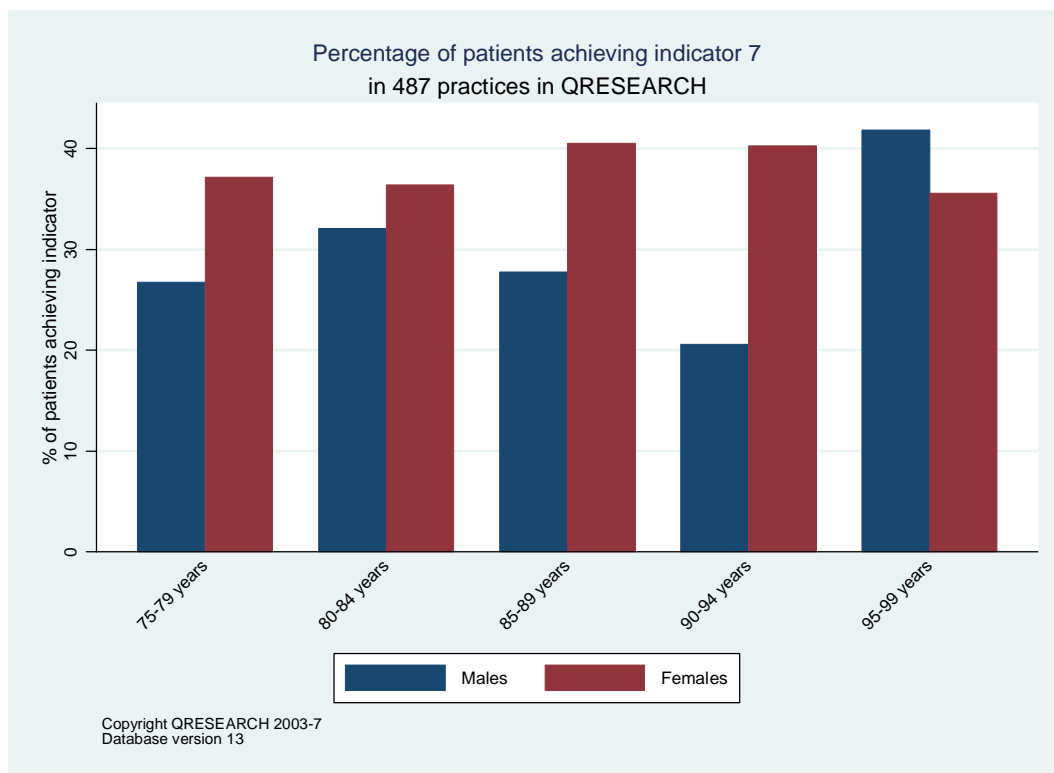
Overall there were 124 registered patients who were eligible for indicator 6. This denominator is very low because the Read code used for the definition is not one which is often used in general practice. We would therefore recommend the definition for indicator 5 in preference to this definition for future audits.

**6.9 Indicator 7 - % of patients aged 75+ years living in a residential or nursing care home environment with evidence of current treatment with a combined calcium and vitamin D preparation**

Overall there were 3,418 registered patients recorded as living in a residential or nursing care home environment (1.3% of all patients aged over 75 years). Of these patients eligible for indicator 7, 1,248 (36.5%, 95% CI 34.9% to 38.2%) had evidence of current treatment with a combined calcium and vitamin D preparation.

Figure 15 and Table 9 show the percentage of patients achieving indicator 7 by age and sex. The highest percentage was 41.9% (95% CI 27.0% to 57.9%) which occurred in males aged 95-99 years. Only one fifth of males aged 90-94 years achieved the indicator.

**Figure 15: Percentage of patients in QRESEARCH achieving indicator 7, by age and sex**

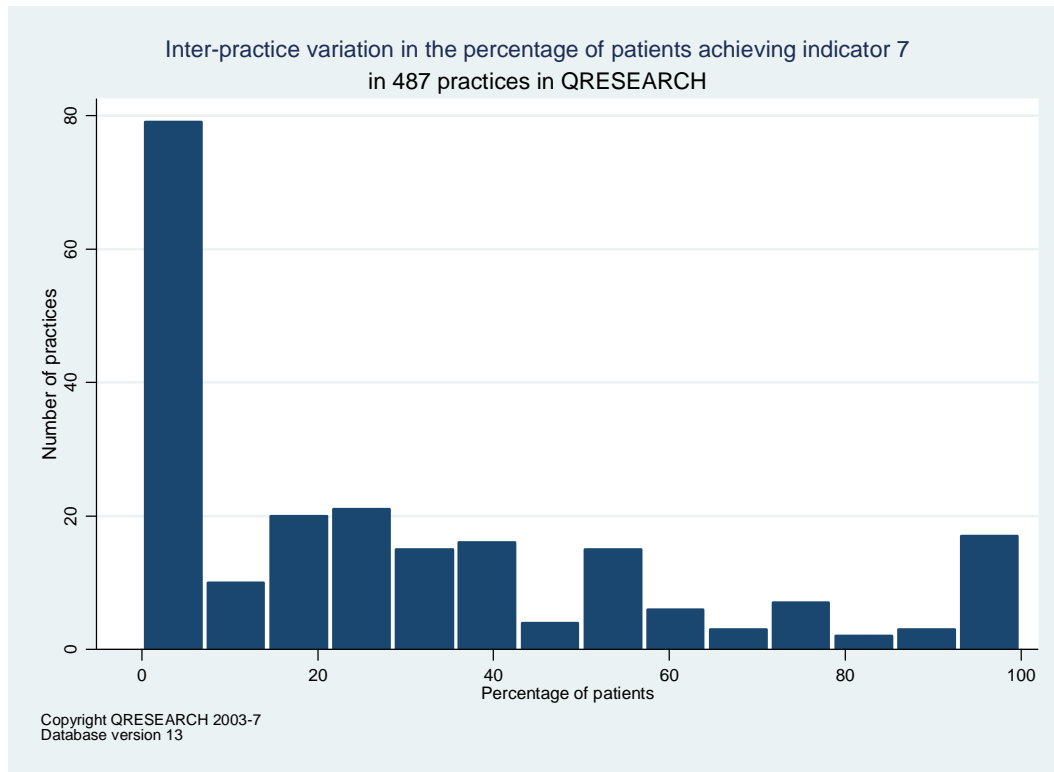


**Table 9: Percentage of patients in QRESEARCH achieving indicator 7 by age and sex**

Sex	Age band	Patients achieving indicator	Patients eligible for indicator	Percentage	95% Confidence interval	
<b>Females</b>	<b>75-79 years</b>	117	315	37.14	31.79	42.74
	<b>80-84 years</b>	206	566	36.40	32.42	40.51
	<b>85-89 years</b>	329	812	40.52	37.12	43.98
	<b>90-94 years</b>	283	703	40.26	36.61	43.99
	<b>95-99 years</b>	113	318	35.53	30.27	41.07
<b>Males</b>	<b>75-79 years</b>	46	172	26.74	20.29	34.02
	<b>80-84 years</b>	59	184	32.07	25.39	39.33
	<b>85-89 years</b>	55	198	27.78	21.66	34.57
	<b>90-94 years</b>	22	107	20.56	13.36	29.46
	<b>95-99 years</b>	18	43	41.86	27.01	57.87

Figure 16 shows the variation between practices in the percentage of patients achieving indicator 7. The median achievement was 20.7% (IQR 0% to 43.8%). The minimum was 0% and the maximum was 100%. Of the 487 practices there were 269 practices with no eligible patients and a further 76 practices where no patients achieved the indicator. There were 19 practices with 100% achievement, although 17 of these were based on a single eligible patient.

Figure 16: Inter-practice variation in percentage of patients achieving indicator 7

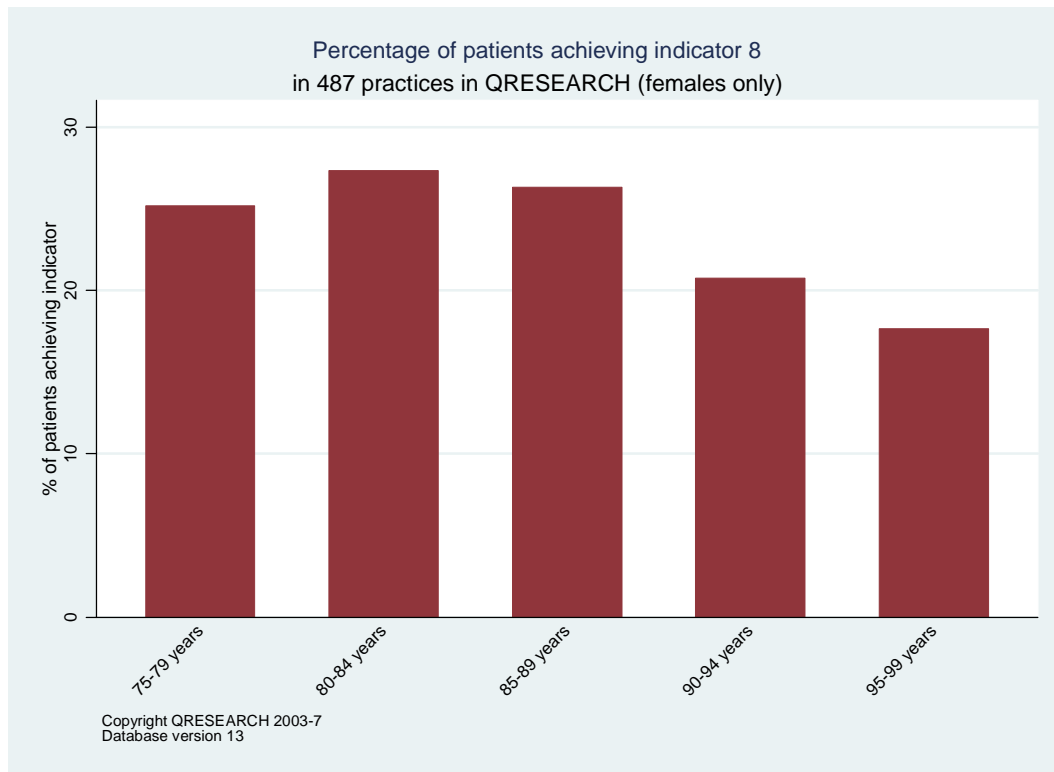


**6.10 Indicator 8 - % of females aged 75+ years with a history of fragility fracture with evidence of a currently prescribed bone sparing agent**

Overall there were 31,094 registered female patients who were eligible for indicator 8. Of these 7,860 (25.3%, 95% CI 24.8% to 25.8%) achieved the indicator. In other words, of all females aged 75+ years with a history of fragility fracture, one quarter had evidence of a currently prescribed bone sparing agent.

Figure 17 and Table 10 show the percentage of females achieving indicator 8 by age band. The highest percentage was 27.3% (95% CI 26.4% to 28.2%) which occurred in the 80-84 year age band. Less than 20% of females aged 95-99 years achieved this indicator.

**Figure 17: Percentage of females in QRESEARCH achieving indicator 8, by age**

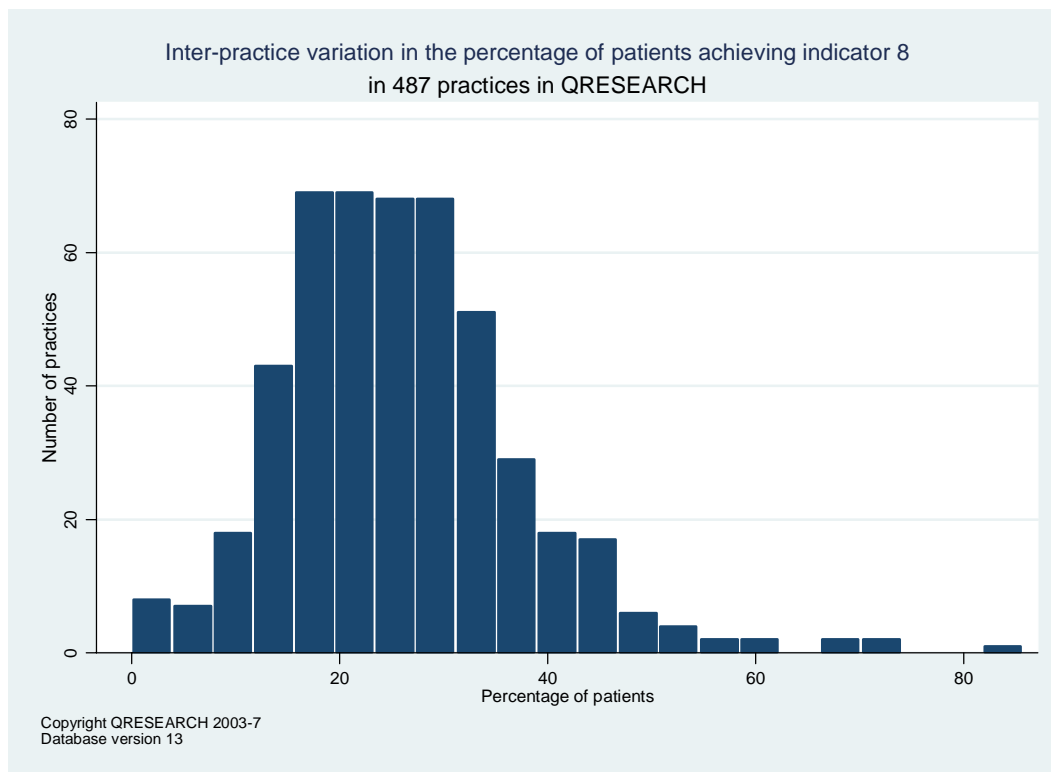


**Table 10: Percentage of female patients in QRESEARCH achieving indicator 8, by age band**

Age band	Patients achieving indicator	Patients eligible for indicator	Percentage	95% Confidence interval	
75-79 years	2,364	9,388	25.18	24.31	26.07
80-84 years	2,592	9,492	27.31	26.41	28.22
85-89 years	1,913	7,277	26.29	25.28	27.32
90-94 years	799	3,849	20.76	19.49	22.07
95-99 years	192	1,088	17.65	15.43	20.04

Figure 18 shows the variation between practices in the percentage of patients achieving indicator 8. The median achievement was 25.0% (IQR 18.0% to 32.0%). The minimum was 0% and the maximum was 85.7%. Of the 487 practices 3 practices had no eligible patients and a further 8 practices had no patients achieving the indicator.

**Figure 18: Inter-practice variation in percentage of patients achieving indicator 8**

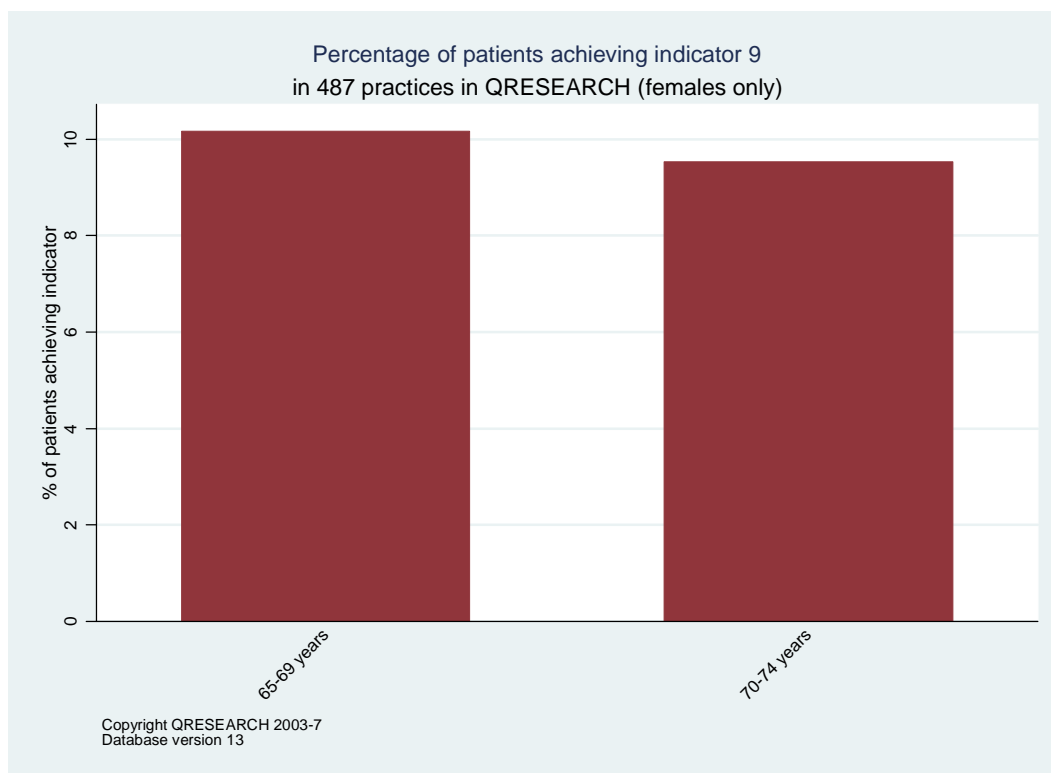


**6.11 Indicator 9 - % of females aged 65-74 with a history of fragility fracture with evidence of referral for bone densitometry**

Overall there were 15,025 registered female patients who were eligible for indicator 9. Of these 1,476 (9.8%, 95% CI 9.4% to 10.3%) achieved the indicator. In other words, of all females aged 65-74 with a history of fragility fracture just under 10% had evidence of referral for bone densitometry.

Figure 19 and Table 11 show the percentage of females achieving indicator 9 by age band. The percentage of patients achieving this indicator was 10.2% (95% CI 9.5% to 10.9%) for females aged 65-69 years. Less than 10% of females aged 70-74 years achieved this indicator.

**Figure 19 Percentage of female patients in QRESEARCH achieving indicator 9, by age band**

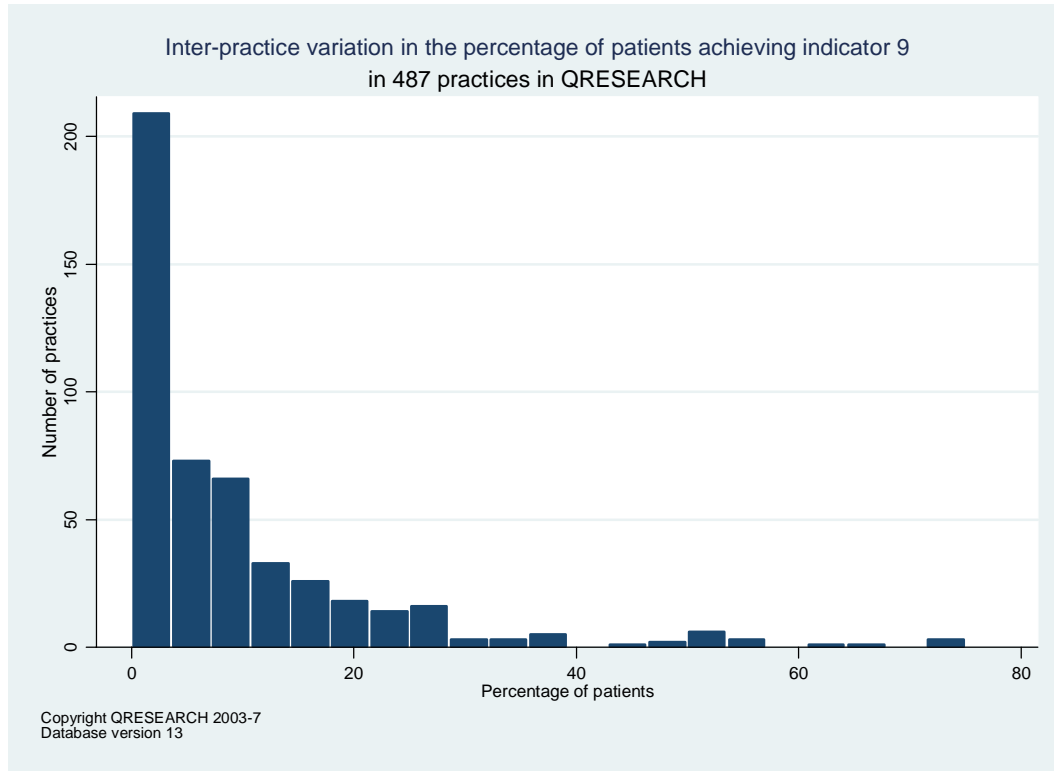


**Table 11: Percentage of female patients in QRESEARCH achieving indicator 9, by age band**

Age band	Patients achieving indicator	Patients eligible for indicator	Percentage	95% Confidence interval	
65-69 years	693	6,813	10.17	9.46	10.91
70-74 years	783	8,212	9.53	8.91	10.19

Figure 20 shows the variation between practices in the percentage of patients achieving indicator 9. The median achievement was 5.3% (IQR 0% to 12.5%). The minimum was 0% and the maximum was 75.0%. Of the 487 practices 4 practices had no eligible patients and a further 161 practices had no patients achieving the indicator.

**Figure 20: Inter-practice variation in percentage of patients achieving indicator 9**



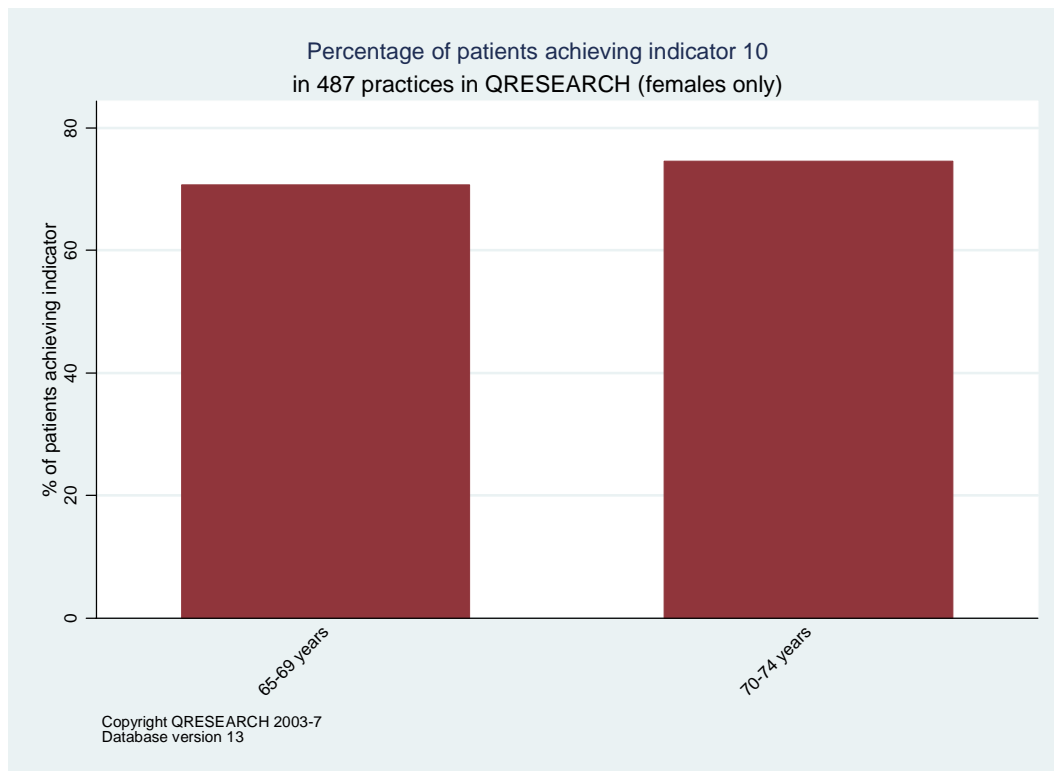


**6.12 Indicator 10 - % of females aged 65-74 with a history of fragility fracture and a diagnostic code for osteoporosis with evidence of a currently prescribed bone-sparing agent**

Overall there were 2,551 registered female patients who were eligible for indicator 10. Of these 1,862 (73.0%, 95% CI 71.2% to 74.7%) achieved the indicator. In other words, of all females aged 65-74 with a history of fragility fracture and a diagnostic code for osteoporosis just under three quarters had evidence of a currently prescribed bone-sparing agent.

Figure 21 and Table 12 show the percentage of female patients achieving indicator 10 by age and sex. The highest percentage was 74.5% (95% CI 72.2% to 76.7%) which occurred in the 70-74 year age band.

**Figure 21: Percentage of female patients in QRESEARCH achieving indicator 10, by age band**

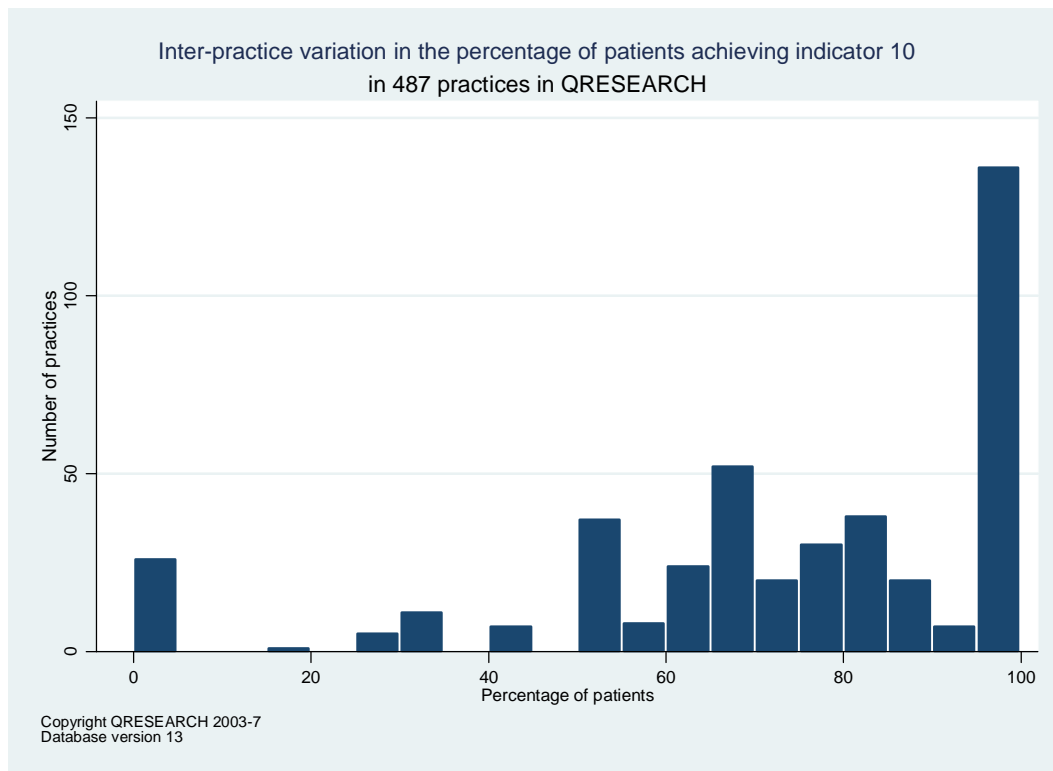


**Table 12: Percentage of female patients in QRESEARCH achieving indicator 10, by age band**

Age band	Patients achieving indicator	Patients eligible for indicator	Percentage	95% Confidence interval	
65-69 years	714	1,010	70.69	67.78	73.49
70-74 years	1,148	1,541	74.50	72.24	76.66

Figure 22 shows the variation between practices in the percentage of patients achieving indicator 10. The median achievement was 75.0% (IQR 60.0% to 100%). The minimum was 0% and the maximum was 100%. Of the 487 practices 65 practices had no eligible patients and a further 26 practices had no patients achieving the indicator. 136 practices had 100% achievement, although 44 of these were based on a single eligible patient.

**Figure 22: Inter-practice variation in percentage of patients achieving indicator 10**



**6.13 Indicator 11 - % of males aged 65+ years with a history of fragility fracture with evidence of referral for bone densitometry**

Overall there were 14,651 registered male patients who were eligible for indicator 11. Of these 261 (1.8%, 95% CI 1.6% to 2.0%) achieved the indicator. In other words, of all males aged 65+ years with a history of fragility fracture less than 2% had evidence of referral for bone densitometry. This is extremely low.

Figure 23 and Table 13 show the percentage of males achieving indicator 11 by age band. The highest percentage was 2.0% (95% CI 1.5% to 2.6%) which occurred in the 80-84 year age band.

**Figure 23: Percentage of male patients in QRESEARCH achieving indicator 11, by age band**

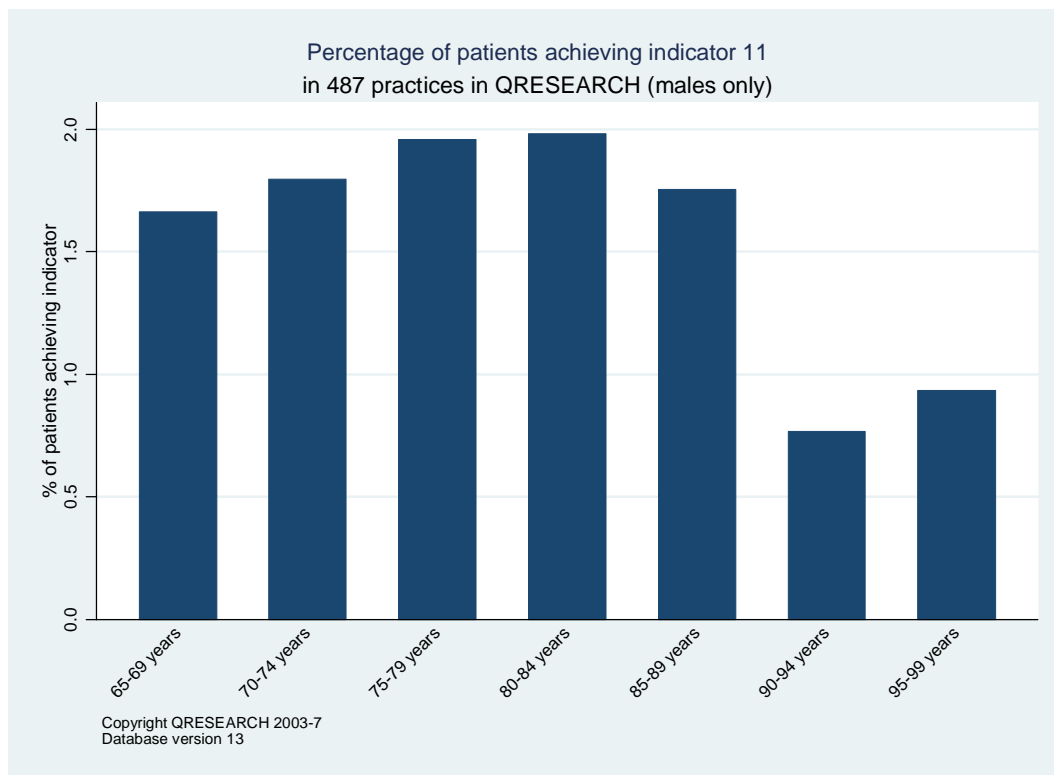
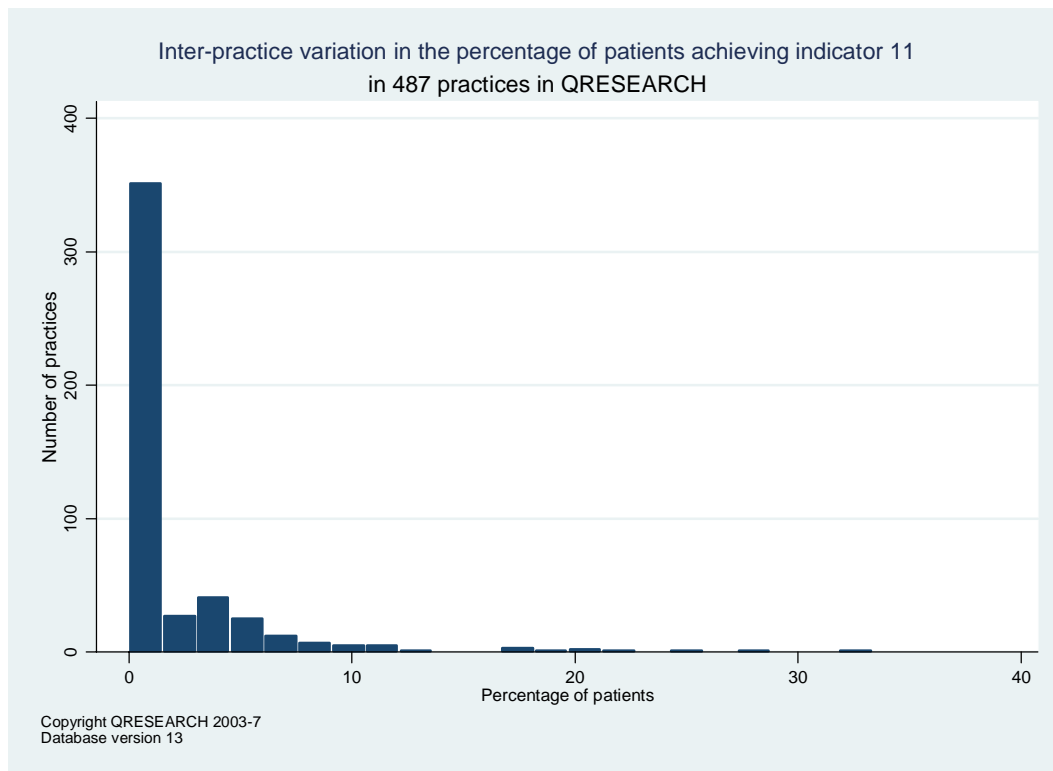


Table 13 Percentage of male patients in QRESEARCH achieving indicator 11, by age band

Age band	Patients achieving indicator	Patients eligible for indicator	Percentage	95% Confidence interval	
65-69 years	59	3,547	1.66	1.27	2.14
70-74 years	62	3,454	1.80	1.38	2.30
75-79 years	60	3,066	1.96	1.50	2.51
80-84 years	49	2,473	1.98	1.47	2.61
85-89 years	26	1,482	1.75	1.15	2.56
90-94 years	4	522	0.77	0.21	1.95
95-99 years	1	107	0.93	0.02	5.10

Figure 24 shows the variation between practices in the percentage of patients achieving indicator 11. The median achievement was 0% (IQR 0% to 2.1%). The minimum was 0% and the maximum was 33.3%. Of the 487 practices 3 practices had no eligible patients and a further 340 practices had no patients achieving the indicator.

Figure 24: Inter-practice variation in percentage of patients achieving indicator 11

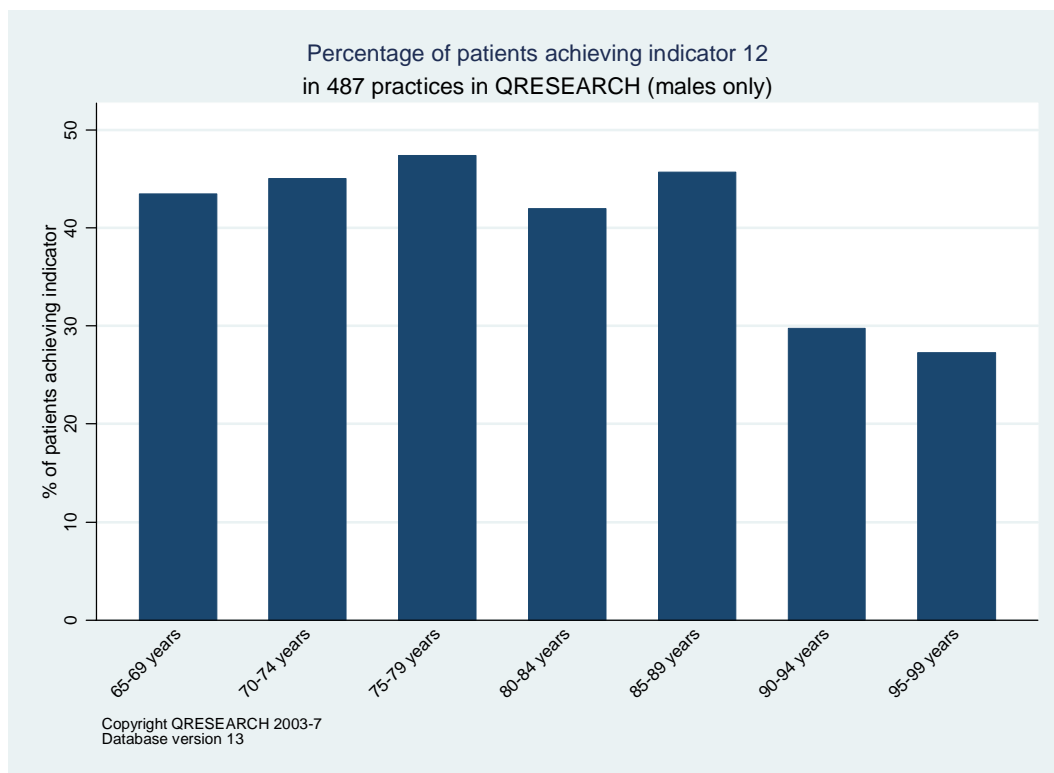


**6.14 Indicator 12 - % of males aged 65+ years with a history of fragility fracture and a diagnostic code for osteoporosis with evidence of currently prescribed alendronate**

Overall there were 700 registered male patients who were eligible for indicator 12. Of these 305 (43.6%, 95% CI 39.9% to 47.3%) achieved the indicator. In other words, of all males aged 65+ years with a history of fragility fracture and a diagnostic code for osteoporosis, less than half had evidence of currently prescribed alendronate.

Figure 25 and Table 14 show the percentage of patients achieving indicator 12 by age band. The highest percentage was 47.4% (95% CI 39.2% to 55.6%) which occurred in the 75-79 year age band. Just over one quarter of males aged 95-99 years achieved this indicator.

**Figure 25: Percentage of male patients in QRESEARCH achieving indicator 12, by age band**

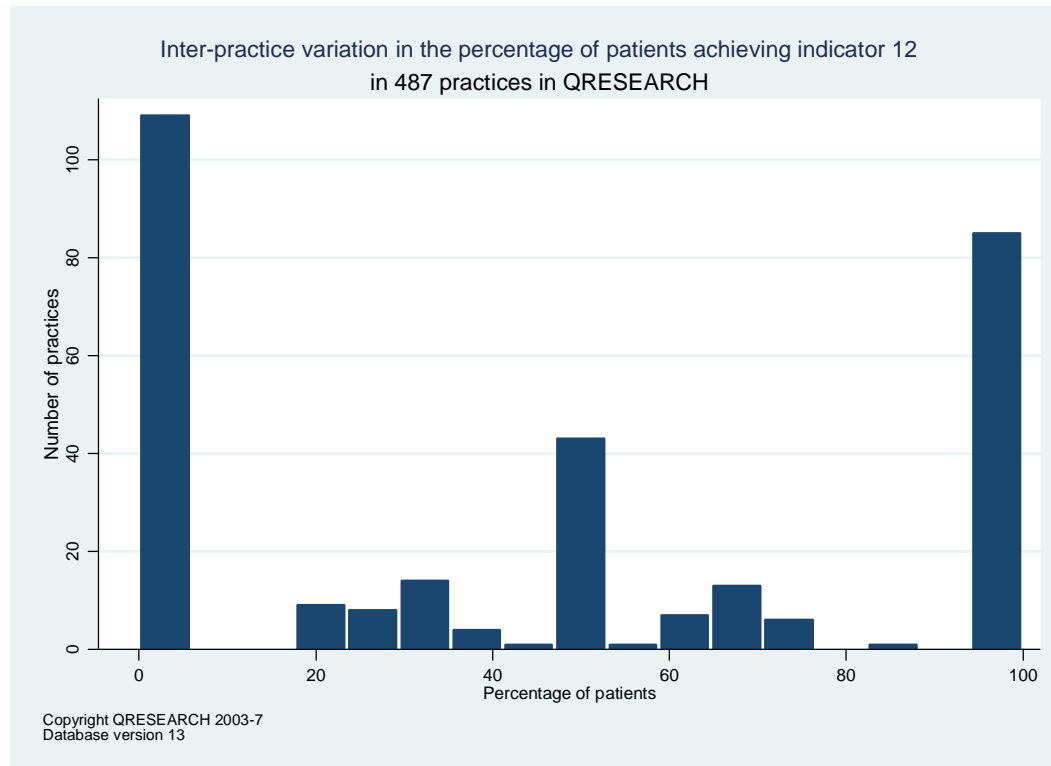


**Table 14: Percentage of male patients in QRESEARCH achieving indicator 12, by age band**

Age band	Patients achieving indicator	Patients eligible for indicator	Percentage	95% Confidence interval	
65-69 years	50	115	43.48	34.26	53.04
70-74 years	59	131	45.04	36.34	53.97
75-79 years	72	152	47.37	39.22	55.62
80-84 years	68	162	41.98	34.28	49.97
85-89 years	42	92	45.65	35.22	56.37
90-94 years	11	37	29.73	15.87	46.98
95-99 years	3	11	27.27	6.02	60.97

Figure 26 shows the variation between practices in the percentage of patients achieving indicator 12. The median achievement was 50.0% (IQR 0% to 100%). The minimum was 0% and the maximum was 100%. Of the 487 practices 186 practices had no eligible patients and a further 109 practices had no patients achieving the indicator. There were 85 practices with 100% achievement, although 61 of these were based on a single eligible patient.

**Figure 26: Inter-practice variation in percentage of patients achieving indicator 12**



**6.15 Indicator 13 - % of females aged 65+ years with recorded strong clinical risk factors for osteoporosis with evidence of either a referral for bone densitometry in the last three years or osteoporosis assessment in the last three years**

Of the 312,517 women aged 65 and over, 41,606 (13.3%) had recorded evidence of strong clinical risk factors for osteoporosis. The risk factors included were: gonadal failure, gastrointestinal disease with malabsorption, transplantation, rheumatic conditions, endocrine conditions, chronic renal disease, anorexia, heavy alcohol consumption or liver disease, bedridden, family history indicating high osteoporosis risk. Of these only 1,143 (2.8%, 95% CI 2.6% to 2.9%) had recorded evidence of either a referral for bone densitometry in the last three years or osteoporosis assessment in the last three years.

Figure 27 and Table 15 show the percentage of females achieving indicator 13 by age band. The highest percentage was 3.5% (95% CI 3.1% to 3.8%) which occurred in the 65-69 years age band. The striking thing about the graph is how the rates decline with increasing age, but the important feature overall is the extremely low rates of achievement for this indicator. Either patients are not being referred/assessed or this is not being recorded in the patients' electronic health record.

**Figure 27: Percentage of female patients in QRESEARCH achieving indicator 13, by age band**

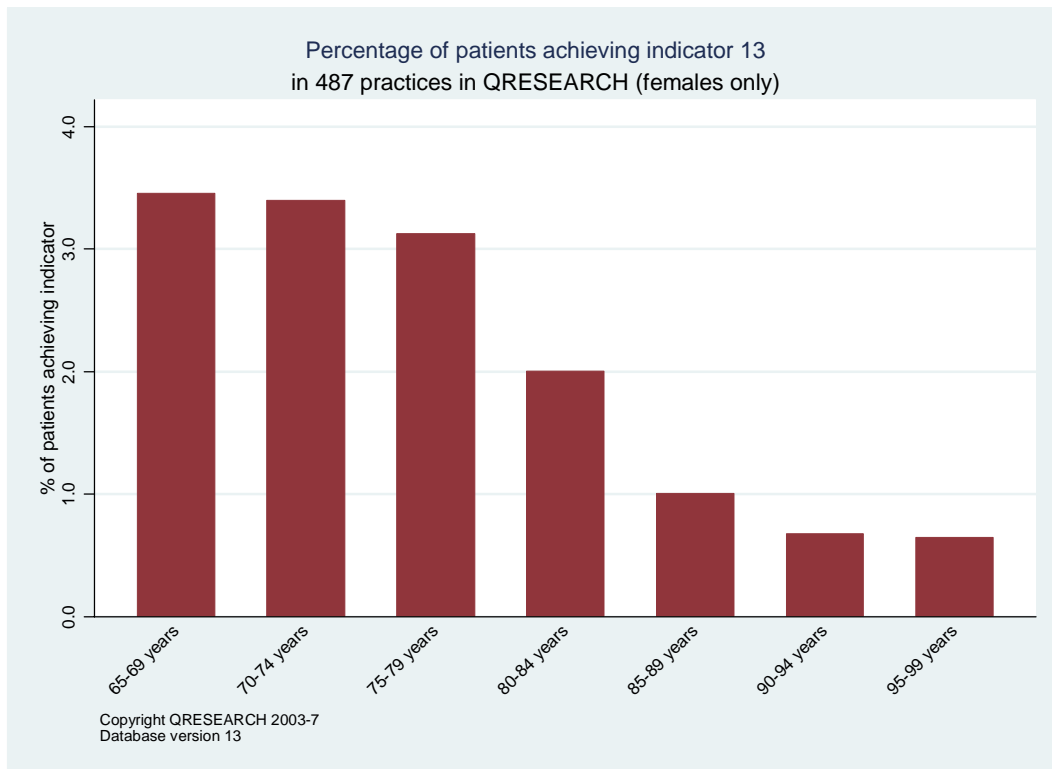
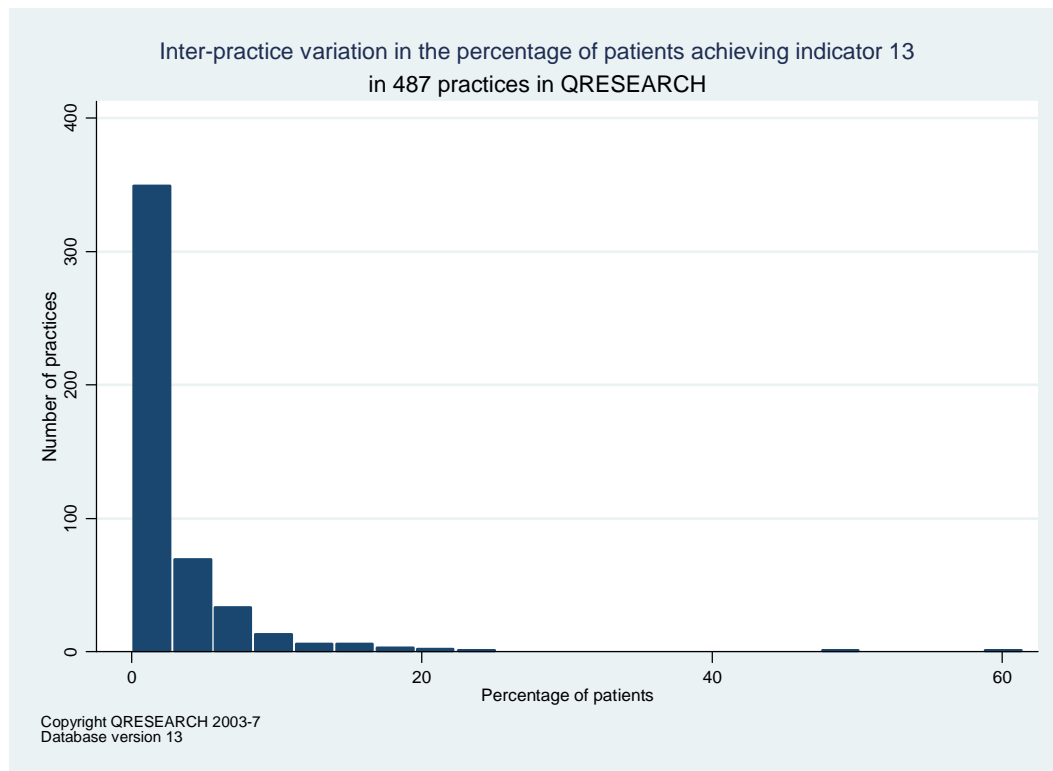


Table 15: Percentage of female patients in QRESEARCH achieving indicator 13, by age band

Age band	Patients achieving indicator	Patients eligible for indicator	Percentage	95% Confidence interval	
65-69 years	373	10,790	3.46	3.12	3.82
70-74 years	319	9,386	3.40	3.04	3.79
75-79 years	259	8,287	3.13	2.76	3.52
80-84 years	135	6,739	2.00	1.68	2.37
85-89 years	42	4,169	1.01	0.73	1.36
90-94 years	12	1,772	0.68	0.35	1.18
95-99 years	3	463	0.65	0.13	1.88

Figure 28 shows the variation between practices in the percentage of patients achieving indicator 13. The median achievement was 1.0% (IQR 0% to 3.1%). The minimum was 0% and the maximum was 61.5%. Of the 487 practices 3 practices had no eligible patients and a further 213 practices had no patients achieving the indicator.

Figure 28: Inter-practice variation in percentage of patients achieving indicator 13



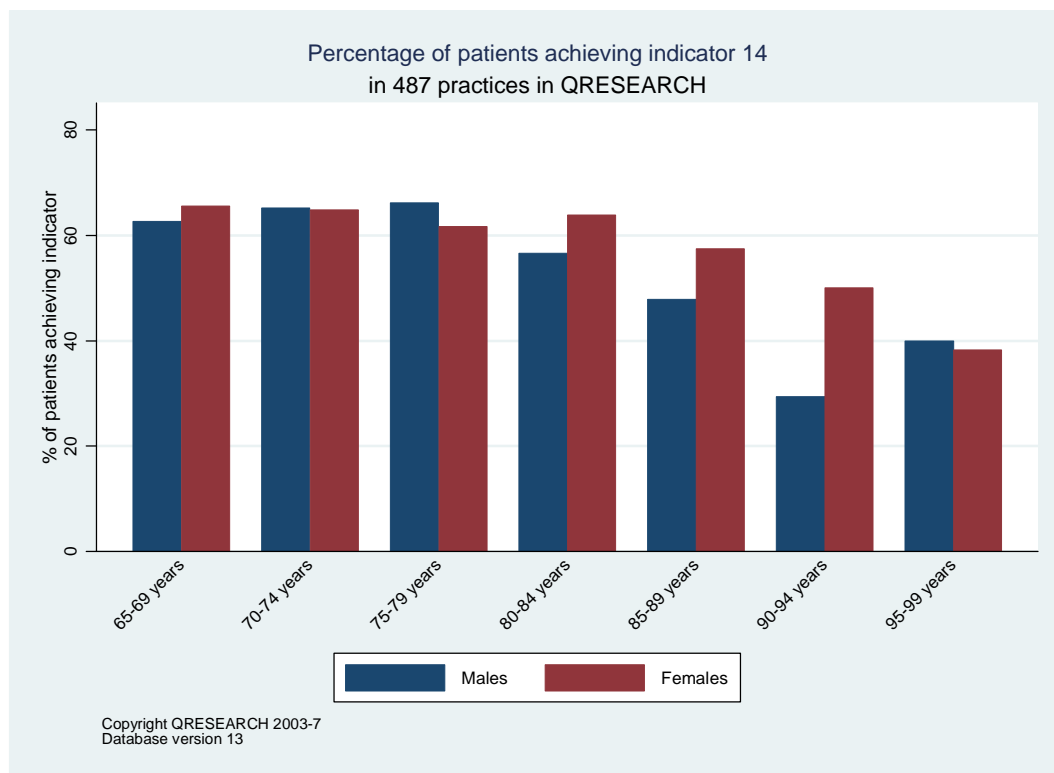


**6.16 Indicator 14 - % of patients aged 65+ years with recorded strong clinical risk factors for osteoporosis and a diagnostic code for osteoporosis with evidence of a currently prescribed bone sparing agent**

Overall there were 5,230 registered patients who were eligible for indicator 14. Of these 3,255 (62.2%, 95% CI 60.9% to 63.6%) achieved the indicator. In other words, of all patients aged 65+ years with recorded strong clinical risk factors for osteoporosis and a diagnostic code for osteoporosis just under two thirds had evidence of a currently prescribed bone sparing agent.

Figure 29 and Table 16 show the percentage of patients achieving indicator 14 by age and sex. The highest percentage was 66.1% (95% CI 57.0% to 74.5%) which occurred in males aged 75-79 years.

**Figure 29: Percentage of patients in QRESEARCH achieving indicator 14, by age and sex**

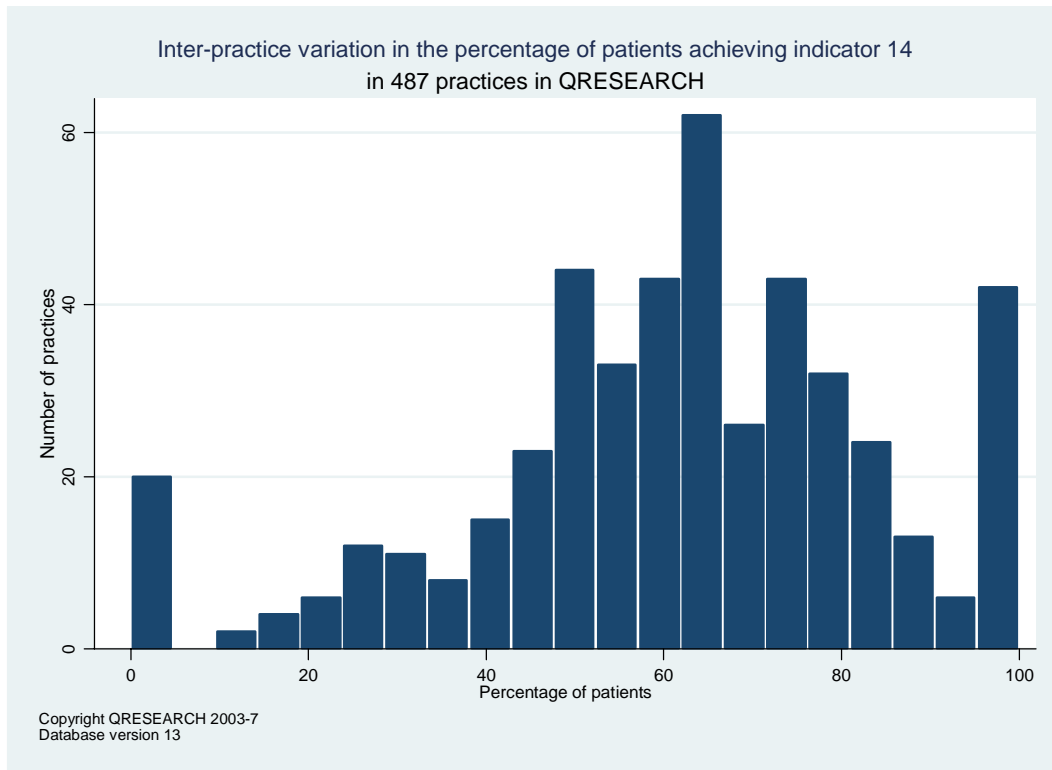


**Table 16: Percentage of patients in QRESEARCH achieving indicator 14, by age and sex**

Sex	Age band	Patients achieving indicator	Patients eligible for indicator	Percentage	95% Confidence interval	
Females	65-69 years	576	879	65.53	62.28	68.67
	70-74 years	676	1,043	64.81	61.83	67.71
	75-79 years	680	1,103	61.65	58.71	64.53
	80-84 years	605	947	63.89	60.73	66.95
	85-89 years	281	490	57.35	52.83	61.77
	90-94 years	93	186	50.00	42.60	57.40
	95-99 years	13	34	38.24	22.17	56.44
Males	65-69 years	72	115	62.61	53.10	71.45
	70-74 years	90	138	65.22	56.65	73.12
	75-79 years	80	121	66.12	56.95	74.47
	80-84 years	60	106	56.60	46.63	66.20
	85-89 years	22	46	47.83	32.89	63.05
	90-94 years	5	17	29.41	10.31	55.96
	95-99 years	2	5	40.00	5.27	85.34

Figure 30 shows the variation between practices in the percentage of patients achieving indicator 14. The median achievement was 63.6% (IQR 50.0% to 76.2%). The minimum was 0% and the maximum was 100%. Of the 487 practices 18 practices had no eligible patients and a further 20 practices had no patients achieving the indicator. 42 practices recorded 100% achievement, although 22 of these were based on a single eligible patient.

Figure 30: Inter-practice variation in percentage of patients achieving indicator 14

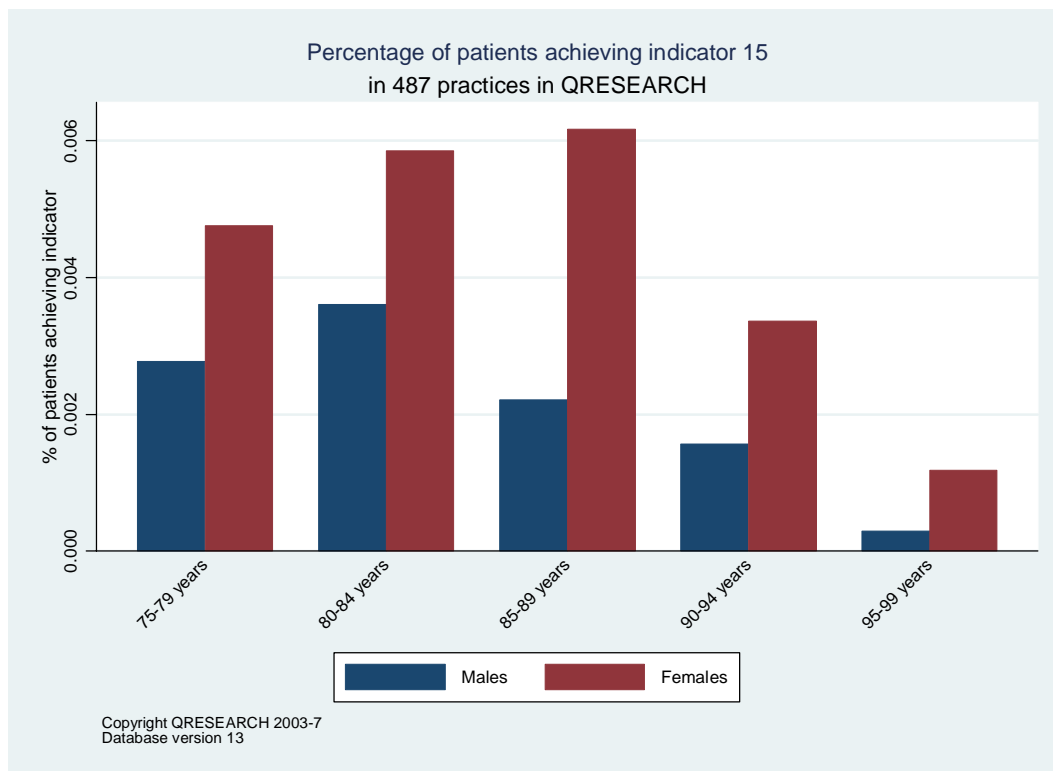


**6.17 Indicator 15 - % of all registered patients who are aged 75+ years and at high risk of falls**

Of the 3.39 million registered patients, 1,076 (0.032%, 95% CI 0.030% to 0.034%) were aged 75+ years and at high risk of falls. This is approximately equivalent to 3 in every 10,000 patients.

Figure 31 and Table 17 show the percentage of patients achieving indicator 15 by age and sex. The highest percentage was 0.062% (95% CI 0.0054% to 0.0071%) which occurred in females aged 85-89 years. The lowest percentage was 0.0003% (or 3 in every 1,000,000 patients) which occurred in males aged 95-99 years.

**Figure 31: Percentage of patients in QRESEARCH achieving indicator 15, by age and sex**

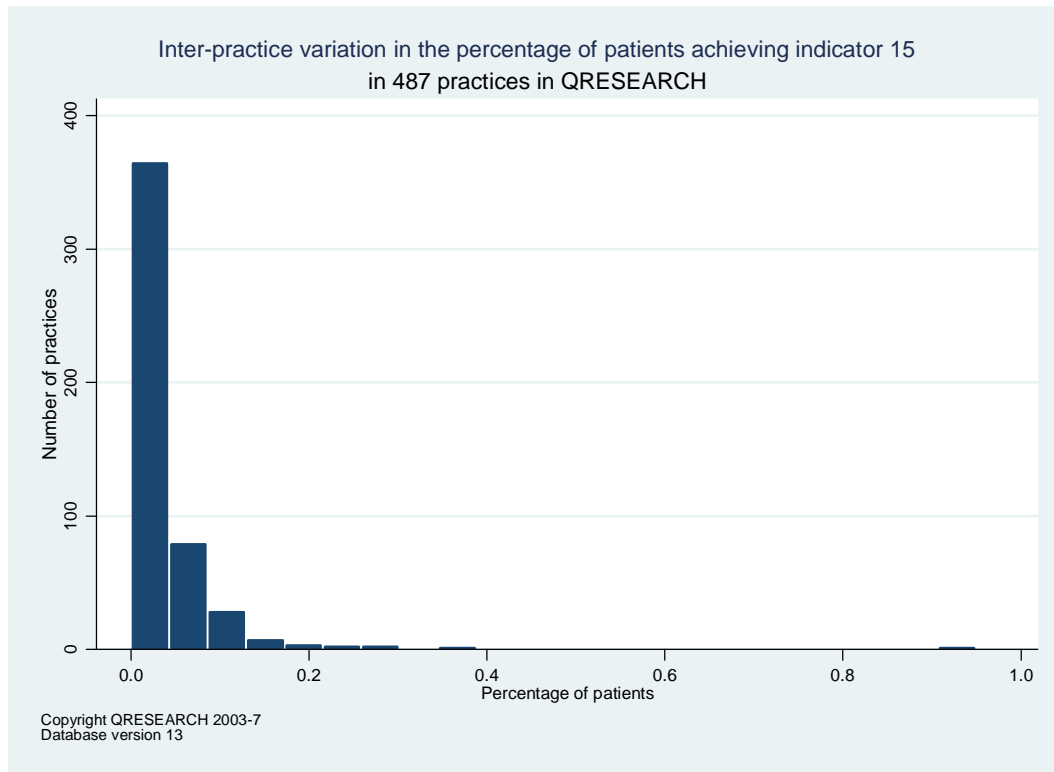


**Table 17: Inter-practice variation in percentage of patients achieving indicator 15**

Sex	Age band	Patients achieving indicator	Patients eligible for indicator	Percentage	95% Confidence interval	
<b>Females</b>	<b>75-79 years</b>	161	3,386,134	0.0048	0.0040	0.0055
	<b>80-84 years</b>	198	3,386,134	0.0058	0.0051	0.0067
	<b>85-89 years</b>	209	3,386,134	0.0062	0.0054	0.0071
	<b>90-94 years</b>	114	3,386,134	0.0034	0.0028	0.0040
	<b>95-99 years</b>	40	3,386,134	0.0012	0.0008	0.0016
<b>Males</b>	<b>75-79 years</b>	94	3,386,134	0.0028	0.0022	0.0034
	<b>80-84 years</b>	122	3,386,134	0.0036	0.0030	0.0043
	<b>85-89 years</b>	75	3,386,134	0.0022	0.0017	0.0028
	<b>90-94 years</b>	53	3,386,134	0.0016	0.0012	0.0020
	<b>95-99 years</b>	10	3,386,134	0.0003	0.0001	0.0005

Figure 32 shows the variation between practices in the percentage of patients achieving indicator 15. Of the 487 practices 119 practices had no patients achieving the indicator.

Figure 32: Inter-practice variation in percentage of patients achieving indicator 15

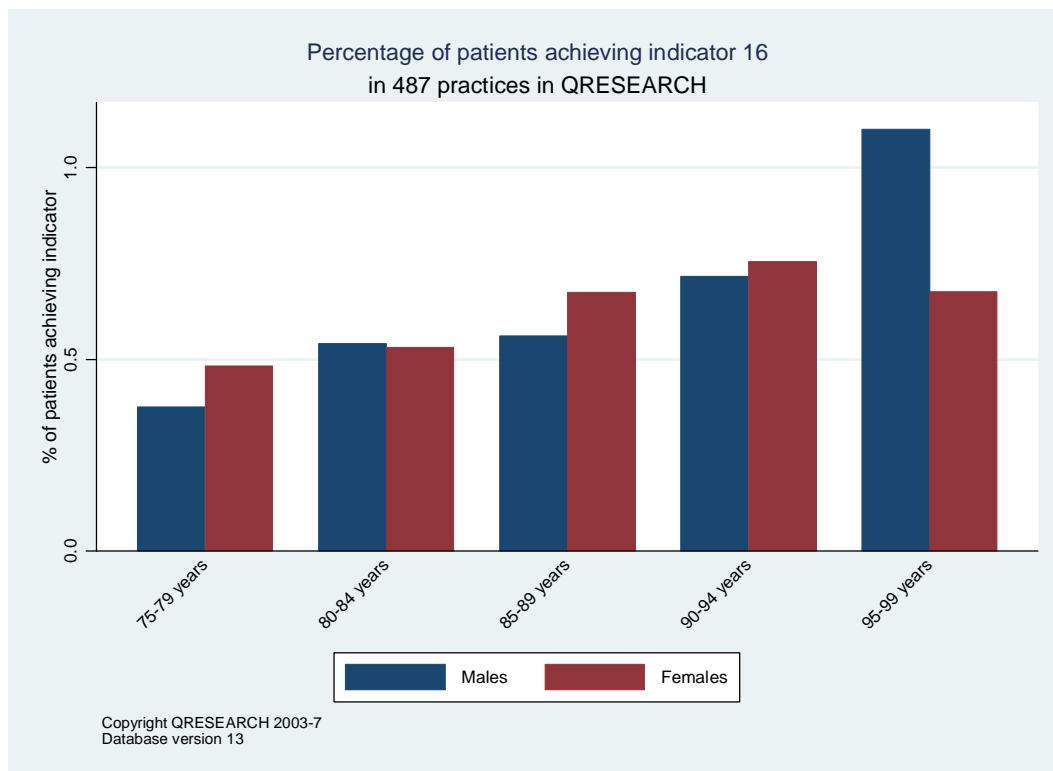


**6.18 Indicator 16 - % of patients aged 75+ years who contacted a healthcare professional in the previous 12 months and have a record of an enquiry about the number of falls they have experienced in the preceding 12 months**

Overall there were 251,409 registered patients who were eligible for indicator 16. Of these 1335 (0.53%, 95% CI 0.50% to 0.56%) achieved the indicator. In other words, of all patients aged 75+ years who had contacted a healthcare professional in the previous 12 months only 0.5% had a record of an enquiry about the number of falls they have experienced in the preceding 12 months. These figures are based on results from 486 practices. One practice was excluded due to data recording issues as it recorded more patients in the numerator than in the denominator.

Figure 33 and Table 18 show the percentage of patients achieving indicator 16 by age and sex. The highest percentage was 1.1% (95% CI 0.5% to 2.1%) which occurred in males aged 95-99 years. The lowest achievement was 0.38% (95% CI 0.32% to 0.44%) which occurred in males aged 75-79 years.

**Figure 33: Percentage of patients in QRESEARCH achieving indicator 16, by age and sex**



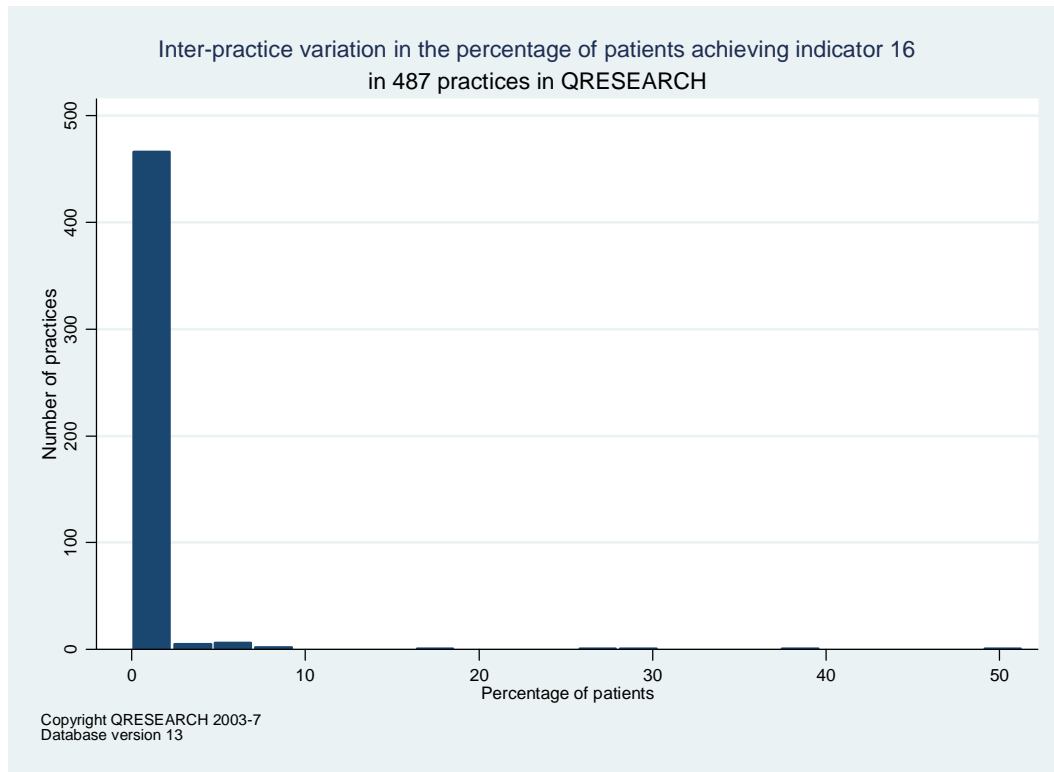
**Table 18: Percentage of patients in QRESEARCH achieving indicator 16, by age and sex**

Sex	Age band	Patients achieving indicator	Patients eligible for indicator	Percentage	95% Confidence interval	
<b>Females</b>	<b>75-79 years</b>	283	58,614	0.48	0.43	0.54
	<b>80-84 years</b>	253	47,597	0.53	0.47	0.60
	<b>85-89 years</b>	202	29,933	0.67	0.59	0.77
	<b>90-94 years</b>	102	13,524	0.75	0.62	0.91
	<b>95-99 years</b>	24	3,553	0.68	0.43	1.00
<b>Males</b>	<b>75-79 years</b>	173	46,097	0.38	0.32	0.44
	<b>80-84 years</b>	169	31,204	0.54	0.46	0.63
	<b>85-89 years</b>	86	15,326	0.56	0.45	0.69
	<b>90-94 years</b>	34	4,743	0.72	0.50	1.00
	<b>95-99 years</b>	9	818	1.10	0.50	2.08

Figure 34 shows the variation between practices in the percentage of patients achieving indicator 16. The median achievement was 0% (IQR 0% to 0.2%). The minimum was 0% and the maximum was 51.3%. Of the 487 practices 3 practices had no eligible patients and a further 339 practices had no patients achieving the indicator.



Figure 34: Inter-practice variation in percentage of patients achieving indicator 16

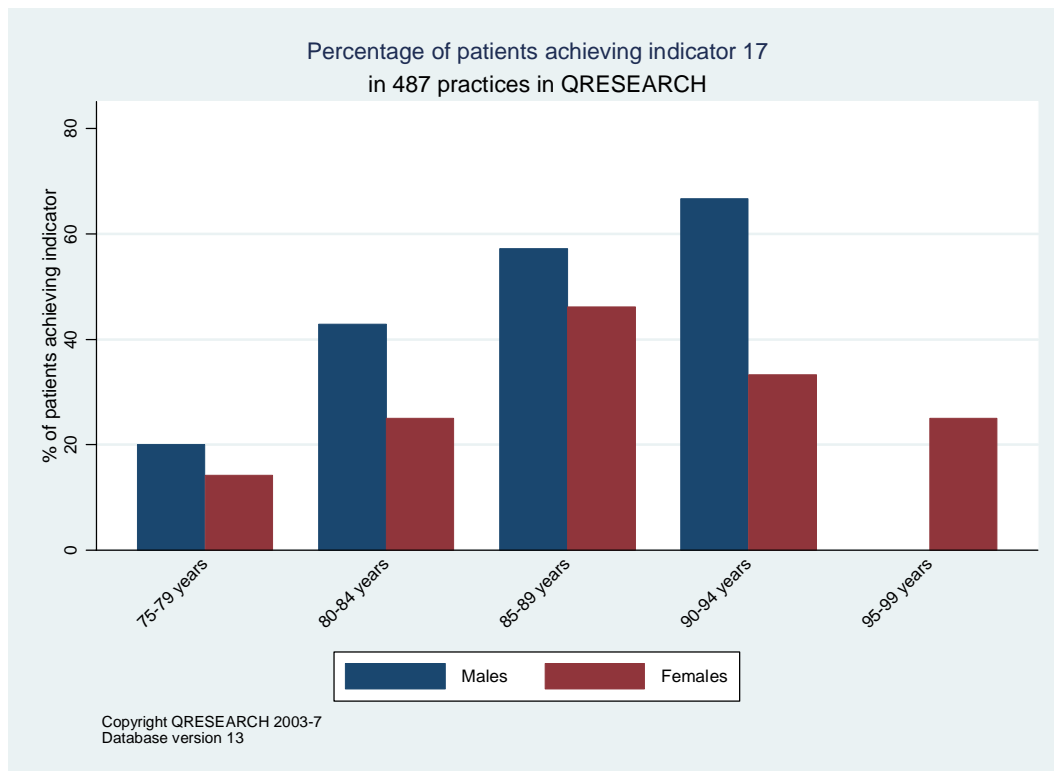


**6.19 Indicator 17 - % of patients aged 75+ years who reported a single fall in the previous 12 months and have been observed for a disorder of gait and balance**

Overall there were 102 registered patients who were eligible for indicator 17. Of these 32 (31.4%, 95% CI 22.5% to 41.3%) achieved the indicator. In other words, of all patients aged 75+ years who had a single fall in the previous 12 months just under one third had been observed for a disorder of gait and balance.

Figure 35 and Table 19 show the percentage of patients achieving indicator 17 by age and sex. The highest percentage was 66.7% (95% CI 9.4% to 99.2%) which occurred in males aged 90-94 years. There were only 8 practices with at least 1 eligible patient and the wide confidence intervals for percentage achievement reflect the small numbers of patients. There was only 1 male aged 95-99 years and this patient did not achieve the indicator.

**Figure 35: Percentage of patients in QRESEARCH achieving indicator 17, by age and sex**

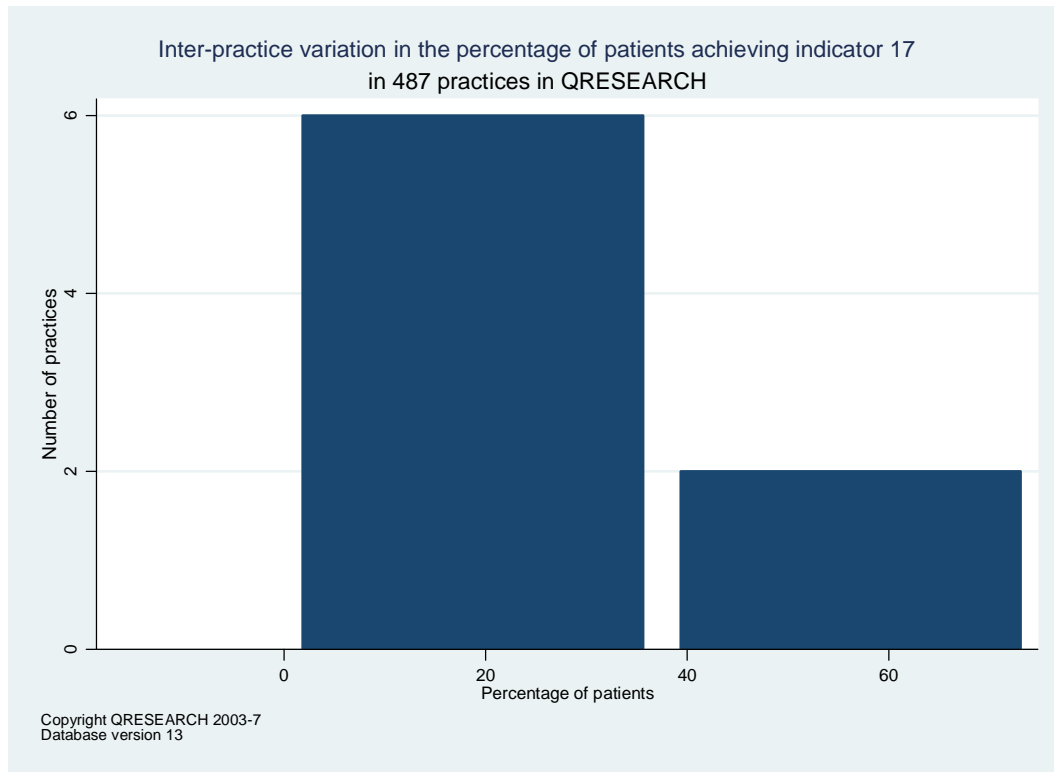


**Table 19: Percentage of patients in QRESEARCH achieving indicator 17, by age and sex**

Sex	Age band	Patients achieving indicator	Patients eligible for indicator	Percentage	95% Confidence interval	
<b>Females</b>	<b>75-79 years</b>	3	21	14.29	3.05	36.34
	<b>80-84 years</b>	5	20	25.00	8.66	49.10
	<b>85-89 years</b>	6	13	46.15	19.22	74.87
	<b>90-94 years</b>	3	9	33.33	7.49	70.07
	<b>95-99 years</b>	1	4	25.00	0.63	80.59
<b>Males</b>	<b>75-79 years</b>	2	10	20.00	2.52	55.61
	<b>80-84 years</b>	6	14	42.86	17.66	71.14
	<b>85-89 years</b>	4	7	57.14	18.41	90.10
	<b>90-94 years</b>	2	3	66.67	9.43	99.16
	<b>95-99 years</b>	0	1	0.00	0.00	97.50

Figure 36 shows the variation between practices in the percentage of patients achieving indicator 17. The median achievement was 31.9% (IQR 7.1% to 43.2%). The minimum was 0% and the maximum was 75.0%. Of the 487 practices 479 practices had no eligible patients and a further 2 practices had no patients achieving the indicator.

Figure 36: Inter-practice variation in percentage of patients achieving indicator 17

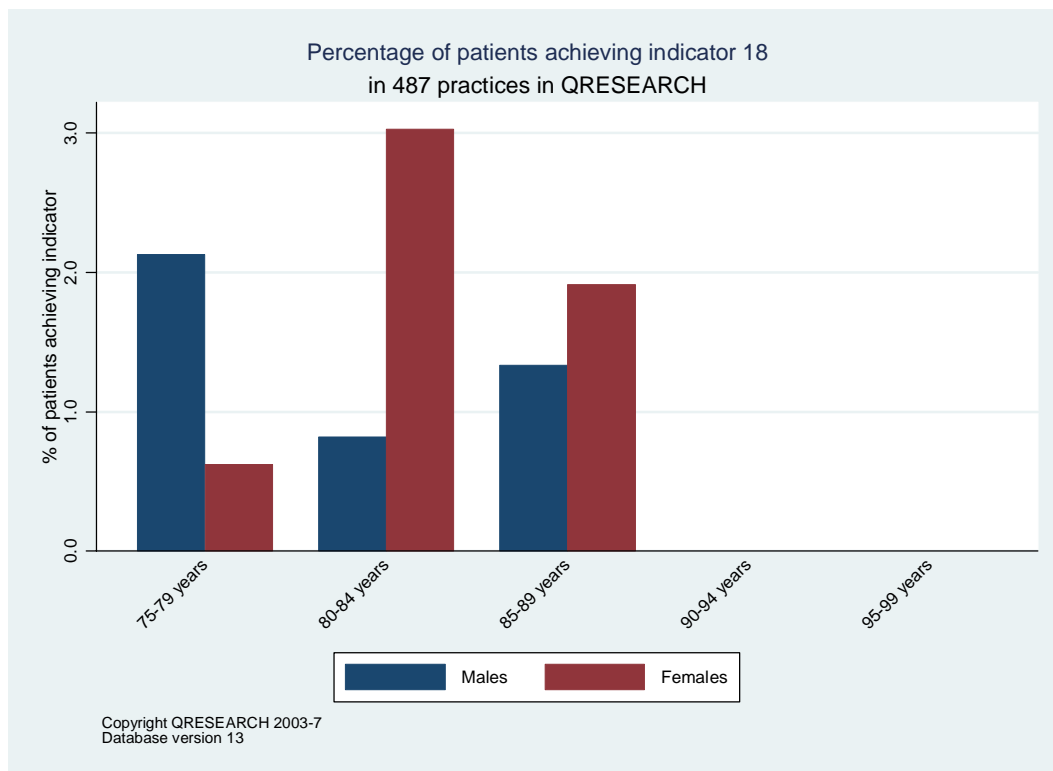


**6.20 Indicator 18 - % of patients aged 75+ years who are at a high risk of falls and have been offered a referral to a falls service or an exercise programme**

Overall there were 1,076 registered patients who were eligible for indicator 18. Of these 15 (1.4%, 95% CI 0.8% to 2.3%) achieved the indicator. In other words, of all patients aged 75+ years at a high risk of falls just over 1% had been offered a referral to a falls service or an exercise programme.

Figure 37 and Table 20 show the percentage of patients achieving indicator 18 by age and sex. The highest percentage was 3.0% (95% CI 1.1% to 6.5%) which occurred in females aged 80-84 years. No patients over the age of 90 achieved this indicator.

**Figure 37: Percentage of patients in QRESEARCH achieving indicator 18, by age and sex**

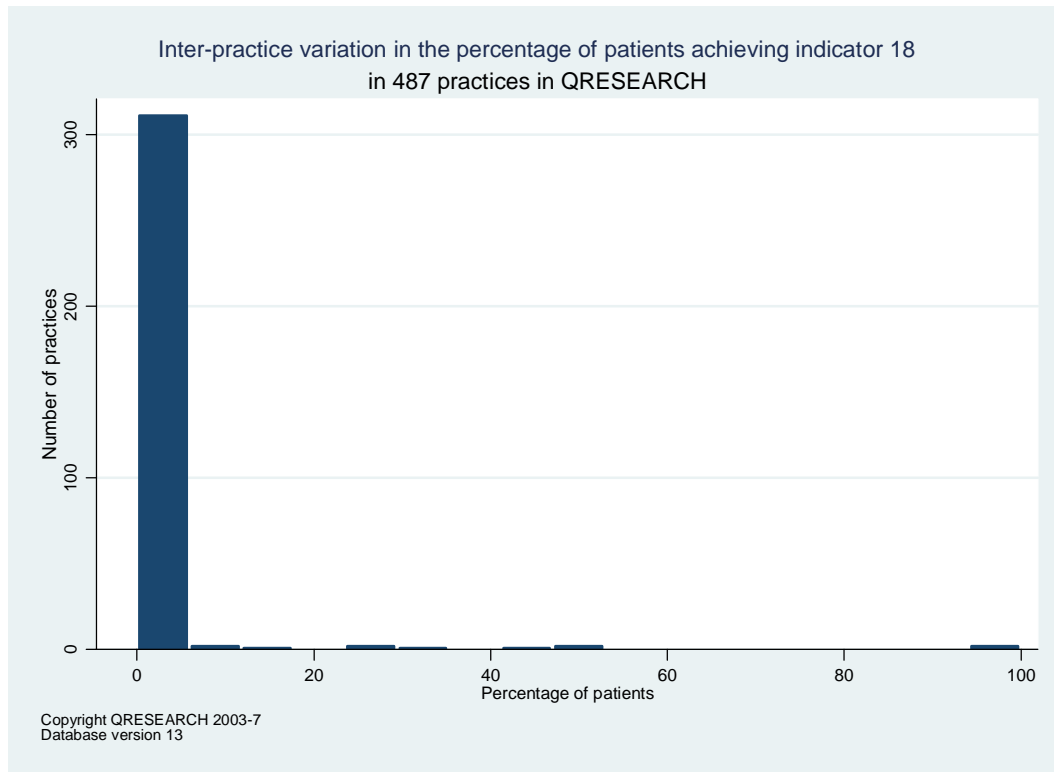


**Table 20: Percentage of patients in QRESEARCH achieving indicator 18, by age and sex**

Sex	Age band	Patients achieving indicator	Patients eligible for indicator	Percentage	95% Confidence interval	
<b>Females</b>	<b>75-79 years</b>	1	161	0.62	0.02	3.41
	<b>80-84 years</b>	6	198	3.03	1.12	6.48
	<b>85-89 years</b>	4	209	1.91	0.52	4.83
	<b>90-94 years</b>	0	114	0.00	0.00	3.18
	<b>95-99 years</b>	0	40	0.00	0.00	8.81
<b>Males</b>	<b>75-79 years</b>	2	94	2.13	0.26	7.48
	<b>80-84 years</b>	1	122	0.82	0.02	4.48
	<b>85-89 years</b>	1	75	1.33	0.03	7.21
	<b>90-94 years</b>	0	53	0.00	0.00	6.72
	<b>95-99 years</b>	0	10	0.00	0.00	30.85

Figure 38 shows the variation between practices in the percentage of patients achieving indicator 18. The median achievement was 0% (IQR 0% to 0%). The minimum was 0% and the maximum was 100%. Of the 487 practices 165 practices had no eligible patients and a further 311 practices had no patients achieving the indicator. Two practices recorded 100% achievement and these were both based on a single eligible patient.

Figure 38: Inter-practice variation in percentage of patients achieving indicator 18

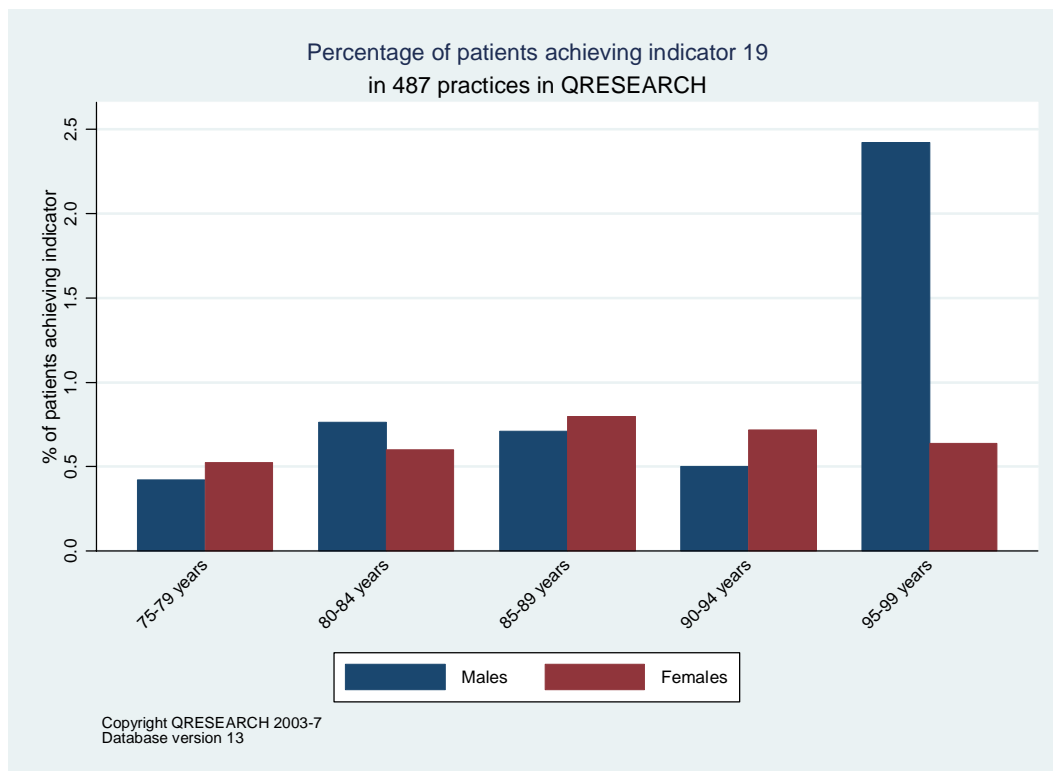


**6.21 Indicator 19 - % of patients aged 75+ years with osteoporosis or a history of a fragility fracture who have evidence of a falls assessment**

Overall there were 50,522 registered patients who were eligible for indicator 19. Of these 319 (0.63%, 95% CI 0.56% to 0.70%) achieved the indicator. In other words, of all patients aged 75+ years with either osteoporosis or a history of a fragility fracture less than 1% had evidence of a falls assessment.

Figure 39 and Table 21 show the percentage of patients achieving indicator 19 by age and sex. The highest percentage was 2.4% (95% CI 0.5% to 6.9%) which occurred in males aged 95-99 years. The lowest percentage was 0.42% (95% CI 0.24% to 0.69%) which occurred in males aged 75-79 years.

**Figure 39: Percentage of patients in QRESEARCH achieving indicator 19, by age and sex**



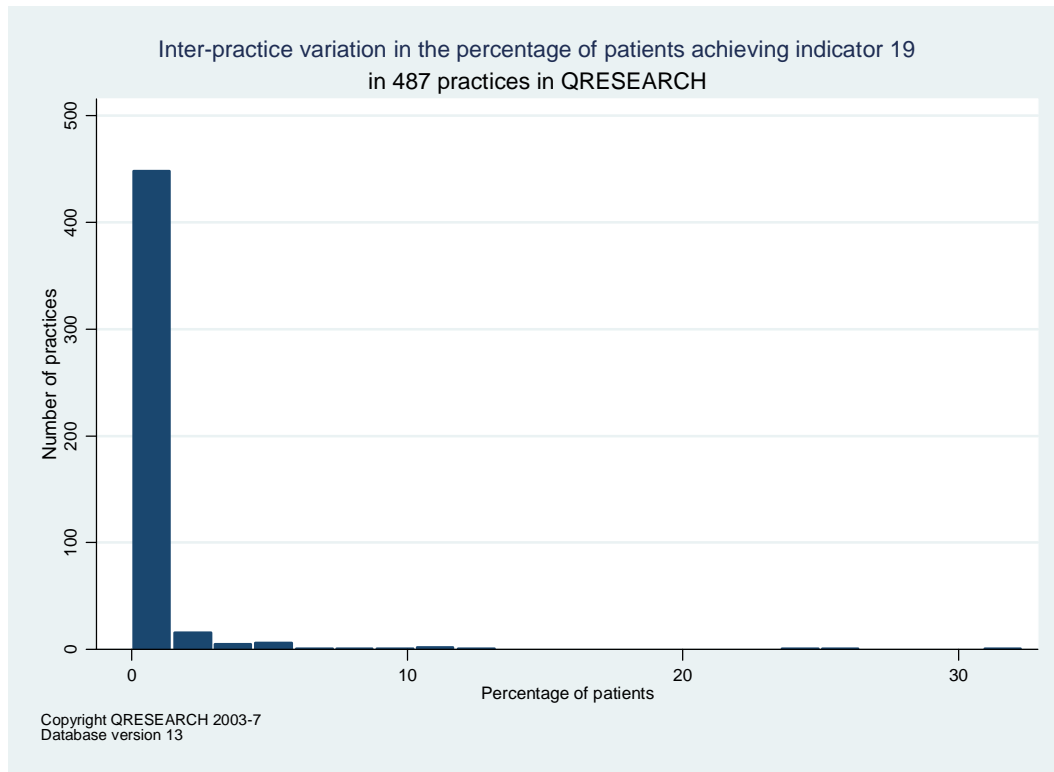


**Table 21: Percentage of patients in QRESEARCH achieving indicator 19, by age and sex**

Sex	Age band	Patients achieving indicator	Patients eligible for indicator	Percentage	95% Confidence interval	
<b>Females</b>	<b>75-79 years</b>	71	13,540	0.52	0.41	0.66
	<b>80-84 years</b>	78	12,990	0.60	0.47	0.75
	<b>85-89 years</b>	74	9,279	0.80	0.63	1.00
	<b>90-94 years</b>	33	4,607	0.72	0.49	1.00
	<b>95-99 years</b>	8	1,256	0.64	0.28	1.25
<b>Males</b>	<b>75-79 years</b>	15	3,558	0.42	0.24	0.69
	<b>80-84 years</b>	22	2,880	0.76	0.48	1.15
	<b>85-89 years</b>	12	1,691	0.71	0.37	1.24
	<b>90-94 years</b>	3	597	0.50	0.10	1.46
	<b>95-99 years</b>	3	124	2.42	0.50	6.91

Figure 40 shows the variation between practices in the percentage of patients achieving indicator 19. The median achievement was 0% (IQR 0% to 0%). The minimum was 0% and the maximum was 32.4%. Of the 487 practices 3 practices had no eligible patients and a further 402 practices had no patients achieving the indicator.

Figure 40: Inter-practice variation in percentage of patients achieving indicator 19

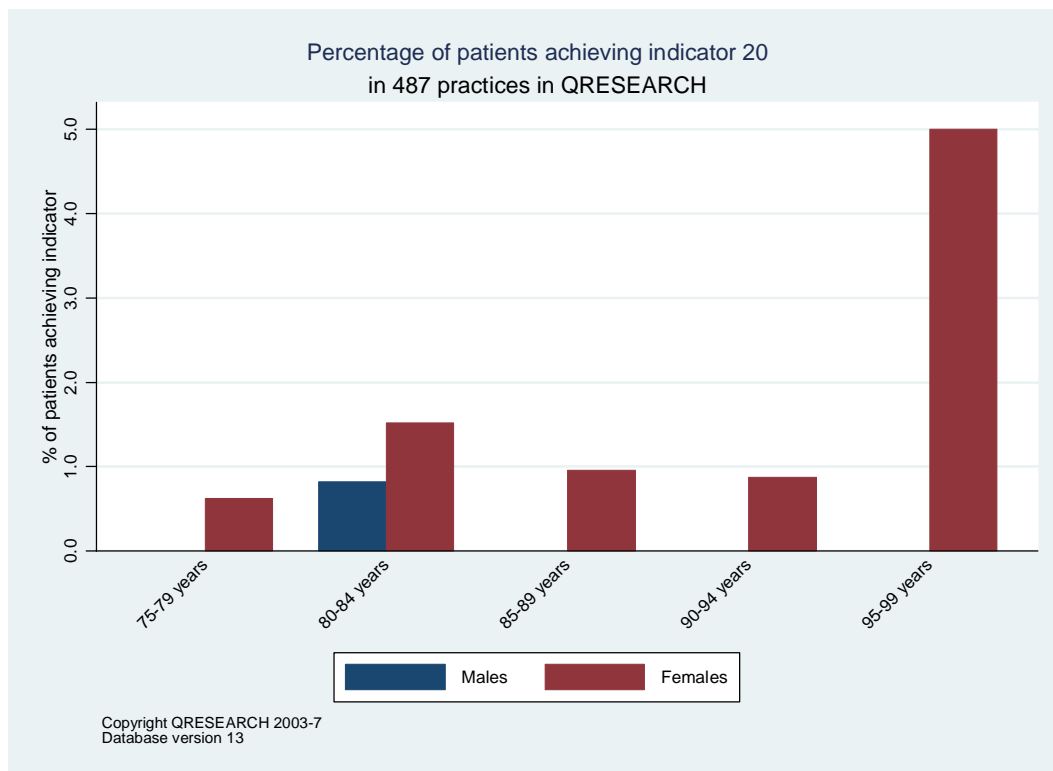


**6.22 Indicator 20 - % of patients aged 75+ years at high risk of falls who have evidence of an assessment for osteoporosis in the last three years**

Overall there were 1,076 registered patients who were eligible for indicator 20. Of these 10 (0.9%, 95% CI 0.5% to 1.7%) achieved the indicator. In other words, of all patients aged 75+ years at high risk of falls less than 1% had evidence of an assessment for osteoporosis in the last three years.

Figure 41 and Table 22 show the percentage of patients achieving indicator 20 by age and sex. The highest percentage was 5.0% (95% CI 0.6% to 16.9%) which occurred in females aged 95-99 years. Only one male patient (in the 80-84 year age band) achieved this indicator.

**Figure 41: Percentage of patients in QRESEARCH achieving indicator 20, by age and sex**

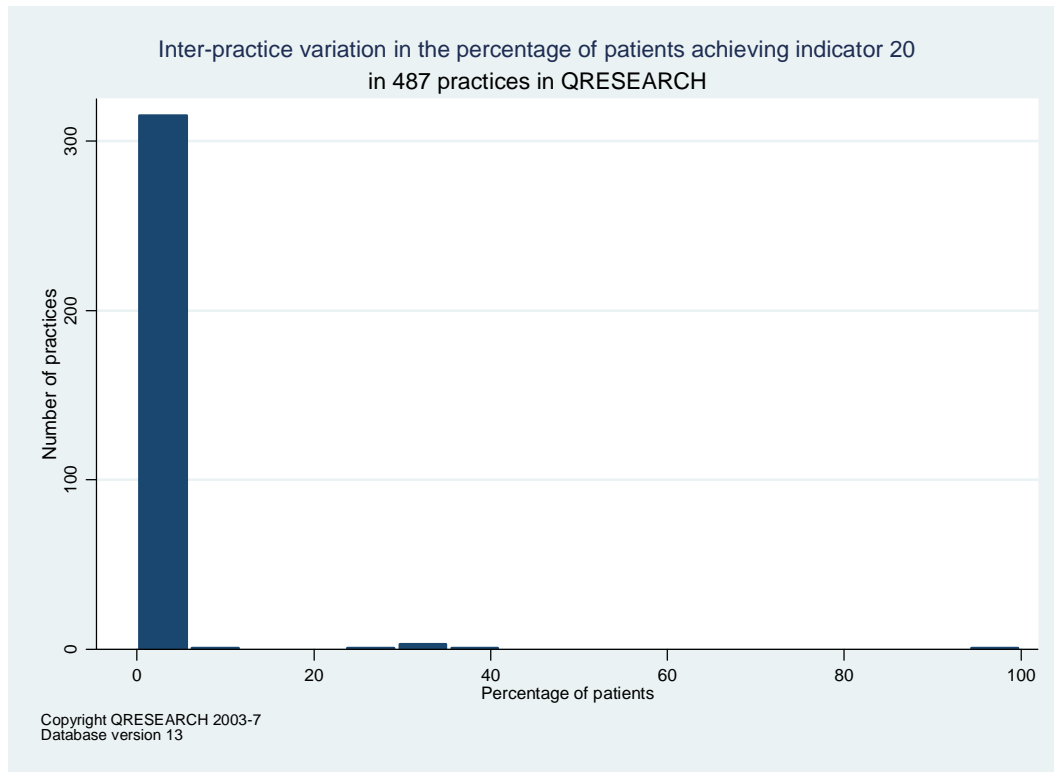


**Table 22: Percentage of patients in QRESEARCH achieving indicator 20, by age and sex**

Sex	Age band	Patients achieving indicator	Patients eligible for indicator	Percentage	95% Confidence interval	
<b>Females</b>	<b>75-79 years</b>	1	161	0.62	0.02	3.41
	<b>80-84 years</b>	3	198	1.52	0.31	4.36
	<b>85-89 years</b>	2	209	0.96	0.12	3.41
	<b>90-94 years</b>	1	114	0.88	0.02	4.79
	<b>95-99 years</b>	2	40	5.00	0.61	16.92
<b>Males</b>	<b>75-79 years</b>	0	94	0.00	0.00	3.85
	<b>80-84 years</b>	1	122	0.82	0.02	4.48
	<b>85-89 years</b>	0	75	0.00	0.00	4.80
	<b>90-94 years</b>	0	53	0.00	0.00	6.72
	<b>95-99 years</b>	0	10	0.00	0.00	30.85

Figure 42 shows the variation between practices in the percentage of patients achieving indicator 20. The median achievement was 0% (IQR 0% to 0%). The minimum was 0% and the maximum was 100%. Of the 487 practices 164 practices had no eligible patients and a further 314 practices had no patients achieving the indicator. One practice recorded 100% achievement and this was based on a single eligible patient.

Figure 42: Inter-practice variation in percentage of patients achieving indicator 20



### 6.23 Summary of practice-level 'zero returns' on eligibility and achievement

The previous sections have described for each indicator the number of practices which had no eligible patients, and the number which had eligible patients but none who achieved the indicator. Table 23 brings together these findings, and shows that for several indicators a large proportion of practices had 'zero returns' of one type or another.

In terms of eligibility for the indicators, the table shows that:

- 98% of practices had no patients age 75 or over with a single fall recorded in the previous 12 months (indicator 17)
- 55% of practices had no patients aged 75 or over recorded as living in residential or nursing care homes (indicator 7)
- 38% of practices had no male patients aged 65 or over with a recorded fragility fracture and osteoporosis diagnosis (indicator 12)
- 34% of practices had no patients aged 75 or over who could be identified as at high risk of falls, based on prior falls or gait/balance disorders (indicator 18)

In terms of achievement of the indicators:

- in 83% of practices, none of the over 75 year olds with osteoporosis or prior fragility fracture had a recorded falls assessment (indicator 19)
- in 70% of practices, none of the over 65 year old males with prior fragility fracture had a recorded referral for bone densitometry (indicator 11)
- in 70% of practices, none of the over 75 year olds who had recently been in routine contact had a recorded falls enquiry (indicator 16)
- in 65% of practices, none of the over 75 year olds at high falls risk had a recorded assessment for osteoporosis (indicator 20)
- in 64% of practices, none of the over 75 year olds at high risk of falls had a recorded referral to falls service or exercise programme (indicator 18)
- in 33% of practices, none of the 65-74 year old females with prior fragility fracture had a recorded referral for bone densitometry (indicator 9)

**Table 23: Practices with zero returns for eligibility or achievement of each indicator**

Indicator	Description	Number (%) of practices	
		with no eligible patients	with eligible patients but none achieving
1	% of patients diagnosed with osteoporosis	--	1 (0.2)
2	% of patients with osteoporosis with evidence of current osteoporosis treatment in the last 6 months or specific osteoporosis assessment within the last 15 months	1 (0.2)	6 (1.2)
3	% of patients on specific osteoporosis treatment with evidence of an appropriate diagnostic code	6 (1.2)	1 (0.2)
4	% of patients on specific osteoporosis treatments with evidence of a co-prescribed combined calcium and vitamin D3 preparation	6 (1.2)	0 (0.0)
5	% of patients aged 65+ years on systemic glucocorticoids for more than 3 months at any dose with current treatment with a preparation licensed for the prevention of glucocorticoid induced osteoporosis	6 (1.2)	7 (1.4)
6	% of patients aged 65+ years on systemic glucocorticoids for more than 3 months at any dose within the last 6 months with current treatment with a preparation licensed for the prevention of glucocorticoid induced osteoporosis	469 (96.3)	6 (1.2)
7	% of patients aged 75+ years living in a residential or nursing care home environment (denominator) with current treatment with a combined calcium and vitamin D preparation	269 (55.2)	76 (15.6)
8	% of females aged 75+ years with a history of fragility fracture (denominator) with a prescribed bone sparing agent	3 (0.6)	8 (1.6)
9	% of females aged 65-74 with a history of fragility fracture (denominator) with a referral for bone densitometry to determine their risk for future fracture	4 (0.8)	161 (33.1)
10	% of females aged 65-74 with a history of fragility fracture and a diagnostic code for osteoporosis (denominator) who have a currently prescribed bone-sparing agent	65 (13.3)	26 (5.3)
11	% of males aged 65+ years with a history of fragility fracture (denominator) with a referral for bone densitometry to determine their risk for future fracture	3 (0.6)	340 (69.8)
12	% of males aged 65+ years with a history of fragility fracture and a diagnostic code for osteoporosis (denominator) with a currently prescribed alendronate	186 (38.2)	109 (22.4)
13	% of females aged 65+ years with strong clinical risk factors for osteoporosis (denominator) who have evidence of either a referral for bone densitometry in the last three years or osteoporosis assessment in the last three years	3 (0.6)	213 (43.7)
14	% of patients aged 65+ years with strong clinical risk factors for osteoporosis and a diagnostic code for osteoporosis (denominator) with a currently prescribed bone sparing agent	18 (3.7)	20 (4.1)
15	% of the total practice population who are aged 75+ years and at high risk of falls	--	119 (24.4)
16	% of patients aged 75+ years who have contacted a healthcare professional in the previous 12 months (denominator) who have enquired about the number of falls they have experienced in the preceding 12 months	3 (0.6)	339 (69.6)
17	% of patients aged 75+ years who have reported a single fall in the previous 12 months (denominator) who have been observed for a disorder of gait and balance	479 (98.4)	2 (0.4)
18	% of patients aged 75+ years at high risk of falls (denominator) who have been offered a referral to a falls service or an exercise programme	165 (33.9)	311 (63.9)

Author: Julia Hippisley-Cox  
Date: 30 August 2007

6-87

## Final Version

19	% of patients aged 75+ years with osteoporosis or a history of a fragility fracture (denominator) who have evidence of a falls assessment	3 (0.6)	402 (82.5)
20	% of patients aged 75+ years at high risk of falls who have been assessed for osteoporosis in the last 3 years	164 (33.7)	314 (64.5)



## 7. Interpretation

### 7.1 Context

This study evaluates standards of care recorded on the QRESEARCH general practice clinical database in a population of nearly 3.4 million patients. As such it is the largest cross sectional study ever reported evaluating standards in the management of osteoporosis and falls' risk in a primary care setting.

The indicators of care examined in this study have been derived from current national guidance as described in section 5.4. Whilst the quality of coding for many conditions is good on GP clinical computer systems, there are known shortfalls in the coding relating to the diagnosis of osteoporosis<sup>17</sup> and very little prior information on the recording of falls. The inability to distinguish between data gaps (i.e. gaps in the recording of diagnoses on the clinical computer system) and care gaps needs to be born in mind when interpreting the results in this report. The level of 'zero returns' from practices, both in terms of having not a single patient shown as eligible for a particular form of care, and in having not a single patient recorded as receiving that care, shows the current extent of under-recording and the caution which is needed in interpreting overall percentages. Prescribing data however can be considered robust because of the almost universal use of prescription management software in general practice.

### 7.2 Prevalence of osteoporosis

In our study, 1.17% of the population have a diagnosis of osteoporosis recorded in their electronic primary care record, 1.14% after standardising by age and sex to the UK population (indicator 1). This would have included patients with clinical and DXA diagnostic codes at any possible site or region of interest (ROI) including peripheral sites. If it could be assumed all patients on specific osteoporosis treatment were accurately diagnosed with osteoporosis the prevalence would rise from 1.17% to 1.84%. For people aged 65 and over, the prevalence of diagnosed osteoporosis was 8.6% for women and 1.1% for men, and the prevalence of treated or diagnosed osteoporosis was 12.9% for women and 2.6% for men. The computer recorded prevalence of osteoporosis on GP databases is always going to be less than the true population prevalence as there is no national screening programme and by its nature, the condition is asymptomatic until a clinically apparent fragility fracture has occurred. The true prevalence of osteoporosis in the UK has been the subject of debate as this has traditionally been derived from US populations. However in the only published comparison<sup>18</sup>, osteoporosis in the UK (defined as a T-score less than –2.5 at the neck of femur or trochanter) had a prevalence of 8.1% for women and 2.7% for men, adjusted to age 65 years, while the figures were 15.1% and 7.3% respectively for the US. This is likely to be a conservative estimate as it ignores those diagnosed with osteoporosis on the basis of low bone mineral density (BMD) at the lumbar spine or other regions of interest in the hip. It is worth noting that while many of the

management and care guidelines described in this report relate principally to older patients, substantial numbers of osteoporosis patients are aged under 65: 23% of the diagnosed women and 39% of the men in this study (indicator 1).

### **7.3 Aspects of management and prescribing for patients with osteoporosis**

Not all patients with osteoporosis need medication. In practical terms, it is more important to identify patients with osteoporosis who also have a risk of future fracture that is greater than that expected from their BMD alone. This is derived from well recognised clinical risk factors, such as prior fragility fracture. In this respect the study looked to see what proportion of patients with osteoporosis had evidence of either current or recent treatment (defined as a prescription for a specific osteoporosis treatment being issued in the last six months), or a documented clinical review in the last 15 months (indicator 2). This indicator was met in almost 60% of patients. On the other hand only half the patients with a record of treatment with a specific bone remodelling agent had evidence of an appropriate diagnostic code (indicator 3). This may reflect under recording of osteoporosis or the use of bone-remodelling agents in patients who do not have osteoporosis and in whom clinical review might be appropriate in the light of current and emerging guidance from NICE. Among the patients with clinically apparent osteoporosis (a documented diagnosis and/or evidence of relevant treatment) the proportion known to have received treatment or assessment was 74%.

Inadequate calcium intake and insufficiency of vitamin D3 is associated with an increased risk of fracture. Vitamin D insufficiency in particular is very common in patients with osteoporosis and fragility fracture<sup>19</sup>. Unless the prescribing clinician is confident a patient having treatment for osteoporosis is replete in calcium and vitamin D3 co-prescription is advised by NICE guidance<sup>7</sup>. Clinical efficacy in published studies is dependent on calcium and vitamin D being optimised in both intervention and control arms. Nearly half the patients in this study had no evidence of co-prescription with calcium (indicator 4).

### **7.4 Glucocorticoid induced osteoporosis (GCIO) in over 65 year olds**

Patients on glucocorticoids have a significantly increased risk of fracture at a lower threshold of BMD<sup>20</sup> but frequently do not receive treatment to reduce this risk<sup>15</sup>. National guidance recommends bone protection with licensed anti-resorptive agents (alendronate or risedronate) in patients exposed to systemic glucocorticoids for more than three months<sup>21</sup>. At any one time about 0.9% of the adult population will be prescribed glucocorticoids but only 20% of those will be on long term treatment<sup>22</sup>. The prevalence of steroid usage may vary between 2.1% and 2.5% in the over 65 year old population but there is likely to be a higher proportion of long-term users compared to intermittent users in this age group. To monitor standards of care for glucocorticoid induced osteoporosis it is necessary to distinguish long term users from intermittent or one time users. While there is a Read code to flag a record that the

patient is on steroid prophylaxis, it was anticipated before the study that this would not be well used. In practice we found that only 124 patients (less than 4 per 100,000) had the appropriate Read code and a prescription for an appropriate glucocorticoid prescription in the previous six months (indicator 6) and hence this is not a useful clinical indicator. Alternatively, GP clinical systems could be interrogated identify all patients who had a record of two prescriptions for a systemic glucocorticoid in the previous 6 months as a surrogate marker of long term use (indicator 5). This method identified just over 17,000 patients ie 3% of all those aged 65 and older but it is not clear to what extent patients with two intermittent prescriptions might be included in this identified population.

### **7.5 The residential and nursing care home setting**

Patients in nursing or residential homes have a higher risk of falls<sup>23</sup> and have a four-fold increased risk of hip fracture<sup>24 25</sup>. Calcium and vitamin D3 supplementation has been shown to be effective in reducing hip fracture risk in this population<sup>26</sup> who may also benefit from a possible reduction in the falls rate from vitamin D3<sup>27</sup>. Despite this, previous studies have indicated a low level of appropriate intervention despite osteoporosis being very common in patients in this environment<sup>14</sup>. In this study just over one third of patients recorded as living in residential or nursing care homes (RNCH) by the use of an appropriate Read code were receiving calcium and D3 (indicator 7).

However it was anticipated that care home residence would be under-recorded in primary care, and in practice only 1.3% of people aged 75 or over had this coding. In 2004 there were an estimated 410,000 older people in the UK living in care homes (source: Office of Fair Trading: Care Homes for Older People in the UK, London 2005), which represents around 4.2% of the population aged 65 and over, and a substantially higher proportion than this would be expected among those aged 75 and over. GPs tend not to use read codes to identify patients from nursing or residential homes. This is probably because the GPs will be familiar with their nursing homes and will identify patients according to the address rather than a code. This is one reason why the number of patients in nursing/residential seemed low. The other reason is that the analysis only included patients who were registered for the whole of 2006 - elderly patients in nursing homes are more likely to have died during the year and would therefore not have been included in our study.

### **7.6 Secondary fracture prevention**

Patients presenting with a prior fragility fracture represent an ideal opportunity to intervene as they have anything from a 1.5 to 9.5-fold increased risk of future fracture<sup>28 29</sup>. An estimation of bone mineral density with a DXA scan can help to refine fracture risk prediction because older patients with osteoporosis probably represent one of the highest risk groups. It has been reported that as many as 45% of those

presenting with a hip fracture have had a prior minimal trauma fracture<sup>30</sup>. NICE has issued, and is currently revising a Technology Appraisal<sup>7</sup> confirming the cost effectiveness of a number of pharmacological agents that have been shown in large randomised controlled trials to reduce fracture incidence by as much as 50%. Despite this many research studies and previous large scale locality audit has consistently indicated sub-optimal care<sup>11 16</sup>.

There is currently no single concept code for a fragility fracture and it would in any event probably not be well-used. In this study the documented recording of a fracture that could be considered likely to be fragility by site and nature since the age of 45 was accepted as a proxy. Most fracture sites, excluding open fractures and those of the hand, feet and skull were accepted. The evidence behind this rationale has been described recently<sup>31</sup>.

Approximately one in two women and one in five men will sustain a fracture after the age of 50<sup>32</sup>, but not all of these will be due to minimal trauma. There is limited evidence about the prevalence of prior fragility fracture in UK populations, however. As only about 8% of vertebral fractures come to clinical attention in the UK<sup>32, 33</sup> most estimates of fracture prevalence will underestimate and vertebral fractures will rarely be recorded on GP databases. Self reported prior fracture estimates derived from patient re-call are estimated to be accurate<sup>34</sup>. A study in Lanarkshire found a prevalence of self-reported prior fragility fracture in over 65 year old women of 24.3%<sup>35, 36</sup>. Other epidemiological studies report point prevalence estimates of fractures sustained after age 50 in postmenopausal women or those over 50 year of age of 29% (Dubbo, Australia<sup>34</sup>), 16% (Manitoba, Canada<sup>37</sup>) and 17.6% (France<sup>38</sup>). A previous study looking for recorded prevalence of prior fragility fracture in a UK GP setting found only 5.7% of over 65 year olds were identifiable<sup>16</sup>. In this study the identified prevalence of fragility fracture in the over 65 year female population was 14.8%, more than 2.5 times higher (indicators 8,9). It has been estimated by NICE that about 50% of the fragility fractures experienced by women are seen in those over 75 years of age and the remainder are evenly distributed between the 65-74 year old cohort and those under 65. This is supported by the Australian study<sup>34</sup>. Using this assumption a predicted prevalence of prior fracture in over 50 year old women would be 9.8% which is significantly less than most published studies.

Current NICE Technology Appraisal Guidance indicates over 75 year old females with a prior fragility fracture and 65-74 year olds with DXA confirmed osteoporosis should receive treatment<sup>3</sup>. In this study, among the women with a presumed prior fragility fracture, only a quarter of the over 75 year olds were receiving secondary prevention (indicator 8), and less than one in ten of the 65-74 year olds had a record of bone densitometry (indicator 9). Of the 65-74 year olds with a prior fracture as well as diagnosed osteoporosis, 73% had evidence of treatment (indicator 10). The prevalence of fragility fracture among men aged 65 and over was 6% compared with 14.8% for women. Less than 2% had a record of bone densitometry (indicator 11), and just under half of those who also had diagnosed osteoporosis were receiving treatment (indicator 12).

## 7.7 Primary Prevention

Primary prevention intuitively is perceived as the optimal management strategy, which is treating people early to maintain bone mass and prevent the first fracture. However this usually has the disadvantage of having to treat larger numbers of lower risk patients in order to avert fractures. This has health economic consequences and patient safety issues related to the larger numbers of patients exposed to treatments that may carry a payload of adverse reactions. Legacy guidance from the Royal College of Physicians (RCP) has emphasised the case-finding approach based on identifying clinical risk factors and directing interventions at those who have concomitant osteoporosis. Further guidance is currently awaited from NICE on the exact thresholds they deem cost-effective for pharmacological interventions.

This study evaluated the management of over 65 year old females (rather than younger patients) who had recognised clinical risk factors for osteoporosis and osteoporotic fracture. The list of risk factors is lengthy and growing, and in this study does not include more recently recognised risks such as diabetes, chronic obstructive pulmonary disease, androgen deprivation therapy or the use of aromatase inhibitors where definitive management guidance is still being developed.

We identified over 41,000 women (representing 13% of women aged 65 and over) as high risk. Only 2.8% of those identified had evidence of a documented assessment of their bone health or a referral for DXA (indicator 13), but among the subgroup who also had an osteoporosis diagnosis, 62% were receiving appropriate treatment (indicator 14).

## 7.8 Integration of bone health with falls' risk assessment or intervention

Since the National Service Framework for Older People<sup>5</sup> the strategic driver within the NHS has principally been for integrated falls clinics with bone health as a subsidiary part of the patient pathway. This has been partly understandable because 95% of peripheral fractures follow a fall and because of the morbidity and bed utilisation associated with falls outside that derived from falls' related fracture alone. However the evidence base for interventions that reduce fractures, and therefore hospital admissions, bed days and social care utilisation lies clearly with the management of osteoporosis and the subsequent reduction in fractures. Evidence that interventions known to reduce the rate of falls also reduce fractures is sparse and metrics associated with NHS and social care resource utilisation are not included in studies evaluating falls intervention efficacy<sup>39</sup>. The assessments and interventions associated with falls are far more complex than those for bone health, the taxonomy has been less well-defined and the trials reported in the world literature have not been powered to demonstrate outcomes such as a reduction in fracture rates or hospital admissions. This does not mean that falls management strategies will not improve patient outcomes, as those with the dual risk of both osteoporosis and a recent fall are nearly 25 times more likely to suffer a fracture<sup>6</sup>. A reduction in falls rates is also likely to maintain quality of life by preventing fear of falling and preserving

independence. The referral by general practice to integrated falls service could be expected to drive effective comprehensive geriatric assessment.

The role of primary care is principally for case finding the high risk faller as defined in NICE clinical guidelines<sup>40</sup>. This involves clinicians asking about the number, nature and context of falls on routine contact with older people and looking for disorders of gait and balance. Those identified as high risk should be offered either strength and balance training or a multi-professional falls clinic referral. To fulfil the aspiration of the NSF, fallers should have a bone health assessment and those with an increased risk of fragility fracture also assessed for falls risk. In this study this was rationalised to a short set of indicators and these were examined to assess how often this information was being recorded and appropriate management delivered to older patients over 75 years of age, where the risk gradient of falls and fractures is rising most steeply. It is estimated that 1 in 3 over 65 year olds and one in two over 85 year olds will fall each year and half of these will fall repeatedly<sup>39</sup>.

Our findings show that there is no widespread recording in general practice of falls, disorders of gait or balance, or risk of future falls in older people. Routine contact with a health professional resulted in a recorded falls history for less than 1% of patients aged 75 and over (indicator 16). Less than a third of older patients with a recent fall had evidence of a gait and balance observation (indicator 17). Less than 1% of over 75 year olds were estimated to be at high risk of falling, based on their recorded falls history and any gait or balance assessments. Of these only 1.4% had a record of a relevant referral (indicator 18), and less than 1% had a record of bone health assessment (indicator 20). Similarly, less than 1% of older patients with known osteoporosis or prior fragility fracture had a record of falls assessment (indicator 19). The Clinical Effectiveness and Evaluation Unit has recently reported a national audit of falls and bone health. Though about three quarters of NHS acute Trusts reported the presence of an integrated falls service, the number of new patients assessed per week were only 1.7 per 100,000 base population<sup>41</sup>. The present study found no evidence that the falls patient pathway is well used or embedded in to clinical practice in primary care. In the CEEU audit it was noticeable that organisational standards in the management of osteoporosis lagged behind those for falls. In primary care, though there is room for improvement, it would appear that documented case-finding, assessments and interventions for patients at risk of osteoporotic fracture greatly exceed those for patients at risk of falls.

## 7.9 Implications for a potential Quality Outcomes Framework domain

- This study indicates the potential for identifying patients at risk of osteoporosis and falls using electronic health care records from primary care. There are shortfalls in computer recording which could be addressed by the introduction of new computer codes, training and a systematic approach as is being considered by the Expert Review Group.

- A ‘single concept’ fragility fracture code would avoid the necessity of searching large datasets of fracture codes to distinguish fragility fractures from high trauma fractures.
- An agreed definition for what constitutes ‘current’ osteoporotic therapy would be needed.
- A computer code for a disorder of gait or balance present/absent would be preferred rather than the use of large datasets of relevant codes.
- A preferred set of codes would need to be agreed and disseminated to GPs at least three months before implementation.
- A systematic opportunistic identification of high risk fallers through the QOF would have significant implications for the work load of existing falls services.

## 8. References

1. Burge R, Worley D, Johansen A, Bhattacharyya S, Bose U. The cost of osteoporotic fractures in the UK Projections for 200-2020. *Journal of Drug Assessment* 2001;4:91-107.
2. Lawrence T, White C, Wenn R, Moran C. The current hospital costs of treating hip fractures. *Injury*. 2005;36(1):88-91.
3. Department of Health. Hospital Episode Statistics (England). London: Department of Health, 2006.
4. Osnes E, Lofthus C, Meyer H, al. e. Consequences of hip fracture on activities of daily life and residential needs. *Osteoporos Int* 2004;15:567-74.
5. Department of Health. National Service Framework for Older People. London: Department of Health, 2001.
6. Geusens P, Autier P, Boonen S, Vanhoof J, Declerck K, Raus J. The relationship among history of falls, osteoporosis, and fractures in postmenopausal women. *Archives of Physical Medicine and Rehabilitation*. 2002;83(7):903-6.
7. NICE. Bisphosphonates (alendronate, etidronate, risedronate), selective oestrogen receptor modulators (raloxifene) and parathyroid hormone (teriparatide) for the secondary prevention of osteoporotic fragility fractures in postmenopausal women. Technology appraisal guidance 87. London: National Institute for Health and Clinical Excellence., 2005.
8. Scottish Intercollegiate Guidelines Network. Management of Osteoporosis: National clinical guideline 71., 2003.
9. American Geriatrics Society. Guideline for the prevention of falls in older people. *Journal of the American Geriatrics Society* 2001;49(5):664-72.
10. British Orthopaedics Association. *The care of fragility fracture patients (The Blue Book)*, 2003.
11. Giangregorio L, Papaioannou A, Cranney A, Zytaruk N, Adachi J. Fragility Fractures and the Osteoporosis Care Gap: An International Phenomenon. *Seminars in Arthritis and Rheumatism* 2006;35(5):293-305.
12. Elliot-Gibson V, Bogoch E, Jamal S, Beaton D. Practice patterns in the diagnosis and treatment of osteoporosis after a fragility fracture: a systematic review. *Osteoporos International* 2004;15(10):767-78.

Author: Julia Hippisley-Cox

8-95

Date: 30 August 2007

13. Feldstein A, Nichols G, Orwoll E, Elmer P, Smith DH, M., al. e. The near absence of osteoporosis treatment in older men with fractures. *Osteoporos International* 2005;16(8):953-62.
14. Aspray T, Stevenson P, Abdy S, Rawlings D, Holland T, Francis R. Low bone mineral density measurements in care home residents--a treatable cause of fractures., 2006;35(1):37-41. *Age and Ageing*. 2006, January 1;35(1):37-41.
15. Chantler I, Davie M, Evans S, Rees J. Oral corticosteroid prescribing in women over 50, use of fracture prevention therapy, and bone densitometry service. *Ann Rheum Dis* 2003, April;62(4):350-2.
16. Bayly J, Hollands R, Yemm S, Riordan-Jones S, Brough-Williams I, Thatcher M, et al. How well is guideline care in the management of risk factors for osteoporotic fractures being implemented in a large cohort of patients in a UK primary care setting? *Osteoporos Int*. 2007;18 (Suppl 1):S22-3.
17. de Lusignan S, Chan T, Wood O, Hague N, Valentin T, van Vlyman J. Quality and variability of osteoporosis data in general practice computer records: implications for disease registers. *Public Health* 2005;119(9):771-80.
18. Holt G, Khaw K, Reid D, Compston J, A. B, Woolf A, et al. Prevalence of osteoporotic bone mineral density at the hip in Britain differs substantially from the US over 50 years of age: implications for clinical densitometry. *British Journal of Radiol* 2002;75(897):736-42.
19. Dixon T, Mitchell P, Beringer T, Gallacher S, Moniz C, Patel S, et al. An overview of the prevalence of 25-hydroxy-vitamin D inadequacy amongst elderly patients with or without fragility fracture in the United Kingdom. *Current Medical Research and Opinion*. 2006;22(2):405-15.
20. van Staa T, Leufkens H, Cooper COI. The epidemiology of corticosteroid-induced osteoporosis. 2002;13:777-87.
21. Royal College of Physicians. Osteoporosis: clinical guidelines for prevention and treatment. 1999.
22. van Staa T, Leufkens H, Abenham L, Begaud B, Zhang B, Cooper C. Use of oral corticosteroids in the United Kingdom. *QJM*. 2000, February 1;93(2):105-11.
23. Rubenstein L. Falls in older people: epidemiology, risk factors and strategies for prevention. 2006;ii:37-41.
24. Brennan J, Johansen A, Butler J, Stone M, Richmond P, Jones S, et al. Place of residence and risk of fracture in older people: a population-based study of over 65-year-olds in Cardiff. *Osteoporosis International*. 2003;14(6):515-9.
25. Norton R, Campbell A, Reid I, Butler M, Currie R, Robinson E, et al. Residential status and risk of hip fracture. *Age and Ageing*. 1999, March 1;28(2):135-9.
26. Chapuy M, Arlot M, Delmans P, Meunier P. Effect of calcium and cholecalciferol treatment for three years on hip fractures in elderly women. *British Medical Journal* 1994, April 23;308(6936):1081-2.
27. Bischoff-Ferrari H, Dawson-Hughes B, Willett W, Staehelin H, Bazemore M, Zee R, et al. Effect of Vitamin D on Falls: A Meta-analysis. *JAMA*. 2004, April 28;291(16):1999-2006.
28. Emkey, Ettinger. Improving Compliance and Persistence with Bisphosphonate Therapy for Osteoporosis. *The American Journal of Medicine*. 2006;119(4):S18-S24.



29. Klotzbuecher C, Ross P, Landsman P, Abbott T, Berger M. Patients with prior fractures have an increased risk of future fractures: a summary of the literature and statistical synthesis. *J Bone Miner Res* 2005;15:721-39.
30. Edwards B, Bunta A, Simonelli C, Bolander M, Fitzpatrick L. Prior Fractures Are Common in Patients With Subsequent Hip Fractures. *Clinical Orthopaedics & Related Research*. 2007;E-pub.
31. Court-Brown C, Caesar B. Epidemiology of adult fractures: A review. *Injury*. 2006;37(8):691-7.
32. van Staa TP, Dennison EM, Leufkens HG, Cooper C. Epidemiology of fractures in England and Wales. *Bone* 2001;29(6):517-22.
33. O'Neill T, Felsenberg D, Varlow J, C. C., Kanis J, Silman A, al. e. The prevalence of vertebral deformity in European Men and Women: the European Vertebral Osteoporosis Study. *J Bone Miner Res*. 1996;11(7):1010-8.
34. Eisman J, Clapham S, Kehoe L. Osteoporosis Prevalence and Levels of Treatment in Primary Care: The Australian BoneCare Study. *Journal of Bone and Mineral Research* 2004;19(12):1969-75.
35. Brankin E, Caroline M, Munro R. Closing the osteoporosis management gap in primary care: a secondary prevention of fracture programme. *Current Medical Research and Opinions*. 2005;21:425-82.
36. What Is the Prevalence of Post-Menopausal Fragility Fracture (Part 2)? ASBMR (2006); 2006.
37. Leslie W, Anderson W, Metge C, L-J. M. Clinical risk factors for fracture in postmenopausal Canadian women: A population-based prevalence study. *Bone* 2007;40(4):991-6.
38. Amamra N, Berr C, F. C-C, Delcourt C, Delmas P, Derriennic F, et al. Estimated number of women likely to benefit from bone mineral density measurement in France. *Joint Bone Spine* 2004;71(5):409-18.
39. Close J, Lord S, Menz H, Sherrington C. What is the role of falls? *Best Practice & Research Clinical Rheumatology*. 2005;19(6):913-35.
40. NICE. Falls: the assessment and prevention of falls in older people. Clinical guideline 21. London: National Institute for Health and Clinical Excellence., 2004.
41. Royal College of Physicians The Clinical Effectiveness and Evaluation Unit. National Audit of the Organisation of Services for Falls and Bone Health for Older People. London, 2006.