



Secondary fracture prevention: first steps to a national audit

Fracture Liaison Service Database (FLS-DB)
Feasibility study summary report



In association with:

Commissioned by:



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Primary audience: healthcare professionals, NHS managers, commissioners, policymakers

Secondary audience: patients and carers, patient organisations

Falls and Fragility Fracture Audit Programme

The Fracture Liaison Service Database (FLS-DB) is commissioned by the Healthcare Quality Improvement Partnership (HQIP) and managed by the Clinical Effectiveness and Evaluation Unit (CEEU) of the Royal College of Physicians (RCP) as part of the Falls and Fragility Fracture Audit Programme (FFFAP), alongside the National Hip Fracture Database (NHFD) and Falls Pathway workstream. FFFAP aims to improve the delivery of care for patients having falls or sustaining fractures through effective measurement against standards and feedback to clinicians, commissioners and the public.

Healthcare Quality Improvement Partnership

The Healthcare Quality Improvement Partnership (HQIP) is led by a consortium of the Academy of Medical Royal Colleges, the Royal College of Nursing and National Voices. Its aim is to promote quality improvement, and in particular to increase the impact that clinical audit has on healthcare quality in England and Wales. HQIP hosts the contract to manage and develop the National Clinical Audit and Patient Outcomes Programme (NCAPOP). Their purpose is to engage clinicians across England and Wales in systematic evaluation of their clinical practice against standards and to support and encourage improvement in the quality of treatment and care. The programme comprises more than 30 clinical audits that cover care provided to people with a wide range of medical, surgical and mental health conditions.

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Overview

People with low bone density and a tendency to fall are at risk of a fragility fracture and those who sustain one such fracture are at high risk of another. There are approved treatments for low bone density and interventions to reduce falls risk, but they are not offered to most patients who should be on treatment. Fracture liaison services (FLSs) have been introduced to ensure that patients are assessed after fragility fracture and offered secondary prevention. A Fracture Liaison Service Database (FLS-DB) has been proposed to support audit to establish the extent to which this is happening.

This feasibility study was conducted to assess whether an FLS-DB can be developed to meet these objectives. More specifically, the feasibility study was designed to find out whether it is possible to determine:

- an accurate estimate of the incidence of fragility fracture in a locality
- whether patients who have had a fragility fracture can be identified in GP records
- whether patients who are assessed and treated for osteoporosis and falls risk can be identified in GP records
- whether the records of patients' fragility fractures can be matched across GP records and FLS databases.

In response to information governance challenges regarding access to identifiable records, the feasibility study also investigated whether opt-in GP practice-level consent was achievable for release of patient data to an FLS-DB.

The feasibility study demonstrated that, in principle, a national FLS-DB is able to answer the basic critical questions on the management and appropriate follow-up of patients who sustain a fragility fracture. A useful method of estimating the expected number of fractures (the denominator) was developed, but there is still progress to be made in refining its accuracy. Data about fragility fractures can be extracted from primary care databases, but there are severe limitations on their completeness, and uncertainty, in particular about how the date of fracture is recorded. Information governance restrictions made it necessary for us to attempt an opt-in model of GP consent. This proved unworkable and therefore assessment of data linkage between FLSs and general practice could not be carried out adequately. However, if in the future GP data were to be more widely available for linkage, the successful elements of this work provide the building blocks for capitalising on this opportunity to drive improvement in patient care. We will now focus efforts on developing an FLS-DB facilities audit across the UK and rolling out the FLS-DB patient audit by collecting a minimum common dataset via a modern data collection web tool. This next phase of work will allow a more comprehensive national picture of fragility fracture secondary prevention, as well as a comparison of service models and associated outcomes at the patient level for different NHS organisations. This will identify gaps and shortfalls in commissioning of FLSs and assist the sharing of best practice, which in turn will generate improvements in outcomes for this patient group.

Acknowledgements

We are grateful to all the organisations within both secondary and primary care that consented to participate in this study. Without their commitment, this report would not have been possible.

We are also grateful to the National Institute for Health Research (NIHR) Musculoskeletal Biomedical Research Unit at Oxford University Hospitals NHS Trust, and to the University of Oxford for access to the Read code list used in the REFReSH study.

We would like to thank the members of the FFFAP Advisory Group (Appendix 1) for their input into this project.

List of abbreviations

A&E	Accident and emergency
CAG	Confidentiality Advisory Group
CCG	Clinical commissioning group
CEEU	Clinical Effectiveness and Evaluation Unit
DXA	Dual-energy X-ray absorptiometry
FFFAP	Falls and Fragility Fracture Audit Programme
FLS	Fracture liaison service
FLS-DB	Fracture Liaison Service Database
HES	Hospital Episode Statistics
HRA	Health Research Authority
HSCIC	Health and Social Care Information Centre
HQIP	Healthcare Quality Improvement Partnership
ICC	Intra-class correlation
ICD	International Classification of Diseases
NCD	National clinical director
NHFD	National Hip Fracture Database
NICE	National Institute for Health and Care Excellence
NIHR	National Institute for Health Research
NOS	National Osteoporosis Society
OPCS	Office of Population Censuses and Surveys
QOF	Quality and Outcomes Framework
RCP	Royal College of Physicians
RCS-CEU	Royal College of Surgeons – Clinical Effectiveness Unit
REFReSH Study	Regional Evaluation of Fracture Reduction Services after Hip Fracture

Background

Osteoporosis

Osteoporosis is a disease in which the density and quality of bone are reduced. As bones become more porous and fragile, the risk of fracture after a simple fall increases. Often there are no symptoms until the first fracture occurs. Patients who sustain one fragility fracture are at a very high risk of sustaining another fracture. National Institute for Health and Care Excellence (NICE)-approved therapies and interventions can significantly reduce the risk of re-fracture by 20–70% depending on fracture site. However, most patients who should be on treatment are not offered it because of a failure of the NHS to identify, investigate, initiate and then monitor this high-risk patient group.

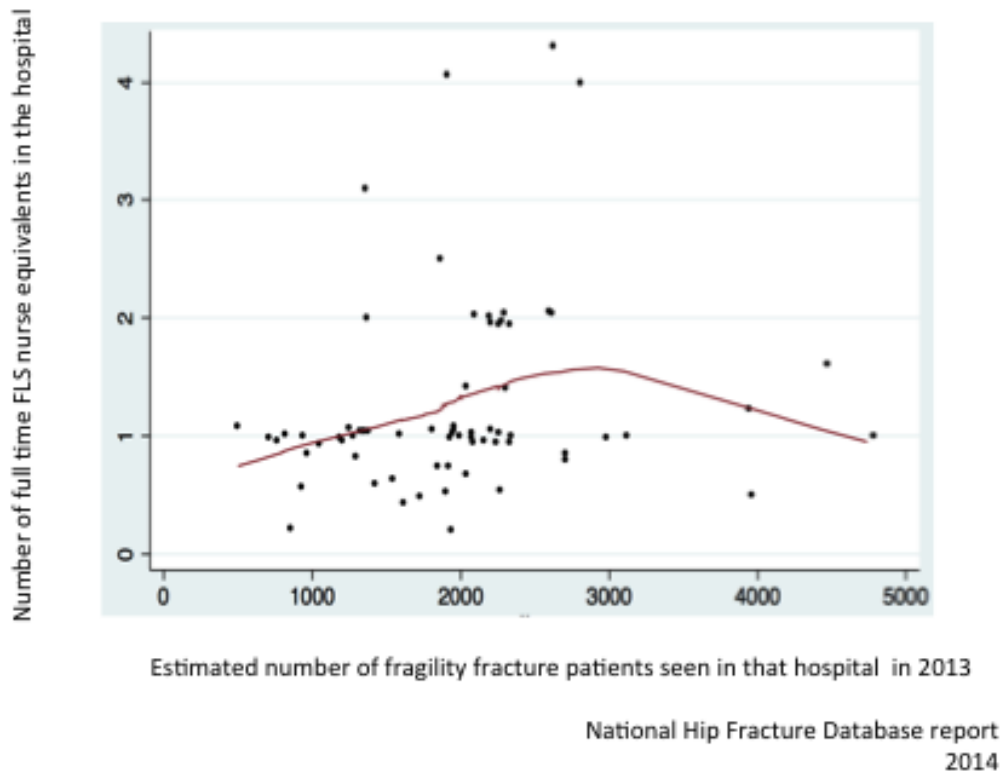
In view of this and the ageing population, without improvements to service provision the rising burden of fragility fracture (currently over 300,000 fractures per year including 65,000 hip fragility fractures) could potentially overwhelm NHS and social care services and inflict unnecessary suffering and disability on thousands of individuals.¹

Fracture liaison services

Fracture liaison services (FLSs) have been recommended by the Department of Health to reliably close the existing care gap. FLSs aim to ensure that identification, investigation, treatment initiation and monitoring where appropriate are consistently and systematically delivered to all patients with fragility fractures. Although most FLSs are led and based in secondary care, they can be based and/or led by primary care. An FLS usually comprises a dedicated healthcare professional who works to pre-agreed protocols for secondary fracture prevention with support from a medically qualified practitioner (either a GP with specialist interest or a hospital doctor with expertise in bone diseases). Based on National Osteoporosis Society (NOS) estimates for the 19 million adults aged over 50 years in England, national FLS coverage should prevent 31,000 fractures including 13,000 hip fractures over 5 years. This leads to a 5-year saving of at least £156.2 million in NHS acute care costs, not including social care or community costs or benefits to patients, their families and carers.

However, in 2010 only 37% of health economies in England, Wales and Northern Ireland had an FLS, while Scotland had almost universal access. Of those FLSs, there is great variability in terms of capacity (staff per 1,000 patients) and scope of service, for example the role of the FLS in respect of drug adherence and falls prevention (Figure 1).²

Figure 1. Relationship between reported number of FLS nurses per hospital and the estimated number of fragility fracture patients seen in that hospital per year



The number of patients reliably accessing secondary prevention is currently unknown, but using data from the primary care 2012/2013 Quality and Outcomes Framework (QOF) indicators for secondary fracture prevention suggested that fewer than one in five patients were effectively managed in the first year.³

Fracture Liaison Service Database (FLS-DB)

The Falls and Fragility Fracture Audit Programme (FFFAP) is managed by the Clinical Effectiveness and Evaluation Unit (CEEU) of the Royal College of Physicians (RCP). The programme was commissioned by the Healthcare Quality Improvement Partnership (HQIP) to perform a feasibility study of an FLS-DB to demonstrate whether patient-level data from primary care settings can be linked with data from FLSs (principally in secondary care settings). The goal of FLS-DB would be to establish whether patients have received appropriate assessment and treatment for osteoporosis and falls.

More specifically, FLS-DB would aim to describe four key components of the care pathway:

- incident fragility fracture identification (which occurs almost exclusively in secondary care)
- investigation (including dual-energy X-ray absorptiometry (DXA) for bone health)
- initiation of treatments (for both bone protection and falls reduction)
- monitoring in the short (4 months) and long (12 months) term for persistence of bone protection therapy and recommended exercise.

This requires integration of data obtained both from the acute episode in secondary care (where the index fracture is identified) and primary care (where bone health treatments may be initiated, monitored and maintained and where community or primary care provision of falls reduction interventions is recorded). The ultimate aim of FLS-DB is to provide comparative information by ongoing national clinical audit of the provision of secondary prevention for patients with fragility fractures by all providers in England and Wales. This will raise awareness of the condition, and allow providers to judge their delivery of appropriate care compared with national clinical guidance and to benchmark against regional and national peers. This therefore becomes an audit cycle for service improvements locally and nationally. The method builds on the success of the National Hip Fracture Database (NHFD) that has driven improvement in hip fracture care provided by hospitals.⁴

This report details the findings of a feasibility study conducted to assess whether an FLS-DB can be developed to meet these objectives.

Design of the feasibility study

Scope

The aim of the feasibility study was to answer the following questions for FLSs in England.

- 1 Can we identify the population who sustain a fragility fracture in areas covered by clinical commissioning groups (CCGs) using the Hospital Episode Statistics (HES) accident and emergency (A&E) and outpatient databases?
- 2 Can we identify the population who sustain a fragility fracture using GP electronic records?
- 3 Can we identify patients who are assessed and treated for osteoporosis and falls risk using GP electronic records?

In order to answer the final feasibility question, an additional question was added following changes within the information governance landscape.

- 4 Can a practice-level 'opt-in' mechanism be used as the basis for a national database?
- 5 Can we identify and match records for the same fragility fracture from FLS and GP databases?

Governance and oversight

The FLS-DB feasibility study is part of the FFFAP, which is commissioned by HQIP and managed by the CEEU of the RCP. A clinical director provided clinical leadership and was supported by a multidisciplinary and multi-agency advisory group (Appendix 1) and a project manager.

Data were collected and processed with specific approval of the secretary of state for health on the recommendation of the Health Research Authority (HRA) Confidentiality Advisory Group (CAG) under the Health Service (Control of Patient Information) Regulations 2002, commonly referred to as section 251 approval.

Conduct of the feasibility study

Site selection and recruitment

For the purposes of the feasibility study, eligible FLS providers were any care provider in England (acute or non-acute) providing a service that:

- i) identifies patients presenting to an acute provider with a fragility fracture
- ii) investigates, initiates or refers for treatment initiation with respect to osteoporosis and falls risk.

In primary care, all GP practices in England were eligible for inclusion in the feasibility study.

In total, 21 FLSs contributed to the secondary care data collection and 91 GP practices provided patient data for analysis in the feasibility study (see feasibility question 5).

Feasibility question 1

Can we estimate the total population who have sustained a fragility fracture in a given constituency – NHS hospital trust, CCG or GP practice?

Although national statistics can provide the nationwide number of fragility fractures, it is difficult to apply this at NHS trust level, as trusts frequently serve geographically ill-defined populations. We explored this question to find the most accurate methodology for estimating the target population in individual trusts, CCGs or GP practices. This is needed to provide the denominator of a calculation for FLS case finding and is used to calculate fragility fracture case ascertainment through the feasibility study report.

We used the following criteria to assess this question.

- The agreement between estimates of fracture numbers for each NHS acute trust.
- The population incidence of fractures using a number of methods.
- The agreement between the estimates with numbers of fractures recorded in local databases for three NHS trusts.

Question 1 methods

The Clinical Effectiveness Unit at the Royal College of Surgeons of England (RCS-CEU) explored a variety of methods and data sources to estimate the total number of fractures presenting to a hospital setting, including HES data on presentations at hospital A&E departments, attendances at outpatient clinics and inpatient hospital episodes from 145 acute trusts in England. We

assessed the consistency and accuracy of the estimates produced by these methods. We quantified the level of agreement between the estimates using the intra-class correlation (ICC), which describes the estimates produced by the different methods in relation to the variation in the estimates across all the NHS acute trusts. We also estimated the total number of fragility fractures by multiplying by five the number of hip fractures derived from NHFD returns for 2013 (the 'rule of five estimate'). As a further comparison method, we took epidemiological estimates, scaled from the UK overall to the population of England, with GP practice level demographic data to produce estimates of the number of fragility fractures.⁵

Question 1 results

The results from the analysis of HES data showed that the mean number of fractures within NHS acute trusts varied substantially, reflecting the size of the hospital and its catchment area. Each of the three methods used captured this spread consistently and there was a high level of correlation between the methods (Table 1). However, the outpatient method tended systematically to underestimate the number of fractures compared with the other two methods. A weakness of the A&E method then became apparent when we examined how the methods were used to estimate the population incidence of closed fractures among over-50s for each CCG catchment area. The method using A&E data seemed to overestimate the expected number of fractures for smaller hospitals, and this appeared to be due to incomplete coding of the reason for presentation at A&E and attendance at outpatients.

Data source and method	Total fractures	Mean by trust	Acute trust median (interquartile range)	Acute trust range (min to max)
Method 1 (A&E data)	310,300	2,140	1,973 (1,563–2,537)	874–5,050
Method 2 (outpatient data)	200,535	1,383	1,213 (950–1,703)	346–3,101
Method 3 (inpatient data)	297,540	2,052	2,005 (1,380–2,440)	535–4,505

We established that the most robust estimate came from knowing the incidence of hip fractures, using the 'rule of five estimate'. Because of the requirement of the best practice tariff, the NHFD reports the incidence of hip fracture both by CCG and by trust, with high levels of case ascertainment (95%).⁶ This makes the 'rule of five' the ideal mechanism for estimating total fragility fracture incidence, which needs both these units of analysis. Epidemiological estimates and practice-level demographic data predicted 9,965 fractures for the 91 GP practices overall, correlating well with the rule of five estimates at a practice level although consistently somewhat higher. The limitations of this simple rule are clearly apparent. The actual ratio of all fragility fractures to hip fractures is likely to vary between catchment populations owing to variation in age structure. However, this level of imprecision is substantially smaller than that expected from the variability in FLS provision.

Our ability to estimate the denominator more accurately is likely to improve in coming years as more data are collated from the audit process.

Feasibility assessment: successful. Our 'rule of five' based on number of hip fractures establishes a mechanism for estimating the total number of fragility fractures at both hospital and CCG levels. While this estimate may be less accurate when applied at the smaller unit of an individual GP practice, it is used as the basis of the denominator for the purpose of the feasibility study and will be refined during the roll-out phase of FLS-DB.

Feasibility question 2

Does the GP electronic record contain extractable data on incident fragility fractures?

We used the following criteria to assess this question.

- Ability of the primary care query to correctly identify patients with fragility fractures recorded in GP systems.
- Proportion of the expected total number of patients with a fragility fracture identified by the query.

Question 2 methods

We designed a query based on Read codes for automatic extraction of data from GP electronic patient records of patients who had experienced a fragility fracture between 1 April 2011 and 30 September 2013 in 91 GP practices. We refined the query to exclude non-fragility fractures and non-incident cases (cases with one or more fracture records in the 12 months before the index fracture date within our defined period). We compared the extracted number of records with the number expected from the 'rule of five', adjusted for the age profile of each practice, to assess the completeness of the estimate of the number of fragility fractures obtained from GP records.

Question 2 results

The refined query identified 8,572 patients with an index fracture during the study period. Overall, the 'rule of five' predicted 8,222 fragility fractures in the 91 practices. Using this as a denominator, the observed case ascertainment from GP records was 104% of the predicted number overall, and at a practice level this showed considerable variation. As steps had been taken to reduce inclusion of spurious fractures, this finding is anomalous. This suggests that there may be errors in the primary care coding of fractures, that there are still fractures included in the dataset which occurred prior to the study period, or that the 'rule of five' provides an underestimate of the expected caseload. There was no change in the total number of fractures recorded following the introduction of the QOF indicator relating to maintenance of a register of fragility fractures in April 2012.

Feasibility assessment: partially successful. Analysis of data demonstrated that diagnostic information about fractures is being recorded by GPs, but we cannot be confident that each fracture is recorded with its date of incidence. This is likely to be the main reason for the excessive number of fractures that we apparently observed. Additional work is required to further develop an algorithm that accurately identifies incident fragility fractures at a practice level for a given time period.

Feasibility question 3

Can we identify patients who are assessed and treated for osteoporosis and falls risk using GP electronic records?

We used the following criteria to assess this question.

- Ability to describe the patients who are assessed and treated for osteoporosis and falls risk using GP electronic records.
- Completeness and quality of information relating to osteoporosis assessment and treatment, and falls assessment and treatment.

Question 3 methods

We conducted analyses on all of the primary care records of patients identified as having a fragility fracture in practices with at least 20 patients with an index fracture during the study period and up to 31 March 2013. We stratified the index fractures by whether they occurred before or after the introduction of the QOF indicator. We considered prescribing data at both 6 months and 12 months (as a proposed surrogate for adherence to bone-sparing therapy in the absence of a better measure) after the index fracture date. We further interrogated the records to identify any recorded information regarding assessment and management of falls risk using the criteria shown in Table 2 below.

Question 3 results

There was no difficulty in extracting coded data about assessment and treatment of osteoporosis from the electronic medical records, where the data had been entered. However, the number of cases in which the information was present was disappointingly low. According to the extracted data, fewer than one-third (31.2%) of all patients who had an index fracture during the study period received an acute prescription for osteoporosis therapy within 6 months of their fracture. This had not improved since the introduction of the QOF in April 2012 and there was a wide range in the proportion of patients receiving prescriptions across the practices: 20.0–61.9% pre QOF and 22.2–73.9% post QOF. Patterns of prescription at 12 months were similar to those seen at 6 months.

We cannot say whether the low figures are the result of failure to act or of failure to record. However, the prescribing data used for the query are typically a very reliable indicator, on the basis that computerised prescription generation for routine repeat prescription is almost

universal in GP practices and the data were extracted from the prescription detail rather than from separately coded data.

Coded data on assessment and treatment of falls risk were almost entirely absent. Fewer than a fifth of patients (18.7%) with an index fracture during the study period had any evidence of a falls assessment or treatment after their fracture in their primary care record. Only 3.9% of patients had a record of a formal falls risk assessment (Table 2). As with osteoporosis treatment, we are unable to conclude whether this is failure to act or failure to record and code information.

Table 2. Falls assessment and/or treatment following index fracture

Falls assessment or treatment	n	% of fractures*
Formal risk assessment	330	3.9
Exercise plan	71	0.8
Treatment, intervention or referral	814	9.5
Falls risk considered	790	9.2
Falls exemption	7	0.1

*n=8,572. Categories are not mutually exclusive; patients may be included in more than one category.

Feasibility assessment: partially successful. The analysis of data demonstrated that information was being entered by GPs on (1) diagnoses of osteoporosis, (2) the use of DXA scans and (3) medications prescribed for osteoporosis. However, the number of patients with information available is disappointingly low and is in accord with the results from the QOF 2013/4. The prescription of supplements and bone-sparing agents can be measured at 6 and 12 months post fracture and is reliable, being derived from computerised prescription generation. Assessment and prevention of falls risk are either rarely done or rarely documented in GP records.

Feasibility question 4

Can a practice-level ‘opt-in’ mechanism be used as the basis for a national database?

In order to extract the required data from primary care in a format allowing linkage to the secondary care records (to answer question 5), we made an application to the CAG for the use of personally identifiable patient data without patient consent. However, owing to the ongoing changes in information governance at the time of this work, we did not secure permission. However, the approval that we did receive allowed the Health and Social Care Information Centre (HSCIC) to extract identifiable data for the project, provided that GP practices gave their explicit (opt-in) consent, giving rise to the fifth feasibility question, which we assessed according to the following criteria.

- Proportion of GP practices approached that opted in to releasing identifiable patient data.
- Proportion of GP practices that opted in **and** provided identifiable data.
- Impact of a local FLS service and local FLS champion on consent rate and data provision:
 - proportion of GP practices opting in and providing data in areas with and without an FLS/FLS champion (and compared with a control region).

Question 4 methods

We approached 16 practices that had supported other previous national clinical audit activities as pilot sites to test out the methodology. Following the pilot and further discussion with HQIP, we agreed to test more fully whether practice-level opt-in consent could be obtained by seeking practice-level consent from GP practices in those areas where secondary care data were being collected through the FLS. We developed a communication to GP practices, describing the purpose of the project and requesting consent for the extraction of identifiable data by the HSCIC, relating to patients registered with their practice. GP practices in regions where the local FLS had completed the data collection for the secondary care element of the feasibility study were contacted, either by a local FLS champion or by the HSCIC, requesting this practice-level consent. As a control, the HSCIC also contacted a sample of GPs in an area with no FLSs.

Question 4 results

In total, 2,214 practices were contacted to provide consent for the study. Of these, 1,573 practices were contacted directly by the HSCIC, resulting in a consent rate of 7%. The remaining 641 practices were contacted by their local FLS champion, where the champion knew the practice. This achieved a similar consent rate of 9%. The consent rate of the control practices was 6% (Table 3).

Data were subsequently sent by 57% of the opt-in practices contacted by champions (5% of all those contacted by champions) and 53% of the opt-in practices contacted by the HSCIC (4% of all those contacted by HSCIC), compared with 44% of the opt-in control group (3% of the controls contacted) (Table 4).

	Contacted n	Opted in (consented) n (%)	Sent data to HSCIC n (%)
GP practices contacted by champions	641	60 (9%)	34 (5%)
GP practices contacted by HSCIC	1,573	108 (7%)	58 (4%)
Sample region (control group)	635	39 (6%)	17 (3%)

From the 91 GP practices that provided data in a usable format, initial linkage of primary and secondary care data was possible for 770 patients. If the originally anticipated opt-out methodology had been an option, based on rates seen in previous work such as the early National Diabetes Audit, one could expect the inclusion of 965 practices from the 2,214.⁷ Using

a similar ratio of practices to sets of linkable patient data as we have demonstrated, this would have achieved over 8,000 linked records, compared with the 770 achieved using the opt-in methodology.

Feasibility assessment: unsuccessful. Opt-in consent, even with the encouragement of a local champion, yielded disappointing results and provided only a small sample of GP practices within each FLS area, which is insufficient for the roll-out of the proposed database. However, this may change in the future if there are policy changes to encourage engagement of general practice in national audit work and as the information governance landscape in the UK develops.

Feasibility question 5

Can we identify and match records for the same fragility fracture across primary and secondary care?

We used the following criteria to assess this question.

- Ability to link data received from secondary care FLS to primary care GP data at a patient level.
- Percentage of available records that can be linked by index fracture across primary and secondary care.

Question 5 methods

We developed a web-based data collection tool for secondary care FLSs to upload the data in an agreed dataset from hospitals where legacy local FLS databases already existed, or to enter the same data manually from those centres without an FLS database. Data were collected from FLSs between 1 July 2013 and 31 October 2013. To allow linkage between primary and secondary care data, we then aligned Read codes used in primary care with International Classification of Diseases (ICD) 10 and Office of Population Censuses and Surveys (OPCS) codes used in secondary care. We developed and piloted a detailed specification for data extraction to allow the mapping of fracture events from the secondary care data to the same event in the primary care data.

The HSCIC received data from 91 GP practices that consented to participate and from the secondary care FLS data collection tool for 15 FLSs with data on at least 10 patients, in an identifiable format. They matched patient identifiers in the GP data (NHS number, sex, age and postcode) with the same information in the FLS data, if available. This identified the records of patients whose fracture was recorded in both the FLS and GP datasets. Linkage results are presented overall and separately for GP practices in an area where there was a known,

well-established FLS with high-quality data at a secondary care level, as an example of the best degree of linkage that may be expected.

Question 5 results

The required data existed in both datasets to match records technically between the two sources. However, overall the linkage rates achieved were low (Table 4) and variable across the different localities. Owing to the low opt-in rate of GP practices within the catchment areas of the FLSs, it was difficult to identify with any degree of certainty the reason for the variability: ie the practices where patients with index fragility fractures were registered may not have been included in the dataset, if the practice did not opt in. However, it is reasonable to assume that the cause of the observed low linkage rate may be multifactorial, with other reasons including: patients presenting at other trusts within or outside the assumed CCG catchment areas; differences in dates for the data submission period between FLSs and GP practices in the feasibility study; or inaccuracies in recording. It could be expected that, with a more complete GP dataset, this linkage rate would improve. In the area with a well-established FLS, the rate of linkage increased from the overall rate seen in the study, which suggests that improvement can also be made at a service level.

Table 4. Patients with a fragility fracture in the GP database matched to the FLS database

Type of fracture	All practices, n=91		Practices in example area with well-established FLS, n=7	
	Patients in GP dataset, n	Patients in GP dataset matched to FLS, %	Patients in GP dataset, n	Patients in GP dataset matched to FLS, %
All fragility fractures	8,572	7.0	1,015	27.1
Number of lower limb fractures	2,786	8.3	346	35.3
Number of upper limb fractures	3,134	7.5	355	24.5
Rib/pelvis fractures	713	2.1	101	8.9
Other fractures*	1,939	0.6	213	26.8

*Other neck and trunk (not rib or pelvis), dislocation, fragility (N331 code only), unspecified fracture.

Feasibility assessment: partially successful. The datasets from the FLS and GP databases both contained patient NHS numbers and dates of birth. As these are mandated fields, it should be technically possible to link patient records across care settings. There was a very low percentage of patients for whom data appeared in both the GP data and secondary care FLS data, which may be a reflection of the low opt-in rate for general practice, and the possibilities for better linkage where there is an established FLS have been demonstrated.

Conclusion and next steps

The feasibility study has confirmed that there is a wide variation in secondary fracture prevention in the NHS, and significant divergence from standards of care set out by NICE. There is therefore an urgent need for an audit in this domain. The feasibility study has demonstrated that, in principle, a national FLS-DB should be able to audit important aspects of the management and appropriate follow-up of patients who sustain a fragility fracture. There is still progress to be made to define the expected number of fractures more accurately at GP level; there are unanswered questions relating to case documentation in primary care, in particular those relating to assessment and management of falls risk but also in terms of more accurately identifying index fracture dates.

The information governance landscape has limited the scope of the feasibility study to explore fully the ability to link records across primary and secondary care and is also a limitation to the ability of FLS-DB to develop as originally planned. However, if in the future data were to be available for linkage from the majority of GP practices using the mechanisms described here, the successful elements of this piece of work provide the fundamental building blocks required to capitalise on this opportunity and drive improvement in clinical care across the secondary–primary care patient pathway.

In the meantime, there is the opportunity to build on the secondary care work done to date with the FLS and we now plan to focus efforts on developing a facilities audit across the UK and to develop the dataset for the FLS-DB patient audit to harmonise data collection within FLSs in the NHS. It will also roll out more widely the secondary care data collection web tool developed as part of this project. We have reviewed activity throughout the data collection phase in secondary care and have developed a refined dataset and enhanced web tool (with user feedback reporting) in anticipation of a future development in this area.

We hope that this next phase of work will produce a more comprehensive national picture of fragility fracture prevention and allow comparison of processes and associated outcomes for different NHS organisations. We also hope that it will identify gaps and shortfalls in commissioning of FLSs and assist the sharing of best practice, which will in turn generate improvements in outcomes for this patient group.

Alongside establishing the feasibility of a national clinical audit, focusing on secondary prevention for centres with infrastructure to support participation, FLS-DB considers that, with support from partner organisations, it has a wider quality improvement remit. This involves supporting those with enthusiasm for setting up services, by encouraging peer cooperation, and sharing of experiences and best practice initiatives between organisations.

A national patient organisation, the National Osteoporosis Society (NOS), is playing a leading role in this and the FLS-DB is working with them in two important respects: (i) the NOS hosts an FLS implementation group that brings together a wide range of stakeholders – including the

national clinical director (NCD) for trauma – and has produced standards for FLSs, an implementation toolkit and a benefits calculator for commissioners, and (ii) the FLS champions’ network – an open-door network of secondary prevention enthusiasts committed to the aim of ensuring that every patient who sustains a fragility fracture is assessed and treated to reduce the risk of a further fracture. This network was started by the FLS-DB, with HQIP funding for two champions meetings in May 2013 and February 2014. The network is now organised and funded by the NOS, with the work of the FLS-DB continuing to form a central component of its meetings.

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Appendix 1 – FLS-DB Advisory Group membership

Member	Job title / organisation
Dave Marsh	FLS-DB clinical lead
Finbarr Martin	Consultant geriatrician, Clinical Effectiveness and Evaluation Unit, Royal College of Physicians
Roz Stanley	FFFAP programme manager
Rhona Buckingham	Operations director, Clinical Effectiveness and Evaluation Unit, Royal College of Physicians
Christopher Boulton	FFFAP project manager, National Hip Fracture Database
Naomi Vasilakis	FFFAP project manager, Falls and FLS-DB
Marie Keetley	FLS-DB project manager (pH Associates)
Carmen Tsang	Clinical Effectiveness Unit, Royal College of Surgeons of England
David Cromwell	Clinical Effectiveness Unit, Royal College of Surgeons of England
Jenny Neuburger	Royal College of Surgeons of England
Kassim Javaid	University of Oxford
Jonathan Bayly	University of Derby
Anne Thurston	National Osteoporosis Society
Frances Dockery	Guys and St Thomas' NHS Trust
Jim Duffy	Health and Social Care Information Centre
Anthony Hui	South Tees NHS Foundation Trust
Gavin Clunie	Cambridge University Hospitals NHS Foundation Trust
Alastair Mclellan	Western Infirmary, Glasgow
Bob Handley	University of Oxford
Sonya Stephenson	National Osteoporosis Society
Alun Cooper	GP, West Sussex

Falls and Fragility Fracture Audit Programme (FFFAP)

A suite of linked national clinical audits, driving improvements in care; managed by the Royal College of Physicians

- > **Falls Pathway Workstream**
- > **Fracture Liaison Service Database (FLS-DB)**
- > **National Hip Fracture Database (NHFD)**

