ProFouND: Prevention of Falls Network for Dissemination

DELIVERABLE D6.3

D6.3 Interim report on data collection

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Contents

INTRODUCTION AND OVERVIEW.

ProFouND proposes to bring about change across Europe by influencing policy and practice so as to improve the uptake of evidence-based falls prevention interventions and change knowledge and attitudes towards falls and their prevention whilst using novel ICT solutions.

As part of the work of ProFouND the Description of Work (DoW) proposes setting up monitoring systems to identify whether there is change in falls incidence and in service provision. This document reports on two deliverables aimed at setting up systems to monitor progress in falls prevention in EU regions as part of the EIP goal. It should be noted that at the behest of the first EC project officer allocated to ProFouND, the initial proposal and DoW proposed seven deliverables for WP6. These included pieces of epidemiological work in each of the collaborating regions to specify falls rates within those regions and epidemiological studies of populations involved in the interventions implemented as best practice within regions. Perhaps ironically at the same time the project officer insisted on specific targets for reduction in fall rates being removed from the work plan. A number of Deliverables were removed during Period 1, based on feedback from the Independent Advisory Board and with the agreement of the second project officer allocated to ProFouND, so that the deliverables were reduced to five, and the epidemiological work described in D6.2 (and D6.4 of original DoW) was dropped due to resource constraints. Subsequently D6.3 and D6.4 were merged into one, with further revision of the DoW and agreement of the third project officer. (We are currently working with our fourth project officer).

DoW Deliverables

D6.3	Interim report on data collection

There are already core data set consensus statements for falls and injury incidence in the literature from the EUNESE and ProFaNE groups (EUNESE 2006, Hauer et al 2006, Lamb et al 2007, Schwenk et al 2012). Recent work by the FARSEEING consortium has agreed metadata sets as they relate to ICT based fall interventions (Klenk et al 2013) and a taxonomy to describe interventions (http://farseeingresearch.eu/resources/taxonomy/). By 2015 it is intended to have an EU-wide monitoring system with substantive contributions to the Joint Action on Monitoring Injury in Europe (JAMIE), using the IDB protocol (Rogmans, 2012; http://man301110a.decipher.uk.net/en/content/cms/research/research-projects/jamie-joint-action/). These have been used to provide a framework for defining the ProFouND core dataset.

As part of Task 6.1 partners were asked to identify local data which are routinely collected and easily accessible. We have then used online survey and consensus techniques to generate a consensus on what is available in our partner regions. Thus the consensus process takes into account practical considerations on top of scientific ones. Our aim was also, if possible, to collect data on service provision, costs, and quality of life parameters from existing routine data held in participating regions/countries. However, usable data in these domains are meagre or non-existent and we will not be able to pursue these meaningfully without specialist prospective data collection which is not resourced within ProFouND (see above). It should be pointed out our approach has differed to the work of the EIP-AHA Action Group 2 although they are aligned. For ProFouND the aim is to identify a core dataset immediately available from records in our partner regions. For the EIP-AHA the aim has been to define an ideal type data set, defining data that should be collected rather than is being collected. Our work differs from that of E-NOFALLS as they have focused on ICT available and where it is being used, whereas ProFouND is focusing in this document on deliverables related to fall incidence monitoring, and ways of identifying changes in service provision.

In order to identify data the link to an online questionnaire was circulated to all partners and participating centres requesting information on existing data bases in each country and region. Based on this we defined the core dataset. This has enabled us to finalise the methods of data collection and to try and merge routine and administrative data bases in participating centres. However, the available data are sparse, and the variables routinely collected in most partner regions are restricted in number (see below). Following the establishment of the core dataset we have found through requesting this data from partners that even this limited dataset cannot be provided in a usable format, so as to show impact/change. Data have been provided by partners at both aggregate and case by case level and cannot be provided on a comparable scale. In order to collect data on more than the most basic of fall related variables, (e.g. falls rates) it is clear that bespoke data collection would be required (as provided by some partners but not with any consistency).

It was always clear to us that not all data of interest would be available from routine and administrative data collected in participating regions. We thus proposed as Task 6.3 to design protocols for bespoke or prospective data collection and to explore in which centres/regions these data could be collected. We designed a specific survey instrument to be administered in participating regions/countries to collect requisite data to monitor process. The protocol designed has been implemented as part of this task in order to collect baseline data reflecting falls services. These baseline data have been collected for the period preceding implementation of the interventions to be produced by WP4 & WP5. Data collection tools have been specifically designed for the project to permit us to monitor and evaluate process changes.

Therefore the deliverable will demonstrate:

Part 1: The issues with data collection on the falls core dataset. Including an outline of the data partners have been able to provide in comparison with the original survey and established core dataset.

Part 2: Baseline quantitative data on the delivery of strength and balance exercise in the partners localities before the delivery of cascade training. Qualitative follow-up data with participants on what process changes they have started to make as a result of the training.

Part 1

European Falls and Injury Data: incidence of falls in participating regions of Europe using routine datasets.

Background

Falls are an important public health issue. It is generally accepted that each year, 35% of over-65s experience one or more falls with about 45% of people aged over 80 who live in the community falling each year. Between 10 and 25% of such fallers will sustain a serious injury (DH, 2009). This has implications in terms of independence, quality of life and also cost to health services. Hip fracture is the most common serious injury related to falls in older people and death rates are rising (Centers for Disease Control and Prevention, 2010). Each year approximately 10% of the elderly population (65+) will be treated by a doctor for an injury and approximately 100,000 older people in the EU27 and EEA countries will die from injury from a fall each year (Eurosafe, 2013).

The Prevention of Falls Network for Dissemination (ProFouND) is an EC funded initiative dedicated to bring about the dissemination and implementation of best practice in falls prevention across Europe. ProFouND comprises 21 partners from 12 countries, with associate members from a further 10 countries. ProFouND aims to influence policy to increase awareness of falls and innovative prevention programmes amongst health and social care authorities, the commercial sector, NGOs and the general public so as to facilitate communities of interest and disseminate the work of the network to target groups across EU. ProFouND's aim is to increase the delivery of evidence based practice in falls prevention and therefore reduce the numbers of falls and injurious falls experienced by older adults across Europe. However, the project's main focus will be to have a particular impact within the regions represented by partners and associate members. We therefore aimed to investigate the impact and effectiveness of the project, by collecting baseline and follow up falls data in regions participating in ProFouND.

Aims and objectives

Our aim was to create and implement systematic and comparable data collection systems which can provide objective measures of the impact and return on investment from prevention measures carried out under the auspices of the ProFouND network.

The original objectives were:

To agree a core data set based on routinely available data for falls and falls injury which can be collected across the localities and countries where the ProFouND project is likely to have a direct impact. (Agreed dataset = D6.1)

To collect baseline data on falls and falls injuries using the agreed routinely available core data from sites/localities participating in ProFouND and from comparison sites not participating. (Protocol = D6.2, This report = D6.3)

To collect follow up data on falls and falls injuries from the same sites following baseline. (To be reported in future report)

To undertake pooling and analysis of datasets to provide trend data on falls and falls injuries from before and through the project period to permit analysis of secular changes and compare changes observed in participating sites with those in control sites. (Removed from work plan because of insufficient resource.)

Methods

Design

We adopted a fully quantitative approach collecting data from both existing and easily available quantitative datasets on falls and fracture injury.

Sampling principles and procedures

Having already contacted our 21 partners and 8 Associate members and asked them to identify datasets for us (Appendix 1), or to identify colleagues who could assist us in accessing data/data collection, we contacted them again to ask them to provide the core data (see Table 1 and Appendix 2). All datasets have been anonymised before being shared with us and patient identifiable data have not been shared. The use of dropbox and university recommended ncrypt software has been used to ensure data safety and compliance with data security regulations. Ethical approval was not required but an ethical overview has been provided by the University of Manchester Research Ethics Committee.

Data Collection Methods

Data collection commenced in July 2014 and is still ongoing. The core dataset agreed is outlined below (additional measures were included in an extended core dataset (see Appendix 2):

Table 1: Core dataset

Demographics	Recording Country Locality Persons country of residence Patient Age Gender *Male* *Female* Ethnicity (open box, not pre-defined) Place of Residence *Own home* *Assisted Living e.g. Sheltered Housing* *Hospital* *Acute* *Subacute (rehabilitation)* *Nursing and Residential Care Facilities* *Providers of ambulatory care*
Patient History	Chronic Disease ICD codes used or applied to free text. History of falls in the last 12 months *Yes* *No* Medication (open text box) Previous attendance to hospital *Yes* *No*
Description of fall	Date of Injury Time of injury Reported loss of consciousness *Yes* *No*
Treatment/Intervention	Date of attendance Time of attendance Part of the body (free text-then coded using ICD) Number of days of admission Died in hospital within 90 days

Results

Data collection from partners has led to a patchy response. Although partners initially agreed the above minimum dataset, there are issues with the provision of these data. Data access and data confidentiality issues have provided a barrier to data provision and slowed down the process. The differences between different health care systems in particular has led to differing levels of data access. A distinct difference can be seen between countries with insurance based healthcare systems (Germany, France, Switzerland) and countries with tax based systems (UK, Scandinavia, Italy, Spain).

We intend to continue to collect data to illustrate the types of existing data that are available for assessing the impact of falls prevention interventions across Europe. However, it is unlikley we will be able to pool these data due to the different ways the data have been collected, the different time periods the datasets cover and the inability to standardise the datasets so that they are comparable to one anothe (see Table 2 and 3).

Table 2: Summary of core data

Partner	**Country/ location**	**Type of data**	**Parameters**
18: Vasterbotten	Sweden Vasterbotten Region	Aggregate data/Trend data 2001-2013. **National board of health and well-being statistics**	Number of medical visits (hospital) for falls injury. age 65+, by gender per 1,000. W00-W19. 01.01.2013-01.07.2014 AND total number of patients W00-W19. 2001-2013. Age 65+, by gender. 2010-2013, by gender and by age category 65-69, 70-74, 75-79, 80-84, 85+ Broken down by cause of fall, 2001-2013. W00-W19 Broken down by cause of fall and gender 2010-2013, W00-W19 W19 Accidental Falls Age 65+. Length of stay in days (for all) W00-W19. Accidental falls, AGE 65+. Care episodes Death due to falls, age 65+ 2001-2013. People 65+ who sought care at Norrlands University Hospital

			(including patients from primary care emergency service) after being injured during a fall. From municipalities of Umeå, Nordmaling, Vännäs, Bjurholm, Vindeln or Robertsfors. Divided by age category, 65-74, 75-84, 85-94, 95+ and gender Divided by accident site and whether indoor/outdoor Injury mechanism and indoor/outdoor % of people under the influence of alcohol. Number of people cared for in hospital, broken down by municipality and year. 2009-2012. Number of people cared for in hospital, broken down by number of days of care and gender. Treated in hospital % hip/femur fracture, % pelvic fracture and % sustained a concussion or more serious brain injury.
16: JUHÖ	Austria Vienna	Case by case January 2013, 1 month Ambulance data	Recording country Locality Place of residence Patient age Gender Date of fall Time of fall Body part injured loss of consciousness Falls in last 12 months Medication Date of attendance Time of attendance N=134
19: JYU	Finland Jyvaskyla	Case by Case 2011-2012 LISPE project, which is a 2-year	Country Locality Age Gender

		prospective cohort study of community-dwelling older people aged 75 to 90	Dwelling Falls in last 12 months Required medical attention Number of times needed medical attention N=848
22: TEISTE Lamia in partnership with 11: Demokritos	Athens, Larisa and Koniskos Trikala Greece	Case by Case Home dwelling older people research/clinical study Athens, Larisa and Koniskos, Trikala. N=217 local hospital data from 01/01/2013-31/12/2013 N=1029 cases- 2000-2005. Emergency department. Study data. There could be follow-up if funding is secured.	Gender Age Age group Height Weight BMI work Education Place of living Family Lifestyle (e.g. active) Medical history Doctors visit Mobility Drug intake Smoking Insurance Stand up without hands Fall in last 12 months Height of fall Place of fall Injury Injury type Difficulty getting up Fear of falling Balance One or more falls Drugs- Four or more Psychiatric drugs Vision Falls checklist Mood GDS FES-1 TGUG
Further data via 22 TEISTE Chalkidona, Physiotherapy	Chalkidona Greece	Case by Case n=65 Physiotherapist clinic/exercise groups/community based	Gender Age Height Weight Occupation Education Place of residence Living conditions e.g. live alone

			Activity levels Medical history Visits to GP in last month Mobility Medication: 4 or more. Smoking Type of fall Place of fall Injury Treatment at home
20: CSI	Amsterdam Netherlands	Case by case, weighted for extrapolation to national numbers. Uses IDB coding. 2012 2013	Country Gender Age Date of injury Time of injury Date of attendance Time of attendance Mechanism of injury Part of the body injured Number of days hospitalised Treatment/follow-up Type of injury Deceased
1: UNIMAN with Manchester Public Health	Manchester UK	Aggregate 2010-2011 (later data will become available) Uses IDB coding Aged 65+ Greater Manchester Data on more parameters will become available. Including ambulance call-outs for falls.	Gender Age catagory Cause of fall (ICD10 code W00-W19) Injury (part of body injured) (ICD10 S00 - T98X)

Table 3: Comparison of Data Variables Available

Variable	18: Vasterbotten	16: JUHÖ	19: JYU	22: TEISTE & 11: Demokritos	22: TEISTE Chalkidona,	20: CSI	1: UNIMAN
Case by case		Y	Y	Y	Y	Y	
Aggregate	Y						Y
Recording Country	Y	Y	Y	Y	Y	Y	Y
Locality	Y	Y	Y	Y	Y	Y	Y
Place of Residence		Y	Y	Y	Y		
Age Range	Y			Y			Y
Patient Age	Y	Y	Y	Y	Y	Y	
Patient Gender	Y	Y	Y	Y	Y	Y	Y
Accident Site	Y			Y			
Indoor/ Outdoor	Y			Y*	Y		
Cause of Fall W00-W19	Y					Y	Y
Date of Injury/Date of Fall		Y					
Time of Injury/Time of Fall		Y					
Part of Body	Y	Y		Y	Y	Y	Y
Reported Loss of Consciousness		Y					
Medical History				Y	Y		
History of Falls in Last 12 Months	Y	Y		Y			
Medications		Y		Y	Y		
Date of Attendance		Y				Y	
Time of Attendance		Y				Y	
Number of Visits for Falls per 1000	Y						
Total Number of Patients with Falls	Y						
Length of Stay	Y					Y	
Death due to Falls	Y					Y	
Did they need Medical Care			Y				
How many Times Required Medical Care			Y				

*At home vs not at home

Discussion

The data collected so far are insufficent for meaningful data analysis. However, the process does illustrate that partners are able to access data for us that are not normally routinely reported in large datasets (Austria/Greece), alongside data that are collected routinely (Sweden/Netherlands/UK). We have already received positive responses from Denmark and Norway who will be able to contribute to data collection over time (restrained by ethics and data protection).The UK may be able to offer an increased dataset (not currently reported). Our German partners have difficulty providing the data due to the differences in their healthcare system across federal states, but are willing to share case studies which illustrate data collection on a organisational level e.g. care home data. Further work will be carried out to engage with partners and associate partners and to agree a ProFouND consensus statement on data collection over the next year, which will be presented as part of D6.4 at month 36. These data will enable us to present a ProFouND statement on what can currently be provided on a national, organisational and local level. As part of this work partners and associate members have been asked to bring example's of best practice to a workshop in Stuttgart in March, 2015 (See Appendix 3). We continue to work closley with EIP-AHA A2 D2.2 and the A2 monitoring framework to both inform their work and share contacts and data sources.

Given the issues in data collection identified above a number of approaches have been considered to mitigate for the paucity of data.

1: Maximising response rates: In order to improve response rates for the future we have considered simplification of data requested and method of collection. Specifically partners will be asked to supply data they have immediate access to, including but not solely limited to, process data. As well as using online data collection methods, we plan, at least in part, to link the data collection of process information to the periodic reporting function, so that data reporting is seen as part of the periodic reporting function, which should improve response from partners. Given the paucity of baseline outcome data, D6.4 will per se not be in a position to report changes over time in falls rates related to implementation of best practice. Focus will have to be on process data, and a mixed method approach of using quantitative and qualitative data from partners will be prioritised.
2: Use of routine data: Working with Partner 3 in Germany we have conducted two pieces of work exploring the utility of using existent and routine data in estimating accuracy of falls data and estimating future impact of falls prevention interventions on fracture rates. In the first piece of work we started from the observation that in published work fall incidence differs considerably between studies and countries. Our aim was to derive estimates of fall incidence from two population-based studies among older community-living people in Germany and compare retrospective and prospective falls data collection methods. We did this using data derived from two German population based health surveys. We compared self-report retrospective fall data with prospective fall calendars. In short our analyses demonstrate that retrospective self-reported fall incidence differed between studies and that study design influences retrospective reported fall incidence considerably. However, importantly for future epidemiological studies, costly prospective data collection gives similar rates to the cheaper retrospective report method. This work has been published (Rapp et al, 2014). In the second piece of work we used routine population data and fracture data from Bavaria to estimate the effects of two fracture prevention strategies under different assumptions of intervention effectiveness (effect size), and participation rates. The Bavarian population was chosen because of the availability of age- and gender-stratified fracture rates, and official population data, both current and projected to 2025. Our models were restricted to community-dwelling persons aged 65 years and older. We compared models based on fall-prevention exercise being offered to all persons aged 70 to 89 years and oral bisphosphonate

treatment offered to all persons with osteoporosis. Treatment effect sizes were estimated from published meta-analyses. Focusing on fall prevention, reduction in all femoral fractures in the population is the outcome of interest. In 2014, reduction of femoral fractures by 10% required 21% of all persons aged 70-89 to participate in fall-prevention exercise. Without intervention, demographic changes will result in a 24% increase in femoral fractures by 2025. To lower this increase to 10%, fall-prevention-exercise participation rate needs to be 25%, whereas to hold the 2025 rates at 2014 rates require 43% fall-prevention-exercises participation, and is not achievable using oral bisphosphonates. It seems that high treatment and participation rates are needed to achieve substantial effects on the expected burden of femoral fractures in the future. This work has been accepted for publication (Benzinger et al, 2016). These two pieces of work demonstrate the utility of good quality routine data in falls prevention planning. Future collection of such data it seems would be advantageous to policy makers since it would permit evidence based policy decision making.

3: Estimating fall incidence from population data: Although beyond the scope of ProFouND and these deliverables, we are conducting technical work to estimate the numbers of falls in each of the 28 member states of the EU. This requires (i) identification of best applicable estimates of population fall rates from the literature in a suitable format for modelling (ii) identification of community living and institutionalised population estimates for baseline year and projections until 2040 from EU census data and projections available on EuroStat. We have based our approach on the methods used by Svedbom et al (2013) in their estimation of the prevalence of osteoporosis in the EU. They took published age-sex specific prevalence data and applied these to the population data for each of the 27 EU members in 2010. We are undertaking a similar approach using age-sex specific fall incidence data. However, whilst simple in concept the task is more challenging in practice because of (i) the paucity of good quality age-sex specific falls data in European populations, (ii) the lack of directly available population data in the EU28 on community dwelling older people and residential care dwelling older people. Nonetheless, a technical report on annual fall and fall injury rates for community dwelling and long-term residential care dwelling older people for each EU28 country from 2014-2040 will be completed later in 2016 as a consequence of ongoing work arising from the ProFouND project.

Part 2

Changes in the delivery of Strength and Balance training for falls prevention across Europe.

Background

Each year approximately 10% of the elderly population (65+) will be treated by a doctor for an injury as the result of a fall and approximately 100,000 older people in the EU and EEA countries will die from injury from a fall (Eurosafe, 2013) .

There is increasing evidence that exercise programmes that include specific strength and balance training can significantly reduce the risk and rate of falls (Gillespie et al, 2012 & 2009; Sherrington et al, 2011 & 2008). Strength and balance training (SBT) has been described as 'carrying out exercise that increase muscle strength in the legs and improve balance' (Yardley et al, 2008: 554). The evidence based FaME and Otago strength and balance exercise programmes are two of the main specific programmes proven to reduce falls in frailer older people (Davis et al, 2009; Sherrington et al, 2008 & 2011; Skelton et al, 2005; Robertson et al, 2001) and are currently the main programmes adopted in the UK (RCP, 2012 p53) and successful training has been carried out with over 2,000 instructors trained in either FaME or Otago.

The Prevention of Falls Network for Dissemination (ProFouND) is an EC funded initiative dedicated to bring about the dissemination and implementation of best practice in falls prevention across Europe. As part of this project WP5 are training a cache of instructor's throughout Europe to deliver evidence-based strength and balance programmes based on Otago (with some extra training on FaME approaches) where there is currently little or no provision. The ProFouND project also intends to give evidence-based guidance on the provision of strength and balance programmes and effective exercise pathways for older people, through its website.

The proposed research intends to explore the impact of the ProFouND project on the delivery of evidence-based strength and balance programmes for falls prevention and service change across specific areas of Europe. However, it is noted that the ProFouND network is not and never was conceived to be nor funded as a research network.

Research question.

Are there differences as a result of our cascade training intervention in the delivery of strength and balance training for falls prevention in specific areas of Europe over the ProFouND project period (2013-2016)?

Aims and Objectives

Aims.

To evidence the impact of the ProFouND project on changes in the delivery of strength and balance for falls prevention.

Objectives

- To establish how specific localities in countries in Europe deliver strength and balance training and if delivery is evidence-based.

- To explore the impact of both the evidence-based training and evidence-based guidance delivered by the ProFouND project on those specific localities.

- To provide further recommendations to localities and all European countries on how they can

deliver effective strength and balance programmes for falls prevention.

Methods

Study design
Overall the research proposed adopts a pre and post intervention design using quantitative methods. This is to help us evaluate the impact of the ProFouND project. We have also carried out interim qualitative methods to monitor impact. Monitoring and evaluation of any programme or intervention is vital to determine whether it works, to help refine programme delivery, and to provide evidence for continuing support of the programme (Rootman et al, 2001).

Sampling principles and procedures
The pre and post intervention design consists of an online quantitative questionnaire and an interim qualitative questionnaire which has been sent to service managers and staff delivering strength and balance or falls prevention programmes in localities of European countries where the ProFouND project is likely to have a direct focused impact (Table 1). As we are interested in service change, recruitment will be purposive and opportunistic. Services who are either going to receive a direct intervention (strength and balance cascade training) or are likely to be influenced by the project will be contacted and asked if they will participate.

Data collection methods.
All ProFouND partners and associate partners were asked to identify organisations that will be influenced by the project. Additionally, we have worked closely with the lead of WP5 who has been delivering the cascade training to identify and contact services. WP5 made the initial contact with the organisations and asked them if they were happy to participate in this bespoke data collection. Instructors were sent a link to a University of Manchester webpage, which included all participant information and the link to the questionnaire. The organisations were asked to complete the survey once at baseline (before the ProFouND project is likely to have an impact, August 2014) and will be asked to complete it again towards the end of the project (November/December 2015) when we could have seen changes in services and delivery. They have also been asked to complete an interim qualitative questionnaire in January 2015 (again through an online survey) to give feedback on the interim impact of the cascade training on practice.

Questionnaire Design
The first part of the quantitative questionnaire (Appendix 4) collects demographic information about which organisation and locality the data comes from. The next section asks about the content of the intervention (5 different types of delivery of exercise), the dose of delivery, content of the sessions, assessments and outcomes and training undertaken to deliver them. It also establishes the services provided and the pathways and referral routes each organisation currently has established. The next section then asks about maintenance and what is offered after the sessions provided, are there pathways to maintanance classes in the community. This questionnaire aims to follow some of the principles of the Royal College of Physicians (RCP) survey carried out in the UK (RCP, 2011).

The qualitative questionnare asks five questions on action taken since the cascade training, it asks about the training of other instructors and changes to delivery to older adults (Appendix 5).

Data analysis
When the results from the quantitative questionnaire were downloaded from the online survey they were checked for missing data, the data were then exported from Excel into SPSS. The survey has been designed carefully in an attempt to avoid missing data. However, missing data are not always avoidable and strategies are in place to deal with its occurrence. A comments box was added to the

end of the questionnaire so that if participants felt that they could not answer or nominate the answer they wanted then they could explain this. Quantitative data have been analysed using SPSS Release 22.0 and at this stage includes only univariate analysis. We may carry out between group tests when follow-up data have been collected.

Framework analysis has been used for the anaylsis of the qualitative survey. This is a method being increasingly used in health research (Smith & Firth, 2013). The Framework approach facilitates systematic qualitative analysis and summarises and classifies data within a thematic framework (the framework of the questions asked). It provides researchers with a clear, structured process through which they are able to demonstrate the steps in the analysis, the subsequent explanations and applications to policy and practice (Ritchie & Spencer, 1994). Because only a small dataset was collected, the data were analysed directly by the researcher rather than a computer software programme. The validity of the analysis has been checked by returning to the data, once themes were identified and by a second researcher, who checked samples of analysis.

This study will help to monitor the impact of the ProFouND project and assist in the prevention of falls though feedback on the delivery of evidence-based practice. This could enable people at risk of falls or who have fallen to sustain preventive behaviour, promoting independence and reducing future risk of falls and fractures. This could have an impact on costs associated with hospital admission and social care packages. Encouraging long term sustainability of exercise (particularly group activity) also has the potential to provide wider health and well-being benefits such as providing social inclusion and tackling social isolation. This study will give important information to all European countries about the delivery of strength and balance training in falls interventions and delivery afterwards in the community and therefore could lead to improved maintenance of strength and balance by older adults, helping them to live healthy, active and independent lives for longer.

Ethical issues

Ethical approval was sought from the University of Manchester Committee on the Ethics of Research on Human Beings. Further European ethical approval has not been required as this is evaluation of service provision rather than research and we have asked service managers rather than patients to complete the questionnaire, our ethical advice has been that we did not require further approvals. The population is service managers and staff, and they are not classed as a vulnerable group. The choice of methods should not lead to any distress as the participants will be answering questions in an online questionnaire, where they do not wish to leave their details they have the option to omit them. The risks involved in participation in surveys are quite minimal and well under the control of the respondent (Fowler, 1993: 133). Participant information completed online has been encrypted and password protected so that only the lead researcher can access it. Service managers may be concerned about comparison with other areas and other provision, however they have been assured their information will remain strictly confidential. They are also part of this evaluation study as they are willing to carry out service change and training.

Results

Baseline data

There were N=64 respondents to the quantitative questionnaire; 20 were Swedish, 14 Greek, 11 Austrian, 6 German, 6 Norwegian, 2 Italian, 1 Spanish. These represent the regions in which WP5 cascade training had been implemented up to the time of survey. The baseline data are reported in tables below.

Table 1: Service following injury or admission to hospital that uses rehabilitation exercises in groups to reduce the risk of future falls N=27

Once group based rehabilitation has been offered to the patient on average how long do they wait before it starts?	Less than 1 week	6
	1 -2 weeks	6
	2-3 weeks	5
	More than 1 month	2
	2 or more months	1
Once group based rehabilitation starts how often do patients receive a service?	Once a week	7
	Twice a week	12
	Every day to twice a day	2
	Customised	1
How long does each session last?	Less than 30 minutes	4
	30mins-45 minutes	8
	45 mins-60 minutes	10
Over what period of time does the patient receive group based rehabilitation?	1- 4 weeks	3
	5-8 weeks	3
	9-12 weeks	6
	17 weeks +	3
	No end point	6
	Tailored	1
In general what types of follow on exercise sessions are available for older people after rehabilitation is completed?	Strength and balance	17
	Chair based (seated)	8
	Exercise referral scheme (gym based or community based)	9
	Tai Chi	2
	Aqua based	1
	General 50+ exercise classes	6
	Walking programmes	5
	None	2
	Don't know	2
Before group based rehabilitation starts the patient receives - - a pre-exercise assessment e.g. of their strength/balance/gait/function		17
	SPPB	7
Pre-exercise assessment used to: **- adapt exercises to people's health conditions** **- tailor exercises to patient's goals**		16 14
Re-assess the pre-exercise assessments at the end to demonstrate change over time.		18
Group based rehabilitation service uses progressive strength exercises		17
	Increased number exercises	9
	Increased reps/sets	17
	Increased weight/resistance	14
	Peak strain	2
	Don't know	2

Group based rehabilitation service uses progressive balance exercises		20
	Increasing number of exercises	7
	More challenging exercises	18
	Reducing hand holds (support)	17
	Vestibular and proprioceptive challenges	13
	Duel tasking	1
	Don't know	1
Average number of hours of supervised strength and balance exercise in groups each patient receives		27.13 (SD 17.06, range 5-60)
Delay in patients receiving rehabilitation due to the demand for the service		15
Provide transport to the sessions		9
Provide refreshments		10
Referral pathway set up		10
Referral criteria for service/classes		12
	One or more falls	12
	Loss of consciousness	1
	Injurious fall	7
	Reduced strength and balance	3
	Self-referral	14
	Professional referral	13
	GP	9
	Community (e.g. physio)	12
	Hospital	11
	Voluntary sector	4
At the end of your intervention advice is given to older people about the continuation of an exercise programme (either at home or at a community exercise class)		15
At the end of any of the interventions provided older people are given a printed home exercise booklet		8
Who delivers the sessions:	Occupational Therapists	5
	Physiotherapist	17
	Nurses	2
	Doctors	2
	Therapy assistants	7
	Sports Scientists	2
	Exercise instructors	4
What is the basic level of training that staff receive in order to lead exercise sessions?	In-house training	12
	Evidence based qualification	5
	Other non falls specific exercise qualification	9
How many staff are employed to deliver the service		6.90 (SD 0.71, range 1-40)

Table 2: Service following injury or admission to hospital that uses 1 to 1 rehabilitation exercises to reduce the risk of future falls N=29 (44.6% of participants).

Once one to one rehabilitation has been offered to the patient on average how long do they wait before it starts?	Less than 1 week	11
	1 -2 weeks	8
	2-3 weeks	2
	3-4 weeks	1
	More than 1 month	2
Once one to one rehabilitation starts how often do patients receive a service?	Once a week	1
	Twice a week	12
	Every day to twice a day	6
How long does each session last?	Less than 30 minutes	7
	30mins-45 minutes	13
	45 mins-60 minutes	4
Over what period of time does the patient receive one to one rehabilitation?	1- 4 weeks	9
	5-8 weeks	6
	9-12 weeks	4
	13 -16 months	1
	17 weeks +	1
	No end point	1
	Tailored	2
In general what types of follow on exercise sessions are available for older people after rehabilitation is completed?	Strength and balance	22
	Chair based (seated)	8
	Exercise referral scheme (gym or community based)	5
	General 50+ exercise classes	3
	Walking programmes	7
Before one to one rehabilitation starts the patient receives a pre-exercise assessment e.g. of their strength/balance/gait/function		23
	SPPB	4
	Berg	5
	Overall assessment	9
Pre-exercise assessment used to:		
	adapt exercises to people's health conditions	23
	tailor exercises to patient's goals	22
Re-assess the pre-exercise assessments at the end to demonstrate change over time.		20
One to one rehabilitation service uses progressive strength exercises		19
	Increased number exercises	
	Increased reps/sets	16
	Increased weight/resistance	17
	Peak strain	12
		4
One to one rehabilitation service uses progressive balance exercises		21
	Increasing number of exercises	14
	More challenging exercises	20
	Reducing hand holds (support)	18
	Vestibular and proprioceptive challenges	13
Average number of hours of supervised one to one strength and balance exercise each patient receives	13.47 (11.33 SD, range 3-48)	
Delay in patients receiving rehabilitation due to the demand for the service		3
Charge for sessions		1

Referral pathway set up		5
Referral criteria for service/classes	One or more falls	4
	Loss of consciousness	2
	Injurious fall	2
	Risk assessment tool	1
	Self-referral	5
	Professional referral	5
	GP	4
	Community (e.g. physio)	4
	Hospital	3
	Voluntary sector	1
At the end of your intervention advice is given to older people about the continuation of an exercise programme (either at home or at a community exercise class)		4
At the end of any of the interventions provided older people are given a printed home exercise booklet		5
Who delivers the sessions:	Occupational Therapists	1
	Physiotherapist	5
	Nurses	1
	Doctors	1
	Therapy assistants	2
	Exercise instructors	1
What is the basic level of training that staff receive in order to lead exercise sessions?	In-house training	3
	Evidence based qualification	2
How many staff are employed to deliver the service		11 (SD 24.7, range 1-100)

Table 3: Home based exercise service that uses exercise to reduce the risk of future falls N=21

Once home based rehabilitation has been offered to the patient on average how long do they wait before it starts?	Less than 1 week	5
	1 -2 weeks	3
	2-3 weeks	3
	3-4 weeks	1
	More than 1 month	1
Once home based rehabilitation starts how often do patients receive a service?	Once a week	3
	Twice a week	4
	Every day to twice a day	4
	Customised	2
How long does each session last?	Less than 30 minutes	3
	30mins-45 minutes	4
	45 mins-60 minutes	5
Over what period of time does the patient receive home based rehabilitation?	1- 4 weeks	4
	5-8 weeks	3
	13-16 week	1
	No end point	2
	Tailored	2
In general what types of follow on exercise sessions are available for older people after rehabilitation is completed?	Strength and balance	12
	Chair based (seated)	7
	Exercise referral scheme (gym or community based)	4
	General 50+ exercise classes	3
	Walking programmes	8
Before home based rehabilitation starts the patient receives a pre-exercise assessment e.g. of their strength/balance/gait/function		11
	Generic assessment	9
	SPPB	3
Pre-exercise assessment used to:		
adapt exercises to people's health conditions		9
tailor exercises to patient's goals		9
Re-assess the pre-exercise assessments at the end to demonstrate change over time.		8
Home based rehabilitation service uses progressive strength exercises		11
	Increased number exercises	7
	Increased reps/sets)	10
	Increased weight/resistance	8
	Peak strain	3
Home based rehabilitation service uses progressive balance exercises		10
	Increasing number of exercises	6
	More challenging exercises	9
	Reducing hand holds (support)	11
	Vestibular and proprioceptive challenges	8
Average number of hours of supervised strength and balance exercise each patient receives	17.6 (15.8SD , 4-50 range)	
Delay in patients receiving rehabilitation due to the demand for the service		7
Charge for service		2
Referral pathway set up		6

Referral criteria for service/classes	One or more falls	8
	Loss of consciousness	2
	Injurious fall	5
	Self-referral	10
	Professional referral	8
	GP	8
	Community (e.g. physio)	8
	Hospital	5
	Voluntary sector	1
At the end of your intervention advice is given to older people about the continuation of an exercise programme (either at home or at a community exercise class)		9
At the end of any of the interventions provided older people are given a printed home exercise booklet		7
Who delivers the sessions:	Occupational Therapists	1
	Physiotherapist	10
	Nurses	1
	Doctors	1
	Therapy assistants	3
	Exercise instructors	1
What is the basic level of training that staff receive in order to lead exercise sessions?	In-house training	4
	Evidence based qualification	5
How many staff are employed to deliver the service	1.6 (SD 0.89, 1-3 range)	

Table 4: Community based group service that uses strength and balance exercises to reduce the risk of future falls? N=13

Once community based exercise which includes strength and balance has been offered to the patient on average how long do they wait before it starts?	Less than 1 week 1 -2 weeks 2-3 weeks 2 or more months	5 2 2 1
Once community based exercise which includes strength and balance starts how often do patients receive a service?	Once a week Twice a week	6 5
How long does each session last?	30mins-45 minutes 45 mins-60 minutes More than 60 minutes	1 9 1
Over what period of time does the patient receive community based exercise which includes strength and balance	9-12 weeks 13-16 weeks 17 weeks + No end point	1 2 1 5
In general what types of follow on exercise sessions are available for older people after the sessions are completed?	Strength and balance Chair based (seated) Exercise referral scheme (gym based or community based) Tai Chi General 50+ exercise classes Walking programmes	6 4 3 2 6 4
Before community based exercise which includes strength and balance starts the patient receives a pre-exercise assessment e.g. of their strength/balance/gait/function		3
Pre-exercise assessment used to: **adapt exercises to people's health conditions** **tailor exercises to patient's goals**		 3 2
Re-assess the pre-exercise assessments at the end to demonstrate change over time.		3
Community based exercise which includes strength and balance uses progressive strength exercises	 Increased number exercises Increased reps/sets Increased weight/resistance Peak strain	6 5 8 3 1
Community based exercise which includes strength and balance exercise uses progressive balance exercises	 Increasing number of exercises More challenging exercises Reducing hand holds (support) Vestibular and proprioceptive challenges	9 5 9 8 7
Average number of hours of supervised strength and balance exercise in groups each patient receives	30.67 (SD 21.19 , range 10-50)	
Delay in patients receiving exercise due to the demand for the service		4
Provide transport to the sessions		1
Provide refreshments		4
Older people charged for the sessions		7
Referral pathway set up		2

Referral criteria for service/classes	Balance issues	2
	One or more falls	4
	Loss of consciousness	1
	Injurious fall	4
	Self-referral	9
	Professional referral	4
	GP	6
	Community (e.g. physio)	5
	Hospital	2
At the end of your intervention advice is given to older people about the continuation of an exercise programme (either at home or at a community exercise class)		4
At the end of any of the interventions provided older people are given a printed home exercise booklet		5
Who delivers the sessions:	Sports Scientists	1
	Physiotherapist	6
	Volunteers	1
	Exercise instructors	4
What is the basic level of training that staff receive in order to lead exercise sessions?	In-house training	3
	Evidence based qualification	6
	Other non falls specific exercise qualification	4
How many staff are employed to deliver the service	2.2 (SD 2.4, range 1-8)	

Table 5: Community based group service that uses general exercise (like walking groups) to reduce the risk of future falls? N=10

Once general group based community exercise has been offered to the patient on average how long do they wait before it starts?	Less than 1 week 1 -2 weeks	5 2
Once general group based community exercise starts how often do patients receive a service?	Once a week Twice a week Every day to twice a day	4 4 1
How long does each session last?	30mins-45 minutes 45 mins-60 minutes	2 5
Over what period of time does the patient receive general group based community exercise	17 weeks + No end point	1 6
In general what types of follow on exercise sessions are available for older people after the sessions are completed?	Strength and balance Chair based (seated) Exercise referral scheme(gym or community based) General 50+ exercise classes Walking programmes	5 2 5 5 6
Before general group based community exercise starts the patient receives a pre-exercise assessment e.g. of their strength/balance/gait/function		1
Pre-exercise assessment used to:	Adapt exercises to people's health conditions Tailor exercises to people's goals	1 0
Re-assess the pre-exercise assessments at the end to demonstrate change over time.		0
Average number of hours of supervised exercise in groups each person receives	46.5 (SD 45.5, range 8-10)	
Delay in person being able to attend a class due to the demand for the service		2
Provide transport to the sessions		2
Provide refreshments		4
Charge		7
Referral pathway set up		1
Referral criteria for service/classes	Frailty Self-referral Professional referral GP Community (e.g. physio) Hospital Voluntary sector	2 7 2 4 4 4 1
At the end of your intervention advice is given to older people about the continuation of an exercise programme (either at home or at a community exercise class)		4
At the end of any of the interventions provided older people are given a printed home exercise booklet		3
Who delivers the sessions:	Physiotherapist Exercise instructors	3 4
What is the basic level of training that staff receive in order to lead exercise sessions?	Evidence based qualification Other non falls exercise qualification	3 3
How many staff are employed to deliver the service	15.9 (SD 22.89, 1.5-56 range)	

Table 6: Follow on classes (N=64, full sample)

Follow on classes available in the community	Strength and balance	18
	Chair based (seated)	16
	Exercise referral scheme (gym or community based)	13
	General 50+ exercise classes	21
	Walking programmes	12
	Tai Chi	12
Why do you not refer onto follow up classes in the community?	Lack of resources/not available	26
	No classes near	21
	Staff not qualified	16
	Patients too frail/unwell	19
	Lack of motivation (patient)	21
	Cognition	17
	Already doing strength and balance	11

Interim follow-up data (qualitative data).

There were 24 participants who completed the follow-up qualitative survey, 8 were from Norway, 5 from Sweden, 5 from Germany, 3 from Greece, 1 from Switzerland and one from Austria, one participant chose not to state any personal information. Based on Framework Analysis, findings (verbatim quatations) are summarised in a grid below under the key areas of *changes to delivery with older adults, starting new interventions, training others and future plans*. Three participants stated that they had taken no action and that this was primarily due to lack of time and resource constraints, although there was still an intention to take action by training others or changing delivery.

	Did this by:
Intergrating elements of Otago into classes/delivery: I integrated elements of the Otago exercise programme in my senior sports class (Germany, Stuttgart). In individual work with older clients I use the OEP more often, depending on their reason to come (Austria). I have tried to be aware of what feed - back you gave me during the course in Trondheim when I teach others (Trondheim, Norway) Yes. I explain more, and provide more accurate step by step instructions. Some of the exercises we now deliver, we have changed the program aft er the cascade course (Opperguard, Norway). Using more modified Otago exercises in the strength and balance groups delivered by physiotherapist (Opperguard, Norway). I have been more aware of all the aspects of instruction after the course,and think I can say, become a better instructor (Bergan, Norway). Yes, the plan includes an extended version with more distinct interventions (Umea, Sweden). I am more concerned about the safety issue in	***Providing more challenging and progressive exercises:*** I use the backwards chain coming down and up from the floor (Norway) I am using the home program, pictures and exercises in the Otago program. I am asking my patients to exercise harder now than before the cascade training (Vasterbotton, Sweden) Getting them to train harder, using the home programs and trying to get follow up either in their healthcare centers or in their homes (Vasterbotton, Sweden). When I deliver exercise to older adults, I'm more aware of telling why we're doing the different exercises, and I think my instructions are more precise. I'm also more aware of always finding progression in the exercises, both in strength and in balance (Stavenger, Norway). ***Importance of maintanance*:** Value ongoing programs for elderly patients even more, trying to encourage them to go to a sports club or to another course. Although I learned there is not a fitting program for everyone in my region...(Oldenberg, Germany). ***Emphasis on outcomes:*** I try to explain more why we do the exercises and give them examples from every day life (Bergan,

my own Groups. I am more structured in my delivery to older adults (I quite liked the English thoroughness) (Not stated) 10 nurses training each 2 people 75+ - project still running and in evaluation with local university of applied science Dornbirn (Austria)	Norway). ***Tailoring:*** Understanding the need for differenciated groups (Not stated) I let people work more themselves, giving out them an individual shaped Programm (hoping they are doing at home really) (Switzerland) I try to be more structured , when I deliver exercises to my seniore sports class. This helps to reduce the speed, also in doing the exercises and makes it more challenging (Stuttgart, Germany). Yes I've done some. I've changed a little the programme from exclusively OTAGO, gave some more balance exercises - stances from yoga and tai-chi(without being specialised to those), and they liked it very much. I tried and managed to deliver the programme at the same session in participants of different levels, getting help from a participant who's the best in the group (Chalkidona, Greece).
Set up new classes delivering to older adults: Six participants had set up new classes in their locality:	**"**Established a fall prevention group in the clinic" began fall prevention training (Otago program) with 10 participants in a small sensor-based fall prevention study (Oldenberg, Germany) **"**I have also been able to start 2 new training Groups**"** (not stated) **"**I have organized New training Groups , as part of my work in coordinating the Senior training in Bergen Municipality**"** (Norway) Four offered interventions for the target group of frail elderly who have fallen including: 1. pt with Otago and Fame/training at home, 2.Otago and Fame offered as group training in a day center (Umea, Sweden). tried to start a course for our guests in our old people`s home - stopped because they didn`t want to train three times a week for a whole hour

	(I tried to reduce frequencies and time until it wasn`t Otago) (Switzerland) I know that one of the students has already provided an OTAGO course in her setting (residential care). (Erlangen, Germany)
Trained others through cascade training: Participants either trained physiotherapists, trained students, trained existing exercise instructors or trained volunteers to become instructors.	***Physiotherapists:*** Presenting the cascade training to stakeholders, physiotherapy students etc. Deliver the training to new OEP learners (12 physios last November and planning a new course in February) I provided a cascade training for physiotherapists myself (Lamia, Greece) Instruction of our whole physiotherapistic team (Switzerland) I provided a cascade training for physiotherapists myself (Germany) I gave a class for physiotherapists (10hrs) one of two modules (Oldenberg, Germany) ***Students:*** I have integrated the OTAGO program into the MA program of Gerontology with an additional seminar (Germany) I have been teaching student in Balance training for elderly in fall prevention (Oslo, Norway) ***Instructors:*** I have visited several groups. Observed our instructors. We have organized a half day follow-up for our instructors (Norway). Yes. I have been doing interviews of potential instructors,and trained ,sofar only two New instructors (Bergan, Norway) I have delivered review of instruction in seminar

	with the instructors of our Groups, and organized first aid course for the instructors. I have contributed in the translating of the material from English to Norwegian (Bergan, Norway) ***Volunteers:*** I've organized two courses (together with a colleague) to train volunteers to deliver exercises too older adults. As a result of this one new group for older adults has startet, and two more will start this month. Together with my colleague I will guide these volunteers - quite much in the beginning, and then with regular intervals (Norway)
Future interventions	***Training:*** Plan 2 Otago trainer courses (Hamburg and Oldenbur;first part of the course in Hamburg is finished)together with a colleague (Germany) Spoken to a few people with the aim to start planning this spring (a course to train instructors) (Umea, Sweden) It is planned to start an Otago exercise class in Nuremberg in 2015 (Germany, Stuttgart)**).** Started to plan courses for physiotherapy students (Umea, Sweden) A group has been set up for the continuing planning: - courses for pt.s and others during spring. To implement this intervention-package in one of the teams to begin with, then evaluate and continue with more teams (Umea, Sweden) Im Gleichgewicht bleiben is adding the OEP- these moduels will take place in oct/nov 2015- 29 people , working with movement groups/ older people. Planning to start to teach the OEP home-care nurses all over the area, still waiting for political ok/ finances for the educational programme (Austria). Further trainings planned. Depends on a decision of one major health insurance, who thinks about funding Otago in the region of Baden-Wűrttemberg. If they will, there will be a huge demand and surely other cascade trainings will follow (Stuttgart, Germany)**.**

	I have been in some meetings with potential volounteers interested in a course to Train elderly in fall prevention and have started some plans With somebody (Oslo, Norway) One OEP learners course in February, May and possibly August (Lamia, Greece) Present the OEP in our yearly course for the doctors in town (Switzerland) Provide another OTAGO training for the students (SS 2015), and right now I am in negotiation with the council of NÃrnberg to install a network of possible OTAGO courses by training the professionals in ambulant care (Nuremberg, Germany). The cascade trainers in Norway are part of the planning of making a national model for fallpreventing groups (Stavenger, Trondheim, Bergan: Norway) ***With older people:*** 1. Organise speeches trying to inform more people about falls and their consequences in seniors.2. In cooperation with gymnasts of the municipality, organise walks - jogging in the park for seniors, trying to activate them and reduce the sedentary behaviour (Chalkidona, Greece)

Discussion

The baseline and interim data suggest that there are opportunities to better adopt the evidence base in practice across Europe and that the Cascade training is having an impact on the delivery of strength and balance training. A large amount of the delivery outlined by participants in the baseline survey is in a hospital/acute setting where older people do not get the evidence-based exercise dose. They seem to get nearer to the evidence based 50 hours within the community setting, but there are a lack of follow-on community classes and clear exercise pathways from different services. A large amount of the participants training is through in-house training and not formal evidence based training. Some participants have stated evidence based training and this is often because they completleted the questionnaire just after the cascade training (but before they had made any changes as a result). There are little systematic opportunities for follow-up and exercise maintanance in the community (only a third have follow-up classes) and a lack of trained non-clinical staff. This very much reflects provision in the UK (RCP, 2012). However, the interim qualitative follow-up of those trained suggests that as a result of the cascade training we could see changes in delivery so that it is more progressive and tailored, an increased number of classes being offered both in a clinical and community setting and better defined exercise pathways. It is important to note that the Cascade training is ongoing and there has already been significantly more training offered since the original baseline data were collected.

OVERALL NEXT STEPS

As part of the final year of the ProFouND project we will continue to work towards the following:

1) Core dataset- we will continue to collect core data from partners and associate partners to assess the data that is currently available across Europe. We will also collect best practice examples of data collection/service evaluation, leading to an agreed ProFouND consensus statement.

2) Bespoke dataset- we will carry out a follow-up quantitative survey of all participants who have undertaken the cascade training and also a further qualitative survey for further detail about actions and changes in practice following training.

This work will contribute to D6.4 and the report on changes in participating countries and regions to be submitted in month 36.

References

Benzinger P, Becker C, Todd C, Bleibler F, Klenk J, Rapp K. (2016) The impact of preventive measures on the burden of femoral fractures – a modelling approach to estimating the impact of fall prevention exercises and oral bisphosphonate treatment for the years 2014 and 2025. *BMC Geriatrics*.

Campbell R., Evans M., Tucker M., Quilty B., Dieppe P., Donovan J.L. (2001) Why don't patients do their exercises? Understanding non-compliance with physiotherapy in patients with osteoarthritis of the knee. *J Epidemiology Community Health*; 55(2):132-38.

Centers for Disease Control and Prevention (2012) Falls amongst older adults: An overview. http://www.cdc.gov/homeandrecreationalsafety/falls/adultfalls.html.
Data Protection Act 1998. London: Stationery Office, 1998

Davis J.C., Robertson M.C., Ashe M.C., Liu-Ambrose T., Khan K.M., Marra C.A. (2009) Does a home based strength and balance programme in people aged ≥ 80 years provide the best value for money to prevent falls?: A systematic review of economic analyses of falls prevention interventions. *Br J Sports Med*. 44. 80-89. doi:10.1136/bjsm.2009.060988 .

Department of Health. (2001) *National Service Framework for Older People (NSF).* London: Crown Copyright.

Department of Health. (2009) *Prevention Package for Older people.* London: Crown Copyright

Department of Health. (2011) *UK Physical Activity Guidelines*. London: Crown Copyright.

Department of Health. (2011a) *Start Active, Stay Active.* London: Crown Copyright.

DH (2009). Falls and fractures: Effective interventions in health and social care. London: Department of Health.

EUNESE (2006). Priorities for elderly safety in Europe: Agenda for Action. www.eunese.org.

Eurosafe (2013) Injury Database. http://ec.europa.eu/health/data_collection/databases/idb/index_en.htm

Eurosafe (2013) JAMIE Project Documentation. http://www.eurosafe.eu.com/csi/eurosafe2006.nsf/wwwFreeText/jamieprojectdocumentation.htm?OpenDocument&context=7B506D71199DF2AEC1257857003CC238

Eurosafe (2013) Safety for Seniors. http://www.eurosafe.eu.com/csi/eurosafe2006.nsf/wwwVwContent/l2safetyforseniors-seniornew.htm. Accessed 20.6.2013.

Health and Social Care Information Centre (2013). Hospital Episode Statistics. http://www.hscic.gov.uk/hes.

Klenk, J. Chiari, L. Helbostad, J. L. Zijlstra, W. Aminian, K. Todd, C. Bandinelli, S. Kerse, N. Schwickert, L. Mellone, S. Bagalá, F. Delbaere, K. Hauer, K. Redmond, S. J. Robinovitch, S. Aziz, O. Schwenk, M. Zecevic, A. Zieschang, T. Becker, C. for the FARSEEING Consortium and the FARSEEING Meta-Database Consensus Group. Development of a standard fall data format for signals from body-worn sensors: the FARSEEING consensus. *Zeitschrift fur Geriatrie und Gerontologie,* 2013: 46, 720-726. DOI: 10.1007/s00391-013-0554-0

Later Life Training (2012) Home: why we do what we do. www.laterlifetraining.co.uk/

NHS England and the Health and Social Care Information Centre (2013) NHS Hospital data and datasets: A consultation. Leeds: NHS England.

ProFaNE (2011) Taxonomy and Classification. http://www.profane.eu.org/about.html

Rapp K, Freiberger E, Todd C, Klenk J, Becker C, Denkinger M, Scheidt-Nave C, Fuchs J. (2014) Fall incidence in Germany. Results of two population-based studies, and comparison of retrospective and prospective falls data collection methods. *BMC Geriatrics*, 14:105 doi:10.1186/1471-2318-14-105

Robertson M.C., Devlin N., Gardner M.M., Campbell A.J. (2001) Effectiveness and economic evaluation of a nurse delivered home exercise programme to prevent falls. 2: Controlled trial in multiple centres. *BMJ*; 322 : 701 doi: 10.1136/bmj.322.7288.701

Rogmans WH. Joint action on monitoring injuries in Europe (JAMIE). *Arch Public Health* 2012 Aug 28;70(1):19. doi: 10.1186/0778-7367-70-19.

Rootman, I., Goodstadt, M., Hyndman, B., McQueen, D.V., Potvin, L., Springett, J. Ziglio, E (2001). Evaluation in health promotion. Principles and perspectives. Copenhagen: WHO Regional Publications, European Series, No. 92.

Royal College of Physicians (2011) Falling standards, broken promises. National audit of falls and bone health in older people report. London: RCP. **www.rcplondon.ac.uk/sites/default/files/national_report.pdf**

Royal College of Physicians (2012) Older people's experiences of therapeutic exercise as part of a falls prevention service-patient and public involvement. London: RCP.

Sherrington C., Tiedemann A., Fairhall N., Close J.C.T. Lord S.R. (2011) Exercise to prevent falls in older adults: an updated meta analysis and best practice recommendations. *NSW Public Health Bulletin*. 22. 78-83.

Sherrington C., Whitney J.C., Lord S.R., Herbert R.D., Cumming R.G., Close J.C.T. (2008) Effective exercise for the prevention of falls: a systematic review and meta-analysis. *Journal of the American Geriatrics Society.* 56(12). 2234-43.

Skelton D., Dinan S., Campbell M., Rutherford O. (2005) Tailored group exercise (Falls Management Exercise -- FaME) reduces falls in community-dwelling older frequent fallers (an RCT). *Age Ageing*. 34(6):636-39.

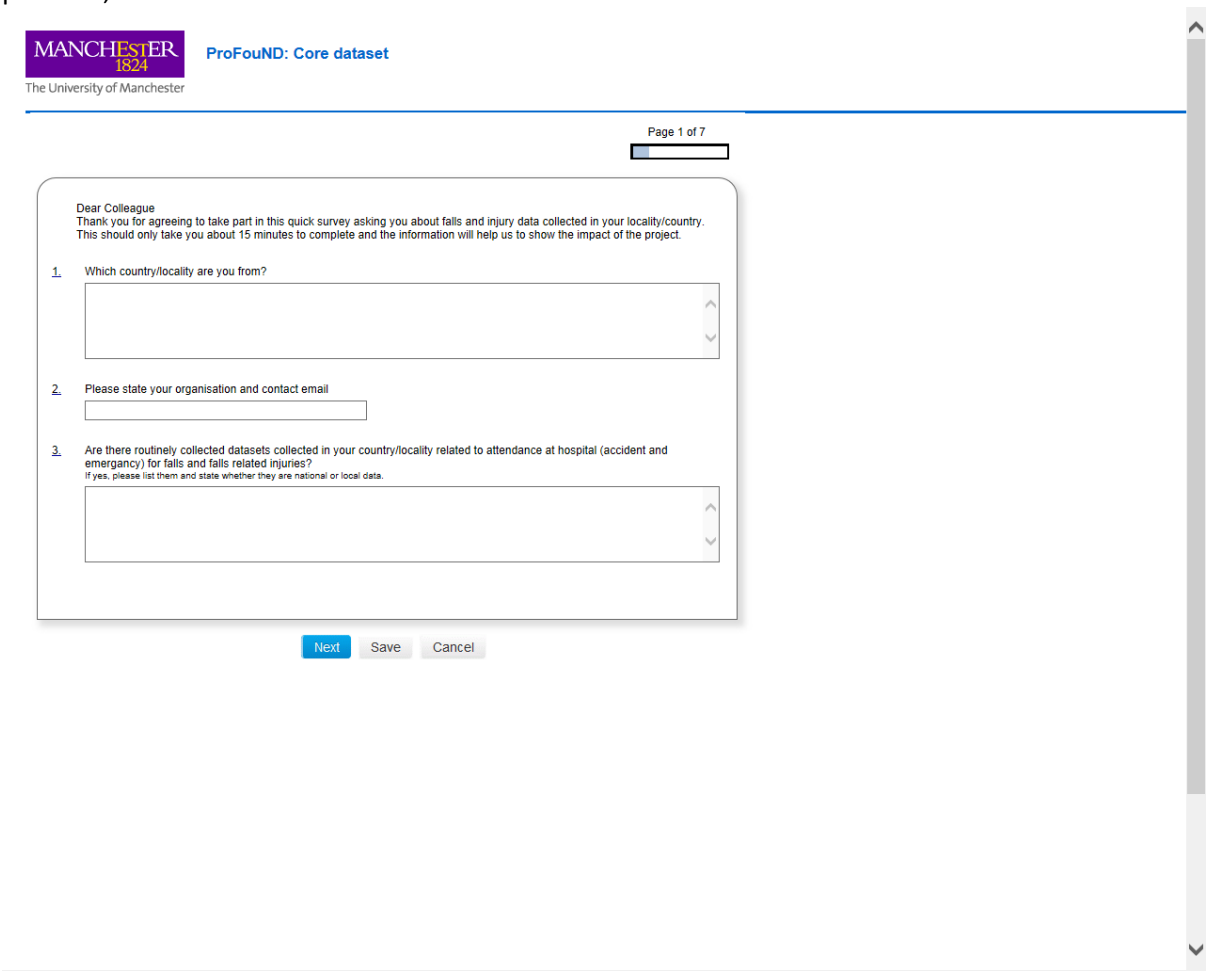
Smith, J. and Firth, J. (2013) Qualitative data analysis: the Framework approach, *Nurse Researcher,* volume 18 (2): 52-62.

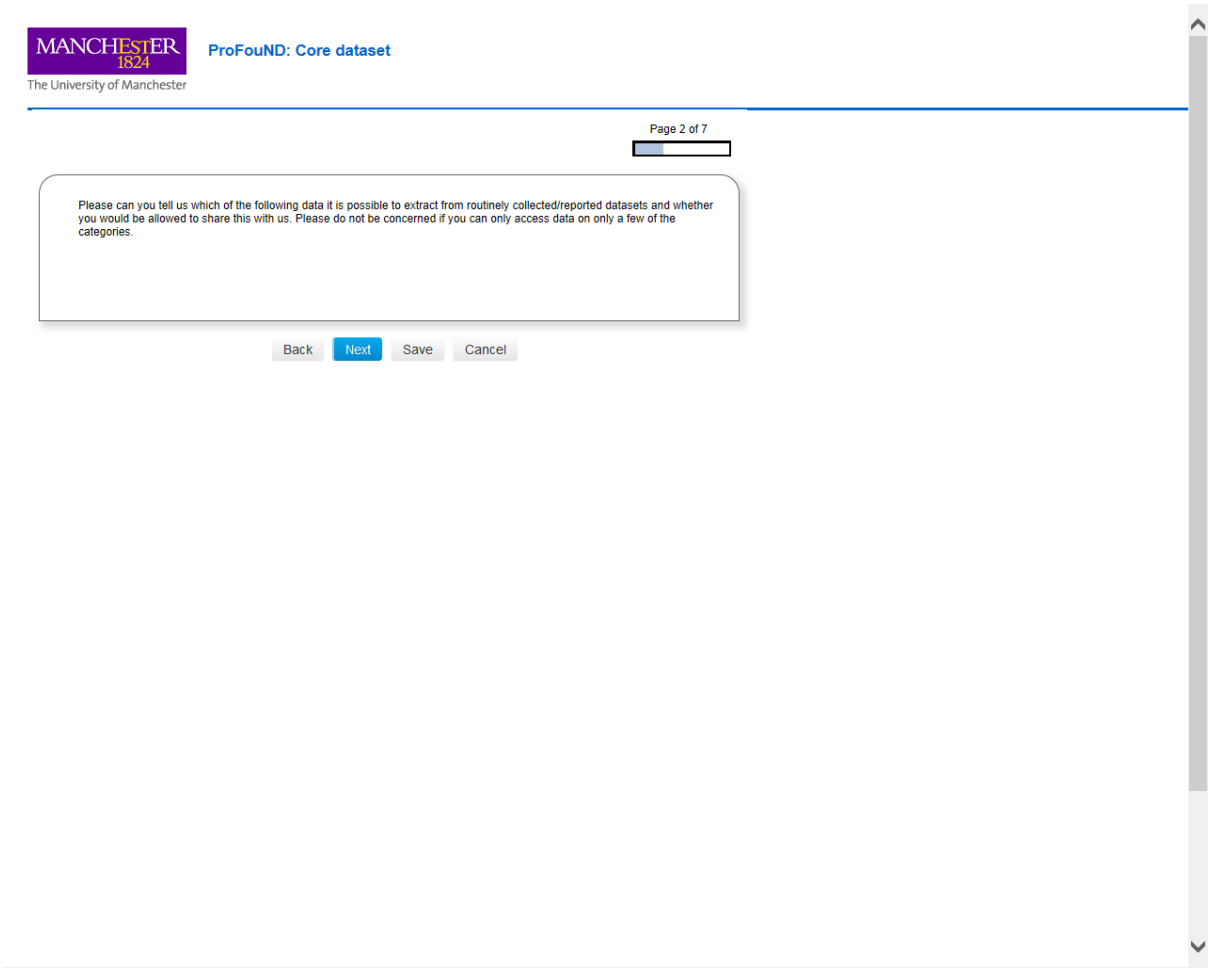
Svedbom A, Hernlund E, Ivergård M, Compston J, Cooper C, Stenmark J, McCloskey EV, Jönsson B, Kanis JA, & EU review panel of the IOF (2013). Osteoporosis in the European Union: a compendium of country-specific reports. *Arch Osteoporos*, 8:137 DOI 10.1007/s11657-013-0137-0

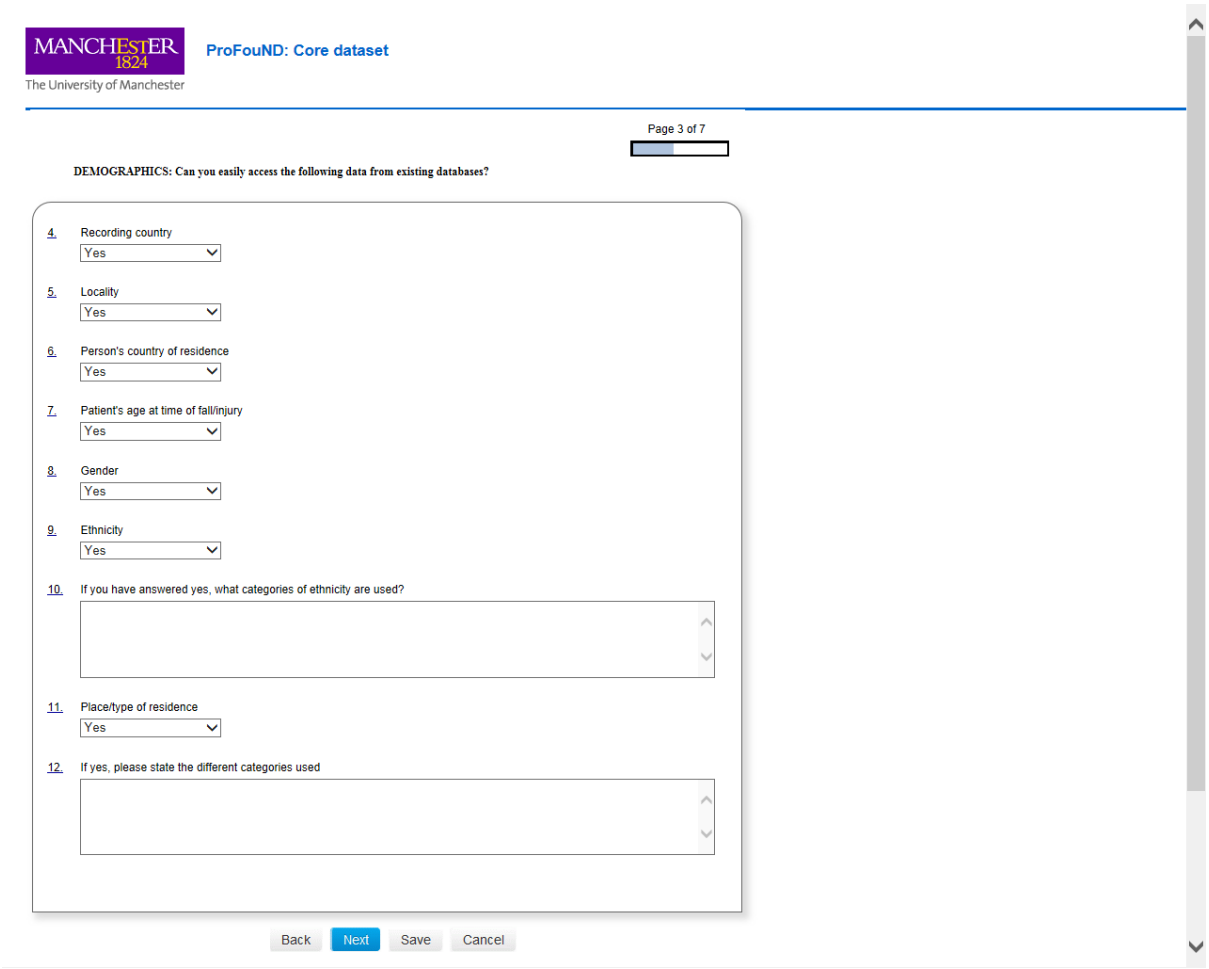
Appendices

Appendix 1

The online survey conducted from 01/11/13-31/01/14 completed by 42 respondents representing partners, associate members and other stakeholders.




MANCHESTER 1824
The University of Manchester
ProFouND: Core dataset
Page 2 of 7
Please can you tell us which of the following data it is possible to extract from routinely collected/reported datasets and whether you would be allowed to share this with us. Please do not be concerned if you can only access data on only a few of the categories.
Back
Next
Save
Cancel


MANCHESTER 1824
The University of Manchester
ProFouND: Core dataset
Page 3 of 7
DEMOGRAPHICS: Can you easily access the following data from existing databases?
4. Recording country
Yes
5. Locality
Yes
6. Person's country of residence
Yes
7. Patient's age at time of fall/injury
Yes
8. Gender
Yes
9. Ethnicity
Yes
10. If you have answered yes, what categories of ethnicity are used?
11. Place/type of residence
Yes
12. If yes, please state the different categories used
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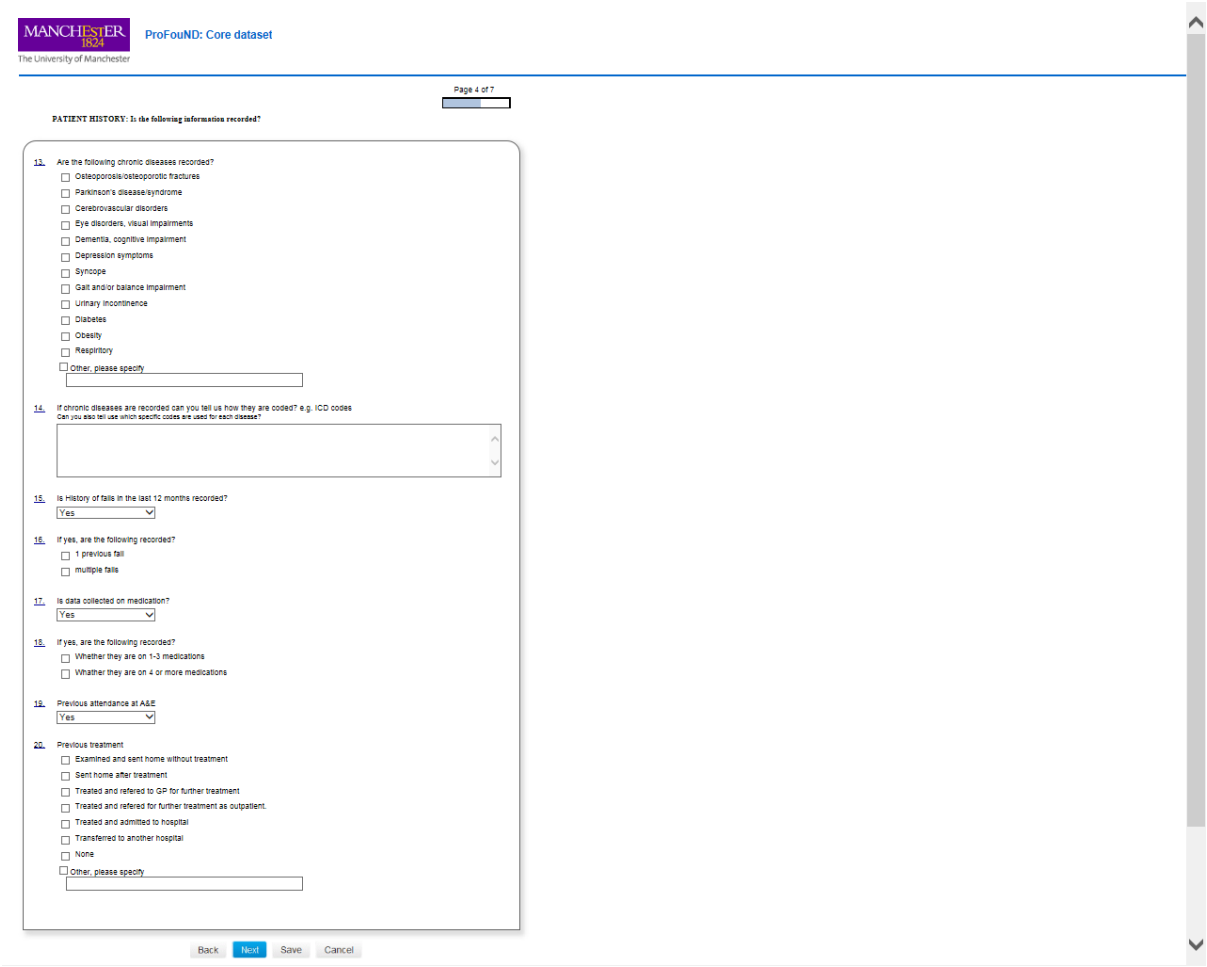
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PATIENT HISTORY: Is the following information recorded?
13. Are the following chronic diseases recorded?
Osteoporosis/osteoporotic fractures
Parkinson's disease/syndrome
Cerebrovascular disorders
Eye disorders, visual impairments
Dementia, cognitive impairment
Depression symptoms
Syncope
Gait and/or balance impairment
Urinary incontinence
Diabetes
Obesity
Respiritory
Other, please specify
14. If chronic diseases are recorded can you tell us how they are coded? e.g. ICD codes
Can you also tell use which specific codes are used for each disease?
15. Is History of falls in the last 12 months recorded?
Yes
16. If yes, are the following recorded?
1 previous fall
multiple falls
17. Is data collected on medication?
Yes
18. If yes, are the following recorded?
Whether they are on 1-3 medications
Whether they are on 4 or more medications
19. Previous attendance at A&E
Yes
20. Previous treatment
Examined and sent home without treatment
Sent home after treatment
Treated and refered to GP for further treatment
Treated and refered for further treatment as outpatient.
Treated and admitted to hospital
Transferred to another hospital
None
Other, please specify
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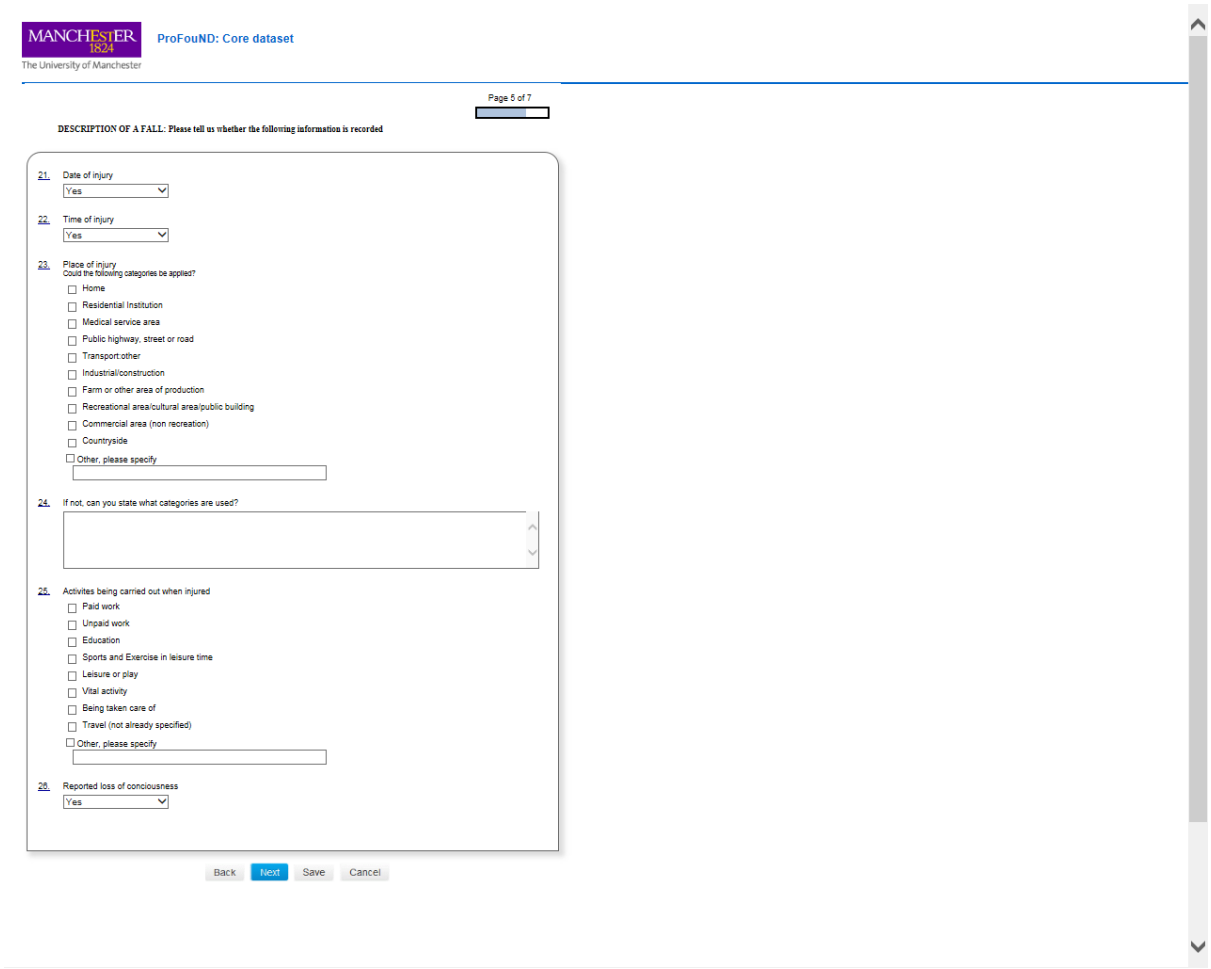
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DESCRIPTION OF A FALL: Please tell us whether the following information is recorded
21. Date of injury
Yes
22. Time of injury
Yes
23. Place of injury
Could the following categories be applied?
Home
Residential Institution
Medical service area
Public highway, street or road
Transport other
Industrial/construction
Farm or other area of production
Recreational area/cultural area/public building
Commercial area (non recreation)
Countryside
Other, please specify
24. If not, can you state what categories are used?
25. Activites being carried out when injured
Paid work
Unpaid work
Education
Sports and Exercise in leisure time
Leisure or play
Vital activity
Being taken care of
Travel (not already specified)
Other, please specify
26. Reported loss of conciousness
Yes
Back
Next
Save
Cancel

TREATMENT/INTERVENTION Is the following information recorded?

27. Date of attendance (at hospital)
Yes

28. Time of attendance
Yes

29. Type of injury recorded
- [ ] No injury diagnosed
- [ ] Contusion, bruise
- [ ] Abrasion
- [ ] Open wound
- [ ] Fracture, please state
- [ ] Distorsion, sprain
- [ ] Concussion
- [ ] Other, please specify

30. If injury is recorded can you state how each one is coded? e.g. ICD code?

31. Body part injured
Yes

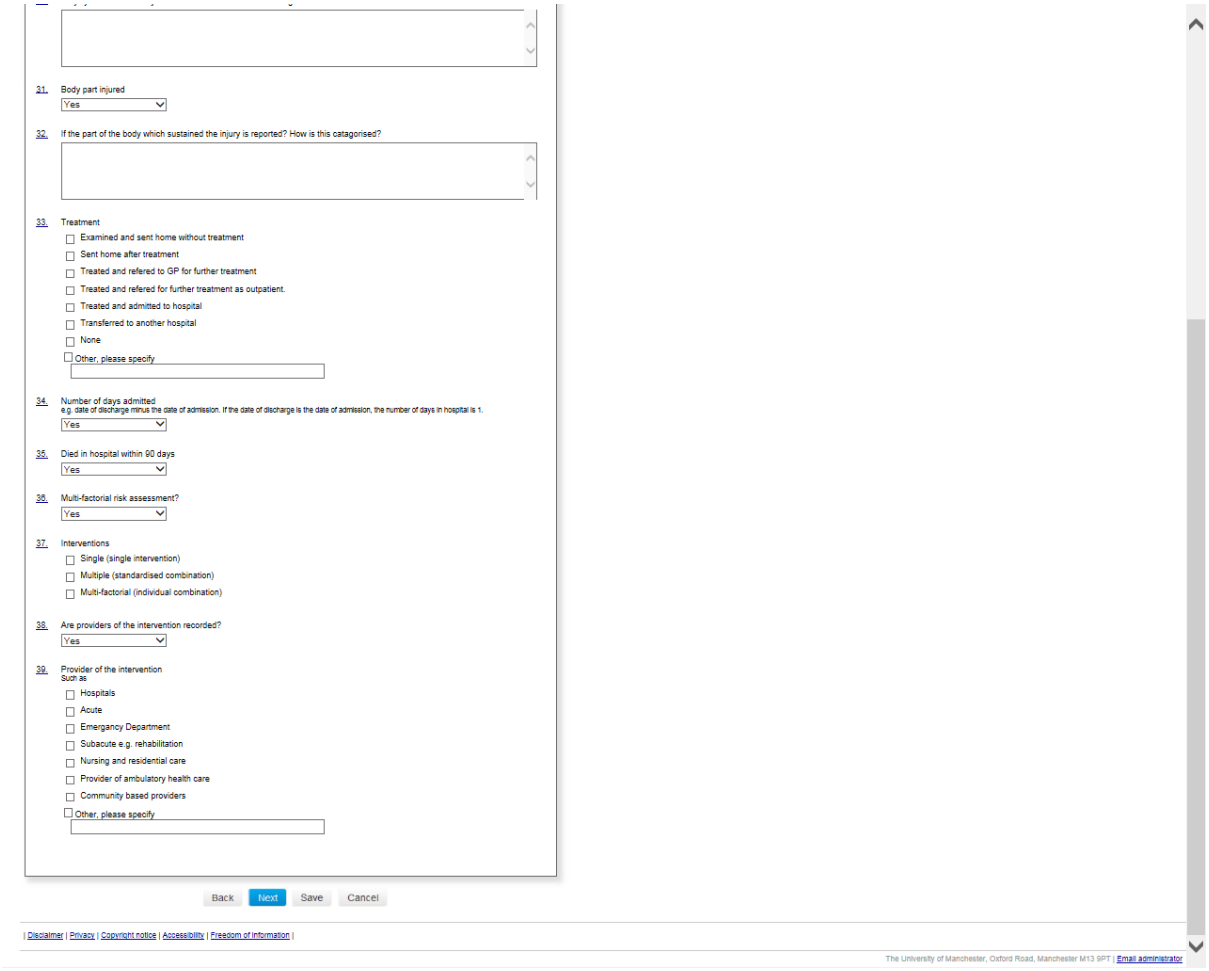
32. If the part of the body which sustained the injury is reported? How is this catagorised?

33. Treatment
- [ ] Examined and sent home without treatment
- [ ] Sent home after treatment
- [ ] Treated and refered to GP for further treatment
- [ ] Treated and refered for further treatment as outpatient.
- [ ] Treated and admitted to hospital
- [ ] Transferred to another hospital
- [ ] None
- [ ] Other, please specify

34. Number of days admitted
e.g. date of discharge minus the date of admission. If the date of discharge is the date of admission, the number of days in hospital is 1.
Yes

35. Died in hospital within 90 days
Yes

36. Multi-factorial risk assessment?
Yes


31. Body part injured
Yes
32. If the part of the body which sustained the injury is reported? How is this catagorised?
33. Treatment
Examined and sent home without treatment
Sent home after treatment
Treated and refered to GP for further treatment
Treated and refered for further treatment as outpatient.
Treated and admitted to hospital
Transferred to another hospital
None
Other, please specify
34. Number of days admitted
e.g. date of discharge minus the date of admission. If the date of discharge is the date of admission, the number of days in hospital is 1.
Yes
35. Died in hospital within 90 days
Yes
36. Multi-factorial risk assessment?
Yes
37. Interventions
Single (single intervention)
Multiple (standardised combination)
Multi-factorial (individual combination)
38. Are providers of the intervention recorded?
Yes
39. Provider of the intervention
Such as
Hospitals
Acute
Emergency Department
Subacute e.g. rehabilitation
Nursing and residential care
Provider of ambulatory health care
Community based providers
Other, please specify
Back
Next
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Cancel
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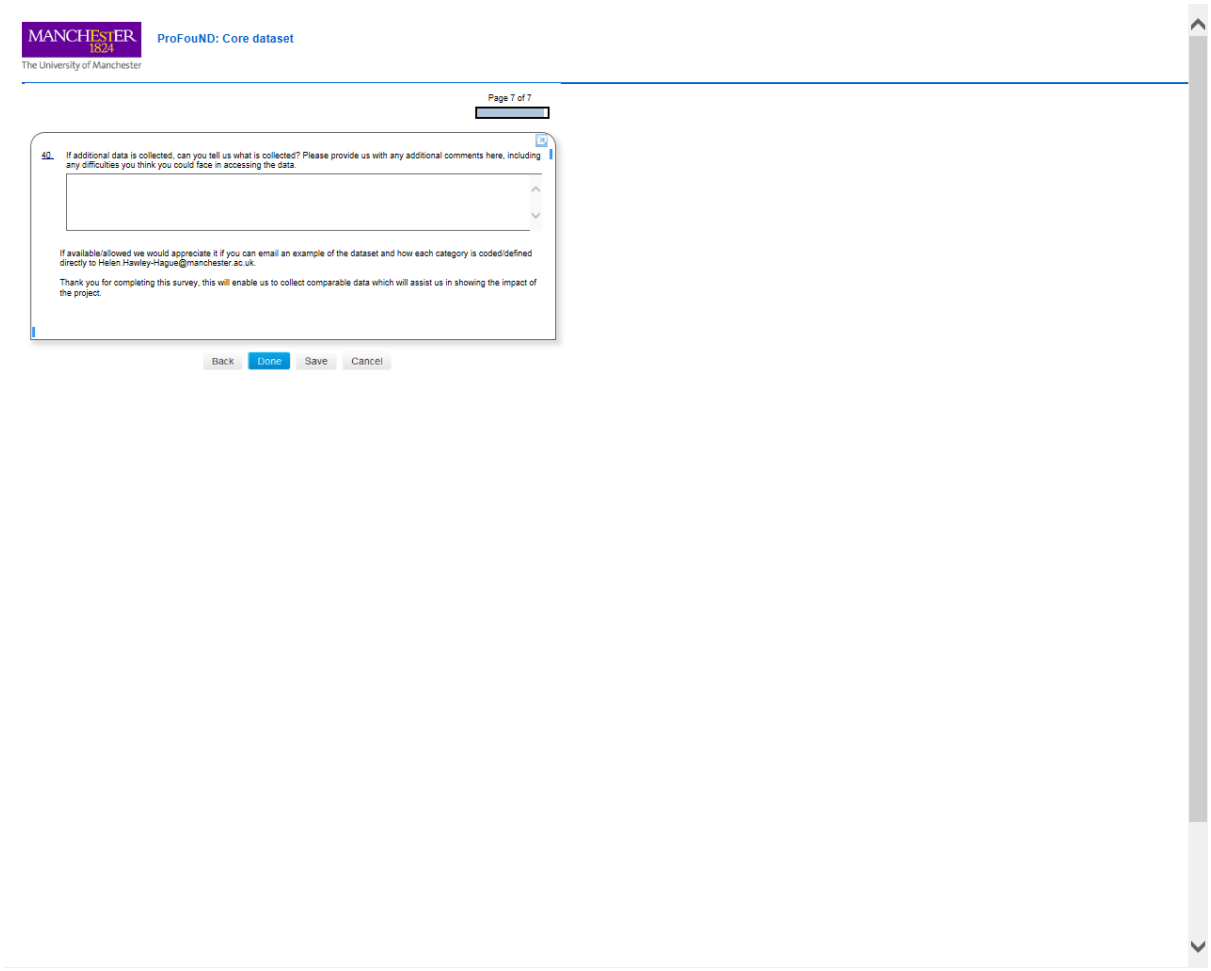
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40. If additional data is collected, can you tell us what is collected? Please provide us with any additional comments here, including any difficulties you think you could face in accessing the data.
If available/allowed we would appreciate it if you can email an example of the dataset and how each category is coded/defined directly to Helen.Hawley-Hague@manchester.ac.uk.
Thank you for completing this survey, this will enable us to collect comparable data which will assist us in showing the impact of the project.
Back
Done
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Example Commentary by Partner 10 AUSL11 on ability to provide falls data.

1-2: ok

3: traumas are recorded, not falls

4-8: ok

9-10: not recorded, recorded only where patients were born

11-12: ok

13: possible to get by using the unique identifier (codice fiscale) of the patients and/or linking it to other databases (community specialistic activity, medication, hospital admissions, rehabilitation, etc)

14: ICD-IX-CM: please bi more specific on what is wished

15-18: recorded not in the clinical notes but not in the database

19-20: previous treatment: possible to get this information by using the unique identifier (codice fiscale) of the patients within the A&E (pronto soccorso) database and/or linking it to other databases (community specialistic activity, medication, hospital admissions, rehabilitation, etc)

21 and 22: ok

23, 24 and 25: if the cause of the access to the A&E department is trauma the following codes are recorded (1 = aggression; 2 = autolesionism; 3 = work accident; 4 = home accident; 5 = school accident; 6 = sport accident; 7 = road accident; 9 = accidents in other closed environments)

1 = aggressione; 2 = autolesionismo; 3 = incidente sul lavoro; 4 = incidente domestico; 5 = incidente scolastico; 6 = incidente sportivo; 7 = incidente in strada; 9 = incidenti in altri luoghi chiusi

26: ok

27-33:ok

34: possible by linking the A&D database with the hospital database by the unique identifier (codice fiscale)

35: died in hospital possible by linking the A&D database with the hospital database by the unique identifier (codice fiscale); anyhow, wherever the death occurred is possible to access to status in life or death linking the A&D database with the mortality registry of the municipalities by the unique identifier (codice fiscale)

36: and 37: non systematic assessment is made at the A&D level

38-39: any action taken is recorded in the ausl databases and can be tracked by the codice fiscale.

40: if more details are necessary please let me know I add also a file with the structure of the A&E department database it is in Italian (36 page file *Struttura tecnica della Base Dati e Documentazione di utilizzo* not attached herein- available on request)

Appendix 2: Core dataset.
(All partners, represented countries)

Demographics

Recording Country
Locality
Persons country of residence
Patient Age
Gender
- *Male*
- *Female*

Ethnicity (open box, not pre-defined)
Place of Residence
- *Own home*
- *Assisted Living e.g. Sheltered Housing*
- *Hospital*
- *Acute*
- *Subacute (rehabilitation)*
- *Nursing and Residential Care Facilities*
- *Providers of ambulatory care*

Patient History

Chronic Disease
- ICD codes used or applied to free text.

History of falls in the last 12 months
- *Yes*
- *No*

Medication (open text box)
Previous attendance to hospital
- *Yes*
- *No*

Description of fall

Date of Injury
Time of injury
Reported loss of consciousness
- *Yes*
- *No*

Treatment/Intervention

Date of attendance
Time of attendance
Part of the body (free text-then coded using ICD)
Number of days of admission
Died in hospital within 90 days

Multi-factorial risk assessment
Yes
No
Provider of intervention (often only recorded as hospital)
Free text

Appendix 2: Additional Core data subset (as above but including the following):
(Greece, Finland, Sweden and Italy)
(UK and Hungary providing some parameters)

Patient History

Previous Treatment (see IDB for further definitions)
Examined and sent home without treatment
Sent home after treatment
Treated and referred to GP for further treatment
Treated and referred for further treatment as outpatient.
Treated and admitted to hospital
Transferred to another hospital
Other
Unknown

Description of fall

Place of Injury (see IDB for further definitions)
Home
Residential Institution
Medical Service Area
Public highway, street or road
Transport: Other
Industrial/construction
Farm or other area of production
Recreational area/cultural area/public building
Commercial area (non-recreation)
Countryside
Other specified
Non-specified

Treatment/Intervention

Type of injury (using ICD codes but can also be mapped to IDB)
No injury diagnosed
Contusion, bruise
Abrasion
Open wound
Fracture, please state
Luxation, dislocation
Distortion, sprain

Concussion
Other specified type of injury
Unspecified injury

Treatment (see IDB for further definitions)
Examined and sent home without treatment
Sent home after treatment
Treated and referred to GP for further treatment
Treated and referred for further treatment as outpatient.
Treated and admitted to hospital
Transferred to another hospital
Other
Unknown

Interventions
Single (single intervention)
Multiple (standard combination)
Multi-factorial (individual combination)

Appendix 3

Work Package 6 Workshop

Aim: To assist localities with monitoring falls prevention outcomes.

Objectives:

- To provide a consensus statement on what is currently feasible to collect to measure the impact of falls prevention interventions.
- To provide best practice examples of data collection.

Please read the following information and complete the questions in preparation for the workshop in Stuttgart.

We propose that it is feasible for localities to collect the following data to monitor falls prevention:

Level of measurement		
National:	Hip fracture rates	Per 100,000, Aged 65+. Age specific rates. Based on hospital data. Rates per 100,000 and with consideration of the population age. ICD codes (820.00-821.0).
Organisational:	Fall rates	Per 100,000, Aged 65+.Age specific rates. Based on admission to hospital. Attendance at A&E. ICD codes W00-W19. Ambulance call (unreliable?) Per 100,000, Aged 65+. ICD codes W00-W19. Falls rates in long term care. Falls in primary care ICPC-2E-V4.4 A28
Local:	Risk Assessment	1. Are they asked if they have fallen in the past year and asked about the frequency, context and characteristics of the fall or falls? 2. Do you carry out a multi-factorial assessment? Does the assessment consider: Validated fall risk assessment (e.g. PPA) Fear of falling Gait and balance (only) Cardiovascular assessment Medication review (4 or more medications) Vision Foot assessment Psychological assessment Environment

		Osteoporosis risk Urinary Incontinence
	Intervention	Do you provide interventions based on the above assessments? Single (single intervention) Multiple (standardised combination) Multifactorial (individual combination) Do you provide falls prevention literature?
	Outcomes	Falls risk e.g. Tinetti, FRAT. Fear of falling/Confidence e.g. FES-I, ConfBal Strength and balance outcomes. e.g. TGUG, BERG. Repeated stand test. Completion of strength and balance programme. Bone health e.g. FRAT score, DEXA

Questions for partners

Can partners provide data on the core dataset for 2013-2014, 2014-2015 (please see attached).

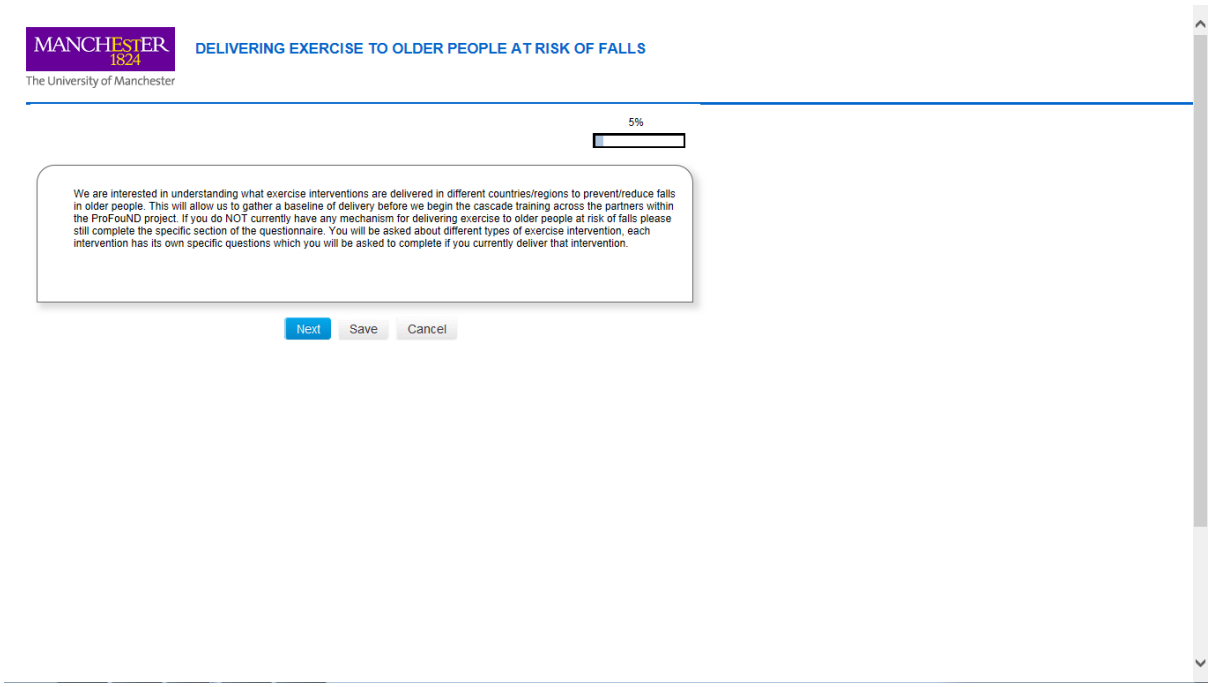
Can partners provide best practice examples of where they have successfully monitored falls or falls related interventions on a national, regional or local level in any population e.g. community, long-term care, hospital?

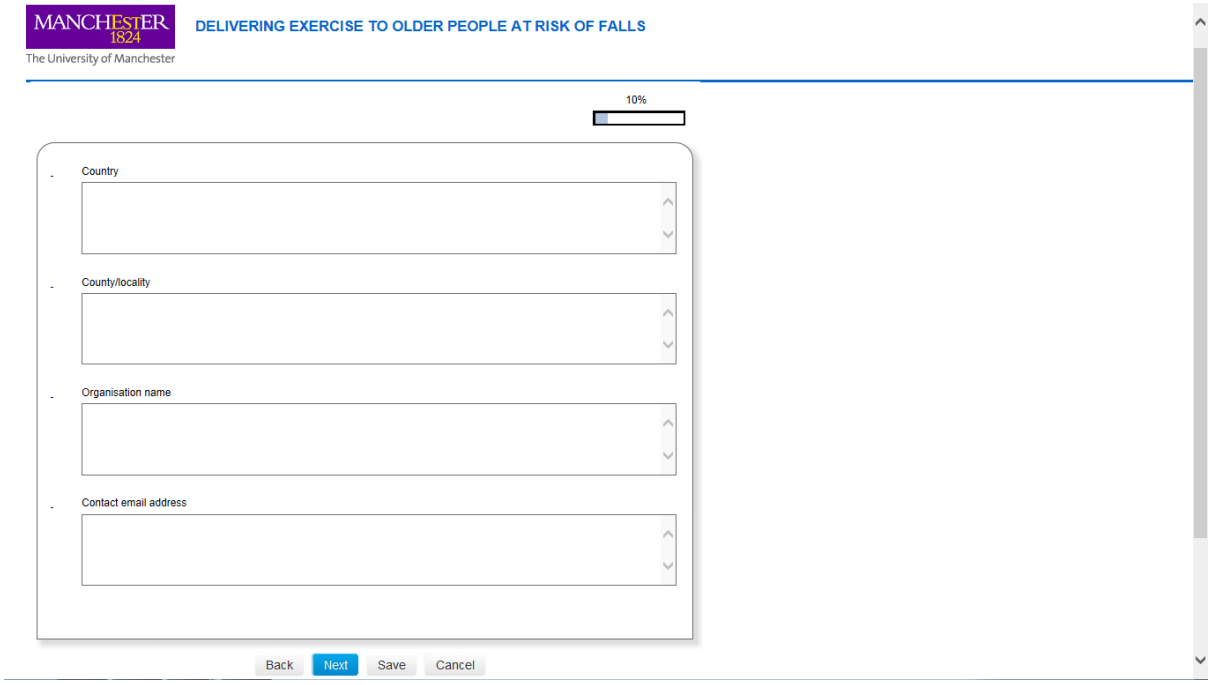
Can partners highlight the issues that have arisen with monitoring such interventions?

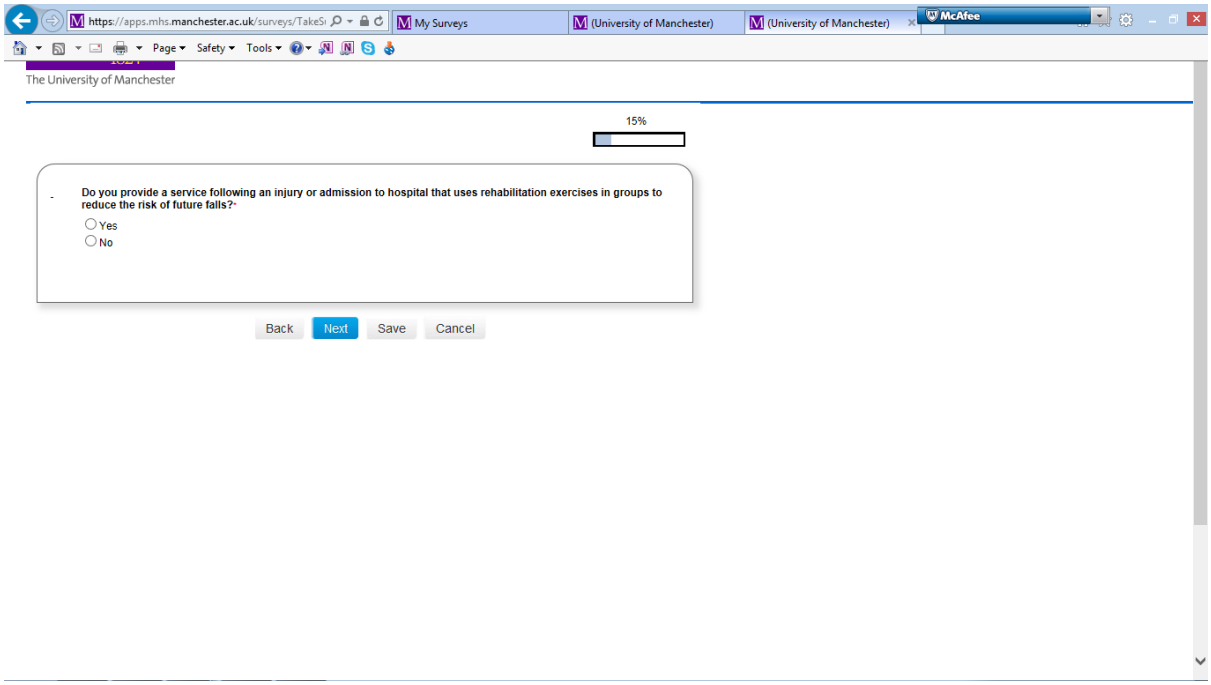
Are there any further indicators which you would suggest would be useful and possible to collect?

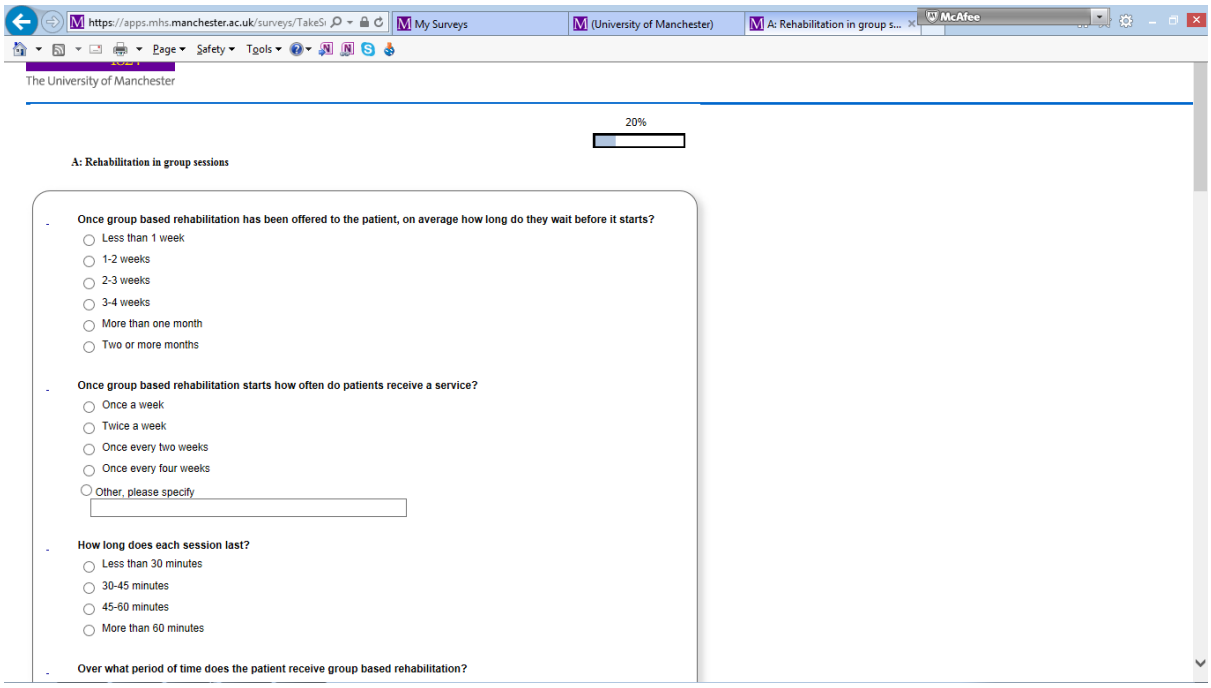
Appendix 4

Screen shots of online questionnaire on delivering exercise to older people at risk of falls



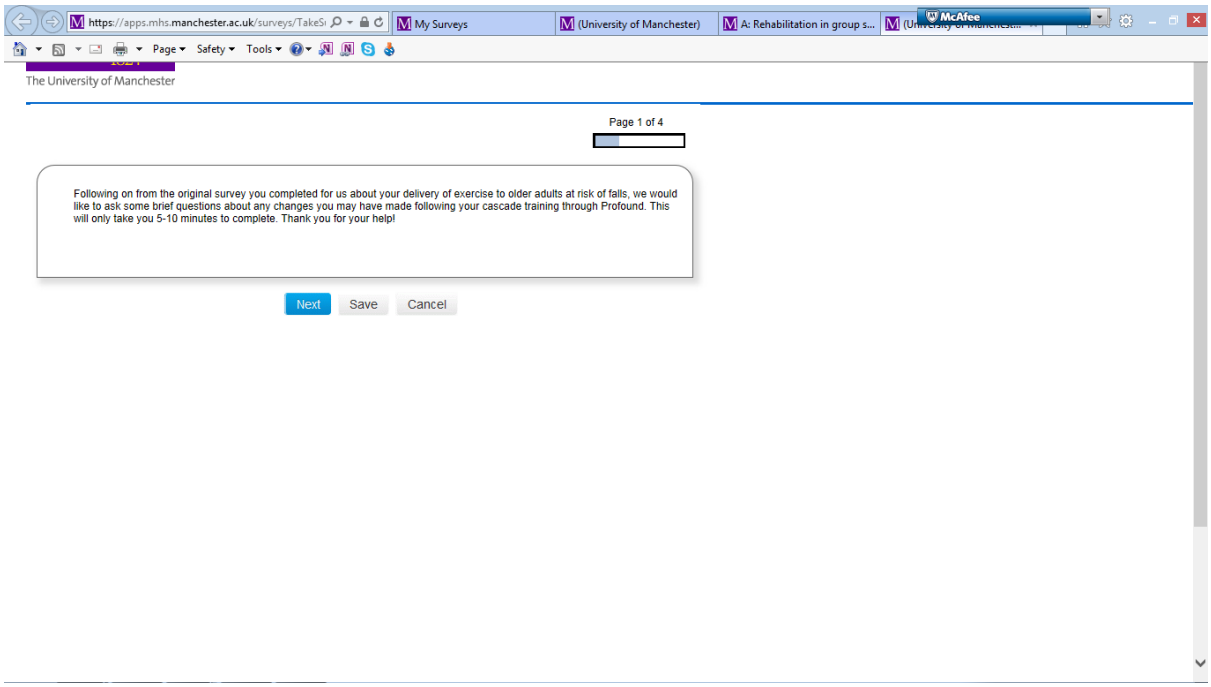


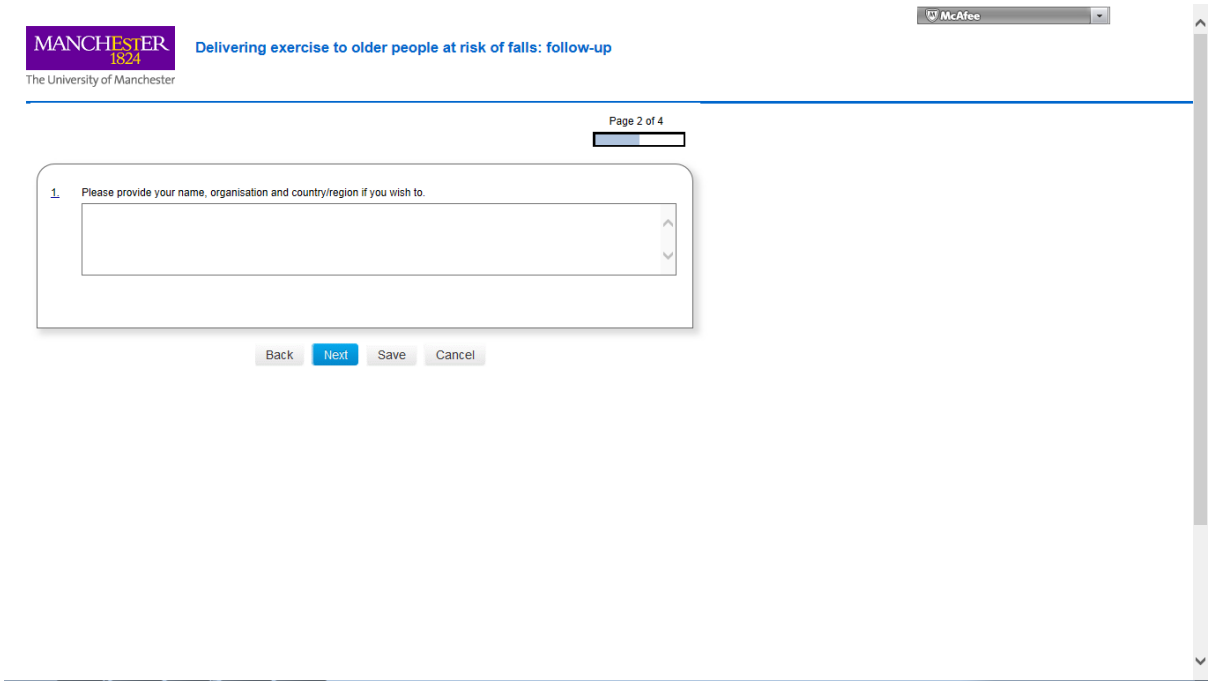




Screen shots of online survey of delivering exercise to older people at risk of falls from https://apps.mhs.manchester.ac.uk/surveys/SurveyList.aspx

Appendix 5: Qualitative interim questionnaire

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Delivering exercise to older people at risk of falls: follow-up
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1. Please provide your name, organisation and country/region if you wish to.
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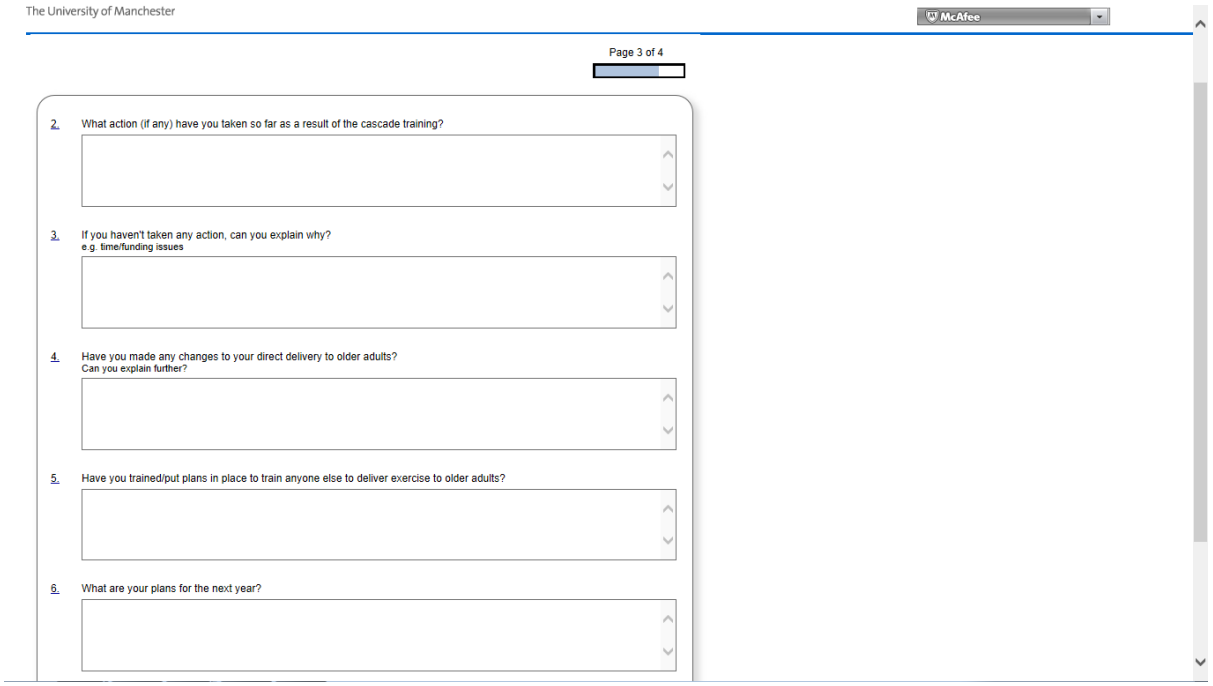
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McAfee
Page 3 of 4
2. What action (if any) have you taken so far as a result of the cascade training?
3. If you haven't taken any action, can you explain why?
e.g. time/funding issues
4. Have you made any changes to your direct delivery to older adults?
Can you explain further?
5. Have you trained/put plans in place to train anyone else to deliver exercise to older adults?
6. What are your plans for the next year?