Project reference no. 13/01/17

Models of Reablement Evaluation: a mixed methods evaluation of a complex intervention (The MoRE project)

Detailed project description

Fiona Aspinal[1], Bryony Beresford[1], Rita Faria[2], Mona Kanaan[3], Alison Laver-Fawcett[4], Gillian Parker[1], Gerald Pilkington[5], Parvaneh Rabiee[1], Helen Weatherly[2]

[1]Social Policy Research Unit, University of York, Heslington, York, YO10 5DD
[2]Centre for Health Economics, University of York, Heslington, York, YO10 5DD
[3]Department of Health Sciences, University of York, Heslington, York, YO10 5DD
[4]Research Centre for Occupational & Mental Health, York St John University, Lord Mayor's Walk York YO31 7EX
[5]Gerald Pilkington Associates, 74 Poplar Grove, New Malden, Surrey KT3 3DN

SUMMARY OF RESEARCH

Reablement is a relatively new approach to supporting people to regain (or maintain) independence and resume the activities which make up their daily lives. The reason for referring an individual to a reablement service can be conceived as falling into one of two broad categories: to support an individual to return home (RH) from hospital or other in-patient care setting following an acute episode; or to support an individual to remain at home (RAH), with minimum demands on home-care/community services, where there is evidence of declining independence or ability to cope with everyday living. It is a short, time-limited intervention. The typical population of people receiving reablement are: those who have suffered an acute illness/event (e.g. a fall), who have a long-term condition, and/or are growing frail. Government has invested substantially in this approach with the aim of reducing costs/demands on acute health care and social care. A national evaluation of reablement services in 2010, primarily focusing on older people who had suffered an acute event, found that reablement can make a positive difference to people's lives.

The rapid expansion of reablement services has led to a range of service models and differences between services in terms of their functions. Research is needed to find out: whether the type of service model affects users' outcomes; what other factors (e.g. age, co-morbidities, reason for referral, user engagement, carer involvement) affect how effective and cost-effective these different service models are; and users' and carers' experiences of reablement. Evidence is also needed on how reablement services are responding to the needs of users with more complex or 'atypical' needs, for example, those with dementia or younger adults. This comprehensive study addresses these questions and will generate evidence to support commissioners and practitioners as they make decisions about the organisation, delivery and development of reablement services. It comprises three work packages (WP) extending over 34 months.

Work package 1: Mapping and modelling reablement services

A national survey of providers of reablement services will establish the type, range and nature of services available across England and generate a typology of reablement services. The typology will be used to identify four service models (or service types) for evaluation. Findings from this WP will be disseminated as interim findings in month 16 of the project.

Work package 2: Evaluation of generic reablement models

A *quantitative evaluation of the effectiveness of the different service models* will examine short and longer-term service-level and individual-level outcomes, and compare outcomes between models. We will use quantitative patient-reported and practitioner-reported measures at three time points (pre-intervention, discharge and 6 months later) to understand the effects of reablement and the impact of service and user characteristics and other factors on effectiveness.

A *process evaluation*, comprising interviews with professionals, service users and carers, will develop an understanding of the immediate and wider context in which reablement models exist, the different effects reablement can have and how, and why, these effects vary between recipients and different services/sites.

The *economic evaluation* will use data collected in WP1 and WP2 to compare the costs and consequences of different generic reablement models in comparable populations. It comprises a rapid systematic review, cost-effectiveness analysis, cost-consequence analysis, and development of a decision analytic model and costing vignettes.

Work package 3: Description of specialist reablement services/practice approaches

This WP focuses on specialist services and generic services that have developed their practice in order to reable user groups with more complex needs and/or ‘atypical’ populations. It will provide evidence on current practice/service models, what has been learnt about meeting the reablement needs of those with specialist needs, differences between generic and specialist reablement, and the costs associated with specialist provision. The survey (WP1) will be used to identify exemplars of specialist services/practices. Managers and practitioners will be interviewed. Data will be compared with process evaluation data from WP2. Findings from this WP will be disseminated as interim findings in month 25 of the project.

Dissemination

A comprehensive and targeted dissemination package includes: production of practitioner and commissioner guidelines, a national dissemination events, publication of papers in peer-reviewed (open-access) journals and practitioner newsletters/magazines, and conference presentations.

BACKGROUND AND RATIONALE

Context

A rapidly ageing population and advances in technology have led to a dramatic rise in the number of people living longer with long-term conditions (HM Government, 2007; Allen and Glasby, 2009), affecting their ability to live independently. This has resulted in a significant rise in hospital admissions (Robinson, 2009) and increasing pressure on social care services. Improvements in care in some childhood conditions have led to increasing numbers of young people with complex needs surviving into adulthood (Fraser *et al*., 2012). Attempts to bring about a real shift to community-based care and avoid unnecessary/lengthy hospital admissions or ‘unnecessary dependency’ on social care services have long dominated health and social care policies and strategies (DH, 2005; DH, 2006). The government has invested in reablement services as there is some evidence that they can enhance independence and have the potential to contain costs. This was signalled by £70 million extra funding made available to the NHS in 2010 to support hospital discharge (DH, 2010a), followed by £300 million/year over 2012-15 for ‘reablement spending’ (DH, 2010b). More recently, the government announced an investment of £91.6 billion in local NHS services in 2012/3, including £150 million for reablement (DH, 2011a). The promotion of reablement services within the Care and Support 2012 White Paper also firmly establishes it as a priority for local authorities (HM Government, 2012).

The existing evidence and evidence gaps

While existing research suggests that reablement can lead to improvements in health-related quality of life, social care outcomes and physical functioning (Glendinning *et al*., 2010; McLeod *et al*., 2009) and remove/decrease the need for commissioned health and home care services (Glendinning *et al*., 2010; McLeod *et al*., 2009; Pilkington, 2008; Lewin and Vandermeulen, 2010; Le Mesurier and Cumella, 1999), the evidence base around reablement services remains patchy and underdeveloped and significant questions remain. Reablement is reported to work differently for different people, being less effective for those with chronic/complex health problems compared to people recovering from acute illnesses or falls (Rabiee and Glendinning, 2011). Considerable variation is also reported in local arrangements for self-care services for long-term conditions (Challis *et al*., 2010).

It is still unclear which models of reablement services work best, for which service users, at what cost and why. Evidence on longer term impacts is also limited. Indeed, for some groups (e.g. young adults with life-limiting conditions and adults with dementia), the evidence base is virtually non-existent. Further research is essential to support the development and commissioning of effective, cost-effective and appropriate reablement services.

Our approach to conceptualising and defining reablement

The term ‘reablement’ is contested. There is confusion about its meaning and there is evidence of differences across the country, and between health and social care, in the way it has been operationalized (Parker, 2014). For example, the term ‘homecare reablement’ is defined as an intervention for people where the main objective is delaying or avoiding the need for long-term, home care support, and where the need is defined largely within a social care model (CSED, 2010). ‘Reablement’ has been defined as a multi-disciplinary intervention with acute hospital admission avoidance and early supported discharge as objectives. Further, some services described as ‘intermediate care’ have much in common with the definition of ‘homecare reablement’. In light of this confusion, throughout this research we will use operational definitions – concentrating on what services do, and not on what they call themselves. This approach was used successfully in the first ever national survey of alternatives to acute hospital care for older people (Parker *et al*., 1999) and subsequently in our NIHR-funded survey of care closer to home for children and young people who are ill (Parker *et al*., 2012), which is similarly an area of rapid service development where definitions are confused and confusing.

Why this research is needed now

As numbers of people with long-term conditions rise and public finance constraints persist, managing demands on care services will remain key for the NHS. Advancing knowledge about reablement services may help prevent or delay people from requiring long-term care and support, reduce the risk of hospital admissions/re-admissions and maximise cost containment.

The rapid move towards development of reablement services that are funded and provided in different ways and by different organisations (CSED, accessed 2011) has created a knowledge gap that cannot be addressed by the existing body of research in this area. New research is thus needed to explore issues not addressed in existing research. Specifically, we want to find out which models of interventions are more effective in improving outcomes for what groups of service users, at what cost and why. Are reablement services equally effective for younger and older people; and for those at higher or lower risks of hospital re-admission? What is the optimum skill-mix of reablement teams, timing and duration for various reablement interventions? How are services and practice developing, and in what contexts, in terms of meeting the reablement needs of 'atypical' or 'higher need' groups, for example, people with dementia and younger adults?

As set out above, re-ablement is highly topical and there has been, and will be, significant investment in re-ablement services. At the moment, however, there are unrealised opportunities to maximise outcomes and to achieve cost-savings, and commissioners, service managers and practitioners are making decisions in a situation of limited evidence. This research is, therefore, both relevant and timely as it offers a unique opportunity to provide new evidence on different models of reablement services which will be of direct benefit to NHS managers, commissioners and their partner organisations: local authorities, third sector and independent providers. Work carried out in preparing for this bid suggests a high degree of interest in this work from stakeholders. A thorough and creative dissemination strategy will ensure the research has maximum impact.

AIMS AND OBJECTIVES

Project aims are to establish:

- the characteristics of generic and specialist reablement services in England;
- the impact of different models of reablement on service-level and service user outcomes;
- the impact of different models of reablement on different groups of service users;
- the indicative costs for the health and social care system of different models of reablement;
- how local context influences the ability of reablement services to achieve their goals;
- how specialist practice and service is, and has developed, for individuals with complex needs or 'atypical' populations who would benefit from reablement.

Objectives

- To undertake a national (England) survey to map different models of reablement services that currently exist (Work package 1).
- To carry out outcome assessment, process evaluation and economic evaluation of different generic reablement models (Work package 2).
- To carry out a qualitative study of specialist reablement practice and service models (Work package 3).
- To disseminate findings to providers, commissioners and service users of reablement services .

RESEARCH PLAN/METHODS

The study comprises three work packages (WP) extending over 34 months.

WORK PACKAGE 1 (WP1): MAPPING & MODELLING REABLEMENT SERVICES

Work package 1 will generate 'stand-alone' evidence on reablement services in England and develop a typology of current models or types of reablement services. It will also be used to fine-tune the design and sampling of WP2 and WP3. It will employ survey methodology comprising a three-stage process: identifying services providing reablement; identifying key informants in each reablement service; and administering a survey to the key informants via a structured questionnaire. (To avoid confusion between the use of the term 'model' to describe service configuration (i.e. service model) and statistical techniques (i.e. modelling), we have used ‘service type’ instead of ‘service model’ throughout the methods section).

Distinguishing between reablement and other services

The fuzziness of the definition of reablement, and the overlap in service delivery with intermediate care, is the main reason why a national survey that clearly delineates the different objectives that these services deliver, and how they do so, is an essential first part of our evaluation.

Two key characteristics distinguish intermediate care/reablement from other health and social care services, and a third distinguishes intermediate care from reablement. We will use information about these characteristics to distinguish between the services we are interested in and those we are not.

The first characteristic is the generally agreed **objectives** of intermediate care/reablement. These are: acute admission avoidance at the point of clinical need for acute care; early supported discharge after acute admission; longer-term avoidance of unplanned hospital admission; reduction in the use of home care services; avoidance of admission to long-term care.

Secondly, there is the **time-limited nature** of the service offered (usually up to a maximum of six weeks). This is the key defining characteristic that distinguishes intermediate care or reablement from, say, generic rehabilitation services.

The third characteristic, that distinguishes intermediate care from reablement, is the **restorative element** included in the service. In other words, a reablement service is about enabling people to regain or retain function for themselves, rather than providing input that *replaces* that function (e.g. reablement teaches people how to cook for themselves again, rather than providing meals on wheels).

Identification of reablement services and key informants

The first stage of WP1 will involve an initial screening exercise to identify the person most closely involved with commissioning intermediate care/reablement services in every CCG (n=221) or LA with responsibility for adult social services (n=154) in England. Some of these commission joint services, others may have more than one service, and a few may have none, so the total number of *services* surveyed may be somewhat, but not much, smaller or larger than 375. We will contact this person and ask about services that they commission that serve any, some or all of the five objectives of intermediate care/reablement.

These informants will provide contact details for the managers of such services. We will then contact the managers by telephone and confirm the objectives of their service, and that they operate in a time-limited form and include some element of restorative input. If, at this stage, we identify services that operate **only** to keep people out of hospital at the point of clinical need for acute care, they will be excluded from the study.

We will then establish whether the manager identified by the commissioner is the person best placed to answer detailed questions about the service delivery and organisational characteristics of the service, including its costs or, if not, who would be. This identified person will then receive the detailed questionnaire (see below) in electronic form.

Our experience of surveying services in previous NIHR-funded projects (Bernard *et al*., 2010; Parker *et al*., 2012) suggests that this staged approach is the most efficient way of ensuring both a high response rate and high quality data. It also allows the researchers to ask brief contextual questions during the initial contact that increase understanding of the service and its environment but which are difficult to broach via postal or internet-based surveys.

The survey

Development of the questionnaire

The content of the questionnaire will be informed both by our existing knowledge of reablement services and their organisational features and by consultation with reablement service providers and commissioners. Thus, although we will be building on previous work in this field, the survey content will be developed in partnership with service providers and commissioners. After initial drafting of the questionnaire, we will ask commissioner and provider members of our advisory group to participate in a cognitive interview, where we work with them to ascertain what they understand by our questions and to identify any gaps in the survey. Feedback from this will be used, where necessary, to revise questions.

Content of the questionnaire

First, we will establish again the **objectives** that the service addresses (as defined above). Where more than one objective is addressed, further questions will establish whether those objectives are targeted through a single or multiple service ‘offer’ (for example, does the service have separate teams addressing different key objectives or a single team that addresses all objectives?).

Second, we will establish the ways in which they **organise** their services. The questions will cover a range of service delivery and organisational characteristics that research with service managers, practitioners and users suggests are important in influencing outcomes in these types of services (SCIE, 2011; Glendinning et al. 2010; Newbronner et al. 2007). These include: inclusion and exclusion criteria for service receipt (including the presence of carers in the person’s home), referral routes, caseload mix and average caseload size, team skill mix (and specifically the presence of OTs on the team), staff training, degree of integration between health and social care, in-house or outsourced provision, geographical coverage, funding, costs and charges, flexibility around the six week ‘limit’, the use of goal setting and robust outcome assessment against goals, and other key variables. We will also ask respondents about their likely interest in taking part in the next stage of the project.

Administration of the questionnaire

We have successfully carried out a number of surveys of health and social care services using the electronic survey software Qualtrics. This is a high function, questionnaire design and administration package that allows sophisticated presentation and question routing, response tracking and data management. Rather than the telephone-administered survey we had originally planned, we have decided to use Qualtrics directly for the data gathering stage of WP1.

With careful preparation through the screening stage – directly identifying the person most able to answer the detailed questions about their service - and robust follow-up, we believe that we will achieve a response rate in excess of 60 per cent, as is common in our research with health and social care providers. Where answers are unclear or ambiguous, we will follow-up respondents via telephone contact.

Analysis

After cleaning, survey data will be exported from *Qualtrics* into the SPSS package and analysed descriptively as a first stage, to give a simple national picture of current reablement provision.

We will then use cluster analysis to develop a typology of reablement services, using data on the characteristics of the services. Cluster analysis is a useful way of developing a tight typology of services, in order to assist analysis of differences and similarities between services, while at the same time preserving the underlying features of individual services. We have used this form of analysis successfully in other NIHR funded research, and believe it is a useful addition to the armoury of techniques for service delivery and organisational research (Parker *et al*., 2012).

The service delivery and organisational variables collected from the survey will form the basis for the cluster analysis. We cannot predict what variables will be important in distinguishing between different types of reablement services in advance of gathering the data and analysing it. Using cluster analysis to generate tight service ‘types’ and then selecting from the predominant ‘types’ for WP2, we will generate results that can be generalised to other services within those types. This would not be the case if we simply pre-chose a number of services for WP2 based on current understanding.

We will then test the typology, using bivariate analysis to ensure that it does, indeed, differentiate between different types of reablement services.

The results of this cluster analysis will stand in their own right as a typology of reablement services but will also inform sampling of services for the next stage of the research, when we will be concentrating on the differential impact of specific service types.

We will also carry out a second cluster analysis, using the survey data on case mix, size and eligibility, to categorise the different service user groups served by reablement services. These categories will also inform sampling for the next stage of the research, where we will be exploring outcomes for different groups – those who use reablement to return home (RH) and those who use it to remain at home (RAH) (see section on quantitative evaluation of effectiveness).

Selection of reablement services to represent each service type

If the cluster analysis in WP1 generates very 'tight' statistical types of reablement service, we may feel relatively confident that a single service within the type will allow us to generalise results to other services of that type. If the types are not tight statistically, however, then we will need to select more than one service to represent each reablement service type. The selection of services to represent each reablement service type will be informed by the factors that the available evidence suggests enhances effectiveness (e.g. flexibility around the six week 'limit' and access to an occupational therapist) and on the basis of the charges for each service.

WORK PACKAGE 2 (WP2): EVALUATION OF GENERIC REABLEMENT SERVICE MODELS

This work package builds on WP1 and will evaluate four 'types' of reablement services identified in WP1. These will be the most commonly employed service types across the country, thus ensuring a meaningful and applicable evaluation with findings transferable to other settings. The evaluation comprises three elements: an outcomes evaluation (WP2a); a process evaluation (WP2b); and an economic evaluation (WP2c).

As described at the beginning of this detailed project description, the reason for referring an individual to a reablement service can be conceived as falling into one of two broad categories: to support an individual to return home (RH) from hospital or residential care setting following an acute episode; or to support an individual to remain at home (RAH).

The desired outcomes for users of reablement services will, to some degree, be determined by the reason for referral. The type of outcome may also vary. For example, maintaining the status quo may be an appropriate outcome for a RAH service user, while for RH users there is likely to be an expectation of improvements in outcomes. Equally, the characteristics of these two groups of service users in terms of health status and functioning may well differ.

The key questions for the evaluation are:

- Is there a particular reablement service model(s) which best supports people to return home (RH)?
- Is there a particular reablement service model(s) that best supports people to remain at home (RAH)?
- What characteristics or features of a reablement service (e.g. ethos, staffing/skill mix; integrated vs single agency; in-house vs contracted out provider; local service context) contribute to positive outcomes?
- Are there particular sub-groups of service users, defined by person-centred or contextual factors, which do not experience the same outcomes as the 'typical' service user?
- Are there particular model(s) and/or service characteristics that perform better in terms of achieving positive outcomes for people where the success or impact of reablement may be compromised (e.g. memory/confusion; low levels of engagement with reablement; absence of informal carer involvement)?
- What are the indicative costs associated with different models of reablement?
- Which models of reablement are most cost-effective for which service users?

WP2a: The Outcomes Evaluation

The outcomes evaluation will collect outcomes data from people receiving reablement support.

Design and analytical approach

Given that an RCT (whether through individual or cluster randomisation or using a waiting list control design) is not an appropriate design to address the questions outlined in the research brief and that, even if it were, it would be unfeasible and unethical in the current service landscape (i.e. where almost all health and social care communities have a reablement service and everyone who is entitled to it is offered reablement), we have adopted a quasi-experimental design. Coupled with modern statistical techniques, quasi-experimental studies can offer much where RCTs are not possible.

Different disciplines call our chosen design different things – for example, a stratified, longitudinal panel study in applied social science and a nested or clustered repeated measures design in psychology. The key distinguishing feature of this design, whatever it is called, is the gathering of information about outcomes for individuals at a number of points, in order to examine change over time and, by using a clustered sample structure, allowing examination of how change over time is influenced by a range of individual and contextual factors. In our case, the type of reablement service is the main contextual factor.

We have chosen multilevel modelling as the most appropriate analytical approach for this type of design. This is an alternative approach to multivariate analysis of repeated measures (Quené and van der Bergh, 2004), that allows exploration of more than one explanatory variable at different levels (Hox 1998) and that facilitates analysis of cross-level interactions (Scherbaum and Ferreter, 2009). It will allow us to analyse separately the impact of service user characteristics, the types of reablement service, and time on service user outcomes, and to identify any possible interactions between them. This approach is thus ideally suited to exploring questions of relative effectiveness, and which sub-groups might benefit most.

Multi-level models are also useful in the type of research we are proposing to undertake because they do not necessarily require individuals to be assessed at exactly the same time or complete data on all participants to be available (Atkins, 2005). Given the challenges of data collection over time with predominantly frail groups, this is a further strength of adopting this approach.

This analytical approach also allows us to take into account possible autocorrelations that arise when data are gathered from people receiving the same service and when the same individuals are measured more than once. If not taken into account, analysis of such data can give an over-optimistic assessment of impact on outcomes.

Multi-level analysis in health services research tends to be used mainly in cluster-randomised trials or in analysis of large data sets exploring public health outcomes. However, its ability to explore change over time in individual-level data within panel studies and in non-randomised, repeated measures designs in the social and behavioural sciences (Atkins, 2005) and its potential value in organisational outcomes research (Cho, 2003) point also to its usefulness in quasi-experimental designs that explore the impact of different ways of delivering care.

The sample

The outcomes (WP2a) and economic (WP2c) evaluations will use the same sample. This sample will also provide the sampling pool for the process evaluation (WP2b).

RA and RAH service users may well be represented differentially in different service types and the survey data will confirm whether this is the case. If it is, then we will also need to stratify the sample of services to achieve relatively equal potential numbers of each type of service user across the sample of individuals.

Sampling of individuals may also be necessary if services have very large average workloads; we will make a judgement about this when we have selected the services and can decide what sampling fraction we would need to use to generate the required samples in each service and for each reablement service type. If we do need to sample individuals, this will be done randomly and opaquely, and be supported by the York Trials Unit.

As we explain below, we plan to recruit service users over a six-month period. This is to facilitate fieldwork and to reduce burden on the services, but also to ensure that we cover different seasons, when demands on services are likely to vary. Within our current planned timetable, we will be recruiting from November to April.

Sample size

As described above, when individuals within services are studied, the statistical approaches chosen to measure outcomes must take into account the potentially clustered nature of the data collected. People *within* a service are likely to be more like one another (and therefore to have outcomes that are more similar) than are people *between* services. This phenomenon is recognised in cluster-randomised trials, but applies as well to quasi-experimental approaches of the sort we are adopting here.

However, sample size and power calculations are complex with multi-level modelling, as one has to apply inter-class correlations (ICCs) to a conventional sample size calculations in order to arrive at a suitably powered study. However, by definition, ICCs can be generated only once data have been gathered. Consequently, pilot studies to generate ICCs to inform sample sizes for a substantive study, complex computer simulations using a range of (as yet untested) assumptions about what one might find in a substantive study, or ‘rule of thumb’ approaches that can then be revisted once data have begun to be gathered are the only possible approaches (Scherbaum and Ferreter, 2009).

We have carried out extensive searching to identify any broadly similar studies with published ICCs that we could use in our sample size calculation. We found one that seemed relevant – an epidemiological study of factors influencing older people’s (75 and over) admission to acute hospital carried out in 18 general practices, and therefore generating clustered data (Lancaster et al., 2006). This paper explains how some or all of the information required for sample size determination for a multilevel logistic regression is ‘not usually available’ (p.171). In this case, however, the researchers were able to carry out a pilot study but describe the complex process that they nonetheless carried out to come to a pragmatic sample size solution for the main study. In the interests of helping future researchers adopting similar designs in similar topic areas, the paper reports a range of ICCs generated from the main study, pointing out that many of the questions in their survey might be used as outcomes in future research.

One reported ICC and its associated design effect (ICC= 0.00721, design effect = 2.397) – for overall health – seems most close to one of our outcome measures – health-related QoL. Using this as a guide, we have assumed an ICC of 0.007 with an average cluster sample size of 200, which would result in a design effect of 2.393. A sample of people eligible for reablement services is likely, as a group, to display less variation in overall health (and therefore a higher ICC) than a sample of all older people in general practice; we have therefore also used the highest ICC reported in Lancaster *et al*. (2006) in our sample estimates. This ICC of 0.01355 is rounded to 0.014 and, using an average cluster size as above, results in a design effect of 3.786.

The marginal effect (all other things being equal) of reablement versus home care as usual in the prospective longitudinal study, using difference-in-difference analysis was 0.107 (Glendinning et al, 2010, p.81). We take this to be comparable to Cohen's f^2 and indicative of a small to medium effect size. We have assumed that differences in effect size between different types are likely to be smaller than those seen between reablement versus usual care and have therefore used the relatively small effect size of $f^2 = 0.06$ for the next part of our calculation.

Using a sample size calculation for hierarchical multiple regression, without clustering, the minimum total sample size required to detect an effect size of 0.06 with a power of 80% and an alpha of 0.05, and with up to 20 individual predictors and 4 reablement service type predictors would be 222. Inflated by the two design effects given above (2.393 and 3.786), we would therefore need an achieved sample size of between 532 and 841. Assuming an attrition rate of 25% between T0 and T2, we therefore need to recruit between 710 and 1121 people in total.

We have made the pragmatic decision to recruit between these two figures, giving us ~800 people in total, around 200 per reablement service type.

We emphasise that these calculations do not carry the accuracy that would be possible with a conventional experimental design, but are the best that can be done in advance of data collection. Once we begin to collect data in WP2a we will generate accurate ICCs and, thereby, accurate assessments of power.

Types of outcomes

We will examine service-level and individual-level outcomes and explore how these vary within and between reablement service type and by individual characteristics.

Service level outcomes will be: the proportion of RH users readmitted to hospital within six months of discharge from the reablement service; the proportion of RAH service users placed in residential care within six months of discharge from the reablement service; the proportion of RAH service users with reduced use of 'home care' type services at six months after discharge from the reablement service. (Health economic issues are dealt with in WP2c).

Individual level outcomes will be: health-related quality of life; social-care related quality of life; mental health; achievement of individually-set reablement goals; admission/readmission to hospital; admission to long-term care.

The table below shows how data collection and our analysis will allow us to address the main research questions for WP2a outlined earlier.

Question	Data used	Analytical approach
1. Is there a particular reablement service model that best supports people to return home?	Individual outcome measures gathered over time from people returning home from hospital with a reablement service.	Identify the individual characteristics (e.g. sex, age, co-morbidity, living circumstances) associated with better and worse individual outcomes. Controlling for these intervening variables, model which of the four reablement types, if any, delivers better individual outcomes for individuals leaving hospital.
2. Is there a particular reablement service model that best supports people to remain at home?	Individual outcome measures gathered over time from all service users. Admission/readmission to hospital. Admission to long-term care. Mortality.	Controlling for intervening variables (as above), model which of the four reablement types, if any, delivers better individual, admission and mortality outcomes for all service users.
3. What characteristics or features of a reablement service … contribute to positive outcomes?	The 'type' defined via the cluster analysis which summarises service features. Detailed qualitative service information	Implicit in the analysis for Q2.

	gathered during the process evaluation. Individual outcome, admission and mortality data (as above)	
4. Are there particular sub-groups of service users which do not experience the same outcomes as the ‘typical’ service user?	Data about individual service user characteristics (age, sex, living circumstances, co-morbidity etc). Individual, admission and mortality outcome data (as above)	Across the whole sample, identify which sub-groups of service users (if any) experience better individual, admission and mortality outcomes. Model these differential outcomes (if any) against reablement service types.
5. Are there particular types of reablement service or characteristics that perform better for some ‘hard to improve’ sub-groups	The ‘type’ defined via the cluster analysis which summarises service features. Detailed qualitative service information gathered during the process evaluation.	Across the whole sample, identify the characteristics of those whose individual, admission and mortality outcomes are worse. Model these poor outcomes against reablement service types.

Baseline and follow-up intervals

Individual outcomes will be measured at the following time points: within the first week of receiving the reablement service (T0); within a week of discharge from the reablement service (T1); 6 months post-discharge (T2=T1 + 6 months).

Sources of data

Service users recruited to the project will be the main source of data. In addition, practitioners conducting reablement service assessments and reablement practitioners will provide information on study participants. Services will provide the project with routinely collected service delivery/audit data. Data on service characteristics, location and socio-demographic context collected in WP1 (and supplemented in WP2b) will also be used in the analysis. An overview of evaluation data that will be collected for service users at each time point is set out in Table 2. Descriptions of each instrument follow.

Table 2 Sources of data and data collection time points

	T0	T1	T2
Service user			
Self-reported outcome measures: EQ-5D; ASCOT SCT-4; GHQ-12	*	*	*
Goal Attainment Rating (user-defined reablement goals)	*	*	*
‘Experiences of Reablement Practice’ questionnaire		*	
The Services and Care Pathway Questionnaire	*	*	*
Practitioner conducting reablement assessment			
Functional Status Assessment	*		
Background information on health/impairments	*		
Background information on reason for referral and reablement plan	*		
Reablement practitioner			
‘Engagement with reablement’ measure		*	

Outcome measures

The characteristics of the study population prohibit the use of an extensive battery of self-report outcome measures. However, it is important that we capture an holistic picture of outcomes. Three measures have been selected which together capture health, well-being, social inclusion, participation and self-efficacy. In addition, we will track attainment of user-specific reablement goals.

<u>Health-related quality of life: EQ-5D</u>

The well-established and widely used health status descriptor of the EQ-5D-5L questionnaire (Part 1) will be used to measure health-related quality of life. It represents five dimensions of quality of life: mobility, self care, usual activities, pain/discomfort and anxiety/depression. Respondents indicate the level of difficulty they are experiencing in each of these domains on a five point scale (no problems, some problems, moderate problems, severe problems, unable) (Rabin *et al*., 2011).

Social care-related quality of life
The ASCOT SCT-4 will be used to measure social-care related quality of life. The ASCOT SCT-4 is one of a suite of measures (known as the Adult Social Care Outcomes Toolkit (ASCOT)) designed to capture information about an individual's social-care related quality of life and to measure the outcomes of social care input in an individual's life. It measures social care QoL across nine domains: control over daily life; personal cleanliness and comfort; food and drink; personal safety; social participation and involvement; occupation; accommodation cleanliness and comfort; dignity. The ASCOT tools (http://www.pssru.ac.uk/ascot/) are used routinely by local authorities and government and were used in the previous reablement evaluation (Glendinning *et al*., 2010).

The ASCOT SCT-4 is designed for use with individuals living in community settings and is sufficiently sensitive to use with individuals with lower levels of need. It comprises nine items (one per domain) each with four possible responses reflecting the range of level of need: no needs, trivial needs, some needs and high needs. To reflect the fact that the difference QoL domains may differ in terms of relative importance to an individual, relative importance or 'preference weights' are applied to raw scores (Netten *et al*., 2011).

It is not yet clear that the ASCOT SCT-4 is sensitive to change over time particularly in frail older groups (Glendinning *et al*., 2010). We will not, therefore, be using social care QoL as our primary outcome but, as the measure is the only available social care QoL instrument, we will include it in our battery for further testing.

Mental health: General Health Questionnaire (GHQ 12)
The GHQ 12 is a measure of current mental health. It focuses on two major areas – the inability to carry out normal functions and the appearance of new and distressing experiences. It has been shown to be valid and useful in both clinical and general populations. Studies have indicated that the GHQ 12 is a consistent instrument over multiple time periods with relatively long periods between applications in general population samples; it is also sensitive to individual change. This makes it particularly well suited for longer-term studies that require an indicator of minor psychiatric morbidity (Pevalin, 2000).

User-defined goal attainment
It is routine practice for quantifiable reablement goals to be agreed between practitioners and individuals when the reablement assessment process takes place. Goal Achievement Scaling (GAS, Hudson, 1998) will be used to measure achievement of these goals. The GAS score is an index of the magnitude of change and compares baseline achievement of the goal, target achievement, and achievement at post-intervention and follow-up.

Other measures and data collection instruments for the outcomes and economic evaluations

Service use and care pathways: The Services and Care Pathway Questionnaire (SCPQ)
The SCPQ will record use of services (health, social care, other statutory, voluntary sector), informal care involvement and care pathways. It will be bespoke to the project but based on tools used in other projects to collect service use/care pathway information (e.g. Callery *et al*., 2011).

Given the anticipated frailty of the study population it was felt that it would be unreasonable to expect recall of service use/pathways which had taken place much beyond the previous month, except for hospital admissions. Therefore, at T0 study participants will be asked to report on their previous month's resource use. At T1 the SCPQ will be completed with respect to the period since they first accessed the reablement service. At T2 the SCPQ will be completed with respect to the previous month only. (This will be assumed to be representative of each of the previous months of resource use since T1. It will then be adjusted to cover the actual duration of time between T1 and T2.) The only exception will be with respect to acute hospital or residential care admissions where we will ask about the entire period between T1 and T2. This is necessary as prevention of admission/re-admission is a core policy aim of reablement.

Experiences of reablement practice
At T1, research participants will complete a brief questionnaire about their views on the practice and approach of the reablement practitioners who worked with them. This will cover their perceptions of their relationship with reablement practitioners and their views on the way practitioners worked with them. We have not been able to identify a pre-existing questionnaire or measure which captures this concept. The research team will, therefore, develop and pilot a questionnaire in Year 1 of the study.

Engagement in reablement
At discharge (T1) reablement practitioners will complete a measure of user engagement in reablement. There are no pre-existing measures of engagement in reablement and we will, therefore, adapt the Hopkins Rehabilitation Engagement Rating Scale (HRERS, Kortee *et al*., 2007). The HRERS was developed to measure engagement in acute rehabilitation services. Some adaptations are required to make it suitable for use in a reablement context. Specifically, the word 'therapy' will need to be replaced with a suitable alternative; the first item concerns

attendance rates at outpatient clinics. During Year 1 of the project we will consult with the scale authors and rehabilitation practitioners regarding adaptations. We will test the psychometric properties of the revised scale (scaling properties, reliability and validity) before entering it into our analyses.

Background data on health, functioning and living situation
For each research participant, the practitioner conducting the reablement service assessment (T0) will complete the following:

- A Functional Status Assessment (e.g. Activities of Daily Living, Canadian Occupational Performance Measure) used routinely by the research sites. (Note: sites will agree to use a common measure).
- The Study Entry Form (SEF) (see below), which includes questions on: health status; impairments (e.g. memory/confusion; cognitive impairment); living situation (e.g. living alone vs with partner/other family); informal carer involvement. (All factors hypothesised to impact on the effectiveness of reablement.)

Overcoming difficulties encountered in a previous evaluation

The experiences of conducting the quantitative elements of an earlier evaluation of reablement (Glendinning *et al*., 2010) have influenced the design of this work package and data collection processes. Key issues in the earlier work were high levels of study drop-out at T1 and T2 (12 months of follow-up), and the quality/completeness of data collected. In response to these difficulties, and reflecting on what reablement services can feasibly be expected to achieve with a population including medically frail and elderly people, we have reduced the follow-up time point from 12 to six months. In addition, research sites will have a dedicated Local Study Administrator (LSA) and Local Study Investigator (LSI), thus removing the burden of responsibility and demands on time from local services and individual practitioners.

Key tasks for the LSA will be: to act as key point of contact for the research site, to develop effective working relationships with key staff in the service and become a familiar figure amongst staff; to liaise with the research site (and/or agencies involved in reablement assessments) regarding recruitment, triggering baseline and discharge data collection; to maintain and administer research site database and data entry.

Key tasks for the LSI will be: face-to-face data collection with service users at all three outcomes data collection time points (i.e. 550 data collection points per service type). This will support high quality data collection and retention to the project as there will be continuity of contact and a sense of on-going relationship between research participant and the research. The LSI will also liaise with the research team regarding recruitment to the qualitative element.

To ensure they can work effectively, research sites will be required to host the LSA. LSA and LSIs appointed to the project will undergo a two day residential training course delivered by the research team. They will also receive on-going group and individual supervision and support via teleconference and occasional face-to-face meetings with the research team.

Finally, to support research participants' on-going engagement with the project during the data collection period, we will distribute A5 'project postcards' (carrying a consistent visual identity) on a bi-monthly basis to participants. These will provide brief information and updates on the project.

Service user recruitment and data collection processes

Recruitment
The practitioner carrying out the assessment will initiate recruitment at the point of assessment for reablement. Depending on local service arrangements, reablement assessments are carried out by the reablement service itself or by the agency referring to the reablement provider. We will put appropriate systems in place at each research site to accommodate this variation. A careful discussion about the project with service users, supplemented by written information, will precede seeking consent.

The practitioner will then complete a Study Entry Form (SEF) covering the following information about the service user: name and contact details; health status and impairments; carer involvement; living situation; reason for referral to the service; record of reablement goals and reablement plan; details of staff assigned to case. The completed SEFs (along with a copy of the Functional Assessment Status measure) will be passed to the Local Study Administrator. This will trigger the Local Study Investigator to make contact with the service user to arrange the T0 data collection visit.

Data collection processes
All data collection will be collected via a face-to-face visit to participants' homes. At each data collection time point consent will be re-checked. Participants will have the option of completing paper or electronic versions of the outcome measures, or to be supported in completing the questionnaires via a structured interview. Tablet

'computers' will be used to administer the electronic versions and the structured interview. An on-line survey system (Qualtrics http://www.qualtrics.com), which offers tablet and off-line completion functions, will be used to manage data collection.

Analysis

The main objective of WP2 is to determine whether particular reablement service types deliver better outcomes for some groups of service users; the main comparison is thus the outcomes achieved in different service types, taking into account individual characteristics that might influence those outcomes.

As outlined earlier, individual service users *within* a particular reablement service type are likely to be similar to each other in a number of respects; the objectives, eligibility criteria and referral routes of services will produce relatively homogeneous service user groups and thus data that are clustered and autocorrelated. Further, the impact of different reablement service types on outcomes may operate simultaneously at more than one level and interact with one another. For example, skill mix in the *team* may influence outcomes at the same time as the age of *individual* service users and may also influence outcomes in some age groups more than in others.

These issues of design and interpretation led us to the choice of multi-level approaches to analysis, as argued above.

We propose to carry out three-level analysis of each of our primary and secondary outcomes, using mixed effects modelling. Level 1 will be change over time, level two the individual, and level three the reablement service type. The type of analysis (linear or logistic) will be determined by the nature of the data being explored (whether or not continuous and whether or not normally distributed). We will fit different models for service users in the RA and RAH groups, and will assess the impact of the intervention by comparing time 0 and time 1 and sustainability of change over time by comparing time 1 and time 2. We will use STATA and R software packages for statistical analysis.

Prior to embarking on the multi-level modelling we will carry out descriptive and bi-variate analyses of the T0 data, to identify any differences in the achieved samples in different models that will need to be controlled for in the subsequent modelling.

WP2b: The Process Evaluation

Reablement can be considered a complex intervention for several reasons. First, it is hard to define (Anderson, 2008), as outlined in the background section. Second, reablement interventions comprise several components which may 'act both independently and inter-dependently' (Craig, 2008a). Third, reablement services are seated within a complex, and changing, health and social care context (Shiell *et al*., 2008; Brady *et al*., 2011) where policy aims, the structural environment and professional approaches may contrast and even, at times, conflict. An additional layer of complexity arises with this study because we will be comparing reablement services across several sites where 'reablement' may be implemented and/or received in different ways. To be able to understand these different types and layers of complexity and their impact on outcomes, implementation and continued development of reablement services, a process evaluation will be undertaken (see Oakley *et al*., 2006).

A process evaluation explores the ways that interventions are implemented (Craig *et al*., 2008b; Bliss and Emshoff, 2002) and the context in which they are delivered (Oakley *et al*., 2006; Craig *et al*., 2008b) so that the system, the different elements of the intervention and how these interact, can be understood (Brady *et al*., 2011). This approach can aid understanding of, for example, the aims of an intervention, how it is delivered and whether the intended aims are achieved. As such, it can provide valuable insights into how the intervention works in practice and the factors that affect its success, as well as highlighting unintended consequences of the intervention/service (Craig *et al*., 2008b).

Undertaking a process evaluation, alongside an outcomes and cost-effectiveness evaluation, will enable us to understand the immediate and wider context in which reablement models exist, the different effects reablement can have and how and why these effects vary between recipients and between different services/sites.

Design

We will use a mixed-methods (O'Cathain *et al*., 2010) approach for the process evaluation. Data collected in WP1 will be used alongside data from qualitative interviews with commissioners, practitioners, service users and carers. These semi-structured interviews will allow more in-depth exploration of local policy, structures and process arrangements (Campbell *et al*., 2000, Bowling, 2002; Sheppard, 2004), the components of the service, service costs, how these components interact and the effects of these interactions (Campbell *et al*., 2000; Brady *et al*., 2011).

Interviewing will take a staged approach:

i. To understand local structures, systems and service delivery/practice issues:
    - interviews with lead commissioners, service managers and practitioners.

ii. To understand service user/carer experience of reablement and goal achievement:
    - interviews with service users and carers (n=~12/10/model);
    - further interviews with practitioners (n=~6-8/model) to identify the barriers and facilitators to achieving service user outcomes.

Sampling and recruitment

Staff

We will first identify and establish a key contact in each research site. From previous work we have undertaken, we know that this is likely to be a service manager. People in this position are knowledgeable about commissioning structures and local practice and are, therefore, able to identify relevant people to invite for interview. Once we have identified relevant staff, we will send each person an invitation pack, explaining the research, what taking part would involve and how to contact the research team to indicate their participation preference. We aim to recruit the lead commissioner/s for reablement and the reablement service manager/s in each case site. We expect that case sites will have one lead commissioner and one service manager for reablement. However, from previous work in social and health care environments, we know that some roles can be shared by several people. We will also interview practitioners in the reablement service. The number of practitioners we interview will depend on the size and structure of the team (something we won't know until we confirm case sites following WP 1). However, we will be sure to gather views of the different professional groups and grades within the team. We will recruit from these groups of staff until we have built up a clear and accurate picture of the local reablement context.

We will also conduct interviews (with service users' permission) with reablement practitioners supporting the service users recruited to the process evaluation. These interviews will be completed after the service user interview and will establish practitioner perspectives on individual-level barriers and facilitators to goal achievement.

Service users

We aim to recruit 10-12 service users per model. We will identify service users from the outcomes evaluation sample when they are discharged from the reablement service. Half of the service user sample will be 'return home' clients and the other half will be 'remain at home' clients. Within these two groups we will purposively sample to include, for example, different levels of goal achievement and personal and socio-demographic factors that might affect goal achievement (based on evidence from staff interviews and preliminary analysis of data collected at discharge (i.e. T1 outcomes data)).

Carers

We will undertake interviews with up to ten carers in each case site. We will initially recruit carers of service users taking part in the process evaluation but we are aware that some service users might not have a carer. We will recruit carers of other recipients of reablement services if needed. Carers will be over 18 years of age and able to give informed consent. We will recruit carers supporting service users in the 'return home' (RH) group and in the 'remain at home' (RAH) group.

The interviews

Interviews to understand local structures, systems and practices

Interviews with commissioners and service managers will explore the wider policy and local service structure, reasons for adopting their approach to reablement and barriers and facilitators to reablement generally and for particular groups of people.

The practitioner interviews will aid understanding of how reablement works in practice, how different clients are accommodated in reablement provision, why the reablement service adopts particular approaches to provision and level of service user and carer participation in, for example, their needs assessment and goal setting, and the barriers and facilitators to achieving service-level outcomes. Those working on the front-line are also likely to be able to provide insight into the additional services people undergoing reablement are accessing, and will thus be able to provide important information about the wider service environment.

Interviews to understand service user/carer experience and goal achievement

The interviews with service users and carers will explore experiences of being involved in the delivery and receipt of reablement interventions and perceived barriers and facilitators to achieving service user outcomes, or reablement goals. Interviews with carers will additionally ask about their views on the reablement intervention provided, benefits and limitations of reablement, relationship with the reablement team, level of carer engagement and factors affecting achievement of service user's goals.

Interviews to understand staff perceptions of individual-level factors affecting goal achievement
To provide information about the factors that affect individual service user's ability to achieve their reablement goals, with service users' permission, we will interview their reablement practitioner to ascertain perceived barriers and facilitators to reablement at an individual case level.

Conducting the interviews
The interviews will be conducted at a time and location preferred by the participant and will last between 45 minutes (staff interviews) and an hour (service user and carer interviews). Follow-up (i.e. individual-level goal achievement) interviews with reablement practitioners will last no longer than 30 minutes. All participants will be required to give informed consent prior to participating in an interview. The interviews will be audio-recorded with the participant's permission. A selection will be transcribed to aid initial stages of analysis. For the remainder, detailed interview summaries will be created from the audio-recording.

Analysis of qualitative data

We will analyse data within, and across, participant and reablement service types using the Framework approach (Ritchie and Lewis, 2003) to managing and thematically analysing qualitative data (Miles and Huberman, 1994). The Framework approach facilitates systematic data management and allows audit trails of the data management process. Qualitative data are managed in a theme-by-case matrix, known as an 'analytical framework'. There are four stages of data management. First, researchers familiarise themselves with the data, and identify themes and key issues. Based on the identified themes and any other *a priori* issues, an index of themes is constructed, resulting in the analytical framework. Visually, this looks like a matrix or chart, with cases as rows and themes as columns. Data are then indexed according to which theme(s) in the framework they relate to. Finally, the indexed data from each case (e.g. participant, focus group) are summarised onto the chart under the relevant theme(s) (known as 'charting').

Together with the quantitative evaluation and cost-effectiveness analysis (also conducted in Work package 2), this process evaluation, will mean we are able to identify the 'active ingredients' of reablement interventions and the key facilitators and barriers to short-term and longer-term achievement of outcomes.

WP2c: The Economic Evaluation

Economic evaluation offers an explicit and transparent framework to quantify and compare costs and outcomes of comparable interventions. This framework is typically applied to examine the cost-effectiveness of healthcare interventions and to improve outcomes for people using the NHS and other public health and social care services.

Reablement services compete with other public and private sector services for constrained health and social care budgets in a context of growing demand. Services face the challenge of demonstrating how they improve outcomes and provide good value for money for the public purse. On the other hand, commissioners face the challenge of interpreting services' claims, and make difficult decisions on which services should be prioritised for funding and what models of care represent best value for money. Our economic evaluation will help inform services and commissioners on the value for money of different reablement service types, to maximise use of available resources given a fixed budget. This component will also generate a set of economic tools that commissioners and services can call on to help inform service delivery, prioritisation and budget allocation.

Aims and objectives

The *economic evaluation* component of the *quantitative analysis* will compare the costs and consequences of different generic reablement service types in comparable populations. Service providers and commissioners may ask, what are the costs associated with providing a particular reablement service, what outcomes might be achieved and what is the best value for money service to provide; that is, on the basis of cost-effectiveness grounds, should health and social care resources be spent in this way rather than some other way? Economic evaluation examines these questions.

The economic evaluation will be achieved as follows:

i. Rapid systematic review of the international evidence on published economic evaluations of reablement interventions to examine (a) the cost-effectiveness of different models of reablement, (b) the study design and analytic methods used to evaluate these interventions and (c) to obtain data to inform the decision model.

ii. Cost-effectiveness analysis following the National Institute for Health and Care Excellence (NICE) reference case (NICE, 2013). Individual service user data on resource use falling on the *NHS and personal social services (PSS)* will be collected using the health and social care pathway questionnaire (SCPQ). Resource use will be costed using published unit costs (Curtis, 2012) and NHS reference costs (DH, 2011b). Health-related quality of life (HRQoL) using EQ-5D will be collected to calculate quality-adjusted life years (QALYs) over the follow-up period (T0 to T2).

iii. Cost-consequence analysis taking a *societal perspective* using individual service user data on resource use for all relevant statutory and non-statutory, including private sector, resource use collected using the SCQP and social care QALY outcomes using Adult Social Care Outcomes toolkit (ASCOT) over the follow-up period (T0 to T2).

iv. Decision analytic model to extrapolate the costs falling on the NHS and PSS and QALYs to a *lifetime horizon* using the individual data collected directly from service users as well as relevant external evidence obtained from the systematic review (noted above), other relevant published literature and national administrative databases, and informed by the structured interviews with staff, service users and carers and shaped by discussions with all research partners.

v. The creation of ‘Costing Vignettes’ to convey the care pathway followed by standard and complex reablement cases, informed by interviews with staff, service users and carers as well as by the cost-effectiveness and cost-consequence analyses.

The rapid systematic review

A rapid systematic review of the international evidence on the cost-effectiveness of models of reablement will be undertaken. The following bibliographic databases will be searched; ASSIA, ECONLIT, HMIC, MEDLINE, NHS EED, HEED, Social Care online, Zetoc. Search terms used will be informed by the national survey (WP1). Literature on reablement service types published since 1995 will be identified as these are comparable to the current reablement service types (Parker *et al*., 1999).

The searches will not be limited by country. Only texts written in the English language will be reviewed. Titles retrieved by the searches will be stored in Endnote XP and reviewed independently by two researchers (RF and HW). Any disagreements will be resolved by consensus. Broad inclusion criteria will be applied to include economic evaluations conducted alongside trials, modelling studies and analyses of administrative databases. Only full economic evaluations that compare two or more options and consider both costs and consequences will be included in the systematic review of economic evaluations of models of reablement. To explore the study design and analytic methods used to evaluate these interventions, the quality of relevant studies will be assessed according to a checklist updated from that developed by Drummond *et al*. (2005). This checklist will reflect the criteria for economic evaluation detailed in the methodological guidance developed by NICE to inform decisions on the cost-effectiveness of technologies for the NHS. In addition, the studies will be evaluated in terms of their relevance to the decision problem (i.e. what is the most cost-effective reablement service type) and UK context.

A data extraction form will be developed to systematically extract data on the comparators, study population, main analytic approaches, outcome measures, costs, estimates of incremental cost-effectiveness and approaches to quantifying decision uncertainty. Findings from these reviews will inform the analysts’ development of the decision model and, where relevant, data will be obtained from this literature as an input into the model.

The cost-effectiveness analysis

The *base case economic evaluation* will follow the NICE reference case described in NICE’s Guide to the Methods of Technology Appraisal (NICE, 2013), incorporating NHS and PSS resource use costs and Health-Related Quality of Life (HRQoL) using Quality-Adjusted Life Years (QALYs). To undertake the cost analysis component, relevant NHS and PSS resource use items will be identified, measured and valued; i.e. resource use will be quantified and multiplied by relevant, nationally applicable unit costs.

Resource use data will be obtained at T0, T1 and T2 using the Services and Care Pathway Questionnaire (SCPQ). The unit cost of each reablement service type will be based on provider charges, that is charges to the NHS and/or local authority for providing the service to each patient. (Data on provider charges will be collected in WP1 and the process evaluation element of WP2.). The provider charge reflects the costs to the payer of the reablement service and given this information is being collected nationally based on WP1, will facilitate benchmarking of costs across different models of care that we are comparing.

In addition to reablement service costs we will cost other NHS and PSS resource use relevant to reablement, for example GP consultations, hospital admissions, social/community care services. These costs will be calculated as an average cost of reablement per episode of reablement. We will explore where, and the extent to which, these costs fall on the reablement service in comparison to other relevant services or sectors. Where available, national unit costs will be used to aid generalisability of findings for example, using PSSRU's unit costs of health and social care (Curtis, 2012).

QALYs will be used to value health outcomes. The EQ-5D-5L health status descriptor will be used to measure the health status of study participants at T0, T1 and T2. It will be scored to reflect the values of the UK population (Dolan *et al.,* 1996). QALYs will be calculated by quality-adjusting the survival over the duration of follow-up with the EQ-5D-5L scores at each time point using the area under the curve method (Matthews *et al*., 1990). Differences in EQ-5D-5L QALYs will be adjusted by baseline utility scores (Manca *et al*., 2005).

Standard economic evaluation decision rules will be followed to combine costs falling on the NHS and PSS budget and QALYs and to compare across reablement service types (Drummond *et al*., 2005). Incremental cost-effectiveness ratios (ICER) will be calculated as well as net monetary benefits using values placed on a QALY gained of £20,000 and £30,000. These cost-effectiveness thresholds are those conventionally used for decisions regarding the value for money of technologies for the NHS (NICE, 2013). Uncertainty around the estimates of costs and QALYs will be expressed in terms of the probability that each model is cost-effective as well as with conventional statistical measures (standard deviation, standard error, 95% confidence intervals). The robustness of findings will be tested using sensitivity analysis, including testing the impact of making different assumptions on how costs change over time, for example to test the impact of last month's costs being lower or greater than other months' costs. Costs over the month prior to referral to the service will be used to adjust the difference in total costs between the two models.

Managing selection bias and confounding

Non-experimental studies are particularly prone to selection bias and confounding which could bias the estimates of costs and outcomes. Selection bias can occur because the service type may be tailored to the particular area and context in which it is delivered. Confounding can occur if there are unobserved characteristics that have an influence on costs and outcomes and their distribution is different by reablement service type.

These biases will be minimised using two strategies. First, the comparison will use service types enrolling patients with similar characteristics (socio-demographics and co-morbidities). Second, econometric techniques will be applied to overcome any remaining imbalances in observed patients' characteristics. A number of techniques will be explored for their relative performance in dealing with observed imbalances between patient groups, such as multivariate regression, matching on individual covariates and propensity score matching (Rosenbaum and Rubin, 1983). Multivariate regression aims to control for the effect of other (observed) characteristics on the costs and QALYs. Propensity score matching aims to create a sample of cases and controls with similar (observed) characteristics. The analysis will follow the quality criteria proposed by Kreif *et al*. (2012) in the cost-effectiveness of observational data. We acknowledge that regression and matching methods assume that biases are related to observed characteristics, which may not be the case. Although this assumption cannot be tested, the economic evaluators will work with the team conducting the effectiveness evaluation, in particular its qualitative component, to assess the plausibility of the assumptions made.

The cost-consequence analysis

The cost-consequence analysis will inform how each reablement service type performs in terms of the reablement service type itself and associated costs falling on all statutory and non-statutory sectors, including the NHS, social care, voluntary and private sectors and out of pocket costs, and a small number of relevant key outcomes including in social care QALYs using the ASCOT SCT-4. As per the cost-effectiveness analysis, data on individual patient resource use and outcomes will be obtained from the Services and Care Pathway Questionnaire (SCPQ) administered at T0, T1 and T2. Informal care will be costed using the opportunity cost method (van den Berg, 2006). Resource use will be costed using published, national average unit costs where possible to aid generalisability of results. Social care QALYs will be measured using the ASCOT instrument and valued to calculate social care-related utility scores using the UK population tariff (Netten *et al*., 2011). These scores will be used to quality-adjust survival over the follow-up period, in the same way as the calculation of EQ-5D-5L QALYs described above.

The cost-consequence analysis will be used to inform the interpretation of, or offer an explanation for, the economic evaluation results.

Decision modelling

The decision model will extrapolate costs and health outcomes beyond the six month time horizon of the study to a lifetime horizon using life tables for England (http://www.gad.gov.uk). Decision modelling offers an explicit mathematical framework to represent decision problems and to incorporate the evidence from a variety of sources, including the primary data collected as part of this study, as well as secondary sources such as the published literature and administrative databases to estimate costs and outcomes (Briggs *et al*., 2006).

The decision model would be used to simulate the costs and outcomes of a hypothetical group of individuals for each reablement service type over their lifetime. The aim is to represent the patient pathway; however this will be constrained by the availability of data to populate the model. At a minimum, the model would include a ‘reablement’ state, a ‘hospitalisation’ state, a ‘home’ state, and a ‘death’ state. Transition probabilities between states will be informed from the individual patient data collected during our study and complemented with relevant external evidence. The cost of the reablement state will correspond to the average cost per patient in each reablement service. The cost of hospitalisation and the cost of the home state will be informed by the cost-effectiveness and cost-consequence analyses (above). HRQoL decrements (or increments, as relevant) associated with the reablement state will correspond to the change in HRQoL observed between T0 and T1. The HRQoL decrement associated with hospitalisation will be obtained from the published cost-effectiveness literature. Other health states, if included, will have a cost and a HRQoL decrement associated with them. The model follows the hypothetical cohort of patients as they transition between states until death. The model will be probabilistic in that input parameters are entered as probability distributions and Monte Carlo simulation is used to propagate the uncertainty over 10,000 simulations. The probabilistic results are translated into cost-effectiveness acceptability curves and probabilities that each model is cost-effective under conventional thresholds used by NICE of £20,000 and £30,000 per QALY gained (Raftery, 2001).

The creation of ‘Costing Vignettes’

‘Costing vignettes’ will be developed which describe and quantify the care pathway. They offer an additional, and accessible, way to present the economic data providing a snapshot of the services and resources required to provide reablement and to facilitate the move from illness and/or impaired independence to reintegration back into a valued lifestyle. Besides reflecting the sequence of services utilised along the care pathway following reablement, the vignettes will report on the context in which the care is provided including any use of informal care, who provides the services and who pays for them, where available. Similar to the vignettes of community care packages reported in the PSSRU unit cost book (Curtis, 2012), care pathways for a typical case and a complex case will be reported, thereby illustrating the considerable variation that exists in the circumstances of the patients using reablement.

Vignettes will be selected from the cohort of reablement care patients who were tracked for the duration of the study (T0-T2). The entire research team, and drawing on findings emerging from other elements of the project, will be involved in decisions regarding the choice of vignettes. In selecting the vignettes, the aim will be to reflect some of the diversity in the kinds of services and type of support offered alongside reablement care and to estimate associated costs.

WORK PACKAGE 3 (WP3): SPECIALIST PRACTICE AND SERVICE MODELS

Based on existing evidence, we anticipate WP1 will find the predominant user group of ‘generic’ reablement services are older people with relatively low levels of other needs. People with complex needs (e.g. dementia; sight loss, learning disabilities) or atypical populations (e.g. younger adults wishing to live independently for the first time; adults with head or spinal injuries) may be ineligible for support from a generic reablement service, or may not experience the same level of benefit as ‘typical’ users and may therefore leave the service with the same level of care needs as on entry to the service (Glendinning *et al*., 2010).

Evidence suggests that the number and proportion of people with specialist needs is growing fast. For example, the number of people living with dementia in the UK is expected to double in the next 30 years while the overall costs of dementia in the UK are estimated to triple from £17 billion per year to over £50 billion (Knapp et al., 2007). By 2050, the number of blind and partially sighted people in the UK is estimated to increase by around 122 per cent from 2008 estimates, to approximately 3.99 million (Access Economics, 2009). The numbers of younger, disabled adults are also predicted to rise, as medical advances mean many people with disabilities are living longer (Fraser et al., 2012; Norman & Fraser, 2014). The rapid rise in the number and proportion of people with specialist needs suggests that responding to such needs will become an ever-growing pressure on health and social care services. It is, therefore, important that these populations are represented in this project. Considering that reablement is a short and focused intervention, an understanding of what ‘works’ and what does not work with these groups is crucial in ensuring that valuable resources are not wasted.

Aims and research questions
The aim of this work package is to explore the organisation and delivery of reablement support for people with specialist needs. This includes ‘adapted or extended practice’ within generic reablement services and specialist reablement services. It will build on, and develop, the high level descriptive information collected during WP1. It will also utilise data collected/findings from the process evaluation (professional interviews, WP2) in order to explore differences in service models, practice and workforce characteristics between generic and specialist reablement provision.

A qualitative research design involving semi-structured interviews with professionals in a series of ‘exemplar’ services will be used to gather data to address the following research questions:

- How are generic reablement services adapting their service model or practice to accommodate the needs of ‘specialist’ groups? What is the rationale for these adjustments?
- What has been their learning as they have developed this provision?
- What are the barriers to the delivery of reablement and achievement of positive outcomes for these groups within the context of generic reablement services?
- How do specialist services approach and deliver reablement? How does it differ from generic provision?
- What are the barriers to the delivery of reablement and achievement of positive outcomes for groups with specialist needs within specialist services? Do these differ from people with low level needs using generic services?
- What do specialist reablement approaches or services cost?
- What specific ingredients of service and support arrangements might best support the quality of life and independence of people with specialist needs?
- What outcomes might be appropriate to assess the success of these services in future evaluation?

Selection of service exemplars
One of the outputs of WP1 will be descriptive report of reablement provision across England, including specialist practice within generic teams or specialist/population specific teams. Scrutiny of WP1 data will inform the specifics of our sampling frame. It is therefore, not clear at this stage what type of speciality groups we will focus on or whether we will focus on more than one type of speciality. Our decision about which specialist services to investigate will be informed by our project advisory group, comprising reablement service managers and commissioners, and their guidance about the most pressing concerns related to particular ‘specialist’ populations. However, drawing on the issues and questions set out in the commissioning brief, these might include specialist reablement provision for older people with dementia, young adults with complex needs recently transferred from children’s services, and users with learning disabilities. A focus on these types of provision would allow us to look at reablement across the lifecourse and with respect to populations where the reablement is particularly challenging (e.g. cognitive impairments). In addition, the exemplars will represent ‘adapted generic practice’ *and* specialist teams. We will also aim to represent different approaches for the same population and a range of approaches to integration between health and social care. We anticipate investigating around ten specialist rehabilitation exemplars. The research sites selected for this WP will not be participating in WP2. All research sites will be offered the option of anonymous involvement.

Sampling and recruitment
In each case study site, data will be collected from one service manager and two front line staff. Once we have identified the service manager in each of the ten exemplars. Each service manager will be sent an invitation pack, explaining the research, what taking part will involve and a consent form which they will be asked to complete and send back to the research team if they agree to participate in the research. Each manager will also be asked to identify several front-line staff with different grades/experiences. From this sample, we will recruit two front-line reablement practitioners per site (20 across the sites). The procedure to recruit front-line staff will be the same as that used to recruit service managers.

Data collection
All interviews will be semi-structured and will be conducted over the telephone. These interviews will use similar interview schedules to those used in the process evaluation of generic reablement services in WP2. This will allow us to conduct comparative analyses across the two datasets.

In addition, the interviews with service managers and front-line staff in this WP will explore:

- team characteristics/skill mix for addressing specialist needs;
- specialist/additional training;
- adjustments to usual practice/practice developments made in response to specific population;
- the kind of advice and support that help service users the most;
- the type of evidence collected/used to measure impact of service intervention; and
- views on the factors perceived to promote or constrain the benefits of the service intervention for particular groups of people.

Conducting the interviews

Telephone interviews will be conducted at a time preferred by the participant and will last about one hour. All participants will be required to give informed consent prior to participating. The interviews will be audio-recorded with the participant's permission and fully transcribed.

Data analysis

As with WP2b, analysis of the data will be thematic, informed by the research questions (Miles and Huberman, 1994), and use the Framework approach. Data analysis will be supported by NVivo software. For further detail on the analysis process see WP2.

WP3 will provide an initial evidence base for how specialist reablement services and specialist approaches/practice within generic services are organised and delivered to groups with complex, or specialist needs. It will identify the features of the organisation and delivery of the intervention that are likely to optimise self-care and independence. WP3 also assess the feasibility of a full evaluation in the future to determine the cost-effectiveness of reablement support for groups with specialist needs. The policy interest in this area and high level of appetite for information on what 'works' and what does not with groups with specialist needs (whether they be specialist teams or generic teams), suggest that there would be considerable value to be gained from this work.

PATIENT AND PUBLIC INVOLVEMENT

In preparing this proposal, we have worked with members of SPRU's well-established consultation group of Adults, Older People and Carers and, through existing links and networks, consulted with representatives of voluntary sector organisations and reablement practitioners. We sought their opinions of our research ideas and plans, including any revisions to the aims and design set out in our outline application. Our consultation work confirms that self-care and reablement is a high priority for health and social care.

Key issues and/or aspects requiring further work in developing this full application highlighted by this consultation process were: clarify what 'reablement' means in the context of this research; track use of health/community/social services and not just hospital services; test for differences in the approach/ethos of in-house teams and contracted out services; ensure it is possible to compare between NHS and Social Services providers; explore manager's ethos/philosophy and its impact on delivery/practice; explore how multiple impairments are addressed by reablement services. We have taken these comments and suggestions into account when revising the proposal.

A Project Advisory Group (PAG) will be formed with membership including representatives of voluntary sector organisations and service users. The PAG will advise on recruitment, research materials and methods to ensure that they are relevant/appropriate for participants. They will also contribute to the interpretation of data and be involved in developing dissemination materials. We have commitments from the Neurological Alliance, Age UK and managers of in-house and out-sourced reablement services to assist us with identifying reablement service users to join the group. Representatives from these organisations/services will also become members of the PAG.