A study to understand and optimise community hospital care in the NHS

RESEARCH PLAN

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SUMMARY
Considerable information describing the contemporary community hospital is available from two NHS Benchmarking Network national surveys (180 community hospitals). Two findings are prominent. Firstly, the core function of the contemporary community hospital is in-patient care of older people. Secondly, large differences are observed in key measures such as bed provision per weighted population, clinical leadership, waiting times, length of stay, cost per admission and cost per day. We propose to investigate the effects of these issues on the performance of community hospital ward care by using the existing data sets in combination with a series of linked, in-depth studies so that the optimum configuration for a community hospital ward can be understood. Performance will be quantified by modelling cost-efficiency. The model functions of interest include provider and ward organisation features; clinical and service level outcomes; patient experience; types of patient care; and costs. Our focus will be on analysing and describing community hospital ward care as applied to older people, that is, slow, medium and high intensity rehabilitation, and end of life care. The National Audit of Intermediate Care Round 2 (collected Spring 2013) has been modified to support this work. The data sets will also include alternatives to community hospital ward care, namely: care home-based rehabilitation; home-based rehabilitation; and social service enablement services. We therefore have the opportunity to conduct large scale between-service comparisons and to assess the whole system impact of community based rehabilitation services for older people on secondary care provision.

Our study objectives are:
1. To measure the current relative performance of community hospital in-patient care for older people (what does current community hospital practice look like? – Study 1 and 2).
2. To identify the characteristics of community hospital in-patient care for older people that optimises performance (what does 'best' look like? – Study 1 and Study 3).
3. To investigate the current impact of community hospital in-patient care for older people on secondary care and the potential impact if the community hospital care was optimised to best practice nationally (What might the effects of "best" look like? Study 1).
4. To determine if there is an association between the configuration (capacity and proportions) of short-term, community-based services (i.e. community hospital wards, home-based rehabilitation, care home rehabilitation and enabling services) and reduction in secondary care bed utilisation by older people. (Is there an optimum whole system configuration, and what are the tolerances? Study 1).
5. To develop web-based interactive toolkits for use by local commissioners and community hospital teams that support operational changes to optimise performance (Study 4).

These objectives will be realised through four inter-linked studies:
Study 1: Cost efficiency modelling (heath economics study)
Study 2: National community hospital survey (co-produced with the Community Hospitals Association
Study 3: In-depth case studies (quantitative and qualitative study)
Study 4: Quality improvement toolkit development.

The co-applicants comprise a team of health economists and an efficiency analysis expert led by Claire Hulme; The Patients Association (led by Heather Eardley); the Community Hospitals Association (led by Helen Tucker); a social scientist with experience in older people's services (Mary Godfrey) and academic clinicians with experience in community

hospital care (John Young; John Gladman; Elizabeth Teale; Pam Enderby

BACKGROUND AND RATIONALE

Community hospitals have a long history and have evolved and adapted during recent decades. They provide a wide range of locality-based out-patient, health promotion, rehabilitation, day hospital and diagnostic services with particular configurations differing between community hospitals as a result of local history and perceived need. The policy direction for community hospitals was contained within the White Paper: *Our health, our care, our say: a new direction for community services* (DoH 2006). It was expected that Primary Care Trusts would engage in an "ambitious" shift of resources from secondary care to community services over a ten year period. A new generation of community hospitals was proposed as an important component of the vision for community services within the umbrella term intermediate care. The new format for the community hospital was that of: locally-led; high quality; focus on older people; new care pathways; adopt new technologies; minimise acute hospital admissions; promote integrated solutions; be affordable for the whole health economy (1).

There is high quality evidence that supports the community hospital as an effective bedbased rehabilitation service for older people. A multicentre study in England randomised patients (n=490) either to remain in a general hospital ward or to transfer to one of seven community hospitals (2). The main finding was a significantly greater functional independence at six months for the patients allocated to the community hospital group (2), with similar cost effectiveness (3). A similar single centre RCT in Norway (n=142) reported lower mortality and indirect evidence for increased independence for the community hospital group compared to the group receiving continued care in a general hospital (4). There is also evidence that older people are able to favourably distinguish and prioritise community hospital ward care (5-7).

This evidence suggesting superior outcomes for older people receiving rehabilitation in a community hospital, at an affordable cost, is encouraging, particularly in the context of nearly 300 community hospital identified in the Community Hospitals Association mapping study. Thus, community hospitals remain an important provision for health care in the NHS. Considerable additional information describing the contemporary community hospital is available from two other national surveys from the NHS Benchmarking Network: the NHSBN Community Hospitals Project; and the National Audit of Intermediate Care (8). These complementary surveys provide information on 180 community hospitals (approximately twothirds of all community hospitals). Two findings are prominent. Firstly, it is clear that a core function of the contemporary community hospital is rehabilitation for older people: 'general rehabilitation' provided in 97% of the community hospitals". This is in accord with strong policy directives from the Department of Health relating to intermediate care services for older people (9,10). Secondly, that the contemporary community hospital is characterised by extreme variability, e.g. bed provision per 100,000 weighted population (range <10-70); clinical leadership (50% nurse led; 50% consultant led); average length of stay (11-58 days); cost per admission (£3,700-£17,500); cost per day (£140-£450).

This variation in the community hospital was highlighted by the NHS Institute for Innovation and Improvement but, despite provider engagement with their Productive Community Hospital initiative, the wide variations have continued. There is evidence that some features might be associated with negative performance. For example, the type of ward leadership (11), waiting times (12) and under provision of Comprehensive Geriatric Assessment (13). However, our knowledge of the features that characterise optimum community hospital ward performance is incomplete as no large scale study has been designed to systematically investigate the issue. Additionally, there is a paucity of information available to service planners about the comparative outcomes and efficiencies of community hospitals in relation to alternative forms of community rehabilitation services such as care home-based

rehabilitation; home-based rehabilitation; and social service enablement services. Thus, seven years on from "*Our health, our care, our say: a new direction for community services"* the "ambitious" shift of care focus for older people from secondary care to the community has not yet been realised (14).

WHY THE RESEARCH IS NEEDED NOW

The process of rehabilitation lies at the heart of "best practice" for older people (15). Rehabilitation has been defined as "an often complex process which enables individuals after impairment by illness or injury to regain as far as possible control over their own lives" (King's Fund, 1999). Rehabilitation has historically been a function of acute hospital care, particularly in elderly care departments. However, an established pattern of rising emergency admissions for older people, despite a steady reduction in acute hospital beds, has inevitably resulted in shorter lengths of stay, making general hospital rehabilitation especially vulnerable (15). The community hospital is one of several service models with the potential to provide high quality, cost-effective community-based rehabilitation for older people. Yet, there appears to be uncertainty amongst commissioners and planners about the possible contribution of community hospitals. Overall, the number of community hospitals declined slightly between 1998 and 2008 (334 to 296) (CHA survey) but this headline finding disguises a mixed picture of closures offset by newly opened facilities that reflects an inconsistent approach to the provision of community services for older people. The policy direction of increasing community-based service provision for older people is well established. This has been partly driven by the acknowledgement that large general hospitals comprise an environment in which unintended harms are common for this vulnerable patient group, eg risk of falls, delirium, increased dependency.

Despite a decade of consistently applied policy, investment in intermediate care services to provide short-term rehabilitation for older people appears to have stalled. The National Audit of Intermediate Care obtained information from 62 commissioning and 112 provider organisations (327 intermediate care services). An important finding was that intermediate care capacity nationally was around half that required to address anticipated need for inappropriate admissions and post-acute care for older people. There was considerable scope to free up capacity in many services by simply addressing excessive lengths of intermediate care stay. From a whole systems perspective, however, no relationship was found between the scale of local intermediate care provision and it impact on secondary care utilisation. It was concluded that the case for further investment required new local evaluations to provide better evidence that new increases in intermediate care capacity would indeed impact favourably on secondary care utilisation. Until, and unless, this evidence is available, it will be difficult for commissioners to justify pro-active reductions in secondary care bed base. In relation to community hospitals, this means capital investment new community hospitals will continue to be sporadic and opportunistic rather than strategically planned, and that some community hospitals will close because of uncertainty over their whole system contribution.

AIMS AND OBJECTIVES

We aim to use two existing data sets (the NHS Benchmarking Community Hospital Project and the National Audit of Intermediate Care) to describe in detail the current and potential performance of community hospital in-patient care for older people. Performance will be quantified by modelling cost-efficiency. The model functions of interest include provider and ward organisation features; clinical and service level outcomes; patient experience; types of patient care; and costs. Our focus will be on analysing and describing community hospital ward care as applied to older people, that is, slow, medium and high intensity rehabilitation, and end of life care. The National Audit of Intermediate Care Round 2 (collected May 2013) also includes data sets on alternatives to community hospital ward care, namely: care

homebased rehabilitation; home-based rehabilitation; and social service enablement services. We therefore have the opportunity to conduct large scale between-service comparisons and to assess the whole system impact of community based rehabilitation services for older people on secondary care provision. To ensure valid between-service comparisons, we will here restrict our focus to that of slow and medium term rehabilitation, and end of life care (high intensity rehabilitation is not a feature of care home-based rehabilitation; home-based rehabilitation; and social service enablement). We are also working in partnership with the Community Hospitals Association to maximise the response rate to the upcoming round of the NHS Benchmarking Community Hospital Project to conduct a new comprehensive national survey of community hospitals with a focus on performance measurement.

Objectives
1. To measure the current relative performance of community hospital in-patient care for older people (what does current community hospital practice look like? – Study 1 and 2).
2. To identify the characteristics of community hospital in-patient care for older people that optimises performance (what does 'best' look like? – Study 1 and Study 3).
3. To investigate the current impact of community hospital in-patient care for older people on secondary care and the potential impact if the community hospital care was optimised to best practice nationally (What might the effects of "best" look like? Study 1).
4. To determine if there is an association between the configuration (capacity and proportions) of short-term, community-based services (i.e. community hospital wards, home-based rehabilitation, care home rehabilitation and enabling services) and reduction in secondary care bed utilisation by older people. (Is there an optimum whole system configuration, and what are the tolerances? Study 1).
5. To develop web-based interactive toolkits for use by local commissioners and community hospital teams that support operational changes to optimise performance (Study 4).

These objectives will be realised through three inter-linked studies:
Study 1: Cost efficiency modelling (heath economics study)
Study 2: National community hospital survey (co-produced with the Community Hospital Association
Study 3: In depth case studies (quantitative and qualitative study)
Study 4: Development of web-based quality improvement toolkits

RESEARCH METHODS

Description of data sets

The will draw on the following data sets:

1. National Audit of Intermediate Care datasets 2012 and 2013
2. Community Hospitals NHS Benchmarking Network (NHSBN) datasets 2012, 2013 and 2014
3. Hospital Episodes Statistics

A list of the variables collected within the Community Hospitals (NHSBN) 2012 and NAIC 2012 data sets can be found at Appendix 1 and 2. Several meetings between the coapplicants have taken place to understand the data sets, the constituent data items and how they are collected. Some preliminary analyses have been conducted to plan the proposed analyses for this programme of work.

National Audit of Intermediate Care

The audit is a unique partnership project between the British Geriatrics Society, the

Association of Directors of Adult Social Services, AGILE (Chartered Physiotherapists working with older people), the College of Occupational Therapists, the Royal College of Physicians, the Royal College of Nursing, the Royal College of Speech & language Therapists, The Patients Association and NHS Benchmarking. A Steering Group comprising representatives from the partner organisations guide the content and conduct of the audit. Project management, data collection, analysis and event management are provided by the NHS Benchmarking Network. The audit is uniquely funded using a subscription model. The audit includes bed and home based intermediate care services provided by a range of health and social care providers including acute trusts, community service providers, local authorities and independent providers. These services are provided in a range of health and social care settings including service users' own homes, general hospitals, community hospitals, nursing and residential care homes.

Many definitions of intermediate care have been proposed. For the purposes of the audit, the definition of intermediate care provided by the Department of Health (16) is used; "a range of integrated services to promote faster recovery from illness, prevent unnecessary acute hospital admission and premature admission to long-term residential care, support timely discharge from hospital and maximise independent living." A help line is available to audit participants to clarify if their service qualifies.

The audit is structured with organisational and patient level components. The organisational level audit included separate sections for commissioners and providers of intermediate care. Although involvement in the audit was voluntary, there was a high level of engagement in Round 1 with 62 commissioning organisations (Primary Care Trusts, Clinical Commissioning Groups and Local Authorities) and 112 providers participating with data for 327 intermediate care services (167 bed based and 160 home based) and 3,150 patient level audits submitted; 1,585 from bed based and 1,565 from home based services. The Round 1 data set was high quality: 22 of the 30 audit sections had >95% completeness; and all the 10 patient level audit sections had >99% completeness.

Round 2 of the audit is now underway with 92 commissioning organisations (102 CCGs and 22 local authorities) having signed up to participate, giving coverage of half of the NHS (population covered = 28million). Round 2 has been extended to encompass re-ablement services, which are predominantly local authority provided. Data collection takes place between May and July 2013. The audit Steering Group has supported the proposed use of data for research (participants are asked to consent to this) and have modified Round 2 to focus on care quality and outcomes. The previous patient level audit undertaken has therefore been replaced by a staff completed Service User Questionnaire (Appendix 3) and a specifically designed Patient Reported Experience Measure (PREM) (Appendix 4). The Service User Questionnaire has been field tested and includes:

Demographic information: age; gender; pre-admission accommodation; place of referral

Level of Care assessment (17). This practitioner completed assessment places the patient into one of nine categories depending on their service need: no intervention needed; prevention/maintenance programme; convalescence; slow stream rehabilitation; regular rehabilitation; intensive rehabilitation; specific treatment for an individual condition (eg wound care); medical care and rehabilitation; rehabilitation for a complex disabling condition; palliative care. Each category has a clear definition for accurate completion. The assessment is completed on arrival and at discharge from the service.

Clinical outcome: assessed by change in the modified Barthel index score (18) between admission to the service and discharge. The modified Barthel index includes ten items of daily living activities and the summary score describes the dependency of the patient.

Service outcome: assessed by recording the place of residence at discharge and whether that is consistent with improved/maintained function (return to pre-admission accommodation), or deterioration in function (new care home or change from care home to nursing home).

Patient Reported Experience Measure (PREM):
The development of a specific intermediate care PREM was conducted using a Delphi survey and consisted of three stages. In the first stage the Picker Community Hospitals questionnaire was used to generate a list of 41 questions which were circulated to the National Audit of Intermediate Care Reference Group (intermediate care practitioners) and Steering Groups (multi-professional membership), and a member of the Picker Institute. This combined panel were asked to comment on the appropriateness of the questions for home and bed-based intermediate care and suggest additions if considered necessary. The initial aim had been to produce one generic questionnaire for both bed-based and home based intermediate care. However, from the first round responses it became clear that some questions would need to be customised to suit the two service types and therefore two slightly differently worded PREMs would be required. In the second round the combined panel were sent revised lists of questions and asked to select the 20 they thought were most important to ask for each PREM. From this a revised consensus list of 15 questions were selected for each of the questionnaires and sent to The Patients Association for comments and feedback which were incorporated into the final versions of the PREMs. Field testing took place in three sites and the Steering Group formally agreed the adoption for Round 2 of the audit.

Audit collection process
The service user questionnaire is completed prospectively by clinicians for 50 consecutive users in all bed based intermediate care services taking part (in 2012, 38% of these services were located in community hospitals, 26% in residential care homes and 16% in nursing homes). The 50 consecutive service users is estimated to comprise a 10% sample of each bed-based service. The prospective design of the audit (most national audits are based on retrospective case note reviews) allows data to be collected at two time points (admission and service discharge) and limits reporting bias due to ill patients being transferred to acute services and therefore not captured in the audit process. The service users in the sample are also given the intermediate care PREM to complete and return by post.
A full audit of the home based intermediate care services (home rehabilitation and enabling services) was not possible due to cost constraints. Nevertheless, a full organisational level audit (that includes capacity, lengths of stay, costs, staffing etc), service outcomes and PREMs will be collected.

Community Hospitals NHS Benchmarking Network (NHSBN) datasets
The NHS Benchmarking Network is the in-house benchmarking service of the NHS. The Network has 270 members including CCGs, acute and mental health trusts and community providers and runs a range of benchmarking projects across all sectors of NHS provision. Members submit locally collected data to participate in the projects. Participation is not compulsory and incomplete data submissions are accepted.

The NHSBN Community Hospital Programme was instigated at the request of the Network members to provide a structured comparison using key metrics that include workforce; activity; investment levels; and quality measures. Estimates of the impact of community hospitals on secondary care are also provided. The current version of the Community Hospitals Project contains data from 131 community hospitals for 2010/11 and 90 hospitals for 2011/12.

Hospital Episodes Statistics (HES)
HES data will be requested from The NHS Information Centre for Health and Social care.

Data will be requested by PCT/CCG of responsibility for 2010/11, 2011/12 and 2012/13. Metrics requested will include emergency admissions, occupied bed days and length of stay. Each metric will be analysed by age band; 0-14,15-64, 65-74, 75-84, 85-90 and 90+.

Study 1 Health economics analyses (Objectives 1; 2;3; and 4)

Objective 1 (what does current community hospital practice look like?)
Previous economic evidence on community hospitals derives from a cost-effectiveness analysis embedded within a multi-centre randomised control trial (3). This trial investigated post-acute care for older patients who were either transferred to a community hospital or remained in the general hospital for rehabilitation. Cost-effectiveness results are presented in the form of a ratio showing the pounds spent per additional health gain associated with community hospital care compared to standard practice. Thus, a cost-effectiveness analysis is used to inform decisions on allocation of resources.

The efficiency analysis we will adopt in this study is different in as far as it provides a framework to assess to extent to which resources that have already been allocated to health services are optimally deployed. A service or process is said to be productively efficient if it produces a given output at the least possible cost (19). The aim of this analysis is to identify the performance range for community hospital wards and to explain variations in costs for rehabilitation of older people. In broad terms, the inputs required for the efficiency analysis include cost, output, and quality data, and the outputs are community hospital-specific efficiency scores; an assessment of the scope for efficiency gains across the sector; and information for how costs vary with important variables such as scale and quality.

We will adopt a number of efficiency analysis methods, starting with simple indicators (e.g. cost per admission) and then moving to widely accepted, but more sophisticated, statistical methods for efficiency measurement. Simple indicators of performance for intermediate care services have been produced by NHS Benchmarking using the Community Hospital Project (CHP) data set that includes measures such as costs, outputs, quality and other variables that characterise variation in community hospital activity and performance. The CHP contains data from 131 community hospitals for 2010/11 and 90 hospitals for 2011/12. Working in partnership with NHS Benchmarking team, and the Community Hospitals Association, we are able to extend the dataset to include more hospitals; tightening definitions of variables; accessing data on new variables relevant for our study and to produce newer and more informative simple indicators. The main advantage of these simple indicators is their ease of interpretation. On the other hand, disadvantages include lack of information on differences in skill mix, failure to take account of quality variation and other key differences between community hospital wards. Thus, simple indicators alone may be insufficient to explain the reasons for variation in performance of community hospitals wards. The simple indicators also lack a broader view of the contribution of community hospitals both within other intermediate care services and its impact on secondary care, ie a whole systems perspective. There may be limitations in looking at these indicators in isolation,

Thus, we will investigate the variation in efficiency across community hospitals wards using a range of well-established but more analytically complex methods including standard ordinary least squares (OLS) regression analysis, Stochastic Frontier Analysis (SFA) and Data Envelopment Analysis (DEA). Standard (OLS) regression models enable relationships between (in this case) costs and cost drivers to be estimated, thus revealing the extent to which changing cost drivers will impact on cost. SFA is a similar approach that likewise investigates relationships between costs and the cost drivers. However, in this model, the estimated relationship is interpreted as an efficiency frontier, and community hospital ward inefficiency is measured against that frontier. SFA is widely used in the academic literature (20) and is also used by some economic regulators in the UK and internationally (21). DEA is a method which uses mathematical-programming techniques to produce an efficiency

score for each unit analysed (22). These techniques have been extensively applied to the health sector in general and to the hospital sector in particular (23).

It should also be noted that the standard OLS approach can be extended in a simple way to enable efficiency differences between providers to be compared (the corrected ordinary least squares (COLS) method). This method is widely used by economic regulators in the regulated industries (for example, water, energy and rail); see for example, Smith and Wheat (24), Coelli et al. (20) and Greene (25) in situations where the data does not support the estimation of a stochastic frontier model.

As noted, the standard regression approach will give us information on how costs vary with key factors such as number of admissions and number of beds (which is not possible by using simple indicator measures). The stochastic frontier method (or the simpler, COLS alternative) adds to this by producing an efficiency score for each community hospital, having taken account of as much information as possible as to why costs might vary between hospitals and additionally taking account of random factors that may affect costs in a given year. The DEA method will be used as a cross-check for the ranking of the efficiency scores. The final product of SFA and DEA is a ranking of all community hospitals in terms of efficiency that will allow each hospital to identify the best practice peers and areas for improvement. The health economic research team has extensive experience of applying these methods in both health care and a range of other industries.

The key factors that could influence costs for in-patient care of older people in community hospital wards (expressed in terms of cost per bed and/or cost per service user) in these models include:

- the scale of operation (as measured by, for example, number of admissions, number of beds and throughput/length of stay);
- variations in the price of inputs (for example, the London weighting on staff costs, and also variations in unit salary costs caused by differences in staff mix);
- variations in quality (as measured by, for example, use of Comprehensive Geriatric Assessment (13); falls rates, PREM results and waiting times);
- other sources of heterogeneity (for example, type of ward leadership (11); Level of Care (17); medical cover and funding arrangements).

Our statistical models will firstly identify the best performers and, secondly, the gap between best practice and less well performing community hospitals wards. The models will also provide important and useful information on how costs vary for example across the cost drivers in the bullet point list above. Additionally, we will, in conjunction with Study 2, have an estimate of the scale of quality improvement required across the sector. With permission, this list will be used to inform the candidate hospitals for the in-depth case study (Study 3) to understand in more detail the reasons underpinning performance and the care processes that need to be in place to support best performance.

Objective 2 (what does ‘best’ look like?)
As noted above, in addition to providing relative efficiency information for community hospital wards, the proposed statistical methods produce information on how costs vary with respect to the factors included in the model. So, for example, are bigger hospitals cheaper (per bed)? What is the marginal cost of improving quality?

The analysis described for Objective 1 therefore asks, after taking account of differences between hospitals as captured by the range of cost drivers, which hospitals perform best and what is the gap between the higher performing community hospital wards and the others?

Thus, what does “best” look like - is defined by describing the features of those hospitals that have the highest relative efficiency.

The analysis for Objective 2 extends our understanding further. Certain features of a community hospital ward are likely to reduce costs. For example, it is possible that fewer, larger CHs will substantially reduce costs without serious implications for patient care. Or, it may be that there are certain attractive features of community hospital wards such as higher quality of care and we want to know how much that costs. It is also possible to consider the impact of external organisational factors for example the role of the Clinical Commissioning Group: certain CCGs might be achieving a better (average) performance for their community hospital wards. Andrew Smith, a Co-I for this proposal, has developed specific methods for measuring “tiered” levels of inefficiency within systems, where inefficiency may reside at different levels (CCGs or at the CHs themselves) (24). Finally, we will seek to utilise methods that take into account the impact of unobserved characteristics that vary between community hospitals. There are established methods in the literature that enable such analysis (20; 26), utilised also by Gannon (27) a Co-I in this application, and Farsi et al. (28). We expect to have a data panel of three years which should support these methods, the application of which will add to our knowledge that any cost gaps that we identify represent genuine efficiency differences, as opposed to some other differences between the hospitals that we have failed to identify in our model.

Objective 3 (What might the effects of “best” look like?)
The NHS Benchmarking team, as part of the Community Hospitals Benchmarking Project, investigated the relationship between community hospital capacity (as measured by bed days utilised in CHs) and secondary care utilisation (as measured by acute non-elective bed days) in a PCT area. The relationship between acute non-elective length of stay and CH bed days was also reviewed. In both cases, no relationship was evident from an analysis of these simple indicators. It was concluded that the secondary care data was probably too wide (since it included all non-elective admissions) and needed to be limited to the cohort likely to use community hospitals, namely older people.

For the National Audit of Intermediate Care, the approach was refined by using an age defined breakdown of the secondary care measures obtained from the NHS Information Centre (HES data). This enabled a series of more finely targeted possible relationships to be considered such as:

- Intermediate Care beds commissioned per 100,000 population versus emergency admissions of people aged 75-84 per 100,000 population
- Referrals to home based intermediate care services per 100,000 population versus emergency admissions of people aged 65+ per 100,000 population
- Number of patients accepted into both bed and home based intermediate care per 100,000 population versus acute non-elective length of stay for people aged 65+ per 100,000 population.

These simple indicators again yielded no obvious relationships and it was concluded that a more sophisticated approach was required.

Thus, for Objective 3, a multiple regression analysis will be used to investigate the relationship between secondary care utilisation, identified in the HES data, and relevant variables characterising the quantum and nature of CH care in the CCG area. We use the standard regression approach rather than frontier-based approaches as the focus is on how the explanatory variables impact on the dependent variable, secondary care utilisation, rather than on the efficiency of certain providers. For example, the diverse nature of care can be captured by information such as re-ablement services (available from the NAIC 2013 data). The quantum of the CH provision will be captured by data, e.g. the number of beds for

the rehabilitation of older people. We will also focus on the quality of care in CHs or information that captures the extent to which the CHs in the area were identified as high performers in the earlier analysis. The dependent variable in this model (the variable we are seeking to explain) is therefore secondary care utilisation of older people (sourced from HES). The CH-related variables that we will use as determining factors are, for example, the number of CH beds available; the number of referrals and admissions to CH beds. These data will be sourced from the CHP data sets.

Objective 4 (Is there an optimum whole system configuration, and what are the tolerances?) We will adopt a whole system perspective in order to determine if there is an association between the configuration of community-based rehabilitation services and secondary care utilisation by older people. This analysis will use the Intermediate Care Audit data and we will estimate a standard regression model for estimating the relationship between secondary care utilisation and key variables capturing the configuration of community based rehabilitation services. The dependent variable in this model (the variable we are seeking to explain) is therefore secondary care utilisation of older people (sourced from HES). The variables that we will use as determining factors relate to the configuration of community based rehabilitation services, for example, the capacity and configurations of different forms of services (community hospitals, home-based rehabilitation, care home rehabilitation, enablement services). These data will be sourced from the Intermediate Care Audit data set. The way in which community based rehabilitation services interact with each other, and with the wider secondary care system, is complex and a key part of the project will be to determine how to capture this complexity into a set of measures for inclusion in the model.

Study 2 National survey of community hospitals (Objective 1: what does current community hospital practice look like?))

The intent of the national survey is to utilise the forthcoming round of the NHS Benchmarking Community Hospital Project but with a specific focus on the in-patient rehabilitation and care of older people and to provide the opportunity to include more detailed cost data, and ensure the variables most strongly associated with efficiency are collected reliably. The survey will allow inferences to be drawn about the scale of the work to optimise community hospital ward care nationally, ie small incremental changes or new central policy initiatives. The information will also be important to Clinical Commissioning Groups to plan strategic changes to community rehabilitation services.

The next data collection round for the NHS Benchmarking Network Community Hospital Project is scheduled for 2014. This will allow time for redevelopment of the data specification following the health economist led analyses of the previous NHSBN Community Hospital Project rounds and Round 2 of the National Audit of Intermediate Care as described above. These analyses will identify the key features associated with good/poor performance of community hospital wards and will form the basis for the new national survey. The NHSBN will work closely with the Community Hospitals Association to promote the new data collection round to all community hospitals rather than just NHSBN member organisations as in earlier rounds. The survey will be promoted at the national conferences of NHSBM and the Community Hospitals Association, in newsletters and on their web-sites. Co-production will ensure that pre-survey awareness is raised in community hospitals known to either and both organisations. Support will be sought from other national agencies to ensure participation is as wide as possible. The participant provider organisations and the community hospital ward teams will receive access to the online toolkits (Objective 5/Study 4) as an incentive to join the project. This has the additional advantage of disseminating and promoting take up of the quality improvement toolkit.

The survey instrument will (as far as possible) use existing questions from the previous NHSBN surveys selected (and modified if necessary) to be aligned to the key performance

features identified in the health economic analysis. The instrument will be web-based with inbuilt completion quality checks (usual practice for NHSBN). It will be piloted and refined prior to national roll-out. We will use the comprehensive (and regularly updated) register of community hospitals maintained by the Community Hospitals Association to identify the participants.

The response rates of previous surveys conducted by the Community Hospital Association have been very high. However, if the response rate is low, a second round using an attenuated survey instrument will be directed at the non-responders to assess compliance with the key characteristics that optimise performance.

Study 3 In-depth case studies (Objective 2: (what does 'best' look like?)

Using a case study method (29-31), this proposed study will build on the findings of Study 1. Within the wider context of intermediate care, it will develop an in-depth picture of the structure, content and process of delivery of in-patient care of older people in community hospital wards from the perspective of those providing it and how it is experienced by those who use it. Specifically, the research question addresses: how does it work, for which patients (prior characteristics including health statues and cognitive ability), in what circumstances (event leading to admission), and with what resources to deliver it? The case study method is aimed capturing the complexity of the community hospital system of care for older people, itself nested within, shaped by and intersecting with the wider health and intermediate care systems. The method was previously developed and employed successfully in a study of intermediate care as a system of transitional care (32).

Research Design

Selection of Cases

Drawing on Study 1 outputs, we will purposively select three community hospital wards based on performance. We will select two community hospitals that are identified as 'high performers' and one medium/low performer. Selecting cases that are extreme in respect of our focus of interest, enables exploration of what distinguishes 'high' and 'low' performing community hospitals and facilitates drawing out features of structure, content and practice that impact performance, and the local contextual factors that contribute to shaping them. It is likely that the three community hospital wards will be in different Clinical Commissioning Groups (CCGs). For research efficiency, but depending on the output of Study1, we will select CCGs that are geographically proximal. Selecting a moderate/low performing hospital is not anticipated to be a problem. Previous experience (32) suggests participation in the research is an opportunity for learning and development.

Research Methods

We will employ multiple quantitative and qualitative methods to build up a picture of community hospital provision in each case study: collection of routine aggregate data on patient profile; questionnaires relating to ward culture and care climate; documentary analysis, observation, informant conversations and qualitative interviews with staff, patients and their caregivers. Within each case, the following data will be collected:

1. Size, purpose, model of provision, staffing and interface with the acute hospital and location within the wider system of intermediate care in the area via documents and interviews with senior health and social care staff (3/4 in each site);
2. Patient profile from routinely collected aggregate PAS data;
3. Ward culture and person-centred care: Climate of Care Questionnaire (33) with staff to examine shared philosophy, leadership, adequacy of resources, mutual support, and team working.
4. We will describe the content and process of delivery of treatment, care and therapy to older people in each case study through observation and informant interviews with staff and as experienced by patients (and their caregivers) over two months in each case

study.

- We will carry out observation of practice, including the work of therapy, nursing and medical staff, interactions between professionals and between professionals and patients both in respect of day to day routines and multi-disciplinary forums to effect decision-making and discharge planning for individual patients. Observation will be conducted over different times of the day, typically in 3/4 hour blocs in each case study over a two week period (30-40 hours in each case study). This should provide an orienting picture of routine working practices, although depending on data generated, may be extended. Detailed descriptions of settings, events, interactions and activities will be maintained in fieldnotes: a) descriptive, contemporaneous fieldnotes and b) expanded accounts (34). A chronological fieldwork journal will be maintained to include researchers' impressions and reactions since adopting such methods of reflexivity is an important quality check which undertaking such research (35). Emerging categories about the data will be teste through more focused observation. We will conduct interviews with a purposive sample of staff from different disciplines and at different levels using a topic guide (5/6) to examine how the work of rehabilitation and care for older people is understood, what makes it work and for whom, the resources available and the professional, organisational, cultural and other contextual factors affecting delivery from their different perspective. Interviews will include how care is organised and delivered and the challenges and obstacles encountered. Through discussion of anonymised cases we will explore the kinds of patients perceived as best suited to the service and those most likely to benefit.

- Following on from the observations of practice above, we will purposively select a sample of older patients and their caregiver (if available and appropriate), approximately 10-12 in total (5/6 patients and 5/6 caregivers) and follow them through their journey from admission to discharge. Selection will be based on typical and extreme case sampling strategies; patients that are typical of those supported by the community hospital and extreme in that they pose particularly difficult challenges for delivery, for example, on account of cognitive impairment, multiple co-morbidities and frailty that will adversely impact on the rehabilitation and recovery process. Data will be collected via observation of multi-disciplinary team meetings and informant interviews with staff. These will examine the process of assessment, diagnosis and treatment planning and the sequence of decision-making and discharge planning in respect of these patients; supplemented by conversations with patients and caregivers. The value of this approach is that it enables contemporaneous collection of data relating to experiences of patients and caregivers in the specific context of service delivery. This is particularly valuable for example for patients with cognitive problems or dementia, since data is collected in real time it does not require either verbal facility or ability to recall.

- We will interview these patients selected for observation and their caregivers, in each case study site shortly before discharge from the community hospital to reduce problems of recall. As data analysis will proceed simultaneously with data collection, we will leave open the possibility of undertaking a small number of additional interviews to pursue promising lines of enquiry not anticipated in advance. The interviews will assess if and how the care they received facilitated recovery from their perspective. Attention will be on their perception of 'distance travelled' i.e. the changes that have occurred from the event that precipitated acute admission to discharge. It is anticipated that this 'patient journey' component of the study will be conducted over a six-week period.

In total, up to 18 staff interviews and 36 patient and caregiver interviews will be conducted.

Analysis

Case Study Analysis

We have selected the ward as the 'case' to examine how rehabilitation and care of older people in community hospital wards is organised and delivered, how this is experienced by older people and their caregivers and secures their transition from illness/dependence to

resumption of daily routines. At the same time, we are concerned with locating the ward as a site of rehabilitation and care which is embedded in, and part of, the wider intermediate care system within a local health and social care setting. Data analysis therefore will be carried out at different levels. Analytic methods appropriate to the mode of inquiry in respect of each type of data (qualitative and quantitative) will be conducted for each individual case (ward) in the first instance (see below). We will then employ techniques of Qualitative Comparative Analysis (QCA) (36; 37) to examine what configuration of organisational and cultural factors and modes of delivery of rehabilitation and care are necessary and sufficient to result in particular patient centred outcomes.

The stages or steps are as follows:

Stage 1: We will construct a narrative description of the structure (bed-base, staffing, patient profile),, activities (throughput) and care culture for each case. Quantitative data from PAS (age, sex, reason for admission, type of residence, length of in-patient stay, discharge destination, hospital mortality) will be analysed to provide descriptive statistics (for continuous variables: N, mean, SD, median, maximum and minimum) of patient profiles/outcomes. Climate of Care Questionnaire analysis will provide an aggregate picture of care culture with qualitative staff interview and observational data drawn upon to examine how beliefs and values are translated into practice in each organisational context.

Stage 2: Employing grounded analytic techniques, we will examine the process of delivery of rehabilitation and care to patients with different characteristics and needs in the real life context of the ward environment drawing on the observational data and conversations with staff and patients. Grounded theory techniques (simultaneous data collection and analysis, constant comparison and search for negative cases) provide a more robust approach to analysis than thematic approaches; and direct attention on conditions, processes and consequences pertinent to this study.

Stage 3: With the patient as the unit of analysis, we will similarly employ grounded theory analytic techniques to compare and contrast experience and outcome across patients similar to, and different from, each other in terms of the nature of the event that precipitated admission and their prior characteristics (e.g co-morbidity; degree of frailty). Here we propose to employ as a sensitising framework the ‘recovery’ trajectories developed in research on intermediate care (38), although we will also be open to the possibility of generating new recovery trajectories. These take account of the diversity of patient characteristics and therefore the potential for ‘recovery’ from the patient perspective.

Stage 4: Using the method of analytic induction, we will compare and contrast cases in their structure, culture and process of delivery drawing on the narrative descriptions of each case from Stages 1 & 2. Particular interest is in those features of structure, culture and delivery processes that differentiate between cases perceived as high and low performing.

Stage 5: Involves synthesising and simplifying the conditions and delivery processes from Stage 4 to begin to explore the relationship between those conditions and delivery processes and patient outcomes from Stage 3. This will involve the use of QCA techniques, namely truth tables, using a binary system to identify what are the key factors which are logically necessary and sufficient to result in these ‘recovery’ trajectories or outcomes (0 and 1 to indicate their presence or absence).

Stage 6: We will review the different causal paths resulting from the QCA analysis and then test them out through further perusal of the case narratives. The final part of the analysis is locating the community hospital rehabilitation – scope, content, mode of delivery and outcomes within the broader intermediate care system for older people.

Study 4 (Objective 5)
We will develop two web-based interactive toolkits for use by local commissioners and community hospital teams respectively that support operational changes to optimise community hospital ward care for older people. The web pages for the online toolkits will be built in asp.net and linked to the Network's SQL Server database which contains the National Audit of Intermediate Care and the NHSBN Community Hospital Programme data. The toolkits will be securely accessible to participants via the NHSBN website. The toolkits will be based on previous similar work conducted by NHSBM for other clinical service areas and include:
Key Performance Indicator (KPI) dashboards:
The key characteristics (indicators) of community hospitals that optimise performance (Objective 2) will be presented in a series of dashboards. The dashboards will be customised to suit the different needs of commissioners and providers. The dashboards will show the national performance range, the performance level of the "best practice" community hospitals and local performance against each key indicator. The dashboards will show summary information for all community hospitals in the particular health economy with the ability to drill down to the performance of individual community hospitals and additional performance metrics.
Quality, Innovation, Productivity, and Prevention (QIPP) calculator:
The calculator would be used to show the gap between local and "best" community hospitals performance on quality and efficiency, the investment required to meet best practice levels of community hospital capacity and potential savings from meeting best practice efficiency values. The potential impact on local secondary care utilisation of optimising community hospital capacity and performance will be modelled.
Case studies:
Accessible descriptions of the in-depth case studies generated in Study 2 will be available for download as part of the toolkit. The case studies will explain in more detail how "best practice" community hospitals have achieved high levels of performance.
Toolkit development:
The content of the toolkits will be co-produced and iteratively modified with a group of 3 to 6 community hospital teams; the Community Hospitals Association (lead Helen Tucker) and The Patients Association (lead Heather Eardley). The toolkits will be launched at workshops within the final conference event and delegate suggestions for further modification considered.
Toolkit testing:
Initial testing will be conducted with the group of 3 to 6 community hospital teams by the NHSBN Analytics Team. The web pages will then be published to the testing area of the Network's servers. A further round of testing will take place with 3 to 6 new community hospital sites (commissioners and providers). Amendments can be made at this stage to ensure the toolkits function as specified and meet user requirements.
Toolkit deployment:
Once testing is complete, the toolkit will be published to Network's live web and database environments and promoted using the dissemination strategy described above.

PLAN OF INVESTIGATION AND TIMETABLE
Study 1: health economic analyses in months 0 to 15 (Objectives 1 and 2 in months 0 to 6; Objectives 3 and 4 in months 7 to 12; reports months 13 to 15) will use the existing NHS Benchmarking Community Hospital Project datasets and the National Audit of Intermediate Care datasets 2012 and 2013 (The 2013 data will be available by August). The interim findings will be used to inform the content of the web-based instrument for the national community hospital survey in 2014 (Study 2), and allow for the purposeful sampling for Study 3.

Study 2: (Objective 1) National survey: design in months 6 to 9; pilot in months 10 to 12; survey months 13 to 15; analysis in months 16 to 20.

Study 3: (Objective 2): case studies in months 6 to 24 (set up months 6 to 12; data collection months 13 to 19; analysis months 20 to 24)

Study 4: (Objective 5) web-based toolkits in months 25 to 33
Final report and dissemination in months 30 to 36

PROJECT MANAGEMENT
John Young is the Chief Investigator (CI) and has overall responsibility for the implementation, conduct, analysis and reporting of the programme of work. A Project Manager (PM) who reports to the CI will be appointed with responsibility for the day-to-day running of the study. Each of the four studies will have a separate lead: Claire Hulme (Study 1); John Young (Study 2); Mary Godfrey (Study 3); Claire Holditch (Study 4).

Project Steering Group: will meet 3-6 monthly under the chairmanship of Prof John Gladman (Professor of Elderly Care Medicine, University of Nottingham). Membership will be the coapplicants with the purpose to co-ordinate the implementation of the programme of work, to receive reports from the CI and leads for the four studies, and to interpret the emerging findings. The membership will be augmented if necessary to allow for special skills (e.g. additional members of The Patient Association, and the Community Hospitals Association).

Project Management Group: will meet 1-3 monthly under the chairmanship of the CI. Membership will be the PM, research assistants and the study leads. The purpose is the timely delivery of each study, interpreting the results and report writing.

APPROVAL BY ETHICS COMMITTEES
Study 3 (in_depth case studies) will require ethical approval to be obtained in Months 1-4. The main ethical issue is one of consent to participate in ward observations carried out for the research and patient/ caregiver interviews, especially with regard to patients who might have dementia or delirium, memory or communication problems and who may be receiving palliative care, or severely physically or mentally ill. The researchers will seek advice from staff on whether it is appropriate to approach individual patients or their relatives/ friends for consent. Members of the research team have considerable experience in conducting research with people with dementia as participants. The consent process will also take into account the implications of the Mental Capacity Act (2005). Relatives/ friends or Independent Mental Capacity Advocates will be involved in making a decision in the best interests of individuals if they do not have capacity to give consent. If they assent for the individual to be involved, and provided there are no behavioural indications that the individual does not wish to participate, then we believe it is ethical to include such individuals in research. However, if there are any indications during data collection that the patient is uncomfortable and/ or does not wish to participate any longer, then their consent/ assent will be withdrawn. The consent procedure in this research is seen as a process rather than a one-off event, with individuals being given information about the study on a repeated basis, and a sequence of opportunities being provided to withdraw if this is their wish.

The inclusion criteria will be inclusive of patients who have probable dementia i.e. problems with memory, cognition or communication during their hospital stay, so that they might benefit from the study. Patients will be excluded if they are unconscious or close to death. Risks and burdens include the discussion or observation of negative aspects of care with patients and their relatives/ caregivers, the possible intrusion of privacy during observation, concerns about confidentiality and the potential misunderstanding of the research by the participant due to cognitive problems or having difficulty with the English language. Reassurances will be made that the method developed is designed to highlight instances which might cause distress to staff to prevent their re-occurrence and serious untoward incidences will be reported to senior ward staff on duty. Also, that the person's care will not be affected, whether they decide to take part in the research or not.

Research observations will aim to be as unobtrusive as possible and if any signs of distress related to their presence are observed, the researchers will take appropriate action to minimise this. It is intended that informal unstructured conversations be held with and individually tailored to each participant, in order to enhance their contribution and minimise any potential distress. Reassurances will be made during the consent process that data collected will be treated confidentially and findings reported anonymously. Information will be presented as simply and clearly as possible to participants, with the assistance of an interpreter if necessary. Our previous experience and knowledge of using observational methods in research is informed by a person-centred approach. This suggests that the risk of discomfort or intrusion to patients during observations is minimal and the potential benefits of raising awareness and helping staff teams to improve quality of care for people with dementia great.

Consent will be sought from staff to participate in interviews and ward team implementation workshops. Following an expression of interest from their ward to participate, ward staff and other staff who visit the ward (e.g. clinical, domestic, catering) will be provided with an information leaflet about the study and what participation would entail at least 3 weeks before the meeting. They may contact the researcher beforehand with any queries. Potential staff participants will be advised in the initial information they receive that the interview/ meeting will also be recorded and transcribed. If they are still willing to participate, they will be asked to complete a consent form, including for the audio recording. Reassurances will be made in the information leaflet that there is no obligation to take part in the study. Although the hospital management will be formally supporting the research, the hospital staff workshop(s) will be limited in numbers and it is anticipated that staff should not therefore feel undue pressure to participate. Consent to complete a questionnaire will be assumed upon completion.

PATIENT AND PUBLIC INVOLVMENT

The external view point for this study has been embedded form the outset. PPI has been through The Patients Association (represented and led by Heather Eardley), and the community hospital constituency through the Community Hospitals Association (represented and led by Helen Tucker). These are both partner organisations for the programme of work and have co-applicant status. Importantly, both organisations have been involved in developing and refining the study objectives, both during the Outline Stage and in this full application. Both organisations will continue their involvement as participant members of the Project Steering Group and thereby assist with the implementation of the study and with results interpretation.

The intermediate care Patient Reported Experience Measure (IC-PREM) was developed as part of the preliminary work and used a Delphi consensus method involving The Patients Association, including sense checking of the candidate questions by a panel drawn from The Patients Association. The Patients Association has membership status of the National Audit of Intermediate Care and had been involved in discussion during 20012/13 to develop the content of the audit for Round 2.

TEAM EXPERTISE

John Young (CI and lead for Study 2) and *John Gladman* are academic geriatricians with many years of HSR experience using multi-method research designs including randomised control trials, systematic reviews, qualitative and health economic studies. Both are NIHR Programme Grant award holders. Collective previous research has included intermediate care and community hospital evaluations.

Heather Eardley (Lead for PPI) is the National Director of Projects for The Patients Association. This is a healthcare charity which for nearly 50 years has advocated on behalf of patients and the public. Helen has experience as a patient, carer and employee. She has

considerable experience in consultation and engagement with people who use services,

DISSEMINATION AND PROJECTED OUTPUTS

The Community Hospital Association (CHA) is a research partner in this study The CHA actively promotes networking and encourages uptake of research and audit between community hospitals. This is achieved through its website (http://www.communityhospitals.org.uk/) and at an annual conference. Both routes will be used to disseminate the study findings to the CHA membership.

The NHS Benchmarking Network has a membership of 270 NHS organisations (PCTs/CCGs; Acute/Foundation Trusts; Community Health Services; Local Health Boards (Wales)). Newsletters are produced and distributed regularly; there is a Twitter account and an established website (http://www.nhsbenchmarking.nhs.uk/). These readily accessible avenues for dissemination will be targeted.

The National Audit of Intermediate Care is conducted by an inter-professional Steering Group that comprises representation from the British Geriatrics Society; the Association of Directors of Adult Social Services; The Royal College of Nursing, the Royal College of General Practitioners, the Royal College of Physicians, the Chartered Society of Physiotherapists and the College of Occupational Therapists the Royal College of Speech & language Therapists, the Patients Association and the NHS Benchmarking Network. These organisations have existing dissemination outlets that can be used inform their respective members of the study findings and encourage transfer and implementation of the research findings into practice.

We have asked for funding to organise a national conference during the final three months of the study with a wide attendance of Clinical Commissioning Groups, community provider organisations and community hospital staff.

We will also present the finding at national conferences (e.g. the British Geriatrics Society meetings, other specialist body meetings), and internationally (e.g. the International Association of Geriatrics and Gerontology). Academic papers will be prepared for publication in peer-reviewed journals. With help from the Patients Association, we will produce a research summary to inform prospective and current users of community hospital care.

Outputs

1. A report that describes the national picture in relation to the current relative performance of community hospital in-patient care for older people.

2. A report that describes the provider and ward organisation features that optimises clinical and service level outcomes; patient experience; and costs for community hospital in-patient care for older people.

3. A report that describes the current impact of community hospital in-patient care for older people on secondary care and the potential impact if the community hospital care was optimised to best practice nationally.

4. A report that describes sorts of whole system configurations in terms of capacity and proportions for short-term, community-based services (i.e. community hospital wards, home-based rehabilitation, care home rehabilitation and enabling services) that are capable of reducing secondary care bed utilisation by older people.

5. Web-based interactive toolkits for use by local commissioners and community hospital teams that support operational changes to optimise performance of community hospital in-patient care for older people.

6. Bespoke study information summary findings and final conference co-produced with the partner organisations and target audiences described above.

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Supplementary files submitted:

Appendix 1: Community Hospital NHSBN Dataset 2012
Appendix 2: National Audit of Intermediate Care 2012 Dataset
Appendix 3: National Audit of Intermediate Care 2013: Content of Service User Questionnaire
Appendix 4: National Audit of Intermediate Care 2013: Service User Questionnaire (pdf)
Appendix 5: National Audit of Intermediate Care 2013: Patient Reported Experience Measure (pdf)
Appendix 6: Flow diagram
Appendix 7: Gantt chart