Enhancing the efficiency and effectiveness of community based services for older people: a secondary analysis to inform service delivery.

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1. Aims/Objectives:

Aim: To explore, through literature reviews and secondary analysis of existing data, ways to enhance the effectiveness and efficiency of intermediate care services.

Objective 1: To identify those patients most likely to benefit from IC and those who would be best placed to receive care elsewhere.

Objective 2: To examine the effectiveness of different models of IC.

Objective 3: To explore the differences between intermediate care services and how they have changed over time.

Objective 4: Based on the findings above, develop a service tool kit to guide service commissioning and monitoring.

2. Background:

The increasing need to focus on maintaining service quality while using resources in the most effective way underpins the current NHS Quality, Innovation, Productivity and Prevention (QIPP) agenda(1). One area in which this philosophy is evident is around the efficient access to and discharge from hospital(2). There is growing emphasis on length of stay and preventing avoidable and unplanned hospital admissions, particularly for older people (2-4). Since its inception as a policy intervention over ten years ago, intermediate care (IC) has been widely implemented as a way of avoiding hospital admission and promoting early hospital discharge, as well as a mechanism to deal with subsequent policy changes, such as emergency care reform (2, 5). As such, the term 'intermediate care' includes a raft of services, including community based rehabilitation, hospital at home schemes, post-acute care, 'step-up' and 'step-down' services, primarily, but not exclusively for older people (6). For the purpose of this research, IC is defined as non-acute, time limited services that are designed to increase the independence of older people (7).

Our team have undertaken two studies involving 31 IC teams and more than 7800 patients in England that have captured detailed information about the nature of the patients, the teams, skill mix, and patient and staff outcomes (SDO 08/1519/95; SDO 08/1819/214, hereafter known as 'Project 1' and 'Project 2'). Project 1 explored the relationship between different staffing models and patient outcomes in IC teams (7). It provided evidence of great variation in the services provided and patient outcomes achieved, demonstrating a relationship between staffing models and patient outcomes. Project 2, which is nearing completion, has built on these findings to develop a change management approach to implement good practice in interprofessional team working in IC teams with the aim of reducing variation and improving patient outcomes.

The data available to date suggest a complex picture of IC services. Qualitative data arising from Projects 1 and 2 found that IC teams perceive that they are under growing pressure to help meet hospital targets regarding lengths of stay and waiting times, by accepting patients with increasingly complex needs. This perception is supported by our data. In Project 2, (based on a sample of n= 5500 patients collected in 2010) 3.6% of patients died and 8.4% of patients were admitted to hospital during their episode of IC. In comparison, a National Evaluation of Intermediate Care (8) (n=2253 patients, collected in 2004) found that 2.4% of patients died and 7% were admitted to hospital before discharge from IC, suggesting that mortality rates are increasing (χ $\square$ = 7.4, p<0.005, 1df) and that there is a trend towards increasing rates of readmission to hospital, although this was not statistically significant.

In addition, Project 2 found that 4.3% of patients referred to IC are deemed inappropriate before admission. Given that IC should have a planned outcome of independence and typically enable patients to return home (6), these findings collectively suggest that that up to 16% of referrals to IC may be inappropriate and that some teams showed higher proportions that would not benefit from their services, risking patient health, putting inappropriate pressures on services and staff, as well as placing hospitals at risk of incurring financial penalties(2). IC entry thresholds are inconsistent and any entry guidance that does exist is locally determined which means that IC services tend to receive patients on the basis that there is 'nowhere else for them to go', rather than because they demonstrate a real potential for improvement in the IC setting (7).

At the same time, there has been rapid growth in the use of support workers, rather than qualified practitioners, to deliver much of the care within IC (13). Project 1 found that the level of patient impairment and patient needs were unrelated to skill mix (14). Evidence is urgently needed to ensure that hospital avoidance schemes such as IC benefit the patient and that IC facilities have the appropriate skill mix to address the increasingly complex needs of the patients they take on. However, there has been little research to date to inform decisions regarding what constitutes appropriate staffing in IC in terms of staff type, skill mix and intensity. In the context of ongoing changes to casemix and workforce, commissioners and managers have a distinct lack of evidence to support decision-making regarding staffing of or referrals to IC.

Almost no information is available about the clinical processes of intermediate care such as the detail of the actual interventions performed by staff with the patients. This reflects, in part, the diversity of the patients admitted to intermediate care and their breadth of medical, social and environmental needs. As a result, decision making in intermediate care by managers, clinicians and commissioners is informed solely by the patient characteristics and wider service characteristics (termed 'generic processes' by Lilford et al (15)).

A range of patient and service characteristics have been associated with outcomes of older people receiving IC. Several studies have explored factors associated with improvements in patient outcomes in related settings, but most tend to focus on patient characteristics as predictors; to focus on specific diagnostic groups (e.g. stroke survivors); and use a wide range of dependent and independent variables, with few considering the impact of skill mix. This makes comparisons difficult. The British Geriatrics Society has undertaken three audits of intermediate care services (16), but the lack of comparable outcomes data captured in each audit limits the predictive ability of the data.

A recent European study of older patients admitted to hospital showed that mortality within a month of hospital admission is in the order of 10-12% (17). Similarly, rates of readmission in the first 30 days typically run at around 10-12% (17) , rising to 30 or 40% by 6 months after

discharge (18). While these studies are not directly comparable, because they consider a more acutely ill population, they identified several variables of importance to predicting patient outcomes, such as age, gender, living alone, admission route, admission status, functional status, reason for admission, and the services received. Several of these variables are mirrored in rehabilitation research (19). Other predictors of rehabilitation outcomes in older patients include lower admission scores on a range of dependency measures (7, 8, 20). One study found that the best predictor of patient improvement was the '6 minute walk test (20)'. Another found that severe cognitive impairment was a strong negative predictor of recovery (21).

Several service and team level characteristics have been associated with patient outcomes. Indeed, one national evaluation of IC found that service characteristics were a better predictor of service costs and patient outcomes than patient characteristics (8). Service characteristics include team factors, such as skill mix and the nature and quality of team working and different models for the delivery of care, such as intensity of care delivery. Team level variables that have been associated with improvements in patient functional status include better team working (22); including more therapists (as opposed to nursing and medical staff) in the staffing mix (23); employing staff who are competent in rehabilitation (24); having a staff to patient ratio which is greater than average (25); having a higher proportion of care delivered by support workers (7, 26); and a larger team size (7).

Other important questions about efficacy in IC also remain unanswered. For example, the intensity of treatment for older IC service users has a very limited evidence base. Whilst a number of studies have evaluated intensity and frequency of rehabilitation provision in hospital, IC and community based studies remain rare. Ryan et al (27) demonstrated significant differences in outcomes for older people receiving more intensive regimes of rehabilitation in IC at 3 months and at 12 months (27). These data, however, are limited to those patients recovering from stroke and hip fracture. The impact of intensity on patient outcomes has been reported in other studies of rehabilitation teams (28, 29). A systematic exploration of our current datasets around intensity/frequency of contact or treatment would assist in the development of guidance to commissioners around these questions.

This research proposes to merge and re-analyse the data from Projects 1 and 2 to identify which patient characteristics are associated with 'good' outcomes with IC and those for whom IC is inappropriate or who could be better managed in an alternative setting. Additionally we will examine the impact of different team and staffing structures on patient outcomes and service costs to enable us to identify the most cost effective service configurations. This is important, as changes to the skill-mix in health and social care are proposed as a mechanism to reduce labour costs, and IC has been shown to have a flexible workforce (7).

Our unique datasets cover a large number of patient admissions (currently over 7800, but expected to increase to 8000 by March 2011) from 33 IC teams across England and include details of the service context, costs, patient and staffing / skill mix (approx 800 staff) and patient outcomes. Despite previous large scale studies (8), it has been difficult to draw clear conclusions because of the heterogeneity of the teams. The scale of these data will help produce the most definitive information available to date regarding the relationship between staffing models and outcomes.

We will revisit the questions of effectiveness and efficiency of staffing models (explored in Project 1) across the merged databases. The data that have not yet been explored include details of the discharge destination (institutionalisation vs return to home), diagnostic categories or the

reason for referral (if unrelated to diagnosis), and service use after discharge. The merged dataset will also provide more definitive information about the characteristics of patients entering IC, the nature of services they receive, and how these relate to patient outcomes. The longitudinal nature of our data on IC teams, which spans a five year period, enables us to describe in detail how IC has evolved over this time.

The outcomes of this study will include evidence to guide commissioning decisions about ways to link quality and productivity, by ensuring that IC services are delivered to the right people and provided by staff with appropriate skills to meet those patient needs. We will also be able to compare the numbers and types of patients referred to different teams and patient outcomes by team to provide normative data to inform discussion about the trade-offs relating to costs and outcomes and provide information for future service evaluation comparisons.

3. Need:

The questions addressed in this study were developed in consultation with partners, including those involved in the original research projects, as well as commissioners, providers and patients from the South Yorkshire Collaboration for Leadership in Applied Health Research and Care (SY CLAHRC), and addresses their specific needs around older peoples' intermediate care and rehabilitation services (see Service users / public involvement section).

The demands on the health service of improving cost-effective support to an increasing population of older people with health and care needs has been recognised nationally and internationally (30) There is a clear need to produce empirical data to identify those people who are most likely to benefit from intermediate care, or who may be better off in another setting(2).

This research is closely related to two other concurrently commissioned SDO projects. The research will help address questions around unplanned admissions to hospital (outlined in SDO brief 10/1010) but will answer questions related to the 'downstream' consequences of these policies if the wrong people are turned away from hospital. It helps to identify the inequity related to team structures; and identify those teams that are more effective at meeting patient needs; and more efficient in terms of service costs. It will help to develop theory around health service organisation with a view to producing information which can be used in service development and benchmarking. It also contributes to workforce theory by developing an approach to analysing the complex and multidimensional components of an interdisciplinary workforce (staff type, grade mix, intensity and impact).

The second, related project is the expedited evidence synthesis of intermediate, step-down, hospital at home and other forms of community care as a replacement for acute inpatient care (10/1012). Our findings will complement both of these studies when they are published, and where possible, we will work with the successful teams to share findings or information which may optimise the outputs of all projects.

The specific products that will arise from this research include guidance for intermediate care service providers and commissioners around referral / entry criteria and team configuration; tools against which services can benchmark themselves, and which may have further use in the commissioning and monitoring of services.

Our research has several implications for the White Paper (1) and the Revision to the Operating Framework for the NHS in England 2010/11(2). Specifically, GP commissioning requires evidence about the types of patients who will achieve the greatest benefit from IC. Additionally, hospitals will receive no additional payment for treatment if patients are readmitted to hospital within a 30 day period. Our research will develop ways to identify patients at risk of being unexpectedly admitted or readmitted to hospital during an IC episode so that appropriate services can be put into place at the start and support the planned additional responsibility of hospitals for discharged patients.

There is a need to develop benchmarks against which IC teams can compare themselves, and be compared, and which look at the expected health gain for a particular type of service user. The research will help inform planned changes to the tariff promoting integration of the wide variety of re-ablement and post-discharge support by identifying patients' ongoing support needs following their episode of IC. The metrics (outcomes) based approaches proposed by the new White Paper (1) risk disadvantaging those types of services which are complex, less easily defined, and can have multiple outcomes in favour of more easily defined and measurable services. This means that there is an urgent need to develop tools to equip complex IC services to collect meaningful outcomes and benchmarks against which they can compare their effectiveness and efficiency.

The increasing ageing population, combined with real resource reductions to the NHS means that there is a need for high quality evidence on which decisions about the quality, safety and effectiveness (including cost effectiveness) about care delivery can be made, in line with the QIPP agenda.

4. Methods:

CONCEPTUAL FRAMEWORK: Our conceptual framework aligns closely with a modified Donabedian framework proposed by Lilford et al (2010), which, examines the relationships between structures, processes and outcomes, but which separates the processes into three further subcategories: clinical processes, (involving the actual treatment, such as the processes of the rehabilitation, medication); targeted processes (designed to improve clinical processes through training in the use of a device); and generic processes (such as skill mix or staffing models adopted by an organisation).

The model proposed by Lilford suggests a causal link between the generic, specific and clinical processes, which in turn influence patient outcomes. These sub-categories are hierarchical. The clinical processes directly impact on the patient, and can be influenced by the targeted processes. Both clinical and targeted processes can be influenced by the generic processes. Given the lack of information about the clinical processes of IC, this framework provides a structure in which the generic processes (such as skill mix, team structures, intensity of care) can be examined, and their consequences for patient outcomes explored.

This project involves the merging and re-analysis of two datasets which have collected prospective data from 33 community based older peoples' teams (SDO 08/1519/95; SDO 08/1819/214; Projects 1 and 2) between 2006 and March 2011. The datasets include comparable, detailed descriptive, longitudinal data about each team; staff and patients.

The first dataset is complete (Project 1), and includes data from 1913 patients and 325 staff from 20 teams between 2006 and 2008. The second dataset (Project 2) will be complete in March 2011. It already has 5800 complete patient records from 13 teams and based on current return rates, we expect this to exceed 6000 by 1st March 2011, resulting in a total database of over 7900 patients and approximately 800 staff, forming the largest dataset of IC in the UK.

The 33 teams reflect the diversity of IC services nationally in terms of rurality, size, skill mix and host organisation.

Each dataset includes detailed information about the team, the patients and the staff. More detail about each of the outcome measures is provided in Appendix 1.

- **Team details** were collected using a detailed 'service proforma' and includes 45 variables to describe team size, skill mix, host organisation and admission criteria (31). The service proforma was completed at one time point (the start of the project) in Project 1, and at two time points in Project 2. Eight teams involved in Project 1 were also involved in Project 2. We therefore have data on 25 independent teams. However, effectively we have datasets for 8 teams at 3 time points which will allow us to assess how the team structure, staffing and context has changed over time, as expressed in Objective 3.
- **Patient details** were collected by staff at admission and discharge using a structured 'Client Record Pack' (CRP) and includes 95 variables describing details of age, gender, dependency at admission and discharge (Therapy Outcome Measure, Level of Care Need)(32), EQ-5D (33) at admission and discharge, living arrangements at admission, diagnosis / reason for referral, place of care provision, outcome of episode of care and type of practitioners involved in care. Patients also completed a patient satisfaction questionnaire. All consecutive patient admissions over a defined period were included for each team.
- All **staff** completed a structured 'Workforce Dynamics Questionnaire' (WDQ) which includes 120 variables describing staff roles, length of experience, job satisfaction, team working, and role integration and flexibility (7).

Merging of the data.
All data are currently stored in SPSS Version 19.0. Projects 1 and 2 have one dataset each for the Service Proforma (team) data: CRP (patient) data and staff data. The same data collection tools were used to collect the data in each project.

Data from Project 1 are already complete and clean. All teams involved in Project 2 will have completed data collection by March 2011. Data cleaning has commenced on the 9 (of 13) teams which have already finished data collection. As a result, we have well established data cleaning protocols.

Data sets will be merged using statistical programming within the Stata statistical software, Data from the two projects will be combined to create three merged datasets;
1. Service proforma dataset n=33
2. CRP dataset n = 7800 (approx)
3. Aggregated team dataset (service proforma, plus average team outcome scores n = 33)
The three datasets will be linked in the analyses using the common team identifier variable.

5. Contribution of existing research:

This research builds on and enhances previously funded research around the workforce (SDO 08/1519/95 & SDO 08/1819/214); it also adds to work being undertaken within the South Yorkshire CLAHRC (SY-CLAHRC) Stroke workforce work package.

The project will utilise the close relationship that exists between the applicants and the CLAHRC SY. CLAHRC work in South Yorkshire has already assisted in the prioritisation of research

questions around IC and workforce issues and the development of a research agenda as a result of network events with providers and commissioners from across Yorkshire, Humberside and North East Derbyshire. Of particular concern are issues around the commissioning and operationalisation of models of IC care and rehabilitation services, more specifically: skill mix; intensity; duration and timing. Furthermore, SY-CLAHRC Stroke has a planned strategy of engagement events over the coming months. These events are aimed at further engagement with commissioners and providers, but also with service users and carers. Funding for these events has already been secured and no additional resource is being sought. These events will continue to provide opportunities for dissemination and knowledge transfer.

A further aim of our project is to ensure that we develop appropriate knowledge translation tools for the dissemination of the findings into practice. These will include guidance around referral protocols for IC teams, and using our existing change management approaches to work with teams to implement the tools. Additionally, our multidisciplinary team will ensure that we produce a suite of publications for appropriate high quality peer reviewed journals, such as J Health Services Research and Policy, Clinical Rehabilitation, BMJ, Health and Social Care in the Community. We will use our existing networks as a way to disseminate the findings directly to the teams.

6. Plan of Investigation: **Plan of investigation and timetable**

The project will start on Oct 01 2011 and finish on the Sept 30th 2012.

Activity	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Form advisory group	■											
Consult with advisory group	■				■				■		■	
Project team meetings	■		■		■		■		■		■	
Merge datasets	■	■										
Commence literature reviews for each research question	■	■	■									
Commence multivariate analyses		■	■	■								
Undertake economic analyses		■	■	■								
Complete work packages (RQs 1 - 9)			■	■	■	■	■	■				
Synthesise findings to address Objective 4							■	■	■			
Preparation of final report									■	■	■	■
Dissemination			■				■		■	■	■	■

Approval by ethics committees

Both projects on which this secondary analysis is based have received ethics and research governance approval from the relevant institutions. Ethics approval numbers are COOP 06/Q1606/132; EEICC 08/H1004/124. No further approvals will be required to perform the research stated in this bid.

7. Project Management:

Project management

Our team members span two institutions: Sheffield Hallam University and the University of Sheffield. All participants have an existing close working relationship. The majority of the applicants have been involved with both of the projects involved and several work closely together under the remit of CLAHRC SY. We will form an external advisory committee,

primarily comprising interdisciplinary practitioners, managers and commissioners as well as patients and their relatives from the Sheffield CLRN with perspectives on research engagement and performance who will be consulted twice throughout the progress of the project.

PE will act as the principle investigator and will liaise between the project team, the external advisory committee and the sponsor. She will take overall responsibility for ensuring the timely and quality delivery of the outputs. SA will undertake the project management role including coordinating meetings, establishing the advisory group, and liaising with team members at the appropriate times to ensure their input into their respective work packages. The project team will meet bi-monthly throughout the project.

Each team member will focus on a small number of research questions relating to their specific area of expertise, and will be actively engaged in the project to produce their specific output, and to provide input into the final practice guide.

8. Service users/public involvement:

Service users have been involved in the development of both projects that form the basis of the secondary analysis. The Barnsley CRAG (Community Research Advisory Group), which is a service user reference group, was consulted about the tools, methodology and findings of both of the projects. The findings from the proposed study have specific relevance to service providers, managers and commissioners and they have been consulted as our partners in the SY CLAHRC (described earlier in the bid). The questions were identified through structured consultation with SY CLAHRC (service providers and commissioners), by commissioners and representatives from service user groups (including Age Concern) as part of our steering committee, and through specific questions arising from the teams involved in the two projects.

Representatives of older peoples' service user groups (eg Age Concern) will be invited onto our Project Advisory Group, and we will engage with the Service User Engagement Group facilitated by the Sheffield CLRN and SY CLAHRC who will be invited to have input into the study design and the interpretation of the findings / outcomes in terms of their relevance to service users.

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