

Secondary analysis and literature review of community rehabilitation and intermediate care: an information resource

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Scientific summary

Community rehabilitation and intermediate care

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Scientific summary

Background

Despite a previous large-scale study (Barton P, Bryan S, Glasby J, Hewitt G, Jagger C, Kaambwa B, *et al.* *A National Evaluation of the Costs and Outcomes of Intermediate Care for Older People*. Birmingham and Leicester: University of Birmingham and University of Leicester; 2005), it has proved difficult to draw clear conclusions because of the heterogeneity of the teams. By merging and comparing data from our two projects [*The Relationship Between Workforce Flexibility and the Costs and Outcomes of Older Peoples' Services (COOP)* study and *The Impact of Enhancing the Effectiveness of Interdisciplinary Working (EEICC)* study], this study aims to provide the most definitive information available to date regarding staffing models and patient outcomes. A further advantage of combining the two data sets is that it allows examination of changes over time as policies and service developments have evolved.

The data were derived from two projects funded by the National Institute for Health Research (NIHR) Service Delivery and Organisation (SDO) programme:

Project 1: COOP [Nancarrow SA, Enderby PM, Moran AM, Dixon S, Parker SG, Bradburn MJ, *et al.* *The Relationship Between Workforce Flexibility and the Costs and Outcomes of Older Peoples' Services (COOP)*. Southampton: NIHR SDO; 2010] was carried out between May 2005 and July 2008. It aimed to investigate how workforce policy affected service development of IC services across England and whether or not variations in organisational and management structures, as well as workforce configurations, had an impact on patient, staff and service outcomes.

Project 2: EEICC [Nancarrow SA, Enderby PM, Ariss SM, Smith T, Booth A, Campbell MJ, *et al.* *The Impact of Enhancing the Effectiveness of Interdisciplinary Working (EEICC)*. Southampton: NIHR SDO; 2012] aimed to examine the impact of an intervention to improve interdisciplinary working and explore the relationship between teamworking and impacts on staff and patients. Patient outcome data were collected between March 2009 and April 2011.

Aims and objectives

To explore, through secondary analysis of existing data, ways to enhance the effectiveness and efficiency of intermediate care services

All community-based support for older people who would otherwise be admitted to hospital, or would require increased length of stay will be called intermediate care (IC) services in this report. These services are commonly staffed by a range of Allied Health Professionals (AHPs), nurses, social care staff and support workers.

This research was based on reanalysis of a merged data set from two projects 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 alternative settings. Additionally, we have examined the impact of different team and staffing structures on patient outcomes and service costs to identify the most cost-effective service configurations. The research reported was also informed by a series of systematic literature reviews focused on the specific research objectives in each chapter.

Objectives

1. To identify those patients most likely to benefit from IC and those who would be best placed to receive care elsewhere.
2. To examine the effectiveness of different models of IC.
3. To explore the differences between IC service configurations and how they have changed over time.
4. To use the findings above to develop accessible evidence to guide service commissioning and monitoring.

Our unique data sets contain data on 8070 patient admissions from 32 IC teams across England and include details of the service context, costs, staffing/skill mix (800 staff), patient health status and outcomes.

Data collected

Both projects collected literature review, service, team and patient data.

Literature review

Systematic reviews that were undertaken in the previous studies were updated (see *Results summary*) and informed by Walker and Avant's approach to concept analysis (Walker LO, Avant KC. *Strategies for Theory Construction in Nursing*. Upper Saddle River, NJ: Pearson/Prentice Hall; 2005). The following databases were searched on 21 December 2011, 23 March 2012, 10 April 2012 and 12 April 2012:

- MEDLINE (via EBSCOhost)
- Cumulative Index to Nursing and Allied Health Literature (CINAHL; via EBSCOhost)
- Applied Social Sciences Index and Abstracts (ASSIA; via ProQuest); *Chapter 4* only.

Results summary

Chapter	Database hits			Number of duplicates
	CINAHL	MEDLINE	ASSIA	
<i>Chapter 1</i>	828	981	N/A	1560
<i>Chapter 2</i>	712	1512	N/A	1884
<i>Chapter 3</i>	837	30	N/A	859
<i>Chapter 4</i>	299	408	N/A	633
<i>Chapter 4</i>	387	332	N/A	624
<i>Chapter 5</i>	165	293	N/A	404
<i>Chapter 5</i> (additional search)	57	44	N/A	93
<i>Chapter 7</i>	1308	1552	N/A	2176
<i>Chapter 8</i>	11	14	N/A	16
<i>Chapter 9</i>	768	1413	72	1516
<i>Chapter 9</i> (UK only)	81	150	27	208
N/A, not applicable.				

All searches have been written up for MEDLINE using the EBSCOhost interface.

Service data

Each team provided information relating to the size, nature, staffing and resourcing of the services. The service pro forma was developed through a systematic literature review and piloted in regional evaluations of IC services (Nancarrow SA, Enderby P, Johns A, Freeman J, Cooke J. *Evaluation Report*

for the Wakefield Intermediate Care Services. Sheffield: University of Sheffield; 2005; and Farnon L, Nancarrow S. Employment and career development opportunities for podiatrists and foot care assistants in the NHS. *Br Podiatry* 2003;**6**:103–8). It provided contextual information about services, including the population, line management, numbers and types of staff, service aims and objectives and associated services, setting of care, host organisation and case mix.

Team data

Staff members of the teams participating in both studies provided individual information using the Workforce Dynamics Questionnaire.

Patient data

Client record information

For both studies, staff members completed a 'client/service user record pack' for every patient referred during the study period. This captured information about service use and change in patient health status using the levels of care (LoCs) (Enderby P, Stevenson J. What is intermediate care? Looking at needs. *Manag Community Care* 2000;**8**:35–40), European Quality of Life-5 Dimensions (EQ-5D) (Dolan P. Modelling valuations for EuroQoL health states. *Med Care* 1997;**35**:1095–108) and therapy outcome measures (TOMs) (Enderby P, John A, Petherham B. *Therapy Outcome Measures for Rehabilitation Professionals*. Chichester: John Wiley & Sons Ltd; 2006). Information collected included demographic information, reason for referral, referral route, home information, reason for discharge and place of discharge.

Level of care

Level of care describes eight categories of patient need. It has been used as one proxy for the severity of patient illness and to identify potential groups of patients based on their level of service requirement (Nancarrow SA, Enderby P, Johns A, Freeman J, Cooke J. *Evaluation Report for the Wakefield Intermediate Care Services*. Sheffield: University of Sheffield; 2005).

European Quality of Life-5 Dimensions

The EQ-5D is a generic measure used primarily by economists to calculate quality-adjusted life-years. It uses a single question to assess each of five health domains: mobility, self-care, usual activities, pain/discomfort and anxiety/depression. The EQ-5D tariff scoring system ranges from 1 (which indicates full health) through to 0 (indicating death) and down to –0.59 (for which negative values indicate states worse than death) (Dolan P. Modelling valuations for EuroQoL health states. *Med Care* 1997;**35**:1095–108).

Therapy outcome measures

The therapy outcome measure (TOM) scale is a therapist-rated rehabilitation outcome measure. It contains four dimensions including impairment, activity, social participation and well-being, with each dimension scored on an 11-point ordinal scale (0 to 5, including half points). Lower scores indicate higher levels of impairment, reduced activity restriction, increased social isolation and greater distress (Enderby P, John A, Petherham B. *Therapy Outcome Measures for Rehabilitation Professionals*. Chichester: John Wiley & Sons Ltd; 2006).

Information on teams

Project 1: involved 158 team members from 20 community-based IC teams. There were large variations in team sizes (median 24.1 WTEs). The ratios of support workers to qualified staff varied widely [mean 0.7, range 0–5.6 whole-time equivalents (WTEs)], as did the ratio of the total number of staff to the total referrals of patients to the services (mean 66.9, range 2.9–385.4 WTEs).

Project 2: 253 team members from 11 community-based IC teams participated. As in project 1, there were large differences in size of team (mean/median = 38.7/19.9, range 6.2–102.1 WTEs) with the average team size being 29 WTEs. The average percentage of professionals in the team was 63% (range 21–95%) and the ratio of professionals to support workers was 1 : 0.7 WTEs. Team leaders had responsibility for, on average, 40 staff.

Data management

Both projects collected quantitative and qualitative data.

Quantitative data

All data were entered into Statistical Product and Service Solutions version 19 (IBM Corporation Armonk, NY, USA) for descriptive analyses and to explore change over time. The main analyses were undertaken using the Stata statistical package (V.10; StataCorp LP, College Station, TX, USA).

Qualitative data

Qualitative data have provided some additional contextual information, but are only referred to tangentially in this report.

Statistical methods

We analysed the combined data using a generalised linear mixed model in which team was incorporated as a random effect. Missing outcome and covariate data were imputed using multiple imputation.

Summary of findings

We have taken each of the objectives and research questions and reviewed the literature prior to presenting the secondary analysis of the combined data set.

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

Which patients are most or least likely to benefit from intermediate care?

Key points from the literature

There have been several controlled trials of community health care including IC. Most studies demonstrate reduced pressure on acute beds as well as being preferred by patients. However, the use of non-clinical residential facilities, for example residential homes, have not been subjected to controlled trials despite being frequently used for IC. The value of IC for persons with cognitive decline or requiring end-of-life care has not been studied and research has not reported which patients are less likely to benefit from IC. There is some indication that age, cognitive status and living alone affect outcomes and a suggestion that those with sensory impairment, increased number of comorbidities and depression do less well in IC.

Key points from the secondary analysis

The patients who were most likely to improve were those with admission LoCs of 3, 4 or 5 (> 40% for impairment, activity and participation, > 30% for well-being as determined by the TOM scale). The probability of any improvement was between 64% (level 6) and 77% (level 4).

Improvement was greatest among patients who were referred from acute settings (accident and emergency, ambulance, rapid response, acute hospital, day clinics) despite similar baseline scores to those admitted from other settings. Nevertheless, half of all patients did not improve on any of the domains of TOM.

The proportion of patients who remained in their own home following IC decreased with age: for every 10-year increase in age there was a 6% decrease in the odds of returning home. The chance of remaining or returning home was greater for females than males.

Although the chance of returning home is smallest for patients receiving IC at residential or nursing homes (10.1%), the chance of remaining or returning home was greatest for patients who received care at home and who had previously lived at home unaided (71.9%).

Patients who were identified as being in need of rehabilitation on the LoCs were consistently more likely to have the most positive outcomes (return to home, large improvement in TOM parameters and in EQ-5D scores) than the remainder. The group of patients considered as 'inappropriate referrals', or not needing IC services after referral, are poorly understood and require further research.

What are the factors associated with increased hospital admissions for patients using intermediate care services?

Key points from the literature

Services designed to reduce inpatient bed use are likely to do so, but there are no consistent effects on readmissions.

Working across the interface between hospital and community is a key characteristic of services that achieve reductions in readmissions to hospital inpatient care. Studies indicate that frail older people are less likely to be readmitted to inpatient hospital care if they have a comprehensive geriatric assessment and receive community-based care after discharge.

Key points from the secondary analysis

Patients identified as having medical care needs on the LoCs had the highest probability of being hospitalised. Those identified as zero (does not need any intervention) unsurprisingly had the lowest rate of hospital admissions. For every 10-year increase in age, there is a 20% increase in the odds of being transferred to hospital.

What are the factors predicting admission to institutional care (e.g. admission to a nursing home) among intermediate care service users?

Key points from the literature

Evidence suggests that IC has some effect in reducing the risk of admission to long-term care for older people. However, poor activities of daily living scores, existence of cognitive impairment and increasing age are consistently associated with admission to long-term care.

Key points from the secondary analysis

Permanent institutionalisation was uncommon (1%), but was associated with age, living arrangements and TOM scores at admission. The odds of institutionalisation were approximately doubled for each 10 years of age and approximately halved with each unit increase in TOM scores. Patients who were not living in their own home or who had left their usual place of residence during IC were most likely to be permanently institutionalised.

What factors are associated with increased risk of mortality for intermediate care patients?

Key points from the literature

Increased mortality is related to age, limitations in physical function, functional disabilities and clinical instability, which are all issues associated with requiring IC. Furthermore, maintaining or increasing mobility reduces the risk of death.

Key points from the secondary analysis

There is a higher death rate among patients receiving IC in more recent years and substantially more patients receiving IC with TOM impairment scores of less than three died as compared with those with higher scores. Those patients who are well enough to receive IC in their own home have the least probability of death.

Our findings suggest that there is a case for integrating palliative care services for older people with IC/community rehabilitation as the complexity of cases being cared for in the community is increasing.

Objective 2: to examine the effectiveness of different models of intermediate care

What team-level factors associated with the greatest benefits to patients in terms of health status?

Key points from the literature

Few studies have examined specific team-level factors associated with better patient care. However, the literature suggests that team composition, tenure, regular team meetings, task allocation, cohesiveness and communication are important.

The number of different disciplines in IC teams has been associated with a 17% reduction in service costs and a higher ratio of support staff to qualified staff may be associated with greater improvements in EQ-5D scores.

One study indicated that the use of 'care facilitators' to improve co-ordination of care reduced emergency readmission presentations [by 10% chronic obstructive pulmonary disease (COPD) and 39% congestive heart failure (CHF)], admissions [by 25% (COPD) and 36% (CHF)] and length of stay [by 18% (COPD) and 36% (CHF)].

Another study on interprofessional stroke rehabilitation was perceived to contribute to better care for patients. Team-level factors included teamworking, multidisciplinary rounds, supervision, education and training, leadership, holistic care, communication, and strong interpersonal relationships. Rotation, colocation of team members and risk aversion of nursing staff were potential confounding factors.

Key points from the secondary analysis

We found evidence that more clinical support staff and domiciliary staff were associated with a small improvement in TOM impairment scores. However, this latter finding was heavily influenced by data from one team. This study provides additional evidence that interdisciplinary teamworking in IC may be associated with better outcomes for patients, but care should be taken with overinterpretation.

What is the cost-effectiveness of different models of care?

Key points from the literature

The COOP study showed that the average cost per patient decreased as the number of different practitioners involved in their care increased and, counterintuitively, fell with an increase in the proportion of unqualified staff.

Key points from the secondary analysis

The value of health gain compared with the cost of the service cannot demonstrate absolute cost-effectiveness, but allows comparisons between teams. We found substantial variability in costs and outcomes between teams. Costs initially increased with improving health (or reducing impairment) and then fell for higher levels of health improvement (or impairment). Increased numbers of different types of practitioners were associated with higher costs.

There was no clear effect of different staffing patterns (i.e. number of practitioners and proportion of skilled staff) on net monetary benefit (NMB). However, there is weak evidence that larger services generate higher NMB.

We caution that the purposes and composition of IC teams vary substantially and, thus, it may not be sensible to compare costs indiscriminately between all services. However, efficiency savings may be possible.

Objective 3: to explore the differences between intermediate care service configurations and how they have changed over time

How have intermediate care services changed over time?

Key points from the literature

No literature was found that directly addressed change of IC services over time. The literature suggests little evidence of commonly agreed vision and purpose; these services have frequently been integrated with others and these relationships are generally unstable.

There is a tension between the specialisation and hierarchy seen in other areas of the NHS and the more generalised and collaborative approaches needed in multidisciplinary IC teams.

Key points from the secondary analysis

There were some consistent trends between data from the seven teams (in both studies) and the whole data set, but changes over time were small and variation from team to team meant no consistent pattern. However, our data supports the literature, demonstrating an increase in the ratio of patients to staff over time.

For all study data, the percentage of patients deemed not to require the service (LoC = 0) or inappropriately referred rose (from 6.7% to 9.5% and from 4.1% to 10.4%, respectively). For data only from teams involved in both studies the percentage of patients with LoC = 0 or considered to be inappropriately referred also rose (from 5.0% to 8.5% and from 5.0% to 13.0%, respectively).

How have referral patterns changed over time and what is the relationship with patient outcomes?

Key points from the literature

Although policy has changed over the last decade, we have not found any literature examining the impact of this on referral patterns to IC.

Key points from the secondary analysis

The majority of teams (6 out of 7) showed an increase in the percentage of referrals from acute hospital wards and a decrease (4 out of 7) in referrals from AHPs to IC over the period studied. Although all teams, except teams 4 and 5 (which remained on 0%), showed declining referrals from social services, the number of referral routes to IC increased and the nature of referrals has changed over time for different teams.

There are indications of increased inappropriate referrals to IC in more recent years and a higher proportion of patients with more severe impairments are being referred to IC.

Objective 4: service toolkit

Development of a service toolkit to guide providers and commissioners of services

The demographic data, LoC, TOMs, EQ-5D score and other tools used in this research are practical, reliable and valid. They could be incorporated into dashboards or benchmarking tools to stimulate improvements in clinical effectiveness and cost-effectiveness and efficiency and reduce variation in the provision of services. A trial of a toolkit is under way.

Future work

This study highlights the need for funding high-quality studies that attempt to examine what specific team-level factors are associated with better outcomes for patients. It is therefore important that studies in the future attempt empirically to examine what process-level team variables are associated with these outcomes. Owing to the heterogeneity of IC services, mixed-methods studies incorporating theories that relate context to outcomes are recommended.

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