Measuring and optimising the efficiency of community hospital inpatient care for older people: the MoCHA mixed-methods study

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Scientific summary

The MoCHA mixed methods study

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Background

Community hospitals are small hospitals providing a range of locally based inpatient and outpatient services and are established health-care facilities in the UK and internationally. Although they can provide a range of local services (e.g. minor injury units, day hospitals, satellite secondary care clinics), 98% of community hospitals in the UK (of a total of ≈400) provide inpatient rehabilitation for older people. In the context of an ageing population, this is a potentially valuable health service function. However, survey information from the NHS Benchmarking Network that included 180 community hospitals in England, Scotland and Wales indicated considerable variation in operating costs and outputs of these hospitals. This is an important consideration for health-care planners who need to make decisions on how to deploy resources optimally for local populations.

Objectives

The Models of Community Hospital Activity (MoCHA) study used a mixed-methods design to explore and more fully understand the nature of variation in community hospital performance in relation to the rehabilitation of older people. We developed studies to address the five research objectives, which were to:

1. measure the current relative performance (cost efficiency) of community hospital inpatient care for older people (studies 1 and 2)
2. identify the characteristics of community hospital inpatient care for older people that optimise performance (studies 1 and 3)
3. develop web-based interactive toolkits for use by local commissioners and community hospital teams that support operational changes to optimise performance (study 4)
4. investigate the current impact of community hospital inpatient care for older people on secondary care use and the potential impact if community hospital care was optimised to best practice nationally (study 5)
5. 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 (study 5).

Methods

Study 1: an analysis of cost efficiency of community hospitals

We used the NHS Benchmarking Network Community Hospital Programme data set that contained information on 158 community hospitals in the financial year of 2013/14. Econometric estimation using stochastic frontier analysis was conducted in which a cost function was modelled using significant predictors of community hospital ward costs.

Study 2: a national survey of community hospitals

The aim of the national community hospital survey was to collect data from a larger and more representative sample of the community hospitals that provide rehabilitation to older people in the UK. In partnership with the Community Hospital Association, we developed a brief postal survey instrument that focused on the four key cost-efficiency parameters identified in study 1, namely bed occupancy, input prices, lengths of stay and nursing staff mix. Questions relating to these four parameters were extracted from the existing items in the NHS Benchmarking Network Community Hospitals Project. We used a national sampling frame for community hospitals in the UK and posted the survey instrument to matrons/ward managers, with a postal reminder at 2 weeks.

Study 3: comparative case study of community hospitals

Three case studies were conducted that sought to provide insight into the less tangible aspects of community hospital ward care that were unlikely to be captured in the quantitative cost-efficiency analysis. We anticipated that this would produce a more complete description of community hospital ward performance in terms of what made it work and for whom, the resources needed and the professional, organisational, cultural and other contextual factors that influenced effective care delivery. We purposively selected three community hospital wards providing rehabilitation based on their relative cost efficiency (study 1), namely two 'high performers' and one 'low performer'. We used ethnographic methods (i.e. ward observation, informant interviews, shadowing staff, conversation and examination of documents) and grounded theory analytical techniques.

Study 4: development of a toolkit for commissioners and community hospital providers to optimise performance

A web-based interactive toolkit was developed by integrating the outputs from the econometrics analysis (study 1) and the qualitative case studies (study 3). The content of the toolkit was co-produced and iteratively modified by the Project Management Group, the Community Hospital Association and Patients Association. The toolkit consisted of a database in structured query language server, an application interface built in a Node.js framework and a front end (user interface) built using Angular 2 technology. The toolkit was hosted on a Windows® server (Microsoft Corporation, Redmond, WA, USA) within Internet Information Services (Microsoft Corporation).

Initial testing was conducted by the NHS Benchmarking Network analytics team. The web pages were then published to the testing area of the NHS Benchmarking Network server. A further round of testing took place with three community hospital sites. Amendments were made at this stage to ensure that the toolkits functioned correctly as specified and met user requirements.

Study 5: an analysis of the impact of intermediate-care services on secondary care utilisation

We obtained a data set from the Atlas of Variation in Healthcare and linked this to the NHS Benchmarking Network National Audit of Intermediate Care. The National Audit of Intermediate Care data set is a unique community service data set that contains descriptive, activity, process and outcome variables on four well-categorised and nationally common types of intermediate care: bed-based intermediate care (community hospitals and care home beds); crisis response teams; home-based intermediate care; and reablement services (primarily delivered by local councils). The Atlas of Variation in Healthcare is a collaboration between NHS England, Public Health England and NHS Right Care and reports a range of health-care indicators in terms of geographic footprints ('Maps'). Although there were five 'Maps' of potential interest to us in the Atlas of Variation (Maps 61–65), resource restraints led us to focus on Map 61: 'the rate of emergency admission to hospital for people aged $\geq$ 75 years with a length of stay of $<$ 24 hours per 100,000 population per Clinical Commissioning Group'. We used a series of multiple regression analyses to investigate the relationship between the dependent variable (the indicator of secondary care utilisation) and the independent variables characterising the activities of the four types of intermediate-care services. The analyses conducted for this work used the geographical footprint of a Clinical Commissioning Group.

Findings

Research objective 1: to measure the relative performance of community hospital wards

Cost efficiency (study 1)

The mean cost-efficiency predictions were consistent between several analytical approaches with a range of 0.72–0.92 and an average of 0.83. Community hospital wards operating at the highest cost efficiency were distinguished (although were not identified in our study because of anonymised records), which is useful to facilitate ranking and learning across the sector. The analysis suggests that, on average, if all community hospital wards were operating in line with the highest cost efficiency, savings of 17% (or £47M per year) could be achieved for our sample of 101 community hospitals. Potential efficiency in community

hospitals in the UK is comparable with those from the NHS acute hospital sector. Significant economies of community hospital size were found (this result is consistent across all the models estimated), implying that a 1% rise in output is associated, on average across the sample, with a 0.85% increase in costs.

National survey (study 2)

We posted the survey instrument to matrons/ward managers in 423 UK community hospitals. Despite careful design that included piloting and modifications, the response rate was poor (4.1%, $n = 24$). Thus, we were unable to recalculate community hospital cost efficiencies for a larger sample as planned; therefore, our cost-efficiency estimates relate only to the sample of 101 community hospital wards in the NHS Benchmarking Network data set.

Research objective 2: to identify the characteristics of community hospital inpatient care for older people that optimise performance

Cost efficiency study (study 1)

Four inter-related factors were identified that were statistically significantly associated with community hospital ward performance: number of occupied bed-days (this is derived from lengths of stay and number of admissions), bed occupancy rate, the nursing staff skill mix and ward staffing levels. From a practical point of view, these factors are all potentially modifiable by ward staff and hospital managers. There is, therefore, much that might be done at ward level to optimise efficiency.

Comparative case studies (study 3)

Ward staff ($n = 25$), senior and middle manager ($n = 18$) interviews and patient case studies ($n = 16$) were conducted, and 226 hours of ward observations obtained. The three hospitals varied in their degree of autonomy, in staffing and in operating systems. They converged in that their main function was to support discharges from the associated acute trust ('step-down' care). Quality aspects of rehabilitation were described: interdisciplinary working including collaboration in routine practices and effective interprofessional communication, meaningful engagement of patients and families, and managing care transitions. Recovery trajectories, which affected episode length, were identified. Features of practice that required further development were drawn out, including investment in training and support to provide appropriate and effective care to patients with multiple and complex needs.

Research objective 3: to develop a web-based interactive toolkit to support operational changes to optimise performance) (study 4)

The toolkit was launched for discussion and feedback at a community hospital association annual conference in June 2017 in the format of an interactive workshop. Delegates' suggestions for further modification were recorded and incorporated into the final version.

The toolkit comprises three key components:

1. an efficiency calculator (based on the results of study 1)
2. a scenario calculator (to model the effects of changes to key parameters)
3. the case vignettes (study 3).

The toolkit is now available at http://mocha.nhsbenchmarking.nhs.uk/ (accessed 9 September 2019).

Research objectives 4 (to investigate the impact of community hospital care for older people on secondary care use; study 5) and 5 [to investigate if there is an association between the configuration of intermediate-care services (i.e. community hospital wards, home-based rehabilitation, care home rehabilitation and reablement services) and reduction in secondary care bed utilisation; study 5]

Our main finding was that the crisis response team type of intermediate care had a statistically significant negative association with the emergency admission indicator. Thus, as crisis response team activity increased,

there was an associated decrease in emergency admissions with a length of stay of < 24 hours for people aged ≥ 75 years. None of the other types of intermediate-care activity was associated with a reduction in emergency admissions. Thus, for bed-based (a term that includes community hospitals) and home-based intermediate care, and reablement services, no statistical link to admission avoidance was found in our analyses.

Limitations

Our econometric analyses were based on cross-sectional data sets that may lose validity within a changing NHS. We were also limited by missing data so that only 101 out of the 158 community hospitals available to us in the NHS Benchmarking Network community hospital data set could be included in the analyses. We do not know the reason for the missing data and have assumed it to be missing at random for the purposes of our work. The low response rate to our national survey means that we cannot extrapolate reliably from our sample of 101 community hospital wards to present estimates for potential savings for the national stock of community hospitals in England or in the UK. Similarly, the study to investigate the effect of different types of intermediate care on emergency admissions to secondary care was limited by the modest number of Clinical Commissioning Groups (between 41 and 54) in the data set, and because we were able to investigate only one indicator of acute hospital admissions for older people.

Conclusions

The results suggest that efficiency of community hospital wards in the NHS is comparable with that of the NHS acute sector. Furthermore, the results also suggest that there are modifiable performance factors that might reasonably lead to potential efficiency savings that might be augmented further by economies of scale. We also present the first evidence to confirm the admission avoidance function of the intermediate-care service model of crisis response teams. This finding did not extend to the current use of community hospitals, which are currently more frequently used as step-down facilities.

Findings from the case studies showed how collaboration and interprofessional working and knowledge-sharing drove goal-planning and actions, informed by engagement of patients and family members. These mechanisms and practices established a framework for ongoing progress review and identifying the support necessary to facilitate ‘safe’ discharge. Thus, discharge-planning was both an end point in the hospital episode and a critical juncture in the patient journey. Findings also show how intravariation in length of inpatient stay reflects the complexity of patient need and associated recovery trajectories and reinforces the significance of a system approach to understanding community hospitals.

Research implications

- Future research should be based, when possible, on panel data sets that follow key variables over time. This would allow increased analytic power and should be possible given that the National Audit of Intermediate Care is now in its seventh iteration and that the Atlas of Variation is regularly updated.
- Future national surveys of community hospitals should include our four key variables so that cost efficiency can be calculated as a new summary outcome for community hospital ward performance.
- A programme of development work could be initiated to examine the extent to which community hospital wards are able to optimise their efficiency and quality using the published toolkit. This might include new training programmes for staff working in this sector that take account of the increased complexity of patients.
- Community hospitals tend to be considered in isolation. More whole-system analyses should be carried out, possibly using other national ‘Maps’ available in the Atlas of Variation, to investigate further the impact of community hospital activity on secondary care utilisation. Our preliminary econometric analyses suggest that this is methodologically feasible.

- At care delivery level, there is need for in-depth research into the relationship between patient profile, mechanisms and practices for delivering rehabilitation, patient recovery trajectories and destination outcomes.
- There is need for the development of a more granular understanding of intermediate-care service use and their combinations to better understand how to optimise outcomes for patients with particular characteristics.

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