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The provision of hospital at home care: results of a national survey of UK hospitals

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Abstract

Background

Hospital at home (HaH) replicates elements of hospital-based care in the community, to facilitate the safe management of a broad spectrum of acute illness in the patient's usual environment. The extent to which this model of care has been adopted in the United Kingdom (UK) is unknown.

Methods

The Society for Acute Medicine Benchmarking Audit is a day of care survey undertaken annually within the UK. Participation is open to all hospital in the UK receiving acutely unwell medical patients. A questionnaire is used to collect hospital-level data on the structure and organisation of acute care delivery. The survey included questions designed to quantify the number of hospitals that offered HaH. When present, further questions were asked to clarify the characteristics of the HaH service in terms of workforce, range of diagnostic test and interventions. This information was used to build a picture of HaH service provision at a national scale.

Results

A total of 130 hospitals contributed organisational data to SAMBA19. The capability to refer to a hospital at home service was recognised by 46.9% (n = 61) of units. The majority of these services, 83.3% (n = 50) were nurse-led. The capability to provide a physician review at home was reported in 23.3% (n = 14). The majority of services could provide intravenous antibiotics at home, but access to other simple interventions, such as intravenous diuretics or acute supplemental oxygen, is limited.

Conclusion

At present, few Acute Medical Units in the UK have access to a hospital at home service capable of replicating essential elements of inpatient care. Significant changes to existing acute care organisations and investment in infrastructure are required to establish equal access to hospital-at-home care within the UK.

What's already known about this topic?

HaH is a model of care which allows acute illness at a level of severity that would typically require inpatient care to be managed in the patient's usual environment. The effectiveness of this type of care has been demonstrated across a range of clinical conditions.

What does this article add?

We report the first description of the provision of HaH care at a national level. We identified wide variation in both the availability of HaH care and the capabilities of individual services. A small number of services were identified which offered a range of services that would be anticipated to replicate routine hospital care.

Introduction

In the United Kingdom (UK), the standard acute care pathway is based on a simple model with the hospital at its core. The care of patients with medical emergencies primarily occurs within Acute Medical Units (AMUs) led by a dedicated team of specialist physicians with expertise in acute medicine.[1] AMUs function at the interface between the community, the emergency department and the wider hospital. Physicians practising in the community do not typically have timely access to the resources needed to diagnose and manage acute illness at higher acuity levels.[2] If urgent imaging, laboratory blood tests or parenteral treatment is deemed necessary, escalation of care to the hospital is the default option.

There is an increasing interest in alternatives to hospital-bed based care models for patients with acute medical illness.[3] The Hospital at Home (HaH) model provides short-term, targeted interventions equivalent to that delivered within an acute hospital but within an individual's own home.[4] HaH is delineated from other community-based services by its role in managing conditions associated with degrees of acuity that would invariably require escalation to the hospital if the HaH option was not available. Care is delivered by multidisciplinary teams and overseen by a specialist clinical decision-maker. There is a growing evidence base that HaH is a safe and effective care model for a range of acute conditions.[5-7] The model is particularly effective in managing decompensated heart failure and acute exacerbations of chronic obstructive airways disease in selected cases.[8]

Increased provision of HaH care is acknowledged as a vehicle to improve care for older patients living with frailty in acute crisis within UK healthcare policy.[9, 10] Hospital admission is associated with a period of heightened risk for adverse events which persists beyond discharge.[11] Older patients living with frailty are at elevated risk of delirium, falls, and hospital-acquired infections, which are deleterious to the outcome and distressing to patients.[12] It is plausible that environmental factors associated with hospital bed-based care influence the incidence of these complications and the trajectory of functional recovery. A recent multi-site randomised controlled trial of HaH care in acutely unwell older patients

found a reduced risk of admission to long-term residential care at six months.[13] Increased physical activity levels during the acute care episode associated with HaH care provide a plausible mechanistic explanation for this finding.[14]

The emergence of Coronavirus disease (Covid-19) has had a profound global impact and posed fundamental questions regarding how healthcare systems should be organised to meet the challenge. Rapidly expanding the number of available inpatient beds has been a critical strategic approach but is practically constrained by space and cost. It has become clear that existing models of care are not optimised for this situation. The threat of viral outbreaks has severely limited hospitals ability to undertake business as usual. The need for contingencies less reliant on traditional hospital infrastructure to mitigate this risk is clear. Several HaH models focusing on the management of patients with covid-19 have been recently described, suggesting this approach is feasible and safe for selected patients.[15, 16]

Providing specialist services capable of safely managing acute illness across an extended range of severity is an attractive solution to address some of these concerns. The extent to which existing community infrastructure could accommodate patients with higher levels of dependency and acute illness is not clear. Establishing the current landscape of HaH provision in the UK could provide important insights into the investment and resource allocation required to make this approach a viable option.

The Society for Acute Medicine (SAM) undertakes an annual day-of-care survey called the Society of Acute Medicine Benchmarking Audit (SAMBA). The audit is designed to allow individual hospitals to assess adherence to national policy and measure performance against defined quality indicators. Questions were included within SAMBA to determine the current prevalence of HaH models of care in the UK and describe the variation between models regarding access to diagnostic and treatment modalities.

Methods

SAMBA19 was completed on Thursday 27th June 2019 between 00:00 and 23:59. Hospital participation in SAMBA 19 is voluntary. Recruitment is open to all public hospitals in the UK receiving acutely unwell medical patients. Non-acute and community hospitals were excluded from participating. Data collection was overseen locally by a named consultant physician. A description of SAMBA methodology has previously been reported elsewhere.[17] The study protocol is available via the SAM website.[18]

Data on the structure and composition of each SAMBA participating hospital was obtained using a unit questionnaire completed by the locally designated SAMBA lead. The presence of a HaH service was ascertained in each hospital. The definition of what constituted a HaH service was left to the discretion of the respondent. Subsequent questions asked for specific details relating to the organisational structure of the HaH services, including details around the workforce involved in care delivery and the range of diagnostic tests and interventions available within the service.

Statistical analysis

Numerical data are summarised as mean and standard deviation for normally distributed data and median and interquartile range (IQR) for non-normally distributed data. Discrete data are presented as counts with proportions. Differences in normally distributed numerical data were compared using a t-test, and counts were compared using a chi-squared test. Plots are provided with error bars indicating 95% confidence intervals. Statistical analysis was performed using R statistical software.

Ethics and approvals

As an audit, SAMBA does not require formal ethical approval. All patient-level data are collected during the delivery of routine care. Participating units were asked to register with their local audit office and Caldicott Guardian. Patient-level data uploaded to the online portal was non-identifiable. SAMBA is listed on the NHS England Quality Accounts list as a priority audit.

Results

A total of 130 hospitals participated in organisational data in the survey. The mean number of inpatient beds in participating hospitals was 554 (SD 258). The capability to refer to a HaH service was recognised by 46.9% (n = 61) of responding AMUs. There was no difference mean number of inpatient beds between hospitals with HaH services and those without (HaH = 570 SD 246, No-HaH = 546 SD 268, p-value = 0.6). HaH was provided by an acute hospital trust in 50.8% (n = 31) of and by community healthcare trust in the 49.2% (n = 30).

A comparison of acute hospital and community commissioned HaH models in terms of the range of services offered is provided in figure 1. The range of services offered was broadly similar. The delivery of acute oxygen therapy was significantly more common in HaH models commissioned by community healthcare trusts (Acute = 5 of 31 (16.2%), Community = 14 of 30 (46.7%), p-value < 0.05). Physicians led a higher proportion of HaH models commissioned by acute hospital trusts, but the difference was not statistically significant. (Acute = 6 of 31 (19.3%), Community = 4 of 30 (13.3%).

The workforce structure of each HaH service was described by 98.4% (n = 60) of responding units with a HaH service. The service was led by nurses in 83.3% (n = 50) of cases and by a physician in 16.7% (n = 10). All services could provide assessment by nurses in the home, and 15% (n = 9) utilised non-registered nurses to facilitate assessment and provide care in the home. Doctors provided home visits to conduct medical assessments in 23.3% (n = 14) of services. Assessment and treatment by therapists were provided by 45.0% (n = 27) of services.

The range of diagnostic tests and investigations varied between services. The majority of services could arrange blood tests following transfer of care to HaH after an initial assessment in the hospital (86.7%, n = 52). A smaller proportion, 30% (n = 18), provided initial blood tests without the need for prior hospital assessment. The capability to perform an ECG was present in 8.3% (n = 5) of services and to perform point of care ultrasound in 1.7% (n = 1). No diagnostic investigations were directly available in 8.3% (n = 5) of HaH services.

The spectrum of available interventions also varied between services. Intravenous antibiotics could be administered in the home by 93.3% (n = 56) of services, intravenous diuretics by 41.7% (n = 25) of services and intravenous fluid by 36.7% (n = 22) of services. The capability to provide acute oxygen therapy was present within 31.6% (n = 19) of services and acute nebulised medication within 11.7% (n = 7). A summary of the combinations of interventions and diagnostic capabilities among the reported services is shown in Figure 2. The most commonly described service defined by respondents as HaH provided home intravenous antibiotics in isolation without access to other features characteristic of the HaH model.

Discussion

Summary of results

We present survey data from a national audit of acute hospitals in the UK to describe the scope and nature of HaH care. Approximately half of the surveyed hospitals did not have access to a HaH service. Hospitals have a significant amount of autonomy in how to design and deliver acute care. There are many potential explanations for unequal access to HaH, including differences in organisational culture, resource availability, and local patient demography. The causes of variation were not addressed directly by our study. For HaH care to become ubiquitous throughout the UK, a significant number of hospitals would need to be convinced of the potential benefits and invest in change.

A significant proportion of services identified as HaH were limited to providing intravenous antibiotics without access to other diagnostic or treatment modalities. The absence of input from specialist clinicians and the restricted range of basic tests and treatments suggests the majority of services described are not designed to manage acute illness at levels of acuity that would typically require hospital assessment and inpatient admission.

Public sector healthcare in the UK has a relatively complex organisational structure. In England, care is organised around Acute and Community NHS Trusts. Acute NHS Trusts provide secondary care services such as emergency departments, inpatient and outpatient medicine and surgery from hospitals that range in size. Community healthcare trusts typically offer services such as district (community) nursing and community physiotherapy. In other areas of the UK, acute and community care is integrated. The HaH model provides care for patients with severity of illness that would typically require hospital admission, but it does so in a community setting. These characteristics may explain why HaH models within the UK are operated by acute and community organisations in equal measure. NHS community services perform a diverse range of activities and exhibit marked variation local in composition and design.[19] The need to bolster community services to reduce hospital admissions is made explicit within the NHS long term plan.[3]

This policy environment may explain the involvement of community healthcare trusts in the delivery of care traditionally provided by acute hospitals. The range of services offered was similar when HaH models were compared based on their source of commissioning. HaH models commissioned by community hospital trusts were statistically more likely to provide acute oxygen therapy. This may reflect the commissioning structure of specialist community respiratory services which focus on the management of acute exacerbation of chronic respiratory conditions. These services are often delivered by community providers with additional support from hospital respiratory departments.[20]

Limitations

This survey is the first to quantify UK HaH service provision and provides the best insight so far into the range of services identified locally as providing HaH care. In the UK, the management of acutely unwell medical patients requiring inpatient admission occurs almost exclusively in hospitals with an AMU. There are approximately 225 AMUs in the UK.[21] This suggests a response rate of 58.6%. Participating AMUs covered a wide geographical area and a range of hospital sizes, including district general hospital and university teaching hospitals. This suggests SAMBA provides a reasonable approximation of HaH nationally. Systemic differences between SAMBA participating and non-participating AMUs may affect the accuracy of our estimates.

The questionnaire was completed by a member of the acute medical team based within the hospital, who may not have had full knowledge of the complete range of available capabilities of their HaH service. It is, therefore, possible that the restricted scope of the services described represents a limited or flawed understanding by the respondent of the services available rather than a genuine absence. Unit questionnaires are overseen by a senior practising clinician likely to have a detailed knowledge of local services, reducing the likelihood of misrepresentation.

Comparison with other literature

The HaH model is internationally recognised, and its implementation has been described in Europe, Australia and the United States of America.[22-24] No previous attempts have been made to map the provision of HaH services on a national scale. The HaH literature is characterised by descriptions of individual HaH models delivered by individual care providers and pooled analysis of potentially different models. Interpretation of this body of literature is complicated by the absence of a universally accepted definition of HaH.[23] Fundamentally, the model is defined by an ability to manage acute illness in the community that would otherwise require escalation to the hospital for assessment and treatment. The structure and organisation of services, including the range of diagnostic tests and treatments deemed necessary to achieve this aim, may differ. The involvement of a specialist physician, nurse visits, the ability to perform basic blood tests and administer IV treatments (most notably antibiotics and diuretics) are core components. It could be argued that a much more comprehensive range of capabilities would be required to truly replicate hospital-level care. Services with the ability to respond to physiological disturbance with appropriate organ support, such as intravenous fluid or oxygen therapy, were rare within our survey even though such interventions are commonplace in the context of hospital admission.

Making direct comparisons with hospital care by defining HaH models by the range of interventions provided is problematic. The involvement of specialist clinicians with the knowledge and expertise to make informed clinical decisions and appropriately manage risk could be seen as more important than the individual interventions offered. Only a small proportion of the HaH services identified provided a medical assessment by a physician in the patients home environment. While multidisciplinary care is of pivotal importance, it would be expected that the absence of this capability from most models would lead to constraints in the spectrum of conditions and level of risk which could be safely managed. Several previous studies demonstrating the efficacy of HaH models have been physician-led.[25-27] It is dif-

difficult to establish how the range of services described compares with HaH provision internationally. Descriptions of individual services from specific regions are relatively abundant but may not provide a good representation of care by different providers within the same country. We are not aware of previous attempts to map HaH provision at the national scale. International comparisons based on differences in the range of tests and treatments offered ignores differences in the wider health ecosystem between countries, which may drive fundamental differences despite superficial similarities.

The HaH model requires the involvement of clinical decision-makers capable of practising outside the comfort of the hospital environment. Delivering HaH care involves a mixture of skills not currently in line with any individual speciality training program curriculum. Fostering the skills needed may necessitate bespoke training tailored to the role. Although not a prerequisite for an effective model of HaH care, rapid advances in the provision of point-of-care diagnostics may facilitate broader access to investigations previously restricted to the hospital environment; specifically, the use of point-of-care ultrasound may have practical applications allowing refinement of diagnoses without the need for conventional radiology.[28] The range of diagnostic tests and interventions required to deliver acute care through a HaH model optimally is not clearly defined and may differ in response to the local healthcare environment and population health needs.

Implications for practice and research

The expansion of HaH services to effectively manage acute illness has never been more important than at present. Covid-19 has dramatically changed the landscape of acute care and has necessitated careful re-assessment of the balance of risks and benefits associated with hospital admission. The mainstay of management in covid-19 pneumonia is supplemental oxygen alongside careful monitoring. The vast majority of patients do not require advanced levels of organ support within an intensive care unit.[29] Dramatically expanding bedded inpatient capacity to deal with predicted surges in demand due to covid-19 is practically challenging and potentially unnecessary if equivalent care could be provided at home. The benefits of incorporating a robust HaH model into the broader health care system in the current climate extend beyond those with confirmed or suspected coronavirus infection. For many, particularly older patients with complex comorbidity and features of frailty, the threat of catastrophic consequences in the event of coronavirus infection has changed the threshold at which assessment in the hospital is in the

patients best interests. This re-calibration to risk is a logical response to changed circumstances but may exclude some patients from potentially beneficial treatment. The HaH model could provide a sensible alternative to hospital assessment and admission for this patient group. Our findings suggest very few existing HaH services in the UK would have the necessary resources to manage covid-19 pneumonia without significant expansion in the range of diagnostic tests obtainable, treatments offered, and supportive measures available. This would require re-organisation and investment based on our assessment of HaH provision before covid-19.

Conclusion

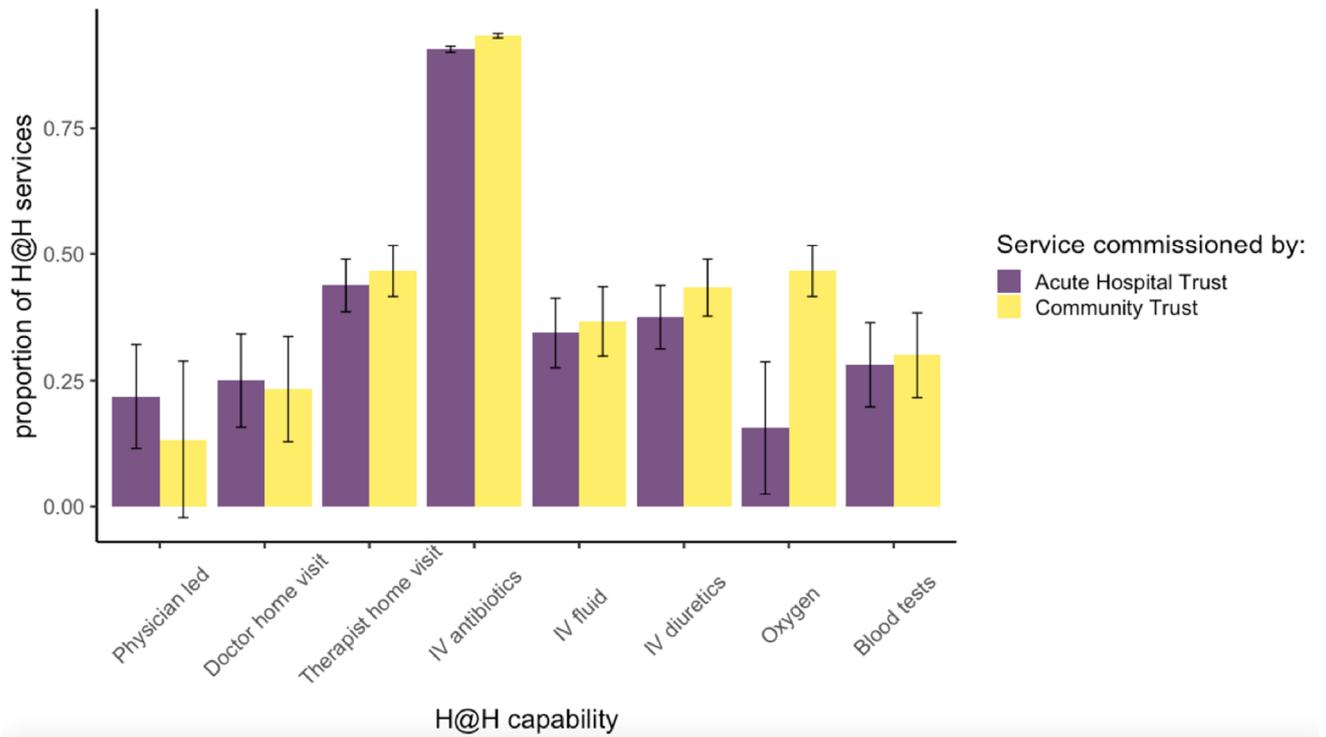
The provision of HaH as a model of care is currently limited in the UK. Where HaH services exist, their capacity to provide diagnostic testing and interventions varies. Establishing equal access to HaH across the UK will require system-wide changes to acute care organisation, alongside engagement and investment from those delivering and organising care.

Disclosures, funding and acknowledgements

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Figure 1

Comparison of HaH models based on commissioning organisation



Caption

The plot demonstrates the combinations provided by individual HaH services. Dots represent specific capabilities within a service. Horizontal columns represent the total numbers of services offering that particular service. The vertical columns represent combinations of services.

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