



Rapid Response

Admission avoidance hospital at home for older people with frailty

HIS Evidence Conclusions

- The evidence base for Hospital at Home (HaH) is characterised by heterogeneity. The range of patient populations encompassed, the specification of interventions, including the way in which services are accessed, and the scope and intensity of health and social care input vary widely. The diagnostic and treatment interventions available to patients at home also varies. This heterogeneity reduces the certainty and applicability of the evidence.
- Randomised controlled trial evidence consistently supports the safety of HaH for selected older people with frailty, finding no evidence of increased mortality or readmission rates in the months following the acute illness when compared with standard hospital admission.
- In the largest trial, HaH was geriatrician-led and included multidisciplinary care and comprehensive geriatric assessment. Most patients were admitted to HaH from a short-stay assessment unit. This trial reported that participants allocated to HaH were less likely to be living in long-term residential care at six months.
- Patient selection to identify those who can safely receive treatment at home is illustrated by study exclusion criteria focusing on particular clinical conditions, availability of informal caregivers and suitability and location of home environment.
- There is consistent evidence from prospective studies that costs of care are lower for HaH when compared with inpatient care and two studies indicate that HaH is likely to be a cost-effective alternative.
- Across a range of measures, patient preference for and satisfaction with HaH appears to be high with respondents to surveys and interviews citing home comforts and familiarity of environment as benefits along with being able to continue the routines of family life, better sleep and nutrition and avoiding infection risk.
- Very little evidence was identified that specifically considered the views of a patient's family, friends and informal caregivers.

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What were we asked to look at?

For this rapid response we were asked to:

- summarise the findings of an evidence synthesis on admission avoidance hospital at home (HaH) for frail elderly patients which was published by Healthcare Improvement Scotland in January 2020
- update the 2020 report by identifying and incorporating new evidence.

Methods

A literature search was carried out between 8 and 14 October 2019. An update search was undertaken on 24 January 2022. Concepts used in the searches included: Hospital at Home, admission avoidance and frail elderly.

The term “Hospital at Home” has varied definitions across the published literature. Study selection was based on identifying interventions which met the following criteria:

- Service provides active treatment by healthcare professionals in the patient’s own home (or care home) for a condition that otherwise would require acute hospital inpatient care, and always for a limited time.
- Provides care and treatment for acutely unwell people. It is specialist-led, with senior medical decision-making.
- Referrals to HaH may come from the ambulance service or general practitioners, as well as from hospital emergency departments or acute assessment wards.
- Distinct from community-led services to reduce unplanned hospital admissions or services to facilitate early hospital discharge.

Outcomes of interest included mortality, hospital admission, transfer to residential care settings, length of stay, quality of life, patient satisfaction, staff satisfaction, safety, cost effectiveness.

2022 Update

UK randomised controlled trial with economic evaluation and qualitative analysis

Clinical effectiveness

A randomised controlled trial (RCT) conducted across nine UK centres (two in Scotland) compared treatment in established comprehensive geriatric assessment HaH (CGAHaH) services (n=687) with inpatient hospital care (n=345).¹ Randomisation was in a 2:1 ratio to reflect the need to reduce demand on acute hospital beds which may imply variation in perceived equipoise between interventions.² Study participants were people aged ≥ 65 who were being considered for an unplanned hospital admission from a short-stay acute assessment unit (eight centres, 77.6%) or from primary care (one centre, 22.1%). Participants were recruited between 2015 and 2018. Having a caregiver was not a requirement for participation. Exclusion criteria included suspected stroke, end of life care, living in a residential care setting or having an unsafe home environment.

Four essential components of the HaH intervention were:

1. geriatrician-led admission avoidance HaH
2. a multidisciplinary team
3. healthcare guided by the principles of CGA, that included virtual rounds, and
4. direct access to acute-hospital based healthcare, such as diagnostics and transfer to hospital.

The core workforce usually included consultant geriatricians, junior doctors, nurse practitioners, healthcare assistants or support workers, physiotherapists, occupational therapists and community pharmacists. The CGAHaH services had access to social workers, homecare, district nursing, community rehabilitation and community mental health services.

For the inpatient arm of the trial it was estimated that around 80% of patients would receive geriatrician-led care with CGA, with 20% receiving general medical hospital care.

The primary outcome was living at home at six months (ie alive and not living in long-term residential care). Secondary outcomes included death, length of stay, readmission, patient satisfaction and quality of life. Delirium was measured at three and five days and one month.

The mean age of participants was 83.3, 60.8% were female and 72.3% had some cognitive impairment. The most frequently cited presenting problems were acute functional deterioration, falls, shortness of breath and confusion/dementia/delirium. Infections were diagnosed in 44.4% of participants.

There was no evidence of a difference between interventions in the outcome living at home at six months (adjusted relative risk (RR)=1.05, 95%CI 0.95 to 1.15, p=0.36) or 12 months (RR=0.99, 95%CI 0.89 to 1.10, p=0.80).

There was also no evidence of difference in the risk of death at six months (RR=0.98, 95% CI 0.65 to 1.47, p=0.92) or 12 months (RR=1.14, 95% CI 0.80 to 1.62, p=0.47).

The rate of admissions to long-term residential care at six months was lower in the CGAHaH group (RR=0.58, 95% CI 0.45 to 0.76, p<0.001).

Thirty-seven patients allocated to CGAHaH were immediately admitted to hospital. Seventy six patients allocated to inpatient care were admitted to CGAHaH because of strong preference for care at home or pressure on hospital beds. Mean initial length of stay was greater in the group allocated to CGAHaH compared with those allocated to hospital admission (6.89 CGAHaH days compared with 5.25 hospital days).

There was a higher risk of readmission or transfer to hospital in the CGAHaH group at one month (RR=1.32, 95% CI 1.06 to 1.64, p=0.012), but no evidence of a difference between groups at six months (RR= 0.95, 95% CI 0.86 to 1.06, p=0.40) where 54.4% of CGAHaH and 56.6% of hospital patients had been readmitted. The authors suggest that the higher transfer rate at one month could have arisen in part from limited availability of overnight care.

There was no evidence of a difference between groups for the presence of delirium at three or five days and a relative reduction in the CGAHaH group at one month (RR=0.38, 95% CI 0.19 to 0.76; p=0.006). This finding was based on only 10 cases in the CGAHaH group so requires cautious interpretation.

Patient satisfaction was measured at one month using the patient-reported experience questionnaire and was greater in those receiving CGAHaH.

Health related quality of life was recorded at six months using the EQ-5D-5L instrument which covers mobility, self-care, usual activities, pain/discomfort and anxiety/depression. There was no evidence of a difference in scores between study groups. The tool was completed by research nurses.

Cost-effectiveness

An economic analysis conducted alongside the RCT estimated costs per participant including healthcare, social care and societal perspectives.³ Costs included staffing, medicines, equipment, transport and overheads as well as loss of productivity of informal carers. Only completed cases where full information on costs were available were included. Sensitivity analysis suggested minimal impact of missing data.

Costs were UK £s, 2017-2018 prices. Time horizon was six months. The cost of hospital care was based on an average of national data for non-elective short stays and long stays and elective long stay admissions that were relevant to the trial population. This may have overestimated hospital costs.⁴

When adjusted for factors including gender and baseline utilities, total healthcare costs per patient at six months for the CGAHaH group (n=563) were £15,124 whilst for the inpatient group these were £17,390 (n=274) a mean difference of -£2,265 (95%CI -£4,279 to -£252). When total societal costs were included, the total cost per patient was £19,067 for the CGAHaH group compared with £21,907 for the inpatient group, mean difference -£2,840 (95%CI -£5,495 to £-185).

When adjusted for gender, known cognitive decline, baseline utilities and site, the quality adjusted life years (QALYs) from baseline to six months calculated from risk of dying and change in quality of life were not significantly different between the two groups (0.245 compared with 0.247). The confidence intervals around the mean difference were wide (-0.002, 95% CI -0.013 to 0.010) indicating uncertainty.

The study authors conclude that, taking a health and social care perspective, admission avoidance CGAHaH is likely to be cost-saving and has a 97% probability being cost effective at a willingness to pay threshold of £20,000 per QALY despite large uncertainty around the effect of CGAHaH on QALYS.

Patient and carer experiences of acute healthcare in hospital or HaH

As part of the RCT a qualitative researcher undertook interviews (n=34) with participants (alone or with their informal carers (n=29) to explore the work of patients and caregivers at the time of an acute health event, the interface with health professionals in hospital and CGAHaH and how their experiences related to the principles that underpin CGA.⁵ Three of the nine trial sites contributed participants to this part of the study. Participants were purposively selected for diversity of characteristics which may impact on how people cope with changes in health such as presenting health conditions, social care receipt and family situation.

Findings included:

- Patients and carers described the process of working together to understand a change in health and what action was required. This was more complex when patients were showing confusion.
- There was a perception amongst family caregivers that their knowledge of the patient could have informed decision-making but that they had not been invited to contribute to assessment.
- Many carers expressed reluctance to challenge hospital staff if their concerns were not acknowledged. Some became more assertive after repeat admissions.
- Respondents were not aware of goal documentation and conveyed a lack of involvement in hospital discharge planning.
- Uncertainty and ambiguity around when discharge from HaH would occur was raised.
- HaH respondents described the work of monitoring safety and containing risks.
- Carers living separately from the HaH patient were concerned about substituting for 24-hour hospital care.
- Many respondents commented on lack of a written record from both hospital and HaH.

The study concluded that older people and informal caregivers have a substantial role in managing the complex relational structures and decision-making that support autonomy and the provision of healthcare during an acute health crisis.

US randomised controlled trial with cost analysis and qualitative evaluation

An RCT from the US randomised emergency department patients who were assessed as having low risk of clinical deterioration to a home hospital service (n=43) or usual care (n=48).⁶ Patients who were living alone were not excluded. Participants were required to live within five miles of the hospital. All patients received at least one visit from a general internist and two daily visits from nursing staff. A home hospital physician was available 24 hours a day for urgent issues and visits. All patients had continuous remote monitoring of temperature, heart rate, respiratory rate, movement and falls and had access to oxygen therapy, intravenous medications and in-home radiology as well as point-of-care diagnostics.

The primary outcome was cost of the acute care episode. Secondary outcomes included healthcare use, physical activity and patient satisfaction.

The adjusted mean cost of the acute care episode was reduced by 38% (95%CI 24% to 49%, $p < 0.001$) in the home hospital group compared with the inpatient group. Patients in the home hospital group had less imaging, fewer laboratory tests and fewer consultations. At 30 days from discharge the readmission rate was lower for home hospital patients (7% compared with 23%).

Home hospital patients were less sedentary and spent less of the day lying down. Both study groups reported similarly high levels of satisfaction with care.

Patient perspectives

A qualitative evaluation was conducted as part of the RCT described above.⁷ Brief, semi-structured interviews (n=36) focused on patient perspectives of their wellness and the clinicians and caregivers supporting that wellness. The interviewers did not have any prior relationship with participants. There were large differences in one of the emerging themes between home hospital patients and those who had an inpatient stay. Under the heading of factors promoting healing, participants who had received home hospital emphasised the value of 'sleeping in their own bed' whilst inpatients described interrupted sleep and discomforts of a hospital bed. Participants at home described being able to 'roam' in and enjoy the comforts of their usual environment whilst those in hospital were more limited in what activity they could do. Both groups noted burden on family and friends either in providing care or in costs and effort of travelling to hospital visits.

Safety from infection risk was noted by home hospital participants alongside doubts about safety should more serious illness develop. Hospital patients appreciated proximity to quick care 'if anything happened.'

Implementation in rural areas

The authors of the RCT and qualitative evaluation have explored rural clinicians perceptions around barriers to implementing rural care at home in the US context.⁸ These included geographic accessibility, internet connectivity and staffing issues. A simulation exercise using mock admissions emphasised the importance of patient selection.⁹ These studies were not examined in full text for this rapid response.

Survey of UK Hospital at Home services

Cross-sectional survey data from a voluntary audit of acute hospitals in the UK undertaken on 29 June 2019 was used to describe the scope and nature of HaH care services.¹⁰ Responses were provided by nominated individual clinicians. A total of 130 hospitals participated out of approximately 225 acute medical units. The capability to refer to a HaH service was noted by 46.9% (n=61) of participating hospitals. Information on workforce structure and investigations and treatments was provided by 60 of the units with HaH. The service was nurse-led in 83.3% (n=50) of cases and led by a physician in 16.7% (n=10). All services could provide assessment by nurses in the home. Doctors provided home visits to conduct medical assessments in 23.3% (n=14) of services. HaH services would likely have encompassed early supported discharge as well as admission avoidance. Survey findings for diagnosis and treatment capabilities are in Table 1

Table 1: Interventions available in HaH services in UK

Capability	Number of HaH services (baseline 60)	Proportion of HaH services
Intravenous antibiotics	56	93.3%
Arrange blood tests	52	86.7%
Intravenous diuretics	25	41.7%
Intravenous fluids	22	36.6%
Oxygen therapy	19	31.6%
Nebulised medication	7	11.7%
Electrocardiogram	5	8.3%
Ultrasound	1	1.7%

US survey of reasons for participating in or declining HaH

A US survey of 442 patients offered HaH, mainly following assessment in the emergency department, explored reasons for choosing HaH or hospital admission.¹¹ For those who accepted HaH (n=295) in-person or telephone surveys were conducted by a research assistant within a few days of HaH admission. When a patient or their representative declined HaH (n=147) staff documented verbatim the reasons that were given. This qualitative data on reasons for refusal was independently reviewed and categorised by three data analysts. It is unclear why views were collected in different ways from the two groups and whether the survey of those accepting HaH had a fixed list of potential responses.

The primary reasons patients (or their representative) gave for accepting HaH were that they anticipated being more comfortable at home (78.2%), liked having family around (40.7%) and being able to do things around the home (36.1%). They also noted being away from other sick people (22.7%), having a bad hospital experience in the past (19%) and having fear of not returning home from hospital (8.8%).

For those who declined, 35% did not provide any specific reason. The most commonly cited reason was concern around having their care needs met (12.9%) and having strangers visiting their home (10.9%). A small proportion of respondents (2.7%) declined because their caregivers needed respite. The authors note that reasons for declining HaH may have been limited since the person collecting views was typically the clinician offering HaH.

2020 Evidence summary

The 2020 report is available at the link below.

<https://ihub.scot/media/6929/20200130-hospital-at-home-supporting-appendices.pdf>

This section summarises key evidence which was identified.

Systematic review

A Cochrane systematic review of randomised controlled trials (RCTs) published in 2016 encompassed a broader patient population than frail elderly since it included patients aged 18 and over.¹² Sixteen RCTs comparing H@H with inpatient care were included, covering UK, Europe, Australia and New Zealand. Half of the trials excluded patients who did not have continuous family support. The co-primary outcomes were mortality and transfer to hospital.

Mortality

- There was no evidence of a difference in mortality at three months between patients experiencing HaH and those receiving inpatient care. At six months there was evidence consistent with the possibility of a small beneficial effect. Evidence for mortality was described as moderate-certainty.
 - Mortality at three months follow-up was assessed based on individual patient data meta-analysis from five studies (n=833). Following adjustment for age and sex, the RR was 0.77 (95% confidence interval CI 0.54 to 1.09, p=0.15).
 - Mortality at six months follow-up was based on published and unpublished data combining six trials (n=912). RR was 0.77 (95% CI 0.60 to 0.99, p=0.04).

Transfer to hospital

- There was no evidence of an effect of HaH on hospital readmission or transfer for older patients (≥65 years) at an average of five months follow-up (RR = 0.98 95% CI 0.77 to 1.23, p=0.84), seven studies (n=834). Evidence was described as moderate-certainty for this outcome.

Secondary outcomes

The Cochrane review reported only low certainty evidence for living in residential setting at follow up (inconsistent findings), length of stay (inconsistent findings).

For patient satisfaction, there was variation in instruments used, response rates and timing of measurement so certainty was low. Overall, HaH patients expressed greater or similar satisfaction with care or location of care when compared with those receiving inpatient care.

For other outcomes including functional ability and complications it was not possible to combine studies because of heterogeneity in populations and measures used.

Cost data relating to three studies where the participants were elderly patients with a health condition all indicated that costs were lower for the HaH patients, but the costs included varied across the studies.

Randomised controlled trial

A UK RCT was conducted across three hospitals in one UK NHS Trust.¹³ Elderly patients with acute exacerbation of chronic obstructive pulmonary disease (COPD) admitted to hospital and identified as at low mortality risk were randomised to HaH under the care of a hospital respiratory team, (n=60) or to usual hospital care (n=58), Usual care (UC) focused on prompt discharge. The authors of the study emphasised that, since all or most of the admission was avoided, the HaH intervention differed from early supported discharge and encompassed patients who were more unwell. The primary outcome was health and formal social care costs at 90 days.

Cost

- Mean 90-day costs of health and formal social care were £1,016 per patient lower in HaH group (95% CI £-2,735.5 to £644.8). The difference in cost was driven by reduced bed days. The probability of HaH being cost effective compared with UC was 90% at the NICE threshold of £30,000 per QALY. HaH was both cheaper and more effective for most patients treated (74% probability). The authors note that extending the analysis beyond 90 days may have been preferable to identify any potential difference in readmission rates.

Length of hospital stay

- Length of hospital stay was significantly shorter in the HaH group (p=0.001) with similar clinical outcomes between groups as measured by use of A&E, GP and secondary care services up to three months after discharge.

Readmission rates

- Readmission rates were similar in both arms, with 22 (36.7%) in HaH and 23 (39.7%) in UC

Mortality

- There was one death at follow up in each study group.

Patient preference

- When asked at day 14, around 90% of all patients in the trial stated that they would prefer HaH to usual care for future exacerbations of similar severity.

Non-randomised comparative study

A retrospective propensity score matched analysis used patient-level administrative data from three Scottish Health Boards to compare healthcare costs and mortality rates associated with unscheduled hospital care and geriatrician-led admission avoidance HaH services.¹⁴ Follow-up period was six months from the index discharge.

Healthcare costs

Findings were different for each site:

- For site 1, the cost of HaH was, on average, 18% lower than inpatient care. When the index admission cost was excluded the costs in the six months following discharge were on average 27% higher for recipients of HaH than for those receiving inpatient care.
- For site 2 there was, on average, no difference between total costs of the two services. When the

index admission cost was excluded the costs in the six months following discharge were on average 9% higher for recipients of HaH than for those receiving inpatient care.

- For site 3, the cost during index admission in HaH and over the six months after index discharge was, on average 15% higher than admission to hospital. When the index admission cost was excluded, the costs in the six months following discharge were on average 70% higher for recipients of HaH than for those receiving inpatient care.

The costs during follow-up were largely driven by acute non-elective admissions.

Mortality rates

The analysis found an increased risk of death during follow up at all three HaH sites, (RR=1.09, 1.29, 1.27 respectively). Conclusions on this were limited by the possibility of residual confounding. The study authors highlighted potential confounders not included in the analysis, such as the use of community and social services prior to admission and also noted the risk of confounding by indication where patients in particular clinical situations are more likely to be referred to one or other service.

Qualitative studies and evaluations

Patient and carer interviews

One UK study conducted semi-structured interviews with patients with chronic obstructive pulmonary disease (n=44), carers (n=15) and staff (n=30) participating in a COPD HaH RCT.¹⁵ Barriers identified included; fear of being alone when unwell in case condition deteriorates, and privacy concerns around people coming into one's home. Facilitators to implementation included: comfort in the home environment, improved sleep and nutrition and less disruption to family and social life.

An evaluation of HaH included patient (n=5) and carer (n=3) interviews.¹⁶ Patients valued being in a familiar environment and reported feeling safe at home. Patients and caregivers reported apprehension about admission to an acute hospital and caregivers reported that it is important to them to be able to maintain their own daily routine.

Focus groups and staff interviews

Another qualitative study, this from the USA, used focus groups and interviews with staff and stakeholders to explore barriers and facilitators to setting up a HaH service.¹⁷ These included policy and regulatory issues, the need to develop internal and external partnerships, clarity around eligibility criteria and coordination of services.

Patient satisfaction survey

An evaluation of a service providing acute care at home in south London used a 20-question survey to explore patient satisfaction.¹⁸ Response rate was 14%. Satisfaction was high with 99% of respondents reporting being very satisfied or satisfied. Patients preferred having treatment at home and reported feeling safe within the service. Areas highlighted for investigation were adequacy of pain control and access to patient records during home visits.

Medical staff electronic survey

GPs and hospital doctors (n=49) were recruited to an electronic survey around their perception of involvement in an admission avoidance CGAHaH service in Fife, Scotland.¹⁶ The majority were aware of the types of patients who were suitable for HaH and were positive about their experiences of the single point of access for referral. Some noted that information provided on discharge from HaH sometimes lacked detail and format, and GPs reported having to follow up with HaH staff to clarify information. Approximately half of the respondents reported that HaH had increased their workload.

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