



The Response of Hospital at Home Services During the Covid-19 Pandemic: A Scoping Review

Toal, D., Ryan, A., & Ryan, K. (2023). The Response of Hospital at Home Services During the Covid-19 Pandemic: A Scoping Review. *Home Health Care Management & Practice*.
<https://doi.org/10.1177/10848223231188714>

[Link to publication record in Ulster University Research Portal](#)

Publication Status:

Published online: 30/07/2023

DOI:

[10.1177/10848223231188714](https://doi.org/10.1177/10848223231188714)

Document Version

Author Accepted version

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‘The Response of Hospital at Home Services during the Covid-19 pandemic: A Scoping Review’

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Disclaimers: The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Source of support: The author received no financial support for the research, authorship, and/or publication of this article.

Word Count:

- Abstract: 249
- Text (4149)

Number of figures and tables:

- Tables: 5
- Figures: 1

Disclosure of relationships and activities:

Ms Deborah Toal: MSc student and lead author

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Abstract

Title: The impact of Hospital at Home services during the Covid-19 pandemic: A scoping review.

Aim: To examine the national and international literature on the response of adult Hospital at Home (HAH) services to the global Covid-19 pandemic.

Objectives: Explore key themes to emerge and make recommendations for further research.

Methods: The databases were searched using agreed search terms. Arskey and O'Malley's scoping review framework was utilised and papers were identified and analysed for common themes.

Results: 31 papers were included in the review. Of the papers included, general adult medicine was the largest service group (n=15) with geriatric services the next largest (n=12). Most papers were European in origin (n=19). Key themes to emerge include 1) similar outcomes for HAH patients compared with traditional inpatient care, 2) expansion of capacity for inpatient care due to HAH use, 3) growth of virtual monitoring in HAH setting, 4) reduction in infection transmission in HAH setting, and 5) cost reduction due to HAH utilisation.

Conclusion: Hospital at home demonstrated good outcomes for both patients with Covid-19 and other conditions during the pandemic. These services also expanded capacity during a global healthcare crisis. Remote monitoring played a major role in the expansion of capacity and the reduction of infection transmission during the pandemic. Although some papers discuss how HAH is more cost effective than traditional hospital, more work is needed around this as many of the patients may not have been as sick as those admitted to traditional hospital during the pandemic.

Key Words

Hospital at Home, Acute Care at Home, Hospital in the Home, Covid-19, Coronavirus, Sars-cov-2.

Introduction

The term 'Hospital at Home' (HAH) is used to describe a service which provides hospital level care in a patient's own home. Its establishment was driven by the growth of the multimorbid older population living at home and increasing pressures on inpatient services.¹ Treatment may consist of intravenous antibiotics, fluids, diuretics, or oxygen therapy.

There is a growing body of international literature on the positive impact of HAH services for older people.²⁻⁶ The key difference between Hospital at Home and other home health services is that HAH is an alternative approach to support people who would otherwise require inpatient care. The evidence suggests that HAH is a proven alternative in caring for older people, and in caring for those with chronic conditions, oncological conditions, and acute mental health episodes.⁷⁻¹⁰

Background

In America, HAH services were first developed in the early 1990s and focused on looking after older people as hospital avoidance schemes.¹¹ In Australia, HAH services have been well established since the early 1990s where the initial focus was on delivering intravenous therapy to adults of all ages in their own homes as an early discharge from hospital service.¹²

There is a growing body of international literature on the positive impact of HAH services for older people.^{2, 6, 3,4} Hospital at Home services internationally include speciality areas such as oncology, respiratory, mental health and paediatrics. The key difference between Hospital at Home and other home health services is that HAH is an alternative approach to supporting people who would otherwise require in-patient care.

The Covid-19 pandemic has resulted in an unprecedented global increase in the demand for acute care beds.¹³ The World Health Organisation estimates there have been almost 7 million Covid-19 deaths globally.¹⁴

The pandemic has prompted healthcare services to deliver innovative models of care to manage demand of inpatient services.¹⁵ Services such as HAH, virtual and telephone appointments have expanded exponentially.¹⁶ The NHS published papers in 2020 which identified HAH services as a resource to provide acute care in the community.^{17,18} HAH services have played a role in reducing the need for hospitalizations in the past and have proven to be more cost effective than inpatient care.⁵

Methods

A scoping review was conducted to examine the literature on the impact of Hospital at Home Services during the Covid-19 pandemic. The review does not re-produce the findings of Cochrane reviews which have highlighted the impact of HAH services which focused on safety and outcomes in a pre-pandemic world.³⁻⁵ Instead, this scoping review highlights key themes emerging from the literature on the impact of the Covid-19 pandemic on the delivery of hospital at home services.

Aim

To examine the national and international literature on adult HAH services and the response they had to the global Covid-19 pandemic.

Design

Scoping reviews are an effective method of mapping out the literature and identifying key concepts.¹⁹ According to Arskey and O' Malley, scoping reviews may be used to determine if a full systematic review of the literature is needed and can enable gaps in the literature to be

identified.²⁰ Levac et al.²¹ and Daudt *et al.*²² recommend the use of Arskey and O'Malley's framework and it was therefore used to guide this review.

The Arskey and O'Malley framework involves six distinct steps:

Stage 1. Identify the question.

Stage 2. Identify relevant studies.

Stage 3. Study selection

Stage 4. Charting the data

Stage 5. Reporting the results

Stage 6. Consultation

According to Arskey and O'Malley, the review question should be clearly defined to ensure a good search strategy, whilst remaining broad in nature to provide a wide breadth of coverage.²⁰

The second step, involves formulating a plan to include relevant databases, timeframe and language. The third step is selecting the studies. Once inclusion and exclusion criteria are applied, and duplicates are removed, this narrows the search to the most appropriate studies.²¹

The fourth step is charting the data, a data-charting form is utilised to extract data from each study. Arskey and O'Malley suggest using a descriptive or narrative method to extract the data. The fifth step in the process is to collate, summarise and report the findings using thematic analysis to provide an overview of the breadth of literature. The final step is consultation, which Arskey and O'Malley suggest is an optional step, to consult with stakeholders, and have reviews validated and disseminated to determine if further study is needed.

Arskey and O'Malley's framework has been further enhanced.^{21,23} Levac *et al.* recommended that the framework's 6th optional step, 'Consultation with Stakeholders' is an essential step as

it adds methodological rigor to a review.²¹ In this review, the sixth step was achieved by sharing the findings with HAH teams and by presenting the findings at the World Hospital At Home Society (WHAHS) conference in Barcelona in 2023. Tricco *et al.* highlight the need for scoping reviews to be systematic to be trustworthy pieces of work.²⁴ McGowan *et al.* recommended the use of a PRISMA checklist specific to scoping reviews to improve the quality of the reporting of scoping reviews.²⁵ Consequently, the PRISMA-ScR checklist developed by Trico et al was used in this study (Table 5).

Identifying the Question

A good question facilitates an effective literature search and helps to develop a structured review. Peters *et al.* and others recommend Population, Concept and Context (PCC) for formulating a question which the authors used.^{26,27} The question developed was, What has been the response of Hospital at Home services during the Covid-19 pandemic?

Identifying relevant studies.

To ensure the use of correct search terms, the author contacted the World Hospital at Home Society (WHAHS) to source commonly used terms to describe hospital at home services around the world. Hospital in the Home describes services in Australia, Hospital at Home and Acute Care at Home depicts services in UK, Europe and the USA. DT took advice from an experienced healthcare librarian, using Mesh headings the following terms were searched:

- Hospital at Home

- Acute Care at Home

- Hospital in the Home

· Covid-19

· Coronavirus

· Sars-cov-2.

The following databases were explored with the guidance of the health science librarian: CINHAL, MEDLINE, Web of Science, and Scopus. The author contacted the HAH UK, Australian and World societies for grey literature. The reference list of selected papers was also searched.

Mesh headings and Boolean operators AND/OR were used to link terms and expand the search, See PRISMA, Figure 1.

Study selection

All databases were searched for peer reviewed articles from February 2020 until March 2022. This allowed the period of the COVID -19 pandemic to be captured. Peer review ensured an added level of rigor to the study search process.

A scoping review allows the author to capture a broad range of work, including grey literature and work presented at conferences. The emphasis in scoping reviews is not on the quality of the paper, but on examining emerging evidence that may lead to more specific questions that can be rigorously addressed in the form of a systematic review or Randomised Control Trial (RTC).²⁶ The research team agreed the inclusion and exclusion criteria

Inclusion criteria

- All papers from start of Covid-19 pandemic (February 2020).
- Worldwide, but must be published in English.
- All participants must be over 18yrs old.

- Must have received HAH care.

Exclusion criteria

- No papers prior to 2020.
- No language other than English.
- No children under 18.

An experienced librarian then worked closely with DT to conduct an initial search of the literature. The results were then discussed, and DT conducted an initial screening of titles and abstracts to identify the publications most closely aligned to the aim of the review. The team then reviewed the results and any borderline papers were reviewed by AR.

Following more in-depth screening and independent reading by DT and AR, a total of 31 papers were deemed suitable for inclusion in the review.

Results

Charting the data.

The literature search was captured on a PRISMA flow chart (Figure 1). The 31 papers were read and re-read by the author to familiarise oneself with the data. Initially key information was charted for each paper, including publication year, aims, design, sample size, findings and any limitations (Table 3).

The author carried out a narrative synthesis of the results. Most studies included were from Europe (n=19) followed by North America (n=8), Australia (n=2), Asia (n=2). Most of the papers were service evaluations or descriptive observational studies looking at new services set up in response to the COVID-19 pandemic (n=20). A breakdown of study characteristics can be viewed on Table 1. Eleven studies describe how already established services responded

to the pandemic. One study focuses on patient satisfaction to evaluate their service and another on staff satisfaction. The health outcomes for patients with COVID-19 are examined in 23 papers, with one paper examining a case study looking at the outcomes for a patient with dementia being cared for by HAH. From the 31 papers, a total sample size was calculated (n=11,877). However, this reflected differing time periods ranging from eight days to six months. Of the papers included, general adult medicine was the largest service group (n=15) with geriatric services the next largest (n=12). There was also representation from haematology (n=2), oncology (n=1) and women's health (n=1). A breakdown of the studies by setting is also available (Table 2).

Collating, summarising and reporting results

Familiarisation with the selected papers facilitated the identifications of key themes. Kiger and Varpio suggest familiarisation of the data and repeated reading is essential to analyse and discover themes.²⁸ An initial content analysis was performed by DT and this was validated by AR. Similar words and phrases from each paper were highlighted using different coloured markers, recurrent themes were noted in the margins and common themes were identified.

Five key themes emerged from the selected papers (Table 4). These were 1) similar outcomes for HAH patients compared with traditional inpatient care, 2) expansion of capacity for inpatient care due to HAH, 3) growth of virtual monitoring in HAH setting, 4) reduction in infection transmission in HAH setting, and 5) cost reduction due to HAH utilisation.

1. Similar outcomes for HAH patients compared with traditional inpatient care

Twenty-three of the papers detail patient outcomes for the service during the pandemic. The majority of which measure length of stay, mortality rate and transfer or escalation rate to

hospital. The median length of stay for these services ranges from 3 days²⁹ to 13 days.³⁰ The service in New York that Heller *et al.* describe had a mean age of 60yrs old.²⁶ Meanwhile Nougues *et al.* evaluate a service for over 75s which was potentially a more complex patient group.³⁰ Mortality rates range from 0%³¹ to 6%.³² However, Schiff *et al.* actively participated in advanced care planning.³² Additionally, it is important to note that Llorens *et al.*³¹ studied patients who were mostly under the age of 65, whereas in the case of Schiff *et al.* over half (55%) of their patients were over the age of 80yrs old.³² Keenan *et al.* reported a mortality rate which was 2% higher than the rate in UK hospitals, however this group in HAH had an average Clinical Frailty Score of 7.³³ This is higher than the average for inpatients in hospital.³⁴ This could be in part to the fact that patients selected for HAH are often those who would not be candidates for intensive care admission if they acutely deteriorated.

Goudman *et al.* measured patient satisfaction with their HAH service. All service users (n=20) were satisfied with the service and 100% state that they would choose to receive future treatment at home by the HAH team rather than in hospital.³⁵ Schiff *et al.* sought feedback from patients, carers and family members.³² 100% of patients felt well supported at home during their illness, and 88% of families felt supported. Respondents valued support provision to frail older people in their home environment and avoidance of the upheaval of hospital admission. Furthermore, Maniaci *et al.* measured patient satisfaction of their hybrid HAH service, which used virtual monitoring. They found patients had an overall positive experience and scored the service highly in areas such as staff communication and ease of equipment use. However, they had a low response rate of only 41%.³⁶

2. Expansion of capacity for inpatient care due to HAH

All 31 papers highlighted the pressure on services during the first and second waves of the Covid-19 pandemic. Pericas *et al.* explore how hospitals stepped up their HAH programme to

help alleviate the Covid 19 related pressures.³⁷ In Belgium, Mezela *et al.* (2021) measure the effectiveness of an early home abortion service.³⁸ Goudman *et al.* measure the effectiveness and safety of intrathecal pump refills at home.³⁵

Several papers measure bed days saved by the service during the period of the study. Nougès *et al.* note 12,297 saved bed days between March and May 2020 in the acute hospital by managing Covid-19 positive patients effectively in the community.³⁰ This resulted in a significant capacity expansion of 106%, however this service had been established for over 20 years. Multiple studies found significant bed days saved in acute hospitals.^{28,30-32, 39-41}

Schiff *et al.* admitted 39% of all acutely unwell adults over eighty years old with Covid-19 to their HAH service in London, making a significant contribution to local capacity.³² Levine *et al.* managed 15% of all Covid-19 positive patients and 5% of all non-Covid-19 patients in their catchment area in Boston.⁴¹ Benvenuti *et al.* compare the number of Nursing Home (NH) residents admitted to acute hospital with Covid-19 at the start of the pandemic to the number admitted after their service was operationalised.⁴² Prior to the introduction of their service, 58% of NH residents with Covid-19 required hospital admission. This dropped to 10% after the establishment of the service. In addition to managing patients in their own homes and nursing homes, Pericas *et al.* developed a hotel to manage HAH patients in one place, increasing capacity.³⁷

3. Growth of virtual Monitoring in HAH setting

Thirteen studies introduced remote monitoring to their service during the pandemic. Miyamoto *et al.* carried out remote or virtual monitoring with all patients who were clinically stable.⁴³ However, it was established that older patients and those with high risk factors would be

assessed face-to-face daily. The other services had clear escalation protocols in place for those who were virtually monitored but subsequently were assessed as needing a face-to-face assessment.

Although HAH has been widely studied as a safe and effective way to manage acutely unwell patients at home the same cannot be said for virtual monitoring of acutely unwell patients. Sitammagari *et al.* acknowledge that the safety of remote monitoring of acutely unwell patients has yet to be thoroughly investigated with randomised control trials.⁴⁴ Of these thirteen papers, six included the training of families to measure vital signs.^{30,44-48} Marinello *et al.* report that only those carers and families who were highly motivated to keep their loved one at home were willing to carry out remote monitoring.⁴⁷ Ryan *et al.* argue that remote monitoring of vital signs enabled clinicians to escalate care appropriately, reduced admissions to hospital of lower acuity patients with risk factors and also enabled the emergency department to safely discharge patients to HAH with monitoring.⁴⁸

4. Reduction of infection transmission in HAH setting

Twenty papers discuss how HAH and remote monitoring help to reduce both hospital acquired infections and community transmission of Covid-19. Levine *et al.* treated only Covid-19 negative patients to protect patients with underlying chronic conditions from contracting Covid-19 whilst in hospital.⁴¹ Furthermore, four papers discuss new HAH services for cancer and haematological patients during the pandemic. These services were developed to protect this group of patients who were considered high risk for developing serious complications if they contracted Covid-19. Many visits to the hospital setting were prevented by these services at the start of the pandemic, therefore minimizing exposure to a clinical environment and possible Covid-19 exposure.

Importantly, twelve papers focus on the care of older people including NH residents and document how they managed older people in their own home during a time when they were frightened to attend hospital. HAH services are key to reduce the risk of complications associated with hospital admission, including delirium, falls and other hospital-acquired infections.⁴⁹ Miyamoto *et al.* conclude that HAH is a better option than hospital for patients with a Clinical Frailty Score (CFS) of seven or more as these patients are less likely to be suitable for Intensive Care Unit level care.⁴³ Benvenuti *et al.* agree, and state that frail, older people are at risk of over-treatment when admitted to hospital with an acute illness.⁴² Mark *et al.* describe a new service to avoid attendances to the emergency department, the development of a mobile X-ray unit.³⁹ The service for older people following suspected fractures ensures that only those with confirmed fractures on X-ray are admitted while others remain at home. Kadafa *et al.* demonstrate how HAH's robust infection control measures resulted in no acquired Covid-19 cases on their service by either a patient or healthcare worker.⁵⁰

5. Reduced Cost due to HAH utilisation

Twelve of the papers discuss the cost saving of HAH, with many utilising remote monitoring. Many papers acknowledge the work already available on the cost analysis of HAH compared to traditional hospital care which describes its cost effectiveness.⁵¹ Llorens *et al.* calculate savings as 338.53 Euros per day, comparing the average cost of stay in acute medicine in hospital, to the average cost per day in HAH.³² Furthermore Levine *et al.* describe significant savings for their area in HAH.⁴¹ The field hospital set up in Boston to increase acute capacity cost \$75,000 per patient. Meanwhile traditional hospital care was on average \$15,000 per patient; HAH costs were 38% less than traditional hospital care, meaning HAH offers significant savings. However, several of the studies agree that a formal financial evaluation is required. This has also been reflected in work prior to the pandemic.⁵²

Discussion

The aim of this this systematic scoping review was to establish the impact of Hospital at Home Services During the Covid-19 pandemic. From the 31 papers identified for peer review, five themes emerged. These include similar of outcomes for HAH patients, expansion of capacity for inpatient care due to HAH, use of virtual monitoring in HAH setting, reduction in infection transmission in HAH setting, and cost reduction due to HAH utilisation.

This scoping review identifies similar outcomes for HAH patients compared to traditional inpatient care. Keenan *et al.* reports similar outcomes for frail older people with Covid-19 managed by HAH services compared to traditional hospitals.³³ Schiff *et al*'s. HAH service was specifically dedicated to frail older people whose care provision by geriatricians ensured that advance care planning and comfort care were a priority for individuals.³² This is consistent with previous work demonstrating HAH meets quality care standards similar to those of inpatient care.² Previous work also comments on reduction in delirium in HAH compared with inpatient admission.⁵²

From data available, all HAH services provide expansion of capacity for inpatient care. Services were innovative when planning for surges of Covid-19 including introduction of a Hotel HAH service.³⁷ This expanded capacity within the acute hospitals under the care of the HAH and demonstrates scalability and innovation during times of extreme pressure. There is a dearth of prior work on this issue, likely due to the fact that the COVID 19 pandemic was unprecedented in recent times. However, given the ageing population with increased frailty, this will likely be an ongoing issue, particularly with a focus on palliative care.⁵³

In addition to this, the scoping review shows that to scale up services, the use of virtual monitoring was essential in managing mild to moderate illness in the HAH setting. This shows the possibilities of virtual monitoring and may provide ongoing increased capacity within

healthcare. There is also anecdotal evidence to suggest that virtual monitoring may also have offered a safe working environment for many highly experienced clinicians who may have been otherwise isolating at home, and whose knowledge and skills may otherwise have been under-utilised during the pandemic. Most of the research available on virtual monitoring for patients at home has been since the COVID 19 pandemic but identifies it as a key component of disaster relief.^{54,55}

Reduction of infection transmission in the HAH setting proves a common theme. Chen et al. report SARS-CoV-2 to be highly communicable in hospital settings.⁵⁶ Virtual monitoring not only protects patients from exposure to clinical environments, but also affords protection to staff. Kadafa *et al*'s paper highlights the infection control procedures put in place and which resulted in no Covid-19 infections among patients and staff.⁵⁰ It is also possible that utilising technology and working from home removed some staff from the clinical environment and this may have reduced the spread of infection to staff and patients. However, Baker et al. found in their study the risk of transmission from staff to patient was low. Among 253 patients exposed to an infected healthcare worker there was only one clear case of transmission.⁵⁷ Other work from 2020 shows that infection transmission in an inpatient cohort is significantly reduced by the use of personal protection equipment.⁵⁸

The literature review also highlighted the impact of HAH services on families, many of whom were caring for sick relatives and who took on additional caring responsibilities. Muldrew *et al.* conducted a scoping review reporting that during lockdowns, support provision to carers was dramatically reduced as day centres and respite services stopped.⁵⁹ Fear of hospitalisation, which can often be a source of respite for carers, also added to carer strain during the pandemic. Cohen *et al.* agree, they find that care giver intensity and care giver burden increased during the pandemic.⁶⁰ Further research is required to explore this issue in greater detail.

HAH has been shown to be successful in managing chronic conditions, and now exhibits similar outcomes to hospital for Covid-19. Attention should be paid to the role HAH can play for older people in long term care facilities whose health and wellbeing can be negatively impacted by long waiting times in ED and unnecessary hospital admissions.

Previous studies validate the cost effectiveness of HAH.^{3, 61} Michaud *et al.* report that the use of telemedicine reduces healthcare costs although this fluctuates depending on equipment used, type of service and conditions being treated.⁶² Whilst it is possible that the use of virtual monitoring of patients may reduce HAH costs, further research and a comprehensive economic analysis is required.

Older people are disproportionately impacted by Covid-19. Morciano *et al.* highlights the 29,542 excess deaths in care homes in England between March and August 2020.⁶³ In America, Chapman and Harrington discuss how nursing home residents make up 0.5% of the total population of USA, however, they account for 30% of all Covid-19 deaths.⁶⁴ Daly (2020) highlights the failings in government policy during the beginning of Covid-19 which resulted in Covid-19 breakouts in many nursing home facilities.⁶⁵ Moreover, Rajan *et al.* argue that the British government's social care policies were ineffective due to delays in implementation.⁶⁶ This resulted in an inability to access funding, source appropriate PPE, and struggles with workforce retention during the first waves of Covid-19. Lessons learnt from this are likely to prompt discussion about the role of HAH in future care provision and support for our nursing homes.

Limitations

Most of the review papers are service evaluations; this was mainly because the services were new and developed quickly in response to the pandemic. Covid-19 is still a major health

challenge with new and emerging evidence ongoing, therefore more time may be needed to allow work to emerge.

This work was undertaken as part of a Masters degree programme of study and it was the lead author's first experience of doing a scoping review. While this could be considered a limitation, the input of a highly experienced librarian and the experience of the supervisory team significantly ameliorated this limitation. .

Conclusion and recommendations

This scoping review shows the positive impact HAH services had during the Covid-19 pandemic. Previous work has described HAH use prior to the COVID 19 pandemic however it proved to be a key mechanism for healthcare services to respond to an exponential increase in demand for services. HAH increased capacity in acute hospitals when it was needed. They explore different ways to deliver healthcare, including virtual monitoring and hotel hospitals, which evolved as the pandemic progressed. HAH prevented admission to hospital for frail, older people, and provided advanced care planning and end of life care with family present, during a time that visiting was restricted in hospitals. Furthermore, HAH expanded from its traditional areas of care such as acute medicine and geriatric care to women's health and oncology.

A full cost analysis of HAH services and patient outcomes during Covid-19 in comparison with traditional hospital care should be explored. Finally, additional work is needed to look at carer burden during the Covid-19 pandemic.

References

- 1, Department of Health, Policy & Strategy Directorate Delivering care closer to home: meeting the challenge.
2. Leff B, Burton L, Mader SL, Naughton B, Burl J, Inouye SK, Greenough III WB, Guido S, Langston C, Frick KD, Steinwachs D. Hospital at home: feasibility and outcomes of a program to provide hospital-level care at home for acutely ill older patients. *Annals of internal medicine*. 2005 Dec 6;143(11):798-808.
3. Shepperd S, Butler C, Craddock-Bamford A, Ellis G, Gray A, Hemsley A, Khanna P, Langhorne P, Mort S, Ramsay S, Schiff R. Is comprehensive geriatric assessment admission avoidance hospital at home an alternative to hospital admission for older persons? A randomized trial. *Annals of internal medicine*. 2021 Jul;174(7):889-98.
4. Shepperd S, Craddock-Bamford A, Butler C, Ellis G, Godfrey M, Gray A, Hemsley A, Khanna P, Langhorne P, McCaffrey P, Mirza L. A multi-centre randomised trial to compare the effectiveness of geriatrician-led admission avoidance hospital at home versus inpatient admission. *Trials*. 2017 Dec;18(1):1-9.
5. Shepperd S, Iliffe S, Doll HA, Clarke MJ, Kalra L, Wilson AD, Gonçalves-Bradley DC. Admission avoidance hospital at home. *Cochrane database of systematic reviews*. 2016(9).
6. Tibaldi V, Isaia G, Scarafioti C, Gariglio F, Zancocci M, Bo M, Bergerone S, Riccaud NA. Hospital at home for elderly patients with acute decompensation of chronic heart failure: a prospective randomized controlled trial. *Archives of internal medicine*. 2009 Sep 28;169(17):1569-75.

7. Mendoza H, Martín MJ, García A, Arós F, Aizpuru F, Regalado De Los Cobos J, Belló MC, Lopetegui P, Cia JM. 'Hospital at home' care model as an effective alternative in the management of decompensated chronic heart failure. *European journal of heart failure*. 2009 Dec;11(12):1208-13.
8. Mooney K, Titchener K, Haaland B, Coombs LA, O'Neil B, Nelson R, McPherson JP, Kirchhoff AC, Beck AC, Ward JH. Evaluation of oncology hospital at home: unplanned health care utilization and costs in the huntsman at home real-world trial. *Journal of Clinical Oncology*. 2021 Aug 10;39(23):2586-93.
9. Kaymaz D, Candemir İ, Ergün P, Demir P. Hospital-at-home for chronic obstructive pulmonary disease exacerbation: Will it be an effective readmission avoidance model?. *The Clinical Respiratory Journal*. 2021 Jul;15(7):716-20.
10. Singh R, Rowan J, Burton C, Galletly C. How effective is a hospital at home service for people with acute mental illness?. *Australasian Psychiatry*. 2010 Dec;18(6):512-6
11. Leff B, Burton L, Guido S, Greenough WB, Steinwachs D, Burton JR. Home hospital program: a pilot study. *Journal of the American Geriatrics Society*. 1999 Jun;47(6):697-702
12. Montalto, M. and Dunt, D. Home and hospital intravenous therapy for two acute infections: an early study. *Australian and New Zealand journal of medicine*, 1997 27(1), pp.19-23
13. Propper C, Stoye G, Zaranko B. The wider impacts of the coronavirus pandemic on the NHS. *Fiscal Studies*. 2020 Jun;41(2):345-56.
14. World Health Organisation. WHO COVID-19 Dashboard [Internet]. *World Health Organisation*. 2022. Available from: <http://covid19.who.int>

15. Taylor SP, Golding L. Economic considerations for hospital at home programs: beyond the pandemic. *Journal of General Internal Medicine*. 2021 Dec;36(12):3861-4.
16. Dykgraaf SH, Desborough J, de Toca L, Davis S, Roberts L, Munindradasa A, McMillan A, Kelly P, Kidd M. “A decade’s worth of work in a matter of days”: the journey to telehealth for the whole population in Australia. *International journal of medical informatics*. 2021 Jul 1;151:104483.
17. NHS ENGLAND . *COVID-19 NHS preparedness and response*. www.england.nhs.uk/coronavirus. 2020 London: NHS ENGLAND, pp.1–9.
18. NHS SCOTLAND. *Delivering a whole system response to Covid-19*. www.stac.scot.nhs.uk/coronavirus. 2020 Edinburgh: The Scottish Government.
19. Souza MT, Silva MD, Carvalho RD. Integrative review: what is it? How to do it? *Einstein* (São Paulo). 2010 Jan;8:102-6.
20. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *International journal of social research methodology*. 2005 Feb 1;8(1):19-32.
21. Levac D, Colquhoun H, O'Brien KK. Scoping studies: advancing the methodology. *Implementation science*. 2010 Dec;5:1-9.
22. Daudt HM, van Mossel C, Scott SJ. Enhancing the scoping study methodology: a large, inter-professional team’s experience with Arksey and O’Malley’s framework. *BMC medical research methodology*. 2013 Dec;13:1-9.

23. Peters MD, Godfrey CM, Khalil H, McInerney P, Parker D, Soares CB. Guidance for conducting systematic scoping reviews. *JBI Evidence Implementation*. 2015 Sep 1;13(3):141-6.
24. Tricco AC, Lillie E, Zarin W, O'Brien K, Colquhoun H, Kastner M, Levac D, Ng C, Sharpe JP, Wilson K, Kenny M. A scoping review on the conduct and reporting of scoping reviews. *BMC medical research methodology*. 2016 Dec;16:1-0.
25. McGowan J, Straus S, Moher D, Langlois EV, O'Brien KK, Horsley T, Aldcroft A, Zarin W, Garitty CM, Hempel S, Lillie E. Reporting scoping reviews—PRISMA ScR extension. *Journal of clinical epidemiology*. 2020 Jul 1;123:177-9.
26. Peters MD, Godfrey C, McInerney P, Munn Z, Tricco AC, Khalil H. Scoping reviews. *Joanna Briggs Institute reviewer's manual*. 2017;2015:1-24
27. Lockwood C, Tricco AC. Preparing scoping reviews for publication using methodological guides and reporting standards. *Nursing & Health Sciences*. 2020 Mar;22(1):1-4.
28. Kiger ME, Varpio L. Thematic analysis of qualitative data: AMEE Guide No. 131. *Medical teacher*. 2020 Aug 2;42(8):846-54.
29. Heller DJ, Ornstein KA, DeCherrie LV, Saenger P, Ko FC, Rousseau CP, Siu AL. Adapting a hospital-at-home care model to respond to new York City's COVID-19 crisis. *Journal of the American Geriatrics Society*. 2020 Sep;68(9):1915.
30. Nogués X, Sánchez-Martínez F, Castells X, Díez-Pérez A, Sabaté RA, Petit I, Brasé A, Horcajada JP, Güerri-Fernández R, Pascual J. Hospital-at-Home expands hospital capacity during COVID-19 pandemic. *Journal of the American Medical Directors Association*. 2021 May 1;22(5):939-42.

31. Llorens P, Moreno-Perez O, Espinosa B, García T, Payá AB, Sola S, Molina F, Román F, Jimenez I, Guzman S, Gil-Rodrigo A. An integrated emergency department/hospital at home model in mild COVID-19 pneumonia: feasibility and outcomes after discharge from the emergency department. *Internal and Emergency Medicine*. 2021 Sep;16(6):1673-82.
32. Schiff R, Oyston M, Quinn M, Walters S, McEnhill P, Collins M. Hospital at Home: another piece of the armoury against COVID-19. *Future Healthcare Journal*. 2022 Mar;9(1):90.
33. Keenan F, Warnock E, Rice M, Allen K, Warnock J, Beck P, Khan B, McCaffrey P. Outcomes of older COVID-19 patients in Acute Care at Home, Southern HSC Trust, Northern Ireland, from March-June 2020. *The Ulster Medical Journal*. 2021 Sep;90(3):162.
34. Basic D, Shanley C. Frailty in an older inpatient population: using the clinical frailty scale to predict patient outcomes. *Journal of aging and health*. 2015 Jun;27(4):670-85.
35. Goudman L, De Smedt A, Huygens R, Noppen M, Vanschoenwinkel M, Hatem SM, Moens M. Hospital at home for intrathecal pump refills: a prospective effectiveness, safety and feasibility study. *Journal of clinical medicine*. 2021 Nov 17;10(22):5353.
36. Maniaci MJ, Maita K, Torres-Guzman RA, Avila FR, Garcia JP, Eldaly A, Forte AJ, Matcha GV, Pagan RJ, Paulson MR. Provider evaluation of a novel virtual hybrid hospital at home model. *International Journal of General Medicine*. 2022 Feb 22:1909-18.

37. Pericàs JM, Cucchiari D, Torrallardona-Murphy O, Calvo J, Serralabós J, Alvés E, Agelet A, Hidalgo J, Alves E, Castells E, Seijas N. Hospital at home for the management of COVID-19: preliminary experience with 63 patients. *Infection*. 2021 Apr;49:327-32.
38. Mezela I, Van Pachterbeke C, Jani JC, Badr DA. Effectiveness and acceptability of “at home” versus “at hospital” early medical abortion—A lesson from the COVID-19 pandemic: A retrospective cohort study. *European Journal of Obstetrics & Gynecology and Reproductive Biology*. 2021 Dec 1;267:150-4.
39. Mark S, Henderson D, Brealey J. Taking acute medical imaging to the patient, the domiciliary based X-ray response team. *Radiography*. 2022 May 1;28(2):550-2.
40. Gomez-Centurion I, Oarbeascoa G, García MC, Lopez Fresnena MC, Martinez Carreno MJ, Escudero Vilaplana V, Gonzalez-Haba E, Bailén R, Dorado N, Juárez LM, Rodriguez Macias G. Implementation of a hospital-at-home (HAH) unit for hematological patients during the COVID-19 pandemic: safety and feasibility. *International Journal of Hematology*. 2021 Sep 22:1-8.
41. Levine DM, Mitchell H, Rosario N, Boxer RB, Morris CA, Britton KA, Schnipper JL. Acute care at home during the COVID-19 pandemic surge in Boston. *Journal of General Internal Medicine*. 2021 Nov;36:3644-6.
42. Benvenuti E, Rivasi G, Bulgaresi M, Barucci R, Lorini C, Balzi D, Faraone A, Fortini G, Vaccaro G, Del Lungo I, Gangemi S. Caring for nursing home residents with COVID-19: A “hospital-at-nursing home” intermediate care intervention. *Aging Clinical and Experimental Research*. 2021 Oct;33(10):2917-24.

43. Miyamoto Y, Matsuyama T, Kunimitsu K, Nagano H, Yamada Y, Murakami S, Yamahata Y, Ohta B, Morikami Y, Nakagawa M. Hospital at home for elderly COVID-19 patients: a preliminary report with 100 patients. *Journal of Clinical Medicine*. 2022 Mar 26;11(7):1850.
44. Sitammagari K, Murphy S, Kowalkowski M, Chou SH, Sullivan M, Taylor S, Kearns J, Batchelor T, Rivet C, Hole C, Hinson T. Insights from rapid deployment of a “virtual hospital” as standard care during the COVID-19 pandemic. *Annals of internal medicine*. 2021 Feb;174(2):192-9.
45. Hussein NR, Saleem ZS, Rashad BH, Naqid IA, Ibrahim N, Musa DH, Khezaqia ND, Yousif AH. Home management scheme for patients with severe covid-19 in Duhok city, Kurdistan region of Iraq: a possible role for family physicians. *Journal of Family Medicine and Primary Care*. 2021 Nov;10(11):4260.
46. Vella D, Thomas M, Pak J, Aarons K, Devanathan R, Scott B. Issues I: Nurse-led remote HITH program provides safe and effective care for patients with COVID-19. *Australian Nursing and Midwifery Journal*. 2021 Apr;27(3):36-8
47. Marinello R, Brunetti E, Luppi C, Bianca D, Tibaldi V, Isaia G, Bo M. Telemedicine-assisted care of an older patient with COVID-19 and dementia: bridging the gap between hospital and home. *Aging Clinical and Experimental Research*. 2021 Jun;33(6):1753-6.
48. Ryan PP, Hawkins KL, Altman S, Granatowski L, Shy BD, Long J, Hanratty R. A novel virtual hospital at home model during the coronavirus disease 2019 (COVID-19) pandemic. *Infection Control & Hospital Epidemiology*. 2021 Sep;42(9):1140-2.
49. Keeble E, Roberts HC, Williams CD, Van Oppen J, Conroy SP. Outcomes of hospital admissions among frail older people: a 2-year cohort study. *British Journal of General Practice*. 2019 Aug 1;69(685):e555-60

50. Kadafa, P.A., Keegan, R., Bland, P, VHI Health & Wellbeing, Vhi Hospital@home, Dublin, Ireland: infection control measures adopted to prevent the spread of covid-19 in ireland's sole hospital in the home service. 2021. As presented at World Hospital At Home (WHAH) 2nd Conference online 2021

51. MacIntyre CR, Ruth D, Ansari Z. Hospital in the home is cost saving for appropriately selected patients: a comparison with in-hospital care. *International Journal for Quality in Health Care*. 2002 Aug 1;14(4):285-93

52 Caplan GA, Coconis J, Board N, Sayers A, Woods J. Does home treatment affect delirium? A randomised controlled trial of rehabilitation of elderly and care at home or usual treatment (The REACH-OUT trial). *Age and ageing*. 2006 Jan 1;35(1):53-60.

53. Bone AE, Gomes B, Etkind SN, Verne J, Murtagh FE, Evans CJ, Higginson IJ. What is the impact of population ageing on the future provision of end-of-life care? Population-based projections of place of death. *Palliative medicine*. 2018 Feb;32(2):329-36.

54 Hollander JE, Carr BG. Virtually perfect? Telemedicine for COVID-19. *New England Journal of Medicine*. 2020 Apr 30;382(18):1679-81.

55 Sitammagari K, Murphy S, Kowalkowski M, Chou SH, Sullivan M, Taylor S, Kearns J, Batchelor T, Rivet C, Hole C, Hinson T. Insights from rapid deployment of a “virtual hospital” as standard care during the COVID-19 pandemic. *Annals of internal medicine*. 2021 Feb;174(2):192-9.

56 Chen Y, Tong X, Wang J, Huang W, Yin S, Huang R, Yang H, Chen Y, Huang A, Liu Y, Chen Y. High SARS-CoV-2 antibody prevalence among healthcare workers exposed to COVID-19 patients. *Journal of Infection*. 2020 Sep 1;81(3):420-6

57. Baker MA, Fiumara K, Rhee C, Williams SA, Tucker R, Wickner P, Resnick A, Klompas M. Low risk of coronavirus disease 2019 (COVID-19) among patients exposed to infected healthcare workers. *Clinical Infectious Diseases*. 2021 Oct 1;73(7):e1878-80.
58. Sitammagari K, Murphy S, Kowalkowski M, Chou SH, Sullivan M, Taylor S, Kearns J, Batchelor T, Rivet C, Hole C, Hinson T. Insights from rapid deployment of a “virtual hospital” as standard care during the COVID-19 pandemic. *Annals of internal medicine*. 2021 Feb;174(2):192-9.
59. Muldrew DH, Fee A, Coates V. Impact of the COVID-19 pandemic on family carers in the community: a scoping review. *Health & Social Care in the Community*. 2022 Jul;30(4):1275-85
60. Cohen SA, Kunicki ZJ, Drohan MM, Greaney ML. Exploring changes in caregiver burden and caregiving intensity due to COVID-19. *Gerontology and Geriatric Medicine*. 2021 Feb;7:2333721421999279
61. Jones J, Wilson A, Parker H, Wynn A, Jagger C, Spiers N, Parker G. Economic evaluation of hospital at home versus hospital care: cost minimisation analysis of data from randomised controlled trial. *Bmj*. 1999 Dec 11;319(7224):1547-50.
62. Michaud TL, Zhou J, McCarthy MA, Siahpush M, Su D. Costs of home-based telemedicine programs: a systematic review. *International journal of technology assessment in health care*. 2018;34(4):410-8.

63. Morciano M, Stokes J, Kontopantelis E, Hall I, Turner AJ. Excess mortality for care home residents during the first 23 weeks of the COVID-19 pandemic in England: a national cohort study. *BMC medicine*. 2021 Dec;19:1-1.
64. Chapman S, Harrington C. Policies matter! Factors contributing to nursing home outbreaks during the COVID-19 pandemic. *Policy, Politics, & Nursing Practice*. 2020 Nov;21(4):191-2
65. Daly M. COVID-19 and care homes in England: What happened and why?. *Social Policy & Administration*. 2020 Dec;54(7):985-98
66. Rajan S, Comas-Herrera A, McKee M. Did the UK government really throw a protective ring around care homes in the COVID-19 pandemic?. *Journal of Long-Term Care*. 2020 Nov 11;2020:185-95.

List of Tables

Table 1-Study Characteristics

Paper characteristics	Number of articles
Peer Reviewed	24
Cohort	2
Pilot	2
Observational	8
Case study	1
Comparative retrospective	2
Retrospective Case Series	4
Service evaluation	12
Prospective descriptive	1
Reports	7

Table 2-Setting of Studies included

Setting	Number of papers
Nursing Home	3
Own Home	23
Nursing Home and Own Home	4
Hotel	1

Table 3 -Key characteristics Data Extraction table

Author, Year and location	Aims	Design	Sample	Key findings	Limitations
Koeberle <i>et al.</i> 2020. France.	To improve care for older people during the Covid-19 pandemic.	A Service evaluation, examining the first 8 days of a new service set up.	99 Nursing home residents. 72 patients living in own home.	11 NH patients required transfer to hospital, the others were looked after successfully in the nursing home by Hospital at home, or virtual support from the Geriatric team. 38 of the patients living at home required transfer to hospital, the others cared for by nursing support or HAH, or GP involvement.	Only data from the first 8 days of the service is described.

Ryan <i>et al.</i> 2020. USA	To provide a safe home monitoring programme as a contingency plan for overflow of patients in hospital at home.	A Service evaluation following the implementation of a virtual hospital at home program for high-risk patients with Covid-19 and early outcomes associated with the programme.	233 patients included between April 3 rd and May 24 th 2020.	Mean age – 49yrs. With risk factors such as HTN, Obesity and diabetes. Average length of stay 4 days. 190 patients successfully discharged without ongoing care. 11 required transfer to hospital and 31 had follow-up care at home after discharge. 28% of patients were uninsured, with 38% on Medicaid.	A clinical intervention study, however, no comparison group. Only patients with a functioning phone could be enrolled.
Keenan <i>et al.</i> 2021. Northern Ireland	To provide improved outcomes for older people	An observational	123 patients between March	28-day mortality rate of 35%. With an 18% increase in	Although mortality rates were compared

	with Covid-19 in Acute care at home.	retrospective study.	and June 2020.	mortality for those in long term care facilities. 54% of patients were hypoxic and 70% were lymphopenic. 88 patients were residents in long term facilities. Mortality rates increased in direct correlation with admission NEWS scores. Mortality rate 2% higher than acute hospital.	with acute hospital, it would have been good to compare treatments received and other outcomes.
Marinello <i>et al.</i> 2021. Italy.	Telemedicine – assisted care of an older patient with Covid-	A case study.	1 case study.	Patient was successfully managed with IV fluids and bedside ultrasound	A case study of one patient. It would have been useful if they had

	19 and dementia.			carried out. Daily visits by Doctor and nurse including education to care givers.	included their results for all patients with similar demographic .
Vella <i>et al.</i> 2021. Australia.	Nurse-led HAH program provides safe and effective care for patients with Covid-19.	Service evaluation.	416 patients over a 6 month period	Only 8% required transfer to hospital. No deaths. High patient satisfaction.	No detail given on specific acuity of patients or specific outcomes. No comparison with other services.
Stall <i>et al.</i> 2021. Canada.	To describe the implementation of a partnership between hospital and	Description of service model.	126 patients in 1 NH.	89 Covid + residents and 47 + staff. 15 residents were transferred to the hospital, the rest were managed	No details of outcomes for patients under the programme. Mortality

	a nursing home during a Covid-19 outbreak.			within the nursing home, who recovered or received palliative care.	rate not given.
Lwin <i>et al.</i> 2020. Australia.	Outcomes of Hospital in the Home patients with Covid-19.	Retrospective observational study.	23 Patients.	Age range 68-78 yrs old. & patients required admission to hospital. 1 death.	No comparison with acute inpatients made. Mild to moderate disease only managed. No Treatment given, this was a monitoring service only.
Cheney 2021. USA	Describes the Hospital at home growth in America during Covid-19 pandemic.	Observational study of 3 separate HAH programmes.	3 separate services – no patient numbers given.	Services dramatically changed due to the Acute Hospital Care at Home waiver program. With	No patient outcome data for during the pandemic given. No Data given on the

				<p>an increase in service, users and the way in which patients were referred and treated, with more remote monitoring. One service reported a reduction in hospital escalation rates between November 2019 and November 2020.</p>	<p>number of patients cared for under the service during pandemic.</p>
<p>Nogues <i>et al.</i> 2021. Spain.</p>	<p>To establish if Hospital at Home can adapt during a crisis by expanding hospital capacity during the</p>	<p>Service evaluation</p>	<p>917 Patients between March 16th and May 13th.</p>	<p>Average length of stay -13 days. With 57 % of patients having a pneumonia diagnosis. 6% of patients were escalated for hospital care. 1</p>	<p>No comparison to Hospital level care, no direct assessment by senior clinicians.</p>

	Covid-19 pandemic.			patient died on the service. A total of 12,297 bed days were added to hospital capacity during the study period.	
Gomez – Centurion <i>et al.</i> 2022. Spain.	To provide a safe and feasible HAH unit for haematological patients during the Covid-19 pandemic.	Retrospective analysing of data for patients under the service.	105 patients between January and November 2020.	Median length of stay was 11 days. 8 escalations to hospital care. 14 patients received antibiotics at home. Overall over 1000 visits were made to patient's homes. A saving of 1768 bed days saved. A total of 239 visits to the haematological day hospital were saved. Only 4 patients	No comparison to hospital care. No cost comparison.

				developed Covid-19.	
Torrallardo na-Murphy <i>et al.</i> 2021. Spain	To describe the adaption of a hotel by a HAH team to provide hospital level care to large numbers of patients in Barcelona during the pandemic.	Retrospective data collection	516 patients between March 2020 and May 2020.	Treatments included Tocilizumab, antibiotics, antivirals, steroids and oxygen. 28 patients required escalation to inpatient hospital. 2 patients died. 12 required oxygen on discharge from HAH. And average length of stay was 9 days.	No comparison made with traditional hospital level care.
Llorens <i>et al.</i> 2021. Spain	To evaluate the effectiveness of an integrated ED/HAH	Retrospective cohort study.	377 identified as mild Covid pneumonia. 268	Age range of patients 40-59. 108 patients were treated with hydroxychloroquine and 87 with	Only those with mild Covid-pneumonia were included in

	medical care model in mild Covid-19 infection.		hospitalized and 109 HAH.	azithromycin and amoxicillin. Length of stay for HAH was 8 days. With 789 bed days saved.	study. Non randomised study, Patients were accepted who chose the service. A comparable RTC over a longer time frame for a larger sample size could have provided better conclusions.
Levine <i>et al.</i> 2021. USA.	To describe how Hospital at Home provides a high level of care whilst creating inpatient	Retrospective analysis of HAH programme.	65 patients over 95 day period.	419 bed days saved. Median age 66. 59% of patients were treated for infection. 3% were escalated to in patient care.	Small sample size, and limited to a small area.

	capacity during a pandemic.			65% were discharged with no further need for onward referral. HAH care was 38% less expensive compared to inpatient hospital care.	
Sitammagar <i>i et al.</i> 2020. USA.	To describe the development and rapid deployment of a virtual HAH programme.	Prospective case series.	1477 patients between 23 rd March and 7 th May 2020.	Median length of stay 11 days. 3% of patients required inpatient care. 184 required intervention such as IV fluids, IV antibiotics and supplementary oxygen. No reported deaths. Median age was 54 years.	Generalisability limited to those with working telephone and ability to speak English.

Hellar <i>et al.</i> 2020. USA.	To describe the experience of adapting a HAH to meet needs of the pandemic.	Retrospective analysis of service.	24 patients between 19 th March and 18 th April 2020.	The service was created in 2 weeks. 12 patients were Covid +. The mean length of stay was 3.1 days. Representing 75 saved bed days for the month. 3 patients were escalated to hospital care due to deterioration in condition.	Small sample size. No comparison.
Mezela <i>et al.</i> 2021. Belgium.	Evaluate the efficiency of a newly established protocol for at home abortion during the	A retrospective study comparing outcomes for at home abortion to inpatient.	181 patients. 96 in the at home group and 85 for the in hospital group.	Early retained trophoblastic material and surgical interventions were higher in the in hospital group. No significant	Although the care received was similar, the abortion protocols for the two groups differed, as did the dose

	Covid-19 pandemic.			difference was seen between the two groups in other outcomes. Satisfaction with care was equally high. However patients felt safer in the in hospital group.	of misoprostol.
Fouquet <i>et al.</i> 2022. France.	To describe how at home treatment was used to maintain multiple myeloma treatment while protecting the patient during the Covid-19 pandemic.	A comparative, retrospective study of service changes to meet the needs during the Covid-19 surge.	20 patients included. 15 of which had HAH treatment.	Each patient received a monoclonal antibody treatment at home. HAH had an increase of 12% activity for the study month. None of the patients had relapses at 10 month follow up. However 1 patient received	Small sample size, and no comparison with those that received their treatment as in patient.

				<p>palliative care with HAH. This resulted in a reduction in the number of Haematology patients attending day clinic, and therefore prevented patient contamination at hospital.</p>	
<p>Mittaine-Marzac <i>et al.</i> 2020. France.</p>	<p>To describe the activity and organisation of HAH structure during the Covid-19 pandemic for treating patients with</p>	<p>Retrospective analysis of the service pre Covid and during the first surge.</p>	<p>365 patients included in 'period 1' and 473 patients included in 'period 2'</p>	<p>The number of patients increased by 33% during the first surge. Including 159 new patients. The average adult age was 73, and the average child age was 10 yrs old. The</p>	<p>One cancer service declined to use HAH during the Covid surge, but no explanation is given as to why.</p>

	anti-cancer injections.			<p>delivery of anti-cancer preparations increased during the surge by 26%. None of the patients were escalated to hospital from either group. No nosocomial infection was reported after anti-cancer injection in HAH during the study period.</p>	
Pericas <i>et al.</i> 2021. Spain.	Description of the outcomes of patients in HAH during the peak of Covid-19 in Barcelona.	An observational study.	63 patients	Median age was 54. 50% were referred from hospital wards, the rest from emergency room. Median length of stay	Small sample size, the author notes the setup of the HAH hotel simultaneously which may

				<p>was 7 days.82% received anti-viral treatment, 17% received antibacterial agents. 3 patients required escalation to hospital. None of the patients died while on service or on follow up after discharge.</p>	<p>have resulted in smaller number to the HAH service in patients own home.</p>
<p>Mark <i>et al.</i> 2022. England.</p>	<p>To describe the development of an X-ray response team during the Covid-19 pandemic who carried out mobile radiologic diagnostics.</p>	<p>A pilot study.</p>	<p>56 patients.</p>	<p>Average age 80 years old. 86% of patients in own home, and 14% in care homes. 52 mobile x-rays carried out. 25 fractures found, with 27 people transferred to emergency department and</p>	<p>Small pilot study.</p>

				27 admissions avoided.	
Hussein <i>et al.</i> 2021. Iraq.	To investigate the clinical characteristics and outcomes of patients with severe coronavirus disease who were involved in the home management scheme in Duhok city.	A prospective descriptive study.	93 patients.	Average age was 60 yrs old. 72% had co-morbidities. Mortality rate of 3.29% which is similar rate for those admitted to hospital.	Small sample size, compared mortality rates only.
Benvenuti <i>et al.</i> 2021. Italy.	To describe the features and impact of an assistance model involving an	A retrospective descriptive study.	21 NHs (1159 residents) and 43 NHs (2448	38% of residents were Covid+ in wave 1, and 64% were positive in wave 2. 58.2% of Covid + residents were	The interventions delivered were many, so it is difficult to determine

	<p>intermediate care mobile medical specialist team, aimed at delivering 'Hospital in the Nursing Home' care to NH residents with Covid-19 in Florence, Italy.</p>		<p>residents) in wave 1 and wave 2.</p>	<p>transferred to hospital in 1st wave, and only 10% in 2nd wave. With mortality also higher in 1st wave (32% vs 23%).</p>	<p>whether any specific intervention reduced hospital admissions. The author acknowledges that they may have missed mild Covid-19 infection in 1st wave as routine testing was not done, however in 2nd wave all residents were routinely swabbed.</p>
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Maniaci, <i>et al.</i> USA.	To Measure patient experience of a hybrid virtual HAH.	Service evaluation, questionnaire given to patients.	99 surveys sent out.	100% satisfaction. Overall a positive experience for the patient.	Low response rate. 41 questionnaire s returned, so 41% return rate.
Poterre <i>et al.</i> , 2021. France.	A description of the creation of a dedicated HAH service for NH residents.	Retrospective observational service evaluation.	104 patients between April and June 2020.	15 died in the home ; 9 were secondarily hospitalised (1 death)	Small sample size. No comparison group.
Kadafa <i>et al.</i> 2020. Ireland.	To describe infection control measures adopted to prevent spread of Covid-19 in Irelands HAH service.	Observational study.	6 month period	None of the confirmed COVID-19 cases were acquired on the service by either a healthcare worker or patients.	Small time frame. Hard to signify adapted measures with low contamination.

<p>McCann <i>et al.</i> 2021. Northern Ireland.</p>	<p>To describe a HAH response to the Covid-19 pandemic.</p>	<p>Observational retrospective study.</p>	<p>112</p>	<p>The service moved from 5 day referral to 7, staff were redeployed to the team from other services. 81% increase in referrals from same period previous year. 112 Covid + in HAH, local hospital treated 266 in same period.</p>	<p>Small sample size and study time frame. Some comparisons made.</p>
<p>Barta <i>et al.</i> 2021. Spain</p>	<p>To describe patient satisfaction and experience with a medicalised hotel during</p>	<p>An observational descriptive study, using a questionnaire from Picker institute.</p>	<p>427 patients.</p>	<p>High satisfactions and positive experiences (95% and 84%).</p>	<p>No Indepth follow-up to measure experience.</p>

	covid-19 pandemic.				
Goudman <i>et al.</i> 2021. Belgium	To measure the effectiveness, and safety of Hospital at Home for intrathecal pump refills.	A pilot study investigating the safety and feasibility of the intervention	20 Patients	95% of participants felt safe during the procedure. The median time spent by the physician in the patient's home was 26 mins.	A pilot study, with a small sample size. No comparison was made against those who received their refill at home.
Schiff <i>et al.</i> 2022. London	To measure outcomes of patients with Covid-19 treated using an evidence based treatment bundle. To evaluate the experiences of patients	Service evaluation and outcome measure study.	125 patients	875 bed days saved = a full acute ward for a month that otherwise would have required hospital. Mean CFS was 7, and 42% were alive and well 1 month post discharge. 100% patient satisfaction, and	No comparison in outcomes for similar hospital patients. The patient experience was sought several months after treatment, which may

	receiving treatment.			a common theme was being able to be with family.	have led to poor recall.
Lui <i>et al.</i> 2022. USA.	To investigate whether the rate of care escalation from HAH to traditional hospital care in Covid+ patients differed based on patients' racial/ethnic backgrounds .	A retrospective cohort study.	2031 patients	The odds of care escalation from HAH were lower among non-Hispanic blacks (OR 0.84, CI 0.61-1.00, $p=0.052$) , but higher in Hispanics (OR 1.34, CI 0.99-1.81, $p=0.055$), compared to non-Hispanic whites.	Study carried out in one area of America, and population ethnicity may differ in other parts. Only English speaking patients were accepted, which may have impacted the amount of older Hispanic patient participation.

<p>Miyamoto <i>et al.</i> 2022. Japan</p>	<p>To measure outcomes of patients receiving HAH care for Covid- 19.</p>	<p>A service evaluation, using retrospective data from medical records.</p>	<p>100 patients</p>	<p>22 patients required escalation to hospital, 3 of whom died. No patients died while under care of HAH.</p>	<p>External validity is limited, as medical systems and Covid prevalence differs country by country. Nature of study means they could not determine a causal relationship between HAH care and safety or efficacy of care in older Covid-19 patients.</p>
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Table 4 -Themes identified

Themes	Papers
Patient outcomes	Nogues et al (2021), Ryan et al, (2020), Goudman et al (2021) Maniaci et al (2021), Schiff et al (2022), Koeberle et al (2020), Ryan et al (2020) Keenan et al (2021), Marinello et al (2020), Hellar et al (2021), Gomez-Centurion et al (2022), Torrallardona-Murphy et al, (2021), Llorens et al (2021), Levine et al (2021), Sitammagari et al (2021), Mezela et al (2021), Pericas et al (2021), Hussein et al (2021), Benvenuti et al (2021), Miyamoto et al (2022), Lwin et al (2020), Cheney (2021), Mark et al (2022)
Expanding capacity	Nogues et al (2021), Goudman et al (2021), Schiff et al (2022), Koeberle et al (2020), Ryan et al (2020), Maniaci et al (2021), Keenan et al (2021), Marinello et al (2020), Levine et al (2021), Sitammagari et al (2020), Hellar et al (2020), Mezela et al (2021), Fouquet et al (2020), Miyamoto et al

	<p>(2022), Tsai-Ling et al (2022), Barta et al (2021), McCann et al (2021), Kadafa et al (2020), Poterre et al (2021), Benvenuti et al, (2021), Hussein et al (2021), Mark et al (2022), Pericas et al (2021), Llorens et al (2021) Torrallardona-Murphy et al, (2021), Gomez-Centurion et al (2022), Lwin et al (2020), Stall et al (2020) Vella et a (2021), Cheney (2021),</p>
Virtual Monitoring	<p>Nogues et al (2021) Goudman et al (2021), Maniaci et al (2021), Koeberle et al (2020) Ryan et al (2020), Marinello et al (2020), Sitammagari et al (2021), Mezela et al (2021), Fouquet et al (2021), Vella et al (2021) Stall et al (2020), Lwin et al (2020), Cheney (2021), Benvenuti et al (2021)00</p>
Infection transmission reduction	<p>Nogues et al (2021) Koeberle et al (2020) Goudman et al (2021), Maniaci et al(2021), Sitammagari et al (2021), Mezela et al (2021), Fouquet et al, (2022), Mittaine-Marzac et al (2020), Kadafa et al (2021), Pericas et al (2021), Benvenuti et al (2021), Stall et al (2020). Torrallardona-Murphy et al, (2021), Mark et al (2022)</p>

Cost	Llorens et al (2021), Levine et al (2021), Fouquet et al (2022), Pericas et al (2021), Cheney (2021), Torrallardona-Murphy et al, 2021.), Sitammagari et al (2021)
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Table 5 -PRISMA ScR

Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) Checklist

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
TITLE			
Title	1	Identify the report as a scoping review.	Click here to enter text.
ABSTRACT			
Structured summary	2	Provide a structured summary that includes (as applicable): background, objectives, eligibility criteria, sources of evidence, charting methods, results, and conclusions that relate to the review questions and objectives.	Click here to enter text.
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known. Explain why the review questions/objectives lend themselves to a scoping review approach.	Click here to enter text.
Objectives	4	Provide an explicit statement of the questions and objectives being addressed with reference to their key elements (e.g., population or participants, concepts, and context) or other relevant key elements	Click here to enter text.

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
		used to conceptualize the review questions and/or objectives.	
METHODS			
Protocol and registration	5	Indicate whether a review protocol exists; state if and where it can be accessed (e.g., a Web address); and if available, provide registration information, including the registration number.	Click here to enter text.
Eligibility criteria	6	Specify characteristics of the sources of evidence used as eligibility criteria (e.g., years considered, language, and publication status), and provide a rationale.	Click here to enter text.
Information sources*	7	Describe all information sources in the search (e.g., databases with dates of coverage and contact with authors to identify additional sources), as well as the date the most recent search was executed.	Click here to enter text.
Search	8	Present the full electronic search strategy for at least 1 database, including any limits used, such that it could be repeated.	Click here to enter text.
Selection of sources of evidence†	9	State the process for selecting sources of evidence (i.e., screening and eligibility) included in the scoping review.	Click here to enter text.
Data charting process‡	10	Describe the methods of charting data from the included sources of evidence (e.g., calibrated forms or forms that have been tested by the team before their use, and whether data charting was done independently or in duplicate) and any processes for obtaining and confirming data from investigators.	Click here to enter text.
Data items	11	List and define all variables for which data were sought and any assumptions and simplifications made.	Click here to enter text.

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Critical appraisal of individual sources of evidence§	12	If done, provide a rationale for conducting a critical appraisal of included sources of evidence; describe the methods used and how this information was used in any data synthesis (if appropriate).	Click here to enter text.
Synthesis of results	13	Describe the methods of handling and summarizing the data that were charted.	Click here to enter text.
RESULTS			
Selection of sources of evidence	14	Give numbers of sources of evidence screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally using a flow diagram.	Click here to enter text.
Characteristics of sources of evidence	15	For each source of evidence, present characteristics for which data were charted and provide the citations.	Click here to enter text.
Critical appraisal within sources of evidence	16	If done, present data on critical appraisal of included sources of evidence (see item 12).	Click here to enter text.
Results of individual sources of evidence	17	For each included source of evidence, present the relevant data that were charted that relate to the review questions and objectives.	Click here to enter text.
Synthesis of results	18	Summarize and/or present the charting results as they relate to the review questions and objectives.	Click here to enter text.
DISCUSSION			
Summary of evidence	19	Summarize the main results (including an overview of concepts, themes, and types of evidence available), link to the review questions and objectives, and consider the relevance to key groups.	Click here to enter text.
Limitations	20	Discuss the limitations of the scoping review process.	Click here to enter text.

SECTION	ITEM	PRISMA-ScR CHECKLIST ITEM	REPORTED ON PAGE #
Conclusions	21	Provide a general interpretation of the results with respect to the review questions and objectives, as well as potential implications and/or next steps.	Click here to enter text.
FUNDING			
Funding	22	Describe sources of funding for the included sources of evidence, as well as sources of funding for the scoping review. Describe the role of the funders of the scoping review.	Click here to enter text.

JBI = Joanna Briggs Institute; PRISMA-ScR = Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews.

* Where *sources of evidence* (see second footnote) are compiled from, such as bibliographic databases, social media platforms, and Web sites.

† A more inclusive/heterogeneous term used to account for the different types of evidence or data sources (e.g., quantitative and/or qualitative research, expert opinion, and policy documents) that may be eligible in a scoping review as opposed to only studies. This is not to be confused with *information sources* (see first footnote).

‡ The frameworks by Arksey and O'Malley (6) and Levac and colleagues (7) and the JBI guidance (4, 5) refer to the process of data extraction in a scoping review as data charting.

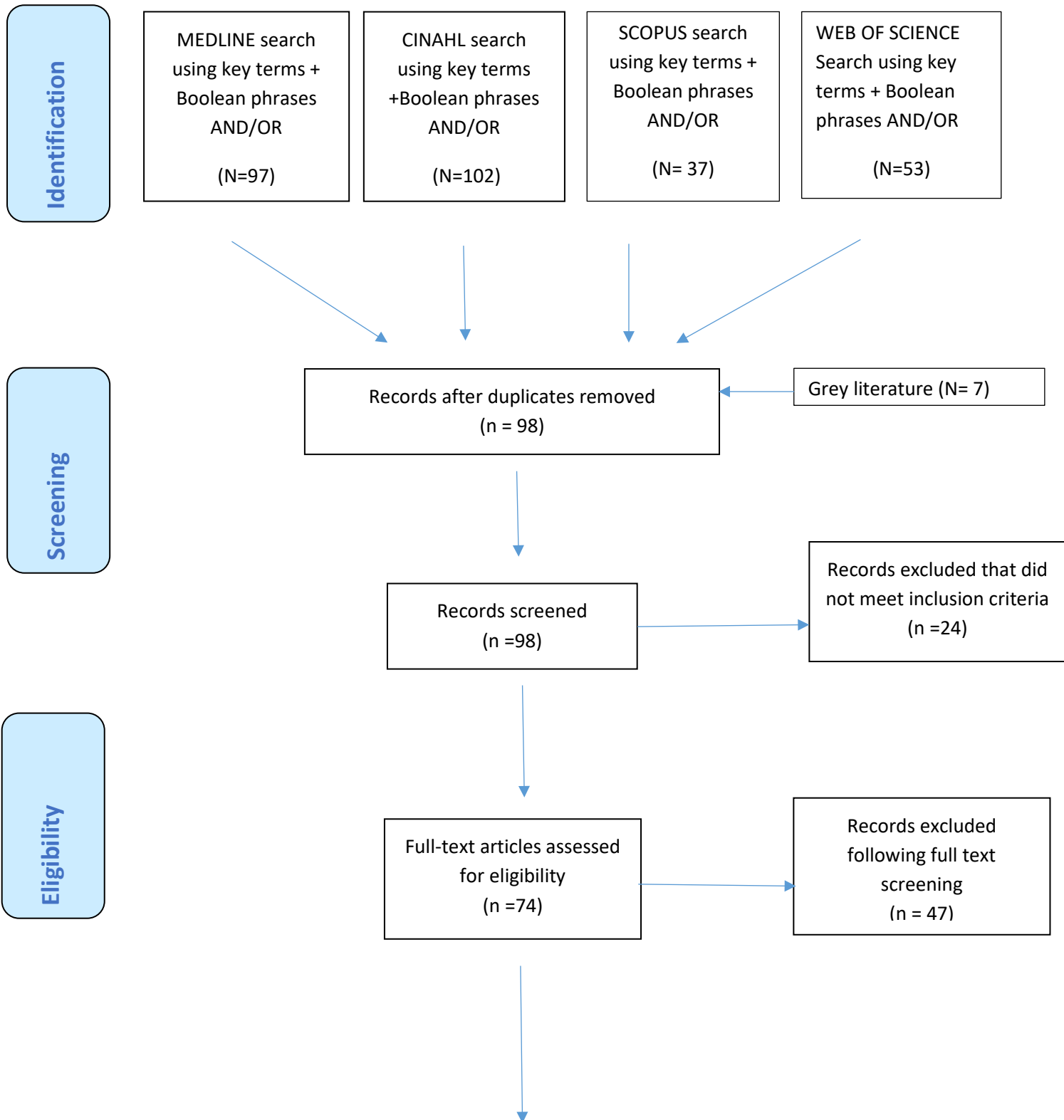
§ The process of systematically examining research evidence to assess its validity, results, and relevance before using it to inform a decision. This term is used for items 12 and 19 instead of "risk of bias" (which is more applicable to systematic reviews of interventions) to include and acknowledge the various sources of evidence that may be used in a scoping review (e.g., quantitative and/or qualitative research, expert opinion, and policy document).

From: Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA ScR): Checklist and Explanation. *Ann Intern Med.* 2018;169:467–473. doi: 10.7326/M18-0850.

Figure 1



PRISMA 2009 Flow Diagram



Included

Studies included for
synthesis
(n =31)