Evidence Brief: Virtual Wards

Contents

Produced by the Knowledge Management team Evidence Briefs offer an overview of the published reports, research, and evidence on a workforce-related topic.

Date of publication: May 2023

Please acknowledge this work in any resulting paper or presentation as:
Evidence Brief: Virtual Wards. Katie Nicholas. (May 2023). UK: Workforce, Training and Education Knowledge Management Team

Jo Wood's Evidence Search on this topic was invaluable in the production of this brief.

There may have been an update to this Evidence Brief - to check you are reading the most current version please see the links below:

- Complete Evidence Brief list – link for Workforce, Training and Education staff
- Complete Evidence Brief list – link for External staff

The following evidence briefs may also be of interest:

- Apps, sensors and wearable technologies
- Digital skills development
- Telemedicine

Key publications – the big picture

For the latest information see the NHS England page on Virtual Wards

Roundtable: How can virtual wards be scaled up?
Source: HSJ Guides
Publication date: April 2023
NHS England views the scaling-up of virtual wards as a crucial strategy for expanding hospital capacity and supporting patient recovery. As a result, NHS trusts have been set the ambitious target of having fully-developed virtual wards in place by the end of 2023 that provide a combined total of 40-50 virtual beds per 100,000 population. The scale of this target is considerable. In March, NHSE announced that 100,000 patients had been treated in virtual wards over the previous 12 months. It also reported that 340 virtual ward programmes are now operating across England, providing a combined total of 7,653 virtual beds. This leaves a deficit of some 16,347 beds that need to be created by the end of the year to meet NHSE's national target.

Virtual wards: the lessons so far and future priorities
Author(s): Hutchings and Edwards
Source: Nuffield Trust
Publication date: March 2023
The expansion of virtual wards – which help patients to manage their health and care at home – is considered an important component of NHS planning for next winter. Following discussions with members of BT's clinical advisory board and drawing on wider evidence and the latest policy developments, Rachel Hutchings and Nigel Edwards discuss the priority areas where further development and action could help improve virtual wards' effectiveness.

Virtual wards and Covid-19: an explainer
Author(s): Walton and Fulop
Source: Nuffield Trust
Publication date: March 2023
Virtual wards are remote services which help patients to manage their health and care at home. Patients and carers are asked to take health readings (e.g. blood oxygen levels, blood pressure, temperature) in a location convenient for them, such as their home. They can submit these to health care providers either via telephone or digitally (e.g. using an app). The readings may then be reviewed and responded to by professionals elsewhere, or patients may be asked to seek further help, for example if their readings are of particular concern. Remote monitoring models have been previously used for a range of chronic health conditions (e.g. Peretz and others, 2018; Castelyn and others, 2021; Jonker and others, 2021).

Delivery plan for recovering urgent and emergency care services
Source: NHS England
Publication date: January 2023
To support recovery, this plan sets out a number of ambitions, including:

- Patients being seen more quickly in emergency departments: with the ambition to improve to 76% of patients being admitted, transferred or discharged within four hours by March 2024, with further improvement in 2024/25.
- Ambulances getting to patients quicker: with improved ambulance response times for Category 2 incidents to 30 minutes on average over 2023/24, with further improvement in 2024/25 towards pre-pandemic levels.

NHS England has engaged with a wide range of stakeholders to develop the plan, and it draws on a diverse range of opinion and experience, as well as views of patients and users.

The Department of Health and Social Care, who produced the content on actions being taken in social care, have led on engagement with the sector.
See also NHS Providers briefing of this document

Bringing hospital care home: Virtual Wards and Hospital at Home for older people
Source: British Geriatrics Society
Publication date: August 2022
This document summarises the current landscape of Virtual Wards from the perspective of healthcare for older people, and provides advice to BGS members looking to set up such services for older people living with frailty.

Building upon services to provide the right care for people through virtual wards
Source: Queen's Nursing Institute
Publication date: 13th June 2022
In this blog, Sam Sherrington, National Deputy Director, Community Nursing at NHS England and NHS Improvement, and Zoe Harris, Senior Delivery Manager for the Digital Care Models Team at NHS England and NHS Improvement explore the important role that community nursing plays in getting virtual wards 'right' for the people we care for, and their families.

Virtual Wards
Source: Institute of Health & Social Care Management
Publication date: March 2022
The NHS went into the Corona Virus pandemic with fewer staff per head of population and fewer beds, than most similar healthcare systems across Europe and OECD countries. Emerging from the pandemic and faced with an overwhelming number of patients on waiting lists, the NHS is turning to efficiency gains and innovative treatment options.

No place like home: using virtual wards and 'hospital at home' services to tackle the pressures on urgent and emergency care
Source: Royal College of Physicians
Publication date: January 2022
What will help to relieve the pressure on hospitals?
> Investment in virtual wards, 'hospital at home' services and social care teams
> A sustainable health and social care workforce.
> A cross-government strategy on health inequalities.

Integration and innovation in action: virtual care
Source: NHS Confederation
Publication date: December 2021
An in-depth look at how NHS organisations are using virtual care to improve outcomes for patients and local communities.

Virtual ward care: breaking the 19th century mould
Source: NHS Confederation
Publication date: 14th December 2021
Embracing the virtual revolution would be the first real change in hospital care for over a century, but are we ready to shift the locus of care?

Virtual wards: caring for Covid-19 patients at home could save lives
Source: Nuffield Trust
Publication date: December 2020
Cecilia Vindrola-Padros, Naomi Fulop and Trish Greenhalgh describe the importance of oximeters and how they could save lives during the Covid-19 pandemic. This article was originally published in The Conversation on 6 November.

RCGP paper on Virtual Wards, Silent Hypoxia and improving COVID outcomes
Source: Royal College of General Practitioners (RCGP)

Publication date: October 2020
COVID-19 remains a significant threat to the individual and society. We now know much more about how this disease progresses and what can be done to influence the course of the disease. It has also been recognised that a proportion of patients presented to hospital significantly hypoxic without perceiving themselves to be overly unwell or breathless, so called Silent Hypoxia(2). This late presentation leads to them requiring intensive therapies and often poor outcomes. It has been suggested that identifying such patients at an earlier phase in their illness when they are starting to become hypoxic will give opportunities for therapies to be instituted earlier with fewer needing escalation of care to intensive care and ventilation(3) .

Remote home monitoring (virtual wards) during the Covid-19 pandemic
Source: University of Birmingham
Publication date: October 2020
Despite previous research on the use of remote home monitoring models for other health conditions, there is a paucity of evidence on the implementation of models for remote home monitoring during the COVID-19 pandemic.

Guidance

Supporting clinical leadership in virtual wards – a guide for integrated care system clinical leaders
Source: NHS England
Publication date: February 2023
The NHS Long Term Plan and the changing commissioning architecture gives us the opportunity to use collective resources within an integrated care system (ICS) to develop a service that supports people to remain independent, safe and in their own homes for as long as possible. Development of services including virtual wards should be a continuum of care through collaboration, supporting both a proactive and reactive approach to delivering care in a joined-up way. We also have the opportunity through using population health intelligence, personalised care and digital inclusion to ensure that the outcomes for patients reduce health inequalities and do not widen them.

Supporting information for ICS leads: Enablers for success – virtual wards including hospital at home
Source: NHS England
Publication date: April 2022
NHS England and NHS Improvement are asking all Integrated Care Systems (ICSs) to extend or introduce the virtual ward model. This document supports ICSs with their strategic and financial decisions on virtual ward planning and implementation. Designed for ICS leadership teams, but will also be helpful for provider organisations as they plan together to implement this model.
This guidance starts a two-year funded transformation programme to support the development of virtual wards operating to standardised clinical models, across every area of England.

Supporting information: virtual ward including Hospital at Home
Source: NHS England
Publication date: March 2022
The 2022/23 priorities and operational planning guidance asked systems to develop detailed plans to maximise the rollout of virtual wards to deliver care for patients who would otherwise have to be treated in hospital, by enabling earlier supported discharge and providing alternatives to admission.
This supporting guidance helps systems to achieve these ambitions, supporting implementation and covers definitions, principles, funding and staffing.

Guidance note: Acute respiratory infection virtual ward
Source: NHS England
Publication date: December 2021
Virtual ward pathway for acute respiratory infection virtual ward.

A guide to setting up technology-enabled virtual wards
Source: NHS England – Transformation Directorate
Publication date: December 2021
Virtual wards should be technology-enabled to maximise the opportunity they offer for both patients, carers and staff. Technology-enablement means the management of patients via a digital platform. In a technology-enabled model, patients measure agreed vital signs and enter data into an app or website. In some cases, they wear a device that continuously monitors and reports vital signs.

Supporting patients and bed capacity through virtual wards and Covid Oximetry @home
Source: NHS England
Publication date: December 2021
Letter asking all integrated care systems (ICSs) seek to put in place comprehensive coverage of COVID Oximetry @home (CO@h) and COVID Virtual Ward (CVW) pathways to meet potential demand.

Guidance note: Frailty virtual ward (Hospital at Homes for those living with frailty)
Source: NHS England
Publication date: December 2021
Virtual ward pathway for frailty virtual wards otherwise known as Hospital at Home.

A guide to setting up technology-enabled virtual wards
Source: NHS England – Transformation Directorate
Publication date: December 2021
Virtual wards should be technology-enabled to maximise the opportunity they offer for both patients, carers and staff. Technology-enablement means the management of patients via a digital platform. In a technology-enabled model, patients measure agreed vital signs and enter data into an app or website. In some cases, they wear a device that continuously monitors and reports vital signs.

Covid virtual ward (secondary care)
Source: Wessex Academic Health Science Network (Programme: Covid Oximetry)
Publication date: January 2021
The Covid Virtual Ward model is a secondary care led initiative to support early and safe discharge (step down) for Covid patients. It has already been implemented in some - but not all - parts of the country where it is having an impact in reducing emergency admissions (Greater Manchester, Liverpool, Tees, North London, Berkshire, Hampshire, West Herts); and builds on the Covid Oximetry @home model previously approved by the National Incident and Response Board (NIRB), and now implemented by all CCGs.

Covid oximetry and virtual wards
Source: The AHSN Network
Publication date: 7th June 2020
Detecting the early signs of deterioration in patients with confirmed or suspected COVID-19 is a significant challenge for health and social care teams. As patients at risk of poorer outcomes can be identified by reduced oxygen saturation levels, the ability to recognise early decreases in blood oxygen levels before the patient becomes symptomatic is vital.

Case Studies

Impact of Virtual Wards
Source: Access
Publication date: 14th April 2023
Virtual wards are a new implemented care programme, acting as an extension of the hospital ward, but what impact do these virtual wards have? What are the benefits to patients? Are virtual wards financially viable?
It is important to assess the services provided in healthcare to ensure they are performing properly, within the realms of a budget and providing the excellent care required. Dissecting a virtual ward is no different and standards must be met, otherwise patients risk suffering.

1. An Economic Evaluation of a virtual Covid Ward in Leicester, Leicestershire, and Rutland
2. An Economic Assessment of the South Eastern Trust Virtual Ward (Ulster and Bangor)
3. Rapid Evaluation of the Virtual Ward at Croydon NHS
4. Review of Gateshead virtual ward
5. The virtual diabetes hospital
6. Virtual Wards: First-of-kind case study on heart failure
7. Hospital at Home is a good option for older people
8. Virtual Ward case study for Mersey Care magazine
9. East Sussex Heart Failure Patients Endorse Virtual Wards Trial

'Virtual wards' help patients to recover at home
Source: University College London Hospitals NHS FT
Publication date: 13th April 2023
The UCLH@Home service is helping patients like 80-year-old Margaret Stone to continue their recovery in their own home under the care of their hospital team.

People to benefit from NHS@Home Virtual Wards service
Source: HealthWatch Wiltshire
Publication date: 9th March 2023
People living in Bath and North East Somerset, Swindon and Wiltshire are now able to receive acute clinical care from the comfort of their own home while helping to relieve pressures on local services.

Virtual wards
Source: Frimley Health NHS FT
Publication date: March 2023
Virtual wards allow patients to get the care they need at home safely and conveniently, rather than being in hospital. The main aim of them is to avoid unnecessary admission to hospital and to keep the patient in their familiar safe and comfortable environment to aid their recovery.
We have virtual wards for patients requiring medical assistance for conditions such as respiratory, COVID treatment, end of life care and treatment for frail patients.

Providing rapid care to people in their own home rather than going to hospital, through a frailty virtual ward in Leeds
Source: NHS England
Publication date: March 2023
This virtual ward in Leeds supports up to 37 patients per day and provides co-ordinated rapid care to people aged over 65 with moderate to severe frailty in their own homes. As of March 2023, they have saved over 21,500 bed days since launching the pilot virtual ward in November 2019.

Supporting people living with frailty in Hull and East Riding
Source: NHS England
In Hull and East Riding, the team working as part of City Health Care Partnership CIC are at the beginning of their frailty ward journey. Their aim is to implement a safe and effective virtual

ward, enabling them to care for people in the place they call home. This requires integrating acute frailty emergency department teams, intermediate care, urgent care, specialist community frailty team and other providers, including Primary Care Networks.

Virtual wards empower the people we care for in east Kent
Source: NHS England
Our frailty Hospital at Home virtual ward was set up in response to COVID-19, to help people living with frailty avoid going to hospital. The ward is run by Kent Community Health NHS Foundation Trust (KCHFT) Community Frailty Team, in an area with a population of 500,000, which includes 275 care homes and more than 6,000 care home residents. As a coastal area which has traditionally attracted retirees, we provide services in locations with a higher frailty need than much of the UK.

Helping people with acute respiratory infections to return home earlier through a virtual ward in Wigan
Source: NHS England
Publication date: February 2023
In Wigan, a virtual ward supports people experiencing acute respiratory infections (ARI) in their own homes. We spoke to Wrightington, Wigan and Leigh Teaching Hospitals NHS Foundation Trust (WWL) about how the virtual ward works.

The Royal Berkshire NHS Foundation Trust outpatient services transformation programme to improve quality and effectiveness of patient care
Author(s): Chan et al.
Source: Future Healthcare Journal
Publication date: November 2022
Background The Royal Berkshire NHS Foundation Trust outpatient services transformation programme is a strategic change programme delivered as a collaborative approach through the Berkshire West Integrated Care Partnership. The main aim of redesign is to improve capacity in clinics and improve patient experience. Methods This was done through a best practice menu and ‘how to’ guides. This simplified and standardised the process for moving activity from face-to-face to virtual, maximising remote monitoring and moving clinics off the main acute site. Results We have successfully implemented six different work streams to transform outpatient services. Referrals are now triaged and streamed. The number of patients reviewed virtually, on patient-initiated follow-up and seen closer to home has increased. Conclusion The outpatient services transformation programme has resulted in improvements within the trust and the integrated care partnership. This programme supports the vision by the Royal College of Physicians and NHS England to modernise and transform outpatient services.

Virtual wards service extended, enabling more patients to be treated at home
Source: NHS Leicester, Leicestershire and Rutland
Publication date: 27th October 2022
A new virtual wards service, which enables patients to receive treatment at home instead of in hospital, is being extended to support patients with a wider range of health conditions. A collaborative of local organisations have worked together to put the service in place, including the Leicester, Leicestershire and Rutland Integrated Care Board (LLR ICB), University Hospitals of Leicester NHS Trust, Leicestershire Partnership NHS Trust, DHU Healthcare and LOROS, together with technology providers Spirit Health and Dignio.

‘Smart’ tech to change the way patients are monitored
Source: Oxford Health NHS Foundation Trust
Publication date: 9th August 2022
Oxford Health is trialling the use of smart monitors known as ‘wearables’ with some of its Hospital@Home patients so that

clinicians can check vital signs remotely, enabling them to act if a condition deteriorates.

Managing heart failure @home: an opportunity for excellence
Source: NHS England Blog
Publication date: 19th July 2022
Following a successful launch event for professionals on the 18 July, National Clinical Director Nick Linker outlines an innovative approach supporting people to manage heart failure at home, using remote monitoring and self-management tools. Living with heart failure is becoming increasingly common due to our ageing population and improving medical care. In 2018, 920,000 people were living with heart failure in the UK, with around 200,000 new diagnoses made annually. People living with heart failure require significant input from NHS services. Caring for heart failure patients accounts for 2% of the total NHS budget and for 5% of all emergency hospital admissions in the UK.

Caring for people with acute respiratory infections at home, through a virtual ward in Wolverhampton
Source: NHS England
Publication date: July 2022
Our ARI virtual ward supports people at home, instead of being admitted into hospital. The virtual ward originally started as an oximetry at home monitoring service. This quickly developed into a COVID virtual ward, supporting people who were still very unwell but could continue their treatment and recovery at home. We are now evolving into an integrated respiratory service, which supports patients at home with COVID, COPD, asthma, oxygen weaning, and acute respiratory infections, such as pneumonia.

More support for surgery patients on virtual wards
Source: Barts Health NHS Trust
Publication date: 13th June 2022
Londoners waiting for heart surgery are to get more support thanks to a virtual ward created by a Barts Health consultant. The number of people waiting for procedures has increased during the pandemic.
The technology allows NHS clinicians to monitor patients at home, give advice on how to prepare for surgery and spot those who may need to be treated sooner. It's the brainchild of consultant cardiologist Dr Debashish Das and has been rolled out to eight specialist heart centres in the capital, including at St Bartholomew's Hospital. Patients using the system will answer questionnaires and submit data such as blood pressure to a virtual ward monitored by hospital clinicians.

Case study: Providing rapid care to people in their own home rather going to hospital, through a frailty virtual ward in Leeds
Source: NHS England
Publication date: March 2022
This case studies describes how the virtual ward in Leeds supports up to 40 patients per day and provides co-ordinated rapid care to people aged over 70 with moderate to severe frailty in their own homes.
Together, they have saved nearly 10,000 bed days since launching the pilot virtual ward in November 2019.

Trial of wearable health technology for cancer patients opens
Source: Manchester University NHS Foundation Trust
Publication date: 26th January 2022
A new trial opens in Greater Manchester today which is to test cutting-edge wearable technologies involving patients who have received cancer treatment. The commercially-available health sensors and devices produce a digital fingerprint of vital signs that could allow doctors to assess the progress of their patients.

Reducing conveyances of older patients in South Warwickshire
Source: NHS Confederation
Publication date: 11th January 2022
Clinicians wanted to test the feasibility of avoiding conveyances where possible and using virtual wards to keep people at home.

Video: Virtual wards enabled by technology: hospital-level care for people in their own home
Source: NHS England YouTube
Publication date: 2022
Virtual wards allow patients to receive care, monitoring and treatment, enabled by technology, in their own home, rather than going to hospital. Support may also involve face-to-face care from multi-disciplinary teams based in the community. This film is about the virtual ward at Norfolk and Norwich University Hospitals NHS Foundation Trust. The NHS is expanding the availability of virtual wards across England.

Rapid evaluation of Croydon Virtual Ward
Source: Health Innovation Network South London
Publication date: December 2021
This rapid evaluation aims to give quick and early messages around the impact of a technology-enabled virtual ward. It looks at patients that were admitted to the Croydon Health Services virtual ward which used the Current Health hub to continuously monitor the health of patients that were acutely unwell and identify any health deterioration. The evaluation explores a series of questions: 1. Who are the patients being admitted to the virtual ward? 2. What factors are essential to make the model effective? 3. Did patients find using the technology acceptable? 4. What is the patient experience of the service? 5. How did the service impact on healthcare utilisation? 6. Did the service deliver any cost savings? 7. What were the patient outcomes?

P19 COVID Virtual Ward and Emergency Department discharges: clinical outcomes and recommendations following COVID pandemic phase 2 Abstract all available
Author(s): Bradley et al.
Source: Thorax 76(Suppl 2)
Publication date: 2021
Introduction In wave 2 of the pandemic, the Virtual COVID Ward (VCW) was expanded to include Emergency Department (ED) as well as ward discharges with COVID pneumonitis. Outcomes of ED COVID patients have been reviewed and key recommendations drawn to inform practice in endemic phase COVID. Methods A retrospective review of persons attending ED who were not admitted with COVID illness (COVNA) was undertaken to assess safety and clinical effectiveness of the VCW between 01/10/2020–01/04/21. Demographic data was collected as well as clinical outcomes including mortality and admission rates. Results 119 COVNA patients identified (female 65 (55%); 77 (66%) BAME; median age 51 years, IQR 38–62, range 16–88). Over half (55%) were between the ages 40 and 69. COVNA patients were relatively free from co-morbidity: 104 (87%) had low or intermediate risk ISARIC 4C scores; all had Charlson co-morbidity score of less than 9 representing low 10 year mortality. Median length of stay on VCW was 3 days (IQR 3–8, range 0–15); median number of calls undertaken was 3 (IQR 2–5, range 0–9). 32 (27%) COVNA patients returned to ED, 8 of whom were discharged home with an overall admission rate 20%. Re-presentations within 5/7 were predominantly COVID related (20/23; 87%). After 5 days, there were no attendances with worsening pneumonitis (figure 1). The commonest route for re-attendance was self-referral (17/32; 53%) of whom 14 were admitted; all 10 persons referred to ED from VCW were admitted. COVNA patients issued with a saturation probe (48%) were more likely to re-present and be admitted (RR 2.2; 95% CI 1.03–4.74; p0.0425). 2 (1.7%) sustained pulmonary emboli; 1 intensive care admission; 4 patients died (3% unadjusted

mortality). Conclusions COVNA patients have low mortality and morbidity from COVID. The VCW model has safely and successfully supported COVNA patients who are deemed fit enough to not require admission (clinical judgment and no oxygen requirement). Ideally, all COVNA patients should be issued with a saturation probe. COVNA patients should be warned that re-presentation and admission may be required. Worsening of symptoms and/or a drop in oxygen saturation should warrant return to ED. This pathway should be continued in COVID endemic phase.

S57 The development and implementation of a virtual discharge ward for patients with COVID-19 pneumonia: data on the first 300 patients Abstract all available
Author(s): Maghrabi et al.
Source: Thorax 76(Suppl 1)
Publication date: 2021
Introduction: There is little described in the current COVID-19 literature about the outcomes of patients discharged from hospital following COVID-19 pneumonia. We describe the rapid establishment of a 'virtual ward' (VW) for follow-up of patients with a suspected or confirmed diagnosis of COVID-19 pneumonia or pneumonitis upon hospital discharge, characteristics and outcomes for the first 300 patient referrals.
Methods: Admitted patients with a confirmed/suspected diagnosis of COVID-19 pneumonia/pneumonitis were referred electronically to the VW on discharge. Pulse oximeters were provided if oxygen saturations were <92%. The 'tracking board' was reviewed daily and phone calls carried out to assess patients for symptom improvement, stability or deterioration. If cause for concern was raised, same-day review for the patient at home was arranged via predetermined community pathways or patients were transferred urgently to hospital.
Results: The M:F ratio was 2:1 and 25% of patients were of black and minority ethnic origin. 71% of patients had at least 1 co-morbidity. 31% of patients were SARS-CoV-2 PCR negative on respiratory tract samples but had high clinical suspicion of COVID-19. 70% of patients had radiological changes on CXR/CT formally reported as being consistent with COVID-19. Median Length of stay (LOS) on the VW was 3.5 days [range 0–19], 85% of patients had a LOS ≤7 days. Around half (158, 53%) of patients had required oxygen during admission. Pulse oximeters were provided to 31 (10%) of patients. Outcomes are shown in figure 1. Thirty-eight (13%) patients re-attended the Emergency Department; 28 were readmitted; of these, 3 were ventilated for respiratory failure, 5 had increasing oxygen requirements and 8 had confirmed pulmonary embolism. 12 had other reasons for admission. 2 patients readmitted by the VW died, both had underlying terminal diagnoses.

P21 Development of a COVID-19 virtual ward to facilitate early discharge from hospital for patients with an on-going oxygen requirement Abstract all available
Author(s): Boast et al.
Source: Thorax 76(Suppl 2)
Publication date: 2021
Introduction and Objectives The COVID-19 pandemic required rapid service changes in order to meet the emerging needs of our patients and to reduce pressures on hospital beds. In March 2020 we established one of the first virtual wards with the aim of supporting patients with a continuing oxygen requirement safely at home during their COVID-19 illness. Methods The virtual ward was delivered by the integrated care ImpACT+ service. This multi-disciplinary service comprises respiratory consultants, respiratory specialist nurses, physiotherapists, occupational therapists and fitness instructors. Our local criteria for on-boarding included: 10 days post onset of symptoms, oxygen requirement 4L or less and the ability to manage with home monitoring equipment. A mix of telephone and home contacts were offered and daily consultant MDTs undertaken. Therapy

team members were up-skilled to support oxygen assessments and weaning regimes to maximise service capacity. A direct electronic referral icon was created on the hospital whiteboard system accompanied by a nurse-led telephone referral service. The scheme was advertised through posters and in-reach work into COVID-19 areas. Results 107 patients were managed on our virtual ward since March 2020. This included 99 COVID-19 patients and 8 with other acute respiratory exacerbations. The mean continuous oxygen prescription on discharge was 1.5 L (range 0.5–4L) and for ambulatory purposes 2.4L (1–6L). 55 patients with COVID-19 were discharged on anticoagulation, 33 on steroids and 21 on antibiotics. 8 30-day readmissions, 3 deaths (2 expected). The total number of bed days on the virtual ward was 2010 (mean 21 days) and in total the activity that service delivered included 904 telephone calls and 274 home visits. Service feedback demonstrated a high level of satisfaction with patients commenting that they valued being at home with support during their recovery. Conclusions This service has shown a supported discharge Covid-19 oxygen weaning service is a valuable initiative to relieve pressures on the acute hospital service and provide high quality care to facilitate early discharge from hospital. This virtual ward highlighted the value of having an integrated respiratory team and extension of this model to other respiratory conditions should be possible with considered adaptions.

Late Breaking Abstract - Was our step-down virtual covid ward safe and effective? Abstract all available
Author(s): Jennings et al.
Source: European Respiratory Journal 58
Publication date: 2021
Introduction: Data on step-down models of care for in-patients with moderate/severe Covid-19 are sparse. We piloted an early supported discharge virtual ward (VW) in response to the second wave with patients discharged on a pathway (red, amber, green) depending on clinical severity and oxygen requirement. Aims and Objectives: To determine if a step-down model of care was effective. Methods: We conducted a single-centre retrospective cohort study of 89 patients who were admitted to the VW between 15th January and 26th February. Primary outcome was defined as the readmission rate within the 6 week period. Secondary outcomes were defined as differences in anxiety and mood scores and need for ongoing oxygen support. Results: 7 of 89 (8%) patients were readmitted during the six week period. There was no significant difference in readmission rates between patients on different pathways. Mean mood and anxiety scores improved between day 1 and day 14 respectively from 3 to 1.8 ($p < 0.05$) and 3.3 to 1.9 ($p < 0.05$). Similar trends were seen on each pathway. 50 patients (56%) were discharged with oxygen. 5 patients commenced oxygen in the community and 4 had their prescription increased; none required readmission. 22 patients were transferred to the Home Oxygen Service after 14 days for review. 30 patients were discharged on dexamethasone. No difference in readmission rates was seen in those patients who required CPAP during admission ($p > 0.05$). 1 patient was readmitted for palliation. We estimate 350-500 bed days were saved. Conclusion: Readmission rates were similar to national figures and were not linked to perceived severity. Our study suggests that a less risk-averse strategy to managing oxygen in the community is safe and effective.

OP339 Virtual COVID Ward: The Use Of Telehealth In The Emergency Response To COVID-19 Abstract all available
Author(s): Rezgui et al.
Source: Technology Assessment in Health Care
Publication date: 2021
Introduction: With unprecedented times, comes accelerated change. Hospitals in our region have begun to facilitate safe discharge for COVID-19 patients in the form of “The virtual COVID ward”. This has enabled patients to be monitored safely

in the community using pulse oximetry, Florence (a telehealth mobile app) and remote consultations. Our objective is to expand upon this model by providing home oxygen therapy for these patients facilitated by telemedicine. Methods: Patients were discharged with an oxygen concentrator if they had an oxygen requirement equal to or less than four litres/minute. Fraction of inspired oxygen needed to be stable and an early warning score of less than four was also required. Once admitted, the Florence app and daily remote consultations were crucial to closely monitor the patient's clinical status. The patient was instructed to enter oxygen saturations and heart rate into the app four times daily. The app would then alert our team if any patients observations deteriorate, triggering immediate assessment. Results: We have discharged ninety patients to the virtual ward, fifty-six of these with home oxygen. The average age was fifty-seven and the Clinical Frailty Score ranged between one and six. At present, ten patients have been re-admitted, four with increasing oxygen requirements, and six with unrelated symptoms. Two patients had oxygen concentrators installed at home after we were alerted to their desaturation by the Florence App. The re-admission rate is eleven percent, which mirrors that of other virtual wards (who do not provide home oxygen). In total, the ward has saved the trust 627 hospital inpatient 'days'. Patients report increased satisfaction at playing a meaningful role in monitoring their own healthcare using the app. Conclusions: Our novel model of supported discharge with oxygen therapy using telehealth demonstrates that it is possible to manage such patients, safely, in the community. Other trusts could utilise this model to reduce inpatient bed occupancy. Looking to the future, could telehealth be utilised further to facilitate other "Virtual wards" in the community?

Trust pilots remote monitoring for heart failure patients
Source: Imperial College Healthcare NHS Trust
Publication date: 14th June 2021

Imperial College Healthcare NHS Trust is working with a remote healthcare provider to pilot an at-home monitoring system that it is hoped could provide additional support for patients with heart failure, improving outcomes and reducing the need to come to hospital. The remote monitoring platform, provided by healthcare technology company Luscii, allows patients to take charge of their healthcare and input important health data such as their weight, blood pressure and heart rate on a daily basis, providing their clinical team with instant access to this information. Doctors and heart failure nurses can monitor for any concerning changes, with the platform also flagging up early signs of patient deterioration using an AI-powered 'clinical engine'.

NNUH Virtual Ward helps patients recover at home
Source: Norfolk and Norwich University Hospitals NHS FT
Publication date: March 2021
The NNUH Virtual Ward has launched to enable patients to continue their recovery from Covid-19 at home while being carefully monitored remotely.
The Virtual Ward builds on remote monitoring that is already in place and, in a phased roll out, will provide a safe and effective monitoring and follow-up service for up to 40 patients and the potential to help other patient groups.

There are some case studies on the FutureNHS Discharge and Community Services Group (free NHS Futures log in required and request to join the group)

- Royal Cornwall Hospitals Virtual Ward
- Leeds Frailty Virtual Ward

O-14 Creation of a virtual ward: a response to Covid-19 Abstract all available
Source: BMJ Supportive & Palliative Care 11(2)
Publication date: 2020

Background With a second wave of COVID-19 peaking in mid-December 2020, one hospice closed its inpatient unit to allow clinical staff to be utilised to greater effect in the community. This approach had been used during the first wave of the pandemic, with good effect, allowing more referrals and more patients to be cared for in their place of choice. However, for a very small number of complex patients, the lack of inpatient facilities had proved problematic. To avoid this consequence during the second wave, a new plan to open a virtual ward, staffed by some of the inpatient team, was devised. Aim To ensure that dying patients with complex needs were given equitable and appropriate care whilst the inpatient unit was closed.
Method Clinical staff were once more re-located to the community teams, but this time with 24-hour provision of nursing care, rather than the usual four times daily visits. Medications were administered in a more timely way, and delivery of personal care was given at the patient's convenience, rather than set times, with increased support for families. Closer liaison with the multi-disciplinary team (MDT) also improved the patient experience, with daily MDT discussion. Results Eight patients who required complex medical intervention, were admitted to other local hospices. However, 47 patients were admitted to the virtual ward, averaging 8.6 admissions per month. Identification of the last weeks of life was greatly improved by the internal referral process, reflected in an average length of stay of 7 days (range 3-13 days). Conclusion By offering complex care to people at end of life in their own homes, this approach fulfilled the ideal criteria of 'providing everyone the right care, from the right person at the right time' and reduced prior inequality of care provision (Thomas, 2021).

Slough Covid-19 Virtual Ward Patient Stories
Source: NHS England and Frimley Health and Care
Publication date: 2020

Two case studies collected by the Slough COVID-19 pilot team, focusing on black and minority ethnic patients. The studies emphasise the importance of appropriate training and information delivery to patients, regular telephone consultations with clinicians, ensuring that information is available in different languages, and home visits where possible.

Providing rapid care to people in their own home rather than going to hospital, through a frailty virtual ward in Leeds
Source: NHS England
This virtual ward in Leeds supports up to 37 patients per day and provides co-ordinated rapid care to people aged over 65 with moderate to severe frailty in their own homes.
As of March 2023, they have saved over 21,500 bed days since launching the pilot virtual ward in November 2019.

Wearable sensor trialled for remote Covid-19 monitoring
Author(s): Justine Alford
Source: Imperial College London
Publication date: April 2020
Wearable technology to remotely detect signs that a patient's condition is worsening is being trialled to support the ongoing COVID-19 response. Led by Imperial College London, in partnership with NHS organisations in northwest London, the sensor is being used to monitor people in quarantine at a special NHS facility near Heathrow airport, for example travellers from abroad or those wishing to travel to return home.

Remote monitoring for patients with chronic conditions in the Midlands
Source: NHS England – Transformation Directorate
Across Leicester, Leicestershire and Rutland the COVID-19 pandemic has driven forward a rapid expansion of remote monitoring schemes which is allowing clinical teams to keep

track of patients with chronic conditions safely and in the comfort of their own home.
It forms part of a wider plan to improve digital health services for people with long term conditions, aiming to reduce the pressure on hospital services and improve outcomes by detecting and addressing signs of deteriorating health earlier among recently discharged and chronically ill patients.

Supporting care with remote monitoring
Source: NHS England Transformation Directorate
The NHS continues to work on delivering more care to people in their homes.
NHSX is working with all 7 NHS regions in England to scale digitally enabled healthcare at home for people with long term conditions. This includes both physical and mental health, for people for whom home is a care home, and for acute COVID-19.

- Track the impact of antipsychotic drugs on patient's cardiac health in their own home – North East and Yorkshire
- Recognize the deterioration of residents' health and improve the care available – London
- Remote monitoring technologies for heart failure, COPD and Covid-19 – Midlands
- Remote monitoring of symptom using the digitally enabled service – North West
- Remote patient monitoring to identify deterioration of patients with silent hypoxia – South East
- Remote monitoring and digital tools to improve health and wellbeing for people with learning disabilities – South West
- The role of remote monitoring in the future of the NHS – South East London

Tech-enabled virtual wards: relieving pressure on the NHS while caring for patients at home
Source: NHS England – Transformation Directorate
Early on during the first wave of the pandemic, NHSX supported a pilot that gave COVID-19 patients a pulse oximeter and an app. This meant they could leave hospital early, or avoid admission altogether.

Virtual wards
Source: Sussex Health & Care
Virtual wards allow patients to get the care they need at home safely and conveniently, rather than being in hospital. Includes video examples from Hailsham and Eastbourne.

In the News

BT launches virtual ward programme to help transform UK health services
Source: BT
Publication date: 25th April 2023

- New programme spans product and partnerships to support the NHS and other healthcare providers with tech to help manage patient care
- Programme launch sees BT partner with leading healthcare technology specialists to offer virtual wards and virtual care solutions for the NHS
- Partner solutions available now include an integrated care app for clinicians, AI remote monitoring and an online patient consultation platform

World-leading NHS virtual wards treat 100,000 patients in a year
Source: NHS England
Publication date: 11th March 2023

More than 100,000 patients have been treated in NHS virtual wards in the last year, with 16,000 patients treated in January alone. Virtual wards allow patients to get hospital-level care at home safely and in familiar surroundings, helping speed up their recovery while freeing up hospital beds for patients that need them most.

Virtual wards: tech matters, but so do people
Author(s): Emily Well (Chief Nursing Information Office, Norfolk and Norwich University Hospitals NHS FT)
Source: Health Tech World
Publication date: 8th December 2022
Emily Wells is the first Chief Nursing Information Officer to be appointed by Norfolk and Norwich University Hospitals NHS Foundation Trust. Here, she outlines her thoughts on how to develop a successful virtual ward, drawing on her Trust's experience of working on new care pathways with HomeLink Healthcare.

Debate: Virtual Wards
Source: National Health Executive
Publication date: 20th September 2022
The National Health Executive hosted a debate, during the NHE365 Digital Healthcare virtual event, discussing about how the NHS has had to provide care to more than 600,000 patients in hospital with COVID from the very start of the pandemic. The virtual ward project is designing to act as a solution to allow more beds in the hospital to become available by managing and monitoring patients from the comfort of their own home. Using remote technologies, patients will be able to access health care through means of mobile IT and report any issues to clinicians.

Virtual wards, real world benefits
Source: Microsoft
Publication date: 30th June 2022
Sometimes it takes a crisis to fully grasp an opportunity. Virtual wards were invented in the early 2000's by Dr Geraint Lewis, now Director of Population Health at Microsoft. Despite that, it's only in the last few years that they have taken the NHS by storm. Virtual wards help reduce hospital admissions, keep patients safer, and discharge them earlier in collaboration with social care where appropriate.

'Patients at risk' from 'hastily rolled out virtual wards'
Author(s): Illman
Source: HSJ
Publication date: 7th January 2022
NHS England's plans to rapidly expand virtual wards are being 'hastily rolled out' and could put patients at risk while taking up significant staffing capacity, leading clinicians have warned. The Society for Acute Medicine and the Royal College of Physicians are among those who have raised concerns to HSJ about the huge increase in the use of the virtual wards model, under which patients are discharged home and given oximeters that fit on their finger so they can be remotely monitored by clinical staff.

Networks

National learning network for virtual wards
Source: The AHSN Network
Publication date: January 2022
The AHSN Network is supporting healthcare systems to prepare for the expansion of virtual wards across England, a way of helping people to safely manage their care at home, rather than in hospital.

The virtual wards community of practice webinar takes place from 12 noon every Thursday. To join, register your place online.

Join the NHSFutures virtual wards space

eLearning

Virtual wards enabled by technology
Source: NHS England and eLearning for Healthcare
The virtual wards (VW) enabled by technology elearning session provides an overview of learning for registered clinicians working on a VW. It also includes links to national guidance and clinical pathway resources. VWs allow patients to receive the care they need in their own home, safely and conveniently rather than in hospital. VWs also provide integrated care systems with an opportunity to narrow the gap between demand and capacity for secondary care beds, by providing an alternative to admission or early discharge. A VW supports a person who would otherwise be in a physical hospital bed, to get the acute care, remote monitoring and treatment they need in their own home. There are different VW models, and their emphasis on technology varies in line with patient needs and preferences.

Frailty
Source: NHS England and eLearning for Healthcare
The London Clinical Network for Frailty in collaboration with Imperial College Healthcare NHS Trust and Wessex Academic Health Science Network have developed this elearning programme which aims to standardise training and knowledge of frailty as a complex multi-system, long term condition. This education programme is compliant with the 'Frailty, A framework of core capabilities' (2018) and has been funded through Health Education England's Urgent and Emergency Care Workforce Collaborative for London.

The Star for workforce redesign

More resources and tools are available in the Star

Statistics

You can find relevant statistics on the Health and Care Statistics Landscape

National Data Programme

Workforce, Training and Education staff can look at the National Data Warehouse (NDL) SharePoint site to find out more about datasets and Tableau products.

Published Peer Reviewed Research

2023

Systematic literature review on the effectiveness and safety of paediatric hospital-at-home care as a substitute for hospital care
Abstract only*
Item Type: Generic
Author: Detollenaere, Jens, Van Ingelghem, Ingrid, Van den Heede, Koen and Vlayen, Joan
Publication Date: April 2023
Publication Details: European journal of pediatrics, , Germany:
Abstract: The hospital landscape is shifting to new care models to meet current challenges in demand, technology, available budgets and staffing. These challenges also apply to the paediatric population, leading to a reduction in paediatric hospital beds and occupancy rates. Paediatric hospital-at-home (HAH) care is used to substitute hospital care in an attempt to bring hospital services closer to children's homes. In addition, these models attempt to avoid fragmentation of care between hospitals and the community. An important prerequisite for this paediatric HAH care is that it is safe and at least as effective as standard hospital care. The aim of this systematic review is to analyse the evidence on the impact of paediatric HAH care on hospital utilisation, patient outcomes and costs. Four bibliographic databases (Medline, Embase, Cinahl and Cochrane Library) were systematically searched for RCTs and pseudo-RCTs that studied the effectiveness and safety of short-term paediatric HAH care with a focus on models as an alternative to acute hospital admissions. Pseudo-RCTs are defined as observational studies that mimic the design of an RCT, but without randomisation. Outcomes of interest were the length of stay, acute (re)admissions, adverse health outcomes, therapy adherence, parental satisfaction or experience and costs. Only articles written in English, Dutch and French conducted in upper-middle and high-income countries and published between 2000 and 2021 were included. Quality assessment was carried out by two assessors using the Cochrane Collaboration's tool for assessing the risk of bias. Reporting is done in accordance with the PRISMA guidelines. We identified 18 (pseudo) RCTs and 25 publications of low to very low quality. Most of the included RCTs focused on the neonatal population: phototherapy for neonatal jaundice, early discharge after birth combined with outpatient neonatal care. Other RCTs focused on chemotherapy for acute lymphoblastic leukaemia, diabetes type 1 education, oxygen therapy for acute bronchiolitis, an outpatient service for children with infectious diseases and antibiotic treatment for low-risk febrile neutropenia, cellulitis and perforated appendicitis. The identified study results show that paediatric HAH care is not associated with more adverse events or hospital readmissions. The impact of paediatric HAH care on costs is less clear. Conclusions: This review suggests that paediatric HAH care is not associated with more adverse events or hospital readmissions for various clinical indications compared to a standard hospital. Because of the low to very low level of evidence, it is worthwhile to further investigate safety, efficacy and cost effects under strict and well-controlled conditions. This systematic review provides guidance on the essential elements that should be included in HAH care programmes for each type of indication and/or intervention. What is Known: * The hospital landscape is shifting new models of care to meet current challenges in demand, technology, staffing and models of care. Paediatric HAH care is one of these models. Previous literature reviews are inconclusive whether this is a safe and effective way of providing care. What is New: * New evidence suggests that paediatric HAH care for various clinical indications is not associated with adverse events or hospital readmissions compared to a standard hospital. Current evidence is characterised by a low level of quality. * The current review

provides guidance on the essential elements that should be included in HAH care programmes for each type of indication and/or intervention. Copyright © 2023. The Author(s), under exclusive licence to Springer-Verlag GmbH Germany, part of Springer Nature.

Digital Health Technologies for Post-Discharge Care after Heart Failure Hospitalisation to Relieve Symptoms and Improve Clinical Outcomes
Item Type: Generic
Author: Krzesinski, Pawel
Publication Date: March 2023
Publication Details: Journal of clinical medicine, 12, (6) , Switzerland:
Abstract: The prevention of recurrent heart failure (HF) hospitalisations is of particular importance, as each such successive event may increase the risk of death. Effective care planning during the vulnerable phase after discharge is crucial for symptom control and improving patient prognosis. Many clinical trials have focused on telemedicine interventions in HF, with varying effects on the primary endpoints. However, the evidence of the effectiveness of telemedicine solutions in cardiology is growing. The scope of this review is to present complementary telemedicine modalities that can support outpatient care of patients recently hospitalised due to worsening HF. Remote disease management models, such as video (tele) consultations, structured telephone support, and remote monitoring of vital signs, were presented as core components of telecare. Invasive and non-invasive monitoring of volume status was described as an important step forward to prevent congestion-the main cause of clinical decompensation. The idea of virtual wards, combining these facilities with in-person visits, strengthens the opportunity for education and enhancement to promote more intensive self-care. Electronic platforms provide coordination of tasks within multidisciplinary teams and structured data that can be effectively used to develop predictive algorithms based on advanced digital science, such as artificial intelligence. The rapid progress in informatics, telematics, and device technologies provides a wide range of possibilities for further development in this area. However, there are still existing gaps regarding the use of telemedicine solutions in HF patients, and future randomised telemedicine trials and real-life registries are still definitely needed.

COVID-19 (Omicron strain) hospital admissions from a virtual ward - who required further care?
Item Type: Generic
Author: Mackay, Ian, France, Megan, McAuley, Duncan, Wing, Sean, Wheeldon, Mary, Britton, Susan, Todd, Catherine, Pitiris, Alexandra, Barrett-Beck, Leah, Rushbrook, Elizabeth, Bennett, Cameron and McCarthy, Kate
Publication Date: 2023
Publication Details: Influenza and other respiratory viruses, 17, (3) pp.e13108. , England:
Abstract: BACKGROUND: The COVID-19 virtual ward was created to provide care for people at home with COVID-19. Given this was a new model of care, little was known about the clinical characteristics and outcomes of patients requiring admission to hospital from the virtual ward platform. The aims were to characterise hospital admission volume, patient epidemiology, clinical characteristics, and outcome from a virtual ward in the setting of an Omicron (BA.1, BA.2) outbreak., METHODS: A retrospective observational study was performed for all virtual ward patients admitted from 1st January 2022 to 25th March 2022 (over 16 years old). Epidemiological, clinical and laboratory data was reviewed on all patients who required hospital admission., RESULTS: A total of 7021 patients were cared for on the virtual ward over the study period with 473 referred to hospital for assessment. Twenty-six (0.4%) patients were admitted to hospital during their care on the ward. Twenty-

two (84.6%) admissions were COVID-19 related. Fifty three percent of the hospitalised patients were fully vaccinated and 11 had received prior therapeutics for COVID-19. Shortness of breath was the most common reason for escalation to hospital. Chest pain was the second most common reason and the most common diagnosis after investigation was non-cardiac chest pain., CONCLUSIONS: Few patients required admission from the virtual ward in the setting of the Omicron variant (BA.1, BA.2) as a direct result of COVID-19 disease and virtual ward care. Shortness of breath and chest pain were the most common symptoms driving further clinical care. Copyright © 2023 The Authors. Influenza and Other Respiratory Viruses published by John Wiley & Sons Ltd.

Opinion: Virtual wards – urgent care policy must follow the evidence
Author(s): Lasserson and Cookley
Source: BMJ 380
Publication date: 17th February 2023
Virtual wards must not distract from the urgent need for long term workforce, clinical, and capacity plans, write Dan Lasserson and Tim Cooksley

"I don't know how we would have coped without it." Understanding the Importance of a Virtual Hospital Visiting Program During the COVID-19 Pandemic
Item Type: Generic
Author: Dainty, K. N., Seaton, M. B., Molloy, S., Robinson, S. and Haberman, S.
Publication Date: February 2023
Publication Details: Journal of Patient Experience, 10, , United States: SAGE Publications Inc.
Abstract: As the COVID-19 pandemic reached Canada in full strength, the concept of allowing visiting to patients became an impossibility in most healthcare organizations. In March 2020, hospitals across Canada made the decision to close to visitors. This was a complicated decision which left admitted patients with very little option for connecting with family and friends other than through the telephone. In response, North York General Hospital launched a virtual family visiting (VFV) program across all inpatient units. Here we report the findings of a qualitative study of the program informed by an interpretive descriptive approach. Interviews were conducted with families who participated in the VFV program at North York General Hospital in Toronto, Canada during the first wave of the COVID pandemic. A total of 24 family members were interviewed. As anticipated, the family members were all extremely pleased with the opportunity to connect virtually and very satisfied with the VFV program. What was less anticipated was the anxiety and distress that families experienced in being separated from their loved ones. Our data analysis revealed 4 key themes which we have labeled (a) the unforeseen consequences of separation trauma, (b) increased vulnerability of patients and family, (c) a lifeline of human connection, and (d) the role of the facilitator as a connector. This work contributes significantly to a system-level understanding of the impact of imposed separation, increased vulnerability, and the importance of providing an alternative way for families to be present with their loved ones in these unprecedented times. Copyright © The Author(s) 2023.

Digital health as an enabler for hospital@home: A rising trend or just a vision?
Item Type: Generic
Author: Denecke, Kerstin, May, Richard, Borycki, Elizabeth M. and Kushniruk, Andre W.
Publication Date: February 2023
Publication Details: Frontiers in public health, 11, pp.1137798. , Switzerland:
Abstract: Background: Hospital@home is a model of healthcare, where healthcare professionals actively treat patients in their

homes for conditions that may otherwise require hospitalization. Similar models of care have been implemented in jurisdictions around the world over the past few years. However, there are new developments in health informatics including digital health and participatory health informatics that may have an impact on hospital@home approaches., Objectives: This study aims to identify the current state of implementation of emerging concepts into the hospital@home research and models of care; to identify strengths and weaknesses, opportunities, and threats associated with the models of care; and to suggest a research agenda., Methods: We employed two research methodologies, namely, a literature review and a SWOT (strengths, weaknesses, opportunities, and threats) analysis. The literature from the last 10 years was collected from PubMed using the search string "hospital at home" OR "care at home" OR "patient at home." Relevant information was extracted from the included articles., Results: Title and abstract review were conducted on 1,371 articles. The full-text review was conducted on 82 articles. Data were extracted from 42 articles that met our review criteria. Most of the studies originated from the United States and Spain. Several medical conditions were considered. The use of digital tools and technologies was rarely reported. In particular, innovative approaches such as wearables or sensor technologies were rarely used. The current landscape of hospital@home models of care simply delivers hospital care in the patient's home. Tools or approaches from taking a participatory health informatics design approach involving a range of stakeholders (such as patients and their caregivers) were not reported in the literature reviewed. In addition, emerging technologies supporting mobile health applications, wearable technologies, and remote monitoring were rarely discussed., Conclusion: There are multiple benefits and opportunities associated with hospital@home implementations. There are also threats and weaknesses associated with the use of this model of care. Some weaknesses could be addressed by using digital health and wearable technologies to support patient monitoring and treatment at home. Employing a participatory health informatics approach to design and implementation could help to ensure the acceptance of such care models. Copyright © 2023 Denecke, May, Borycki and Kushniruk.

Digital Health and Machine Learning Technologies for Blood Glucose Monitoring and Management of Gestational Diabetes

Abstract only*
Item Type: Generic
Author: Lu, Huiqi Y., Ding, Xiaorong, Hirst, Jane E., Yang, Yang, Yang, Jenny, Mackillop, Lucy and Clifton, David
Publication Date: February 2023
Publication Details: IEEE reviews in biomedical engineering, PP, , United States:
Abstract: Innovations in digital health and machine learning are changing the path of clinical health and care. People from different geographical locations and cultural backgrounds can benefit from the mobility of wearable devices and smartphones to monitor their health ubiquitously. This paper focuses on reviewing the digital health and machine learning technologies used in gestational diabetes - a subtype of diabetes that occurs during pregnancy. This paper reviews sensor technologies used in blood glucose monitoring devices, digital health innovations and machine learning models for gestational diabetes monitoring and management, in clinical and commercial settings, and discusses future directions. Despite one in six mothers having gestational diabetes, digital health applications were underdeveloped, especially the techniques that can be deployed in clinical practice. There is an urgent need to (1) develop clinically interpretable machine learning methods for patients with gestational diabetes, assisting health professionals with treatment, monitoring, and risk stratification before, during and after their pregnancies; (2) adapt and develop clinically-proven devices for patient self-management of health and well-being at

home settings ("virtual ward" and virtual consultation), thereby improving clinical outcomes by facilitating timely intervention; and (3) ensure innovations are affordable and sustainable for all women with different socioeconomic backgrounds and clinical resources.

Digital health and technologies Abstract only*
Item Type: Generic
Author: While, Alison
Publication Date: 2023
Publication Details: British journal of community nursing, 28, (3) pp.120-126. , England:
Abstract: Digital health was given impetus by the COVID-19 pandemic and demonstrated its potential for the delivery of safe care in the community. Remote monitoring and virtual wards are becoming mainstreamed across the UK. Artificial intelligence (AI) software has the potential to transform healthcare delivery but its trustworthiness is a key challenge. Positive staff attitudes towards digital health and new ways of working require staff education and engagement. Continued attention is required to meet the needs of those without access to digital technology and its use.

Virtual wards: a rapid evidence synthesis and implications for the care of older people
Author(s): Norman et al.
Source: Age and Ageing 52(1)
Publication date: January 2023
Background: Virtual wards are being rapidly developed within the National Health Service in the UK, and frailty is one of the first clinical pathways. Virtual wards for older people and existing hospital at home services are closely related. Methods: In March 2022, we searched Medline, CINAHL, the Cochrane Database of Systematic Reviews and medRxiv for evidence syntheses which addressed clinical-effectiveness, cost-effectiveness, barriers and facilitators, or staff, patient or carer experience for virtual wards, hospital at home or remote monitoring alternatives to inpatient care. Results: We included 28 evidence syntheses mostly relating to hospital at home. There is low to moderate certainty evidence that clinical outcomes including mortality (example pooled RR 0.77, 95% CI 0.60–0.99) were probably equivalent or better for hospital at home. Subsequent residential care admissions are probably reduced (example pooled RR 0.35, 95% CI 0.22–0.57). Cost-effectiveness evidence demonstrated methodological issues which mean the results are uncertain. Evidence is lacking on cost implications for patients and carers. Barriers and facilitators operate at multiple levels (organisational, clinical and patient). Patient satisfaction may be improved by hospital at home relative to inpatient care. Evidence for carer experience is limited. Conclusions: There is substantial evidence for the clinical effectiveness of hospital at home but less evidence for virtual wards. Guidance for virtual wards is lacking on key aspects including team characteristics, outcome selection and data protection. We recommend that research and evaluation is integrated into development of virtual ward models. The issue of carer strain is particularly relevant.

Interprofessional collaboration in a community virtual ward: A focus group study
Author(s): Eines et al.
Source: Scandinavian Journal of Caring Sciences
Publication date: January 2023
Background: The problem of a lack of nurses is expected to worsen in the future. With an ever-increasing number of elderly patients with multimorbidity and a shortage of healthcare professionals, primary care must innovatively organise their services to offer more sustainable healthcare services. Organising healthcare services in a community virtual ward has been found to improve the quality of life for vulnerable elderly populations. Aim: The aim of the study was to explore healthcare

professionals' experiences of interprofessional collaboration in care for patients with multimorbidity in a community virtual ward in the Norwegian context. Methods: Focus group interviews were conducted in this qualitative exploratory study. A purposive sample of 17 healthcare professionals working in a community virtual ward in Norway was interviewed. Data were analysed using thematic analysis. Results: The study results show that healthcare professionals recognise a need for patient involvement in the community virtual ward to offer more sustainable healthcare services at home. Furthermore, the results show how healthcare professionals experience the use of assessment tools and whiteboard meetings as useful tools for facilitating interprofessional collaboration. The study results also describe how interprofessional and holistic follow-up with patients with multimorbidity contributes to increased focus on health promotion in the community virtual ward. Conclusion: We found that interprofessional collaboration in community virtual wards may be a sustainable way of organising healthcare services for patients with multimorbidity living at home. Interprofessional collaboration with a patient-centred and health promotion approach, seems to increase the quality of the follow-up for patients with multimorbidity living at home. Additionally, mutual interprofessional trust and respect seems to be essential for making use of the unique expertise of different professions in the follow-up for patients with multimorbidity. In the future, both the patient's voice and opinion of their next of kin should be considered in the development of more sustainable homecare services.

Patient satisfaction with a virtual multidisciplinary team balance clinic: a pilot study Abstract only*
Author(s): Chew et al.
Source: British Journal of Healthcare Management 29(1)
Publication date: January 2023

Background/Aims: The COVID-19 pandemic led to many services being conducted remotely, including ear, nose and throat services. Although much in-person activity has now resumed, some services are still being provided remotely. This pilot study explored patients' satisfaction with the virtual multidisciplinary team balance clinics established at the authors' practice, looking at the feasibility of continuing this model of service delivery in the future. Methods: Self-administered questionnaires were posted to the 56 patients who had received a virtual consultation with the service between March and September 2020, of which 22 were returned. The questionnaire presented respondents with 14 items, with which they rated their agreement on a 6-point Likert scale. Correlations between the final item (which measured overall satisfaction) and the other items were analysed using Spearman's rho. Results: Overall, respondents were satisfied with the virtual consultations. Respondents either agreed or strongly agreed with 13 of the 14 items; the only exception was ‘I obtained better access to healthcare services by use of telemedicine’. Most respondents were happy with the quality of communication and valued the time saved on travel, although one pointed out that this may not be an appropriate mode of service delivery for patients who are deaf. Conclusions: Virtual clinics can be an acceptable adjunct to traditional clinical consultations in an ear, nose and throat outpatient department for balance disorders and should be continued in future.

Comprehensive Geriatric Hospital at Home: Adaptation to Referral and Case-Mix Changes During the COVID-19 Pandemic
Item Type: Generic
Author: Inzitari, Marco, Arnal, Cristina, Ribera, Aida, Hendry, Anne, Cesari, Matteo, Roca, Silvia and Perez, Laura Monica
Publication Date: January 2023
Publication Details: Journal of the American Medical Directors Association, 24, (1) pp.3-9.e1. , United States:

Abstract: OBJECTIVES: To describe the evolution of a Hospital at Home (HAH) based on comprehensive geriatric assessment (CGA), including its adaptability to changing case-mixes and pathways during the COVID-19 pandemic., DESIGN: Observational study of consecutive admissions to a combined step-up (admissions from home) and step-down (hospital discharge) HAH during 3 periods: prepandemic (2018-February 2020) vs pandemic (March-December 2020, and January-December 2021)., SETTING AND PARTICIPANTS: Participants were all consecutive patients admitted to a CGA-based HAH, located in Barcelona, Spain. Referrals followed acute events or exacerbation of chronic conditions, by either primary care (step-up) or after post-acute discharge (step-down)., METHODS: HAH intervention based on CGA and incorporated geriatric rehabilitation. Patient case-mix, functional evolution (Barthel index), and mortality were compared across periods and between pathways., RESULTS: HAH capacity expanded 3 fold from 15 to 45 virtual beds and altogether managed 688 consecutive patients mean age (SD) = 82.5 (9.6) years; 59% women]. Pandemic case-mix was slightly older (mean age = 83.5 vs 82 years, P = .012) than prepandemic, with greater mobility impairment. Across periods, step-up increased (26.1%, 40.9%, 48.2%, P < .01) because of medical events, skin ulcers, and post-acute stroke, whereas step-down decreased; multivariable models showed no differences in functional improvement or mortality. When comparing pathways, step-up featured older patients with higher comorbidity, worse functional status, and lower absolute functional gain than step-down (5.6 vs 13 points of Barthel index, P < .01), remaining statistically significant after adjusting for covariates (P = .003); no differences in mortality were observed., CONCLUSIONS AND IMPLICATIONS: A multipurpose, step-down and step-up CGA HAH expanded its activity and adapted to changing case-mixes and pathways throughout COVID-19 pandemic waves. Although further quantitative and qualitative studies are needed to assess the impact of this model, our results suggest that harnessing the adaptability of HAH may help advance a paradigm shift toward more person-centered, cost-effective models of clinical care aimed at older adults. Copyright © 2022. Published by Elsevier Inc.

Clinical Outcomes of a Newly Instituted Hospital at Home Program During the COVID19 Pandemic Abstract only*
Item Type: Generic
Author: Walsh, David, Ledford, Christy, Lyon, Matthew, Shiver, Stephen, Wilkins, Thad and Furno, Megan
Publication Date: 2023
Publication Details: Annals of family medicine, (21) , United States:
Abstract: Context: The COVID19 pandemic stressed U.S. health systems beyond their capacity and created worsening clinical outcomes. Hospital a Home (HaH) programs were utilized infrequently prior to pandemic. The Acute Care at Home Waiver was introduced in 2020 to facilitate the creation of HaH programs with a goal of promoting treatment in the home setting. A potential alternative approach to creating rapid inpatient level health system capacity is providing hospital-level care at home to substitute for inpatient hospitalization. The overall impact on clinical outcomes of a HaH program in patients with COVID19 is not well understood. Objective: To compare clinical outcomes of a HaH program versus usual hospital care for patients admitted for COVID19. Study Design: Matched case-control retrospective chart review. Setting or Dataset: Academic medical center. Population studied: Patients admitted with COVID19 and subsequently enrolled into the HaH program from February 1, 2021 to January 31, 2022. Patients aged <18 were excluded from consideration for enrollment. A case-control sample was matched on age, gender, and severity of illness. A total of 200 patients (100 HaH and 100 control) were included for analysis. Outcome Measures: Primary outcome: 30-day readmissions,

Secondary outcomes: Inpatient length of stay (iLOS) defined as length of stay in the physical hospital, total length of stay (tLOS) (sum of iLOS and HaH program days), time to readmission, and 30-day emergency department visits. Results: Analysis included 200 patents. The mean age was 50.4. The sample was 55% female. 48.5% were black, 43.5% were white, and 8% were other races. Compared with usual care patients, HaH patients had no difference in 30-day readmissions (11% vs. 14%, p=0.648), mean days to readmission (9.0 vs. 11.8, p=0.201), or return ED visits (17% vs. 20%, p=0.701). Inpatient LOS (5.7 vs. 9.4 days, p=0.005) was shorter in the HaH group. Total LOS (13.0 vs. 9.4 days, p<0. 001) was longer in the HaH group. Conclusions : The HaH program was associated with no difference in readmissions, time to readmission, or return ED visits compared to usual hospital care. HaH programs were associated with shorter inpatient length of stays, but longer total length of stays. In surge times, HaH programs could potentially reduce iLOS and increase bed capacity. Future studies should look to evaluate the economic impact of HaH programs and investigate the drivers of the increased tLOS. Copyright © 2023 Annals of Family Medicine, Inc.

Expansion of patient eligibility for virtual glaucoma clinics: a long-term strategy to increase the capacity of high-quality glaucoma care Full text available with NHS OpenAthens account*
Author(s): Nikita et al.
Source: Ophthalmology 107(1)
Publication date: 2023
Aims The virtual glaucoma clinic (VGC) is a well-established diagnostic pathway for delivery of glaucoma care. Current UK national guidance recommends VGCs for patients with ocular hypertension, glaucoma suspects or early glaucoma. This study evaluates whether expanded eligibility criteria, including other glaucoma phenotypes and disease stages, can deliver safe and effective care with a positive patient experience. Methods Records of over 8000 patients were reviewed in order to determine suitability for VGC attendance using expanded eligibility criteria. Patients with three prior consecutive visits within the glaucoma service were included. Follow-up interval, clinic type, visual acuity (VA), intraocular pressure (IOP) and visual field performance were recorded. Patient satisfaction was recorded for a sample of 118 patients. Results 2017 patients over 31 months were included. Two-thirds of eyes had ocular comorbidities, a fifth of eyes had undergone prior cataract surgery and 10% of eyes had undergone a prior laser treatment for glaucoma. After three visits, 32% of patients remained in the VGC, 42% were seen in face-to-face clinics and 25% were discharged. There were no clinically significant changes in VA, IOP and visual field performance during follow-up. 72% of patients expressed a preference to continue their care within VGCs. Conclusions This study demonstrates that VGCs with expanded patient eligibility criteria can deliver high-quality glaucoma care that is safe, effective and with high levels of patient satisfaction. This approach provides a long-term solution to adapt delivery of glaucoma care to our expanding and ageing population.

Virtual Acute Psychiatric Ward: Evaluation of Outcomes and Cost Savings Abstract only*
Item Type: Generic
Author: Castillo, Bon A., Shterenberg, Ravit, Bolton, James M., Dewa, Carolyn S., Pullia, Katrina and Hensel, Jennifer M.
Publication Date: 2023
Publication Details: Psychiatric services (Washington, D.C.), pp.appips20220332. , United States:
Abstract: OBJECTIVE: The COVID-19 pandemic motivated rapid expansion of virtual care. In Winnipeg, Canada, the authors launched a virtual psychiatric acute care ward (vWARD) to divert patients from hospitalization through daily remote treatment by a psychiatry team using telephone or videoconferencing. This

study examined vWARD patient characteristics, predictors of transfer to a hospital, use of acute care postdischarge, and costs of the vWARD compared with in-person hospitalization., METHODS: Data for all vWARD admissions from March 23, 2020, to April 30, 2021, were retrieved from program documents and electronic records. Emergency department visits and hospitalizations in the 6 months before admission and the 30 days after discharge were documented. Logistic regression identified factors associated with transfer to a hospital. Thirty-day acute care use after discharge was modeled with Kaplan-Meier curves. A break-even cost analysis was generated with data for usual hospital-based care., RESULTS: The 132 vWARD admissions represented a diverse demographic and clinical population. Overall, 57% involved suicidal behavior, and 29% involved psychosis or mania. Seventeen admissions (13%) were transferred to a hospital. Only presence of psychosis or mania significantly predicted transfer (OR=34.2, 95% CI=3.3-354.6). Eight individuals were hospitalized in the 30 days postdischarge (cumulative survival=0.93). vWARD costs were lower than usual care across several scenarios., CONCLUSIONS: A virtual ward is a feasible, effective, and potentially cost-saving intervention to manage acute psychiatric crises in the community and avoid hospitalization. It has benefits for both the health system and the individual who prefers to receive care at home.

Systematic literature review on the effectiveness and safety of paediatric hospital-at-home care as a substitute for hospital care
Abstract only*
Item Type: Generic
Author: Detollenaere, Jens, Van Ingelghem, Ingrid, Van den Heede, Koen and Vlayen, Joan
Publication Date: 2023
Publication Details: European journal of pediatrics, , Germany:
Abstract: The hospital landscape is shifting to new care models to meet current challenges in demand, technology, available budgets and staffing. These challenges also apply to the paediatric population, leading to a reduction in paediatric hospital beds and occupancy rates. Paediatric hospital-at-home (HAH) care is used to substitute hospital care in an attempt to bring hospital services closer to children's homes. In addition, these models attempt to avoid fragmentation of care between hospitals and the community. An important prerequisite for this paediatric HAH care is that it is safe and at least as effective as standard hospital care. The aim of this systematic review is to analyse the evidence on the impact of paediatric HAH care on hospital utilisation, patient outcomes and costs. Four bibliographic databases (Medline, Embase, Cinahl and Cochrane Library) were systematically searched for RCTs and pseudo-RCTs that studied the effectiveness and safety of short-term paediatric HAH care with a focus on models as an alternative to acute hospital admissions. Pseudo-RCTs are defined as observational studies that mimic the design of an RCT, but without randomisation. Outcomes of interest were the length of stay, acute (re)admissions, adverse health outcomes, therapy adherence, parental satisfaction or experience and costs. Only articles written in English, Dutch and French conducted in upper-middle and high-income countries and published between 2000 and 2021 were included. Quality assessment was carried out by two assessors using the Cochrane Collaboration's tool for assessing the risk of bias. Reporting is done in accordance with the PRISMA guidelines. We identified 18 (pseudo) RCTs and 25 publications of low to very low quality. Most of the included RCTs focused on the neonatal population: phototherapy for neonatal jaundice, early discharge after birth combined with outpatient neonatal care. Other RCTs focused on chemotherapy for acute lymphoblastic leukaemia, diabetes type 1 education, oxygen therapy for acute bronchiolitis, an outpatient service for children with infectious diseases and antibiotic treatment for low-risk febrile neutropenia, cellulitis and perforated appendicitis. The identified study results show that paediatric HAH care is not

associated with more adverse events or hospital readmissions. The impact of paediatric HAH care on costs is less clear. Conclusions: This review suggests that paediatric HAH care is not associated with more adverse events or hospital readmissions for various clinical indications compared to a standard hospital. Because of the low to very low level of evidence, it is worthwhile to further investigate safety, efficacy and cost effects under strict and well-controlled conditions. This systematic review provides guidance on the essential elements that should be included in HAH care programmes for each type of indication and/or intervention. What is Known: * The hospital landscape is shifting new models of care to meet current challenges in demand, technology, staffing and models of care. Paediatric HAH care is one of these models. Previous literature reviews are inconclusive whether this is a safe and effective way of providing care. What is New: * New evidence suggests that paediatric HAH care for various clinical indications is not associated with adverse events or hospital readmissions compared to a standard hospital. Current evidence is characterised by a low level of quality. * The current review provides guidance on the essential elements that should be included in HAH care programmes for each type of indication and/or intervention.

Interprofessional collaboration in a community virtual ward: A focus group study
Item Type: Generic
Author: Eines, T. F., Storm, M. and Gronvik, C. K. U.
Publication Date: 2023
Publication Details: Scandinavian Journal of Caring Sciences, , United Kingdom: John Wiley and Sons Inc.
Abstract: Background: The problem of a lack of nurses is expected to worsen in the future. With an ever-increasing number of elderly patients with multimorbidity and a shortage of healthcare professionals, primary care must innovatively organise their services to offer more sustainable healthcare services. Organising healthcare services in a community virtual ward has been found to improve the quality of life for vulnerable elderly populations. Aim(s): The aim of the study was to explore healthcare professionals' experiences of interprofessional collaboration in care for patients with multimorbidity in a community virtual ward in the Norwegian context. Method(s): Focus group interviews were conducted in this qualitative exploratory study. A purposive sample of 17 healthcare professionals working in a community virtual ward in Norway was interviewed. Data were analysed using thematic analysis. Result(s): The study results show that healthcare professionals recognise a need for patient involvement in the community virtual ward to offer more sustainable healthcare services at home. Furthermore, the results show how healthcare professionals experience the use of assessment tools and whiteboard meetings as useful tools for facilitating interprofessional collaboration. The study results also describe how interprofessional and holistic follow-up with patients with multimorbidity contributes to increased focus on health promotion in the community virtual ward. Conclusion(s): We found that interprofessional collaboration in community virtual wards may be a sustainable way of organising healthcare services for patients with multimorbidity living at home. Interprofessional collaboration with a patient-centred and health promotion approach, seems to increase the quality of the follow-up for patients with multimorbidity living at home. Additionally, mutual interprofessional trust and respect seems to be essential for making use of the unique expertise of different professions in the follow-up for patients with multimorbidity. In the future, both the patient's voice and opinion of their next of kin should be considered in the development of more sustainable homecare services.

of Caring Sciences published by John Wiley & Sons Ltd on behalf of Nordic College of Caring Science.

Technologies for monitoring activities of daily living in older adults: a systematic review Abstract only*
Item Type: Generic
Author: Gadey, Natasha, Pataunia, Patricia, Chan, Andrew and Rios Rincon, Adriana
Publication Date: 2023
Publication Details: Disability and rehabilitation.Assistive technology, pp.1-10. , England:
Abstract: PURPOSE: As the older adult population rise globally, technologies to monitoring activities of daily living (ADL) may have a role in supporting aging in place for older adults. The objective of this systematic literature review was to study the scope, diversity and readiness of technologies developed to monitor ADL in older adults., METHODS: We systematically searched two scientific databases (CINAHL and IEEE), following Preferred Reporting Items for Systematic reviews and Meta Analyses (PRISMA) guidelines. We included studies on technologies used to monitor older adults' ADL in the home but excluded studies focused on communication technologies (phone calls, text messages) or monitoring postures alone. The JBI checklist for case series was used for quality assessment. Extracted details included population characteristics, ADL assessment outcomes, types of monitoring technology, and technology readiness and usability., RESULTS: The search found 147 papers, with 16 papers included in the final analysis. The literature described 48 types of technologies. Of moderate quality studies, five studies used wearables at technology readiness level 4-6 to monitor basic ADL (walking, transfers and walking up stairs) and one used ambient sensors to detect urinary incontinence., CONCLUSIONS: Monitoring technologies remain at development stages. More research is needed to strengthen technologies that monitor activities of daily living.Implications for rehabilitationMonitoring activities of daily living at home remains focused on using wearables to assess in-home functional mobility to support rehabilitation.Technologies remain a 4-6 readiness level and there is a lack of evidence to recommend in-home monitoring technologies.

Hospital at home: A change in the course of care Abstract only*
Item Type: Generic
Author: Gaillard, Garrett and Russinoff, Ian
Publication Date: 2023
Publication Details: Journal of the American Association of Nurse Practitioners, 35, (3) pp.179-182. , United States:
Abstract: ABSTRACT: Acute care services in the United States are largely delivered in the hospital setting. Since the recent pandemic, acute care services in the hospital have become overwhelmed. An elderly population with comorbidities and lack of hospital capacity is leading to a "hospital without walls" approach to acute care. Hospital at Home (HaH) is a paradigm shift in the standard way to administer acute care. Model development coupled with innovations in telehealth and remote patient monitoring has led to HaH being considered a viable alternative to admitting patients to the hospital. Robust evidence suggests that HaH interventions are a new option for providers to assess, treat, and monitor patients. Outcomes equivalent to in-patient stays with no mortality difference makes this model a viable option for patient care outside of the hospital. An overall reduction in cost compared with an in-patient stay may be an economically viable option for overwhelmed hospital systems looking to care for their surrounding population. In this brief, we review some of the existing evidence and the growth of the HaH concept, and what it means for members of the interdisciplinary care team. Copyright © 2022 American Association of Nurse Practitioners.

Hospital at home: emergence of a high-value model of care delivery
Item Type: Generic
Author: Kanagala, Sai Gautham, Gupta, Vasu, Kumawat, Sunita, Anamika, Fnu, McGillen, Brian and Jain, Rohit
Publication Date: 2023
Publication Details: The Egyptian journal of internal medicine, 35, (1) pp.21. , England:
Abstract: Background: With increasing healthcare demands for acute illness in patients especially in the times of pandemic, healthcare organizations require modern solutions. Hospital at home (HaH) is one such tool that has the potential to solve these problems without compromising the care of the patients., Main body: Hospitals have been the conventional setting for managing acute sickness patients; however, it could be a very challenging environment for a few patients, especially for the older population who are highly susceptible to hospital-acquired infections. Health care in a hospital setting can also be very expensive, as it often involves a lot of healthcare professionals providing care. HaH service can provide the same quality of care expected in traditional settings., Conclusions: The median length of stay and the rate of readmissions were lower in people under HaH care. Compared with patients in a hospital setting, patients in HaH had better clinical outcomes. HaH unit provides an integrated, flexible, easy-to-scale platform that can be cost-effectively adapted to high-demand situations. Copyright © The Author(s) 2023.

Technology-enabled virtual ward for COVID management of the elderly and immunocompromised in Singapore: a descriptive cohort
Item Type: Generic
Author: Ko, Stephanie Q., Kumar, Shoban Krishna, Jacob, Jonathan, Hooi, Benjamin M. Y., Soo, Michelle, Nashi, Norshima, Cruz, Maria Teresa D., Wah, Yeo Ai, Xin, Wong Zhi, Smitasin, Nares, Lum, Lionel and Archuleta, Sophia
Publication Date: 2023
Publication Details: BMC infectious diseases, 23, (1) pp.102. , England:
Abstract: BACKGROUND: To address the hospital bed demand for Delta and Omicron surges in Singapore, the National University Health System (NUHS) developed a COVID Virtual Ward to relieve bed pressures on its three acute hospitals-National University Hospital, Ng Teng Fong General Hospital, Alexandra Hospital. To serve a multilingual population, the COVID Virtual Ward featuring protocolized teleconsultation of high-risk patients, use of a vital signs chatbot, supplemented by home visits where necessary. This study aims to evaluate the safety, outcomes and utilisation of the Virtual Ward as a scalable response to COVID-19 surges., METHODS: This is a retrospective cohort study of all patients admitted to the COVID Virtual Ward between 23 September to 9 November 2021. Patients were defined as "early discharge" if they were referred from inpatient COVID-19 wards and "admission avoidance" if they were referred directly from primary care or emergency services. Patient demographics, utilisation measures and clinical outcomes were extracted from the electronic health record system. The primary outcomes were escalation to hospital and mortality. Use of the vital signs chatbot was evaluated by examining compliance levels, need for automated reminders and alerts triggered. Patient experience was evaluated using data extracted from a quality improvement feedback form., RESULTS: 238 patients were admitted to the COVID Virtual Ward from 23 September to 9 November, of whom 42% were male, 67.6% of Chinese ethnicity. 43.7% were over the age of 70, 20.5% were immunocompromised, and 36.6% were not fully vaccinated. 17.2% of patients were escalated to hospital and 2.1% of patients died. Patients who were escalated to hospital were more likely to be immunocompromised or to have a higher ISARIC 4C-Mortality Score. There were no missed deteriorations. All

patients received teleconsults (median of 5 teleconsults per patient, IQR 3-7). 21.4% of patients received home visits. 77.7% of patients engaged with the vital signs chatbot, with a compliance rate of 84%. All patients would recommend the programme to others in their situation., CONCLUSIONS: Virtual Wards are a scalable, safe and patient-centered strategy to care for high risk COVID-19 patients at home., TRIAL REGISTRATION: NA. Copyright © 2023. The Author(s).

Virtual hospital-level care-feasibility, acceptability, safety and impact of a pilot Hospital-In-The-Home model for COVID-19 infection
Item Type: Generic
Author: Lawrence, J., Truong, D., Dao, A. and Bryant, P. A.
Publication Date: 2023
Publication Details: Frontiers in digital health, 5, pp.1068444. , Switzerland:
Abstract: Background: Hospital-in-the-Home (HITH) delivers hospital level care to patients in the comfort of their own home. Traditionally HITH involves clinicians travelling to patients' homes. We designed and implemented a virtual model of care leveraging a combination of virtual health modalities for children with COVID-19 in response to rising patient numbers, infection risk and pressures on protective equipment. In contrast to other models for COVID-19 infection in Australia at the time, our HITH service catered only for children who were unwell enough to meet criteria for hospitalisation (ie bed-replacement)., Aims: To measure the feasibility, acceptability, safety and impact of a virtual model of care for managing children with COVID-19 infection requiring hospital-level care., Methods: Retrospective study of a new virtual model of care for all children admitted to the Royal Children's HITH service with COVID-19 infection between 7th October 2021 and 28th April 2022. The model consisted of at least daily video consultations, remote oximetry, symptom tracking, portal messaging and 24 h phone and video support. Patients were eligible if they met a certain level of severity (work of breathing, dehydration, lower oxygen saturations) without requiring intravenous fluids, oxygen support or intensive care. Online surveys were distributed to staff and consumers who experienced the model of care., Results: 331 patients were managed through the virtual HITH program with a mean length of stay of 3.5 days. Of these, 331 (100%) engaged in video consultations, 192 (58%) engaged in the patient portal and completed the symptom tracker a total of 634 times and communicated via a total of 783 messages. Consumer satisfaction (n = 31) was high (4.7/5) with the most useful aspect of the model rated as video consultation. Clinician satisfaction (n = 9) was also high with a net promoter score of 8.9. There were no adverse events at home. Eight children (2.4%) represented to hospital, 7 (2.1%) of whom were readmitted. The impact is represented by a total of 1,312 hospital bed-days saved in the seven-month period (2,249 bed-days per year). In addition, 1,480 home visits (travel time/ protective equipment/ infection risk) were avoided., Conclusion: A virtual HITH program for COVID-19 in children is feasible, acceptable and safe and has a substantial impact on bed-days saved and nursing travel time. The implications for management of other acute respiratory viral illnesses that contribute to hospital bed pressure during winter months is immense. Virtual HITH is likely to be a key enabler of a sustainable healthcare system. Copyright © 2023 Lawrence, Truong, Dao and Bryant.

Use of an open-source electronic health record to establish a "virtual hospital": A tale of two curricula Abstract only*
Item Type: Generic
Author: Medlock, S., Ploegmakers, K. J., Cornet, R. and Pang, K. W.
Publication Date: 2023
Publication Details: International journal of medical informatics, 169, pp.104907. , Ireland: Elsevier Ireland Ltd.

Abstract: Background: The electronic health record (EHR) is central to medical informatics. Its use is also recognized as an important skill for future clinicians. Typically, medical students' first exposure to an EHR is when they start their clinical internships, and medical informatics students may or may not get experience with an EHR before graduation. We describe the process of implementing an open-source EHR in two curricula: Medicine and Medical informatics. For medical students, the primary goals were to allow students to practice analyzing information from the EHR, creating therapeutic plans, and communicating with their colleagues via the EHR before they start their first clinical rotations. For medical informatics students, the primary goal was to give students hands-on experience with creating decision support in an EHR. Approach: We used the OpenMRS electronic health record with a custom decision support module based on Arden Syntax. Medical students needed a secure, stable environment to practice medical reasoning. Medical informatics students needed a more isolated system to experiment with the EHR's internal configuration. Both student groups needed synthetic patient cases that were realistic, but in different aspects. For medical students, it is essential that these cases are clinically consistent, and events unfold in a logical order. By contrast, synthetic data for medical informatics students should mimic the data quality problems found in real patient data. Outcome(s): Medical informatics students show more mature reasoning about data quality issues and workflow integration than prior to using the EHR. Comments on both course evaluations have been positive, including comments on how working with a real-world EHR provides a realistic experience. Conclusion(s): The open-source EHR OpenMRS has proven to be a valuable addition to both the medicine and medical informatics curriculum. Both sets of students experience use of the EHR as giving them valuable, realistic learning experiences. Copyright © 2022

Virtual wards: a rapid evidence synthesis and implications for the care of older people

Item Type: Generic

Author: Norman, Gill, Bennett, Paula and Vardy, Emma R. L. C.

Publication Date: 2023

Publication Details: Age and Ageing, 52, (1) , England:

Abstract: BACKGROUND: Virtual wards are being rapidly developed within the National Health Service in the UK, and frailty is one of the first clinical pathways. Virtual wards for older people and existing hospital at home services are closely related., METHODS: In March 2022, we searched Medline, CINAHL, the Cochrane Database of Systematic Reviews and medRxiv for evidence syntheses which addressed clinical-effectiveness, cost-effectiveness, barriers and facilitators, or staff, patient or carer experience for virtual wards, hospital at home or remote monitoring alternatives to inpatient care., RESULTS: We included 28 evidence syntheses mostly relating to hospital at home. There is low to moderate certainty evidence that clinical outcomes including mortality (example pooled RR 0.77, 95% CI 0.60-0.99) were probably equivalent or better for hospital at home. Subsequent residential care admissions are probably reduced (example pooled RR 0.35, 95% CI 0.22-0.57). Cost-effectiveness evidence demonstrated methodological issues which mean the results are uncertain. Evidence is lacking on cost implications for patients and carers. Barriers and facilitators operate at multiple levels (organisational, clinical and patient). Patient satisfaction may be improved by hospital at home relative to inpatient care. Evidence for carer experience is limited., CONCLUSIONS: There is substantial evidence for the clinical effectiveness of hospital at home but less evidence for virtual wards. Guidance for virtual wards is lacking on key aspects including team characteristics, outcome selection and data protection. We recommend that research and evaluation is integrated into development of virtual ward models. The issue of carer strain is particularly relevant. Copyright © The Author(s)

2023. Published by Oxford University Press on behalf of the British Geriatrics Society. All rights reserved. For permissions, please email: journals.permissions@oup.com.

Severity of illness and risk of mortality in Mayo Clinic's virtual hybrid advanced care at home program: a retrospective cohort study
Item Type: Generic
Author: Paulson, M. R., Torres-Guzman, R. A., Avila, F. R., Maita, K. C., Garcia, J. P., Forte, A. J., Matcha, G. V., Pagan, R. J. and Maniaci, M. J.
Publication Date: 2023
Publication Details: BMC Health Services Research, 23, (1) pp.287. , United Kingdom: BioMed Central Ltd.
Abstract: Background: In July 2020, Mayo Clinic launched Advanced Care at Home (ACH), a high-acuity virtual hybrid hospital-at-home model (HaH) of care at Mayo Clinic Florida and Northwest Wisconsin, an urban destination medical center and a rural community practice respectively. This study aims to describe demographic characteristics of ACH patients as well as their acuity of illness using severity of illness (SOI) and risk of mortality (ROM), to illustrate the complexity of patients in the program, taking into account the different diagnostic related groups. Method(s): Mayo Clinic uses All Patient Refined-Diagnosis Related Groups (APR-DRG) to calculate SOI and ROM on hospitalized patients. APR-DRG data, including SOI and ROM, were gathered from individual chart reviews from July 6, 2020, to March 31, 2022. Result(s): Out of 923 patients discharged from ACH, the average APR-DRG SOI was 2.89 (SD 0.81) and ROM was 2.73. (SD 0.92). Mean age was 70.88 (SD 14.46) years, 54.6% were male patients and the average length of stay was 4.10 days. The most frequent diagnosis was COVID-19 infection with 162 patients (17.6%), followed by heart failure exacerbation (12.7%) and septicemia (10.9%). The 30-day readmission rate after discharge from ACH was 11.2% (n = 103) and the 30-day mortality rate was 1.8% (n = 17). There were no in-program patient deaths. Conclusion(s): SOI and ROM from patients at the ACH program have been shown to be in the range of "moderate/major" according to the APR-DRG classification. The ACH program is capable of accepting and managing highly complex patients that require advanced therapeutic means. Furthermore, the ACH program has an in-program mortality rate of 0 to date. Therefore, ACH is rising as a capable alternative to the brick-and-mortar hospital. Copyright © 2023, The Author(s).

Virtual wards and hospital at home services Abstract only*
Item Type: Generic
Author: Trueland, J.
Publication Date: 2023
Publication Details: Cancer Nursing Practice, 22, (2) pp.12-13. , United Kingdom: RCN Publishing Company Ltd.
As the boundaries between acute and community care change, new opportunities will arise for nurses. Virtual wards are expanding in many parts of the UK, with the aim of allowing patients to get the care they need at home, rather than in hospital.

Outcomes in novel hospital-at-home model for patients with COVID-19: a multicentre retrospective cohort study
Item Type: Generic
Author: Tsujimoto, Yasushi, Kobayashi, Masanori, Oku, Tomohisa, Ogawa, Takahisa, Yamadera, Shinichi, Tsukamoto, Masako, Matsuda, Noriya, Nishihira, Morikazu, Terauchi, Yu, Tanaka, Takahiro, Kawabata, Yoshitaka, Miyamoto, Yuki and Morikami, Yoshiki
Publication Date: 2023
Publication Details: Family practice, , England:
Abstract: BACKGROUND: Hospital-at-home (HaH) care has been proposed as an alternative to inpatient care for patients

with coronavirus disease (COVID-19). Previous reports were hospital-led and involved patients triaged at the hospitals. To reduce the burden on hospitals, we constructed a novel HaH care model organized by a team of local primary care clinics., METHODS: We conducted a multicentre retrospective cohort study of the COVID-19 patients who received our HaH care from 1 January to 31 March 2022. Patients who were not able to be triaged for the need for hospitalization by the Health Center solely responsible for the management of COVID-19 patients in Osaka city were included. The primary outcome was receiving medical care beyond the HaH care defined as a composite outcome of any medical consultation, hospitalization, or death within 30 days from the initial treatment., RESULTS: Of 382 eligible patients, 34 (9%) were triaged for hospitalization immediately after the initial visit. Of the remaining 348 patients followed up, 37 (11%) developed the primary outcome, while none died. Obesity, fever, and gastrointestinal symptoms at baseline were independently associated with an increased risk of needing medical care beyond the HaH care. A further 129 (37%) patients were managed online alone without home visit, and 170 (50%) required only 1 home visit in addition to online treatment., CONCLUSIONS: The HaH care model with a team of primary care clinics was able to triage patients with COVID-19 who needed immediate hospitalization without involving hospitals, and treated most of the remaining patients at home. Copyright © The Author(s) 2023. Published by Oxford University Press.

The Next Frontier of Remote Patient Monitoring: Hospital at Home

Item Type: Generic
Author: Whitehead, David and Conley, Jared
Publication Date: 2023
Publication Details: Journal of medical Internet research, 25, pp.e42335. , Canada:

Abstract: Remote patient monitoring (RPM) has shown promise in aiding safe and efficient remote care for chronic conditions; however, its use remains more limited within the hospital at home (HaH) model of care despite a significant opportunity to increase patient eligibility, improve safety, and decrease costs. HaH could achieve these goals by further adopting the 3 primary modalities of RPM (ie, vital sign, continuous single-lead electrocardiogram, and fall monitoring). With only 2 in-person vital sign checks required per day, HaH patient eligibility is currently often limited to lower-acuity cases. The use of vital sign RPM within HaH could better match the standard clinical practice of vital sign checks every 4-8 hours and enable safe care for appropriate moderate-acuity medical and surgical floor-level patients not traditionally enrolled in HaH. Robust, efficient collection of more frequent vital signs via RPM could expand patient eligibility for HaH and create a digital health safety net that enables high quality care. Similarly, our experience at Massachusetts General Hospital has demonstrated that appropriate use of continuous single-lead electrocardiogram RPM can also expand HaH enrollment, particularly for patients with acute decompensated heart failure. Through increasing enrollment of patients in HaH, RPM stands to enable more patients to reap the potential safety benefits of home hospitalization, including decreased rates of delirium and hospital-acquired infections, and better avoid aspects of posthospital syndrome. Furthermore, instituting fall detection RPM allows care teams to further HaH patient safety during their episode of acute care and develop enhanced mitigation strategies to avoid falls post home hospitalization. RPM also has the potential to assist HaH in achieving greater economies of scale and decreasing direct variable costs. By expanding HaH eligibility, RPM could enable HaH programs, which have traditionally operated under capacity, to care for a larger census and decrease allocated fixed costs per hospitalization. Additionally, RPM for HaH could further optimize hybrid in-home

and remote nurse or physician evaluations, decreasing costs on a per-episode basis by up to an estimated 3.5%. Overall, RPM holds great promise to increase patient eligibility and patient safety while decreasing costs. However, it is in its infancy in achieving its potential to advance the HaH model of care; further research and experience that inform operational and technical as well as policy considerations are needed. Copyright ©David Whitehead, Jared Conley. Originally published in the Journal of Medical Internet Research (https://www.jmir.org), 16.03.2023.

A whole healthcare system mortality review of the second wave COVID-19 pandemic response, were lessons learned? Abstract only*
Item Type: Generic
Author: Tankel, Jeremy W., Ratcliffe, David, Smith, Martin, Hindley, Clare, Mullarkey, Andrew, Waterhouse, Dee, Riley, Andrea and Green, Darren
Publication Date: 2023
Publication Details: Acute medicine, 22, (1) pp.39-46. , England:
Abstract: We previously reported a study of features of emergency healthcare response to COVID-19 that could be modified to mitigate against future excess deaths. Here we determined what themes persisted in later waves. This was an expert panel review of all components of care delivered to COVID-19 patients who died (primary and secondary care, community services, NHS 111 and 999, COVID oximetry at home, virtual wards). 174 deaths were included. 5% were deemed >50% avoidable, 75% included avoidability themes. Contact with primary care remains mostly via telephone, creating diagnostic risk. Patient decision to avoid healthcare contact was common. Recommendations include: better utilisation of home monitoring in future pandemics; improved avoidance of nosocomial spread; patients be encouraged to seek medical advice earlier.

2022

Successful implementation of round-the-clock care in a virtual ward during the COVID-19 pandemic Abstract only*
Item Type: Generic
Author: Wells, Emily, Taylor, Jessie Lever, Wilkes, Matt and Prosser-Snelling, Ed
Publication Date: 2022
Publication Details: British journal of nursing (Mark Allen Publishing), 31, (20) pp.1040-1044. , England:
Abstract: The COVID-19 pandemic led to unprecedented demand on NHS infrastructure. Virtual wards (VW) were created in response, using technology to monitor patients remotely. Their implementation required new systems of staffing, escalation, risk management and information governance. The Norfolk and Norwich University Hospitals Foundation Trust offered an example of a highly successful VW. It cared for 852 patients in its first year of operation, providing 24/7 nursing cover, supported by pharmacists and junior doctors, daily consultant-led ward rounds and virtual visits. The remote care platform collected continuous vital sign observations and generated custom alarms. The care team triaged, then escalated to nurse-specialists or consultants as required. Patients reported increased confidence and relief at earlier discharge. Staff highlighted the benefits of working from home, even if isolating or shielding. Challenges included developing awareness of the new service, overcoming concerns around increased workload and transitioning from emergency to long-term funding. The ward subsequently expanded from COVID-19 to nine other use cases.

Lessons learnt for digital inclusion in underserved communities from implementing a covid virtual ward
Item Type: Generic
Author: Fox, Rosanna, Saeed, Zeshan, Khan, Sadia, Robertson, Harry, Crisford, Sophie, Wiggam, Andrew, Foley, Abby, Raza,

Farhana and Wright, Michael
Publication Date: November 2022
Publication Details: PLOS digital health, 1, (11) pp.e0000146. , United States:
Abstract: The factors associated with digital exclusion in the covid virtual ward population at a North West London teaching hospital were assessed in this study. Patients discharged from the covid virtual ward were contacted to give their feedback on their experience. Questions were tailored to whether or not the patient used the Huma app during their time on the virtual ward and were subsequently divided into 'app user' and 'non-app user' cohorts. The non-app user population accounted for 31.5% of the total patients referred to the virtual ward. Four major themes drove digital exclusion in this group: language barriers, access, inadequate information/training, and poor IT skills. In conclusion, incorporating additional languages and improving hospital-setting demonstration and information provision to patients prior to discharge were highlighted as key factors for reducing digital exclusion in the covid virtual ward patients. Copyright: © 2022 Fox et al. This is an open access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Overcoming adversity: Building a remote interdisciplinary neurorehabilitation service during the COVID-19 pandemic
Item Type: Generic
Author: Ellis, Henrietta, Allsopp, Leanne, Tourle, Kelly, Moore, Katie, Potter, Kristy-Jane and Dharm-Datta, Shreshth
Publication Date: November 2022
Publication Details: Future healthcare journal, 9, (3) pp.346-350. , England:
Abstract: Background: The COVID-19 pandemic necessitated rapid change in neurorehabilitation delivery at the Defence Medical Rehabilitation Centre (DMRC), with a reduction in inpatient capacity., Aims and method: An interdisciplinary remote working group developed a novel neurorehabilitation telerehabilitation (TR) model. The plan, do, study, act (PDSA) model was used to develop and monitor activity in the changing pandemic context and to identify clinical outputs, key themes and learning points., Results: Eight PDSA cycles were performed, including video outpatient clinics, multidisciplinary team meetings, virtual ward rounds and TR for patients at home. Ten patients and 21 staff members provided feedback. Qualitative themes emerged including information technology, consultation environment, access to clinical notes and record keeping, clinical considerations, consent, patient and staff feedback, and feasibility., Conclusion: COVID-19 accelerated the implementation of TR at DMRC, allowing maintenance of service during lockdown. TR was acceptable to patients but placed a significant burden on staff. Practical suggestions for establishing a TR service are provided alongside challenges and limitations. Copyright © Royal College of Physicians 2022. All rights reserved.

The virtual wards aiming to ease hospital pressures
Author(s): Jo Best
Source: BMJ 378
Publication date: July 2022
Health services in England have been tasked with treating more patients at home, to cope with growing demand for beds—Jo Best asks how this will work

Palliative care virtual ward: early evaluation of a novel model of care to support patients with complex symptom management known to a UK tertiary hospital specialist palliative care team
Author(s): Barry et al.
Source: Future Healthcare Journal
Publication date: July 2022

Introduction: This study aims to evaluate the pilot phase of a palliative care virtual ward (VW), believed to the first of its kind in the UK, to assess for safety, suitability, effectiveness and ability to reduce length of hospitalisation for patients managed by a specialist palliative care (SPC) team in a tertiary hospital setting. Materials and methods: A retrospective single-centre evaluation of the first 10 patients transferred to a newly established 'palliative care VW', supported and delivered within the context of a wider hospital VW programme, established February 2021. Patients received daily contract via video consultation with a palliative care consultant. Remote physiological monitoring and nursing support was in place 24 hours a day. Patient outcome scores, readmission data, length of stay and referral reason were collected, alongside descriptive data of patient experience. Results and discussion: All patients had metastatic cancer, were known to the SPC team during their hospital admission and met the complexity criteria for admission to an inpatient specialist palliative care unit. The average age was 65 years old. The average inpatient length of stay prior to VW was 9.8 days. The average length of stay in VW was 3.2 days. The average symptom score on Integrated Patient Care Outcome Scale (IPOS) on admission to VW was 24.4. On Day 1, the average score was 13.9, and on Day 3, 12.1. On average, symptom burden reduced by 51%. Reasons for admission to VW included rapid titration of pain management (seven), management of breathlessness and hypoxia post pulmonary embolus (one), management of pain related to sepsis (one) and management of bowel obstruction (one). There were no adverse events, no patients were readmitted to hospital and patient feedback was universally positive. Conclusion: For patients in the last weeks and months of life, prolonged hospital admissions are rarely wanted. Restrictions in visiting arrangements and risk of COVID-19 infection are particularly pertinent to patients with terminal illness with complex symptom control issues; however, the premium on hospice beds often leads to lengthy hospital stays. The SPC VW model provides a promising, safe and effective alternative for such patients to be cared for in their own home during stabilisation of acute symptom control issues. Further work is need to understand the cost–benefit of this approach, which has the potential to increase specialist palliative care bed capacity in a innovative and effective way.

Remote care and triage of obstetric patients with COVID-19 in the community: operational considerations

Author(s): Bircher et al.
Source: BMC Pregnancy and Childbirth 22(550)
Publication date: July 2022
Background: During the SARS-CoV-2 (COVID-19) pandemic, routine antenatal care was disrupted, and pregnant women positive for COVID-19 were at increased risk of caesarean section, intensive care admission or neonatal unit admission for their baby. Virtual care and telehealth can reduce barriers to care and improve maternity outcomes, and adoption has been encouraged by health authorities in the United Kingdom. Methods: Norfolk and Norwich University Hospitals Trust deployed a flexible maternity virtual ward (MVW) service using the Current Health platform to care for pregnant women during the pandemic. Patients were monitored either intermittently with finger pulse oximetry or continuously with a wearable device. We outline the MVW technology, intervention and staffing model, triage criteria and patient feedback, as an example of an operational model for other institutions. Results: Between October 2021 and February 2022, 429 patients were referred, of which 228 were admitted to the MVW. Total bed-days was 1,182, mean length of stay was 6 days (SD 2.3, range 1–14 days). Fifteen (6.6%) required hospital admission and one (0.4%) critical care. There were no deaths. Feedback alluded to feelings of increased safety, comfort, and ease with the technology. Conclusions: The MVW offered a safety net to pregnant women positive for COVID-19. It provided reassurance

for staff, while relieving pressures on infrastructure. When setting up similar services in future, attention should be given to identifying clinical champions, triage criteria, technology and alarm selection, and establishing flexible escalation pathways that can adapt to changing patterns of disease.

The impact of post-hospital remote monitoring of COVID-19 patients using pulse oximetry: A national observational study using hospital activity data
Author(s): Geroghiou et al.
Source: eClinical Medicine 48
Publication date: June 2022
Background: There was a national roll out of 'COVID Virtual Wards' (CVW) during England's second COVID-19 wave (Autumn 2020 – Spring 2021). These services used remote pulse oximetry monitoring for COVID-19 patients following discharge from hospital. A key aim was to enable rapid detection of patient deterioration. It was anticipated that the services would support early discharge, reducing pressure on beds. This study is an evaluation of the impact of the CVW services on hospital activity. Methods: Using retrospective patient-level hospital admissions data, we built multivariate models to analyze the relationship between the implementation of CVW services and hospital activity outcomes: length of COVID-19 related stays and subsequent COVID-19 readmissions within 28 days. We used data from more than 98% of recorded COVID-19 hospital stays in England, where the patient was discharged alive between mid-August 2020 and late February 2021. Findings: We found a longer length of stay for COVID-19 patients discharged from hospitals where a CVW was available, when compared to patients discharged from hospitals where there was no CVW (adjusted IRR 1·05, 95% CI 1·01 to 1·09). We found no evidence of a relationship between the availability of CVW and subsequent rates of readmission for COVID-19 (adjusted OR 0.97, 95% CI 0.91 to 1·03). Interpretation: We found no evidence of early discharges or changes in readmissions associated with the roll out of COVID Virtual Wards across England. Our analysis made pragmatic use of national-scale hospital data, but it is possible that a lack of specific data (for example, on which patients were enrolled and on potentially important confounders) may have meant that true impacts, especially at a local level, were not ultimately discernible. It is important that future research is able to make use of better quality - preferably linked - data, from multiple sites.
Funding: This is independent research funded by the National Institute for Health Research, Health Services & Delivery Research program (RSET Project no. 16/138/17; BRACE Project no. 16/138/31) and NHSE&I. NJF is an NIHR Senior Investigator.

Comparison of the Characteristics and Outcomes of COVID-19 Patients Treated by a Hospital-at-Home Service in Japan during the Alpha and Delta Waves
Item Type: Generic
Author: Inokuchi, Ryota, Jin, Xueying, Iwagami, Masao, Sun, Yu, Sakamoto, Ayaka, Ishikawa, Masatoshi and Tamiya, Nanako
Publication Date: 2022
Publication Details: Journal of clinical medicine, 11, (11) , Switzerland:
Abstract: Coronavirus infections occurred in repeated waves caused by different variants of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), with the number of patients increasing during each wave. A private after-hours house-call (AHHC) service provides hospital-at-home (HaH) services to patients in Japan requiring oxygen when hospital beds are in short supply. This retrospective study aimed to compare the characteristics of COVID-19 patients treated by the AHHC service during the COVID-19 waves caused by the Alpha (March-June 2021) and Delta (July-December 2021) SARS-CoV-2 variants. All patients with COVID-19 treated by the AHHC service from March to December 2021 while awaiting

hospitalization were included. The data were collected from medical records and follow-up telephone interviews. The AHHC service treated 55 and 273 COVID-19 patients during the Alpha and Delta waves, respectively. The patients treated during the Delta wave were significantly younger than those treated during the Alpha wave (median: 63 years and 47 years, respectively; p < 0.001). Disease severity did not differ significantly between the two waves, but the crude case-fatality rate was significantly higher during the Alpha wave (10/55, 18.2%) than during the Delta wave (4/273, 1.4%; p < 0.001). The patient characteristics and outcomes differed between the Alpha and Delta waves.

Piloting 'Virtual Ward': a novel platform for delivering medical student education by residents
Item Type: Generic
Author: Kappel, Coralea, Hijazi, Waseem and Singhal, Nishma
Publication Date: May 2022
Publication Details: BMC medical education, 22, (1) pp.392. , England:
Abstract: BACKGROUND: Clinical experiences lie at the heart of undergraduate medical education (UGME). COVID-19 related disruptions in Medical Education impacted medical students substantially. As educators, efforts directed at developing new mediums to educate our medical students in the face of these new limitations were vital. The Virtual Ward (VW) pilot was an inaugural resident-driven, virtual educational opportunity aimed at supplement the learning of core internal medicine skills for undergraduate medical students., METHODS: Interested medical students were paired in groups of 5-6 with an internal medicine resident tutor. The McMaster University UGME core internal medicine topic list was provided to resident tutors to teach in an open, morning-report format in which students directed content selection. Following completion of the VW series, we distributed an online anonymous survey using a 5-point Likert scale to gauge the efficacy of the intervention and compare it to existing learning modalities offered by the UGME., RESULTS: In total, 166 medical students and 27 internal medicine resident tutors participated in the VW pilot. 46 (28%) medical students responded to the survey and 96% of survey respondents rated the sessions as being helpful to their learning. The majority rated VW superior to existing learning modalities and 94% thought VW should continue after COVID-related restrictions abate., CONCLUSIONS: VW is a novel educational platform that was very well received by learners. We propose VW may have a continued supplemental role post-pandemic to help with translation of knowledge to clinical skills and provide an additional avenue of mentorship for students. Copyright © 2022. The Author(s).

Factors associated with the workload of health professionals in hospital at home: a systematic review
Item Type: Generic
Author: Cordero-Guevara, J. A., Parraza-Diez, N., Vrotsou, K., Machon, M., Orruno, E., Onaindia-Ecenarro, M. J., Millet-Sampedro, M. and Regalado de los Cobos, J.
Publication Date: May 2022
Publication Details: BMC Health Services Research, 22, (1) pp.704. , United Kingdom: BioMed Central Ltd.
Abstract: Background: Understanding the factors related to workload, could help hospital at home (HaH) managers to make decisions on the most appropriate and efficient use of the HaH services. Published studies on this topic are scarce, so we have conducted a systematic review to identify such factors according to published evidence. Method(s): Due to the heterogeneity of HaH models, HaH was defined as a care that provides a set of medical and nursing care and attention of hospital rank to patients at home, when they no longer require hospital infrastructure but still need active monitoring and complex care. The electronic data base literature search was conducted in MEDLINE (Ovid), EMBASE (Ovid), and Cinahl (EBSCOhost)

from inception to December 2021, including grey literature. Search terms related to `hospital at home', `workload' and `care time' were used. There was no restriction on language, type of study or year of publication. Quality of included studies was assessed using the Critical Appraisal Skills Programme (CASP) checklist and certainty in the body of evidence was assessed using the GRADE Pro Tool. Results were summarised in a tabulated format. Result(s): Eighteen studies with 56,706 patients were included. Workload was measured as time, number of visits or both. The predictive factors of the workload included variables related to patient characteristics and other valid and reliable patient classification systems, as well as characteristics of the institutions where the studies were conducted. The factors associated with higher workloads were: being older, male, living in a rural environment, presenting a higher number of diagnoses, having worse functional status and being unable to assume self-care. Conclusion(s): The identified predictors of workload are mostly associated with home nursing care. The results could be useful and applicable to different organisational models of HaH health systems. More studies that include physicians and proxy measures of workload are needed. Copyright © 2022, The Author(s).

"Virtual ward" community outreach support for COVID-19-positive hemodialysis patients may delay but not prevent subsequent admission to hospital: A single-center retrospective case-control pilot study

Item Type: Generic

Author: Gaied, Joseph, Skinner, Joanne, Winterbottom, Claire, Brook, Matthew O., Thornley, Allison, Turner, Charlotte, Newell, Davinia, Davis, Linsey, Lasserson, Daniel and Bottomley, Matthew J.

Publication Date: April 2022

Publication Details: Hemodialysis international.International Symposium on Home Hemodialysis, 26, (2) pp.278-280. ,

Canada:

ISSN/ISBN: 1542-4758

SARS-CoV-19 (COVID-19) has rapidly spread to become a global crisis since December 2019, disproportionately affecting haemodialysis (HD) cohorts who are unable to shield and frequently possess multiple risk factors for poorer outcome, including advanced age and multiple comorbidities (1,2). We and others have previously reported that regular screening of HD cohorts can detect asymptomatic infection and facilitate early cohorting away from noninfected patients (3,4). However, interventions to prevent subsequent deterioration and admission in COVID-19- positive HD cohorts are lacking. Interventions to reduce admission rates and to shorten admission length are desirable from a health service perspective to reduce pressure on inpatient beds; from a patient perspective shortened or avoided admission reduces the risk of deconditioning. HD cohorts are particularly at risk of this, due to the high prevalence of pre-existing co-morbidities such as sarcopenia, diabetes and cardiovascular disease (5). A ‘virtual ward’ monitoring model was initiated at a large teaching hospital in the United Kingdom in November 2020 for all nasopharyngeal polymerase chain reaction (PCR) swab confirmed COVID-19 positive patients felt to be at risk of deterioration but not requiring admission (ambulant) at time of diagnosis. Symptomatic and asymptomatic COVIDpositive patients receiving in-centre HD were provided with written information, an oxygen saturation probe and daily contact with an outreach nurse along with weekly remote assessment by a multidisciplinary team of nephrologists, microbiologists, nurses and acute physicians. Outreach nurses undertook face-to-face review of patients in the community if required. Transfer to hospital for medical assessment was triggered by a fall in oxygen saturation to below 94% or a new clinical concern.

Effectiveness and safety of pulse oximetry in remote patient monitoring of patients with Covid-19: a systematic review
Author(s): Alboksmaty et al.
Source: The Lancet Digital Health 4(4)
Publication date: April 2022
The COVID-19 pandemic has led health systems to increase the use of tools for monitoring and triaging patients remotely. In this systematic review, we aim to assess the effectiveness and safety of pulse oximetry in remote patient monitoring (RPM) of patients at home with COVID-19. We searched five databases (MEDLINE, Embase, Global Health, medRxiv, and bioRxiv) from database inception to April 15, 2021, and included feasibility studies, clinical trials, and observational studies, including preprints. We found 561 studies, of which 13 were included in our narrative synthesis. These 13 studies were all observational cohorts and involved a total of 2908 participants. A meta-analysis was not feasible owing to the heterogeneity of the outcomes reported in the included studies. Our systematic review substantiates the safety and potential of pulse oximetry for monitoring patients at home with COVID-19, identifying the risk of deterioration and the need for advanced care. The use of pulse oximetry can potentially save hospital resources for patients who might benefit the most from care escalation; however, we could not identify explicit evidence for the effect of RPM with pulse oximetry on health outcomes compared with other monitoring models such as virtual wards, regular monitoring consultations, and online or paper diaries to monitor changes in symptoms and vital signs. Based on our findings, we make 11 recommendations across the three Donabedian model domains and highlight three specific measurements for setting up an RPM system with pulse oximetry.

The Rapid Development of Virtual Care Tools in Response to COVID-19: Case Studies in Three Australian Health Services
Author(s): Gray et al.
Source: JMIR Publications 6(4)
Publication date: April 2022
Background: News of the impact of COVID-19 around the world delivered a brief opportunity for Australian health services to plan new ways of delivering care to large numbers of people while maintaining staff safety through greater physical separation. The rapid pivot to telemedicine and virtual care provided immediate and longer term benefits; however, such rapid-cycle development also created risks. Objective: The aim of this study was to understand the sociotechnical aspects of the rapid-cycle development of seven different COVID-19 virtual care tools, and to identify enablers, barriers, and risks at three health services in Victoria, Australia. Methods: A qualitative, embedded, multiple case study design was adopted. Researchers from three health services collaborated with university researchers who were independent from those health services to gather and analyze structured interview data from key people involved in either clinical or technical aspects of designing and deploying seven different virtual care tools. Results: The overall objectives of each health service reflected the international requirements for managing large numbers of patients safely but remotely and for protecting staff. However, the governance, digital maturity, and specific use cases at each institution shaped the methodology and specific outcomes required. Dependence on key individuals and their domain knowledge within an existing governance framework generally enabled rapid deployment, but sometimes posed barriers. Existing relationships with technical service developers enabled strong solutions, which in some cases were highly scalable. Conventional project methodologies such as steering committees, scope, budget control, tight functional specification, consumer engagement and codesign, universal accessibility, and postimplementation evaluation were ignored almost universally in this environment. Conclusions: These three health services took a variety of approaches to the rapid-cycle development of virtual care tools to meet their urgent needs for

triaging and remote monitoring during the first year of the COVID-19 pandemic. Their experiences provided insights into many social and technical barriers and enablers to the development of virtual care tools. If these are addressed proactively, they will improve clinical governance and technical management of future virtual care. Some changes can be made within individual health services, while others entail health system policy reforms. Enhancing the environment for virtual care tool design and implementation now will yield returns not only during future health emergencies but also in many more routine care settings.

Remote patient monitoring identified the need for triage in patients with acute Covid-19 infection Abstract only*
Author(s): Tabacof et al.
Source: Telemedicine and eHealth 28(4)
Publication date: April 2022
Introduction: Telehealth was frequently used in the provision of care and remote patient monitoring (RPM) during the COVID-19 pandemic. The Precision Recovery Program (PRP) remotely monitored and supported patients with COVID-19 in their home environment. Materials and Methods: This was a single-center retrospective cohort study reviewing data acquired from the PRP clinical initiative. Results: Of the 679 patients enrolled in the PRP, 156 patients were screened by a clinician following a deterioration in symptoms and vital signs on a total of 240 occasions, and included in the analyses. Of these 240 occasions, 162 (67%) were escalated to the PRP physician. Thirty-six patients were referred to emergency department, with 12 (7%) admitted to the hospital. The most common risk factors coinciding with hospital admissions were cardiac (67%), age >65 (42%), obesity (25%), and pulmonary (17%). The most common symptoms reported that triggered a screening event were dyspnea/tachypnea (27%), chest pain (14%), and gastrointestinal issues (8%). Vital signs that commonly triggered a screening event were pulse oximetry (15%), heart rate (11%), and temperature (9%). Discussion: Common factors (risk factors, vital signs, and symptoms) among patients requiring screening, triage, and hospitalization were identified, providing clinicians with further information to support decision making when utilizing RPM in this cohort. Conclusion: A clinician-led RPM program for patients with acute COVID-19 infection provided supportive care and screening for deterioration. Similar models should be considered for implementation in COVID-19 cohorts and other conditions at risk of rapid clinical deterioration in the home setting.

Hospital at home for acute medical illness: The 21st century acute medical unit for a changing population
Author(s): Knight and Lasserson
Source: Journal of Internal Medicine 291(4) pp. 438-457
Publication date: April 2022
Recent trends across Europe show a year-on-year increase in the number of patients with acute medical illnesses presenting to hospitals, yet there are no plans for a substantial expansion in acute hospital infrastructure or staffing to address demand. Strategies to meet increasing demand need to consider the fact that there is limited capacity in acute hospitals and focus on new care models in both hospital and community settings. Increasing the efficiency of acute hospital provision by reducing the length of stay entails supporting acute ambulatory care, where patients receive daily acute care interventions but do not stay overnight in the hospitals. This approach may entail daily transfer between home and an acute setting for ongoing treatment, which is unsuitable for some patients living with frailty. Acute hospital at home (HaH) is a care model which, thanks to advances in point of care diagnostic capability, can provide a credible model of acute medical assessment and treatment without the need for hospital transfer. Investment and training to support scaling up of HaH are key strategic aims for integrated healthcare systems.

Overall patient experience with a virtual hybrid hospital at home program
Item Type: Generic
Author: Maniaci, Michael J., Torres-Guzman, Ricardo, Garcia, John P., Avila, Francisco R., Maita, Karla C., Forte, Antonio J. and Paulson, Margaret R.
Publication Date: April 2022
Publication Details: SAGE open medicine, 10, pp.20503121221092589. , England:
Abstract: Objectives: Traditional hospital at home models often have high patient experience scores. The purpose of this study is to look at the patient experience of a new virtual hybrid model of hospital at home called Advanced Care at Home., Methods: Patients in Mayo Clinic's Advanced Care at Home program received a survey via email from 1 January-31 May 2021. Each survey consisted of 20 questions divided into 18 multiple-choice and two open-ended questions., Results: Ninety-nine surveys were sent and 41 partially or completely finished surveys were returned for a response rate of 41.4%. Patients responded positively, denoted by answering "strongly agree or somewhat agree," with regard to the ability to reach the team right away 100% of the time, being kept informed 92% of the time, the command center responding promptly to their needs 95% of the time, the team providing comfort and support 98% of the time, feeling comfortable with interacting with their provider by phone or tablet 95% of the time, the ease of use from the equipment 97% of the time, the virtual and in-person staff working well together 98% of the time, the staff treating patients with courtesy and respect 100% of the time, and the ease of understanding the discharge process and feeling ready to leave the program 100% of the time. All providers received positive responses on listening 88% of the time. Patients gave a top rating in likelihood to recommend the program 100% of the time., Conclusion: Overall, the Advanced Care at Home model of hospital at home was highly recommended by patients. Patients scored the program high on responsiveness, staff engagement and communication, ease of equipment use, and readiness for discharge, strengthening the overall confidence in this novel program.

The impact of remote home monitoring of people with COVID-19 using pulse oximetry: A national population and observational study
Author(s): Sherlaw-Johnson et al.
Source: eClinical Medicine 45
Publication date: March 2022
Background: Remote home monitoring of people testing positive for COVID-19 using pulse oximetry was implemented across England during the Winter of 2020/21 to identify falling blood oxygen saturation levels at an early stage. This was hypothesised to enable earlier hospital admission, reduce the need for intensive care and improve survival. This study is an evaluation of the clinical effectiveness of the pre-hospital monitoring programme, COVID oximetry @home (CO@h). Methods: The setting was all Clinical Commissioning Group (CCG) areas in England where there were complete data on the number of people enrolled onto the programme between 2nd November 2020 and 21st February 2021. We analysed relationships at a geographical area level between the extent to which people aged 65 or over were enrolled onto the programme and outcomes over the period between November 2020 to February 2021. Findings: For every 10% increase in coverage of the programme, mortality was reduced by 2% (95% confidence interval:4% reduction to 1% increase), admissions increased by 3% (-1% to 7%), in-hospital mortality fell by 3% (-8% to 3%) and lengths of stay increased by 1·8% (-1·2% to 4·9%). None of these results are statistically significant, although the confidence interval indicates that any adverse effect on mortality would be small, but a mortality reduction of up to 4% may have resulted

from the programme. Interpretation: There are several possible explanations for our findings. One is that CO@h did not have the hypothesised impact. Another is that the low rates of enrolment and incomplete data in many areas reduced the chances of detecting any impact that may have existed. Also, CO@h has been implemented in many different ways across the country and these may have had varying levels of effect. Funding: This is independent research funded by the National Institute for Health Research, Health Services & Delivery Research programme (RSET Project no. 16/138/17; BRACE Project no. 16/138/31) and NHSEI. NJF is an NIHR Senior Investigator.

Hospital at Home for Elderly COVID-19 Patients: A Preliminary Report with 100 Patients
Item Type: Generic
Author: Miyamoto, Yuki, Matsuyama, Tasuku, Kunimitsu, Katsutomo, Nagano, Hiroyuki, Yamada, Yoshie, Murakami, Shigemi, Yamahata, Yoshihiro, Ohta, Bon, Morikami, Yoshiki and Nakagawa, Masanori
Publication Date: March 2022
Publication Details: Journal of clinical medicine, 11, (7) , Switzerland:
Abstract: Hospital-at-home (HaH) care is useful for patients with COVID-19 and an alternative strategy when hospital capacity is under pressure due to patient surges. However, the efficacy and safety of HaH in elderly patients with COVID-19 remain unknown. In Kyoto city, we conducted a retrospective medical record review of HaH care focused on elderly COVID-19 patients from 4 February to 25 June 2021. Eligible patients were (1) COVID-19 patients aged >=70 years and those who lived with them or (2) COVID-19 patients aged <70 years with special circumstances and those who lived with them. During the study period, 100 patients received HaH care. Their median age was 76 years (interquartile range 56-83), and 65% were over 70 years. Among 100 patients, 36 (36%) had hypoxia (oxygen saturation <= 92%), 21 (21%) received steroid medication, and 34 (34%) received intravenous fluids. Although 22 patients were admitted to the hospital and 3 patients died there, no patients died during HaH care. HaH care may be safe and effective in elderly patients with COVID-19. Our study shows that HaH provides an alternative strategy for treating COVID-19 patients and can reduce the healthcare burden at hospitals.

Virtual Wards: A Rapid Adaptation to Clinical Attachments in MBChB During the COVID-19 Pandemic Abstract only*
Item Type: Generic
Author: Huser, Camille, Templeton, Kerra, Stewart, Michael, Dhanani, Safiya, Hughes, Martin and Boyle, James G.
Publication Date: February 2022
Publication Details: Advances in Experimental Medicine and Biology, 1356, pp.95-116. , United States:
Abstract: When the COVID-19 pandemic suddenly prevented medical students from attending their clinical attachments, the faculty involved in the third year of medical school (MBChB3) at the University of Glasgow created Virtual Wards. The focus of the Virtual Wards was to continue teaching of clinical reasoning remotely whilst COVID-19 restrictions were in place. Virtual Wards were mapped to the common and important presentations and conditions and provided opportunity for history-taking, clinical examination skills, requesting investigations, interpreting results, diagnosis and management. The Virtual Wards were successful, and further wards were developed the following academic year for MBChB4 students. This chapter describes the theoretical underpinnings of the Virtual Wards and the technological considerations, followed by a description of the Wards themselves. We then analyse an evaluation of the Virtual Wards and provide both a faculty and student perspective. Throughout the chapter, we provide tips for educators developing Virtual Ward environments. Copyright © 2022. The Author(s), under exclusive license to Springer Nature

Switzerland AG.

Comparative Effectiveness of an Automated Text Messaging Service for Monitoring COVID-19 at Home
Author(s): Delgado et al.
Source: Annals of International Medicine
Publication date: February 2022
Background: Although most patients with SARS-CoV-2 infection can be safely managed at home, the need for hospitalization can arise suddenly. Objective: To determine whether enrollment in an automated remote monitoring service for community-dwelling adults with COVID-19 at home ("COVID Watch") was associated with improved mortality. Design: Retrospective cohort analysis. Setting: Mid-Atlantic academic health system in the United States. Participants: Outpatients who tested positive for SARS-CoV-2 between 23 March and 30 November 2020. Intervention: The COVID Watch service consists of twice-daily, automated text message check-ins with an option to report worsening symptoms at any time. All escalations were managed 24 hours a day, 7 days a week by dedicated telemedicine clinicians. Measurements: Thirty- and 60-day outcomes of patients enrolled in COVID Watch were compared with those of patients who were eligible to enroll but received usual care. The primary outcome was death at 30 days. Secondary outcomes included emergency department (ED) visits and hospitalizations. Treatment effects were estimated with propensity score–weighted risk adjustment models. Results: A total of 3488 patients enrolled in COVID Watch and 4377 usual care control participants were compared with propensity score weighted models. At 30 days, COVID Watch patients had an odds ratio for death of 0.32 (95% CI, 0.12 to 0.72), with 1.8 fewer deaths per 1000 patients (CI, 0.5 to 3.1) (P = 0.005); at 60 days, the difference was 2.5 fewer deaths per 1000 patients (CI, 0.9 to 4.0) (P = 0.002). Patients in COVID Watch had more telemedicine encounters, ED visits, and hospitalizations and presented to the ED sooner (mean, 1.9 days sooner [CI, 0.9 to 2.9 days]; all P < 0.001). Limitation: Observational study with the potential for unobserved confounding. Conclusion: Enrollment of outpatients with COVID-19 in an automated remote monitoring service was associated with reduced mortality, potentially explained by more frequent telemedicine encounters and more frequent and earlier presentation to the ED.

Association of Race and Neighborhood Disadvantage with Patient Engagement in a Home-Based COVID-19 Remote Monitoring Program
Author(s): Fritz et al.
Source: Journal of General Internal Medicine 37 pp. 838-846
Publication date: January 2022
Background: COVID-positive outpatients may benefit from remote monitoring, but such a program often relies on smartphone apps. This may introduce racial and socio-economic barriers to participation. Offering multiple methods for participation may address these barriers. Objectives: (1) To examine associations of race and neighborhood disadvantage with patient retention in a monitoring program offering two participation methods. (2) To measure the association of the program with emergency department visits and hospital admissions. Design: Retrospective propensity-matched cohort study. Participants: COVID-positive outpatients at a single university-affiliated healthcare system and propensity-matched controls. Interventions: A home monitoring program providing daily symptom tracking via patient portal app or telephone calls. Main Measures: Among program enrollees, retention (until 14 days, symptom resolution, or hospital admission) by race and neighborhood disadvantage, with stratification by program arm. In enrollees versus matched controls, emergency department utilization and hospital admission within 30 days. Key Results: There were 7592 enrolled patients and 9710 matched controls. Black enrollees chose the telephone arm more frequently than

White enrollees (68% versus 44%, p = 0.009), as did those from more versus less disadvantaged neighborhoods (59% versus 43%, p = 0.02). Retention was similar in Black enrollees and White enrollees (63% versus 62%, p = 0.76) and in more versus less disadvantaged neighborhoods (63% versus 62%, p = 0.44). When stratified by program arm, Black enrollees had lower retention than White enrollees in the app arm (49% versus 55%, p = 0.01), but not in the telephone arm (69% versus 71%, p = 0.12). Compared to controls, enrollees more frequently visited the emergency department (HR 1.71 [95% CI 1.56–1.87]) and were admitted to the hospital (HR 1.16 [95% CI 1.02–1.31]). Conclusions: In a COVID-19 remote patient monitoring program, Black enrollees preferentially selected, and had higher retention in, telephone- over app-based monitoring. As a result, overall retention was similar between races. Remote monitoring programs with multiple modes may reduce barriers to participation.

Using virtual wards and long-term conditions management network to improve practice and performance
Author(s): Kanyimo
Source: BMJ Open Quality 11(4)
Publication date: 2022
England has more than 15 million people and counting with long-term conditions who have the greatest healthcare needs of the population accounting for 50% of all General Practitioner (GP) appointments and 70% of all bed days. Digital technology has the potential to transform care through empowering patients, establishing more robust therapeutic relationships as well as supporting stronger teamworking across boundaries and enabling creation of communities and networks to support patients. There is some hesitancy in National Health Service to adopt digital innovation, but the pandemic has transformed use of remote monitoring in a matter of weeks. The pandemic has highlighted how collaboration and digital technology innovation can radically transform health and care services at pace when people are provided with the space and support to be innovative. Nurse and clinical leaders with digital knowledge are key in engaging nurses who need to be at the heart of technological developments and implementation to make sure changes facilitate, enhance patient care and improve clinical practice. This project aimed to create a forum that offered time, space and opportunities to innovate; share learning; and develop cross boundary relationships for project teams implementing technology-enabled remote monitoring or virtual ward solutions. Florence Nightingale Foundation scholar and NHSX Digital Health team ran the forum using community of practice principles. Qualitative data were used to measure any potential value created. Forum members reported increase in their personal knowledge as they managed to learn from others. An online platform created as an extension to the forum enabled members to continue networking and access resources. The forum provided space for relationships to get stronger. This enabled innovation that changed practice and performance around increased uptake of tech-enabled remote monitoring solutions by patients as well as indirect health outcomes. Further work is required to collate quantitative data to confirm these claims from the forum members.

A Covid -19 Virtual Ward Model: A Preliminary Retrospective Clinical Evaluation From a UK District General Hospital
Author(s): O'Malley et al.
Source: Journal of Primary Care & Community Health
Publication date: 2022
Objective: This study aims to evaluate the safety, utilization, ability to reduce length of hospitalization and overall outcomes of a COVID-19 virtual ward providing ongoing treatment at home. Method: A retrospective single-center study of patients discharged to the COVID-19 virtual "step down" ward between January 27th 2021 and March 2nd 2021. The referral process,

length of hospitalization, length of stay on the virtual ward, readmissions, and ongoing treatment requirements including supplemental oxygen, antibiotics, and/or steroids were all noted. Results: A total of 50 patients were referred to the virtual ward. 43 referrals were accepted, 39 of which were from the respiratory ward. Four patients were readmitted, all due to hypoxia. All readmissions occurred within 5 days of discharge. 72% (n = 31) were discharged home with an ongoing oxygen requirement. 14.3% of patients were discharged with antibiotics only, 9.5% with steroids only and 23.8% with both antibiotics and steroids. The mean length of hospital stay for patients discharged to the virtual ward was 10.3 ± 9.7 days and 11.9 ± 11.6 days for all covid positive patients during this time. On average, patients spent 13.7 ± 7.3 days on the virtual ward. The average number of days spent on oxygen on the virtual ward was 11.6 ± 6.0 days. Conclusion: The virtual ward model exemplifies the potential benefits of collaborative working between primary and secondary care services, relieving pressure on hospitals whilst providing ongoing treatments at home such as supplemental oxygen. It also facilitates an early supported discharge of clinically stable patients with an improving clinical trajectory by managing them in the community.

Covid-19 Oximetry @home: evaluation of patient outcomes
Author(s): Boniface et al.
Source: BMJ Open Quality 11(1)
Publication date: 2022
Background COVID-19 has placed unprecedented demands on hospitals. A clinical service, COVID-19 Oximetry @home (CO@h) was launched in November 2020 to support remote monitoring of COVID-19 patients in the community. Remote monitoring through CO@h aims to identify early patient deterioration and provide timely escalation for cases of silent hypoxia, while reducing the burden on secondary care. Methods We conducted a retrospective service evaluation of COVID-19 patients onboarded to CO@h from November 2020 to March 2021 in the North Hampshire (UK) community led service (a collaboration of 15 General Practitioner (GP) practices covering 230 000 people). We have compared outcomes for patients admitted to Basingstoke and North Hampshire Hospital who were CO@h patients (COVID-19 patients with home monitoring of oxygen saturation (SpO2; n=115), with non-CO@h patients (those directly admitted without being monitored by CO@h (n=633)). Crude and adjusted OR analysis was performed to evaluate the effects of CO@h on patient outcomes of 30-day mortality, Intensive care unit (ICU) admission and hospital length of stay greater than 3, 7, 14 and 28 days. Results Adjusted ORs for CO@h show an association with a reduction for several adverse patient outcome: 30-day hospital mortality (p<0.001, OR 0.21, 95% CI 0.08 to 0.47), hospital length of stay larger than 3 days (p<0.05, OR 0.62, 95% CI 0.39 to 1.00), 7 days (p<0.001, OR 0.35, 95% CI 0.22 to 0.54), 14 days (p<0.001, OR 0.22 95% CI, 0.11 to 0.41), and 28 days (p<0.05, OR 0.21, 95% CI 0.05 to 0.59). No significant reduction ICU admission was observed (p>0.05, OR 0.43, 95% CI 0.15 to 1.04). Within 30 days of hospital admission, there were no hospital readmissions for those on the CO@h service as opposed to 8.7% readmissions for those not on the service. Conclusions We have demonstrated a significant association between CO@h and better patient outcomes; most notably a reduction in the odds of hospital lengths of stays longer than 7, 14 and 28 days and 30-day hospital mortality.

Population-level impact of a pulse oximetry remote monitoring programme on mortality and healthcare utilisation in the people with COVID-19 in England: a national analysis using a stepped wedge design
Author(s): Beaney et al.
Source: Emergency Medicine Journal 39(8)
Publication date: 2022

Background: To identify the population-level impact of a national pulse oximetry remote monitoring programme for COVID-19 (COVID Oximetry @home (CO@h)) in England on mortality and health service use. Methods: We conducted a retrospective cohort study using a stepped wedge pre-implementation and post-implementation design, including all 106 Clinical Commissioning Groups (CCGs) in England implementing a local CO@h programme. All symptomatic people with a positive COVID-19 PCR test result from 1 October 2020 to 3 May 2021, and who were aged ≥65 years or identified as clinically extremely vulnerable were included. Care home residents were excluded. A pre-intervention period before implementation of the CO@h programme in each CCG was compared with a post-intervention period after implementation. Five outcome measures within 28 days of a positive COVID-19 test: (i) death from any cause; (ii) any ED attendance; (iii) any emergency hospital admission; (iv) critical care admission and (v) total length of hospital stay. Results: 217 650 people were eligible and included in the analysis. Total enrolment onto the programme was low, with enrolment data received for only 5527 (2.5%) of the eligible population. The period of implementation of the programme was not associated with mortality or length of hospital stay. The period of implementation was associated with increased health service utilisation with a 12% increase in the odds of ED attendance (95% CI: 6% to 18%) and emergency hospital admission (95% CI: 5% to 20%) and a 24% increase in the odds of critical care admission in those admitted (95% CI: 5% to 47%). In a secondary analysis of CO@h sites with at least 10% or 20% of eligible people enrolled, there was no significant association with any outcome measure. Conclusion: At a population level, there was no association with mortality before and after the implementation period of the CO@h programme, and small increases in health service utilisation were observed. However, lower than expected enrolment is likely to have diluted the effects of the programme at a population level.

Home Monitoring Programs for Patients Testing Positive for SARS-CoV-2: An Integrative Literature Review Abstract only*
Author(s): Lara et al.
Source: Applied Clinical Informatics 13(1)
Publication date: 2022
Background: The severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2) pandemic threatened to oversaturate hospitals worldwide, necessitating rapid patient discharge to preserve capacity for the most severe cases. This need, as well as the high risk of SARS-CoV-2 transmission, led many hospitals to implement remote patient monitoring (RPM) programs for SARS-CoV-2 positive patients in an effort to provide care that was safe and preserve scarce resources. Objective The aim of this study is to provide an integrative review of peer-reviewed literature on different RPM programs that were implemented for SARS-CoV-2 positive patients including their strengths and challenges. Methods: A search was conducted for peer reviewed literature using PubMed, CINAHL, OVID, and Google Scholar. Peer-reviewed studies written in English or Spanish and published between 2019 and 2021 on RPM of SARS-CoV-2-positive patients were considered. Information was extracted according to a qualitative content analysis method, informed by the Comparison of Mobile Patient Monitoring Systems Framework. Results: Of 57 retrieved articles, 10 publications were included. The sample sizes ranged from 75 to 48,290 and the monitoring length ranged from 7 to 30 days. Information regarding the comparison framework was summarized. Main strengths of using RPM for SARS-CoV-2 positive patients was participant acceptance, feasibility, safety, and resource conservation. Main limitations were the lack of information on patient data security measures, robust outcomes testing, and identification of the most effective biomarkers to track SARS-CoV-2 decompensation. Conclusion: Different RPM programs for SARS-CoV-2 were implemented, from sending home participants with a pulse oximeter and collecting readings

via call to modifying existing mobile applications and sending holistic health questionnaires to participants. This review determined that RPM is beneficial to SARS-CoV-2 positive patients; however, its effectiveness can be improved by further research. Mainly, identifying what patient data are most effective at tracking SARS-CoV-2 decompensation by utilizing advanced technology already in the market.

How safe is virtual healthcare?
Author(s): Harrison and Manias
Source: International Journal for Quality in Health Care 34(2)
Publication date: 2022
Background: Undeniable opportunities are posed by virtual models of care that address long-standing health system sustainability challenges and improve access. Virtual models of care describe preventive, diagnostic and treatment practices without face-to-face contact with healthcare providers. Common forms of virtual care that have rapidly progressed due to the coronavirus disease 2019 (COVID-19) pandemic include health provision via telephone or video-conferencing software, the use of wearable monitoring devices, digitized health information and remote (in-home) monitoring [1]. Virtual care has created healthcare contexts with further complexity as a result of novel care settings and technological systems that require different models and processes of care [2]. There may also be greater presence of family members, members of the public and technical support staff during healthcare encounters. These components collectively create highly unpredictable care environments. We examine the key risk areas of virtual healthcare for patient safety based on emerging evidence. Evaluations of virtual models deployed internationally indicate that their key risks relate to retaining the confidentiality of highly personal or sensitive information and ensuring equitable access to services with the necessary supports. Such risks are particularly pertinent to individuals who experience existing health inequities; those with complex health and social needs, low health literacy or from low-income backgrounds [3, 4]. Whilst there has been much scrutiny of the safety features of digital health tools [5], exploration of patient safety in virtual healthcare through an equity lens is needed to ensure quality.

Remote COVID-19 patient monitoring system: a qualitative evaluation
Author(s): Oliver et al.
Source: BMJ Open 12(5)
Publication date: 2022
Background: Many COVID-19 patients are discharged home from hospital with instructions to self-isolate. This reduces the burden on potentially overwhelmed hospitals. The Royal Melbourne Hospital (RMH) Home Monitoring Programme (HMP) is a model of care for COVID-19 patients which chiefly tracks pulse oximetry and body temperature readings. Objective: To evaluate the feasibility and acceptability of the HMP from a patient perspective. Design, settings and participants: Of 46 COVID-19 patients who used the HMP through RMH during April to August 2020, 16 were invited to participate in this qualitative evaluation study; all accepted, including 6 healthcare workers. Attempts were made to recruit a gender-balanced sample across a range of COVID-19 severities and comorbidities. Participants completed a brief semistructured phone interview discussing their experience of using the HMP. Outcome measures and analysis: A thematic analysis of interview data was conducted. Feasibility was defined as the HMP's reported ease of use. Acceptability was considered holistically by reviewing themes in the interview data. Results: The HMP allowed clinical deterioration to be recognised as it occurred enabling prompt intervention. All participants reported a positive opinion of the HMP, stating it was highly acceptable and easy to use. Almost all participants said they found using it reassuring. Patients frequently mentioned the importance of the monitoring clinicians

as an information conduit. The most suggested improvement was to monitor a broader set of symptoms. Conclusions: The HMP is highly feasible and acceptable to patients. This model of care could potentially be implemented on a mass-scale to reduce the burden of COVID-19 on hospitals. A key benefit of the HMP is the ability to reassure patients they will receive suitable intervention should they deteriorate while isolating outside of hospital settings.

Exploring the impact of pulse oximeter selection within the COVID-19 home-use pulse oximetry pathways Abstract only*
Author(s): Stell et al.
Source: BMJ Open Respiratory Research 9(1)
Publication date: 2022
Background: During the COVID-19 pandemic, portable pulse oximeters were issued to some patients to permit home monitoring and alleviate pressure on inpatient wards. Concerns were raised about the accuracy of these devices in some patient groups. This study was conducted in response to these concerns. Objectives: To evaluate the performance characteristics of five portable pulse oximeters and their suitability for deployment on home-use pulse oximetry pathways created during the COVID-19 pandemic. This study considered the effects of different device models and patient characteristics on pulse oximeter accuracy, false negative and false positive rate. Methods: A total of 915 oxygen saturation (spO2) measurements, paired with measurements from a hospital-standard pulse oximeter, were taken from 50 patients recruited from respiratory wards and the intensive care unit at an acute hospital in London. The effects of device model and several patient characteristics on bias, false negative and false positive likelihood were evaluated using multiple regression analyses. Results and conclusions: All five portable pulse oximeters appeared to outperform the standard to which they were manufactured. Device model, patient spO2 and patient skin colour were significant predictors of measurement bias, false positive and false negative rate, with some variation between models. The false positive and false negative rates were 11.2% and 24.5%, respectively, with substantial variation between models.

Budget impact analysis of providing hospital inpatient care at home virtually, starting with two specific surgical patient groups
Author(s): Peters et al.
Source: BMJ Open 12(8)
Publication date: 2022
Objective: To determine the budget impact of virtual care. Methods: We conducted a budget impact analysis of virtual care from the perspective of a large teaching hospital in the Netherlands. Virtual care included remote monitoring of vital signs and three daily remote contacts. Net budget impact over 5 years and net costs per patient per day (costs/patient/day) were calculated for different scenarios: implementation in one ward, in two different wards, in the entire hospital, and in multiple hospitals. Sensitivity analyses included best-case and worst-case scenarios, and reducing the frequency of daily remote contacts. Results: Net budget impact over 5 years was €2 090 000 for implementation in one ward, €410 000 for two wards and €−6 206 000 for the entire hospital. Costs/patient/day in the first year were €303 for implementation in one ward, €94 for two wards and €11 for the entire hospital, decreasing in subsequent years to a mean of €259 (SD=€72), €17 (SD=€10) and €−55 (SD=€44), respectively. Projecting implementation in every Dutch hospital resulted in a net budget impact over 5 years of €−445 698 500. For this scenario, costs/patient/day decreased to €−37 in the first year, and to €54 in subsequent years in the base case. Conclusions: With present cost levels, virtual care only saves money if it is deployed at sufficient scale or if it can be designed such that the active involvement of health professionals is minimised. Taking a greenfield approach,

involving larger numbers of hospitals, further decreases costs compared with implementing virtual care in one hospital alone.

Outcomes from a virtual ward delivering oxygen at home for patients recovering from Covid-19: a real world observational study
Author(s): Ward et al.
Source: Clinical Medicine 22(3)
Publication date: 2022
Background There is a lack of data on the safety of providing oxygen at home to stable patients recovering from COVID-19. Methods A retrospective analysis of patients discharged to a COVID-19 virtual ward (CVW) between January 2021 and March 2021 at a UK district general hospital was performed. Patients with improving clinical trajectories and oxygen requirements up to 4 L/minute were eligible. Outcomes measured were 30-day mortality and readmission rate. Results From 02 January 2021 to 16 March 2021 (74 days), 147 patients discharged to the CVW were included: 71 received continuous or ambulatory oxygen, and 76 received pulse oximetry monitoring only. Five patients were readmitted within 30 days and two patients died. There were no significant differences between readmission and mortality rates between those discharged with or without oxygen. Conclusion Provision of oxygen at home for selected patients recovering from COVID-19 is safe with low risk of readmission and death.

2021

An evaluation of a virtual COVID-19 ward to accelerate the supported discharge of patients from an acute hospital setting
Author(s): Swift et al.
Source: British Journal of Healthcare Management 28(1)
Publication date: November 2021
Background/Aims: In response to high numbers of hospital admissions as a result of COVID-19, a virtual ward was implemented to achieve accelerated discharge from hospital without compromising patient safety. This study assessed the impact of this virtual ward for patients admitted to the acute hospital setting with COVID-19. Methods: A community-based intervention using digital technology and a multi-disciplinary team of specialist clinicians to monitor patients at home was established. An analysis was carried out within the service investigating the safety, health outcomes and resource use of the first 65 patients discharged from hospital into the virtual respiratory ward. Results: Red days, where an urgent response was required, decreased from 33.8% of patients in their first 3 days at the virtual ward to 10.8% in their final 3 days (P=0.002). Four patients were readmitted to hospital, all for clotting disorders. There was one death, which was deemed unrelated to COVID-19. Length of stay was also reduced by 40.3% (P<0.001) and estimated overall savings were £68 052 (£1047 per patient). Conclusions: The virtual ward appeared to assist with earlier discharges, had a low rate of clinically necessary re-admissions, and seemed to reduce costs without compromising patient safety. The authors believe that this intervention could be applied across other NHS trusts facing similar capacity issues as a result of COVID-19.

Mobile health technology for remote home monitoring after surgery: a meta-analysis
Item Type: Generic
Author: Dawes, A. J., Lin, A. Y., Varghese, C., Russell, M. M. and Lin, A. Y.
Publication Date: 2021
Publication Details: The British journal of surgery, 108, (11) pp.1304-1314. , England:
Abstract: BACKGROUND: Mobile health (mHealth) technology has been proposed as a method of improving post-discharge

surveillance. Little is known about how mHealth has been used to track patients after surgery and whether its use is associated with differences in postoperative recovery., METHODS: Three databases (PubMed, MEDLINE and the Cochrane Central Registry of Controlled Trials) were searched to identify studies published between January 1999 and February 2021. Mobile health was defined as any smartphone or tablet computer capable of electronically capturing health-related patient information and transmitting these data to the clinical team. Comparable outcomes were pooled via meta-analysis with additional studies compiled via narrative review. The quality of each study was assessed based on Grading of Recommendations Assessment, Development, and Evaluation (GRADE) criteria., RESULTS: Forty-five articles met inclusion criteria. While the majority of devices were designed to capture general health information, others were specifically adapted to the expected outcomes or potential complications of the index procedure. Exposure to mHealth was associated with fewer emergency department visits (odds ratio 0.42, 95 per cent c.i. 0.23 to 0.79) and readmissions (odds ratio 0.47, 95 per cent c.i. 0.29 to 0.77) as well as accelerated improvements in quality of life after surgery. There were limited data on other postoperative outcomes., CONCLUSION: Remote home monitoring via mHealth is feasible, adaptable, and may even promote more effective postoperative care. Given the rapid expansion of mHealth, physicians and policymakers need to understand these technologies better so that they can be integrated into high-quality clinical care.

Blockchain applications in health care for Covid-19 and beyond: a systematic review

Author(s): Wei Yan Ng et al.

Source: The Lancet Digital Health 3(12)

Publication date: October 2021

The COVID-19 pandemic has had a substantial and global impact on health care, and has greatly accelerated the adoption of digital technology. One of these emerging digital technologies, blockchain, has unique characteristics (eg, immutability, decentralisation, and transparency) that can be useful in multiple domains (eg, management of electronic medical records and access rights, and mobile health). We conducted a systematic review of COVID-19-related and non-COVID-19-related applications of blockchain in health care. We identified relevant reports published in MEDLINE, SpringerLink, Institute of Electrical and Electronics Engineers Xplore, ScienceDirect, arXiv, and Google Scholar up to July 29, 2021. Articles that included both clinical and technical designs, with or without prototype development, were included. A total of 85 375 articles were evaluated, with 415 full length reports (37 related to COVID-19 and 378 not related to COVID-19) eventually included in the final analysis. The main COVID-19-related applications reported were pandemic control and surveillance, immunity or vaccine passport monitoring, and contact tracing. The top three non-COVID-19-related applications were management of electronic medical records, internet of things (eg, remote monitoring or mobile health), and supply chain monitoring. Most reports detailed technical performance of the blockchain prototype platforms (277 [66·7%] of 415), whereas nine (2·2%) studies showed real-world clinical application and adoption. The remaining studies (129 [31·1%] of 415) were themselves of a technical design only. The most common platforms used were Ethereum and Hyperledger. Blockchain technology has numerous potential COVID-19-related and non-COVID-19-related applications in health care. However, much of the current research remains at the technical stage, with few providing actual clinical applications, highlighting the need to translate foundational blockchain technology into clinical use.

Applying a COVID Virtual Ward model, assessing patient outcomes and staff workload Abstract only*
Author(s): Gallier et al.
Source: Acute Medicine 20(4) pp. 266-275
Publication date: 2021
A COVID virtual ward (CVW) is recommended by NHS England, but 'usual care' outcomes have not been reported. A retrospective study of all adults with COVID-19 attending Queen Elizabeth Hospital Birmingham between 01/06/2020-31/01/2021, assessed against CVW criteria and followed for 28 days. Of 2301 COVID-19 patients, 571(25%) would have met CVW criteria. Of these, 325(57%) were discharged after review and 246(43%) admitted. Of admitted patients who met CVW criteria, 81% required hospital-supported therapies; 11% died. Of the 325 discharged, 13% re-presented, 9% with COVID-related symptoms, 2% required intensive care admission, and one died (0.3%). In this comparison, discharging patients without a CVW did not lead to more re-presentations, re-admissions, ITU escalations or deaths compared to published outcomes for hospitals with a CVW.

Is Comprehensive Geriatric Assessment Admission Avoidance Hospital at Home an Alternative to Hospital Admission for Older Persons? : A Randomized Trial
Author(s): Shepperd et al.
Source: Annals of Internal Medicine 174(7) pp. 889-898
Publication date: July 2021
Background: Delivering hospital-level care with comprehensive geriatric assessment (CGA) in the home is one approach to deal with the increased demand for bed-based hospital care, but clinical effectiveness is uncertain. Objective: To assess the clinical effectiveness of admission avoidance hospital at home (HAH) with CGA for older persons. Design: Multisite randomized trial. (ISRCTN registry number: ISRCTN60477865). Setting: 9 hospital and community sites in the United Kingdom. Patients: 1055 older persons who were medically unwell, were physiologically stable, and were referred for a hospital admission. Intervention: Admission avoidance HAH with CGA versus hospital admission with CGA when available using 2:1 randomization. Measurements: The primary outcome of living at home was measured at 6 months. Secondary outcomes were new admission to long-term residential care, death, health status, delirium, and patient satisfaction. Results: Participants had a mean age of 83.3 years (SD, 7.0). At 6-month follow-up, 528 of 672 (78.6%) participants in the CGA HAH group versus 247 of 328 (75.3%) participants in the hospital group were living at home (relative risk [RR], 1.05 [95% CI, 0.95 to 1.15]; P = 0.36); 114 of 673 (16.9%) versus 58 of 328 (17.7%) had died (RR, 0.98 [CI, 0.65 to 1.47]; P = 0.92); and 37 of 646 (5.7%) versus 27 of 311 (8.7%) were in long-term residential care (RR, 0.58 [CI, 0.45 to 0.76]; P < 0.001). Limitation: The findings are most applicable to older persons referred from a hospital short-stay acute medical assessment unit; episodes of delirium may have been undetected. Conclusion: Admission avoidance HAH with CGA led to similar outcomes as hospital admission in the proportion of older persons living at home as well as a decrease in admissions to long-term residential care at 6 months. This type of service can provide an alternative to hospitalization for selected older persons.

Pre-print - Evaluating discharges and readmissions using a COVID Virtual Ward model: a retrospective data study assessing patient outcomes and the likely staffing commitment (This article is a preprint and has not been peer-reviewed)
Author(s): Gallier et al.
Source: MedTxiv
Publication date: July 2021
Background: COVID-19 has placed a catastrophic burden on acute hospitals. In an attempt to reduce admissions and enable

safe early discharge, a COVID virtual ward (CVW) care pathway has been supported by NHS England. This includes discharging people who meet objective criteria based on acuity scores and oxygen saturations, with pulse oximeters and daily phone calls for up to 14 days. Observational studies have reported the safety of this system, but without describing the outcomes from usual care. Methods: A retrospective study using routinely collected health data from all adults with a confirmed positive severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) swab result between 1st June 2020 and 31st Jan 2021 who attended the Emergency Department or Acute Medical Unit at QEHB, which does not have a CVW service. Criteria for CVW were applied using data from the first 24 hours of presentation to hospital and subsequent health outcomes were included for 28 days, including re-presentation, re-admission, ITU escalation and death. Results were compared to reported studies based in secondary care. Results: During the study period, 26,127 patients presented to QEHB hospital. 2301 had a positive SARS-CoV-2 swab. Of these, 1730 (75.2%) did not meet the criteria for the CVW and 571 (24.8%) did. Of the 571, 325 (56.9%) were discharged home within 24 hours and 246 (43.1%) were admitted for 24 hours or longer. Those admitted were older, with increased co-morbidities, 80.9% required hospital-supported acute therapies after the first 24 hours and 10.6% died. Of the 325 discharged, 44 were readmitted (13.5%), 30 (9.2%) with COVID-related symptoms, 5 (1.5%) required ITU and 1 patient (0.3%) died. These results were comparable to published studies with a CVW service. Discussion: In the current study, discharging patients without a CVW did not confer a greater risk of re-presentation, re-admission, ITU escalation or death. The majority of patients who remained in hospital despite meeting the CVW criteria did so for the provision of treatments or acute assessments. It remains uncertain whether a CVW delivers improvements in hard outcomes, and further research is needed.

Telehealth interventions: remote monitoring and consultations for people with chronic obstructive pulmonary disease (COPD)
Author(s): Janjua et al.
Source: Cochrane Database of Systematic Reviews
Publication date: July 2021
Background: Chronic obstructive pulmonary disease (COPD, including bronchitis and emphysema) is a chronic condition causing shortness of breath, cough, and exacerbations leading to poor health outcomes. Face-to-face visits with health professionals can be hindered by severity of COPD or frailty, and by people living at a distance from their healthcare provider and having limited access to services. Telehealth technologies aimed at providing health care remotely through monitoring and consultations could help to improve health outcomes of people with COPD. Objectives: To assess the effectiveness of telehealth interventions that allow remote monitoring and consultation and multi-component interventions for reducing exacerbations and improving quality of life, while reducing dyspnoea symptoms, hospital service utilisation, and death among people with COPD. Search methods: We identified studies from the Cochrane Airways Trials Register. Additional sources searched included the US National Institutes of Health Ongoing Trials Register, the World Health Organization International Clinical Trials Registry Platform, and the IEEEX Xplore Digital Library. The latest search was conducted in April 2020. We used the GRADE approach to judge the certainty of evidence for outcomes. Selection criteria: Eligible randomised controlled trials (RCTs) included adults with diagnosed COPD. Asthma, cystic fibrosis, bronchiectasis, and other respiratory conditions were excluded. Interventions included remote monitoring or consultation plus usual care, remote monitoring or consultation alone, and mult-component interventions from all care settings. Quality of life scales included St George's Respiratory Questionnaire (SGRQ) and the COPD Assessment Test (CAT). The dyspnoea symptom scale used was the Chronic Respiratory Disease Questionnaire Self-

Administered Standardized Scale (CRQ-SAS). Data collection and analysis: We used standard Cochrane methodological procedures. We assessed confidence in the evidence for each primary outcome using the GRADE method. Primary outcomes were exacerbations, quality of life, dyspnoea symptoms, hospital service utilisation, and mortality; a secondary outcome consisted of adverse events. Main results: We included 29 studies in the review (5654 participants; male proportion 36% to 96%; female proportion 4% to 61%). Most remote monitoring interventions required participants to transfer measurements using a remote device and later health professional review (asynchronous). Only five interventions transferred data and allowed review by health professionals in real time (synchronous). Studies were at high risk of bias due to lack of blinding, and certainty of evidence ranged from moderate to very low. We found no evidence on comparison of remote consultations with or without usual care.

The Rise of Wearable Devices during the COVID-19 Pandemic: A Systematic Review †
Author(s): Channa et al.
Source: MDPI 21(17)
Publication date: July 2021
The COVID-19 pandemic has wreaked havoc globally and still persists even after a year of its initial outbreak. Several reasons can be considered: people are in close contact with each other, i.e., at a short range (1 m), and the healthcare system is not sufficiently developed or does not have enough facilities to manage and fight the pandemic, even in developed countries such as the USA and the U.K. and countries in Europe. There is a great need in healthcare for remote monitoring of COVID-19 symptoms. In the past year, a number of IoT-based devices and wearables have been introduced by researchers, providing good results in terms of high accuracy in diagnosing patients in the prodromal phase and in monitoring the symptoms of patients, i.e., respiratory rate, heart rate, temperature, etc. In this systematic review, we analyzed these wearables and their need in the healthcare system. The research was conducted using three databases: IEEE Xplore®, Web of Science®, and PubMed Central®, between December 2019 and June 2021. This article was based on the PRISMA guidelines. Initially, 1100 articles were identified while searching the scientific literature regarding this topic. After screening, ultimately, 70 articles were fully evaluated and included in this review. These articles were divided into two categories. The first one belongs to the on-body sensors (wearables), their types and positions, and the use of AI technology with ehealth wearables in different scenarios from screening to contact tracing. In the second category, we discuss the problems and solutions with respect to utilizing these wearables globally. This systematic review provides an extensive overview of wearable systems for the remote management and automated assessment of COVID-19, taking into account the reliability and acceptability of the implemented technologies.

Virtual hospitals: why we need them, how they work and what might come next
Item Type: Generic
Author: Melman, Alla, Maher, Chris G. and Machado, Gustavo C.
Publication Date: July 2021
Publication Details: Journal of physiotherapy, 67, (3) pp.156-157. , Netherlands:
Globally, approximately one in three adults suffers from a chronic condition. People with chronic conditions are at higher risk of requiring inpatient admission and increased length of hospital stay;1 however, a significant portion of hospital admissions may be preventable. The Australian Institute of Health and Welfare, for example, reported that in 2017 to 2018, around 748,000 admissions to public and private hospitals were classified as potentially preventable, accounting for 1 in 15 admissions or 2.9 million bed days, and costing over A$2.3 billion.2 In the US, 3.5 million potentially preventable adult inpatient stays accounted for

US$33.7 billion in aggregate hospital costs in 2017, representing 12.9% of admissions.3

Comparison of Hospital-at-Home models: a systematic review of reviews
Item Type: Generic
Author: Leong, Man Qing, Lim, Cher Wee and Lai, Yi Feng
Publication Date: 2021
Publication Details: BMJ open, 11, (1) pp.e043285. , England:
Abstract: OBJECTIVES: To provide an overview of the safety and effectiveness of Hospital-at-Home (HaH) according to programme type (early-supported discharge (ESD) vs admission avoidance (AA)), and identify the model with higher evidence for addressing clinical, length of stay (LOS) and cost outcomes., METHODS: A systematic review of reviews was conducted by performing a search on PubMed, EMBASE, Cochrane Database of Systematic Reviews, Web of Science and Scopus (January 2005 to June 2020) for English-language systematic reviews evaluating HaH. Data on primary outcomes (mortality, readmissions, costs, LOS), secondary outcomes (patient/caregiver outcomes) and process indicators were extracted. Quality of the reviews was assessed using Assessment of Multiple Systematic Reviews-2. There was no registered protocol., RESULTS: Ten systematic reviews were identified (four high quality, five moderate quality and one low quality). The reviews were classified according to three use cases. ESD reviews generally revealed comparable mortality (RR 0.92-1.03) and readmissions (RR 1.09-1.25) to inpatient care, shorter hospital LOS (MD -6.76 to -4.44 days) and unclear findings for costs. AA reviews observed a trend towards lower mortality (RR 0.77, 95% CI 0.54 to 1.09) and costs, and comparable or lower readmissions (RR 0.68-0.98). Among reviews including both programme types (ESD/AA), chronic obstructive pulmonary disease reviews revealed lower mortality (RR 0.65-0.68) and post-HaH readmissions (RR 0.74-0.76) but unclear findings for resource use., CONCLUSION: For suitable patients, HaH generally results in similar or improved clinical outcomes compared with inpatient treatment, and warrants greater attention in health systems facing capacity constraints and rising costs. Preliminary comparisons suggest prioritisation of AA models over ESD due to potential benefits in costs and clinical outcomes. Nonetheless, future research should clarify costs of HaH programmes given the current low-quality evidence, as well as address evidence gaps pertaining to caregiver outcomes and adverse events under HaH care.

Clinical outcomes of digital sensor alerting systems in remote monitoring: a systematic review and meta-analysis
Item Type: Generic
Author: Iqbal, Fahad M., Lam, Kyle, Joshi, Meera, Khan, Sadia, Ashrafian, Hutan and Darzi, Ara
Publication Date: 2021
Publication Details: NPJ digital medicine, 4, (1) pp.7. , England:
Abstract: Advances in digital technologies have allowed remote monitoring and digital alerting systems to gain popularity. Despite this, limited evidence exists to substantiate claims that digital alerting can improve clinical outcomes. The aim of this study was to appraise the evidence on the clinical outcomes of digital alerting systems in remote monitoring through a systematic review and meta-analysis. A systematic literature search, with no language restrictions, was performed to identify studies evaluating healthcare outcomes of digital sensor alerting systems used in remote monitoring across all (medical and surgical) cohorts. The primary outcome was hospitalisation; secondary outcomes included hospital length of stay (LOS), mortality, emergency department and outpatient visits. Standard, pooled hazard ratio and proportion of means meta-analyses

were performed. A total of 33 studies met the eligibility criteria; of which, 23 allowed for a meta-analysis. A 9.6% mean decrease in hospitalisation favouring digital alerting systems from a pooled random effects analysis was noted. However, pooled weighted mean differences and hazard ratios did not reproduce this finding. Digital alerting reduced hospital LOS by a mean difference of 1.043 days. A 3% mean decrease in all-cause mortality from digital alerting systems was noted. There was no benefit of digital alerting with respect to emergency department or outpatient visits. Digital alerts can considerably reduce hospitalisation and length of stay for certain cohorts in remote monitoring. Further research is required to confirm these findings and trial different alerting protocols to understand optimal alerting to guide future widespread implementation.

Staff views of a hospital at home model implemented in a Scottish care setting
Item Type: Generic
Author: Karacaoglu, Katherine and Leask, Calum F.
Publication Date: 2021
Publication Details: AIMS public health, 8, (3) pp.467-478. , United States:
Abstract: PURPOSE: Demographic and financial challenges mean prioritising a shift in healthcare provision from acute to community settings. One well-evidenced model encapsulating this is 'hospital at home', however limited research has examined staffs' views on its implementation, which may inform service development and increase job satisfaction. The aim within was to explore the staff perspective of implementing a 'hospital at home' model in a Scottish care setting which can inform service provision and ultimately increase job satisfaction., METHODS: The 'Acute Care @ Home' (AC@H) service had a multi-disciplinary team. Referrals were predominantly received from a geriatric hospital ward. Inclusion criteria were older adults with geriatric syndromes and who required care input for a duration between one to seven days. In-depth staff interviews (N = 13) were conducted and analysed thematically to understand barriers and facilitators to implementation. These were supplemented with questionnaires assessing constructs of interest including training, communication and overall satisfaction., RESULTS: Several themes urged from our study: inter-team and intra-team collaboration, service development and operation, and scaling considerations. High job satisfaction was reported (mean score 73%), particularly due to a perceived non-hierarchical team structure and inclusive management style. Staff attributed positive outcomes through better identifying patients' needs at home compared to in hospital. Continuity of care facilitated rapport building. Recruitment challenges restricted the acuity and volume of patients the team were able to care for., CONCLUSIONS: This qualitative methodology could be useful for future implementation of intermediate care resources for the future health and care system building. Patient assessments at home, as opposed to in hospital, in conjunction with care continuity by staff, may mitigate against hospital risks and better facilitate reablement. Where recruitment challenges are present, agile models of care delivery should be considered.

Remote home monitoring (virtual wards) for confirmed or suspected COVID-19 patients: a rapid systematic review
Author(s): Vindrola-Padros et al.
Source: eClinical Medicine 37
Publication date: June 2021
Background: the aim of this review was to analyze the implementation and impact of remote home monitoring models (virtual wards) for confirmed or suspected COVID-19 patients, identifying their main components, processes of implementation, target patient populations, impact on outcomes, costs and lessons learnt. Methods: we carried out a rapid systematic review on models led by primary and secondary care across

seven countries (US, Australia, Canada, The Netherlands, Ireland, China, UK). The main outcomes included in the review were: impact of remote home monitoring on virtual length of stay, escalation, emergency department attendance/reattendance, admission/readmission and mortality. The search was updated on February 2021. We used the PRISMA statement and the review was registered on PROSPERO (CRD: 42020202888). Findings: the review included 27 articles. The aim of the models was to maintain patients safe in the appropriate setting. Most models were led by secondary care and confirmation of COVID-19 was not required (in most cases). Monitoring was carried via online platforms, paper-based systems with telephone calls or (less frequently) through wearable sensors. Models based on phone calls were considered more inclusive. Patient/career training was identified as a determining factor of success. We could not reach substantive conclusions regarding patient safety and the identification of early deterioration due to lack of standardized reporting and missing data. Economic analysis was not reported for most of the models and did not go beyond reporting resources used and the amount spent per patient monitored. Interpretation: future research should focus on staff and patient experiences of care and inequalities in patients' access to care. Attention needs to be paid to the cost-effectiveness of the models and their sustainability, evaluation of their impact on patient outcomes by using comparators, and the use of risk-stratification tools.

Hospital-at-Home Expands Hospital Capacity During COVID-19 Pandemic
Item Type: Generic
Author: Nogues, Xavier, Sanchez-Martinez, Francisca, Castells, Xavier, Diez-Perez, Adolfo, Sabate, Rosa Ana, Petit, Irene, Brase, Ariadna, Horcajada, Juan Pablo, Guerri-Fernandez, Roberto and Pascual, Julio
Publication Date: May 2021
Publication Details: Journal of the American Medical Directors Association, 22, (5) pp.939-942. , United States:
Abstract: A Coronavirus Disease 2019 (COVID-19)-specific Hospital-at-Home was implemented in a 400-bed tertiary hospital in Barcelona, Spain. Senior or immune-compromised physicians oversaw patient care. The alternative to inpatient care more than doubled beds available for hospitalization and decreased the risk of transmission among patients and health care professionals. Mild cases from either the emergency department or after hospital discharge were deemed suitable for admission to the Hospital-at-Home. More than half of all patients had pneumonia. Standardized protocols and management criteria were provided. Only 6% of cases required referral for inpatient hospitalization. These results are promising and may provide valuable insight for centers undertaking Hospital-at-Home initiatives or in the case of new COVID-19 outbreaks. Copyright © 2021 AMDA - The Society for Post-Acute and Long-Term Care Medicine. Published by Elsevier Inc. All rights reserved.

Pre-print: The implementation of a virtual ward using digital solutions informing community clinicians in early supported discharge of patients with SARS-Cov2 respiratory symptoms from an acute hospital setting (This article is a preprint and has not been peer-reviewed [what does this mean?].)
Author(s): Swift et al.
Source: MedRxiv
Publication date: April 2021
Objectives: To assess the short run successes and challenges of the implementation of a digitally supported accelerated acute hospital discharge scheme for patients admitted with Covid-19.
Design: Analysis of the safety, resource use and health outcomes within the virtual service for the first 65 patients that have been discharged from a virtual respiratory ward.
Setting: Community based intervention using digital technology and a multi-disciplinary team of specialist clinicians to monitor

patients at home. Participants: 65 patients discharged from hospital followed until discharge from the virtual ward. Results: 24.6% of 65 patients had symptoms that were coded red (urgent response required) in CliniTouch Vie in the first day after hospital discharge falling to 7.7% on their final day on the virtual ward; p=0.049. Reductions in red days decreased significantly over time, from 33.8% of patients in their first three days to 10.8% in their final three days; all patients p=0.002. Four patients were re-admitted to hospital, all for clotting disorders. There was one death within this group, which following senior clinical review was deemed to be unrelated to infection with Covid-19. The most important gain for Glenfield hospital was in expediting the rapid discharge of patients admitted with Covid-19 into a supported environment and the freeing up of beds. On 15th January, 48% of beds were taken up with patients admitted with Covid-19 symptoms. In November 2020, immediately prior to the launch of the virtual ward, the mean length of stay for patients who did not access high dependency care or oxygen was 5.5 (+/-1.3) days. The mean length of stay in patients discharged into the virtual ward thereafter was 3.3 (+/-0.4) days; relative reduction, 40.3% (p<0.001). The cost of care provision in the virtual ward was 8,662 UK Pounds in total and 133.26 UK pounds per patient. The estimated overall savings were 68,052 UK Pounds and the mean saving per patient was estimated at £1,047 UK Pounds. Conclusions: The virtual ward appeared to assist with earlier discharges, had a low rate of clinically necessary re-admissions, the safety of patients was not compromised and whilst cost savings were not the primary objective, it seemed to also reduce overall resource use and costs.

A Virtual Ward Model of Care for Patients With COVID-19: Retrospective Single-Center Clinical Study
Item Type: Generic
Author: Ferry, Olivia R., Moloney, Emma C., Spratt, Owen T., Whiting, Gerald F. M. and Bennett, Cameron J.
Publication Date: 2021
Publication Details: Journal of medical Internet research, 23, (2) pp.e25518. , Canada:
Abstract: BACKGROUND: COVID-19 has necessitated the implementation of innovative health care models in preparation for an influx of patients. A virtual ward model delivers clinical care remotely to patients in isolation. We report on an Australian cohort of patients with COVID-19 treated in a virtual ward., OBJECTIVE: The aim of this study was to describe and evaluate the safety and efficacy of a virtual ward model of care for an Australian cohort of patients with COVID-19., METHODS: Retrospective clinical assessment was performed for 223 patients with confirmed COVID-19 treated in a virtual ward in Brisbane, Australia, from March 25 to May 15, 2020. Statistical analysis was performed for variables associated with the length of stay and hospitalization., RESULTS: Of 223 patients, 205 (92%) recovered without the need for escalation to hospital care. The median length of stay in the virtual ward was 8 days (range 1-44 days). In total, 18 (8%) patients were referred to hospital, of which 6 (33.3%) were discharged after assessment at the emergency department. Furthermore, 12 (5.4%) patients were admitted to hospital, of which 4 (33.3%) required supplemental oxygen and 2 (16.7%) required mechanical ventilation. No deaths were recorded. Factors associated with escalation to hospital care were the following: hypertension (odds ratio OR] 3.6, 95% CI 1.28-9.87; P=.01), sputum production (OR 5.2, 95% CI 1.74-15.49; P=.001), and arthralgia (OR 3.8, 95% CI 1.21-11.71; P=.02) at illness onset and a polymerase chain reaction cycle threshold of <=20 on a diagnostic nasopharyngeal swab (OR 5.0, 95% CI 1.25-19.63; P=.02)., CONCLUSIONS: Our results suggest that a virtual ward model of care to treat patients with COVID-19 is safe and efficacious, and only a small number of patients would potentially require escalation to hospital care. Further studies are required to validate this model of care.

Implementation of a virtual ward as a response to the COVID-19 pandemic
Item Type: Generic
Author: Schultz, Katherine, Vickery, Helen, Campbell, Katrina, Wheeldon, Mary, Barrett-Beck, Leah and Rushbrook, Elizabeth
Publication Date: 2021
Publication Details: Australian Health Review : A Publication of the Australian Hospital Association, 45, (4) pp.433-441. , Australia:
Abstract: Objective The aim of this study was to describe and evaluate the implementation of a virtual ward as a COVID-19 hospital avoidance response strategy and identify opportunities for improvement and future applicability. Methods A mixed-method observational study was conducted of a centralised virtual ward, which operated in a large metropolitan Australian health service from 23 March to 1 June 2020. Results In total, 238 unique patients were admitted to the virtual ward, accounting for 264 individual admission episodes and 2451 virtual bed days. Twenty (7.6%) episodes resulted in transfer to hospital and 136 patients provided responses to feedback surveys and reported their experience as very good (61.7%, n=87) or good (34.8%, n=49). Implementation success was high, with the model widely accepted and adopted across the health service. The service delivery model was considered to be low-cost in comparison to inpatient hospital-based care. Conclusions Overall, as a rapidly developed and implemented low-tech model of care, the virtual ward was found to provide an effective, accessible and low-cost solution to managing low-acuity COVID-19-positive patients in the community. This model should be considered in future pandemics as a hospital-avoidance response, with the ability to minimise patient-to-healthcare worker transmission, reduce personal protective equipment use and enhance patient adherence with isolation requirements. Targeted remote telemonitoring should be considered as a future modification to improve patient care. What is known about this topic? Virtual wards aim to reduce hospital demand by providing hospital-level care in community settings such as the patients' home. The COVID-19 pandemic has seen a rapid increase in the utilisation of virtual wards as an acute healthcare response that facilitates contactless care of infectious patients. Despite this rapid adoption, there is limited literature on the effectiveness of virtual ward models of care in a pandemic context. What does this paper add? This study provides a detailed description of the implementation of a virtual ward in a large metropolitan health service. It evaluates the effectiveness of the virtual ward as a COVID-19 response strategy and identifies opportunities for improvement and future applicability. This study contributes to the growing body of literature on the COVID-19 healthcare response and virtual wards. What are the implications for practitioners? This study details the implementation of a virtual ward and highlights potential facilitators and barriers to successful implementation and sustained applicability. Findings provide a comparative benchmark for other health services implementing virtual wards as a pandemic response strategy.

The unique role of the social worker within the Hospital at Home care delivery team Abstract only*
Item Type: Generic
Author: Ross, Helena, Dritz, Ryan, Morano, Barbara, Lubetsky, Sara, Saenger, Pamela, Seligman, Audrey and Ornstein, Katherine A.
Publication Date: 2021
Publication Details: Social work in health care, 60, (4) pp.354-368. , United States:

Abstract: Hospital at Home (HaH) provides acute, hospital-level care at home and post-discharge follow-up. Through a review of 293 HaH admissions conducted by an urban, multidisciplinary HaH program from 2014 to 2017, we find that the social worker is involved in 71% of admissions and plays a crucial role in pre-emergency department discharge home care and safety screening, home intake, follow-up support, and transition of care to primary care providers and community-based services. We describe the social work activities involved in this model of care and present composite case studies for further illustration.

Digital Health Technology and Telemedicine-Based Hospital and Home Programs in Pulmonary Medicine During the COVID-19 Pandemic Abstract only*
Item Type: Generic
Author: Ilowite, Jonathan, Lisker, Gita and Greenberg, Harly
Publication Date: 2021
Publication Details: American Journal of Therapeutics, 28, (2) pp.e217-e223. , United States:
Abstract: BACKGROUND: The current coronavirus disease 2019 (COVID-19) pandemic has caused a significant strain on medical resources throughout the world. A major shift to telemedicine and mobile health technologies has now taken on an immediate urgency. Newly developed devices designed for home use have facilitated remote monitoring of various physiologic parameters relevant to pulmonary diseases. These devices have also enabled home-based pulmonary rehabilitation programs. In addition, telemedicine and home care services have been leveraged to rapidly develop acute care hospital-at-home programs for the treatment of mild-to-moderate COVID-19 illness., AREAS OF UNCERTAINTY: The benefit of remote monitoring technologies on patient outcomes has not been established in robust trials. Furthermore, the use of these devices, which can increase the burden of care, has not been integrated into current clinical workflows and electronic medical records. Finally, reimbursement for these telemedicine and remote monitoring services is variable., DATA SOURCES: Literature review., THERAPEUTIC ADVANCES: Advances in digital technology have improved remote monitoring of physiologic parameters relevant to pulmonary medicine. In addition, telemedicine services for the provision of pulmonary rehabilitation and novel hospital-at-home programs have been developed. These new home-based programs have been adapted for COVID-19 and may also be relevant for the management of acute and chronic pulmonary diseases after the pandemic., CONCLUSION: Digital remote monitoring of physiologic parameters relevant to pulmonary medicine and novel hospital-at-home programs are feasible and may improve care for patients with acute and chronic respiratory-related disorders. Copyright © 2021 Wolters Kluwer Health, Inc. All rights reserved.

Implementation and evaluation of a Covid-19 rapid follow-up service for patients discharged from the emergency department
Author(s): Bell et al.
Source: Clinical Medicine 21(1)
Publication date: January 2021
The COVID-19 pandemic has necessitated rapid adaptation of healthcare providers to new clinical and logistical challenges. Following identification of high levels of emergency department (ED) reattendance among patients with suspected COVID-19 at our centre, we piloted a rapid remote follow-up service for this patient group. We present our service framework and evaluation of our pilot cohort of 192 patients. We followed up patients by telephone within 36 hours of their ED attendance. Pulse oximetry was used for remote monitoring of a subset of patients. Patients required between one and six consecutive telephone assessments, dependent on illness severity, and 23 patients were recalled for in-person assessment. Approximately half of patients with confirmed or probable COVID-19 required onward

referral for respiratory follow-up. This framework reduced unplanned ED reattendances in comparison with a retrospective comparator cohort (4.7% from 22.6%). We reproduced these findings in a validation cohort with a high prevalence of acute COVID-19, managed through the clinic in September–October 2020, where we identified an unplanned ED reattendance rate of 5.2%. We propose that rapid remote follow-up is a mechanism by which ambulatory patients can be clinically supported during the acute phase of illness, with benefits both to patient care and to health service resilience.

A prospective observational real world feasibility study assessing the role of app-based remote patient monitoring in reducing primary care clinician workload during the COVID pandemic
Author(s): Shah et al.
Source: BMC Family Practice 22(248)
Publication date: 2021
Background: The novel coronavirus disease in 2019 (COVID-19) has placed unprecedented strain on healthcare providers, in particular, primary care services. General practitioners (GP) have to effectively manage patients remotely preserving social distancing. We aim to assess an app-based remote patient monitoring solution in reducing the workload of a clinician and reflect this as time-saved in an economic context. Primary care COVID patients in West London deemed medium risk were recruited into the virtual ward. Patients were monitored for 14 days by telephone or by both the Huma app and telephone. Information on number of phone calls, duration of phone calls and duration of time spent reviewing the app data was recorded. Results: The amount of time spent reviewing one patient in the telephone only arm of the study was 490 min, compared with 280 min spent reviewing one patient who was monitored via both the Huma app and telephone. Based on employed clinicians monitoring patients, this equates to a 0.04 reduction of full-time equivalent staffing I.e. for every 100 patients, it would require 4 less personnel to remotely monitor them. There was no difference in mortality or adverse events between the two groups. Conclusion: App-based remote patient monitoring potentially holds large economic benefit to COVID-19 patients. In wake of further waves or future pandemics, and even in routine care, app-based remote monitoring patients could free up vital resources in terms of clinical team's time, allowing a better reallocation of services.

The pilot, proof of concept REMOTE-COVID trial: remote monitoring use in suspected cases of COVID-19 (SARS-CoV 2)
Author(s): Iqbal et al.
Source: BMC Public Health 21(638)
Publication date: 2021
Background: SARS-CoV-2 has ever-increasing attributed deaths. Vital sign trends are routinely used to monitor patients with changes in these parameters preceding an adverse event. Wearable sensors can measure vital signs continuously and remotely, outside of hospital facilities, recognising early clinical deterioration. We aim to determine the feasibility & acceptability of remote monitoring systems for quarantined individuals in a hotel suspected of COVID-19. Methods: A pilot, proof-of-concept, feasibility trial was conducted in engineered hotels near London airports (May–June 2020). Individuals arriving to London with mild suspected COVID-19 symptoms requiring quarantine, as recommended by Public Health England, or healthcare professionals with COVID-19 symptoms unable to isolate at home were eligible. The SensiumVitals™ patch, measuring temperature, heart & respiratory rates, was applied on arrival for the duration of their stay. Alerts were generated when pre-established thresholds were breeched; trained nursing staff could consequently intervene. Results: Fourteen individuals (M = 7, F = 7) were recruited; the mean age was 34.9 (SD 11) years. Mean length of stay was 3 (SD 1.8) days. In total, 10 vital alerts were generated across 4 participants, resulting in

telephone contact, reassurance, or adjustment of the sensor. No individuals required hospitalisation or virtual general practitioner review. Discussion: This proof-of-concept trial demonstrated the feasibility of a rapidly implemented model of healthcare delivery through remote monitoring during a pandemic at a hotel, acting as an extension to a healthcare trust. Benefits included reduced viral exposure to healthcare staff, with recognition of clinical deterioration through ambulatory, continuous, remote monitoring using a discrete wearable sensor. Conclusion: Remote monitoring systems can be applied to hotels to deliver healthcare safely in individuals suspected of COVID-19. Further work is required to evaluate this model on a larger scale.

Implementation and evaluation of a COVID-19 rapid follow-up service for patients discharged from the emergency department
Author(s): Bell et al.
Source: Clinical Medicine 21(1) e57-62
Publication date: 2021
The COVID-19 pandemic has necessitated rapid adaptation of healthcare providers to new clinical and logistical challenges. Following identification of high levels of emergency department (ED) reattendance among patients with suspected COVID-19 at our centre, we piloted a rapid remote follow-up service for this patient group. We present our service framework and evaluation of our pilot cohort of 192 patients. We followed up patients by telephone within 36 hours of their ED attendance. Pulse oximetry was used for remote monitoring of a subset of patients. Patients required between one and six consecutive telephone assessments, dependent on illness severity, and 23 patients were recalled for in-person assessment. Approximately half of patients with confirmed or probable COVID-19 required onward referral for respiratory follow-up. This framework reduced unplanned ED reattendances in comparison with a retrospective comparator cohort (4.7% from 22.6%). We reproduced these findings in a validation cohort with a high prevalence of acute COVID-19, managed through the clinic in September–October 2020, where we identified an unplanned ED reattendance rate of 5.2%. We propose that rapid remote follow-up is a mechanism by which ambulatory patients can be clinically supported during the acute phase of illness, with benefits both to patient care and to health service resilience.

Remote management of covid-19 using home pulse oximetry an virtual ward support
Author(s): Greenhalgh et al.
Source: BMJ 372
Publication date: 2021
What you need to know

- Pulse oximeters used at home can detect hypoxia associated with acute covid-19
- Home oximetry requires clinical support, such as regular phone contact from a health professional in a virtual ward setting
- More research is needed to understand the safety and effectiveness of home oximetry and to optimise service models and referral pathways

Applying a COVID Virtual Ward model, assessing patient outcomes and staff workload Abstract only*
Author(s): Gallier et al.
Source: Acute Medicine Journal 20(4)
Publication date: 2021
A COVID virtual ward (CVW) is recommended by NHS England, but ‘usual care’ outcomes have not been reported. A retrospective study of all adults with COVID-19 attending Queen Elizabeth Hospital Birmingham between 01/06/2020-31/01/2021, assessed against CVW criteria and followed for 28 days. Of 2301 COVID-19 patients, 571(25%) would have met CVW criteria. Of these, 325(57%) were discharged after review and 246(43%) admitted. Of admitted patients who met CVW criteria,

81% required hospital-supported therapies; 11% died. Of the 325 discharged, 13% re-presented, 9% with COVID-related symptoms, 2% required intensive care admission, and one died (0.3%). In this comparison, discharging patients without a CVW did not lead to more re-presentations, re-admissions, ITU escalations or deaths compared to published outcomes for hospitals with a CVW.

What next for Covid oximetry and virtual ward?
Author(s): Irving and Neves
Source: British Journal of General Practice 71(710)
Publication date: 2021
The recent roll-out of COVID Oximetry and virtual ward services across the NHS in England has occurred at a staggering pace. In February 2021, >27 000 high-risk patients with COVID-19 have been treated at home since the first national standard operating procedure was introduced in November 2020 (further information available from authors).1 Observational evidence relating to the effectiveness and value of these local services has started to emerge, with larger national evaluations of the service currently ongoing.2 As services look to become sustainable in the long term and the prevalence of COVID-19 is relatively low, we will soon be presented with an opportunity to decide which elements of these services we wish to amplify and which we should discard. As a result, NHS England is increasingly looking at how it can support automated remote patient monitoring at the patient home through integrated digital platforms for high-prevalence, ambulatory-sensitive conditions such as hypertension, chronic obstructive pulmonary disease (COPD), heart failure, and diabetes. This is moving beyond the usual modes of care delivery such as office-based care for these conditions. This has led to much discussion about whether oximetry and virtual wards should evolve into a single integrated NHS@ home remote patient monitoring service.3 Here we look at whether the enablers achieved through COVID Oximetry @home and virtual wards will be sufficient to overcome some of the historical barriers to introducing telemonitoring services and achieve a coherent, deliverable vision of NHS@home (Figure 1).

Enhancing Safety During a Pandemic Using Virtual Care Remote Monitoring Technologies and UML Modeling
Item Type: Generic
Author: Borycki, Elizabeth M., Kushniruk, Andre W., Kletke, Ryan, Vimarlund, Vivian, Senathirajah, Yalini and Quintana, Yuri
Publication Date: 2021
Publication Details: Yearbook of medical informatics, 30, (1) pp.264-271. , Germany:
Abstract: OBJECTIVES: This paper describes a methodology for gathering requirements and early design of remote monitoring technology (RMT) for enhancing patient safety during pandemics using virtual care technologies. As pandemics such as COrona VIrus Disease (COVID-19) progress there is an increasing need for effective virtual care and RMT to support patient care while they are at home., METHODS: The authors describe their work in conducting literature reviews by searching PubMed.gov and the grey literature for articles, and government websites with guidelines describing the signs and symptoms of COVID-19, as well as the progression of the disease. The reviews focused on identifying gaps where RMT could be applied in novel ways and formed the basis for the subsequent modelling of use cases for applying RMT described in this paper., RESULTS: The work was conducted in the context of a new Home of the Future laboratory which has been set up at the University of Victoria. The literature review led to the development of a number of object-oriented models for deploying RMT. This modeling is being used for a number of purposes, including for education of students in health infomatics as well as testing of new use cases for RMT with industrial collaborators and projects within the smart home of the future laboratory., CONCLUSIONS: Object-oriented modeling, based on analysis of gaps in the literature, was found to be a

useful approach for describing, communicating and teaching about potential new uses of RMT. Copyright IMIA and Thieme. This is an open access article published by Thieme under the terms of the Creative Commons Attribution-NonDerivative-NonCommercial License, permitting copying and reproduction so long as the original work is given appropriate credit. Contents may not be used for commercial purposes, or adapted, remixed, transformed or built upon. (https://creativecommons.org/licenses/by-nc-nd/4.0/).

Digitalising medical education: virtual ward rounds during COVID-19 and beyond
Item Type: Generic
Author: Hagana, Arwa, Behranwala, Ruqaiyah, Aojula, Nivaran and Houbby, Nour
Publication Date: 2021
Publication Details: BMJ simulation & technology enhanced learning, 7, (4) pp.271. , England:
ISSN/ISBN: 2056-6697
The COVID-19 pandemic necessitated a remodelling of medical education as medical students were removed from clinical placements and universities were closed. The response to this unexpected interruption to education was an increased use of online teaching resources and platforms. The reintroduction of medical students to hospitals requires careful consideration as new cases of COVID-19 infections remain prominent in the United Kingdom, and focused efforts are still required to ensure the R rate remains stable and below 1.
Imperial College London has used technology to assist medical education, recently reporting success conducting virtual ward rounds for medical students. 1 Through the use of a Hololens headset worn by a physician carrying out the ward round, an entire cohort of students can watch a healthcare professional (HCP) talk to and examine patients remotely. Concurrently clinical educators are able to enhance learning by displaying virtual images of supplementary clinical material such as X-rays and blood results alongside the video of the doctor–patient interaction being streamed. This use of augmented reality enables a comprehensive clinical scenario to be represented in real time. In addition, virtual ward rounds can be recorded enabling universities to build a library of cases. This presents an opportunity to initiate international collaborations where students globally can benefit from an online bank of virtual ward rounds with a variety of conditions and rare presentations.

The provision of hospital at home care: Results of a national survey of UK hospitals
Item Type: Generic
Author: Knight, Thomas, Harris, Ciara, Mas, Miquel A., Shental, Omri, Ellis, Graham and Lasserson, Daniel
Publication Date: 2021
Publication Details: International journal of clinical practice, 75, (12) pp.e14814. , India:
Abstract: BACKGROUND: Hospital at home (HaH) replicates elements of hospital-based care in the community, to facilitate the safe management of a broad spectrum of acute illness in the patient's usual environment. The extent to which this model of care has been adopted in the United Kingdom is unknown., METHODS: The Society for Acute Medicine Benchmarking Audit is a day of care survey undertaken annually within the United Kingdom. Participation is open to all hospital in the United Kingdom receiving acutely unwell medical patients. A questionnaire is used to collect hospital-level data on the structure and organisation of acute care delivery. The survey included questions designed to quantify the number of hospitals that offered HaH. When present, further questions were asked to clarify the characteristics of the HaH service in terms of workforce, range of diagnostic test and interventions. This information was used to build a picture of HaH service provision on a national scale., RESULTS: A total of 130 hospitals

contributed organisational data to SAMBA19. The capability to refer to a hospital at home service was recognised by 46.9% (n = 61) of units. The majority of these services, 83.3% (n = 50) were nurse-led. The capability to provide a physician review at home was reported in 23.3% (n = 14). The majority of services could provide intravenous antibiotics at home, but access to other simple interventions, such as intravenous diuretics or acute supplemental oxygen, is limited., CONCLUSION: At present, few acute hospitals for consitency in the United Kingdom have access to a hospital at home service capable of replicating essential elements of inpatient care. Our study suggests organisational change in acute care delivery and significant investment would be required to establish equal access to hospital-at-home care within the United Kingdom. Copyright © 2021 John Wiley & Sons Ltd.

2020

Trends beyond the new normal: from remote monitoring to digital connectivity
Item Type: Generic
Author: Calo, Leonardo, de Ruvo, Ermenegildo, Martino, Anna Maria, Prenner, Gunther, Manninger, Martin and Scherr, Daniel
Publication Date: December 2020
Publication Details: European heart journal supplements : journal of the European Society of Cardiology, 22, pp.P8-P12. , England:
Abstract: COVID pandemic emergency has forced changes from traditional in-person visits to application of telemedicine in order to overcome the barriers and to deliver care. COVID-19 has accelerated adoption of digital health. During this time, the distance is itself a prevention tool and the use of technology to deliver healthcare services and information has driven the discovery of mobile and connected health services. Health services should to be prepared to integrate the old model of remote monitoring of CIEDs and adopt new digital tools such as mobile Apps and connected sensors. Copyright Published on behalf of the European Society of Cardiology. © The Author(s) 2020.

Insights From Rapid Deployment of a "Virtual Hospital" as Standard Care During the COVID-19 Pandemic
Item Type: Generic
Author: Sitammagari, Kranthi, Murphy, Stephanie, Kowalkowski, Marc, Chou, Shih-Hsiung, Sullivan, Matthew, Taylor, Stephanie, Kearns, James, Batchelor, Thomas, Rivet, Carly, Hole, Colleen, Hinson, Tony, McCreary, Pamela, Brown, Ryan, Dunn, Todd, Neuwirth, Zeev, et al
Publication Date: November 2020
Publication Details: Annals of Internal Medicine, 174, (2) pp.192-199. , United States:
Abstract: BACKGROUND: Pandemics disrupt traditional health care operations by overwhelming system resource capacity but also create opportunities for care innovation., OBJECTIVE: To describe the development and rapid deployment of a virtual hospital program, Atrium Health hospital at home (AH-HaH), within a large health care system., DESIGN: Prospective case series., SETTING: Atrium Health, a large integrated health care organization in the southeastern United States., PATIENTS: 1477 patients diagnosed with coronavirus disease 2019 (COVID-19) from 23 March to 7 May 2020 who received care via AH-HaH., INTERVENTION: A virtual hospital model providing proactive home monitoring and hospital-level care through a virtual observation unit (VOU) and a virtual acute care unit (VACU) in the home setting for eligible patients with COVID-19., MEASUREMENTS: Patient demographic characteristics, comorbid conditions, treatments administered (intravenous fluids, antibiotics, supplemental oxygen, and respiratory medications), transfer to inpatient care, and hospital outcomes (length of stay, intensive care unit ICU] admission, mechanical

ventilation, and death) were collected from electronic health record data., RESULTS: 1477 patients received care in either the AH-HaH VOU or VACU or both settings, with a median length of stay of 11 days. Of these, 1293 (88%) patients received care in the VOU only, with 40 (3%) requiring inpatient hospitalization. Of these 40 patients, 16 (40%) spent time in the ICU, 7 (18%) required ventilator support, and 2 (5%) died during their hospital admission. In total, 184 (12%) patients were ever admitted to the VACU, during which 21 patients (11%) required intravenous fluids, 16 (9%) received antibiotics, 40 (22%) required respiratory inhaler or nebulizer treatments, 41 (22%) used supplemental oxygen, and 24 (13%) were admitted as an inpatient to a conventional hospital. Of these 24 patients, 10 (42%) required ICU admission, 1 (3%) required a ventilator, and none died during their hospital admission., LIMITATION: Generalizability is limited to patients with a working telephone and the ability to comply with the monitoring protocols., CONCLUSION: Virtual hospital programs have the potential to provide health systems with additional inpatient capacity during the COVID-19 pandemic and beyond., PRIMARY FUNDING SOURCE: Atrium Health.

A novel virtual hospital at home model during the coronavirus disease 2019 (COVID-19) pandemic
Item Type: Generic
Author: Ryan, Patrick P., Hawkins, Kellie L., Altman, Stacey, Granatowski, Lisa, Shy, Bradley D., Long, Jeremy and Hanratty, Rebecca
Publication Date: August 2020
Publication Details: Infection control and hospital epidemiology, 42, (9) pp.1140-1142. , United States:
The COVID-19 pandemic has prompted healthcare systems to rapidly adapt healthcare delivery to accommodate a novel infectious disease while considering infection control practices, hospital capacity, and continued management of other medical conditions. Additionally, the COVID-19 pandemic has disproportionately affected minority communities and those suffering from lower socioeconomic status in the United States; populations that already face worse outcomes in other chronic medical conditions such as hypertension, coronary artery disease, and diabetes.1–3

Digital advantage in the COVID-19 response: perspective from Canada's largest integrated digitalized healthcare system
Item Type: Generic
Author: Baumgart, Daniel C.
Publication Date: 2020
Publication Details: NPJ digital medicine, 3, pp.114. , England:
Abstract: The SARS-CoV-2 pandemic has challenged healthcare systems worldwide. Uncertainty of transmission, limitations of physical healthcare system infrastructure and supplies as well as workforce shortages require dynamic adaption of resource deployment to manage rapidly evolving care demands, ideally based on real time data for the entire population. Moreover, shut down of traditional face-to-face care infrastructure requires rapid deployment of virtual health care options to avoid collapse of health organizations. The Alberta Electronic Health Record Information System is one of the largest population based comprehensive electronic medical record (EMR) installations. Alberta's long standing solid telehealth hardware-, training-, provider remuneration- and legislation infrastructure has enabled quick transition to virtual healthcare. Virtual health services including asynchronous secure clinical communications, real-time virtual care via messaging, telephony or video conferencing (telehealth) and ancillary functions like triage, scheduling, documentation and reporting, the previously established virtual hospital program with home monitoring, virtual health assessments, medication review, education and support for patients and families and coordination between family doctors, specialists and other health team members help to control viral

transmission, protect healthcare personnel and save supplies. Moreover, rapid launch of online screening and triage tools to guide testing and isolation, online result sharing, infected patient and contact tracing including a smartphone exposure tracking application (ABTraceTogether), electronic best practice alerts and decision support tools, test and treatment order sets for standardized COVID-19 management, continuous access to population level real-time data to inform healthcare provider, public health and government decisions have become key factors in the management of a global crisis in Alberta. Copyright © The Author(s) 2020.

Triage into the community for Covid-19 (TICC-19) Patients Pathway – Service evaluation of the virtual monitoring of patients with Covid pneumonia
Author(s): Nunan et al.
Source: Acute Medicine 19(4)
Publication date: 2020
Introduction: COVID-19 pneumonia presented a unique problem for healthcare systems with the potential to overwhelm hospitals and lead to unnecessary morbidity and mortality. Safe triage and follow up systems are required to manage this unprecedented demand. Methods: We designed a pathway for the triage and assessment of patients based on their resting oxygen saturations and response to a 30 metre rapid walking test. We admitted patients to a 'Virtual Ward' for remote oximetry monitoring from the Emergency Department, step down from inpatient wards and from the local Primary Care 'Hot Hub'. This allowed the safe and managed readmission of those patients who deteriorated at home. Results: During the first wave of COVID-19 we entered 273 onto the pathway for Virtual Ward follow up. Of these, 31 patients were readmitted to hospital, two were admitted to Intensive Care and one patient died. Median oxygen saturation at presentation was 97 % (IQR 96-98%) and following a 30 metre walk test 96% (IQR 94-97%). Median NEWS-2 score was 2 (IQR 1-3). On feedback 99.5% of patients were likely or extremely likely to recommend the service to their family and friends. There was a cost avoidance of £107,600 per month. Conclusion: It is safe, feasible and cost effective to set up a triage system with remote oximetry monitoring for patients with COVID-19 and overwhelmingly patients find it a positive experience.

Feature: The "virtual wards" supporting patients with covid-19 in the community
Author(s): Jacqui Thornton
Source: BMJ 369
Publication date: 2020
Managing patients at home eases pressure on wards and reduces patient anxiety, finds Jacqui Thornton
Hospital doctors have established "virtual wards" whereby patients with covid-19 are managed at home, monitoring their own oxygen levels—and freeing up staff and beds. The primary aim of some of these wards is supported early discharge; others are referring patients directly from emergency departments and primary care.
The virtual wards were planned at the beginning of the pandemic to avoid hospitals being overwhelmed, but doctors say that as well as keeping people with covid-19 out of hospital if they do not need to be there, patients are less anxious.

In progress

Hospital at home: A systematic review of how medication management is conceptualised, described and implemented in practice—A study protocol
Author(s): McGlen et al.
Source: PLoS One
Publication date: January 2023

Hospital at Home (H@H) is a method of healthcare delivery, where hospital level interventions are conducted in the patient's usual place of residence, offering an alternative to hospital admission. This often includes the ability to perform point of care diagnostics and treat conditions using a range of treatments traditionally associated with hospital admission, including intravenous medicines and oxygen. H@H services have been established worldwide but there is a wide variation in definition and delivery models and currently no documented evidence supporting the delivery of medicines and medicines management within the H@H model. Therefore, this study aims to 1) describe how medication management in H@H is conceptulised, 2) describe and identify key components of medication management in H@H and 3) describe and identify variability in the implementation of medication management services within H@H models.

Competency Frameworks

Virtual Ward and Urgent Community Response Capabilities Framework
Source: Skills for Health and NHS England
Publication date: October 2022
Background: In response to the pandemic, there has been a period of rapid innovation and transformational change in service delivery. Virtual wards and Urgent Community Response amongst others have formed part of this. Virtual wards should be led by a named registered consultant practitioner i.e., doctor, nurse, allied health professional or primary care GP with knowledge and capability in the relevant specialty or model (frailty and respiratory care).

*Help accessing articles or papers

Where a report/ journal article or resource is freely available the link has been provided. If an NHS OpenAthens account is required this has been indicated. It has also been highlighted if only the abstract is available. If you do not have an OpenAthens account you can self-register here.

If you need help accessing an article, or have any other questions, contact the Knowledge Management team for support KnowledgeManagement@hee.nhs.uk