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Research Article

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Digital Health Transformation in Virtual Wards: Comparing the Impact on Patient Care, Healthcare Efficiency, and System Integration in the UK and Canada

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Abstract

Despite the potential benefits, virtual wards face several challenges that must be addressed to ensure successful implementation and general adoption. It is against this background that this study examines digital health transformation in virtual wards, which compares the impact on patient care, healthcare efficiency, and system integration in the United Kingdom (UK) and Canada. The study adopts the qualitative systematic review design. Data was extracted from fifteen (15) literature that were selected adhering to the Preferred Reporting Items for Systematic Review and Meta-analysis (PRISMA). The findings showed that virtual wards have positive impact on patient outcomes and quality of care. The study demonstrated that virtual wards reduced emergency (ED) presentations and unscheduled admissions among older patients, especially those living alone. Results demonstrated that substantial efficiency gains, especially in reducing inpatient admissions and hospital costs. The findings indicate that the integration of virtual wards within existing healthcare systems varies. The results showed that barriers to virtual ward adoption include financial concerns, technological, and cultural challenges. Results demonstrated that facilitators influencing the success of virtual ward adoption include collaboration and innovation, define program goals, and adapting services to patient needs. The study concluded that virtual wards have several benefits in enhancing patient outcomes and healthcare efficiency.

Keywords: Digital health transformation, Patient care, Health efficiency, System integration, Virtual wards

Introduction

The advancements of digital technologies are pervasive and have penetrated almost every field, profession, or discipline. The healthcare system is not left out in the integration of digital technologies into health practices. The digital transformation of healthcare has accelerated in recent years, which has led to the emergence of different innovative technologies. This has brought about different tech-focused care models such as virtual wards, which is the specific focus of this study. Generally, virtual wards leverage digital health technologies to facilitate remote monitoring, clinical decision-making, and patient engagement. All these enable healthcare providers to deliver hospital-level care in home or community settings. These digitally-designed care models have been gaining attention among

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healthcare practitioners and scholars. These virtual wards are generally viewed as technological innovations that have potential to enhance patient outcomes, improve healthcare efficiency, and ensure better system integration.

The integration of advanced digital health solutions to healthcare service delivery has played a critical role in shaping virtual ward models, which has made it a viable alternative to traditional hospital-based care [1]. To achieve this, some of the digital health tools that are adopted include Artificial Intelligence (AI), telehealth, blockchain technology, wearable sensors, and electronic health records [2]. All of these emerging technologies are pivotal for the development of virtual wards, which are particularly relevant to address the growing challenges faced by healthcare systems worldwide. Different factors such as rising hospital admission rates, constrained healthcare resources, and the need for continuous patient monitoring have necessitated the adoption of innovative mechanisms for healthcare service delivery [3].

In the recent years, there is different occurrence that has led to further discussions regarding virtual wards. Particularly, the COVID-19 pandemic underscores the significance of remote care models enhancing the deployment and adoption of virtual wards to manage non-critical patients outside of traditional hospital environments [4]. Digital health technologies facilitate real-time patient monitoring and remote clinical interventions. Therefore, that will reduce the burden on hospital infrastructure while ensuring patients receive timely and effective care [5]. This will also enhance sustainability and the effective management or administration of the hospital system. [6] contributed that these sustainability and practitioners are practical ways to measure sustainability factors in health organizations.

Aside the adoption and use of virtual wards, there is a need to ensure that it is effectively and efficiently utilized or implemented. Meanwhile, the effectiveness of virtual wards is determined by several factors, which include patient engagement, healthcare provider adoption, interoperability of digital systems, and regulatory frameworks [7]. One of the key benefits of virtual wards is their capacity to enhance patient-centered care by providing treatment plans that align or are tailored to specific patient needs, which enables early intervention and reduce hospital readmission rates. Some of these tools (e.g., Remote Patient Monitoring (RPM) devices, wearable health sensors, and AI-powered analytics) contribute to timely and effective clinical decision making [8]. This allows healthcare professionals to identify or detect deterioration early and prevent the same. Studies [9,10] have established that virtual wards improve patient satisfaction by providing better convenience and autonomy in managing chronic conditions and post-hospitalization care.

Aside the individual benefits of virtual wards to patients, they also contribute to the overall healthcare system efficiency. They do this by ensuring avoidable hospital admissions and facilitate early discharge, optimize resource utilization in virtual wards, alleviate pressure on hospital beds, and enable healthcare providers to allocate resources effectively [11,12]. Moreover, the use of AI and predictive analytics enhances operational efficiency by identifying high-risk patients, automating administrative tasks, and streamlining care coordination [13]. Virtual wards support interdisciplinary collaboration among healthcare professionals, which enhances access to real-time data and foster a more integrated approach to patient care [14]. Meanwhile, interdisciplinary collaboration has been established to be the heart and soul of healthcare [15].

Despite the potential benefits, virtual wards face several challenges that must be addressed to ensure successful implementation and general adoption. For instance, interoperability issues between digital health systems and electronic medical records remain a major challenge as a result of uneven digital ecosystems, which hinders seamless data exchange and care coordination [16]. Moreover, it has been established that there are disparities in digital literacy and access to technology [17]. This may create inequalities in virtual world adoption, especially among elderly populations and individual from socioeconomically disadvantaged backgrounds. Hence, this study seeks to compare the impacts of virtual wards on patient care, healthcare efficiency, and system integration in the United Kingdom and Canada. Based on this central aim, this study seeks to specifically understand the following:

i. How do virtual wards impact patient outcomes and quality of care?

ii. What are the efficiency gains achieved through virtual ward models?

iii. How well are virtual wards integrated within existing healthcare systems?

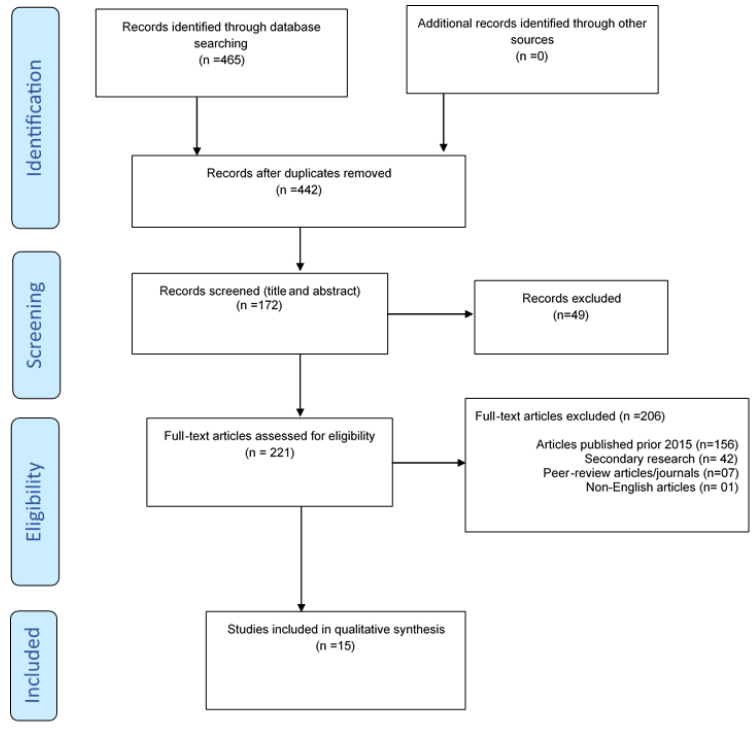
iv. What are the barriers influencing the success of virtual ward adoption?

v. What are the facilitators influencing the success of virtual ward adoption?

Methodology

Qualitative systematic review design was adopted to understand the comparative impact of virtual wards on patient care, healthcare efficiency, and system integration in the United Kingdom and Canada. This research design concerns the formulation of research questions, searching the literature from corpus of databases, screening the literature for relevant literature with the use of some set criteria, assessing the qualities of the selected studies, extracting the relevant information from the final selected studies/literature, and analyzing the collected information to generate themes [18]. This approach is a systematic review of the literature to understand the prevailing themes in a particular study area, which differs from meta-analysis that does not provide opportunity for qualitative evidence on the data extracted from the literature [19]. Thus, this study seeks to qualitatively understand the comparative impact of virtual wards on patient care, healthcare efficiency, and system integration in the United Kingdom and Canada.

To achieve a credible and reliable systematic review of literature, there should be comprehensive and robust search techniques and search terms. This would allow for the return of search results that would provide relevant information for the study. Hence, this study adopted a structured approach to searching the literature. This search technique concerns the use of the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA). The PRISMA framework is designed in such that ensures structured data collection. Studies [20,21] have established that PRISMA is the most popular and widely adopted framework for systematic reviews of literature. The 27-item PRISMA is divided into identification, screening, eligibility, and inclusion. The identification stage concerns literature search, including the sources and databases consulted. The screening stage concerns the evaluation of the titles and abstracts of literature retrieved. The eligibility phase highlights the inclusion and exclusion criteria. Using this PRISMA framework, the final selected literature for this study is fifteen (15) (Figure 1).



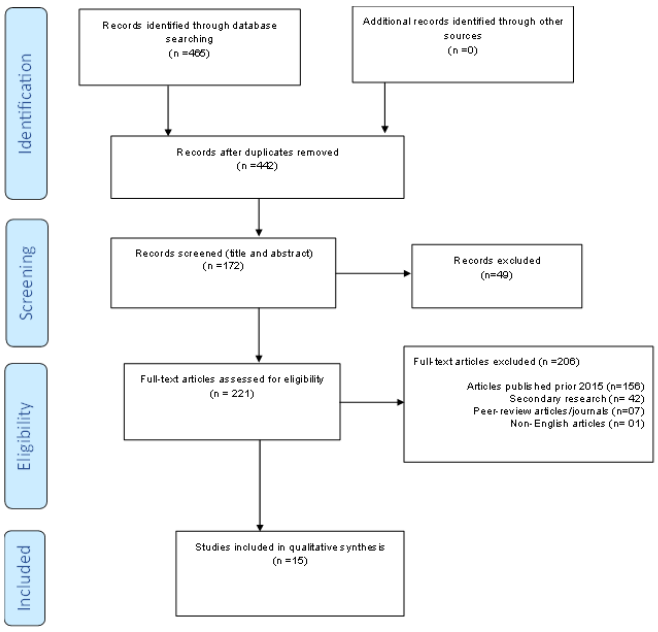


Figure 1: PRISMA diagram flow (Author's self-designed, 2025).

To start with, five (5) databases were consulted for relevant literature for the study. These databases include Web of Science, Scopus, Google Scholar, MEDLINE, and CINAHL. All these were considered as they have literature on digital technology in healthcare service delivery. Different search terms were used for this study, which are premised on the central aims and the specific objectives highlighted for the study. Boolean operators of "AND" and "OR" were used for this study owing to the nature of its relevance in connecting the impacts of virtual wards with patient care, healthcare efficiency, and system integration in the United Kingdom and Canada. These search terms include "virtual wards AND patient care", "virtual wards OR patient care", "virtual wards AND healthcare efficiency", "virtual wards OR healthcare efficiency", "virtual wards AND system integration", "virtual wards OR system integration". Having retrieved the relevant literature to the study, scanning was conducted on the methodology sections of the literature to ascertain those studies that were carried out in the focus areas – the United Kingdom and Canada. While this may be considered as strenuous, it gives room for an exhaustive assessment of literature in the studied area. Meanwhile, the search period was left between 2015 and 2025. This was considered to allow for the retrieval of recent evidences in the area of study (Table 1).

Table 1: Electronic Search Strategy (Extracts for five databases).

S/N	Search Terms	Web of Science	Scopus	Google Scholar	MEDLINE	CINAHL
		Number of Hits				
S1	Virtual wards AND patient care	2890	1200	595	752	1502
S2	Virtual wards OR patient care	2173	750	123	981	1742
S3	Virtual wards AND healthcare efficiency	23000	21000	17300	27000	5211
S4	Virtual wards OR healthcare efficiency	21000	28000	14000	17000	3590
S5	Virtual wards AND system integration	1201	178	59	137	315
S6	Virtual wards OR system integration	1347	128	73	126	213
Databases Search Limits Adopted						
Duplicates removed		89	91	75	82	75
Titles and abstracts checked		56	70	46	28	51
Articles < or = 10 years (2015-2025)		33	19	29	55	24
Secondary research		21	9	12	28	14
Peer-reviewed articles/ journals		13	4	5	15	6
English language only		NA	N/A	2	N/A	N/A
Final selected		5	1	2	5	2

Note*: Author's Literature Search (2025).

Results and Discussions

The thematic analysis was conducted using the "a priori" method, which involves using some predetermined themes to analyze the data extracted from the final selected literature. Thus, the results are presented as related to the research questions. For the impact of virtual wards on patient outcomes, several studies high-

light the positive impact of virtual wards on patient outcomes and quality of care. *Jalilian, et al.* [22] found that virtual ward patients had shorter hospital stays, which leads to improved survival rates compared to those remaining in traditional hospital settings. Similarly, [23] noted that COVID-19 virtual ward patients had comparable hospital stay durations but benefited from ongoing treatment at home, which help improve post-discharge recovery. [24] reported increased patient confidence and relief due to earlier discharge, which contributed to a more positive patient experience.

Furthermore, on the influence virtual wards on patient outcomes, [25] demonstrated that community virtual wards reduced Emergency Department (ED) presentations and unscheduled admissions among older patients, especially those living alone. The study also found that reduced cognition increased ED presentation risk. This indicates that there are risks associated with the absence of virtual wards at emergency departments. *Raphael, et al.* [26] evaluated a home dialysis virtual ward and found it feasible and practical, though care gaps remained. This leaves research gap for future study to explore. [27,28] reported that post-surgical virtual care improves Castillo d monitoring and error detection rates compared to standard care. These findings suggest that virtual wards enhance patient-centered care, reduce hospital dependence, and improve post-discharge recovery.

On the efficiency gains achieved through virtual ward models, virtual wards have demonstrated substantial efficiency gains, especially in reducing inpatient admissions and hospital costs. [22] found that virtual wards resulted in shorter hospital stays, reducing hospital bed costs and improving economic sustainability. *Saleh et al.* (2024) showed that an Atrial Fibrillation (AF) virtual ward significantly reduced inpatient stays and prevented 22 arrhythmia-related readmissions, thereby improving hospital resource allocation. [23] indicated that virtual wards effectively managed COVID-19 patients at home as it minimized hospital occupancy without compromising safety. *Ward et al.* (2022) confirmed that delivering oxygen at home to stable COVID-19 patients was safe, which reduced readmissions. [24] highlighted how virtual wards expanded from COVID-19 to other conditions by showcasing scalability. [29] found that virtual psychiatric wards were more cost-effective than in-person hospitalization, further demonstrating financial viability.

On how well virtual wards are integrated within existing healthcare systems, it was demonstrated that the integration of virtual wards within existing healthcare systems varies, with some studies reporting seamless adoption and others highlighting challenges. [7] found that NHS commissioners viewed virtual wards as promising but expressed concerns about financial sustainability and the need for clear success metrics. [30] identified cultural shifts in professional responsibilities and workflow adjustments as key integration challenges. [31] described the adaptation of virtual wards to existing hospital processes by identifying discharge planning, case management, and multidisciplinary rounds as essential for effective integration. [32] emphasized the need for better technological integration, which include home-based devices and interoperability with existing healthcare infrastructures. These findings suggest that while virtual wards hold potential, their success depends on effective coordination, financial planning, and technological alignment.

On the barriers influencing the success of virtual ward adoption, it was revealed that multiple studies highlight barriers to virtual ward adoption, ranging from financial concerns to technological and cultural challenges. [7] identified funding uncertainty, limited interoperability, and unrealistic implementation timelines as major barriers within the NHS. [30] found that managing complex conditions in virtual rehabilitation wards was challenging, particularly for patients with comorbidities. Technological barriers were also evident. [32] noted issues related to patient privacy, access to technology, and billing complexities. [26] identified care gaps in home dialysis virtual wards, emphasizing the need for improved patient monitoring. [29] pointed to the unpredictability of psychiatric conditions as a challenge in virtual psychiatric wards, which increases the likelihood of hospital transfers.

On the facilitators influencing the success of virtual ward adoption, some of the final selected studies identified key facilitators that enhance virtual ward adoption and effectiveness. [33] emphasized the role of collaboration and innovation, noting that digital technology fosters knowledge sharing and practice improvements. [7] found that defining clear program goals and adapting services to patient needs improved virtual ward feasibility. [30] highlighted the benefits of remote monitoring, video consultations, and patient empowerment in rehabilitation virtual wards. [24] reported that increasing awareness of virtual services and expanding their use beyond COVID-19 improved acceptance and operational efficiency. [31] identified structured implementation processes, including funding, home care support, and standardization of protocols, as critical for successful integration.

Implications

The study's findings have several implications for policy makers, practitioners, theory, and society. For the policy makers, the findings highlight the need for policies on funding, interoperability, and success measurement in virtual ward adoption in healthcare centers. Governments must be ready to provide financial incentives to hospitals to ensure sustainability. Also, regulatory frameworks should be designed to address issues such as liability, data privacy, and telemedicine reimbursement models to facilitate integration. For the practitioners, healthcare professionals should be trained on how to navigate the shift from traditional to virtual care. Interdisciplinary collaboration, especially between IT teams and medical staff, is important in overcoming technological barriers. Effective communication with patients about remote monitoring expectations can improve engagement and adherence.

Theoretically, the findings of the study support the evolution of healthcare models from facility-based to hybrid and home-based care systems. Future studies should explore how behavioral and technological adaptation influences the long-term effectiveness of

virtual wards, which incorporate patient-centered frameworks and implementation science theories. For the society, the findings suggest that virtual wards have the potential to make healthcare more accessible, especially for rural and vulnerable groups. Successful adoption can reduce hospital overcrowding and improve patient autonomy. However, efforts must be made to address the digital divide, which ensure that all patients, regardless of socioeconomic status, can access and benefit from virtual healthcare services.

Conclusion

Virtual wards have demonstrated substantial benefits in improving patient outcomes, which can enhance healthcare efficiency and reduce hospital burdens. However, successful integration requires overcoming financial, technological, and cultural barriers while leveraging collaboration, remote monitoring, and structured implementation strategies. All of these indicate that the implementation of virtual wards in healthcare centers requires understanding the barriers that may pose dangers to the implementation of the emerging technology in healthcare service delivery. Future research study should focus on optimizing virtual ward models to ensure long-term sustainability and effectiveness within healthcare systems.

Acknowledgments

None.

Conflicts of Interest

None.

APPENDIX

DATA EXTRACTION TOOL

S/N	Research Titles and Authors	Aims	Study location	Sample Size (n)	Data Collection	Findings
1	Length of stay and economic sustainability of virtual ward care in a medium-sized hospital in the UK: A retrospective longitudinal study [22].	To evaluate the length of stay difference and its economic implications between hospital patients and virtual ward patients.	The United Kingdom	Virtual ward patients (n=318) were matched 1:1 to 1:4, depending on matching characteristics, to all hospital patients (n=350).	Wrightington, Wigan and Leigh (WWL) Teaching Hospitals, National Health Service (NHS) Foundation Trust, a medium-sized NHS trust in the north-west of England.	- The virtual ward patients had a shorter stay in the hospital before being admitted to the virtual ward (2.89 days, 95% CI 2.1 to 3.9 days). - Chronic kidney disease (CKD) and frailty were associated with a longer length of stay in the hospital (58%, 95% CI 22% to 100%) compared with patients without CKD, and 14% (95% CI 8% to 21%) compared with patients with one- unit lower CFS. - The frailty score was also associated with a higher rate of readmission within 6 months and lower survival. Being admitted to the virtual ward slightly improved survival, although when readmitted, survival deteriorated rapidly - The cost of a 24-hour period in a general hospital bed is £536. The cost of a day hospital saved by a virtual ward was £935.

2	Insights from a single centre implementation of a digitally-enabled atrial fibrillation (AF) virtual ward. *Saleh et al.* (2024)	The study devised and implemented a digitally-enabled AF virtual ward to monitor patients being established onto medical therapy following an AF diagnosis or an AF-related hospitalisation.	The United Kingdom.	Seventy-three (73) patients were onboarded onto the AF virtual ward from October 2022 to June 2023.	Data were extracted from a web-based digital platform called Patients Know Best.	- Thirty-nine (53%) patients had red flag features requiring care escalation, of whom 9 (23%) were advised to attend ED (emergency department) for urgent assessment, 10 (26%) attended for expedited review and 14 (36%) required medication changes. - By 3 months post-monitoring, only 3 patients (4%) had re-attended ED with an arrhythmia-related presentation. - Virtual ward patients had an average 3-day shorter inpatient stay (mean duration 4 days) compared with AF patients hospitalised prior to virtual ward implementation (mean duration 7 days). - Overall, 22 arrhythmia-related readmissions were prevented via the virtual ward model.
3	The views and experiences of integrated care system commissioners about the adoption and implementation of virtual wards in England: Qualitative exploration study [7].	The study aims to develop an understanding of the acceptability and feasibility of adopting and implementing virtual wards in England from integrated care system commissioners' perspectives, including the identification of barriers and facilitators to implementation.	The United Kingdom.	The sample size of the study is twenty (20).	Qualitative semi-structured interviews were conducted with 20 commissioners employed by NHS England (NHSE) in various geographic regions in England.	- Four overarching themes were identified reflecting the acceptability and feasibility of key adoption and implementation processes: (1) assessing the need for VWs, (2) coordinating a system approach, (3) agreeing to Program Outcomes: NHSE Versus Organizational Goals, and (4) planning and adapting services. - Commissioners expressed the need for system-level change in care provision within the NHS, with virtual wards perceived as a promising model that could reform patient-centred care. However, there was uncertainty over the financial sustainability of virtual wards, with questions raised as to whether they would be funded by the closure of hospital beds. There was also uncertainty over the extent to which VWs should be technology-enabled, and the specific ways technology may enhance condition-specific pathways. - Furthermore, narrow parameters of success measures in terms of goals and outcomes of virtual wards, unrealistic timescales for planning and delivery, lack of interoperability of technology and time-consuming procurement procedures, liability concerns, and patient suitability for technology-enabled home-based care were identified as barriers to implementation.

4	Using virtual wards and long-term conditions management network to improve practice and performance. [33].	The study examined the use of virtual wards and long-term conditions management network to improve practice and performance.	The United Kingdom.	The sample size of the study is forty (40).	The qualitative data was collected from healthcare workers in UK hospitals.	- The pandemic has revealed that collaboration and innovation enabled by digital technology can radically transform health and care services at pace when people are provided with the space and support to be innovative. - Qualitative data show that CoP has potential to enhance knowledge and improve practice as it enables space and support to be innovative. However, it is difficult to attribute with 100% certainty the activities of a CoP to a particular outcome without the quantitative data. - Members felt that their personal knowledge had increased as they were able to learn from others but also access resources on the collaborative site. Relationships were reported as definitely stronger, and members felt that this enabled innovation that was changing practice and performance around uptake of tech-enabled RM solutions by patients. The members also felt that there was psychological safety due the structure of the forum in that it was not recorded, and members had opportunities to discuss and network in smaller groups and then feedback themes to the wider group.
5	A Covid -19 virtual ward model: A preliminary retrospective clinical evaluation from a UK district general hospital [23].	This study aims to evaluate the safety, utilization, ability to reduce length of hospitalization and overall outcomes of a COVID-19 virtual ward providing on-going treatment at home.	The United Kingdom.	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 5days of discharge.	Data was collected retrospectively from the secondary data from the selected hospitals.	- The mean length of hospital stays 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.

6	A community virtual ward model to support older persons with complex health care and social care needs [25].	The study developed a community virtual ward (CVW) model to assist health care professionals to support older persons at home during periods of illness and/or functional decline.	Ireland	The sample size for this study is 54 patients.	A quantitative observational study was conducted to examine if a CVW model of care reduced unplanned hospital admissions and emergency department (ED) presentations in 54 patients over a 12-month period.	- There was a reduction in emergency department (ED) presentations post-community virtual ward (CVW) admission (P<0.001), and median unscheduled admissions were reduced (P=0.001). Those living alone had a lower number of ED presentations (median 0.5, interquartile range 0–1) prior to admission in comparison to those living with a caregiver, with no differences observed during admission to CVW. - For those who experienced a fall during CVW admission, the odds ratio (OR) of requiring long-term care doubled for each extra fall (OR =2.24, 95% CI 1.11 to 4.52, P=0.025). - Reduced cognition was associated with an increased risk of ED presentations (ρ=0.292, P<0.05) but not associated with increased risks of unplanned hospital admissions (ρ=0.09, P=0.546). - There were no significant correlations seen between admission avoidance and the number of unplanned hospital admissions or ED presentations.
7	Successful implementation of round-the-clock care in a virtual ward during the COVID-19 pandemic [24].	The study examined the implementation of a 24/7 virtual ward during the COVID-19 pandemic.	Norfolk and Norwich University Hospitals Foundation Trust.	There were 852 patients that served as the sample size of the study.	Data was collected from the patients that used the selected hospitals.	- The remote care platform collected continuous vital sign observations and generated custom alarms. The team triaged, then escalated to nurse-specialists or consultants as required. - Finding showed that there was increased in patients' confidence and relief at earlier discharge. - Challenges faced include developing awareness of the new service, overcoming concerns around increased workload and transitioning from emergency to long-term funding. The wards subsequently expanded from COVID-19 to nine other use cases.

8	Outcomes from a delivering oxygen at home for patients recovering from COVID-19: Areal world observational study. *Ward et al.* (2022)	The study examined the safety of providing oxygen at home to stable patients recovering from COVID-19.	The United Kingdom.	The sample size is 147.	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.	- 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.
9	A virtual ward for home haemodialysis patients – A pilot trial [26].	The primary objective of the pilot study was to assess the feasibility and practicality of implementing the Home Dialysis VW (HDVW) on a broader scale.	Toronto, Canada	This study included 52 home dialysis virtual ward (HDVW) admissions among 35 patients selected from the existing home haemodialysis program.	Data was collected from the 35 patients.	- The implementation and execution of the HDVW Pilot Study proved to be technically feasible and practical. A care gap was identified in 35 (67 %) of the HDVW admissions. - In total, the cohort experienced 85 care gaps. There were no baseline demographic characteristics predictive of experiencing a care gap. error detected (134 (29.7%) v 25 (5.5%); absolute difference 24.2%, 19.5% to 28.9%) and a drug error corrected (absolute difference 24.4%, 19.9% to 28.9%). Fewer participants in the virtual care group than standard care group reported pain at 7, 15, and 30 days after randomisation: absolute differences 13.9% (7.4% to 20.4%), 11.9% (5.1% to 18.7%), and 9.6% (2.9% to 16.3%), respectively. Beneficial effects proved substantially larger in centres with a higher rate of care escalation. - In the total cohort observed for 2912 patient days, there were 9 readmissions, 13 visits to the emergency department, and 7 unplanned visits to the home hemodialysis in-center unit.

10	Post-discharge after surgery virtual care with remote automated monitoring-1 (PVC-RAM-1) technology versus standard care: randomised controlled trial [27].	To determine if virtual care with remote automated monitoring (RAM) technology versus standard care increases days alive at home among adults discharged after non-elective surgery during the COVID-19 pandemic.	Canada	The study focused on eight (8) acute care hospitals in Canada. The total participant is 905.	The study's design is multicentre randomised controlled trial.	- Days alive at home during 31 days of follow-up were 29.7 in the virtual care group and 29.5 in the standard care group: relative risk 1.01 (95% confidence interval 0.99 to 1.02); absolute difference 0.2% (95% confidence interval −0.5% to 0.9%). 99 participants (22.0%) in the virtual care group and 124 (27.3%) in the standard care group required acute hospital care: relative risk 0.80 (0.64 to 1.01); absolute difference 5.3% (−0.3% to 10.9%). - More participants in the virtual care group than standard care group had a drug error detected (134 (29.7%) v 25 (5.5%); absolute difference 24.2%, 19.5% to 28.9%) and a drug error corrected (absolute difference 24.4%, 19.9% to 28.9%). Fewer participants in the virtual care group than standard care group reported pain at 7, 15, and 30 days after randomisation: absolute differences 13.9% (7.4% to 20.4%), 11.9% (5.1% to 18.7%), and 9.6% (2.9% to 16.3%), respectively. Beneficial effects proved substantially larger in centres with a higher rate of care escalation.
11	Virtual acute psychiatric ward: Evaluation of outcomes and cost savings [29].	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.	Winnipeg, Canada	The 132 vWARD admissions represented a diverse demographic and clinical population.	Data for all vWARD admissions from March 23, 2020, to April 30, 2021, were retrieved from program documents and electronic records.	- 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.

12	Deliver cardiac virtual care: A primer for cardiovascular professionals in Canada [32].	The study examined the perceptions of cardiovascular professionals in Canada on delivering cardiac virtual.	Canada	Data was collected from 35 cardiovascular professionals.	Data was collected using the qualitative approach.	- The integration of virtual care, home-based devices, and disruptive technologies emphasize the trend toward virtualization of health care, with the potential for greater personalization of health care interactions and continuity of care. - Adequate and effective cardiac virtual care must be further developed given the need for rapid evaluation and close ongoing follow-up of patients, as seen in the areas of management of heart failure, cardiac rehabilitation, electrophysiology, and hypertension. - Although there are concerns surrounding issues such as patient privacy, access to technology, language discrepancies, and billing, these deficits provide opportunities for growth by health care organizations and technology companies.
13	Post Discharge after Surgery Virtual Care with Remote Automated Monitoring Technology (PVC-RAM): protocol for a randomized controlled trial [28].	The study undertook the Post Discharge after Surgery Virtual Care with Remote Automated Monitoring Technology (PVC-RAM) trial to determine if virtual care with remote automated monitoring (RAM) compared with standard care will increase the number of days adult patients remain alive at home after being discharged following nonelective surgery.	Canada	The sample size is 900 adults in Canada.	For 30 days, patients take daily biophysical measurements and complete a recovery survey.	- This trial will inform management of patients after discharge following surgery in the COVID-19 pandemic and offer insights for management of patients who undergo nonelective surgery in a nonpandemic setting. - Knowledge dissemination will be supported through an online multimedia resource centre, policy briefs, presentations, peer-reviewed journal publications and media engagement.

14	The family medicine-based virtual ward: Qualitative description of the implementation process [31].	This study provides a description of the family medicine-based VW and its implementation to guide health care providers seeking to adapt this intervention to their own setting	Montreal, Canada	The sample size for the study is 250 patients.	Data was obtained from semi-structured group interviews with the VW team and health professionals from two other hospitals, and from informal discussions with members of the VW team.	- The study adapted the VW to utilize existing processes and identified three distinct modules that implementers should consider: discharge planning, case management, and weekly multidisciplinary rounds. - The following were identified as key factors in the implementation process:1) funding, 2) home care, 3) communication, 4) standardization of protocols, 5) quality improvement, and 6) positive reception.
15	Hospital staff perspectives on the drivers and challenges in implementing a virtual rehabilitation ward: Qualitative study	The study	Canada	Twenty-one (21) staff of virtual rehabilitation wards were interviewed.	The analysis of data was performed using framework analysis and the 7 domains of the NASSS framework.	- The results were mapped onto the 7 domains of the NASSS framework. (1) Condition: Managing certain conditions, especially those involving comorbidities and sociocultural factors, can be challenging. (2) Technology: The VRW demonstrated suitability for technologically engaged patients without cognitive impairment, offering
	[30].	explore staff's perspectives on the facilitators and barriers of the VRW, shedding light on service setup and delivery.				advantages in clinical decision-making through remote monitoring and video calls. - However, interoperability issues and equipment malfunctions caused staff frustration, highlighting the importance of promptly addressing technical challenges. (3) Value proposition: The VRW empowered patients to choose their care location, extending access to care for rural communities and enabling home-based treatment for older adults. (4) Adopters and (5) organizations: Despite these benefits, the cultural shift from in-person to remote treatment introduced uncertainties in workflows, professional responsibilities, resource allocation, and intake processes. (6) Wider system and (7) embedding: As the service continues to develop to address gaps in hospital capacity, it is imperative to prioritize ongoing adaptation. This includes refining the process of smoothly transferring patients back to the hospital, addressing technical aspects, ensuring seamless continuity of care, and thoughtfully considering how the burden of care may shift to patients and their families.

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