Innovative Approaches in the Post-Covid Era: The Emerging Role of Nurse Practitioner-Led Virtual Care in a Changing Healthcare Landscape

Sukhdip Grewal, *RN(EC) MN, NP*
Nurse Practitioner
University Health Network

Rachel Ekeanyanwu, *RN (EC) MN, NP*
Nurse Practitioner
University Health Network

Katey Peirson, *PMNP*
Nurse Practitioner
University Health Network

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ABSTRACT

In 2020, the global COVID-19 pandemic profoundly disrupted healthcare systems, overwhelming hospital capacities, straining emergency departments and exposing longstanding gaps in primary care access. These challenges necessitated a rapid transformation of care delivery models, with virtual care emerging as a pivotal solution. In Canada, healthcare organizations and clinicians responded by embracing innovation to maintain the quality and integrity of patient care.

As leaders in this transformation, the University Health Network developed the "Connected Care Hub (CCH)," a transitional Nurse Practitioner (NP)-led virtual clinic, designed to deliver comprehensive, safe, timely, and accessible care. Initially focused on the management of COVID-19 patients, the CCH has since evolved into an integrated model addressing a broad spectrum of acute and chronic conditions through comprehensive virtual assessments, diagnoses, treatments and structured follow-ups. The CCH collaborates closely with providers in the home, community pharmacies, specialists, and primary care providers to bridge critical gaps in transitional care. Its core achievements include enhancing care quality, preventing unnecessary emergency visits, expediting hospital discharges, and reducing readmissions.

These outcomes highlight the transformative potential of transitional NP-led virtual care in improving access, outcomes, and system efficiency. In this paper, we explore the successes, challenges, and future implications of the CCH model, offering valuable insights for health systems navigating a new era of care.

Introduction

Canada's healthcare system is at a critical juncture, facing persistent challenges in primary and acute care access (Canadian Institute for Health Information (CIHI), 2023b). Even prior to the COVID-19 pandemic, one in six Canadians lacked a regular primary care provider (PCP), and fewer than half could access same-day appointments (Canadian Medical Association, 2018). These systemic barriers contributed to heightened patient stress, delayed diagnoses and a surge in Emergency Department (ED) visits for conditions better managed in a community-based setting (CIHI, 2023a; Commonwealth Fund, 2020). The pandemic further intensified these challenges, with an alarming 39% of Canadians visiting the ED in 2020 for concerns typically managed in primary care settings (Commonwealth Fund, 2020). These disruptions disproportionately affected racialized and low-income communities, deepening existing health inequities across the nation (CIHI, 2021, 2023a).

The growing strain on Canada's primary care system has led to a shift in the burden of care to the acute care sector, leading to overcrowded EDs and inpatient wards (Jeyaraman et al., 2021). These pressures are further exacerbated by the rising prevalence of chronic disease, increasing illness complexity, and limited healthcare resources (Steffler et al., 2021). Virtual care integration in acute care pathways presents opportunities to enhance continuity of care, optimize chronic disease management and prevent hospital readmissions (Chauhan and McAlister, 2022).

Virtual care encompasses any interaction, whether synchronous or asynchronous, that occurs between patients and any member of the care team without direct physical contact (Digital Health Canada, 2025). While virtual care was largely confined to remote and underserved areas prior to the pandemic, its adoption surged during the pandemic as a strategic response to mitigate viral transmission and reduce strain on healthcare facilities (Bhatia et al., 2021). In Ontario, virtual care accounted for a mere 1.6% of ambulatory visits in the second quarter of 2019 but increased to 70.6% by the second quarter of 2020 (Bhatia et al., 2021). Although COVID-19 is no longer a public health emergency, virtual care remains an essential mechanism for delivering quality care that is timely, safe, accessible and cost effective (Haleem et al., 2021; Lam et al., 2020; Agarwal et al., 2021).

University Health Network (UHN), recognized as a leading research hospital, aims to drive change and transform lives through bold, visionary steps (University Health Network, 2025). The "Connected Care Hub" (CCH) at UHN reflects this mission by integrating virtual care into acute care models, to improve patient transitions, continuity of care, and access for vulnerable populations. Specifically, the CCH provides transitional care to patients following hospital discharges or ED visits for common respiratory infections, acute medical exacerbations, or chronic disease complications. It also accepts referrals from PCPs for community-based patients with similar conditions who require enhanced support. In this evolving landscape, Nurse Practitioner (NP)-led virtual care has emerged as a compelling model for addressing challenges across the continuum of healthcare. With advanced education, clinical expertise, and a patient-centered approach, NPs are uniquely positioned to lead these initiatives and bridge gaps in traditional models of care (Charalambous, Hollingdrake, & Currie, 2024). In this paper we examine the impact of NP-led virtual transitional care on Canada's healthcare system in the post-COVID era. By advocating for broader integration, we highlight its potential as a strategic solution to advance equity and improve health outcomes.

Connected Care Hub Clinic Overview

The CCH was established in April 2020 in response to the COVID-19 pandemic, with the goal of reducing nonessential ED visits and minimizing risks associated with in-person care. Rapidly deployed during a period of significant system strain, it operated as a virtual team to sustain continuity of care amid limited access to primary care. At the height of the pandemic, the CCH managed over 1,000 virtual visits per week, supported by a collaborative network of physicians and NPs. Since its inception, the program has delivered an estimated 66,650 virtual visits and supported approximately

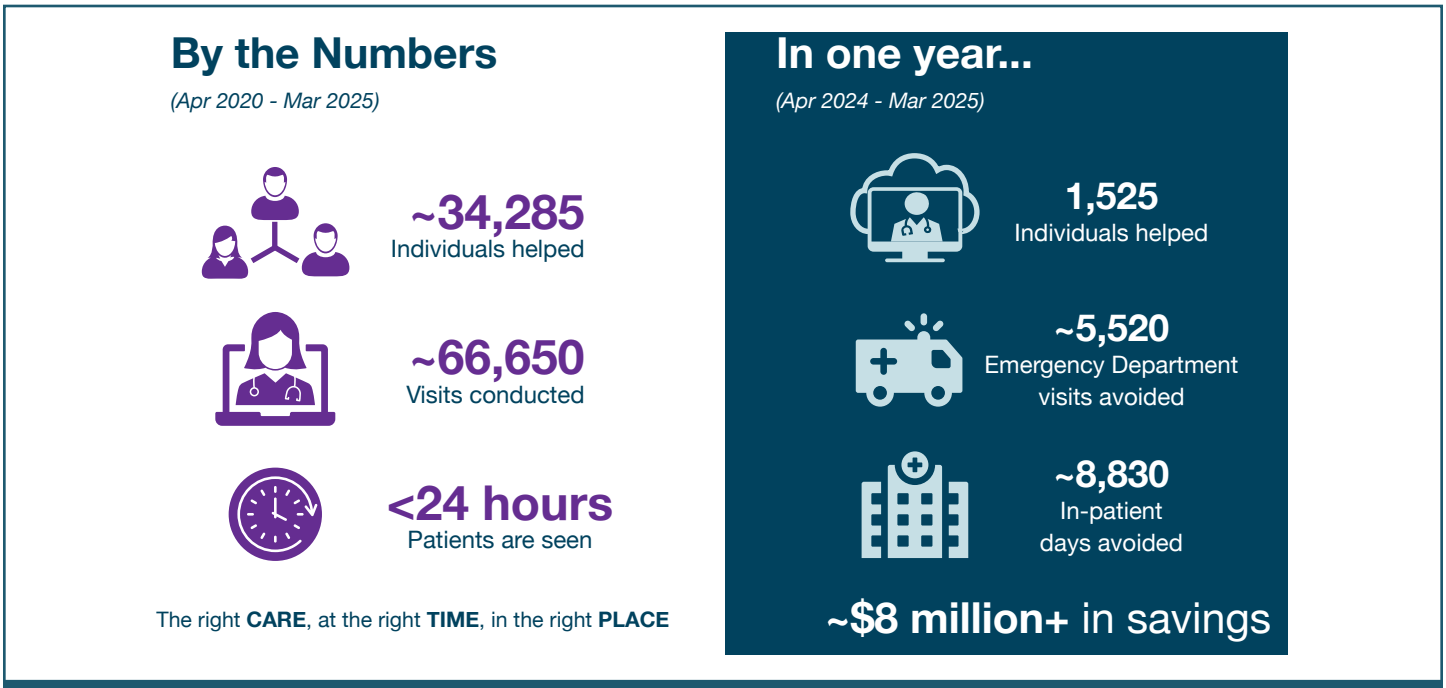

Figure 1.

34,285 individuals, while ensuring patients are seen within 24 hours of referral. In the past year alone, the program is estimated to have helped 1,525 individuals, avoided around 5,520 emergency department visits and 8,830 in-patient days, and generated over $8 million in system savings (Figure 1).

Program Model

The CCH provides short-term, transitional virtual care for high-risk patients with complex medical needs. Its core services include comprehensive assessments, diagnostic investigations, evidence-based treatments, and structured follow-ups. The hub collaborates with interdisciplinary partners such as Ontario Health (OH) atHome, community pharmacies, specialists, and PCPs. Referrals are received from various UHN departments including ED, General Internal Medicine, Transplant, and Oncology, as well as from community-based programs and PCPs. To support continuity, the CCH facilitates safe and coordinated transitions from the hospital to the community, bridging critical gaps in follow-up care and post-discharge support.

Clinical Pathways

The CCH was initially established to manage acute respiratory conditions in populations impacted by COVID-19, pneumonia, RSV, and influenza. Within this respiratory pathway, NPs assess high-risk patients presenting with respiratory symptoms and oversee their management by ordering respiratory viral panel testing, blood work, and chest X-rays. They prescribe treatments including antivirals, antibiotics, corticosteroids, and inhalers, while coordinating short term community nursing care to administer intravenous antiviral therapy to support recovery and prevent deterioration. Building on this foundation, the CCH has since expanded to include a broader spectrum of chronic and complex conditions through structured, condition-specific clinical pathways.

The Chronic Obstructive Pulmonary Disease (COPD) pathway supports clinically stable patients at risk of progressive deterioration and adverse outcomes without prompt intervention. It prioritizes early identification, timely diagnostic evaluation, and prompt initiation of care. NPs order diagnostic spirometry and work collaboratively with Respirologists for patients with confirmed COPD. Patients receive individualized care plans aimed at optimizing symptom control, improving disease self-management, and reducing preventable ED visits and hospitalizations.

The Diabetes pathway, developed in collaboration with Discovery Pharmacy at the University of Toronto, supports patients recently discharged following complications related to newly diagnosed or poorly controlled diabetes. The pathway facilitates early discharge and ensures comprehensive post-acute follow-up. Pharmacists provide targeted education focused on lifestyle modification, while NPs perform clinical assessments, optimize medications including insulin, and deliver personalized support to achieve glycemic stabilization. Patients are followed for a minimum of 14 days, with the duration extended based on clinical necessity and the timely availability of PCPs or specialists to ensure safe and coordinated transitions of care. This model promotes seamless care transitions, enhances patient capacity for diabetes self-management, and reduces reliance on acute care services.

Interdisciplinary Team

The CCH was initially shaped by two part-time NPs with ED physicians providing a majority of the initial patient assessments. Over the past three years, the program has since evolved into a comprehensive interdisciplinary team composed of six full-time NPs, two casual NPs, two full-time Registered Nurses, two part-time Pharmacists, three full-time Administrative Assistants, and a part-time Chiropodist. Within this model, NPs serve as the most responsible providers, working to their full scope of practice and leading patient care across the continuum. This growth has been further bolstered by strategic partnerships with UHN Integrated Care Program, OH atHome, Discovery Pharmacy, Toronto Paramedic Service (TPS), Telemedicine Impact Plus (TIP), Seamless Care Optimizing the Patient Experience (SCOPE) team, Naturally Occurring Retirement Community (NORC) program, and UHN Social Medicine. For example, collaboration with the TPS' Community Paramedicine program has enabled NPs to refer patients for in-home wellness checks, chronic disease assessments and treatments, point-of-care testing, remote monitoring, and connections to essential community resources. By reducing emergency calls, ED visits, and avoidable hospital admissions, this partnership enhances patient outcomes, improves system efficiency, and strengthens rapid response for patients requiring urgent interventions. The CCH has also demonstrated leadership in managing complex COVID-19 cases through province-wide home care partnerships, facilitating the timely delivery of intravenous antivirals and showcasing the hub's capacity for adaptive, scalable care models in response to evolving patient needs. Through interdisciplinary collaboration and organizational adaptability, the CCH has strengthened its capacity to meet the evolving and complex demands of contemporary healthcare, within a post-COVID landscape marked by sustained high demand for virtual care.

Benefits and Limitations of the CCH

Benefits

The CCH offers key advantages over conventional models of care by improving healthcare access through a centralized virtual model that integrates specialty services, streamlines referral pathways, and utilizes advanced technologies. Strengthened by strong community partnerships and an interdisciplinary team, the CCH delivers timely, coordinated, and patient-centered care. A core strength of the CCH is the integration of virtual care to address geographic, logistical, and systemic

Figure 2. Anonymous testimonials from patients, caregivers and clinicians collected by the Connected Care Hub (internal data, 2024).

barriers, particularly for underserved and vulnerable populations. By reducing in-person visits, the model improves access for individuals facing transportation, mobility, or complex caregiving challenges. It also reduces indirect costs such as travel and lost wages, improving affordability for individuals with limited financial resources. To ensure inclusivity, the CCH offers both video and telephone consultations, along with translation services to accommodate patients across diverse languages, varying levels of digital access and health literacy. These strategies promote health equity and align with patient preferences, as 79–98% of Canadian patients report virtual care to be comparable to in-person visits (Canada Health Infoway, 2020) (Figure 2).

Beyond individual outcomes, virtual care has broader systemic benefits. National estimates suggest that shifting 50% of primary care visits to virtual platforms could save 103 million work hours annually, reduce patient travel costs by $770 million, and prevent 325,000 metric tonnes of CO_2 emissions (Canada Health Infoway, 2020). These outcomes reinforce the CCH's role in advancing sustainability, equity, and efficiency, while setting a national benchmark for innovative, patient-centered care delivery.

Limitations and Mitigation Strategies

While the CCH model offers significant benefits, it also presents inherent limitations common to virtual and transitional care approaches. Technological barriers disproportionately affect older adults and socioeconomically disadvantaged populations, particularly those without access to a phone, reliable internet access, or with low digital literacy (Yang, Gao & Jiang, 2024). Additionally, the appropriateness of virtual care varies based on factors such as patient acuity, illness type, individual preferences, and privacy concerns (Gajarawala & Pelkowski, 2020).

Transitional care models present additional challenges, including the risk of care fragmentation, particularly in resource-limited communities facing PCP shortages. Over-reliance on virtual care may also diminish the essential role of in-person services, while its convenience can contribute to over-utilization. From a systems perspective, dependence on a limited workforce may increase the risk of burnout and staff retention as demand continues to grow (West et al., 2016). Finally, the long-term sustainability of such programs relies heavily on stable funding and ongoing stakeholder engagement.

In response to these limitations, the CCH has implemented targeted strategies to maintain high standards of care while supporting system capacity. Standardized clinical protocols support the delivery of care that is both efficient and comprehensive, while risk stratification tools aid in prioritizing high-needs patients and streamlining services for those at lower risk. Patient education initiatives encourage appropriate use of virtual care, helping to minimize fragmentation and reduce unnecessary utilization. For patients requiring in-person assessment, referrals to partners such as community paramedicine help to prevent avoidable ED visits. Virtual care is positioned as a supportive component, particularly during acute episodes or chronic disease exacerbations, rather than a replacement for in-person care.

Looking ahead, the CCH remains committed to refining integrated models that combine virtual and in-person services. These hybrid approaches may enhance diagnostic accuracy, preserve continuity, and support comprehensive, patient-centered care. Continued efforts to diversify the clinical workforce and invest in professional development are also key to improving staff retention and ensuring long-term sustainability.

Future Planning

Advancing Community Partnerships

Building on the success of its collaborative model, the CCH plans to strengthen its partnerships to enhance transitional care beyond the virtual clinic. Upcoming initiatives include partnering with community pharmacies to pilot a transitional diabetes program, bridging critical gaps in diabetes management through innovative, community-based approaches. The CCH is also working to expand its collaboration with the SCOPE program, a virtual interdisciplinary team connecting unaffiliated PCPs to specialists, hospitals, and community services. These initiatives aim to advance integrated care, extending advanced diabetes support beyond UHN while improving service coordination across care settings. Additionally, the CCH anticipates leveraging a broader spectrum of home care resources, using its experience in managing complex COVID-19 cases as a foundation for scalable, adaptive care models to address evolving healthcare needs.

Team Expansion

As the CCH continues to expand, building a dynamic, interdisciplinary team will be essential. The CCH envisions integration of social workers, dietitians, physiotherapists, and occupational therapists as instrumental in cultivating a holistic model of care that is better equipped to address the multifaceted and complex needs of patients. Many individuals referred to the CCH face complex challenges shaped by social determinants of health, including financial insecurity, unstable housing, and difficulty navigating the healthcare system. By incorporating other allied health professionals, the hub aims to enhance capacity to provide comprehensive, patient-centered care that addresses medical concerns while mitigating broader socioeconomic factors impacting health outcomes.

Enhancing Accessibility

Residents in remote and rural communities frequently encounter significant barriers to care, including provider shortages, transportation challenges, and long travel distances, which contribute to poor health outcomes (Sapru et al., 2014). While the CCH currently operates within an urban setting, its model offers insights that may be valuable to geographically underserved regions. Potential strategies may include establishing partnerships with local care providers and sharing best practices to support the development of scalable, adaptable models. Through this continued evolution, the CCH remains committed to expanding access, promoting equity, and supporting broader health system integration.

Expansion of Clinical Pathways

The CCH has led the delivery of timely, coordinated services while bridging geographic and systemic barriers to access. Supported by strong partnerships and established referral pathways, the model effectively serves patients in a fully virtual environment. When in-person evaluation is clinically indicated, the CCH ensures prompt referral to appropriate community or hospital services to maintain continuity and quality of care. Recognizing that some cases require in-person assessment, the CCH is exploring hybrid care options, including extended hours and dedicated clinic space. This approach would preserve the strengths of virtual care while enhancing flexibility to address complex needs. To ensure care remains responsive and targeted, the CCH regularly analyzes utilization patterns, particularly among patient populations with high rates of ED visits, hospitalizations, and readmissions. These insights inform the ongoing development and refinement of clinical pathways, enabling more timely and proactive interventions for high-risk and vulnerable individuals.

Research, Evaluation and Scalability

As the CCH continues to evolve, strengthening its evaluation framework will be essential to understanding its impact and informing future improvements. Early findings indicate clear benefits, including reduced ED visits, decreased inpatient days, timely post-discharge follow-up, and lower inpatient readmission rates. Notably, an initial review showed inpatient readmission rates to be lower among CCH patients, with an overall rate of 8.2% compared to the UHN average of 13.9% (internal data, 2024). To build on this progress, further research, including a propensity matching study, is needed to assess long-term effectiveness, optimize clinical pathways, and gain a better understanding of patient and provider experiences. Evaluating the model's scalability across care settings, coupled with systematic data collection and analysis, will support continuous quality improvement. Disseminating findings through academic channels will enable effective knowledge translation and support broader system adoption.

Conclusion

The Canadian healthcare system relies on innovation to address persistent gaps in primary and acute care, ensuring that high-quality, patient-centered care remains both equitable and accessible. The CCH exemplifies this approach through its predominantly virtual, NP-led transitional care model. By supporting

timely interventions, enhancing continuity, and fostering community partnerships, this initiative has contributed to measurable system improvements, including reduced ED visits, fewer hospital admissions, and earlier discharges. In this paper, we examined the evolving role of the CCH in the post-COVID era, highlighting NP-led virtual care as a scalable, sustainable model. As Canada's healthcare landscape continues to evolve, this model is well-positioned to serve as a national benchmark for accessible, efficient, and equitable care delivery.

References

Agarwal, Payal, Geetha Mukerji, Clare Laur, et al. "Adoption, Feasibility and Safety of a Family Medicine–Led Remote Monitoring Program for Patients with COVID-19: A Descriptive Study." *CMAJ Open* 9, no. 2 (2021): E324–E330.

Bhatia, R. Sacha, Chris Chu, Annie Pang, Mina Tadrous, Vesna Stamenova, and Peter Cram. "Virtual Care Use Before and During the COVID-19 Pandemic: A Repeated Cross-Sectional Study." *CMAJ Open* 9, no. 1 (2021): E107–E114.

Canada Health Infoway. *Analysis of the Current and Potential Benefits of Virtual Care in Canada*. 2020. https://www.infoway-inforoute.ca/en/component/edocman/3819-analysis-of-the-current-and-potential-benefits-of-virtual-care-in-canada/view-document?Itemid=103.

Canadian Institute for Health Information. *Access to Primary Care: Many Canadians Face Challenges*. 2023. https://www.cihi.ca/en/primary-and-virtual-care-access-emergency-department-visits-for-primary-care-conditions.

Canadian Institute for Health Information. *Impact of COVID-19 on Canada's Health Care Systems*. 2023. Accessed January 17, 2025. https://www.cihi.ca/en/covid-19-resources/impact-of-covid-19-on-canadas-health-care-systems.

Canadian Institute for Health Information. *Commonwealth Fund Survey, 2020*. 2020. Accessed January 10, 2025. https://www.cihi.ca/en/commonwealth-fund-survey-2020.

Canadian Medical Association. *Virtual Care in Canada: Discussion Paper*. 2018. https://www.cma.ca/sites/default/files/pdf/News/Virtual_Care_discussionpaper_v2EN.pdf.

Charalambous, J., O. Hollingdrake, and J. Currie. "Nurse Practitioner Led Telehealth Services: A Scoping Review." *Journal of Clinical Nursing* 33, no. 3 (2023). https://doi.org/10.1111/jocn.16898.

Chauhan, U., and F. A. McAlister. "Comparison of Mortality and Hospital Readmissions among Patients Receiving Virtual Ward Transitional Care vs Usual Postdischarge Care: A Systematic Review and Meta-analysis." *JAMA Network Open* 5, no. 6 (2022): e2219113–e2219113.

Connected Care Hub. *Internal Patient and Provider Feedback Data*. 2024. [Unpublished internal data]. University Health Network.

Digital Health Canada. *Virtual Care in Canada: Lexicon*. Accessed January 10, 2025. https://digitalhealthcanada.com/wp-content/uploads/2022/06/Virtual-Care-National-Lexicon-v-JAN2521.pdf.

Gajarawala, Shilpa N., and Jessica N. Pelkowski. "Telehealth Benefits and Barriers." *The Journal for Nurse Practitioners* 17, no. 2 (2020): 218–21. https://doi.org/10.1016/j.nurpra.2020.09.013.

Haleem, Abid, Javaid Mohd, R. P. Singh, and Raju Suman. "Telemedicine for Healthcare: Capabilities, Features, Barriers, and Applications." *Sensors International* 2 (2021): 100117. https://doi.org/10.1016/j.sintl.2021.100117.

Jeyaraman, M., L. Copstein, N. Al-Yousif, et al. "Interventions and Strategies Involving Primary Healthcare Professionals to Manage Emergency Department Overcrowding: A Scoping Review." *BMJ Open* 11, no. 5 (2021): e048613. https://doi.org/10.1136/bmjopen-2020-048613.

Lam, Peter, Pooja Sehgal, Nathanial Andany, et al. "A Virtual Care Program for Outpatients Diagnosed with COVID-19: A Feasibility Study." *CMAJ Open* 8, no. 2 (2020): E407–E413. https://doi.org/10.9778/cmajo.20200075.

Sapru, Ishneet S., Kaitlyn Cassidy, and Shannon L. Sibbald. "Perceived Barriers to Accessing Specialized Medical Care in Rural Communities of Ontario: A Pilot Study." *Western Undergraduate Research Journal: Health and Natural Sciences* 5, no. 1 (2014). https://doi.org/10.5206/wurjhns.2014-15.4.

Steffler, Michael, Yuqing Li, Sandra Weir, et al. "Trends in Prevalence of Chronic Disease and Multimorbidity in Ontario, Canada." *CMAJ: Canadian Medical Association Journal* 193, no. 8 (2021): E270–E277. https://doi.org/10.1503/cmaj.201473.

University Health Network. *UHN Strategic Plan 2021–2025: A Healthier World*. Accessed January 17, 2025. https://www.uhn.ca/corporate/AboutUHN/Purpose_Performance/UHN_Strategic_Plan/Documents/UHN-Strategic-Plan.pdf.

West, C. P., Dyrbye, L. N., & Shanafelt, T. D. (2016). *Physician burnout: Contributors, consequences and solutions*. Journal of Internal Medicine, 283(6), 516–529. https://doi.org/10.1111/joim.12499

Yang, Ruoyan, Shiyun Gao, and Yitong Jiang. "Digital Divide as a Determinant of Health in U.S. Older Adults: Prevalence, Trends, and Risk Factors." *BMC Geriatrics* 24, no. 1 (2024): 1027. https://doi.org/10.1186/s12877-024-05612-y.