Remote Patient Monitoring: The New Frontier in Telemedicine

Opportunities for improving health equity in cancer care

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Telemedicine is a well-established healthcare delivery model, incorporating different modalities of telecommunication technology to deliver care to patients in the home setting. In use since the 1970s, telemedicine use has expanded due to improved quality of technology, patient readiness and satisfaction, and lower costs.[1,2] The COVID-19 global pandemic accelerated this expansion, with telemedicine use sharply increasing and stabilizing at levels 38 times higher than its use prior to the pandemic, with 13 percent to 17 percent of outpatient visits across all specialties occurring via telehealth.[3] Prior to the COVID-19 pandemic, there was an increasing focus on the benefits of telemedicine due to the national physician shortage, aging population, ever-increasing healthcare costs, and more effective anti-cancer treatments resulting in increased survival rates.[1,4] There is an urgent need to develop new models of cancer care because the in-person care model as the sole way to obtain quality cancer care is no longer sustainable. Early identification and intervention of patient illness may help reduce acute care use, including unplanned emergency department visits and hospitalizations, thus, improving quality of care.[5]

Telemedicine and Health Equity

About 1.3 million people in the United States are living with hematological malignancies, namely multiple myeloma, lymphoma, and leukemia.[6] Patients with hematological malignancies and those undergoing bone marrow transplant have higher hospitalization and mortality rates compared to patients with solid tumors.[7,8] Patients with hematological malignancies are often admitted to the hospital due to acute clinical deterioration, and patients may report feeling unprepared to recognize treatment-related side effects.[9,10] The use of telemedicine, specifically remote home monitoring of vital signs, may lead to early recognition of worrisome conditions, such as sepsis, and ultimately lead to earlier intervention and improved patient outcomes.

Implementation research in remote patient monitoring must examine effects on disparities in cancer care and identify modifications to reduce these disparities.

Patients of historically underrepresented groups with hematological malignancies are particularly disadvantaged, because they have higher rates of morbidity and mortality compared to their White counterparts.[11] Social determinants of health, such as access to quality care, likely explain much of this variation.[12] Telemedicine has the potential to enhance the quality of cancer care delivery by improving access to care and early intervention, but there are also concerns that it may exacerbate existing disparities. There is a critical need to define best practices in the implementation of telemedicine to ensure equitable access for all patients with cancer. In this article, we describe early insights from implementing a remote patient monitoring platform at The Mount Sinai Hospital in New York City.

There is an urgent need for research focused on equity-driven implementation of telemedicine in oncology. The COVID-19 pandemic exacerbated disparities in oncology care. Black and Hispanic patients with cancer suffered from care disruptions and delays disproportionally more because of the pandemic.[13] Broad use of tele-oncology has been hampered by the "the digital divide"—the gap between those who do and do not have access to Wi-Fi-capable devices and reliable internet.[14] Within our cancer center, only 17 percent of those using the video visit option are Black and 5 percent are Hispanic.[15] This is significantly lower than our oncology program's demographic breakdown, which consists of 23 percent Black and 14 percent Hispanic patients. Studies in digital interventions in oncology have reported patient benefits, such as reductions in symptom distress and unplanned hospitalizations, but did not focus on patients from diverse racial and ethnic groups.[16,17] Implementation research in remote patient monitoring must examine effects on disparities in cancer care and identify modifications to reduce these disparities. Rigorous evaluation is needed to refine existing telemedicine solutions to fit local context and ensure that these solutions reduce disparities in access to and quality of care.

Remote Patient Monitoring: The New Frontier of Telemedicine

A particular type of telemedicine, remote patient monitoring, represents the next frontier in technological innovation in virtual longitudinal patient care. Remote patient monitoring involves the transmission of health data, such as vital signs, from patients' homes to healthcare providers via wearable devices, a mobile app, and/or home hub (where the cancer care team can see inputted patient data and track trends). Studies have shown promising results for remote patient monitoring, with a recent meta-analysis demonstrating a reduction in hospitalizations.[18] However, most of these studies neither included patients with cancer nor evaluated the implementation of remote patient monitoring among vulnerable patient populations, and widespread implementation of this technology has been limited. A recent prospective observational study showed the benefits of an interdisciplinary remote patient monitoring program for patients with cancer diagnosed with COVID-19. Remote patient monitoring was associated with a 78 percent relative risk reduction in hospital admissions.[19] As such, the expansion of telemedicine utilizing remote patient monitoring is promising for patients with hematological malignancies who are at an increased risk of hospitalization.

A Remote Patient Monitoring Quality Improvement Project

In 2021, our team implemented a quality improvement project to develop and evaluate the feasibility of using the Current Health remote patient monitoring platform among patients with cancer. We selected this platform because it includes a hub for establishing an internet connection, making it possible for patients without a Wi-Fi-enabled device or internet in their home to connect with their medical team. This platform is also available in many languages.

To establish initial feasibility and create appropriate workflows, our team conducted weekly meetings with the disease groups, one disease group at a time, over the course of several months. In these meetings, we discussed potential challenges and necessary changes to the workflows of our inpatient oncology teams, enrolling 258 total cancer center users to date into the platform, including physicians, nurse practitioners, physician assistants, and nurses. We established a centralized team of advanced practice providers and nurses who provide care in our Oncology Care Unit, a 24/7 urgent care unit in our cancer center. The meetings also included developing workflows and training Oncology Care Unit staff on appropriate steps if patients have an alert on their remote patient monitoring device and similarly established protocols for escalation of abnormal vitals to patients' primary oncology teams. Furthermore, we worked with the hospital information technology team to integrate the program with our electronic health record to ensure immediate data availability for clinical decision-making.

Over the course of one year, we enrolled more than 26 patients with hematological malignancies, including 27 percent Black and 8 percent Hispanic patients. Some patients reported enjoying the devices, with a few patients using them for longer than three months. Other patients declined to participate after initial consent because using multiple devices felt too overwhelming for them.

Through our experience, we identified several patient-level and clinician-level factors that need to be considered to increase uptake of remote patient monitoring in oncology settings. For example, selecting the right patients for remote patient monitoring is critical. We developed patient inclusion criteria based on input from all members of our multidisciplinary teams. We expected that these criteria would include acuity and healthcare utilization. During our discussions with clinicians, we also discovered that high-acuity patients at risk of hospitalization, such as patients who have had a bone marrow transplant and who are post allogeneic transplant, may benefit less from continuous monitoring by the care team if they are scheduled for outpatient follow-up appointments multiple times per week.

Clinician-level factors included physician buy-in, appropriate follow-up, and staffing. Most physicians expressed enthusiasm for this technology but also worried about committing their staff to remote patient monitoring and the time it would require for appropriate and timely follow-up. Widespread post-pandemic clinician burnout, staffing shortages, and turnover contributed to these concerns. The current health team was able to address some of these concerns in their training. For example, they pointed out that staff would receive alerts if patient data were out of predetermined ranges that were defined by each disease team. Our team also streamlined the alerts to a centralized team of nurse practitioners and nurses, thereby supporting the individual ambulatory disease teams to only triage if clinical escalation was required.

In our pilot intervention thus far, we have found that remote patient monitoring is a feasible and potentially useful tool for expanding care to the outpatient setting. The technology has the

potential to mitigate healthcare disparities among patients with cancer. Our quality improvement project's interim results demonstrate that recruiting underserved patient populations is feasible. As with all technological innovations, remote patient monitoring requires a dedicated team and involvement of all stakeholders to ensure clinician and patient acceptance. Our team is conducting an evaluation to identify best practices of remote patient monitoring implementation in oncology with a focus on structurally disadvantaged patients—those from diverse racial and ethnic groups—and others without reliable access to the internet or Wi-Fi-enabled devices. Next steps include evaluating patient and clinician experience and preliminary effectiveness of the technology. Though remote patient monitoring has many obvious advantages, like any technology, it carries the risk of increasing disparities in health due to existing social inequities. Therefore, any remote patient monitoring evaluation must come from the place of health equity throughout the project's phases: project design, data collection, analysis, implementation, and dissemination. Our study helps demonstrate that a remote patient monitoring solution for patients with cancer can be scalable, equitable, and clinically actionable. OI

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