Telehealth In Medicare Plans: Leveraging AI For Improved Accessibility And Senior Care Quality

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Abstract

The shortage of medical specialists and primary care providers contradicts the evolution of telehealth and telemedicine technology capabilities. Coupled with the rise of the aging population, there is a pressing call for senior healthcare planning and delivery innovation. The availability and awareness of telehealth services contribute to addressing the concern regarding equitable access to healthcare services. In this work, we design and implement a survey[1] to confirm the reality of the perception and availability of telehealth for senior healthcare services. Our findings indicate that even though Medicaid and commercial plans increasingly provide coverage of new telehealth services during public health emergencies and many want to continue the coverage, the actual coverage of the established services decreased, and their plans offered communication channel limitations. Our proposed AI-enabled cyber-physical system technology framework is presented with supporting communication analysis, requirements, patient journey, and work. Commercialization of the proposed solution can contribute to healthier living supported by technological companionship.

Keywords: *Telehealth, Telemedicine, Medical specialists, Primary care providers, Aging population, Senior healthcare, Healthcare innovation, Telehealth services, Healthcare access, Medicaid coverage, Commercial insurance, Public health emergencies, AI-enabled systems, Cyber-physical systems, Communication analysis, Patient journey, Telehealth awareness, Healthcare delivery, Technological companionship, Healthcare equity.*

1. Introduction

Telehealth is capturing attention as a means to improve both the accessibility and quality of healthcare delivery. Over the past 15 years, widespread adoption and use of the Internet has made it accessible through health systems for patients to solve health problems without leaving home. This is often referred to as e-health, telemedicine, telehealth, or m-health. For the elderly, these systems could have paramount importance regarding accessibility. In this context, the research purpose is to understand the acceptance and usage of telehealth services by older people. Therefore, we developed and tested a research model. The analysis is based on a model and uses the technology acceptance model to explain older users' intention to use telehealth services. The findings show that the elderly perceive usefulness and ease of use as the most relevant drivers of the intention to use telehealth services. We also tested the effects of the variables of sex, age, and education level on users' intention to adopt this service, with mixed results. The senior marketing aspects of smart-connected telehealth technology and suggestions about business development are provided. To promote the usage of telemedical services, it is

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crucial to design and develop user-friendly and intuitive tools that are very appealing to senior users' visual and cognitive capabilities.

1.1. Background of Telehealth in Medicare

Telehealth, encompassing both telemedicine and telecare, describes digitized healthcare services that offer real-time consultations with healthcare professionals, allow for the remote monitoring of vital physical conditions in patients in real-time, and provide unaccompanied care and always-on lifestyle management services for individuals and family members. The prevalence of using telehealth among various age groups rises from a level 10.6% among people under 18 years to 17.2% for those aged 18-44, 21.6% for 45-54, 28.5% for 55-64, and a very high level of 40.1% for seniors aged 65 years and older. Based on the percentage contributions of each of these age groups to the total number of U.S. people in the respective age groups, the weighted mean level of U.S. people using telehealth is 22%, and more than one billion U.S. dollars were saved by the U.S. public from avoiding direct in-person office visits. This study explores telehealth services that the U.S. federal government, specifically Medicare, has approved for coverage by Medicare Advantage plans including Special Needs Plans and Medicare-Medicaid Plans, to not only seek better supplementary care services through digital health technology but also improve the accessibility and quality of care for seniors, and see a reduction in hospital admissions and expenses. The interest is grounded in the annual CMS call letter notices within the broader development of the capitated competitive pricing model used to contract healthcare plans for Medicare enrollees. The U.S. Health and Human Services Department agency that administers Medicare has set out the rules that will be in effect for the plan year, commencing from January 1, 2; sign-up occurs through the 2022 Medicare open enrollment period from October 15 through December 7, 2022, for this private insurance option known as Medicare plan, and its enrollment has been attracting heavy buying.
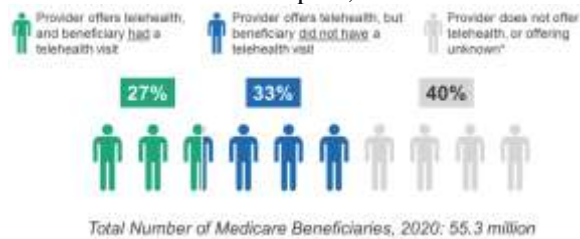

Fig 1 : Medicare and Telehealth

1.2. Significance of AI in Healthcare

Several factors make AI of particular interest and potential impact on the healthcare market in general, and especially acute in sub sectors such as senior healthcare and telehealth, both as complements and substitutes to human medical professionals. Emerging data privacy and accuracy regulations around non-medical data make AI much more valuable as a virtual telehealth assessor than increasingly low-standard alternatives. Many of the inherent risks not only in providing services at a too high level of human error but also in unrealistic expectations around human-generated levels of service, are much lower in AI services than in human provider standards. AI has unique benefits in providing non-human and large-scale services that leverage best practice protocols identified and applied at known levels of reliability across populations of patients.

Additionally, AI has something of a perfect storm of technical development that increases its accessibility and reliability today. This includes improved algorithm sources from both national governments and international corporate sectors through open-source standards and other collaboration protocols. The increased ability of non-medical data sources to substitute for sensitive patient data in typical security applications. An incredible processing capacity in the past half-decade hardware that sits well outside of the typically decades-long adoption lag of

experienced MDs during other medical quality and access changes. The increased credibility of AI systems in a wide variety of real-world settings, from playing games to detecting subtle patterns of fraud in financial markets. There is a high demand for less expensive and more reliable processes in medical care both here and internationally.

Equation 1 : Telehealth Utilization (U) in Medicare
This equation quantifies the rate of telehealth adoption and usage by Medicare beneficiaries.

$$U = \frac{T_{\text{users}}}{T_{\text{eligible}}} \times 100$$

Where:

Tusers = Number of Medicare beneficiaries using telehealth services
Teligible = Total number of Medicare beneficiaries eligible for telehealth services
U = Telehealth utilization rate (%)

2. Current State of Telehealth in Medicare Plans
Traditionally, virtual care delivery has not been a widespread option in Medicare Advantage plans. Even before the pandemic, the extent of virtual care coverage varied from plan to plan, and patients typically faced significant limitations when attempting to access remote care. Restrictions included coverage limits, high copays, and geographic limitations that require many Medicare plan members to receive care in specific and often distant locations only. Furthermore, the pandemic revealed that Medicare plan seniors were especially vulnerable to health crises and also to the strain on health systems, creating a clear market need for coverage that enables Medicare plan beneficiaries to receive timely and convenient access to medical specialists while also providing a safeguard measure for frontline health care workers.
Looking forward, future success in the Medicare plan market will hinge on the ability of health entities to keep up with the demands of the consumer-focused generation. Younger seniors have different expectations when it comes to accessing information and health care and are more likely to switch Medicare plans in search of better care. Consistent with a rating system that helps Medicare members choose health plans based on both cost and quality, the increased level of digitization required to allow people to efficiently access information and seek care virtually will be a significant point of differentiation. Providing access to virtual health care as part of the member benefits package, primarily virtual care delivery solutions such as telehealth and near-site and on-site health and wellness centers, can improve companies' digital readiness in the Medicare environment.

2.1. Overview of Medicare Coverage for Telehealth Services
In the original Medicare fee-for-service pathway, all of the clinical encounters had to take place in a physician's office in an urban setting. Allowing telecommunications to create a two-way encounter in which clinical data is collected with a secure site can be in real-time with two-way voice and video techniques and technologies. The telecommunications in that scenario are both synchronous, with the patient and physician present at the same time although not in the same room, and asynchronous, in which clinical data such as behavior monitoring is stored to be retrieved and interpreted by a person later. For many years, there was a prohibition on the provision of telehealth services through Medicare as generalized benefits for particular groups of beneficiaries. As such, the impetus that led to the provision of these types of services was to enact demonstration projects conducted by various organizations. These demonstration projects had three main objectives: 1. Research the capacity and performance of telemedicine networks for clinical use. 2. Modify policy about telehealth applications in clinical services to benefit people living in rural communities. 3. Research whether a demonstration of such

technologies can save money. In three national legislations, there was permissive authority to cover telehealth network services and developed legislation allowing a limited group of services to be covered under fee schedules. The commonality of being the standard clinical care used for the proposed telehealth services in the acute phase was significant. If there were good techniques and technologies to provide care, it would reduce the burden of traveling to major centers for service at hospitals for acutely ill patients. When complications need to be cared for, patients tend to avoid going to a local professional or can go to their home, as their medical needs leave them sick.
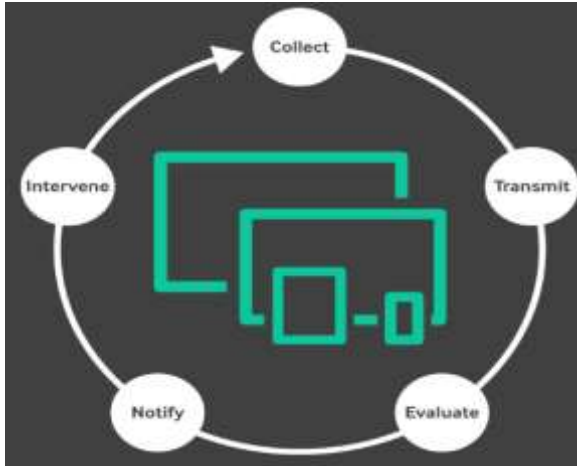

Fig 2 : The Patient Monitoring Cycle for Telehealth.

2.2. Challenges and Limitations

Some studies show increased costs and use of telehealth in general outpatient visits, with a trend from 2010 to 2017 that such an increase has continued. However, telehealth use is still significantly lower than in-person outpatient visits. Even with this trend increasing, most of the revenue growth associated with telemedicine remains concentrated in a few high-profile companies. One major barrier to broader adoption and patient utilization of telemedicine is the lack of access to the technology, with concerns about usability that may limit acceptance. Furthermore, concerns about fraud, waste, and abuse tie reimbursement to a strict set of "originating sites," only qualifying rural geographic sites as content for telehealth coverage. Similarly, coverage is dependent only on blanket support from Medicaid, lack of guidance from Medicare Advantage, and variable contractual risks based on each state's legal and regulatory framework. Other well-evident policy barriers also show tensions between state licensing and competition concerns, compacts between states, interstate licensing, and broader enabling of telehealth to meet state delivery needs.

3. The Role of AI in Enhancing Telehealth Accessibility and Quality of Care

Artificial intelligence can improve the accessibility and quality of telehealth. Medicare plans can leverage AI to assist seniors in setting up telehealth visits, ensuring proper follow-through on care treatment plans, and making intelligent, personalized care recommendations. One significant challenge for seniors in adopting telehealth is the digital divide. Artificial intelligence designed to provide low-level programming assistance that is easy for seniors to interact with effectively could significantly improve telehealth access and care quality for this high-risk population. The popular use of personal digital assistants shows that the tech-savviness of seniors can be improved with the right tools. Voice-activated control of a larger number of devices, like those typically used for senior health monitoring, could help close some of the care gaps exacerbated by COVID.

Another aspect of reduced telehealth accessibility for seniors is leveraging nuanced AI models that can effectively analyze multi-modal inputs, such as expressed patient personal semantic history and overt speech recordings. Context-specific personal history, such as past changes in disease states, may also contribute to patient self-disclosure. In many cases, a patient's spontaneous expressions of emotional change are the best signal of their overall health status. Patient states are often concealed through patients' self-disclosure heuristics that change with motivation. Anticipated patient self-disclosures are often used as predictive features for corroboration of patient verbal utterances. The properties of patient utterances are being extended through deep learning algorithms fed multimodal input related to patient states. The potential of AI, coupled with cutting-edge health monitoring sensor technologies, to bring new capabilities to the aging-in-place paradigm is also a direction ripe for exploration in our current economic and public health context. This is particularly relevant as many seniors during the pandemic have mentioned that telehealth exposes significant privacy concerns as it requires a physical space for private interactions with physicians.

Equation 2 : Patient Satisfaction (S) with Telehealth Services
This equation measures the level of patient satisfaction, which is an important factor in determining the success of telehealth services for Medicare beneficiaries.

$$S = \frac{P_{\text{satisfied}}}{P_{\text{surveyed}}} \times 100$$

*P*satisfied = Number of patients reporting satisfaction with telehealth services

*P*surveyed = Total number of patients surveyed about telehealth services

S= Patient satisfaction rate (%)

3.1. AI Applications in Telehealth

The most prominent and widely discussed applications of AI in telehealth are for image and voice recognition. Both are gaining traction within the healthcare industry. A deep learning engine performs as well as board-certified radiologists in diagnosing several pathologies such as lung cancer. Several recently launched radiology AI companies already have FDA approval for their products, which also saves time and money. The image recognition space has established players along with many new entrants. Sound recognition diagnostic applications are also gaining traction. These can, for example, diagnose ear infections in toddlers, temperature maps, or sneezing and coughing sounds to detect flu epidemics. Such applications can be used by patients or by public health officials trying to understand trends in disease incidence and management.

There are important image and sound recognition applications within a telehealth context that are in the early stages. For example, image recognition can already diagnose skin cancer and can be used in a telehealth visit to guide a patient. There are also novel applications like a medical tricorder that can determine what device is going to be used in a telehealth visit, what data is required to deliver a diagnosis, and if the right device is used. High-growth telehealth companies with pressure to deliver, seen as more real-time and customer service-oriented, are starting to explore the AI space for these applications.

Fig 3 : AI s in Telemedicine

3.2. Benefits and Opportunities

There are four major benefits of AI-enabled telehealth and RPMs in managing senior health care for CMS Advantage Plans. Reimbursement optimization. Medicare Advantage plans are reimbursed for each patient enrolled when they can ensure care, treatment, or a preventive service has been provided. AI algorithms and decision support systems can help in better documenting and reassessing the needs and risk factors of enrollees. These systems can support the plans engaging with key populations as data can be used to determine when to support telemedicine or RPM check-ins, and policy-targeted outreach efforts, and may enable improvement in coding accuracy. This type of support will be important as payers continue to face economic pressure, and leveraging their capabilities for marketing and patient engagement will be important for their growth. Asset utilization. Unlike brick-and-mortar hospitals, telemedicine service capacity is not limited by physical infrastructure. Health professionals can be assigned and flexibly redeployed on a shift basis, resulting in better utilization of labor time and high fixed-cost infrastructure assets such as buildings. Monitoring patients remotely can reduce per-patient healthcare service capacity and allow health professionals to cover a larger number of patients. Studies have shown that telehealth can reduce the use of inpatient admissions or reduce the length of hospitalization, thus freeing up acute care beds more quickly than otherwise. Reducing waiting time is beneficial for patients who are currently affected by the pandemic and other delayed healthcare services. The increased efficiency and availability of hospital spaces can also reduce emergency room crowding and improve the quality of day-to-day hospital functions when the need for sudden surge capacity arises. Some AI tools can automate the information summary and other labor-intensive work usually performed by the healthcare provider before each patient visit, allowing more efficient use of each patient's prioritization, better patient visits, and resource planning.

4. Case Studies and Best Practices

To review the current performance and best practices in virtual care among top-performing MA plans, the manuscript focuses on the top MA plans as ranked by state. We reviewed the data and the related results, aiming to identify existing telehealth services that may serve as best practices. Data includes a broad range of services often associated with digitally mature managed care organizations, including virtual care and relational connectivity services. We augmented this source with an exhaustive review of publicly available digital offerings released by the industry. This review also includes the most recent partnership entities, which often provide a comprehensive list of virtual services supported by the health plan.

To better assess the availability of plans' virtual care offerings, the data was presented by comparing the full list of virtual service offerings per health plan to the total number of benefits compensated through the plans' value share arrangement. Given the expanding role and scope of telehealth, plans that support a large diversity of regional-specific telehealth needs, frequency, and new emerging care areas will score highly. Plans providing acute care episodes or routine telehealth services attracted more points. Plans offering telehealth options and

services supporting both internal and external care connectivity services scored particularly well due to the proactive approach to promoting patients' social connectivity.

4.1. Successful Implementation of AI-Driven Telehealth Programs

Table 1: Performance Considerations

Raise plan member awareness of new telehealth options. Include demos and testimonials, brochures, supplementary educational mailings, and live and email-based customer service. Involve members with AI buzz by including AI-driven telehealth services in plan TV and portal messages. Listen to member feedback and continuously optimize their enrollment, service access, operation, and UI/UX experiences.

Run pilots to gauge plan member interest, operational requirements, and costs, as well as immediate and longer-term impacts. Use quality-focused pilot feedback to design the most desirable, sustainable telehealth-fueled high-trust care programs, providing these to leading plans for early adopters to stimulate their decision to include these programs aimed at mid-year and next-benefit year groups.
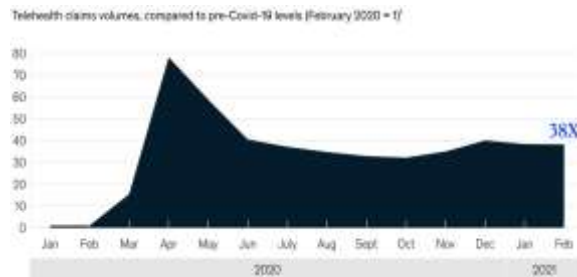

Fig 4 : Growth in Telehealth Usage Peaked During April 2020 but has Since Stabilized

Strategically close telehealth sessions to the questions upcoming in follow-up AI doctor or health coach chats. Enable access to conclusions, and post-session notes, along with links to watch topic videos, visit supplier/partner URLs, and have inexpensive needed tests done at local community partner clinics.

Leverage every major critical illness diagnosis onto specially bound, continuous, 360-degree recovery telehealth arcs. Assist in creating pre- and post-surgery behavior, nutrition, and activity best practices, ensuring planning, adjustment, and recovery meet the latest personalized treatment guidelines.

5. Future Directions and Recommendations

Our empirical scoping study implies that the telehealth regulatory landscape of Medicare Advantage plans could hold significant potential value for senior care with increased and emerging responsiveness of the digital health ecosystem. Coupled with the growth in the adoption of AI-based healthcare services by payer organizations, AI-augmented telehealth services have demonstrated success in reducing costs, expanding access, and lowering the threshold of care technology. By situating the technology between remote intervention and fitting remote care into the new normal, observing the suboptimal healthcare distortion technology, AI-augmented telehealth generates added value from specialized and remote resources while minimizing the influence of information mediators on the result. Increasingly customized for specific care conditions, AI-enabled telehealth services maximize the precision of diagnostic services, expand verified access, streamline healthcare system operations, and improve clinical decision-making that largely benefits participants in Programs of All-Inclusive Care for the Elderly services and the home care coordination strategy of Dual Special Needs Plans. As payer organizations increasingly encourage consumers to stay on top of their

medical conditions, navigate the 'silver tsunami', and enhance their health, the scope of the AI multiplexity of the Medicare Plan's supplementary benefits package becomes more extensive with AI-enabled remote care management.

Equation 3 : AI Efficiency in Care (AIC)

This equation quantifies how much AI contributes to overall efficiency improvements in care delivery, based on specific AI tools like predictive analytics, virtual assistants, or monitoring devices.

$$AIC = \frac{AI\ Efficiency\ Factor}{Traditional\ Care\ Efficiency} \times 100$$ Where:

AI Efficiency Factor = Quantitative measure of AI contribution to faster diagnoses, better management, or fewer misdiagnoses

Traditional Care Efficiency = Efficiency in care delivery without AI support

AIC = AI efficiency improvement percentage

5.1. Policy Implications

In addition to analyzing the effect of telehealth-delivering insurers, we also provide an estimate of the potential gains from additional policy measures to encourage insurers' adoption of telehealth across the nation and insightful evidence for the prominent role of telehealth as a significant technology supporting AI-driven industry. Given the purported benefit of telehealth adopted by AI-driven insurers, it is important to estimate the potential gains and discuss the policy implications of the findings. For simplicity, we work with the county and split different insurers' market shares, assuming these insurers will be able to attain all the prestige of other insurers as they achieve the maximum share in a given market. We counterfactually mimic each non-AI-driven insurer being able to deliver telehealth.
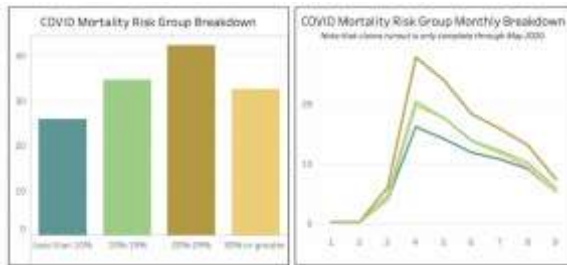

Fig 5 : percent of beneficiaries Using Telehealth, by COVID Mortality Risk Cohort, 2020

5.2. Potential Research Areas

Research can build upon the Medicare FFS policy validation of the selected telehealth services. PTAC and the General Accountability Office are in the process of researching the accessibility and utilization of these telehealth services to support CMS. Additionally, the Center for Medicare & Medicaid Innovation seeks to test innovative payment and service delivery models for health care that deliver better value. Research studies of these tests may be useful in assessing the effectiveness of alternative payment models. In addition, other CMS programs such as Rural Health Clinics and Federally Qualified Health Centers provide services for telehealth.

Telehealth has demonstrated the potential to be an alternative care model for seniors, as evident in many validated tools and anecdotal evidence. It is essential to bring awareness and

acceptance to seniors by providing financial and technological support. This research highlights the benefits of directing CMS to promote telehealth services for its beneficiaries on a regulatory level. Private insurance companies need to eliminate telemedicine cost-sharing; this will largely reduce senior confusion between "telehealth as a service" and "as their pocket expenditure." This will benefit seniors by encouraging them to disclose their mental health issues and support the necessary therapy. It also benefits service providers by allowing them to attain the essential resources and extend telehealth services at seniors' requests.

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