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Tele-health in the United States and Singapore: A Reassessment after SARS-CoV-2

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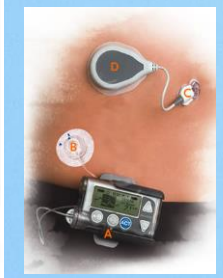
Presentation Outline

What is the value proposition of Tele-Health?

What are the obstacles and challenges to adoption of Tele-Health prior to SARS-Cov-2 (Covid-19) in the U.S.?

How has SARS-Cov-2 affected the uptake of Tele-Health in the U.S. and Singapore

Has the SARS-CoV-2 pandemic has provided the conduit to bridge the gap between theory and practice in Singapore.



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Tele-Health in the U.S. Pre-covid 19

- Telehealth and telemedicine had been in use decades before the COVID-19 pandemic
- Before 2020, telehealth accounted for only 1% of health care claims but it reached a peak of almost 80% of claims in April 2020
- Limited deployment of projects, usually small case.
- Value proposition for use however, was high.
- Cost-benefit studies have been limited in scope
- Reimbursement by Medicare has been extremely limited

Value Proposition

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Chronic Disease Management

Diabetes: Appropriate disease management is critical

Pennsylvania Tele-home Project (171 patients)

Traditional Care Per patient	Remote Monitoring Care per patient	Savings/Patient
$232, 872	$87,327	$145, 500

Estimated 9% of 1.5 million persons in U.S. State and Federal prisons.

- Improvements in glycemic, blood pressure and lipid control with tele-visits

Value Proposition

Chronic Disease Management

- Enables monitoring of indicators of human health condition, such as blood pressure.
  - *Hypertension tends to lead to coronary heart disease, apoplexy and nephropathy. 45% of hypertension patients die from cardiovascular disease*
  - *Hypertension patients are 8 times higher that normal people to get apoplexy.*
  - Allows "aging in place."
  - *95% of older adults surveyed prefer to live in their own homes as long as possible*

HealthPAL

Value Proposition

Cost of Inpatient Care (per patient per month) Compared to Home Care for Select Conditions			
Conditions	Hospital Costs	Home Care Costs	Dollar savings
Low birth weight	$26,190	$330	$25,860
Ventilator-dependent adults	$21,570	$7,050	$14,520
Oxygen-dependent children	$12,090	$5,250	$6,840
Chemotherapy for children with cancer	$68,870	$55,950	$13,920
Congestive heart failure in the elderly	$1,758	$1,605	$153
Intravenous antibiotic therapy for cellulitis, Osteomyelitis, others	$12,510	$4,650	$7,860

Source: National Association of Home Care & Hospice, 2010

Value Proposition

Effective and useful when geography, distance terrain, climate or other physical barriers, and climate has prevented or hindered direct contact between patient and clinician

Savings can be achieved from the reduced costs of patient care, in the U.S. Health and other national health systems through

i) better chronic disease management (COPD, CHF, Diabetes, Hypertension)

ii) reduction in both travel and time for patients and doctors;

iii) from the provision of better health care, generating cost reductions from increased monitoring and early diagnosis of chronic diseases

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Chronic Disease Management
Value Proposition

- 51% of Adults with Chronic Disease Go Online
- The top 4 chronic diseases collectively cost $969 Billion and affect over 152 million Americans per year

Illness Categories	Device or Peripherals
Cardiology, such as hypertension, CHF and stroke	Blood pressure monitor, weight scale, digital electronic stethoscope
Respiratory disease, such as asthma, and COPD	Peak flow meter, monitor, weight scale, digital stethoscope, digital spirometer
Diabetes and wellness	Blood glucose monitor, weight scale
Post-acute recovery, such as wound care, post-surgical and organ transplant	Video camera or image-capturing devices
Mental health, such as chronic depression and schizophrenia	Video camera for live interactive sessions

Source: Pew Internet and American Life Project (various years), Advanced Medical Technology Association

Value Proposition

Studies have shown that the implementation and expansion of telestroke-networks over the past few years has improved access to stroke experts for patients living in rural areas

Stroke is a leading cause of death and disability worldwide.

Over 795,000 strokes occur in the U.S. every year or basically one person experiences a stroke every 40 seconds.

Case: Medical University of South Carolina (MUSC)

The Medical University of South Carolina (MUSC) established a dedicated teleneurology network as an ancillary network to its established telestroke network to provide care to patients with on-acute strokes, post tPA and non-mechanical thrombectomy patients

Patients who presented after the establishment of the teleneurology network were less likely to be transferred to the hub.

The total cost reduction for each patient that was able to avoid transfer was about $4,997

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Organizing Structure and Eco-system

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Mental health conditions (MHCs) affect 44.7 million adults in the U.S. and it is reported that one in five adults experience an MHC in a given year.

A large retrospective case study found that adoption of TeleMental Health was significantly lower than general tele-health in acute care hospitals. However, adoption was significantly higher:

i) In the Veteran Administration Medical Centers (VAMCs) and facilities.

ii) Facilities treating patients insured by Medicare, VHA, and private payers. Facilities treating elderly patients were more likely to have TMH as compared with those who did not.

iii) In states with a higher percentage of rural counties. Higher telehealth/TMH adoption in rural areas might be a result of financial incentives provided by federal and foundation funding that focuses on rural health.

iv) In mental health facilities located in states that had a special application process for licensure for providing interstate tele-health services (twice as likely to have TMH than those in states without specific licensure requirements).

Challenges to Deployment

Organizing Structure and Eco-system

- Multiple Federal regulatory agencies, up to twelve, have oversight on specific aspects (DEA, FDA, FCC, etc) of home-health
- States regulate health related issues within own borders. Multiple and different legal definitions between states.
- Telemedicine defined as “bringing doctor to the patient” as opposed to “patient to the doctor.”
- The technical complexity in the delivery of e-health services requires the active participation of network service providers. Network service providers also offer the advantage of being able to set and/or establish standards and protocols
- Formal partnerships are a pre-requisite with a “key-stone” player taking the lead

Challenges to Deployment

Cost Structure

- Current cost-benefit studies are limited in scope
- Most studies are small and involve samples of between 30 to 450.
- Need for comprehensive and extensive studies of savings to patients/health care providers due to early detection of diseases as well as health maintenance
- Reimbursement by Medicare has been extremely limited
- New comprehensive revenue and payments models need to be developed

Tele-Health in the United States Post-Covid-19

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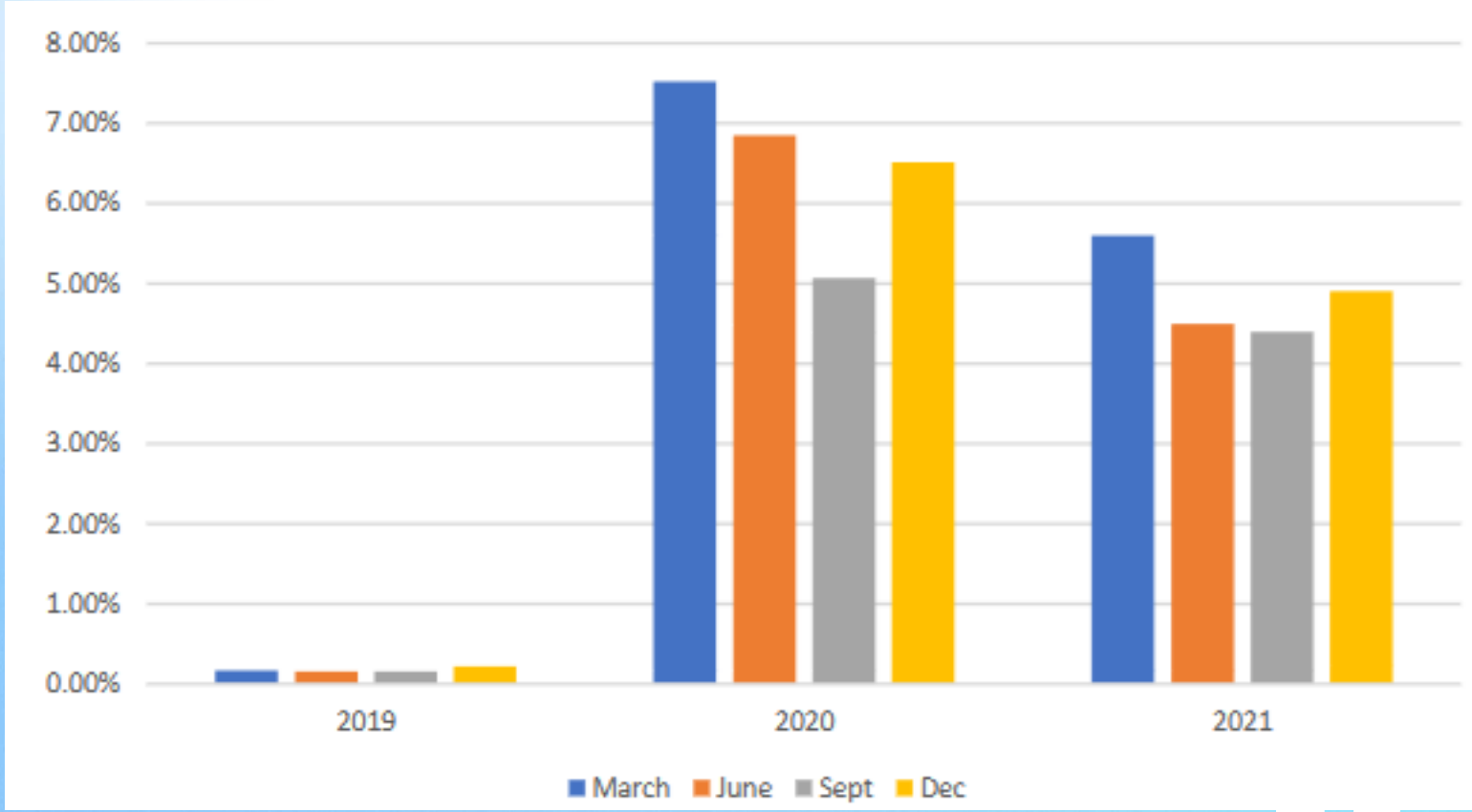
Telehealth claims (as a percentage of all claims) in the United States from 2019 to 2021



Source: Shaver, "The State of Telehealth Before and After the COVID19 Pandemic."

During the COVID-19 pandemic, several temporary waivers were introduced in the U.S. to expand the use of telemedicine and ensure patients could access healthcare while minimizing the risk of virus transmission. Some key waivers included:

1. **Medicare Telehealth Expansion**:
    - **Geographic and Site Restrictions**: Medicare temporarily waived the requirement that patients must live in rural areas and receive telehealth services at specified sites, allowing services to be provided from patients' homes.
    - **Eligible Providers**: The list of providers eligible to offer telehealth services was expanded to include a broader range of practitioners like therapists and counselors.
    - **Reimbursement Parity**: Medicare reimbursed telehealth services at the same rate as in-person visits.
2. **HIPAA Flexibility**:
    - The Department of Health and Human Services (HHS) relaxed enforcement of HIPAA regulations, allowing providers to use platforms like Zoom, Skype, and FaceTime to offer telehealth services, even if those platforms were not fully compliant with HIPAA.

1. **State Licensure Waivers**:
    - Many states waived licensure requirements to allow out-of-state healthcare providers to offer telehealth services to their residents.
2. **Controlled Substances Prescribing**:
    - The Drug Enforcement Administration (DEA) temporarily allowed the prescribing of controlled substances via telehealth without an in-person visit, provided certain conditions were met.
3. **Private Insurance**:
    - Many private insurers voluntarily expanded telehealth coverage and waived cost-sharing for telehealth visits.

Comparison of Centers for Medicare & Medicaid Services telehealth regulations before and after March 2020

Before March 2020	After CARES Act and CMS 1135 Waiver
Who can perform and receive telehealth	
Only certain licensed providers	Any type of clinician can bill for Medicare services
Patients and providers who have a preexisting relationship	No preexisting relationship will be required
Where can telehealth be done	
Only at prespecified sites (ie, designated rural areas, certain medical facilities)	Telehealth may originate and be conducted from any site, including patient's home
Physicians must conduct telehealth from their place of practice	Physicians may conduct telehealth from home
Telehealth may not cross state lines	Telehealth can now be provided to patient in another state (state-specific restrictions may still apply)
What must be used for telehealth visits	
Must be audio-visual (ie, video technology)	Audio-visual OR audio-only are allowed
Only approved technology platforms	Expanded approved platforms, including FaceTime, Skype, and Zoom
How is telehealth reimbursed	
Medicare coinsurance and deductibles apply to telehealth visits	Providers may waive cost-sharing for telehealth paid for by federal programs
Reimbursements for telehealth services is lower than for in-person services	All telehealth visits, including audio-only, will be reimbursed as if the service was furnished in person

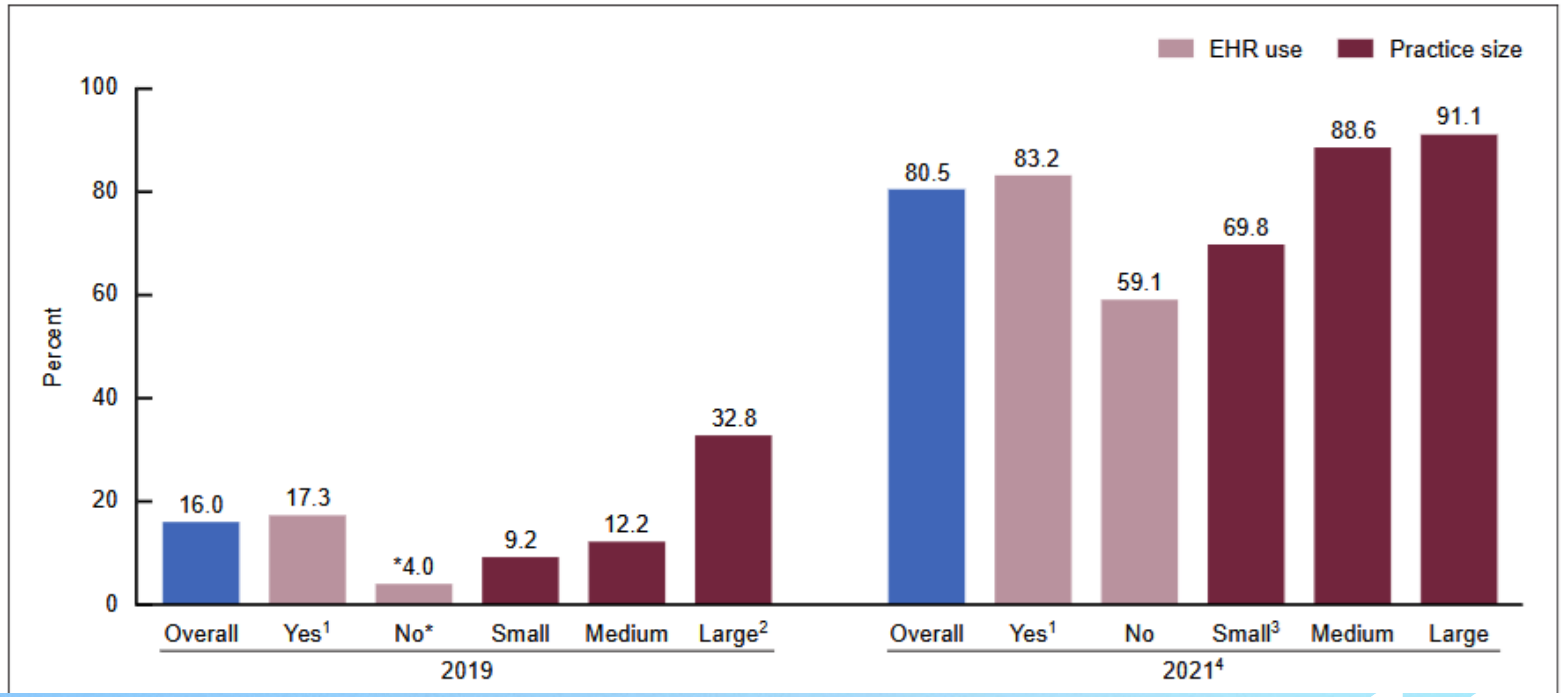
Source: Shaver, "The State of Telehealth Before and After the COVID19 Pandemic."

Changes in payment policies during COVID-19

- Location: Geographic restrictions including the distance between the provider and the patient as well as types of locations each could be at for patients or providers were removed.
- Eligible providers: All health care providers who are eligible to bill Medicare can bill for telemedicine services, including Federally Qualified Health Centers and Rural Health Clinics.
- Eligible services: This includes E&M codes both for new and established patients, as well as other services that were restricted from use by telemedicine before COVID-19.
- Cost-sharing: Providers can reduce or waive patient cost-sharing (copayments and deductibles) for telemedicine visits.
- Licensing: Providers can provide services outside their state of enrollment.
- Modality: Some telemedicine services could now be provided using a telephone

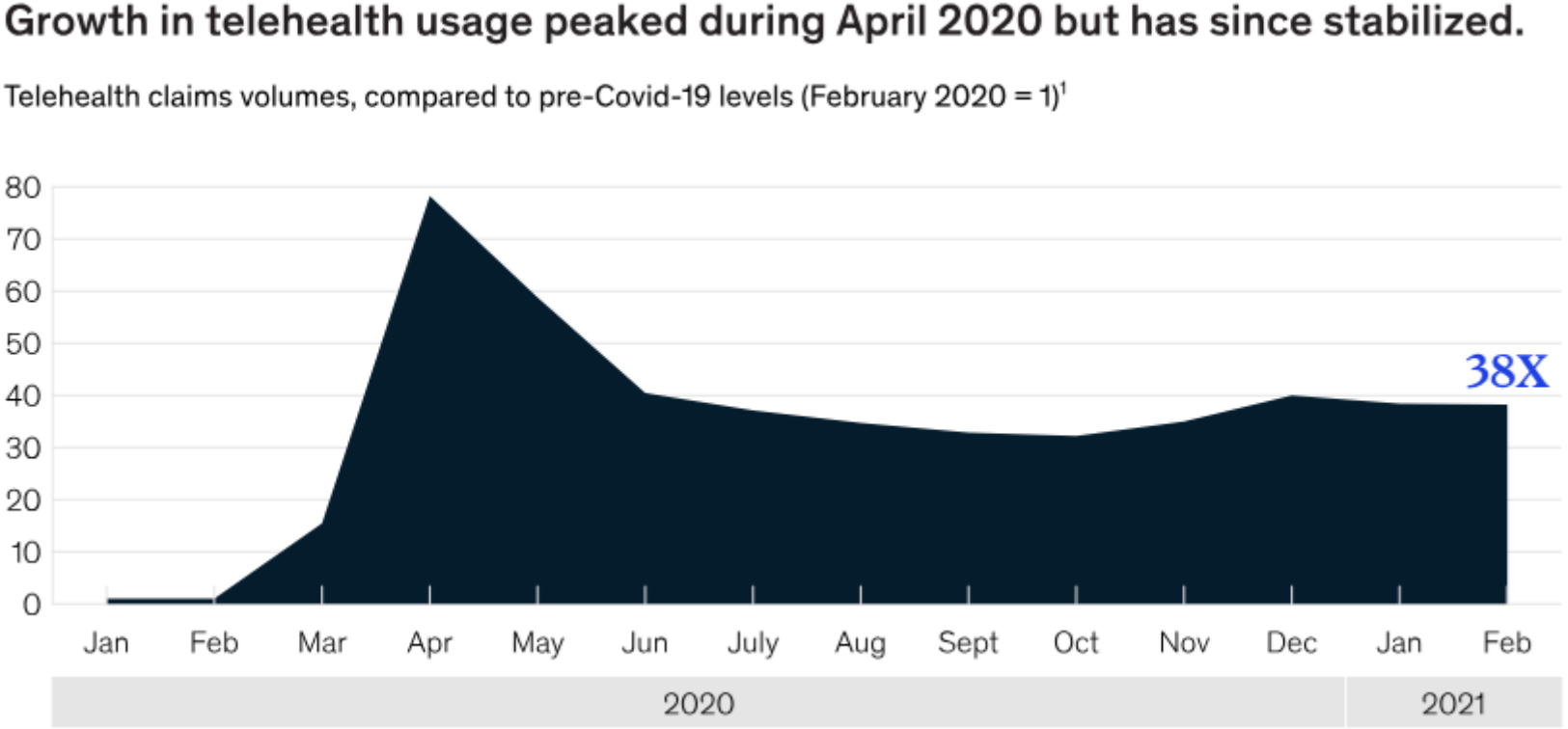
Tele-Health Usage

Percentage of physicians in office-based settings that used telemedicine with video for patient care, overall and by selected characteristics: United States, 2019 and 2021



Source: National Centers for Health Statistics

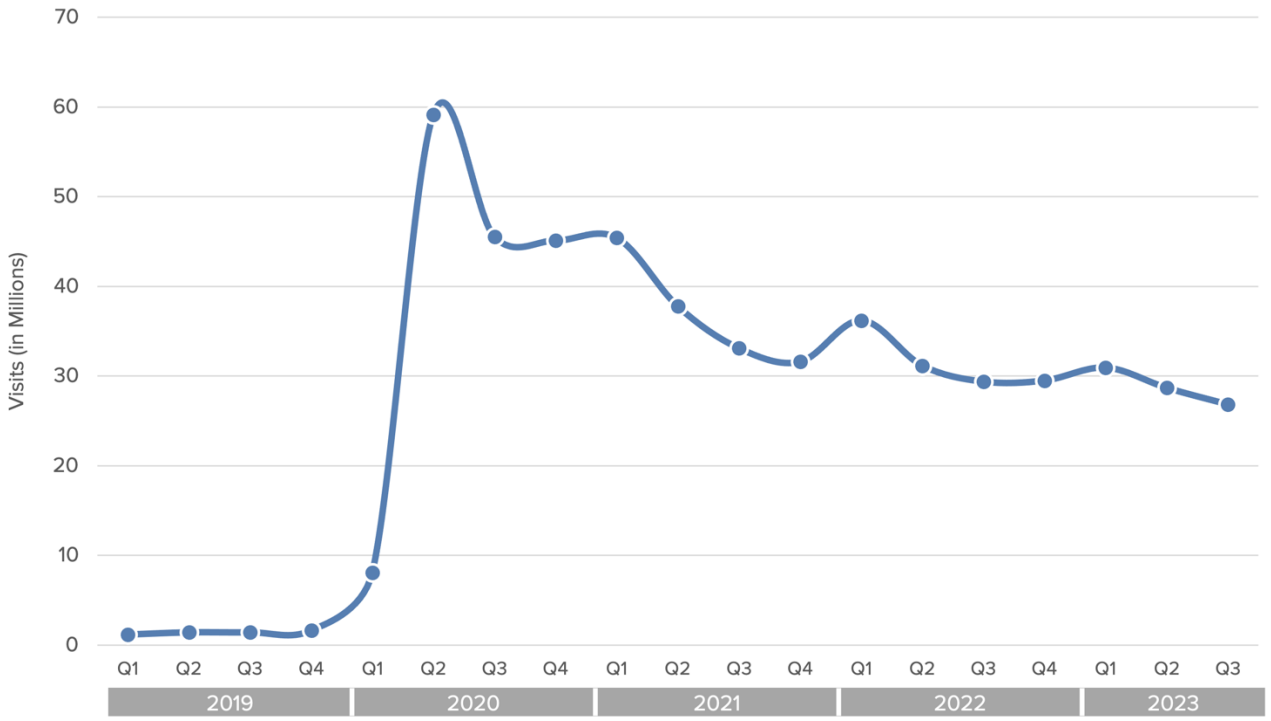
Tele-Health Usage



Mckinsey: https://www.mckinsey.com/industries/healthcare/our-insights/telehealth-a-quarter-trillion-dollar-post-covid-19-reality

Tele-Health Usage

Utilization of telehealth peaked in Q2 2020. Since then, volumes declined or plateaued quarter-over-quarter, except for an increase from Q4 2021 to Q1 2022 (Figure 1).

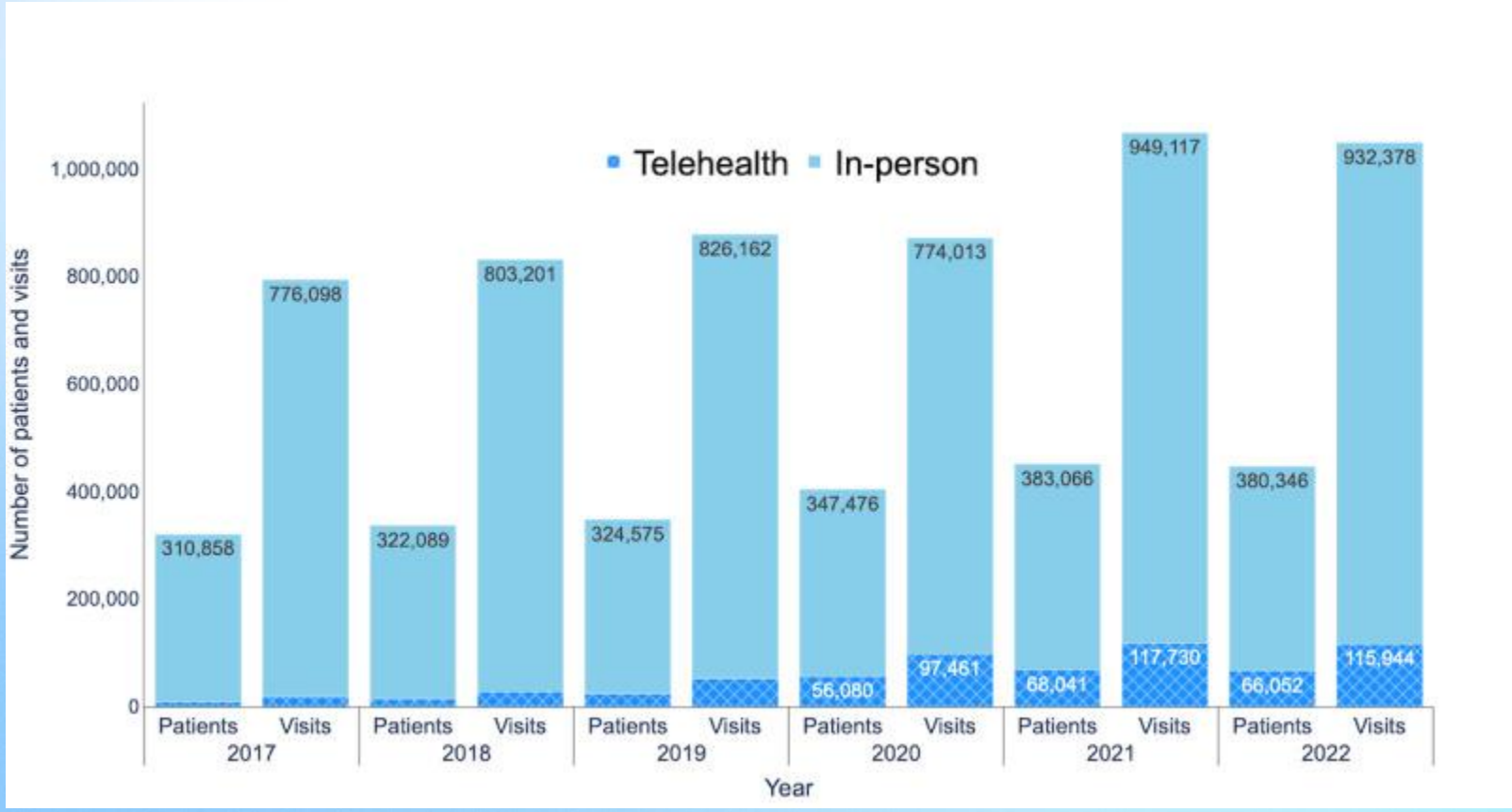


Source: Trilliant Health national all-payer claims database.

trilliant health

https://www.trillianthealth.com/market-research/studies/telehealth-demand-an-update-four-years-after-the-onset-of-the-covid-19-pandemic

Tele-Health Usage



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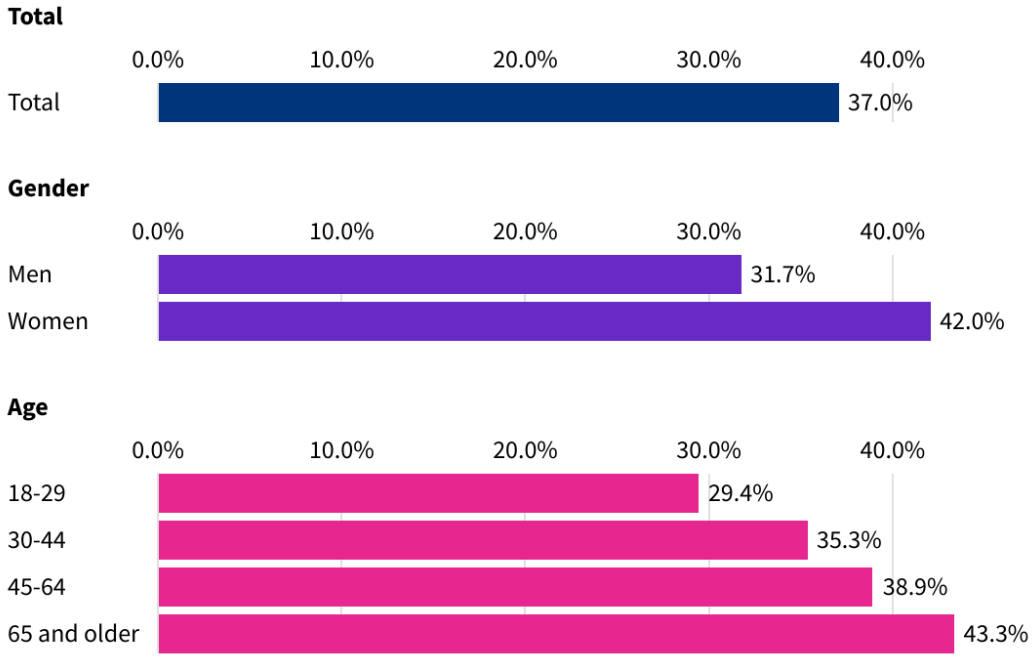
In 2021, telemedicine was more commonly used by women and older Americans.

Percentage of US adults ages 18 and over who used telemedicine in the past 12 months, by sex and age, 2021



Telemedicine use is defined as an appointment with a doctor, nurse, or other health professional by video or phone. Estimates are based on household interviews of a sample of the U.S. civilian noninstitutionalized population.

Source: National Center for Health Statistics

USAFACTS

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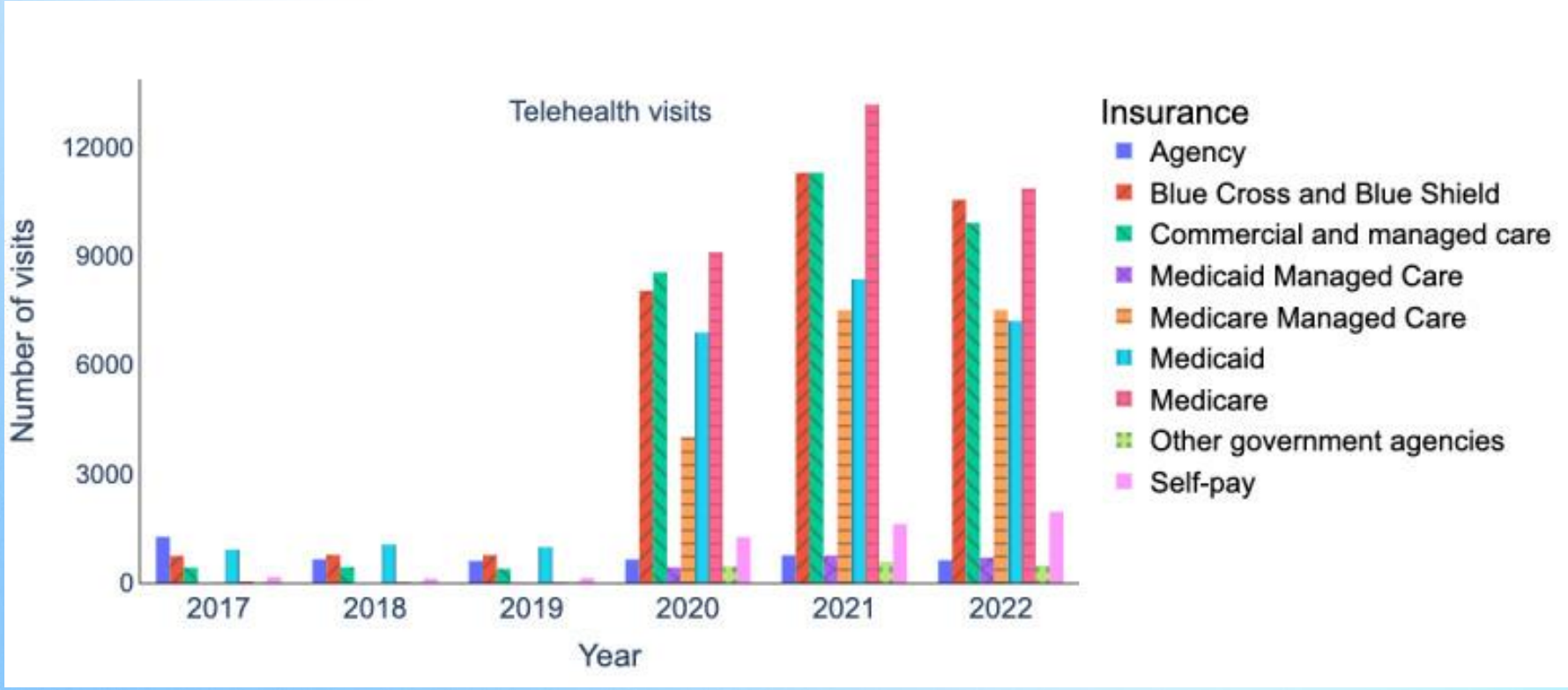
Tele-Health Usage



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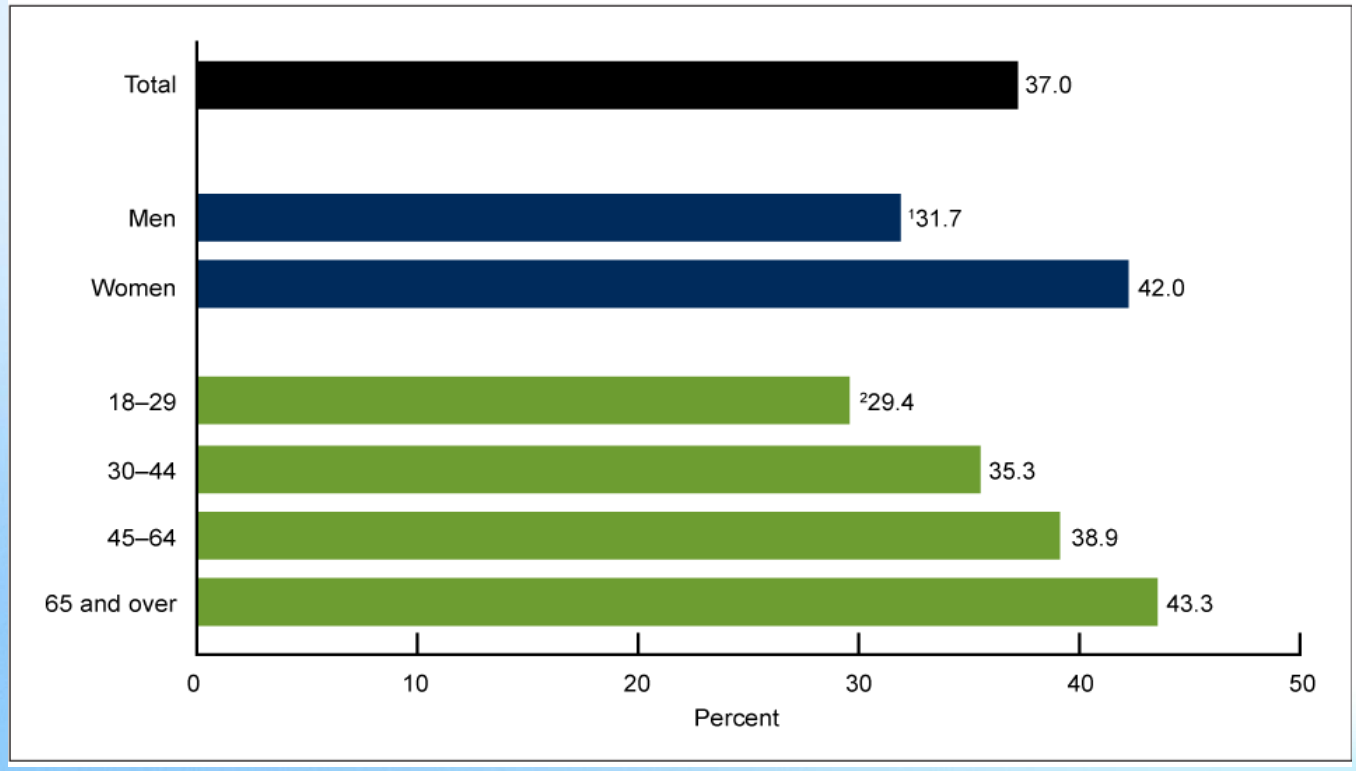
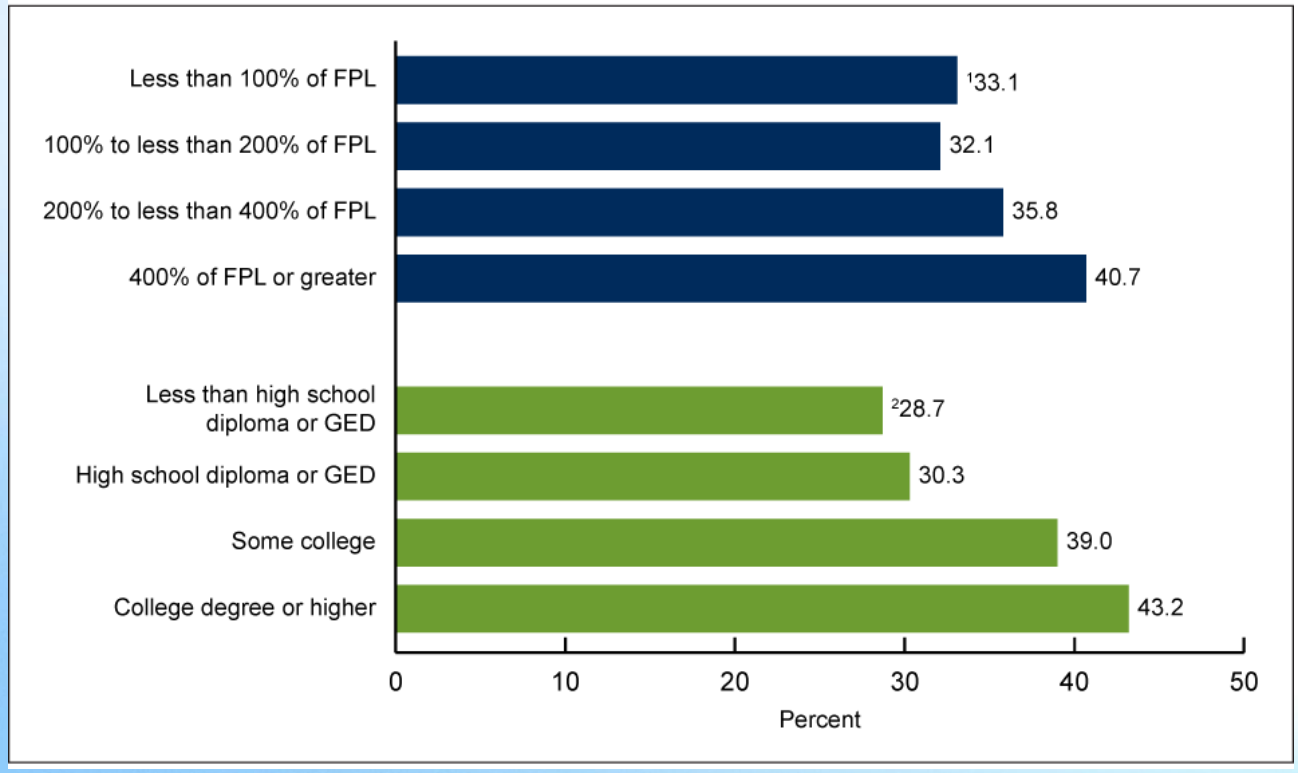
Percentage of adults aged 18 and over who used telemedicine in the past 12 months, by sex and age: United States, 2021



SOURCE: National Center for Health Statistics, National Health Interview Survey, 2021.

Percentage of adults aged 18 and over who used telemedicine in the past 12 months, by family income and education level: United States, 2021



SOURCE: National Center for Health Statistics, National Health Interview Survey, 2021.

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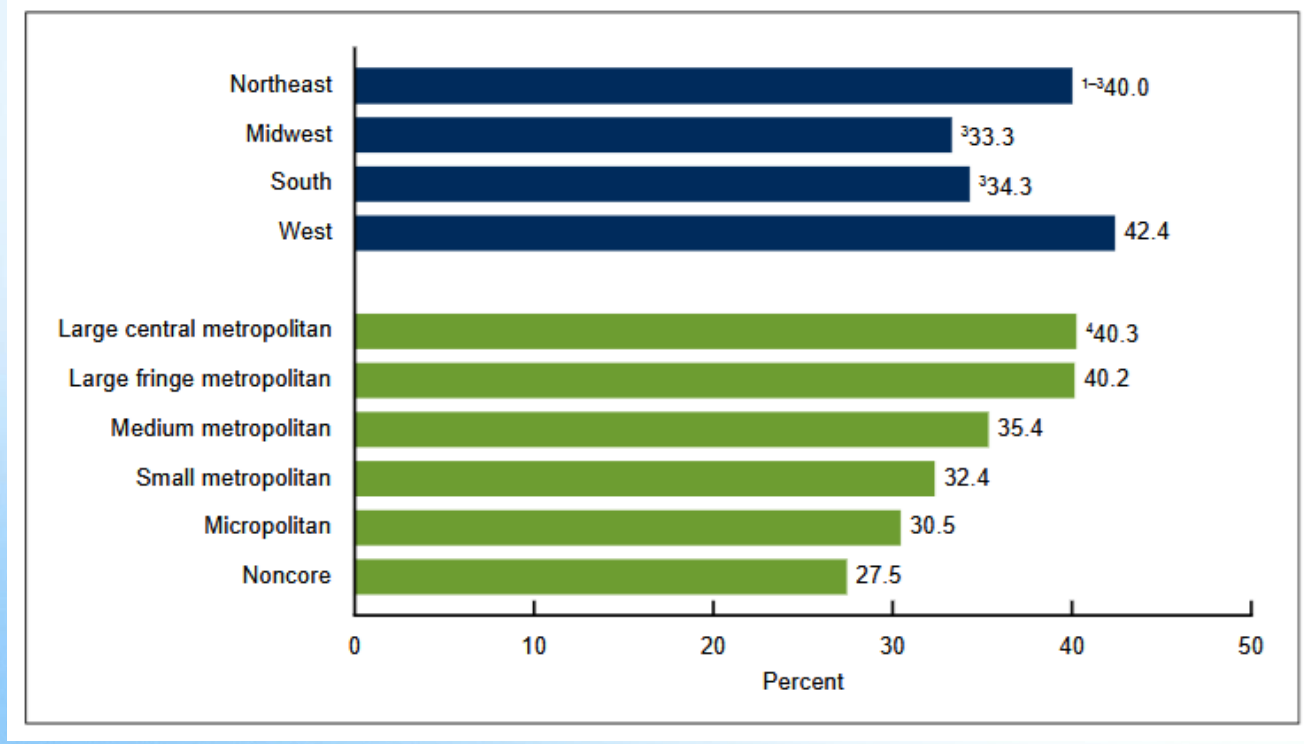
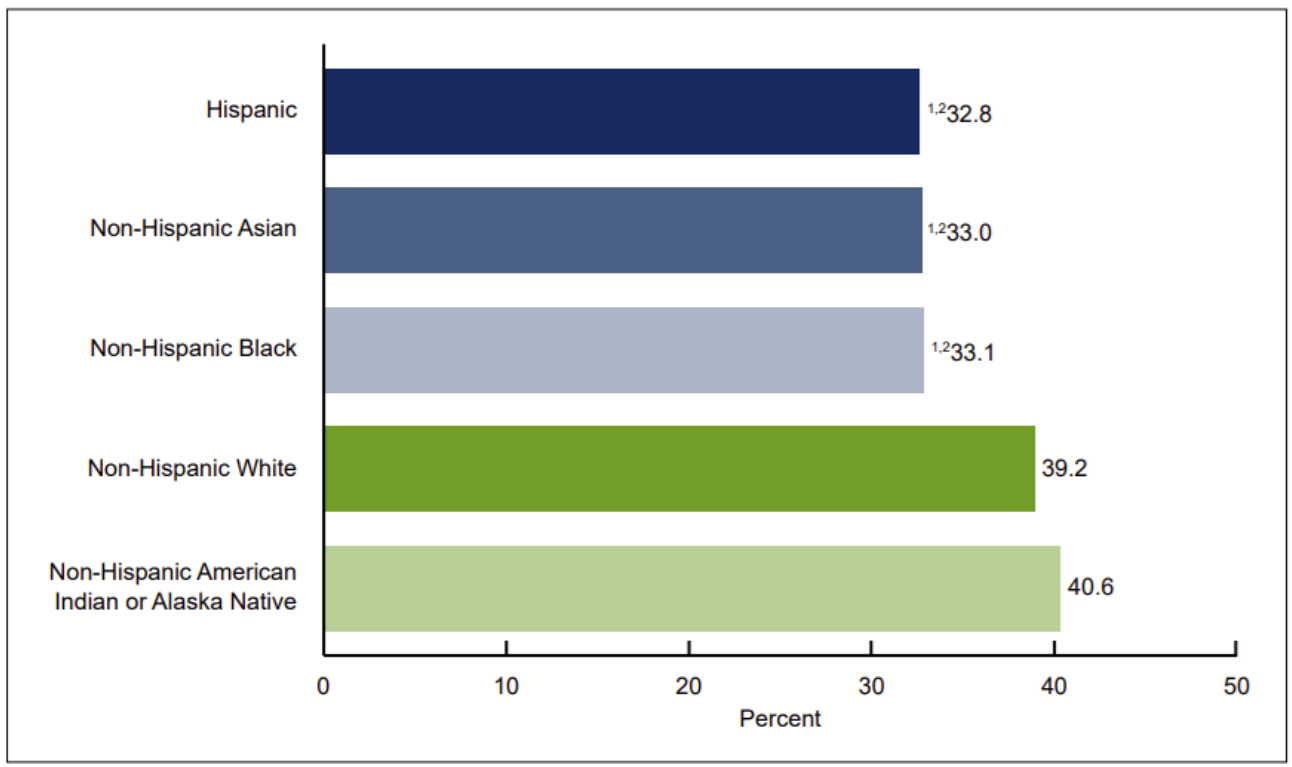
Percentage of adults aged 18 and over who used telemedicine in the past 12 months, by region and urbanization level: United States, 2021



SOURCE: National Center for Health Statistics, National Health Interview Survey, 2021.

Percentage of adults aged 18 and over who used telemedicine in the past 12 months, by race and Hispanic origin: United States, 2021



SOURCE: National Center for Health Statistics, National Health Interview Survey, 2021.

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ArCare and TerrosHealth

- In the U.S. Health systems' use of telehealth changed significantly starting in March 2020.

- Growing interest in use of telehealth services and easy access to them, coupled with widespread cardiovascular disease (CVD) risk factors in the US, indicated a need to rapidly produce evidence-based telehealth interventions focused on high blood pressure.

- CDC's Division for Heart Disease and Stroke (DHDSP) needed
- to rapidly produce evidence-based telehealth interventions focused on high blood pressure.

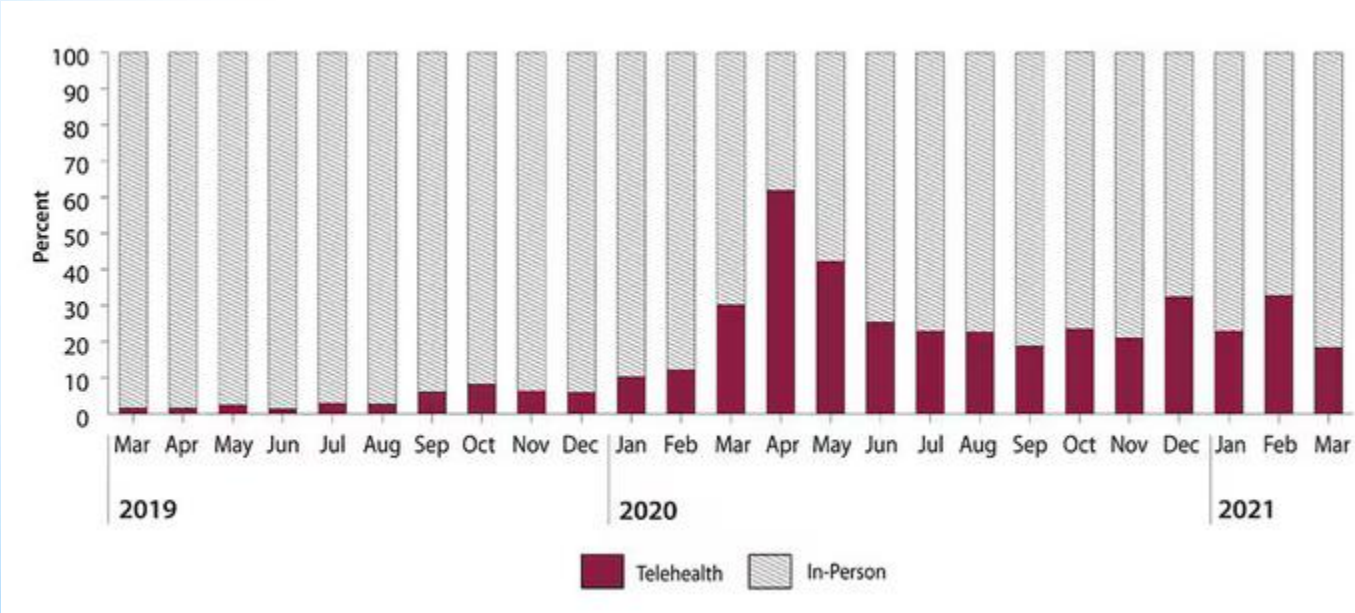
Covid-19 Case-Study: ArCare, Arkansas

Federally Qualified Health Center (FQHC) headquartered in Augusta, Arkansas, Arcare provides primary care, chronic disease management, behavioral health, and pediatric services at 48 clinics. Within its network, 17 clinics serve rural, medically underserved counties in Arkansas, Kentucky, and Mississippi.

ARcare began providing telehealth in 2018, using technology to connect clinicians with patients in satellite clinical or community sites. In March 2020, at the start of the COVID-19 pandemic, ARcare rapidly increased the scale of its telehealth services to accommodate patients' needs and to address access to care.

Source: Centers for Disease Control: https://www.cdc.gov/high-blood-pressure/php/data-research/telehealth-strategies/index.html

Covid-19 Case-Study: ArCare, Arkansas



From March 2019 – February 2020, there were a total of 9,904 encounters among patients with high blood pressure or high cholesterol, of which 5% occurred via telehealth.

Following telehealth expansion, from March 2020 to March 2021, there were a total of 9,086 encounters of which 30% occurred via telehealth. The proportion of telehealth visits peaked in April 2020 (60%) and remained greater than 18% of all monthly visits through March 2021

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Covid-19 Case-Study: ArCare, Arkansas

Barriers:

- Older adult patients were more resistant to using telehealth or lacked the necessary skills to use telehealth technologies.

- Some patients experienced barriers to accessing care via telehealth that were attributed to unreliable broadband internet access in rural areas.

Facilitators:

- Telehealth reduced no-show rates, increased medication adherence, and increased patient reach.

- Health care professionals perceived that telehealth helped some patients overcome transportation barriers that had previously limited their access to health care.

Covid-19 Case-Study: Terros Health, Arizona

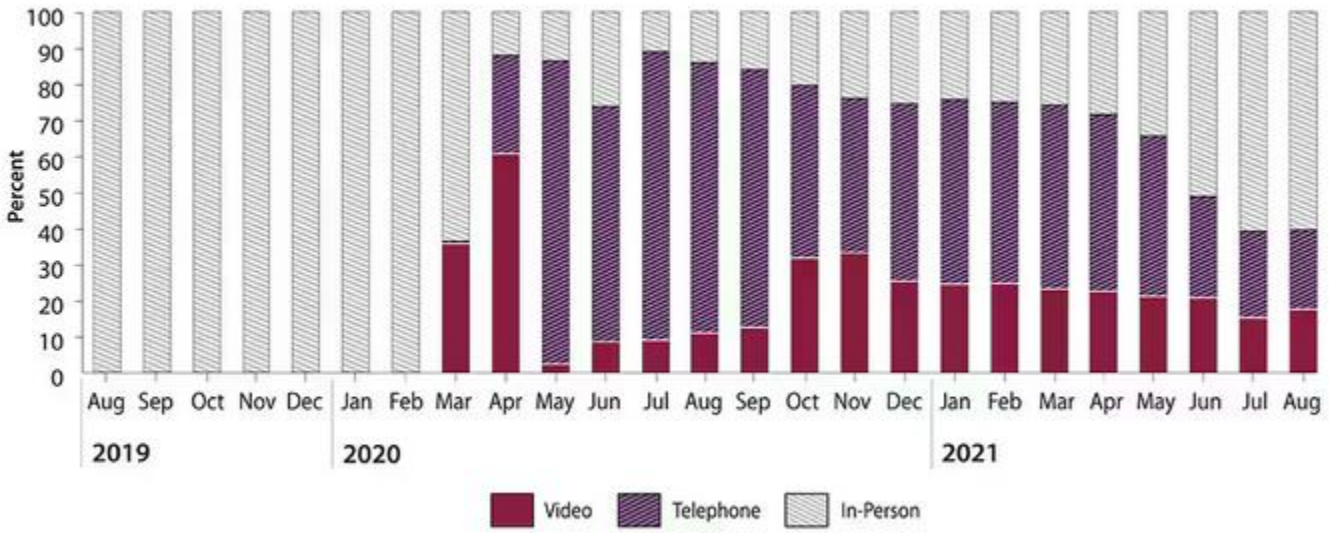
Headquartered in Maricopa County, Arizona, and provides primary care, chronic disease management, and trauma-informed behavioral health services. They have 13 locations, including four FQHCs.

Prior to March 2020, Terros Health exclusively provided in-person health care services through their four FQHC primary care clinics.

In March 2020, Terros rapidly adopted telehealth services to continue providing health care while minimizing in-person visits.

Source: Centers for Disease Control: https://www.cdc.gov/high-blood-pressure/php/data-research/telehealth-strategies/index.html

Covid-19 Case-Study: Terros Health, Arizona



From March 2019 to August 2021, there were 10,287 clinic visits; 58.9% (n= 6,063) occurred in person and 41.0% occurred by telehealth using video call or telephone.

The evaluation assessed aggregate changes in blood pressure control rates among patients with a diagnosis of high blood pressure who sought telehealth services during March 2019 and March 2021 and found

There were no statistically significant differences in blood pressure control between the baseline period (53.4%, March 2019–February 2020) and following the rapid expansion of telehealth services during the COVID-19 pandemic

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Covid-19 Case-Study: Terros Health, Arizona

Barriers:

- Broadband internet access, homelessness, and patient-preferred language were barriers for patients accessing care through telehealth.
- Reported differences in telehealth adoption according to patient's race and ethnicity.

Facilitators:

- Reduced no-show rates, allowed patients to continue health care, and ensured patients kept taking their medicines during the pandemic.
- Increased the amount of people using health care services, specifically among patients who could not take time off work or needed to find childcare coverage for an in-person appointment.
- Helped patients overcome transportation barriers that limited access to in-person health care.
- There were a substantial number of missing blood pressure readings differing significantly by type of clinic—in-person, video call, or telephone. From March 2019 to August 2021, more than 85% of blood pressure readings were missing for all telehealth visits, while only 8% of blood pressure readings were missing for in-person visits.

Tele-Health in Singapore Pre-Covid-19

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Value Proposition

Chronic Disease Management

Changi Hospital Heart Failure Telehealth program in Singapore

- *Total cost of heart failure-related care for each patient dropped by 42%* (S$ 2,514)
- *Length of stay for heart failure related readmissions shortened by 67% (2.2 days vs 6.7 days)*
- 93% of the respondents in the telemonitoring group felt that they were more involved in their own care.

Source: https://www.philips.com.sg/a-w/about/news/archive/standard/news/press/2018/20180125-telehealth-program-by-changi-general-hospital-and-philips-empowers-heart-failure-patients.html

Value Proposition

Teleophthalmology and Diabetic Retinopathy in Singapore

Telemedicine-based diabetic retinopathy (DR) screening model had significantly lower costs (total cost savings of S$173 per person) while generating similar quality-adjusted life-years (QALYs) compared with the physician-based model

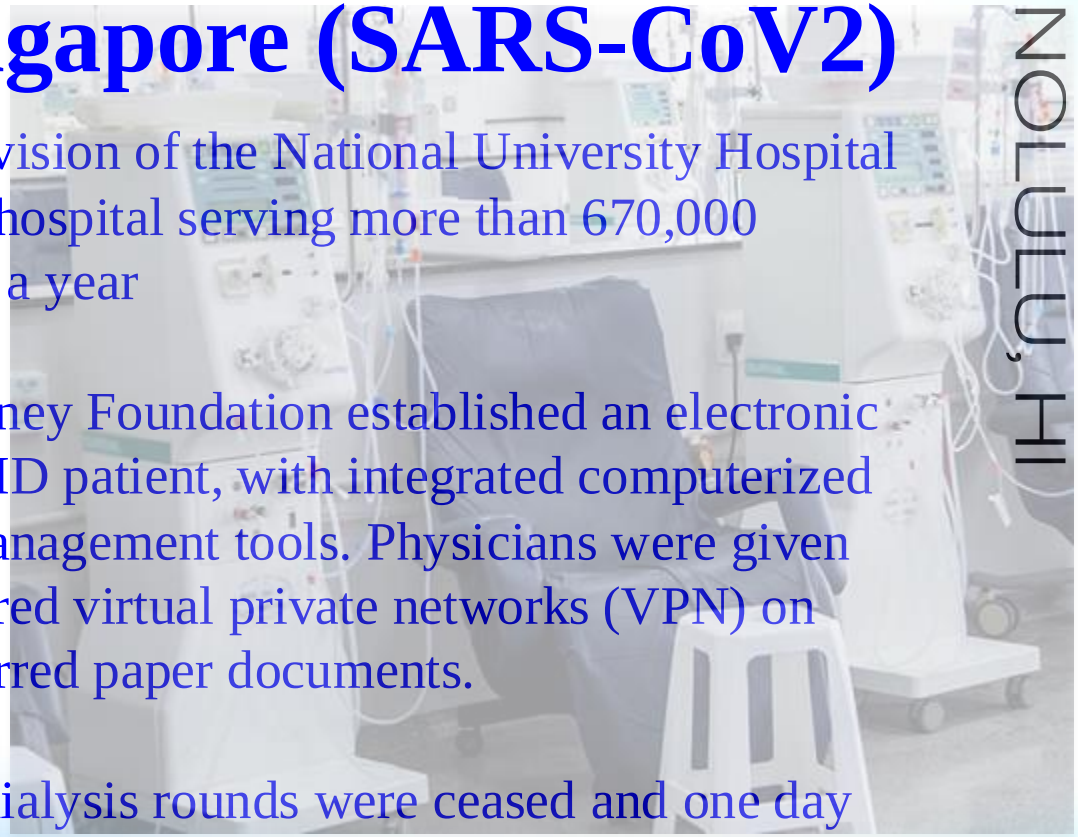
From the health system perspective that includes only direct medical costs, the cost savings are S$144 per person.

Present value of future cost savings associated with the telemedicine-based model is estimated to be S$29.4 million over a lifetime horizon.

Tele-health in Singapore prior to SARS-CoV2

- In the past, telemedicine was employed for review consult cases which were stable, where physical checks and tests were not required, and where patients had access to the appropriate devices and connectivity.
- The initial pilots were for disciplines such as mental health, renal medicine, pharmacy, epilepsy, and dementia.
- Only 1,947 patients used the service between 2017 and the start of 2020

Tele-health in Singapore (SARS-CoV2)



In Singapore, the Nephrology Division of the National University Hospital (NUH) with a 1,160-bed tertiary hospital serving more than 670,000 outpatients and 49,000 inpatients a year

In November 2018, National Kidney Foundation established an electronic medical record (EMR) for each HD patient, with integrated computerized physician order entry and task management tools. Physicians were given remote access via password-secured virtual private networks (VPN) on tablet computers, but many preferred paper documents.

On February 7, 2020, in-person dialysis rounds were ceased and one day later, replaced by remote review of dialysis treatment records and telephone discussion with dialysis nurses for all patients

Seven nephrologists perform monthly rounds on 960 HD patients across seven satellite community dialysis centers (DCs). Frequent in-person rounds at DCs were mandatory before the pandemic. Inpatients at regional hospitals are reviewed by separate attending nephrologists

Tele-health in Singapore (SARS-CoV2)

In a subsequent analysis, NUH found that overall outcomes and patient satisfaction with the rapid adoption of telemedicine to continue providing care to patients.

Key biochemical performance indicators had been unaltered by reduced physician presence. **No significant difference in hospital admission rates for cardiovascular disease or vascular access complications**.

Informal survey of patients at one DC found that most expressed satisfaction with the experience

Two Precursors enabling Service Delivery Platform

In 2014, Singapore launched the Smart Nation Program, designed to harness ICT, networks and data to improve the quality of life of its citizens, strengthen businesses, and help government agencies serve citizens better, particularly in the face of increasing urban density and as aging population.

In 2004 Singapore's 10-year Intelligent Nation masterplan (iN2015) to develop the infocomm infrastructure to support the Internet of Things (IoT) and enable cyber physical systems (CPS).

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The Singapore government has implemented several telehealth initiatives to enhance healthcare accessibility and efficiency:

1.TeleHealth Services: As part of the Smart Nation initiative, TeleHealth offers integrated online medical consultations, allowing patients to receive care without visiting healthcare institutions in person. This approach aims to optimize resources, improve efficiency, and reduce stress for both patients and providers

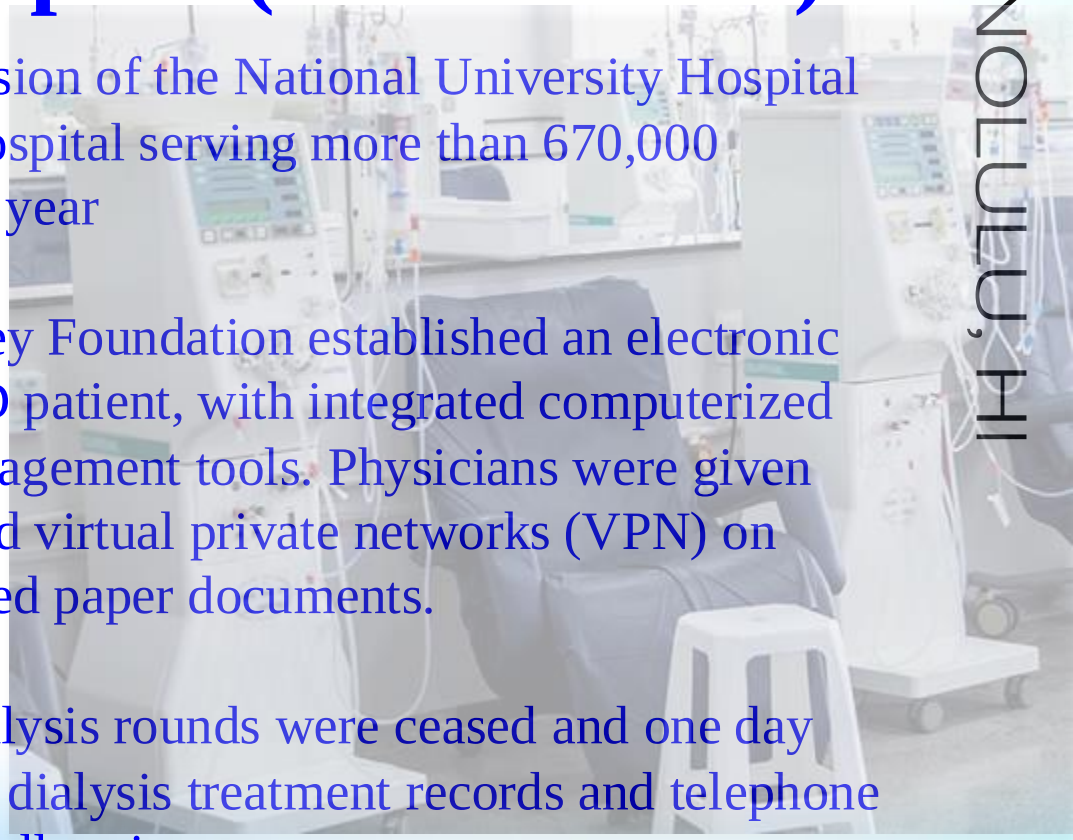
2.Assistive Technology and Robotics in Healthcare: Exploring the use of robotics and assistive technologies to support seniors and individuals with disabilities, enhancing mobility and independence.

3.Regulatory Framework for Telehealth Products: The Health Sciences Authority (HSA) has refined and streamlined regulations for telehealth medical devices, promoting innovation while ensuring public health safety.

4. **Licensing of Telemedicine Services**: The Ministry of Health (MOH) plans to license telemedicine services under the Healthcare Services Act (HCSA) by mid-2022. This licensing aims to safeguard patient safety and well-being while enabling the development of innovative healthcare services.

5. **Regulatory Sandbox (LEAP)**: Launched in 2018, the Licensing Experimentation and Adaptation Programme (LEAP) is a regulatory sandbox initiative by MOH to understand and support innovative healthcare services, including telemedicine, ensuring patient safety and welfare

Tele-health in Singapore (SARS-CoV2)



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Seven nephrologists perform monthly rounds on 960 HD patients across seven satellite community dialysis centers (DCs). Frequent in-person rounds at DCs were mandatory before the pandemic. Inpatients at regional hospitals are reviewed by separate attending nephrologists

Tele-health in Singapore (SARS-CoV2)

In a subsequent analysis, NUH found that overall outcomes and patient satisfaction with the rapid adoption of telemedicine to continue providing care to patients.

Key biochemical performance indicators had been unaltered by reduced physician presence. **No significant difference in hospital admission rates for cardiovascular disease or vascular access complications**.

Informal survey of patients at one DC found that most expressed satisfaction with the experience

Tele-health in Singapore (SARS-CoV2)

- **Regulatory Sandbox Expansion**: The Ministry of Health (MOH) expanded its regulatory sandbox, the Licensing Experimentation and Adaptation Program (LEAP), to include new COVID-19 use cases. This initiative allowed telemedicine providers to innovate within a controlled environment, ensuring patient safety while adapting to pandemic-related healthcare needs.

- **Productivity Solutions Grant (PSG)**: To support healthcare providers in adopting teleconsultation services, the government extended the PSG to include teleconsultation (video) solutions. Eligible providers could receive up to 80% funding support to integrate these services, promoting the shift towards digital healthcare.

- **Healthcare Services Act (HCSA)**: Recognizing the need for a robust regulatory framework, the government introduced the HCSA, set to license telemedicine services by mid-2022. This act aimed to safeguard patient safety and well-being while enabling the development of innovative healthcare services.

Tele-health in Singapore (Covid-19)

- Public healthcare institutions have notably increased the availability of video consultations, extending services to patients with chronic conditions, post-surgical needs, and those requiring long-term or palliative care.

- Data from the Integrated Health Information Systems (IHiS) indicates a substantial rise in video consultations: from 1,947 patients between 2017 and early 2020 to at least 36,000 by January 2021.

- Private telemedicine providers have also reported significant increases in user engagement. Example: MyDoc, a telemedicine provider in Singapore, reported an increase of more than 160% in daily active users since the beginning of 2020.

Conclusions

- There is still no widespread deployment of Tele-Health as yet
- Establishing appropriate government policies, especially reimbursement policies, is necessary for widespread adoption of Tele-health
- Infrastructural issues still need to be addressed, particularly in broadband accessibility in the United States
- Significant user adoption issues persist, and my explain some decline in Tele-Health usage in the U.S. after a peak in the Covid-19 period

Conclusions

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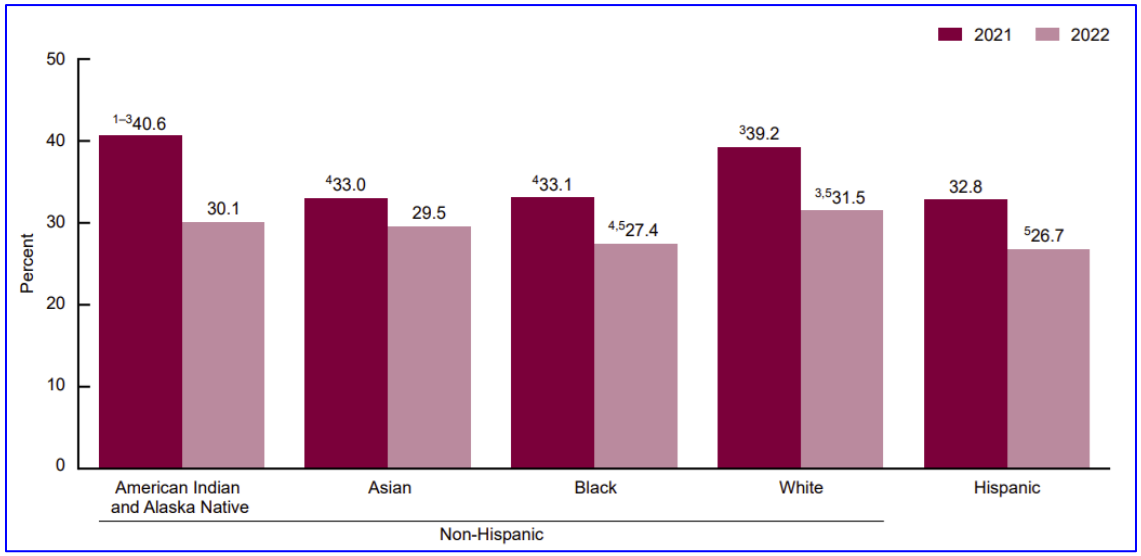

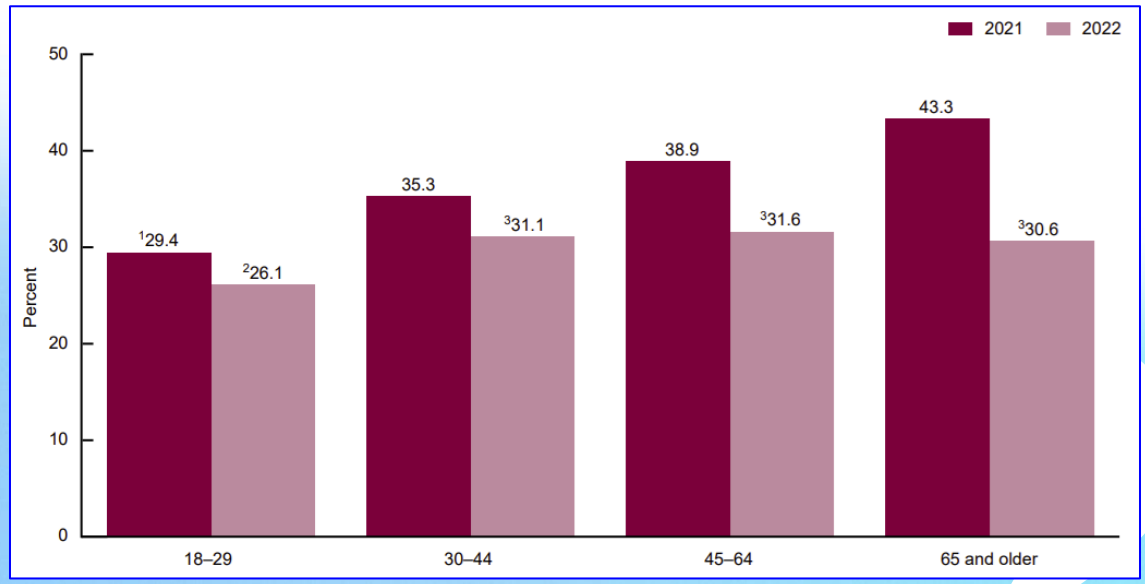

PACIFIC TELECOMMUNICATIONS COUNCIL

Source: National Health Statistics Reports, June 20, 2024

Conclusions

- The annual health care expenditures in the United State is expected to reach $5.7 trillion dollars by 2026 (0ver 15% of GDP)
- *Global shortage of clinical staff*
- Increase in life expectancy and rapid growth of elderly population. Each additional year of life increases health care costs by 3%.
- Tele-Health has potential to engender better and more extensive access to health care at lower costs.

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Thank You

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