How Pandemic Changed Critical Care Telemedicine

Vitaly Herasevich, MD, PhD
Professor of Anesthesiology and Medicine,
Department of Anesthesiology and Perioperative Medicine
Mayo Clinic, Rochester, MN

@VHerasevich  vitaly@mayo.edu
Disclaimer

• Personal view.
• Purely USA experience.
Outline

• Introduce telemedicine concepts
• Telemedicine benefits
• Legal requirements
• COVID induced changes
• What is ahead (Technology part)
Telemedicine
Telemedicine vs Telehealth

**Telemedicine:** The use of technologies to remotely diagnose, monitor, and treat patients

**Telehealth:** The application of technologies to help patients manage their own illnesses through improved self-care and access to education and support systems

Source: Connected Health: A Review of Technologies and Strategies to Improve Patient Care with Telemedicine and Telehealth; Health Affairs 2014
Telemedicine vs Telehealth

• **Telehealth** is different from telemedicine because it refers to a *broader scope of remote healthcare services* than telemedicine.

• While **telemedicine** refers specifically to remote clinical services, telehealth can refer to remote non-clinical services, such as provider training, administrative meetings, and continuing medical education, in addition to clinical services.

[https://www.healthit.gov/providers-professionals/faqs/what-telehealth-how-telehealth-different-telemedicine](https://www.healthit.gov/providers-professionals/faqs/what-telehealth-how-telehealth-different-telemedicine)
### Telehealth Use Cases, Relevant Modalities

<table>
<thead>
<tr>
<th>Modalities</th>
<th>Professional Consultation</th>
<th>Diagnosis &amp; Treatment</th>
<th>Education &amp; Engagement</th>
<th>Ongoing Monitoring &amp; Care Coordination</th>
<th>Investment Required</th>
</tr>
</thead>
</table>
| Videoconference             | +                         | +                     | +                      | +                                    | - Need software, secure internet access for patients  
|                             |                           |                       |                        |                                       | - Home and hospital-based technology              |
| Asynchronous Store-and-Forward |                           |                       |                        |                                       | - Need additional bandwidth, storage space  
|                             |                           |                       |                        |                                       | - Can replace non-urgent phone calls and visits  |
| Remote Device               |                           |                       | +                      |                                       | - More expensive hardware investment  
|                             |                           |                       |                        |                                       | - Used for high-risk patients in non-hospital site |
| Telephone                   | +                         |                       | +                      | +                                    | - Little tech investment, requires proper staffing  
|                             |                           |                       |                        |                                       | - Used for pre-visit triage                         |
| Patient Portal              |                           |                       | +                      |                                       | - High security needs require significant investment  
|                             |                           |                       |                        |                                       | - Must integrate HER                                 |
| Mobile App                  |                           |                       | +                      |                                       | - Minimal hardware investment for providers  
|                             |                           |                       |                        |                                       | - Complex security and data storage issues          |

Source: Marketing and Planning Leadership Council interviews and analysis. (Advisory Board)
Structure of telemedicine services

- Originating Site
- Telemedicine Services
- Clinical providers
Telemedicine benefits
As healthcare shifts the benefit of providing care via telemedicine increases.
Potential **Telemedicine** Uses

- Ambulatory specialty care
- Direct to Patient e-Consultations
- Chronic disease management
- Expanded patient care access
- Tele-ICU - Remote critical care monitoring/consultation
- Hospital at home - Post-discharge monitoring
Overall benefits of telemedicine

**Improved Access** – For over 40 years, telemedicine has been used to bring healthcare services to patients in distant locations. Given the provider shortages throughout the world—in both rural and urban areas—telemedicine has a unique capacity to increase service to millions of new patients.

**Cost Efficiencies** – Reducing or containing the cost of healthcare is one of the most important reasons for funding and adopting telehealth technologies. Telemedicine has been shown to reduce the cost of healthcare and increase efficiency through better management of chronic diseases, shared health professional staffing, reduced travel times, and fewer or shorter hospital stays.

**Improved Quality and Continuity of Care** – Studies have consistently shown that the quality of healthcare services delivered via telemedicine are as good those given in traditional in-person consultations. In some specialties, particularly in mental health and ICU care, telemedicine delivers a superior product, with greater outcomes and patient satisfaction.

**Patient Demand** – Consumers want telemedicine. The greatest impact of telemedicine is on the patient, their family and their community. Using telemedicine technologies reduces travel time and related stresses for the patient. Over the past 15 years, study after study has documented patient satisfaction and support for telemedical services. Such services offer patients the access to providers that might not be available otherwise, as well as medical services without the need to travel long distances.
Benefits of telemedicine for patients

- **No transportation time or costs** - Patient can save money on gas, parking, and public transportation.
- **No need to take time off of work** - Speaking of work, video visits largely remove the need to take time off. Patient simply schedule your visit during a break, or before or after work without missing a day of work or wasting paid time off.
- **Eliminate child or elder care issues** – If there responsibility for caring for children or older adults finding alternative care can be difficult and expensive. Bringing them along can be stressful or impractical. Fortunately, telemedicine solves this challenge by allowing to see doctor while upholding family responsibilities.
- **On-demand options** - More and more physician’s practices are offering telemedicine these days, there’s a good chance that primary care physician would be available via video. If can’t, but still need remote access to care, there are a number of online-only, on-demand options on the market today. Some insurance companies pay for this type of care.
- **Access to Specialists** - Some patients who need the care of a specialist must drive long distances and invest a lot of time for each visit. Telemedicine makes it possible for patient and primary care physician to leverage the expertise of specialists who are not nearby. When it comes to serious health issues, patients want to consult with the best, not the closest.
- **Less Chance of Catching a New Illness** - While everyone does their best to prevent one patient from catching something from another, it is always possible, especially in crowded waiting rooms. By staying home, patient get the care need while avoiding the risk of exposure.
- **Less Time in the Waiting Room** - Video visit via telemedicine technology eliminates all that time spent looking at old magazines in a doctor’s office.
- **Better Health** - When patient be able to see doctor as often as need to, without the challenges of getting into the office, patient can practice better management of medication, lifestyle, and any chronic conditions that might have.
Patients like it...

The survey of 399 virtual visit patients indicated that virtual visits were liked by patients, with 372 (93.2%) of respondents saying their virtual visit was of high quality and 364 (91.2%) reporting their virtual visit was “very” or “somewhat” helpful to resolve their health issue.

<table>
<thead>
<tr>
<th></th>
<th>98%</th>
<th>“Very satisfied” patients with telehealth visit</th>
</tr>
</thead>
<tbody>
<tr>
<td>95%</td>
<td>Patients who would use telehealth again</td>
<td></td>
</tr>
<tr>
<td>95%</td>
<td>Patients who would recommend telehealth visit to friend</td>
<td></td>
</tr>
</tbody>
</table>


Forces Enable Telemedicine Expansion

• Consumer demand
• Cost saving efforts: Commercial and employer-based insurance, ACO shared savings program
• Value-based care and population management incentives
• Patient access/workforce limitations
• New technology capabilities
<table>
<thead>
<tr>
<th>Company</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Telemedicine platforms</strong></td>
<td></td>
</tr>
<tr>
<td><strong>1 Doc Way</strong></td>
<td>1 Doc Way has been around since 2011 and uses hourly pricing model at $25 per hour of video conference.</td>
</tr>
<tr>
<td><strong>American Well</strong></td>
<td>Powered by Vidyo, American Well is the platform used by LiveHealth Online, currently contracts health insurer Anthem / Wellpoint.</td>
</tr>
<tr>
<td><strong>Carena</strong></td>
<td>Based in Washington state, Carena provides a “virtual care model and configurable technology platform to let health systems offer care to consumers.” In addition to a virtual clinic platform, they provide digital marketing services to increase consumer awareness and utilization.</td>
</tr>
<tr>
<td><strong>CarePaths</strong></td>
<td>Behavioral Health EHR and Practice Management platform with video, patient portal, scheduling, secure messaging, claims and billing management, and ePrescribe.</td>
</tr>
<tr>
<td><strong>ChironHealth</strong></td>
<td>A brand-able telemedicine platform with insurance eligibility checking, scheduling, virtual waiting room, and video. ChironHealth stands out in that it guarantees private payer reimbursement for telemedicine video visits.</td>
</tr>
<tr>
<td><strong>CloudVisit</strong></td>
<td>Telepsychiatry platform that recently (March 2015) launched its mobile app for iOS and Android devices; pricing starts at $150/month and includes scheduling.</td>
</tr>
<tr>
<td><strong>DigiGone</strong></td>
<td>Specializing in low bandwidth maritime communications, DigiGone combines software application development and hardware integration for its video solutions. It is currently used by the George Washington University Emergency Medical Department’s Maritime Medical Access team to provide telemedicine.</td>
</tr>
<tr>
<td><strong>Doxy.me</strong></td>
<td>Beautiful, thoughtfully planned, free platform that supports a waiting room workflow. Since it uses WebRTC for video, it does not support video calls on Internet Explorer or Safari. Mobile apps coming in May.</td>
</tr>
<tr>
<td><strong>eVisit</strong></td>
<td>eVisit is telemedicine designed by providers, for providers. It provides 2-way HD video, ePrescribe, medical charting, automated patient engagement emails, and on-boarding support.</td>
</tr>
<tr>
<td><strong>iPath</strong></td>
<td>A free, opensource store-and-forward platform for collaborative exchange of medical knowledge, distance consultations, group discussions and distance teaching in medicine; no video.</td>
</tr>
<tr>
<td><strong>MedSymphony</strong></td>
<td>Primarily a proprietary EMR with video add-on option at $25 for 2 hours and $15 for each additional hour</td>
</tr>
<tr>
<td><strong>REACH Health</strong></td>
<td>Georgia-based company providing interactive physician-to-patient telemedicine and telestroke solutions. Initially designed for telestroke, the system brings together videoconferencing, medical imaging, and patient data.</td>
</tr>
<tr>
<td><strong>Secure Telehealth</strong></td>
<td>Platform appears to be limited to PCs only; uses OmniJoin by Brother for video.</td>
</tr>
<tr>
<td><strong>SecureVideo</strong></td>
<td>Initially focused on telepsychiatry, SecureVideo has been expanding its offerings. Its platform includes scheduling and optional PayPal integration. In addition, it has excellent technical support services.</td>
</tr>
<tr>
<td><strong>SightCall</strong></td>
<td>Formerly Weemo, this is one of the early WebRTC-based video calling platforms out there.</td>
</tr>
<tr>
<td><strong>SnapMD</strong></td>
<td>Secure, cloud based telemedicine technology</td>
</tr>
<tr>
<td><strong>thera-LINK</strong></td>
<td>Telemental health platform with scheduling, ePay (via Stripe), and file storage, it offers a 15-day free trial and $45/month for unlimited video. It uses WebRTC video which means not supported on IE and Safari browsers.</td>
</tr>
<tr>
<td><strong>Vidyo</strong></td>
<td>Vidyo’s low pricing may be deceptive because it doesn’t include hardware and maintenance costs. Read our Vidyo review here.</td>
</tr>
<tr>
<td><strong>Virtual Care Works</strong></td>
<td>Medical-grade network service provider that bundles communications solutions including videoconferencing, secure email, secure texting, and image archival.</td>
</tr>
<tr>
<td><strong>Virtual Therapy Connect</strong></td>
<td>Free for less than 5 hours of video; $50 per month for unlimited video conference; more pricing here</td>
</tr>
<tr>
<td><strong>VirtuMedix</strong></td>
<td>Complete telemedicine platform with patient records, scheduling, and online payment; but uses the slowly-going-obsolete Flash-based video.</td>
</tr>
<tr>
<td><strong>VSee</strong></td>
<td>VSee is NASA’s official video chat + telemedicine platform aboard the International Space Station. It integrates secure health communications, virtual care workflows, and SDKs to easily build and grow any telehealth platform. Offerings include telemedicine kits &amp; carts with medical devices.</td>
</tr>
<tr>
<td><strong>WeCounsel</strong></td>
<td>Telehealth platform with an emphasis on behavioral health, including scheduling, messaging, and file storage. It’s currently offering a1 month free trial and $14.99/mo unlimited use; it uses Vidyo for video.</td>
</tr>
</tbody>
</table>
Challenges for telemedicine

**Quality**
- Provider credentials
- Continuity of care
- Efficacy

**Reimbursement**
- Medicare
- Medicaid
- Commercial

**Clinical use**
- Adequacy of virtual exam
- Patient selection

**Implementation**
- IT infrastructure
- Clinical workflow
- Licensing and credentialing
Legal requirements (USA)
Two major administrative components of telemedicine practice

- Financial (reimbursement)
- Licensure
Figure 1.
Percentage of People by Type of Health Insurance Coverage and Change From 2020 to 2021
(Population as of March of the following year)

<table>
<thead>
<tr>
<th>Type of Coverage in 2021</th>
<th>Change: 2020 to 2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uninsured</td>
<td>8.3</td>
</tr>
<tr>
<td>With health insurance</td>
<td>91.7</td>
</tr>
<tr>
<td>Any private plan</td>
<td></td>
</tr>
<tr>
<td>Employment-based</td>
<td>54.3</td>
</tr>
<tr>
<td>Direct-purchase</td>
<td>10.2</td>
</tr>
<tr>
<td>Marketplace</td>
<td>3.5</td>
</tr>
<tr>
<td>TRICARE</td>
<td>2.5</td>
</tr>
<tr>
<td>Any public plan</td>
<td></td>
</tr>
<tr>
<td>Medicare</td>
<td>18.4</td>
</tr>
<tr>
<td>Medicaid</td>
<td>18.9</td>
</tr>
<tr>
<td>VA and CHAMPVA¹</td>
<td>1.0</td>
</tr>
</tbody>
</table>

* Denotes a statistically significant change between 2020 and 2021 at the 90 percent confidence level.
¹ Includes CHAMPVA (Civilian Health Medical Program of the Department of Veterans Affairs), as well as care provided by the Department of Veterans Affairs (VA) and the military.

Note: The estimates by type of coverage are not mutually exclusive; people can be covered by more than one type of health insurance during the year. Information on confidentiality protection, sampling error, nonsampling error, and definitions is available at <https://www2.census.gov/programs-surveys/cps/techdocs/cpsmar22.pdf>.

Reimbursement Coverage - 2021

Telehealth Coverage and Reimbursement Policies: Medicaid and Private Payers

Fifty states and Washington DC provide reimbursement for some form of live video in Medicaid fee-for-service. Both the jurisdictions of Puerto Rico and Virgin Islands do not indicate they reimburse for live video in their Medicaid programs. The most predominantly reimbursed form of telehealth is live video, with every state offering some type of live video reimbursement in their Medicaid program. However, what and how it is reimbursed varies widely with some Medicaid programs limiting the types of reimbursable services and placing additional requirements and restrictions such as provider type and originating site stipulations. Map based on research conducted between January-March 2023.
Reimbursement requirement

Core Eligibility Requirements for CMS Reimbursement

Medicare provides reimbursement to the originating and distant sites for telehealth services.

**Originating Site**
Location\(^*\) of patient receiving the telehealth service.

- *Beneficiaries receiving telehealth services must be in a facility in a rural health professional shortage area, a rural census tract, or a county not in a Metropolitan Statistical Area (MSA).*
- Medicare pays for 75 individual service codes in 2015.

**Distant Site**
Location of health care provider providing the telehealth service.

- Physician or other practitioner receives professional fee from Medicare for treating the patient.

The Medicare statute does not specify which facilities may serve as distant sites, though CMS has excluded rural health clinics and federally qualified health centers.

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*Congress defines telehealth services as:
- professional consultations
- office visits
- office psychiatry services
- others as determined by the Secretary*

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Note: State Medicaid programs and private insurers may pay a transmission fee instead of, or in addition to, the facility fee.

Source: Adapted from Center for Connected Health Policy, State Laws and Reimbursement Policies
Originating Site – location of eligible Medicare beneficiary. Must be a Health Professional Shortage Area (HPSA) located either outside of a Metropolitan Statistical Area (MSA) or in a rural census tract; or a county outside of an MSA

- **Office of physician or practitioner**
- **Hospital (inpatient or outpatient)**
- **Critical access hospital (CAH)**
- Rural health clinic (RHC) and Federally Qualified Health Center (FQHC)
- Hospital-based or CAH-based renal dialysis center (including satellites)
- Skilled nursing facility (SNF)
- End-stage renal disease (ESRD) facilities
- Community mental health center
- Dental clinic
- Residential facilities, such as a group home and assisted living
- Home (a licensed or certified health care provider may need to be present to facilitate the delivery of telemedicine services provided in a private home)
- School
Telemedicine services

- Consultations
- Telehealth consults: emergency department or initial inpatient care
- Subsequent hospital care services with the limitation of one telemedicine visit every 30 days per eligible provider
- Subsequent nursing facility care services with the limitation of one telemedicine visit every 30 days
- End-stage renal disease services
- Individual and group medical nutrition therapy
- Individual and group diabetes self-management training with a minimum of one hour of in-person instruction to be furnished in the initial year training period to ensure effective injection training
- Smoking cessation
- Alcohol and substance abuse (other than tobacco) structured assessment and intervention services
Distant site - Eligible providers

- Physician
- Advanced Care Practitioner (ACP) - Nurse practitioner - Physician assistant - Nurse midwife
- Registered dietitian or nutrition professional
- Dentist, dental hygienist, dental therapist, advanced dental therapist
- Mental health professional
- Pharmacist
- Certified genetic counselor
- Speech therapist
- Physical therapist
- Occupational therapist
- Audiologist

Not all above eligible for CMS reimbursement
What IS NOT covered?

**Usually following are not covered under telemedicine:**
- Electronic connections that are not conducted over a secure encrypted website as specified by the HIPAA of 1996 Privacy & Security rules
- Prescription renewals
- Scheduling a test or appointment
- Clarification of issues from a previous visit
- Reporting test results
- Non-clinical communication
- Communication via telephone, email or fax
- Day treatment
- Partial hospitalization programs
- Residential treatment services
- Case management face-to-face contact

**The following limitations apply:**
- Payment for telemedicine services is limited to three per week per recipient
- Payment is not available for sending materials to a recipient, other provider or facility
The Interstate Medical Licensure Compact offers a voluntary, expedited pathway to licensure for qualified physicians who wish to practice in multiple states. The Compact significantly streamlines the licensing process. The Compact currently includes 35 states. Compact became operational in April 2017.

https://www.imlcc.org/
Online prescribing

Twenty states allow physician-patient relationships to be established via telehealth technologies.

Establish physician-patient relationship before he/she may prescribe for the patient.

Source: Center for Connected Health Policy. February 2015.
Health Professional Licensure acceptance **2016**

Most states have a consultation exception in their licensure requirements.

Special Telemedicine Licenses:
- Alabama
- Louisiana
- Montana
- Nevada
- New Mexico
- Ohio
- Oklahoma
- Oregon
- Tennessee
- Texas
Complex law – Physical therapy example

http://ptcompact.org/ptc-states
Telemedicine Guidelines

• AMA and ATA have policy statements on telemedicine
• Overarching principles include:
  o Establishment of valid patient-provider relationship
  o Professional judgment in appropriateness for telemedicine in clinical setting
  o Continuity of care/shared medical record
  o Use of evidence-based clinical guidelines for telemedicine
  o Telemedicine held to same standard as in-person visit
COVID induced changes
1135 waiver

• Effective for services starting March 6, 2020 and for the duration of the COVID-19 Public Health Emergency, Medicare will make payment for Medicare telehealth services furnished to patients in broader circumstances for professional services furnished to beneficiaries in all areas of the country in all settings.

• Telemedicine visits are considered the same as in-person visits and are paid at the same rate as regular, in-person visits.
All 50 states and Washington, D.C., have taken actions to improve access to telehealth in response to COVID-19. **In 33 states, commercial insurance carriers are temporarily relaxing requirements around telehealth**, either through state mandates or on their own.

A recent report from McKinsey & Co. documents the “massive acceleration in the use of telehealth” since the COVID-19 epidemic.

Consumer adoption moved from 11% to 46%, and providers are now seeing from 50 to 175 times the number of patients via telehealth than they did before.

Pre-Covid, total annual revenues in telehealth were about $3 billion. With further provider adoption, up to $250 billion of US healthcare spending could be virtualized.

**How has COVID-19 changed the outlook for telehealth?**

1 Consumer
   Shift from:
   - 11% use of telehealth in 2019
   To:
   - 76% now interested in using telehealth going forward

While the surge in telehealth has been driven by the immediate goal to avoid exposure to COVID-19, with more than 70 percent of in-person visits cancelled,1 76 percent of survey respondents indicated they were highly or moderately likely to use telehealth going forward;2 and 74 percent of telehealth users reported high satisfaction.3

[1] Source: Reference 1
[2] Source: Reference 2
Post-COVID

• The COVID-19 Public Health Emergency (PHE) resulted in many changes to the health care system.

• PHE will end on May 11. 2023

• On December 29, 2022, the Consolidated Appropriations Act of 2023 (CAA) extended many flexibilities and waivers authorized during the PHE through December 31, 2024, particularly around telehealth services.
Permanent telehealth changes on the horizon

By MOHANA RAVINDRANATH | 06/19/2020 10:00 AM EDT

With help from Darius Tahir (@dariustahir) and Tim Starks (@tinstarks)

Programming announcement: Our newsletters are evolving. Morning
Hospital at Home: A Leading Care Model for the Future?


Data compiled June 2020.
Sources: US government; industry data; Kagan estimates
Kagan, a media research group within the TMT offering of S&P Global Market Intelligence.
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- Sensors
- Remote monitoring
- Remote labs
# Telemedicine Companies

## 2016

<table>
<thead>
<tr>
<th>Company</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Well</td>
<td>A telehealth services company that brings healthcare into the homes and workplaces of patients</td>
</tr>
<tr>
<td>Avizia</td>
<td>Provides real-time video collaboration to meet the unique product requirements of healthcare</td>
</tr>
<tr>
<td>DeVincian Healthcare</td>
<td>Provides healthcare solutions that improve clinical outcomes, by intelligently and securely connecting mobile devices, healthcare expertise, and healthcare data</td>
</tr>
<tr>
<td>ETIAM</td>
<td>Allows health professionals to enrich, store, visualize and share the patient medical record within and outside the hospital, in real time</td>
</tr>
<tr>
<td>FORA</td>
<td>Provides chronic disease management solutions</td>
</tr>
<tr>
<td>ForaCare, Inc.</td>
<td>An innovator of web based telemedicine and telestroke services</td>
</tr>
<tr>
<td>Kroll Corporation</td>
<td>SnapMD is the leader in white-label cloud-based Virtual Care Management (VCM) systems focused on the patient and clinician telemedicine experience</td>
</tr>
<tr>
<td>Teladoc</td>
<td>Delivers on-demand health care anytime, and anywhere via mobile devices, the internet, secure video and phone</td>
</tr>
<tr>
<td>VirtuMedix</td>
<td>Provides reliable and secure telemedicine platform that allows healthcare practitioners virtual interaction with patients via mobile devices, web portal or telephone</td>
</tr>
<tr>
<td>WellVIA</td>
<td>A nationwide telehealth organization delivering affordable, convenient, quality healthcare to patients round the clock</td>
</tr>
</tbody>
</table>

## Top 10 Best Telemedicine Companies in the World in 2020

Who are the top 10 telemedicine companies in the world in 2020? This is the complete list of the top telemedicine companies.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Telemedicine Company</th>
<th>Revenue (USD millions)</th>
<th>Headquarters</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Teladoc</td>
<td>553</td>
<td>Purchase, New York, USA</td>
</tr>
<tr>
<td>2</td>
<td>MeMD</td>
<td>5</td>
<td>Phoenix, Arizona, USA</td>
</tr>
<tr>
<td>3</td>
<td>iCliniq</td>
<td>10</td>
<td>Coimbatore, Tamil Nadu, India</td>
</tr>
<tr>
<td>4</td>
<td>MDLIVE</td>
<td>36</td>
<td>Miramar, Florida, USA</td>
</tr>
<tr>
<td>5</td>
<td>Doctor On Demand</td>
<td>125.5</td>
<td>San Francisco, California, USA</td>
</tr>
<tr>
<td>6</td>
<td>Amwell</td>
<td>122.3</td>
<td>Boston, Massachusetts, USA</td>
</tr>
<tr>
<td>7</td>
<td>LiveHealth Online</td>
<td>3</td>
<td>Indianapolis, Indiana, USA</td>
</tr>
<tr>
<td>8</td>
<td>Virtuwell</td>
<td>12.4</td>
<td>St Paul, Minnesota, USA</td>
</tr>
<tr>
<td>9</td>
<td>PushCare</td>
<td>11</td>
<td>San Francisco, California, USA</td>
</tr>
<tr>
<td>10</td>
<td>HealthTap</td>
<td>62.4</td>
<td>Mountain View, California, USA</td>
</tr>
</tbody>
</table>
Telehealth: Health care from the safety of our homes.

Whether you’re a patient looking for medical care, or a doctor who provides it, telehealth keeps us connected—even while social distancing during COVID-19.

Explore telehealth resources and tips for providers and patients.

For patients

Find out what telehealth is and what to expect from a virtual doctor’s visit. You can also check out our tips on finding telehealth care.

- What is telehealth?
- Telehealth during COVID-19
- Finding telehealth options

For providers

Get information to help you provide remote care through telehealth services and get up to speed on recent COVID-19 reimbursement, billing, and policy changes.

- Getting started with telehealth
- Policy changes during COVID-19
- Billing for telehealth during COVID-19

https://telehealth.hhs.gov/
The Center for Connected Health Policy

- [https://www.cchpca.org/](https://www.cchpca.org/) - CCHP is the National Telehealth Policy Resource Center. The Center for Connected Health Policy is a nonprofit, nonpartisan organization working to maximize telehealth’s ability to improve health outcomes, care delivery, and cost effectiveness.
What is ahead (Technology part)
This illustration is from the April, 1924 edition of Hugo Gernsback's Radio News. Gernsback was the prolific author and magazine publisher who is often called the Father of Science Fiction.

The TeleDactyl, as depicted by Science and Invention magazine in 1925.
History of telemedicine

• 1930s - The Royal Flying Doctor Service in Australia used radio
• 1960s – NASA
• 1977 – Daily consultation – intensivist
• 1988 - earthquakes in Armenia
• 1997 - John Hopkins affiliated hospital performed a study in surgical ICU using video conferencing equipment connecting to the intensivists' homes
MedPhone Corporation in 1989

- It was the first use of a device called the MDphone transtelephonic defibrillator. The device fits into a briefcase-sized case and can be plugged into a standard phone jack.

- The patient, Ada Evans, 54 years old, was one of two patients equipped with the portable electronic cardiac treatment systems in mid-May.

- On June 25, Mrs. Evans began experiencing an extremely rapid heartbeat. Her husband, Roscoe Evans, activated the MDphone, which automatically dialed the hospital's cardiac care unit.

- After he attached two electrode pads to his wife's chest, hospital workers activated the defibrillator, which restores the heart's normal rhythm with electric shock.

In 1977, a study by Grundy et al. demonstrated feasibility of tele-ICU from an academic medical center to a private hospital [1].

In 1998 home-based intensivists using advanced telemedicine tools for surgical ICU patients. Rosenfeld et al. showed reduced severity-adjusted ICU and hospital mortality, ICU complications, LOS, and cost savings from averted complications [2].
**Tele-ICU**

**Classic Tele-ICU** allows clinicians to remotely see patients, see bedside monitors, review the patient’s past medical history, care plan, test results, and medications. Integrated video/high-quality audio links enable the remote clinician, in real-time, to interact with the patient, bedside nurse, clinician, and the patient’s family.

Dr Shulkin in the Cincinnati VA TeleICU room pic 3
Under Secretary for Health, Dr. David J. Shulkin tours the Cincinnati, OH VA medical center.

Key technical components of telemedicine

- Technical support
- Broadband internet
- Software
- Hardware
- Digital peripherals
What Delivery Mechanisms Can Be Used?

• **Networked programs** link tertiary care hospitals and clinics with outlying clinics and community health centers in rural or suburban areas. The links may use dedicated high-speed lines or the Internet for telecommunication links between sites. ATA estimates the number of existing telemedicine networks in the United States at roughly 200 providing connectivity to over 3,000 sites.

• **Point-to-point connections** using private high speed networks are used by hospitals and clinics that deliver services directly or outsource specialty services to independent medical service providers. Such outsourced services include radiology, stroke assessment, mental health and intensive care services.

• **Monitoring center links** are used for cardiac, pulmonary or fetal monitoring, home care and related services that provide care to patients in the home. Often normal land-line or wireless connections are used to communicate directly between the patient and the center although some systems use the Internet.
NOT NOW KIDS
DADDY'S OPERATING
REMOTELY ON A PATIENT.
Technologies barriers

• Systems are too expensive to enable wide-spread diffusion

• Systems from independent vendors do not interoperate

• What can be done “over the wire” falls far short of what can be done in face-to-face encounters

• Most systems are sold as turnkey capabilities that are not easily customized to meet end user-specific needs
Clinical information system – complex data interaction

Herasevich et al. Medical informatics in ICU., in Principles of Critical Care, 4th, 2015
Progress and Innovation

One variation of the contemporary binaural stethoscope allows for multiple clinicians to listen simultaneously.
First generation ICU computer system – 1961 - 1977

First generation ICU computer system – 1961 - 1977

Bedside

Computer room
First Japan ICU Monitor (1967)

The Nihon-Kohden ICU-80 monitor from 1967 - the monitor is almost as big as the patient bed.
Second generation ICU computer system – 1977-1992

almost ready for TeleICU

EMR adoption statistics

- A **2009** survey of American Hospital Association (AHA) members found just **1.5%** of hospitals had a comprehensive EHR system... increased to **40%** in **2015**

---

Patients who receive their ICU care from a hospital with an eICU program were:

- 26% more likely to survive the ICU.
- Discharged from the ICU 20% faster.
- 16% more likely to survive hospitalization and be discharged.
- Discharged from the hospital 15% faster.

Functional structure of Tele ICU

Fig. 1. Schematic technical outline of a comprehensive Tele-ICU system.
Active patient monitoring vs. tele-consultation

- Almost every EMR vendor such as EPIC, GE Healthcare offers their own telemedicine solutions in general by adding video communication link on the top of EMR software.
- However, these are on-demand telemedicine solutions and cannot be considered as Tele-ICU **Active patient monitoring (ARM)** systems.
- FDA has guidance regarding differentiating ARM from medical device data systems (MDDS).
- Devices (including software devices) used for **APM must be FDA class II certified**. MDDS is not intended to be used in connection with active patient monitoring.

In 2014 - Formal ICU telemedicine programs now support 11% of nonfederal hospital critically ill adult patients.

There is increasingly robust evidence of association with lower ICU (0.79; 95% CI, 0.65-0.96) and hospital mortality (0.83; 95% CI, 0.73-0.94) and shorter ICU (-0.62 d; 95% CI, -1.21 to -0.04 d) and hospital (-1.26 d; 95% CI, -2.49 to -0.03 d) length of stay.
Tele-Critical Care: An Update From the Society of Critical Care Medicine Tele-ICU Committee

Sanjtar Subramanian, MD, MMM1; Jeremy C. Pamplin, MD, FCCM, FACMP2; Marilyn Hrvnak, PhD, RN, ACNP-BC, FCCM, FAAN5; Christina Helsberg, MA3; Richard Riker, MD, MPH; Fred Rincon, MD, MSc, MB.Ethic4; Krzysztof Laudanski, MD, PhD, FCCM3; Lana A. Adzhigirey, MSN, RN, CPHQ5; M. Anas Moughrabieh, MD, MPH6; Fiona A. Winterbottom, DNP, MSN, APRN, ACNS-BC, ACHPN, CCRN7; Vitaly Herasevich, MD, PhD, FCCM1

Objectives: In 2014, the Tele-ICU Committee of the Society of Critical Care Medicine published an article regarding the state of ICU telemedicine, one better defined today as tele-critical care. Given the rapid evolution in the field, the authors now provide an updated review.

Data Sources and Study Selection: We searched PubMed and OVID for peer-reviewed literature published between 2010 and 2018 related to significant developments in tele-critical care, including its prevalence, function, activity, and technologies. Search terms included electronic ICU, tele-ICU, critical care telemedicine, and ICU telemedicine with appropriate descriptors relevant to each sub-section. Additionally, information from surveys done by the Society of Critical Care Medicine was included given the relevance to the discussion and was referenced accordingly.

Data Extraction and Synthesis: Tele-critical care continues to evolve in multiple domains, including organizational structure, technologies, expanded use case scenarios, and novel applications. Insights have been gained in economic impact and human and organizational factors affecting tele-critical care delivery. Legislation and credentialing continue to significantly influence the pace of tele-critical care growth and adoption.

Conclusions: Tele-critical care is an established mechanism to leverage critical care expertise to ICUs and beyond, but systematic research comparing different models, approaches, and technologies is still needed. (Crit Care Med 2019; XX:00–00)

Key Words: critical care; tele-critical care; tele intensive care unit; telehealth; telemedicine

In 2014, the Tele-ICU Committee of Society of Critical Care Medicine (SCCM) published a review of tele-ICU services (1) and now provides updates on its evolution. Today, clinicians use tele-ICU technologies and services in ways not previously considered. Consequently, the committee recommends a new term to describe technology-enabled critical care services to replace existing terms such as tele-ICU, ICU telemedicine, and others—tele-critical care (TCC). This term accommodates the concept that TCC services can be provided to locations beyond the physical confines of an ICU, or even a hospital. This article provides insights into TCC’s evolving prevalence, functions, emerging trends, technologies, new applications, outcomes, and barriers. To clarify terminology, the entity providing TCC services is referred to as the "remote site," and the connected services recipient where care is physically provided as the "local site," regardless of geographic proximity.

TABLE 3. Types of Technologic Interaction With Off-Site Support for 363 Unique Centers Reporting No Formal Tele-Critical Care Program*

<table>
<thead>
<tr>
<th>Type of Technology Used</th>
<th>n = 363, n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tele-radiology (films reviewed off-site)</td>
<td>242 (67)</td>
</tr>
<tr>
<td>Tele-consult (consult without transfer)</td>
<td>63 (17)</td>
</tr>
<tr>
<td>Tele-stroke (neurologist off-site)</td>
<td>95 (26)</td>
</tr>
<tr>
<td>Cellphone (e.g., photops to dermatologist)</td>
<td>161 (44)</td>
</tr>
<tr>
<td>Tele-electroencephalogram (off-site neurorologist review)</td>
<td>111 (31)</td>
</tr>
<tr>
<td>Tele-transfer (hospitals requesting transfer)</td>
<td>77 (21)</td>
</tr>
<tr>
<td>Skype or FaceTime for family meetings</td>
<td>74 (20)</td>
</tr>
<tr>
<td>Tele-electrocardiogram</td>
<td>96 (26)</td>
</tr>
<tr>
<td>Tele-psychiatry</td>
<td>16 (4)</td>
</tr>
<tr>
<td>Telephone-only laboratory review</td>
<td>46 (13)</td>
</tr>
<tr>
<td>Telephone-only vital sign review</td>
<td>34 (9)</td>
</tr>
<tr>
<td>Telephone-only radiograph review</td>
<td>35 (10)</td>
</tr>
<tr>
<td>Telephone-only patient examination with camera</td>
<td>16 (4)</td>
</tr>
<tr>
<td>Other</td>
<td>57 (16)</td>
</tr>
</tbody>
</table>

*Responses of the 363 institutions that did not have formal tele-critical care programs. Note that each center could respond to multiple variables.
What are the barriers?

Although tele-ICU deployment is increasing, it continues to cover only a small proportion of ICU patients. This is primarily due to expense. Studies suggested combined implementation and first year of operation costs for a tele-ICU of $50,000 to $100,000 per monitored ICU-bed.

Telehealth skeptics have long argued that there are not enough data on telehealth’s impact on outcomes and costs to support expanding its use. This bill (Rep. Robin Kelly new telehealth bill) comes as providers and patients worry that recent federal and state policies making telehealth easier to access and bill for will be rolled back once the emergency period ends.
# Key Telemedicine Technology Needs

<table>
<thead>
<tr>
<th>A New Generation Of Devices</th>
<th>Interoperability</th>
<th>Mechanisms for Knowledge Diffusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Less expensive</td>
<td>1. Vendor neutral station-to-station</td>
<td>1. Education and training for non-traditional actors</td>
</tr>
<tr>
<td>2. Usable in more places by broader range of people</td>
<td>2. Plug-and-play devices</td>
<td>2. Tech-embedded, process-specific decision aides</td>
</tr>
<tr>
<td>4. Integration with EHRs</td>
<td>4. Self-configuring</td>
<td>4. Standardized user interfaces to allow portability of skills</td>
</tr>
<tr>
<td></td>
<td>5. Self-calibrating</td>
<td></td>
</tr>
</tbody>
</table>
The Future ICU

What’s next? How can we transform the ICU patient experience?

AI is already changing ICU practice. It’s not just the technology that matters. The human touch is key.

In this issue of the Future ICU, experts share their perspectives on the role of AI in the ICU.

Will Artificial Intelligence Change ICU Practice?

An AI system is coming to a hospital near you. Here’s what you need to know.

The Future ICU

INTELLIGENT CARE -- EMERGENCY MEDICINE -- ANAESTHESIOLOGY

VOLUME 11 -- ISSUE 3 -- WINTER 2023

MANAGEMENT & PRACTICE

The Future ICU

The future of critical care: Where are we headed? What are the challenges and opportunities?

The Future of Critical Care (FtCC) is an initiative of the Mayo Clinic that aims to lead the transformation of critical care delivery.

FtCC is supported by a diverse group of stakeholders, including patients, caregivers, and industry partners.

The FtCC vision is to create a future where critical care is accessible, affordable, and sustainable for all.

FtCC’s mission is to lead the transformation of critical care delivery by leveraging data, technology, and innovation to improve patient outcomes.

PULS

Introducing the Pulmonary Unit, a new approach to critical care.

PULS (Pulmonary Unit) is a new model of care that focuses on the whole patient, not just the disease.

The goal of PULS is to improve patient outcomes by providing comprehensive care that addresses the physical, psychological, and social needs of the patient.

PULS is a multi-disciplinary team approach that includes doctors, nurses, therapists, and other health care professionals.

The PULS model is being tested in several hospitals across the country.

The Future ICU

In the future, the ICU will be a place of innovation and discovery.

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The Future ICU
Electronic system will be able to handle the following:

- Effectively monitor all hospital beds in addition to the ICU
- Tracking patients from admit to discharge (continuity of care)
- Detect and manage deterioration (Sepsis, ARDS, etc)
- Support patients prioritization mechanism
- Automatization of routine tasks
- Human centered design
Functional structure of Tele ICU

Tele-ICU center (cockpit)
- Advanced surveillance
- User friendly interfaces
- Video recognition
- Ambient analytics

CapComs

Monitored remote hospital/ICU
- Bedside monitors
- Audio/Visual link
- Core EMR + PACS

Bedside monitor
Sensors
HD videocamera with audio
National Emergency Tele Critical Care Network - NETCCN

Fundamentally, NETCCN is designed to be rapidly deployed, easy to use, and intended to help with tiered staffing models where local, non-critical care trained clinicians can have a critical care trained expert in the palm of their hand.

https://www.tatrc.org/netccn/index.html
The Intelligent ICU: Using Artificial Intelligence Technology for Autonomous Patient Monitoring

Anis Davoudi1, Kumar Rohit Malhotra2, Benjamin Shickel2, Scott Siegel1, Seth Williams3,4, Matthew Ruppert3,4, Emel Bihorac3,4, Tezcan Ozrazgat-Baslant1,4, Patrick J. Tighe5, Azra Bihorac3,4,5, and Parisa Rashidi1,2,4,5

1Biomedical Engineering, University of Florida, Gainesville, 32611, USA

Figure 1. (a) Intelligent ICU uses pervasive sensing for collecting data on patients and their environment. The system...
### Organ Status

<table>
<thead>
<tr>
<th></th>
<th>3/1</th>
<th>3/2</th>
<th>3/3</th>
<th>3/4</th>
<th>3/5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab/Vital/Event</td>
<td>16:00</td>
<td>00:00</td>
<td>08:00</td>
<td>16:00</td>
<td>08:00</td>
</tr>
<tr>
<td>Creatinine (mg/dL)</td>
<td>1.85</td>
<td></td>
<td></td>
<td></td>
<td>1.69</td>
</tr>
<tr>
<td>Potassium (mEq/L)</td>
<td>3.9</td>
<td></td>
<td></td>
<td></td>
<td>3.8</td>
</tr>
<tr>
<td>Leukocytes (x10^3/µL)</td>
<td>3.2</td>
<td>2.8</td>
<td></td>
<td></td>
<td>3.0</td>
</tr>
<tr>
<td>Hematocrit (%)</td>
<td>21.8</td>
<td>23.7</td>
<td></td>
<td></td>
<td>23.4</td>
</tr>
<tr>
<td>Hemoglobin (g/dL)</td>
<td>7.3</td>
<td>7.7</td>
<td></td>
<td></td>
<td>7.6</td>
</tr>
</tbody>
</table>

### Actions
- Palliative care team contacted
- Primary care team contacted

### Goals
- Case review: 23 hours, 59 minutes remaining
- Palliative note: Not started

### Notes
- None

---

**Artificial Intelligence**  **High Value Data – Eliminate Noise**  **Defined Process**  **Defined QI Goals**  **Communication**
What could be improved in Tele ICU technically?

1. Better cameras/communications (8K)
2. Video recognition technologies
3. Better surveillance/alerting functionally
4. Better presentation of data from EMRs
In Conclusion

- Licensing
- Reimbursement
- Interoperability
- Better systems
+ Patients acceptance
SEE, GRANDPA?...I HAVE AN APP TO CHECK YOUR EARS, AN APP TO MONITOR YOUR BLOOD PRESSURE AND AN APP TO MANAGE YOUR MEDICATIONS!

I MISS DOCTORS.