Penn Medicine

Penn Medicine Connected Health: Structure and Future Planning

2022 Spring Meeting of the Academic Medical Group Leadership

Bill Hanson, MD | Chief Medical Information Officer and Vice President
Gregory Kruse, MPH MSc | Associate Vice President of Strategic Operations and Intelligence

April 1, 2022

Penn Medicine Overview

Penn Medicine = Perelman School of Medicine and the University of Pennsylvania Health System

- Perelman School of Medicine founded in 1765
- UPHS Treat patients with highest acuity
- Cardiology, Oncology, Organ transplant

Tremendous amount of growth

- 7 Acute Hospitals; Women's & Babies Hospital; Psych hospital; Rehab Hospital
- Strategic Partnerships with 6 health systems
- 4 employed physician organizations
- 200 locations throughout the region
- 5.6 million annual ambulatory visits
- 340,000 ED visits
- 130,000 adult admissions
- 3,000 inpatient beds
- 8,900+ Physicians
- 44,000 employees
- $9 billion in annual clinical revenues

Connected Health Evolution at Penn Medicine

2006 - 2008

Tele-ICU
Tele-Stroke
Home Telehealth
Tele-Genetics

2009 - 2012

Tele-Sleep
Tele-Trauma OB
Tele-Dermatology
Tele-Radiology
Travel Medicine

2013 - 2015

Connected Health
Governance
Central vs. Network
Embed Operationally

2016

Value Models
Operating Models
Financial Models
Formal Support Team
Training / IT Support
Reporting Infrastructure

2017 - 2020

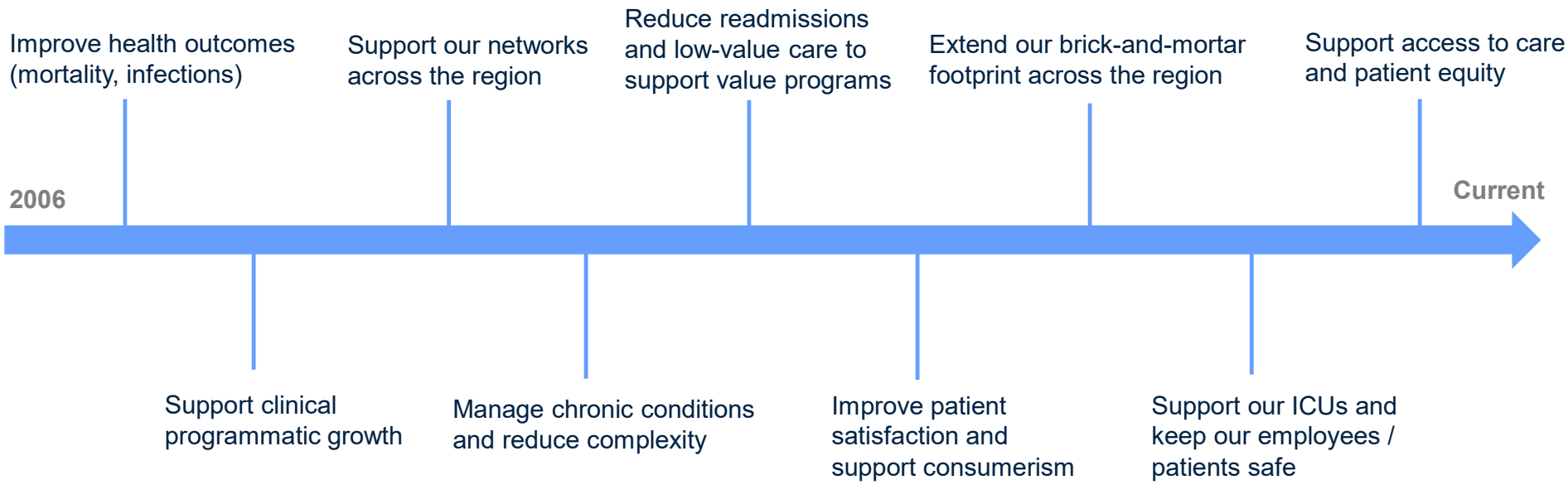
Center for Connected Care
Penn Medicine OnDemand
MyChart Virtual Visits
30+ Network Programs

COVID-19 Pandemic

500 monthly to 8500+ daily
Tele-ICU 200 to 400+ beds
90+ Network Programs
60+ RPM Programs

What are the goals of Connected Health?

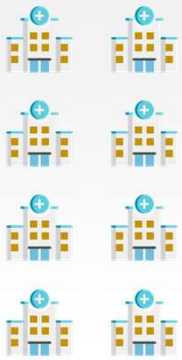
Evolving Alignment with Penn Medicine Goals



Penn Medicine Connected Health Organization

Office of the CMIO

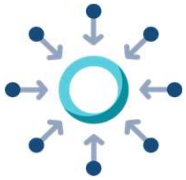
HOSPITALS



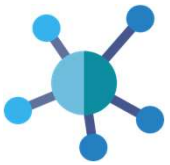
PENN MEDICINE MEDICAL GROUP

- **Faculty physicians**
  Clinical Practices of Univ of Penn
- **Employed physicians**
- **Private practices**

PENN CONNECTED HEALTH



Centralized
Center for Connected Care



Distributed
Network Telemedicine

CONNECTED HEALTH ADVISORY COMMITTEE

- Schedgistration Patient Access
- Physician Billing
- Revenue Cycle
- Regulatory
- Billing Compliance
- General Counsel
- Managed Care Contracting
- Government Relations

PARTNERS

EHR Transformation

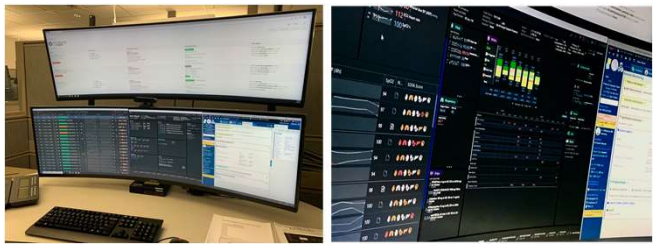
IT

Innovation Center

Penn Medicine Connected Health

Penn Medicine
Center for Connected Care

Largest Digital Health Center in the Region



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Penn Medicine

Tele-ICU

PennLINKS
Penn Medicine

Virtual Nursing

ONDEMAND
Penn Medicine

On-Demand Virtual Care

PennConnects

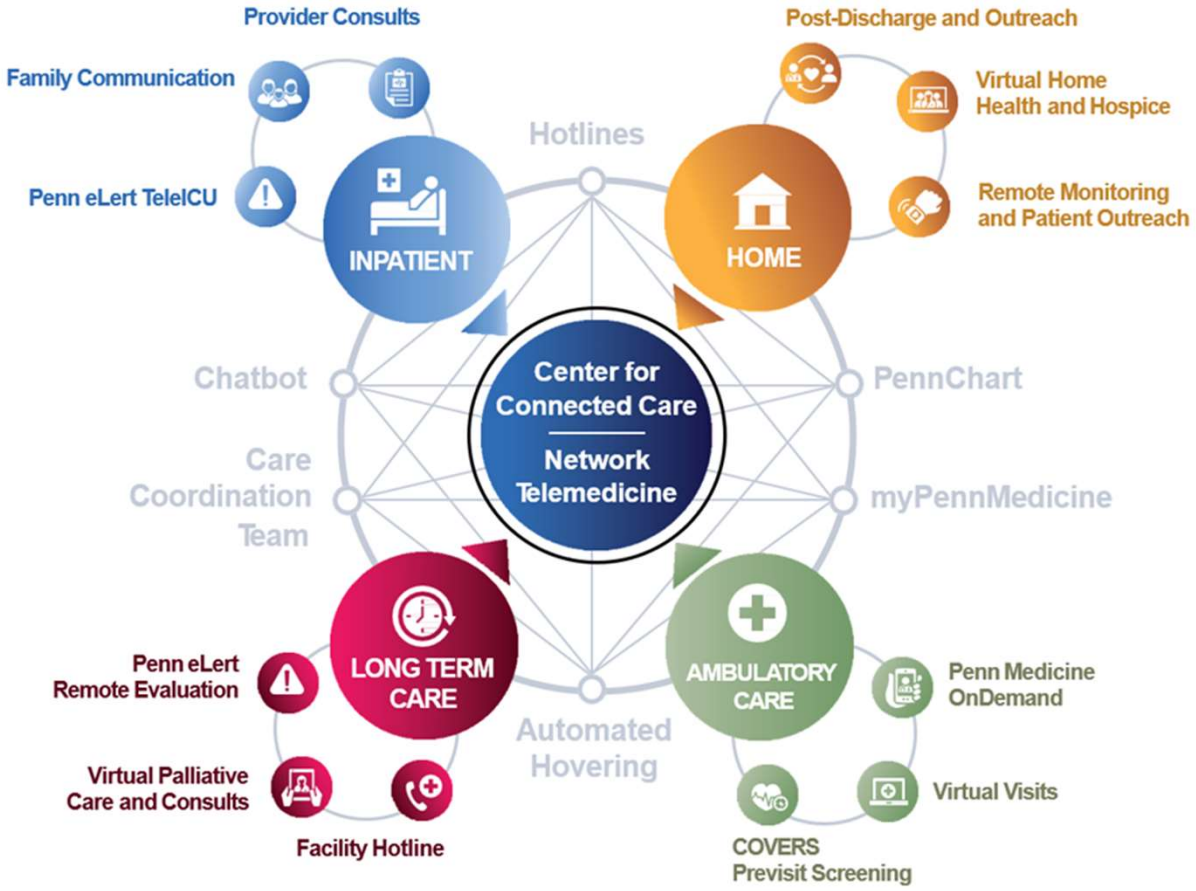
Remote Patient Monitoring

Penn Medicine
Network Telemedicine

90+ Connected Health Programs at Penn Medicine

- **Improve patient access and foster convenience**
- **Major differentiator for virtual care coordination**
- **Enhance value-based care & population management**
- **Retain existing and capture new market share**

Connected Health Landscape



Ambulatory Care

Telemedicine Visits

Virtual Urgent Care Visits

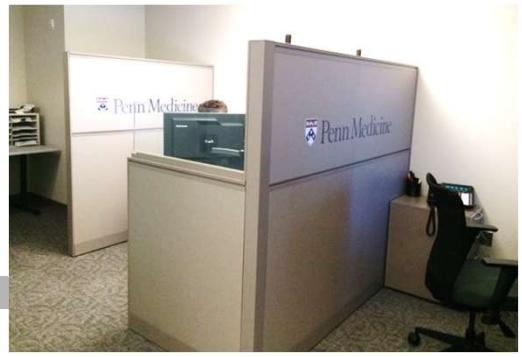
Visit Engagement (pre, post)

Telemedicine Visits

Penn Medicine Network Telemedicine

Telemedicine Guidelines & Policies

- Telemedicine Program Support
- Patients Appropriate for Telemedicine Visits
- EHR Integration
- Interaction with Technology
- Training and conducting Telemedicine Visits
- Licensing, Credentialing, and Regulation



Operations

- New telemedicine program development process
- Developed business models and operations workflow for select use cases that can be scaled
- Standardized Video Visit builds for replication and scale across the system
- Created telemedicine training program and patient-facing material

Telemedicine Visits Volume

Penn Medicine Network Telemedicine

Pre-pandemic

300 *to* 500

Telehealth visits a month

Height of the pandemic

8,500

Virtual visits a day

Since March 2020

1.3 MM+

Virtual visits

Aligning ambulatory telemedicine with enterprise strategies

With a standardized approach to Connected Health technology and platforms enterprise-wide, Penn Medicine's Connected Health team supports and enables the following strategies:

AMBULATORY CARE PRIORITIES

Equity

- ✓ **Portal-agnostic** approach to telemedicine
- ✓ **SMS-first** approach
- ✓ Prioritization of **accessibility features**
- ✓ **Equitable design advocacy** with vendors

Care Team Wellbeing

- ✓ **Human-centered, collaborative design** of telemedicine platforms
- ✓ **Time- and effort-saving** tools that delight
- ✓ **Customizability** empowers clinicians with individual preferences and workflows
- ✓ **Device-agnostic** approach to connecting

Access

- ✓ "**Moving the front door**" to get patients in earlier
- ✓ **24/7 virtual care** infrastructure
- ✓ **Automated hovering** and synchronous / asynchronous telehealth for visit replacements
- ✓ **Virtual group visit** model

Patient Experience

- ✓ **Consistent patient experience** across all practices
- ✓ **Frictionless** peri-visit and join processes
- ✓ **2-way real-time messaging** with care team
- ✓ Seamless addition of **family & support members**

High Reliability

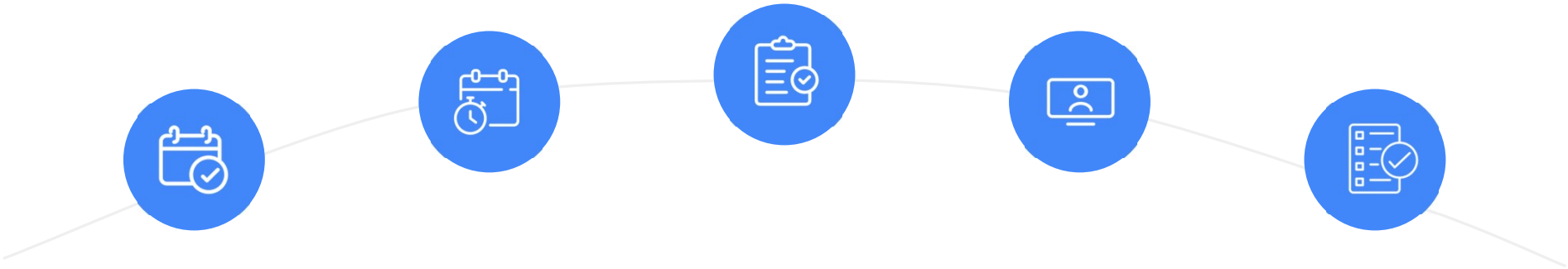
- ✓ Decentralized approach to telemedicine Q&S

ACADEMIC

Research & Education

- ✓ Research collaboration with University faculty and research organizations
- ✓ Medical student education
- ✓ Pathways for trainee partnership

Step-by-Step Overview: A More Seamless Virtual Visit Experience



Scheduling

Scheduling is done within EHR

Unique EHR visit types designate the modality (telehealth vs in-person) of appts on the schedule.

Appt Reminders

Appointment reminders are automatically sent via email and text message.

Reminders include **instructions for video setup and unique meeting link**.

Check-in

Bidirectional patient messaging enables previsit surveys or templated messages to facilitate "check in", "join now", or "running late" flows.

Providers and staff can see in real-time which patients have arrived and waiting in their video meetings and manage day flow.

Appointment

A **schedule view** of the clinic day helps provider flow.

Each **secure, unique video appointment** is launched with two clicks. When completed, the time duration of the appt is auto-calculated for easy documentation.

Check-out

The provider selects desired follow up window and notes within AVS.

Schedulers coordinate and schedule with patients accordingly (at the end of the virtual visit or as follow up).

Communicating with Patients

Penn Medicine Network Telemedicine

TEXT TICKLER

EMAIL TICKLER

Subject: "Time to check in for your upcoming telehealth visit"

Penn Medicine

Hello

{{providerDisplayName}} is looking forward to your telehealth visit on {{AppointmentDate}}. Do not come into the office for this visit.

Your visit is now available for check in. Please click the button below to check in, complete any payments, and review instructions for your visit. Due to high patient volume, we recommend early check in to avoid needing to verify your information during your visit.

CHECK IN ONLINE >

We look forward to seeing you. Thank you for choosing Penn Medicine!

To stop receiving reminders like these, unsubscribe here.

3400 Civic Center Boulevard, Philadelphia PA, 19104 | 800-789-7366 (PENN)

This email is intended for {{sendToEmailAddress}}

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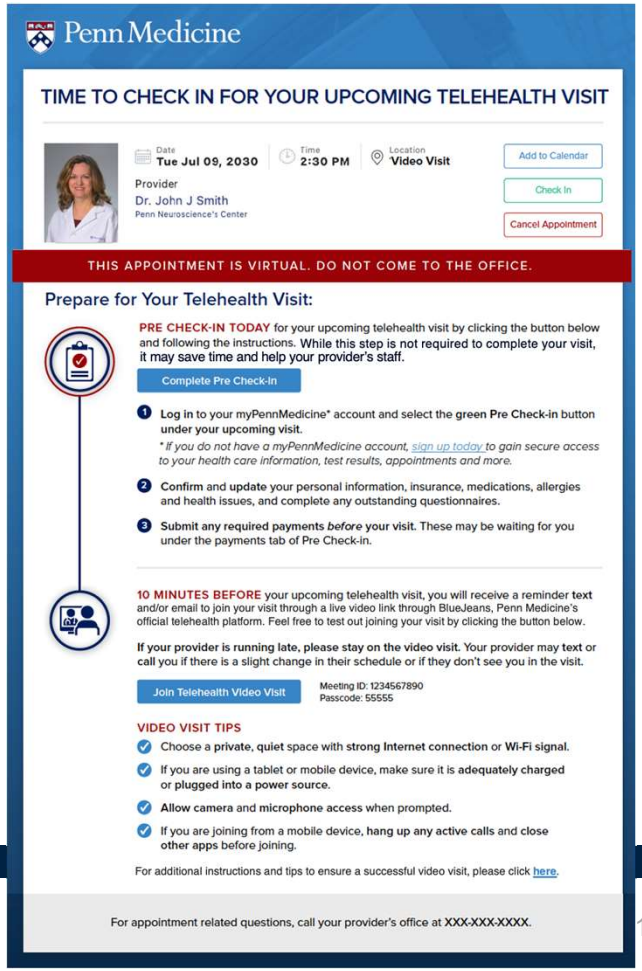
VISIT GUIDE



Penn Medicine

TIME TO CHECK IN FOR YOUR UPCOMING TELEHEALTH VISIT

Date Tue Jul 09, 2030 | Time 2:30 PM | Location Video Visit

Provider
Dr. John J Smith
Penn Neuroscience's Center

Add to Calendar | Check In | Cancel Appointment

THIS APPOINTMENT IS VIRTUAL. DO NOT COME TO THE OFFICE.

Prepare for Your Telehealth Visit:

PRE CHECK-IN TODAY for your upcoming telehealth visit by clicking the button below and following the instructions. While this step is not required to complete your visit, it may save time and help your provider's staff.

Complete Pre Check-in

1. Log in to your myPennMedicine* account and select the green Pre Check-in button under your upcoming visit.
   * *If you do not have a myPennMedicine account, sign up today to gain secure access to your health care information, test results, appointments and more.*
2. Confirm and update your personal information, insurance, medications, allergies and health issues, and complete any outstanding questionnaires.
3. Submit any required payments *before* your visit. These may be waiting for you under the payments tab of Pre Check-in.

10 MINUTES BEFORE your upcoming telehealth visit, you will receive a reminder text and/or email to join your visit through a live video link through BlueJeans, Penn Medicine's official telehealth platform. Feel free to test out joining your visit by clicking the button below.

If your provider is running late, please stay on the video visit. Your provider may text or call you if there is a slight change in their schedule or if they don't see you in the visit.

Join Telehealth Video Visit — Meeting ID: 1234567890, Passcode: 55555

VIDEO VISIT TIPS

- Choose a private, quiet space with strong Internet connection or Wi-Fi signal.
- If you are using a tablet or mobile device, make sure it is adequately charged or plugged into a power source.
- Allow camera and microphone access when prompted.
- If you are joining from a mobile device, hang up any active calls and close other apps before joining.

For additional instructions and tips to ensure a successful video visit, please click here.

For appointment related questions, call your provider's office at XXX-XXX-XXXX.

Telemedicine functionality – Developing our own solution

Penn Medicine Network Telemedicine

Switchboard

Seamless virtual visits, at your fingertips

Unique, Secure Virtual Meetings

Appointment Reminders

Bidirectional Patient Messaging

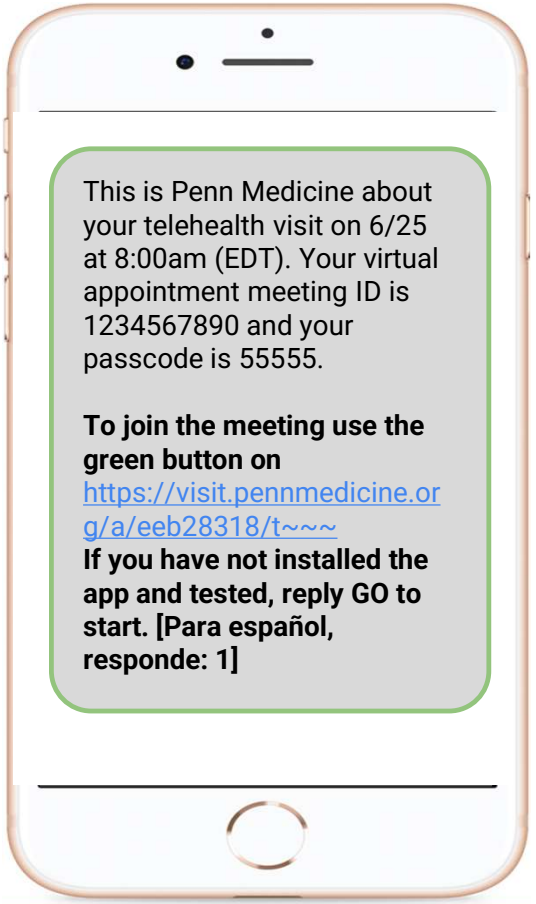
Virtual Waiting Rooms

Dynamic Provider Schedule Search

One-click launch of appointments

Language Translation

Customization



Entity Telehealth Master Policy and Dept Guidelines

Example: Penn Consultative Cardiology video visit

Outlined below are the specific medical conditions and criteria for a Penn Consultative Cardiology video visit. Video visits will only be offered to patients who are established patients to the provider and have previously been seen in Penn Cardiology and are residents of Pennsylvania. Patients will be referred to 911/local emergency services in the event of a life threatening or critical condition.

- Low-risk follow up for established patients with conditions including hypertension, hyperlipidemia, benign palpitations, stable ischemic heart disease, pre-operative risk stratification in the setting of a recent in-person visit (provider to patient, including provision of complicated test results normally requiring a visit)
- Low-risk follow up for established patients with post-partum cardiovascular conditions such as hypertension (provider to patient)
- Low-risk follow up for established patients with cardiovascular conditions as a consequence of oncologic disease (i.e. in the subspecialty of cardio-oncology). Clinical conditions would include hypertension as well as malignancy survivorship cardiac toxicity surveillance (provider to patient)
- Provider to provider questions on oncologic drug therapy and existing cardiovascular conditions or anticipatory guidance for providers on complications of oncologic drug therapy (provider to provider)
- Provider to provider questions on pre-operative patient risk stratification or perioperative cardiovascular condition management (provider to provider)

Low-risk patient population – Generally, a patient who can be evaluated and treated in the absence of a physical hands on evaluation and vital signs that is in alignment with traditional in-person care.

Medical appropriateness for telehealth follow-up - Medical appropriateness is determined by the attending physician's discretion after careful consideration of the patient's medical plan, need for vital signs, all co-morbidities, and overall clinical picture.

Technological appropriateness for telehealth follow-up - Technological appropriateness is determined by assessing the patient's or their caretaker's access to and ability to adequately use the phone-, video-, mobile-, and or web-based modalities needed to complete the telehealth visit.

Telehealth follow-up is intended as an optional alternative modality of postoperative follow-up. At any point during the pre-, peri-, or postoperative periods, the patient or their provider may decide to forego phone and/or video follow-up in favor of in-clinic follow-up due to surgical or medical reasons or for patient or provider preference.

DEFINITIONS

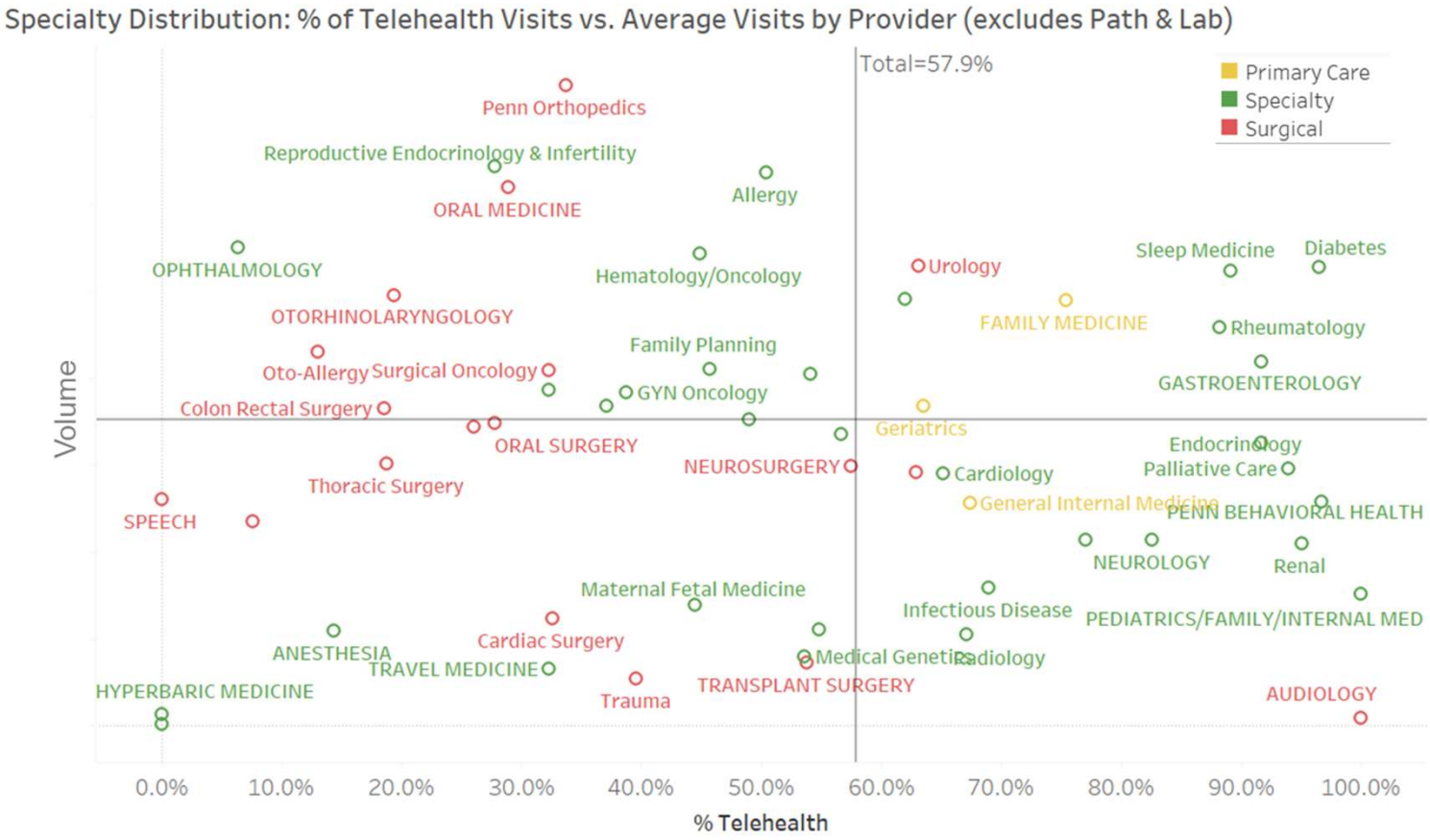
Low-risk surgery – Generally, a surgical procedure that has a predictable course of postoperative recovery, carries a low rate of complications, and involves either a brief inpatient stay or no inpatient stay.

Medical appropriateness for telehealth follow-up - Medical appropriateness is determined by the attending surgeon's discretion after careful consideration of the patient's surgical plan, co-morbidities, and overall clinical picture.

Technological appropriateness for telehealth follow-up - Technological appropriateness is determined by assessing the patient's or their caretaker's access to and ability to adequately use the phone-, video-, mobile-, and or web-based modalities needed to complete the telehealth visit.

Only gastrointestinal patients undergoing laparoscopic cholecystectomies, open inguinal hernia repairs, open umbilical hernia repairs,endocrine oncology patients undergoing thyroidectomy, parathyroidectomy surgery, and cardiovascular patients undergoing Wheat Hemiarch (AVR with ascending and hemiarch aortic graft), "Wheat" (AVR with ascending aortic graft, BioRoot (Pericardial-valved aortic root replacement) with or without hemiarch graft or who have been seen for their 1-year post-op visit with stable testing are eligible. Subsequently, this service may also be extended to patients undergoing other routine, low-risk surgeries not included in the above list.

Telehealth Adoption by Specialty and Average Provider Volume



Reducing low value visits to patients and health system

Penn Medicine Network Telemedicine

Use telemedicine for post-operative follow-up visits

- Patients are offered telehealth follow-up if they are getting an appropriate, low-risk surgery and they are clinically appropriate and they live or work in Pennsylvania
- Evidence of improved clinic and provider efficiency

Dr. John B. Morris, Dr. Steven Raper, Dr. Ken Lee, Dr. Daniel Dempsey

Example: Post Operative (GI)

Each patient saving estimated 159 to 228 min on average
→ 95-96% of the total time spent on clinic POV

- "… [could] recover at vacation house without having to spend time driving."
- "O god, I love [the telemedicine visit]! **It frees up my whole day**! Of course if I were sick I would come down.

Digital Front Door - 24/7 access

ONDEMAND **215-615-2222**

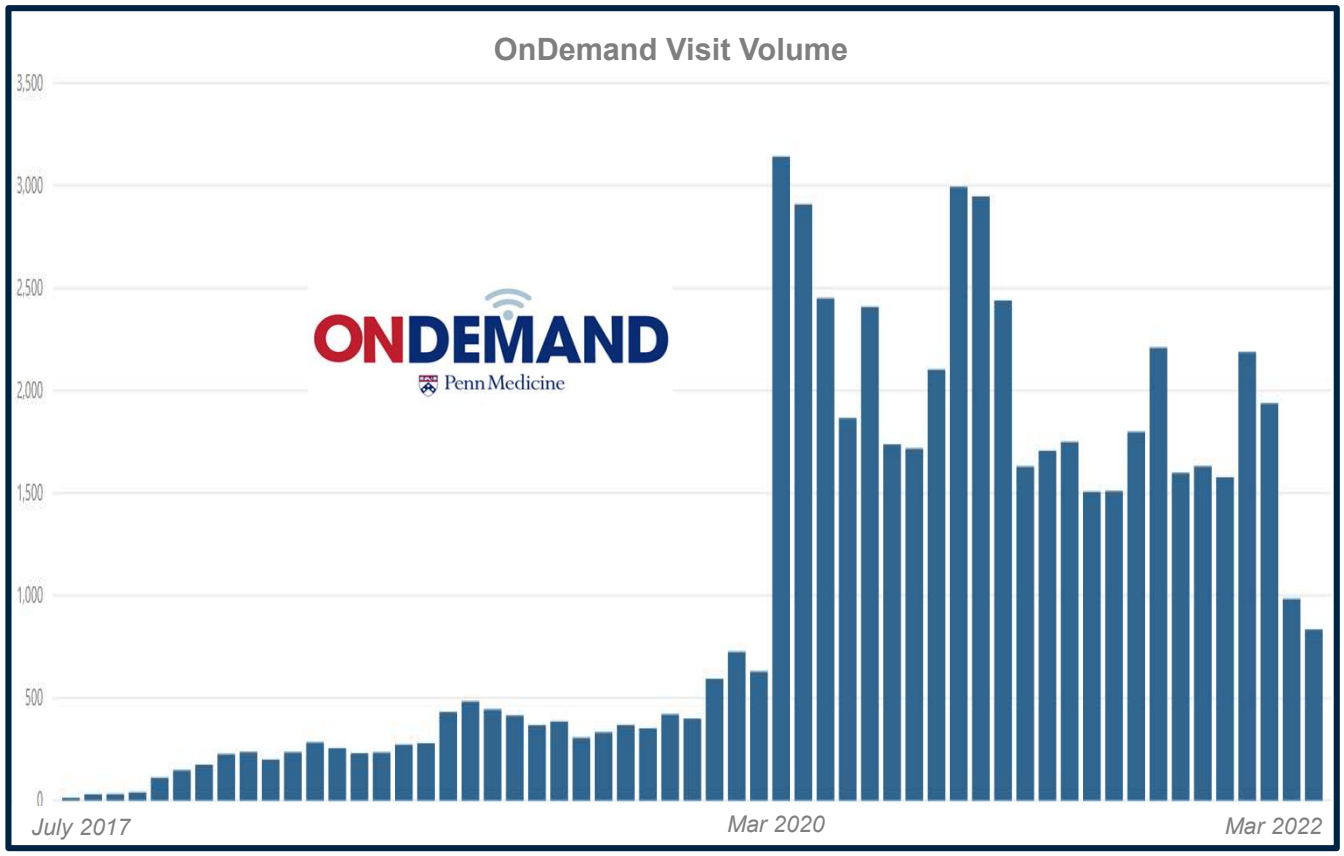
Penn Medicine's Virtual Urgent Care Practice

Ensuring our patients receive the right care, at the right time, in the right place

24/7/365 OnDemand Care from the Penn Center for Connected Care

- Open to the public, any patient with any insurance plan
- Free benefit for UPHS employees with Penn Care PPO insurance
- Patients 14 years or older who are located in PA, NJ, DE, MD
- Practice is staffed by full-time Penn Medicine MDs & APPs
- Provides medical advice, short term care prescriptions, and scheduling collaboration with Penn Medicine primary & specialty care physician teams
- Connect via PennChart's audio-video telemedicine technology using the MyPennMedicine (MPM) app downloaded from the Apple or Google store
- Self-schedule 20-minute virtual appointments via www.PennMedicine.org/On-Dmd
- For more information visit us at www.PennMedicine.org/OnDemand

Digital Front Door - 24/7 access impact



- 600% volume increase Feb – March 2020
- Essential for Access
- Care Continuum Coordination:
  - Provider visits
  - Nurse triage
  - Specialty care coordination
  - Behavioral health assessments
  - SDOH assessments

Access to 24/7 Virtual Care

ONDEMAND
Penn Medicine

ONDEMAND

Established 2017 with the formation Penn Center for Connected Care

- **Past** – employees only, open to the public March 2020 under the PHE with 600% growth
- **Present** – all patients, urgent care from PCSL, grant guarantor Suboxone program
- **Future** – specialty practice billing, subscription model, PCSL capitation, senior living communities, last mile capabilities

COMPETITIVE ADVANTAGE

Amazon, TeleDoc, MDLive, Walmart, CVS, & others

- **Patient Experience** – 24/7/365 access to Penn providers licensed in PA, NJ, DE, MD
- **Virtual First Care** – Penn diagnostics mitigate limitations of virtual encounters
- **Care Coordination** – access to care across Penn primary & specialty practices

$114 savings on per episode spending for OnDemand users

Using design and innovation principles to reduce avoidable emergency department visits among employees of a large academic medical center - ScienceDirect

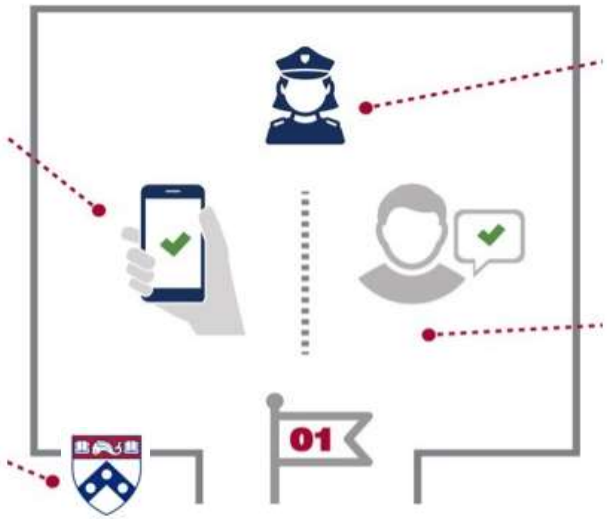
Digital Screening Before Campus Entry

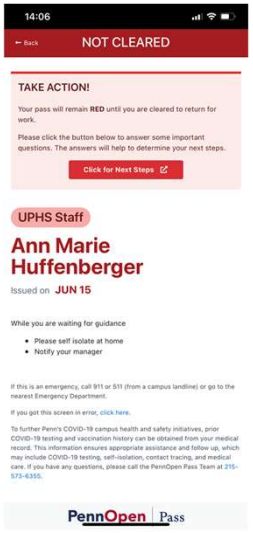
Penn Medicine Center for Connected Care

Custom Text Message/Interactive Voice Response (IVR) System Developed

PennOpen Pass

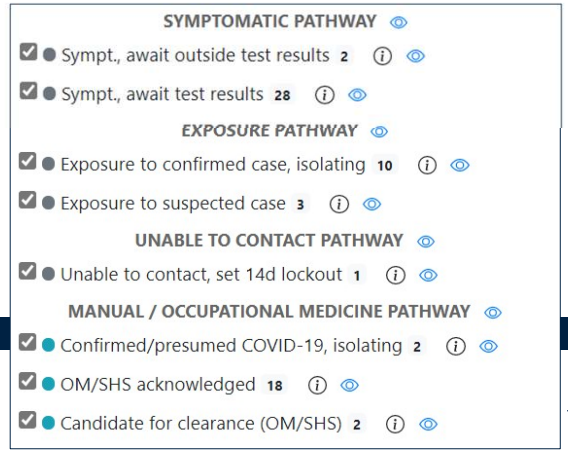
"Fast lane" model template





- More than 8,000,000 Patients, Employee, and Student Screened
- More than 55,000 RedPass Managed Centrally
- Robust On-Campus Collaboration
- EPIC Integration
- 24/7 Clinical Support via Penn OnDemand

RedPass Management System



E-Consults: Reducing unnecessary visits

Penn Medicine Network Telemedicine

E-Consults

- E-consults are peer to peer internet-based consultations referred to as “e-consults” between primary care physicians and specialists, such as endocrinology specialists for diabetic patients.
- Uses asynchronous “store and forward” technology or secure messaging

Benefits

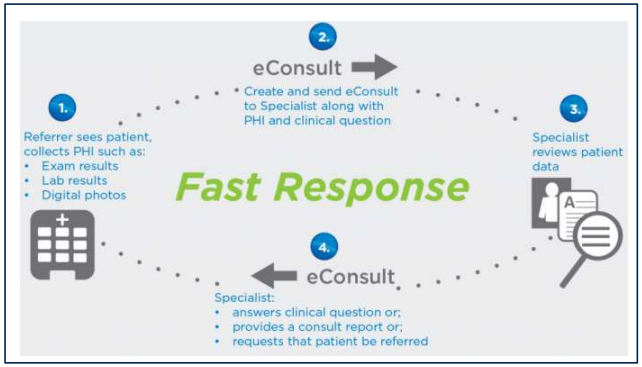
- *Reduction in consults of low value to patients, primary care and specialists (i.e. low disease acuity, high no show rate, low level decision making)*
- *Reduce total cost of care by preventing avoidable specialist visits and utilization*
- *Expedite appropriate diagnostic and therapeutic management*
- *Increase overall patient satisfaction*

Impact

e-Consultative services has prevented 34% of specialist appointments by keeping patients within primary care practices with remote specialist support. Net time-savings of 14% for specialists within rheumatology and endocrinology.

Where are there opportunities in Ambulatory Care?

- Reaching appropriate use steady state in telemedicine visits
  - State licenses built into HER
  - Entity Telehealth Master Policy and Dept Guidelines
  - Post-PHE payer coverage and reimbursement
- Asynchronous Telehealth
  - Scale e-visits and e-consults with sustainable payment model
- Urgent Virtual First Care
  - Integrate with diagnostics
  - Subscription model with employers and retirement communities
  - Explore last mile options



What other opportunities?

Inpatient

eICU

Inpatient Tele-Consults

Penn Medicine
Center for Connected Care


HUP


PPMC

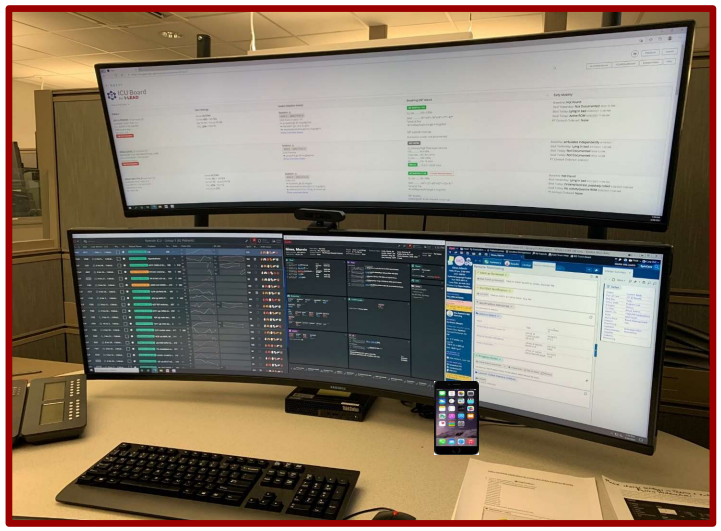

LGH


PAH


PMPH

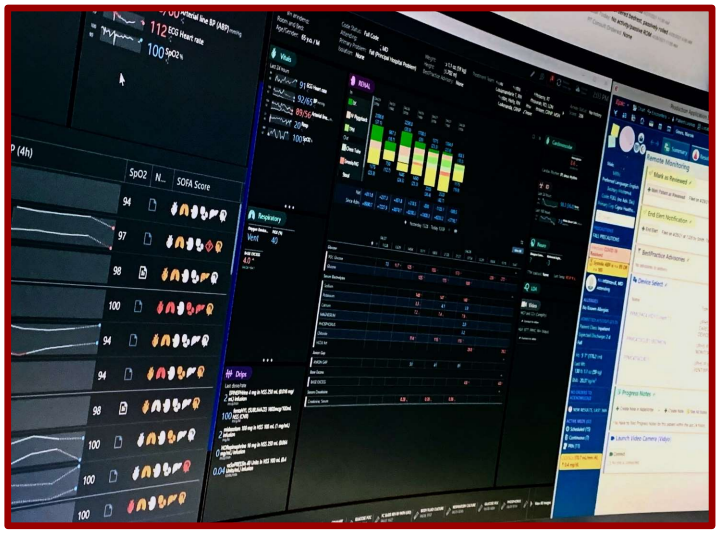

CCH

Rittenhouse



PENN E-LERT®
Penn Medicine

PennChart THE POWER OF ONE



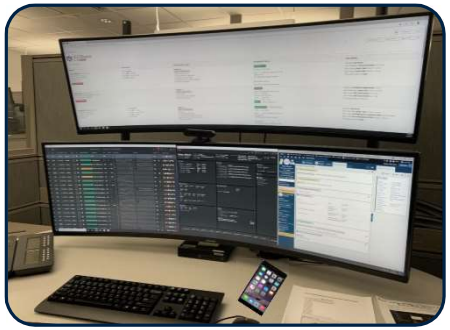
More than 450 connected cameras as fixed & mobile devices across the enterprise

Penn E-lert Activity and Hardware

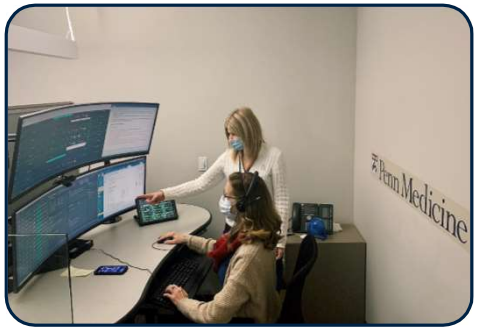
Penn Medicine Center for Connected Care

Annually manages 365K+ video consultations and 302K best practice alerts

Workstations at Rittenhouse Campus

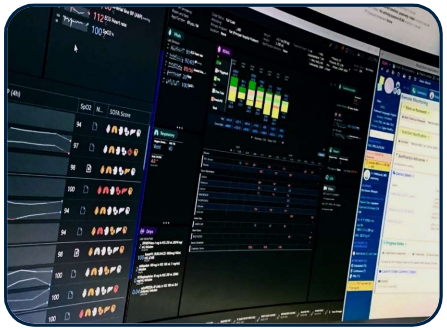


Typical Workstation Set Up

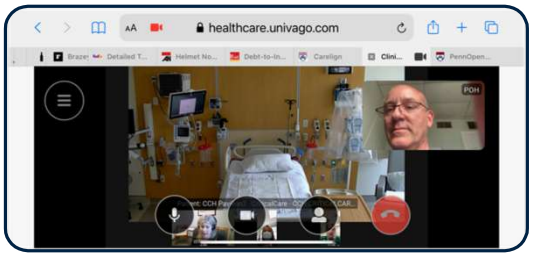


Team Review and Collaboration

Technology Applications

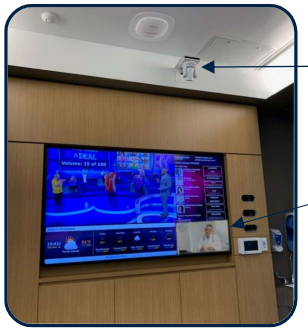


PennChart/EPIC Integrated Software



Capability to Add Participants via Link on Smartphone or Computer

Typical Patient Room



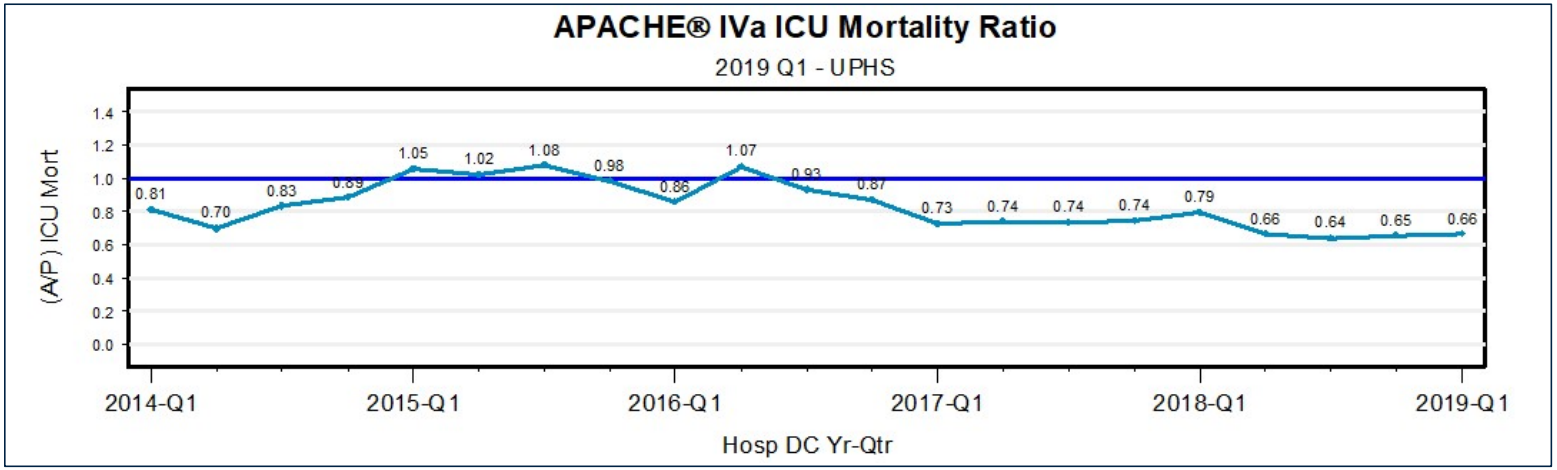
Typical Bedside View of Footwall

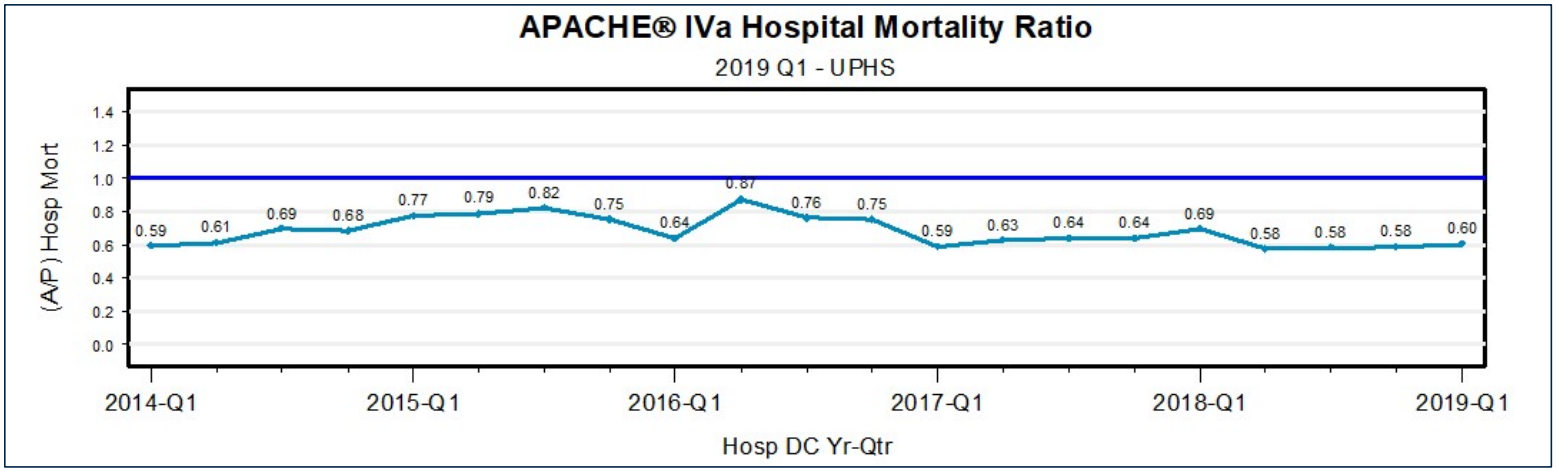
Penn E-LERT e-ICU Button

Penn E-lert Monitoring

Penn Medicine
Center for Connected Care

Improving ICU and hospital mortality





Connected Health Supporting Bundled Care

Penn Medicine Center for Connected Care

Pulmonary Care Surveillance in Critical Care

Partners in High Reliable Delivery of Critical Care

Penn ELERT RNs, RTs, & ICU Intensivists: **Call 215-893-7310**

Pulmonary Care Surveillance Bundle

Components	ELERT Workflow	Communication
Coordination of Spontaneous Awakening Trials (SAT) and Spontaneous Breathing Trials (SBT)	• Alerts: eRN and eRT receive all ICU Board SAT/SBT text alerts. For validated alerts, they will contact the bedside RN and RT who then determine if sedation weaning and/or a breathing trial can be done. • Am Rounds : eRN and eRT perform early am (~5-9:00am) rounds on all ventilated patients who are "SBT ready" to assess for opportunities to coordinate efforts to minimize sedation and facilitate daily SBTs. • RASS Goals: ICU Board screened by eRN at 8am & 8pm. For MV pts on continuous sedatives, eRN compares ordered RASS goals and current documented RASS assessments	• eRN will first text bedside RN if SCIP number in PennChart, or speak directly into room if appropriate, or call the unit desk. • eRT texts bedside RT • eRN will contact RN and provider to evaluate RASS goals
Extubation Risk Screens/Plans completed	• ICU Board screened by eRN at 8am & 8pm • Alerts: eRT receives extubation alert and confirms risk screening/planning process completed prior to extubation. If COVID+, observe CLT	• eRN text Covering provider via Cureatr
If high extubation risk- are visual cues in place ?	• eRN looks for yellow card displayed at pt's bedside, and red sticker on pilot balloon	• Yellow card: eRN text Covering provider via Cureatr • Red sticker: eRT texts RT
BPH Orders and Inspiratory Capacity for newly extubated surgical patients	• eRT checks all newly extubated SICU patients • Is there a BPH Order? • Was the inspiratory capacity performed w/in 6 hours of extubation?	• No Order: eRT text Covering Provider via Cureatr • No IC: eRT text Covering RT
ARDS ICU Board Alerts	• Alerts: eRN receives all ARDS alerts • eMD Validates ARDS/ confirms if proning appropriate • eMD ensures "Lung Protective Ventilation Protocol" is ordered (even if TV/Plat at goal) and prompts changes if not at goal, and promotes proning (with provider order)	• eMD text or call Covering provider • eRT text Covering RT • eRT/eRN offer assistance when alerted that proning is ordered.
GI and DVT prophylaxis	• eRN confirms active orders in place for all mechanically ventilated patients	• eRN text Covering provider via Cureatr
Monitoring and support during procedures	• Alerts: eRT receives alerts of new order placed for Helmet, Cuff Leak Test, Proning, or Extubation • eRN/eRT confirms vent orders and settings match on newly admitted and/or recently intubated pts.	• eRT checks in with team and offers help/guidance • eRT/eRT text provider via Cureatr

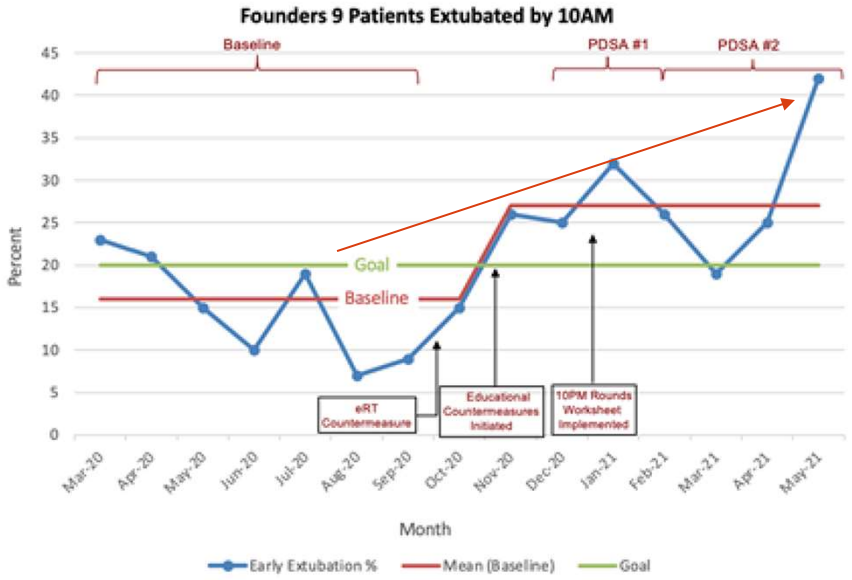
- Coordination of spontaneous awakening trials (SATs) and spontaneous breathing trials (SBTs)
  - Earlier Extubation and improved ICU outcomes
- Extubation risk screening & cuff leak tests
- Bronchopulmonary hygiene compliance
- ARDS best practice protocols
- GI and DVT prophylaxis
- Monitoring & support during procedures

Bundled Care Impact

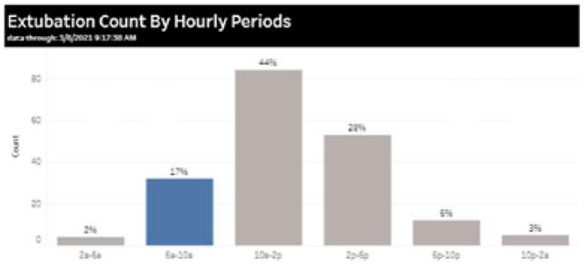
Penn Medicine Center for Connected Care

Earlier Extubation & ICU Throughput

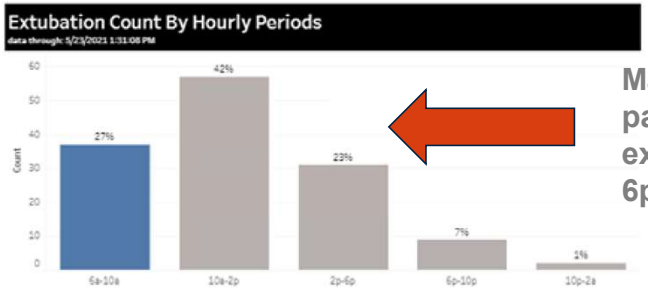
Performance – Run Chart



- **January 2020 – October 2020**



- **November 2020 – May 2021**



Majority of patients extubated by 6pm

Increased number of patients ready for extubation by 12-2pm

Patient Experience- Building for the Future

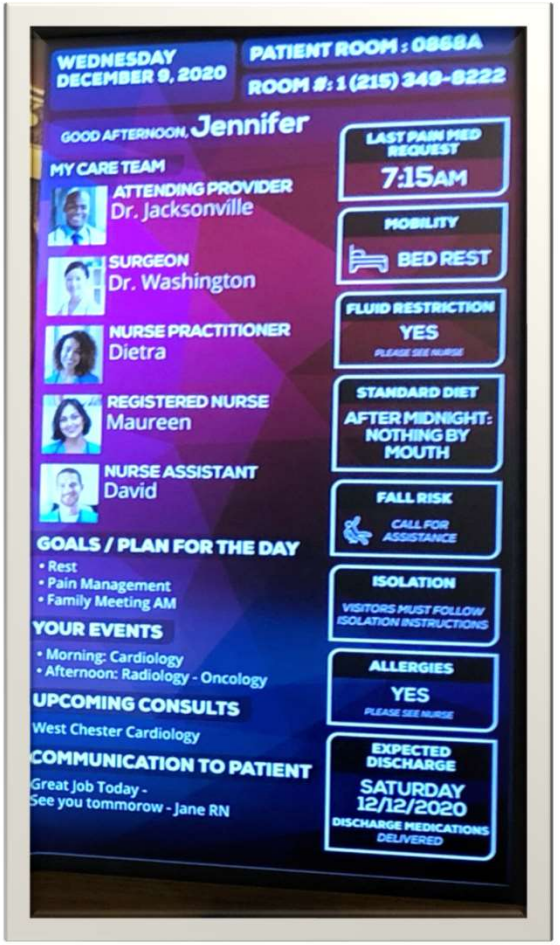
Penn Medicine Center for Connected Care

The Hospital of the University of Pennsylvania New Pavilion

- Opening 2021, 12 stories on Penn Medicine's Philadelphia campus as a hospital built to support the future of medicine.
- Includes advanced operating rooms, telemedicine infrastructure for remote monitoring and consultations, and in-room technology to strengthen communication among patients, families, and care teams.

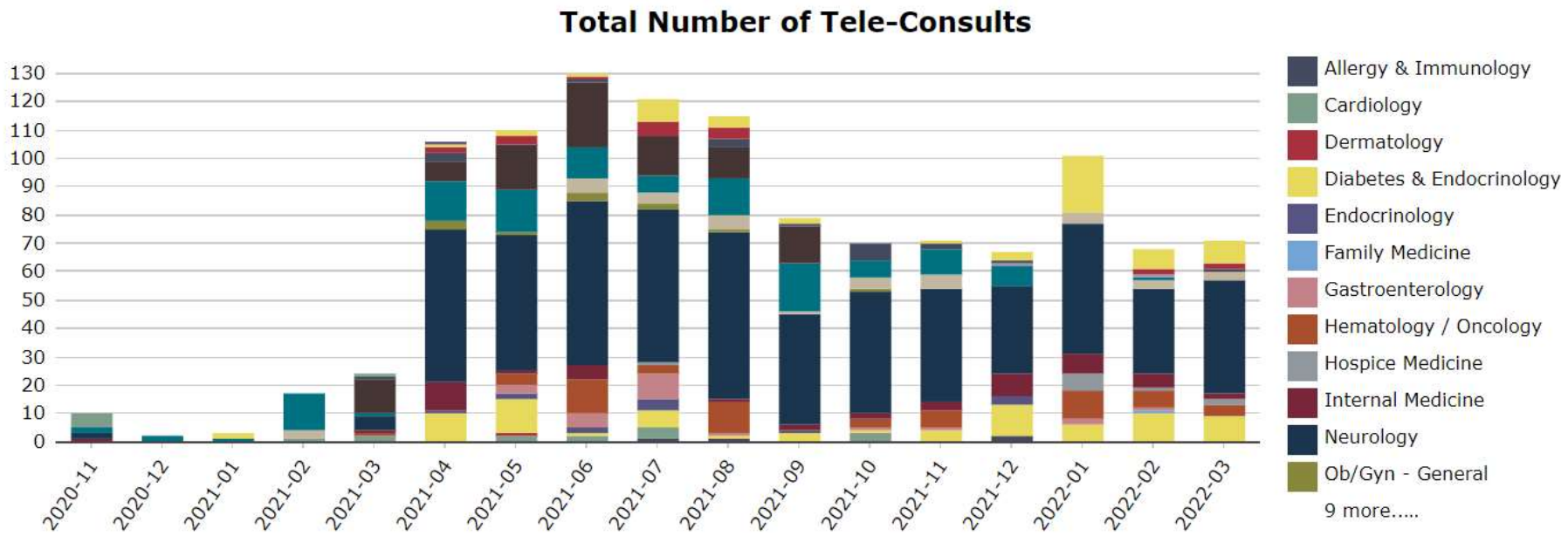
Patient Experience in the Hospital

Fixed cameras in every room



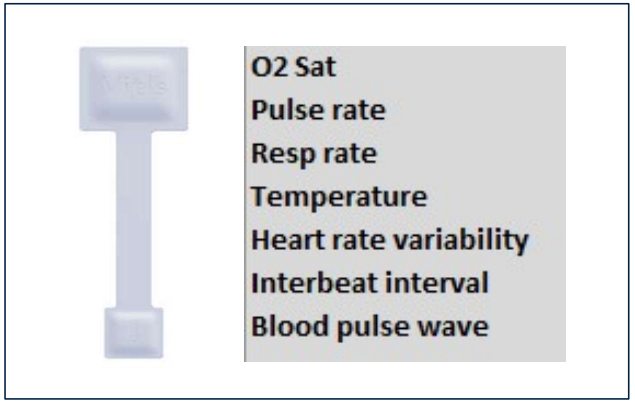
Inpatient Tele-Consults

Provide virtual inpatient consults to cover a larger geography and improve efficiency, either with a hospital or between hospitals



Where are there opportunities in Inpatient Care?

- E-sitter
  - Scale program through a centralized team across all hospitals
- Inpatient wearables
  - Started in pilots but have yet to use in standardized care
- eICU expansion to partners
  - Support appropriate patients to stay in place
  - Support transfer of patients when necessary



What other opportunities?

Home

Remote Patient Monitoring

Remote Patient Monitoring

Penn Medicine Center for Connected Care
Penn Medicine Network Telemedicine

Three Tiered-Intensity Technology Based on Patients' Risk and Needs

	High Touch $$$	**Medium Touch $$**	**Low Touch $**
Solution	Tablet/device solution that is delivered to the patient with nurse coordinator monitoring alerts	Automated calls and texts developed around clinical protocols and alerts monitored by nurse coordinators	Ongoing collection of patient reported outcomes that use rules for alerts or reviewed during visit
Technology	Tablet with devices 4G Cellular w/ AV Warehouse logistics	Phone calls / text messages Interactive response Free text questions	MyPennMedicine AV via Integrated EHR Video
Growth	Over 400 devices currently deployed	Over 150,000 patients reached out to annually	Integrate mobile device and internet of things into the medical record

Remote Patient Monitoring: High Touch

- High intensity programs
  - Devices, logistics, nurses, daily data
- Very effective when used in the right patient populations (e.g., high risk, engaged, period of time)
- Doesn't scale particularly well

High Touch Monitoring: 45-60 days after discharge

HF OUTCOMES

	UPHS Overall				High Touch Remote Monitoring			
	Patients	Readmits	Rate	CMI	Patients	Readmits	Rate	CMI
Total	8518	1495	18%	1.21	1240	129	10%	1.92

Remote Patient Monitoring: Medium Touch

Penn Medicine Center for Connected Care

Penn Medicine Network Telemedicine

PENN MEDICINE CONNECTS

Patient engagement and outreach via text and IVR supported by a team of 14 RNs

Patient pre-appointment screening for COVID-19

Employee COVID-19 screening for entry to campus facilities

Hovering for patients enrolled in Home Care

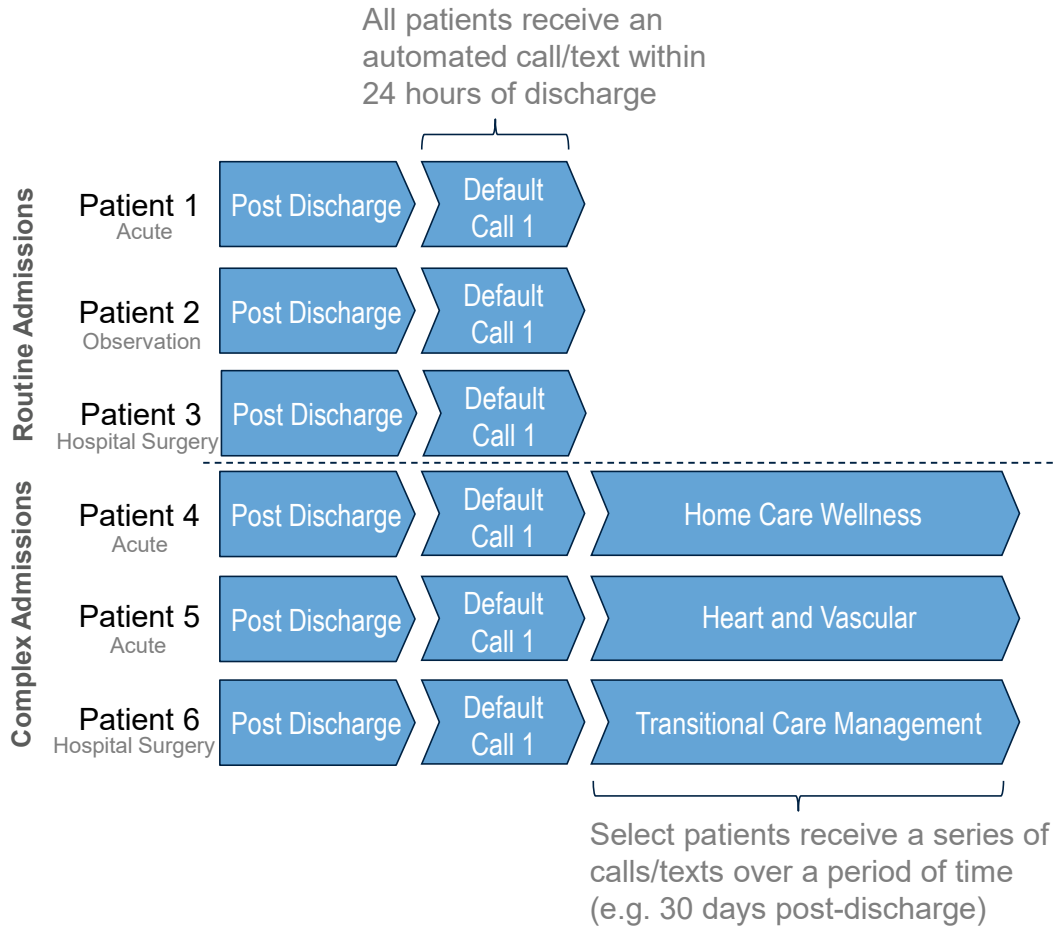
Disease specific automated hovering protocols

Post-discharge outreach

- Outreach to every single patient discharged from Penn Medicine hospitals
- Longitudinal outreach for select specialty service lines
- High-risk populations by payer
- ED – left without being seen
- OB – new birth
- Veterans

- **25,000** outbound SMS per day
- Inbound messages generate an **EHR outreach encounter**
- **7 days per week** 7am-5pm

Penn Connects Post-Discharge Outreach



Default Discharge Outreach to All Patients

- Hospital discharge outreach that is applied to "all" Penn Medicine patients discharged from our 6 acute hospitals
- Managing seamless transitions in care and identifying low/medium/high risk patients within first few days of discharge
- Automation is used to cover broad population

More Complex Discharge Outreach to Specific Patient Populations

- Program (questions, frequency) tailored to the needs of a specific population
- Hovering over a patient population to detect more complex signals (e.g. trends)
- Automation is more around multiple touch points, complex decision trees

Medium Touch Remote Monitoring: COVID Watch

Penn Medicine Center for Connected Care

COVID WATCH

- COVID Watch is a 14-day text-based program that can help you get the right care you need at the right time. Your text updates allow a dedicated team of nurses and doctors to monitor your progress.

COVID WATCH
Penn Medicine

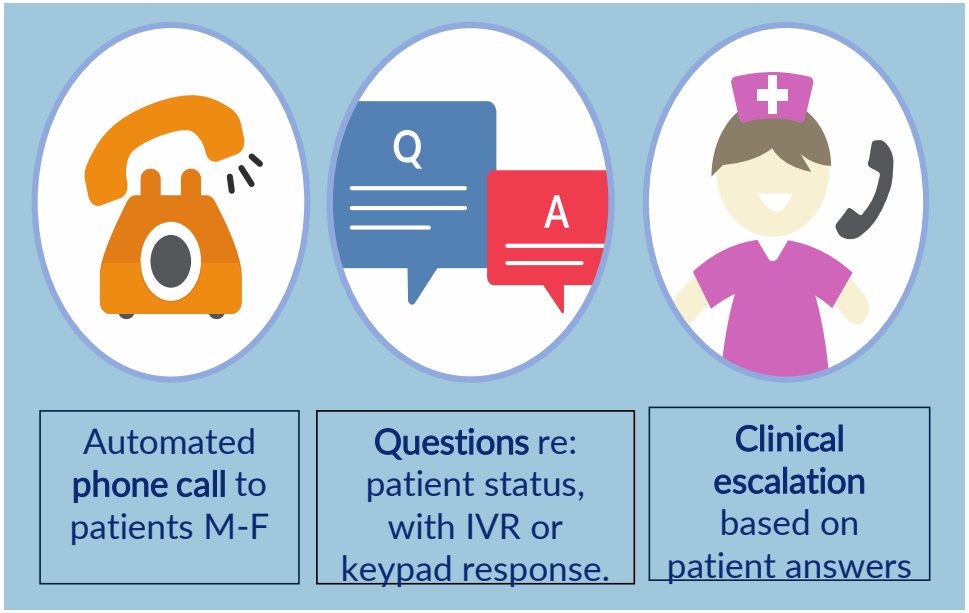
COVID WATCH RESULTS

- 25K+ patients participated in twice daily bidirectional text program
  - At height, 400 patients enrolled a day
  - 80% participation sustained
- Roughly 3-5% daily escalation
  - Respond “worse” ~ 29 minutes response
- Outcomes
  - LOS 14-21 days
  - Net promoter score 80
  - Reduced mortality in the ambulatory setting

[Comparative Effectiveness of an Automated Text Messaging Service for Monitoring COVID-19 at Home | Annals of Internal Medicine (acpjournals.org)]

Patient Engagement at Home

Implementation of automated daily wellness calls to all patients on Penn Medicine at Home, average daily 7K census



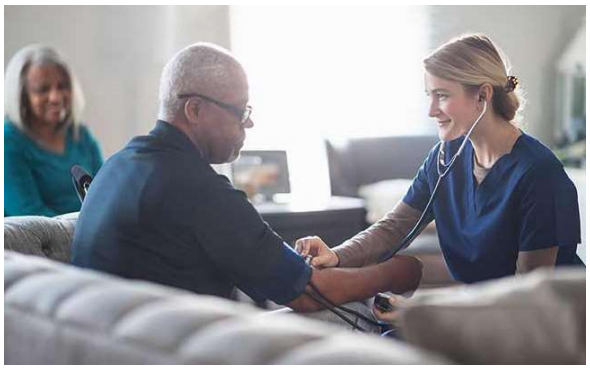
Over 85,000 Wellness calls placed between March 1 – June 30th

Significant increase in digital health devices deployed and significantly expanded capacity through establishment of a “bring your own device” model

Virtual Visits Offered by PMAH March 1 – June 30, 2020	
Virtual Case Management	23,396
Skilled Nursing	8,835
Physical Therapy	5,176
Occupational Therapy	1,865
Speech Therapy	356
Total Visits	39,628

Where are there opportunities in the Home?

- Expand medium touch remote patient monitoring across the health system to all patient populations
  - Benefit from centralized efficiencies and escalation paths
  - Develop more longitudinal programs (30 – 90 days)
- Connect virtual care in the home with in-person care
  - Home Care, Therapy, Diagnostics, Mobile Care
- Supports new initiatives in the home
  - Hospital at Home
  - Sensors in the home
  - 24/7 access to patients in their home



What other opportunities?

Summary

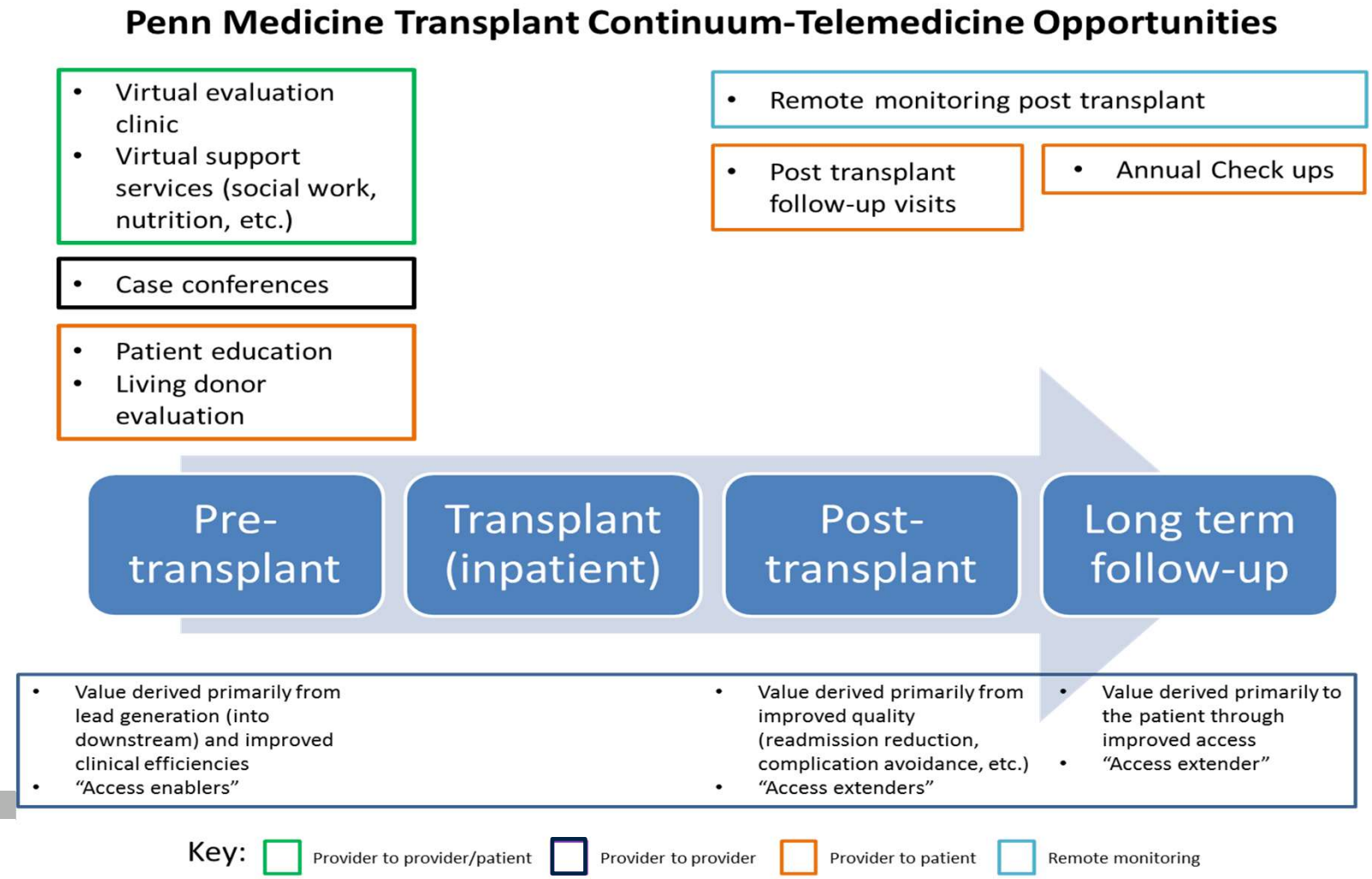
Guidelines for Developing a Connected Health Strategy

- Define telemedicine objectives up front
- Senior leadership support and governance is critical
- Don’t build another silo – embed and support in operations
- Focus on care outside the traditional health care settings
- The technology has to work and ultimately fade to the background
- Develop capabilities to prepare for increasingly dynamic marketplace

Connected Health Current Landscape

Reimbursement	Significant payer variance, facility fees under scrutiny, fee for service enthusiasm, uncertainty.
Regulatory Compliance	Many PHE exemptions, more havoc than before, uncertainty.
Hype	Proven its not hype, patients and providers have affirmed “can do” attitude.
Adoption	Some providers have not bought in; changes at federal and state levels are required to sustain.
Technology	Need to standardize the patient experience: common systems, centrally managed, commitment to scale.
Evidence	Robust ongoing evidence will be necessary to help shape policy in coming years.
Scalability	Proven its scalable, biggest challenge is now to prove its sustainable. Mitigate disparities in care.

Integration of connected health across the continuum of care

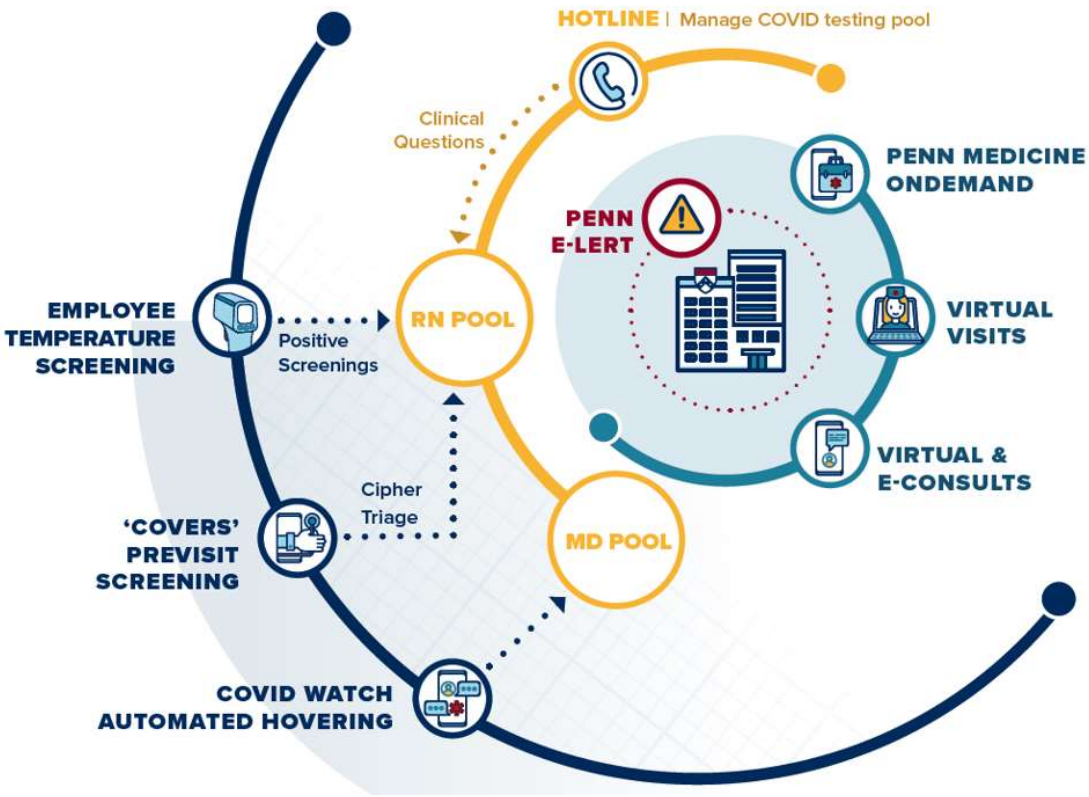


Responding to COVID

TELEMEDICAL EFFORTS
Across the Health System

Telemedicine has been deployed in a series of mutually reinforcing layers:

- An outer screening layer to prevent uncontrolled entry of COVID into the system
- A hotline staffed 24 hr/day by RNs for employee and patient questions
- Providers (MD's, NP's) engaged in Penn Medicine on Demand, virtual visits with patients
- Virtual and limited e-consults between providers
- Penn E-lert virtual ICU for the care of the sickest patients



Penn Telehealth Research and Publications

- Clinical Outcomes
- Health Equity
- Access Improvement
- Patient and Provider Satisfaction
- Provider Efficiency
- Peripheral Devices
- Cost Effectiveness

Video Virtual Clinical Encounters Versus Office Visits for Postoperative Care After Pelvic Organ Prolapse Surgery: A Randomized Clinical Trial

Daniel D Lee [1], Lily A Arya [2], Uduak U Andy [2], Heidi S Harvie [2]

Affiliations + expand

PMID: 32604202 DOI: 10.1097/SPV.0000000000000909

Abstract

Objectives: To determine if patient satisfaction of virtual clinical encounters is noninferior to traditional in-office clinical encounters for postoperative follow-up after reconstructive surgery for pelvic organ prolapse.

Utilizing Remote Real–Time Videoconferencing to Expand Access to Cancer Genetic Services in Community Practices: A Multicenter Feasibility Study

Angela Bradbury [1], Linda Patrick-Miller, Diana Harris, Evelyn Stevens, Brian Egleston, Kyle Smith, Rebecca Mueller, Amanda Brandt, Jill Stopfer, Shea Rauch, Andrea Forman, Rebecca Kim, Dominique Fetzer, Linda Fleisher, Mary Daly, Susan Domchek

Affiliations + expand

PMID: 26831751 PMCID: PMC4754531 DOI: 10.2196/jmir.4564

Free PMC article

Abstract

Background: Videoconferencing has been used to expand medical services to low-access populations and could increase access to genetic services at community sites where in-person visits with genetic providers are not available.

Objective: To evaluate the feasibility of, patient feedback of, and cognitive and affective responses to remote two-way videoconferencing (RVC) telegenetic services at multiple sociodemographically diverse community practices without access to genetic providers.

Methods: Patients at 3 community sites in 2 US states outside the host center completed RVC pretest (visit 1, V1) and post-test (visit 2, V2) genetic counseling for cancer susceptibility. Surveys evaluated patient experiences, knowledge, satisfaction with telegenetic and cancer genetics services, anxiety, depression, and cancer worry.

Results: A total of 82 out of 100 (82.0%) approached patients consented to RVC services. A total of 61 out of 82 patients (74%) completed pretest counseling and 41 out of 61 (67%) proceeded with testing and post-test counseling. A total of 4 out of 41 (10%) mutation carriers were identified: BRCA2, MSH2, and PMS2. Patients reported many advantages (eg, lower travel burden and convenience) and few disadvantages to RVC telegenetic services. Most patients reported feeling comfortable with the video camera--post-V1: 52/57 (91%); post-V2: 39/41 (95%)--and that their privacy was respected--post-V1: 56/57 (98%); post-V2: 40/41 (98%); however, some reported concerns that RVC might increase the risk of a confidentiality breach of their health information--post-V1: 14/57 (25%); post-V2: 12/41 (29%). While the majority of patients reported having no trouble seeing or hearing the genetic counselor--post-V1: 47/57 (82%); post-V2: 39/41 (95%)--51 out of 98 (52%) patients reported technical difficulties. Nonetheless, all patients reported being satisfied with genetic services. Compared to baseline, knowledge increased significantly after pretest counseling (+1.11 mean score, P=.005); satisfaction with telegenetic (+1.74 mean score, P=.02) and genetic services (+2.22 mean score, P=.001) increased after post-test counseling. General anxiety and depression decreased after pretest (-0.97 mean anxiety score, P=.003; -0.37 mean depression score, P=.046) and post-test counseling

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Telemedicine Outpatient Cardiovascular Care during the CO Pandemic: Bridging or Opening the Digital Divide?

Lauren A. Eberly, Sameed Ahmed M. Khatana, Ashwin S. Nathan, Christopher Snider, Howard M. Julien, Mary E Srinath Adusumalli

Originally published 8 Jun 2020 | https://doi.org/10.1161/CIRCULATIONAHA.120.048185 | Circulation. ;0

10.1161/CIRCULATIONAHA.120.048185

Telemedicine Outpatient Cardiovascular Care during the COVID-19 Pandemic: Bridging or Opening the Digital Divide?

Running Title: *Eberly et al.; Inequities in Cardiovascular Telemedicine Care*

Lauren A. Eberly, MD, MPH[1,2]; Sameed Ahmed M. Khatana, MD, MPH[1,2]; Ashwin S. Nathan, MD[1,2]; Christopher Snider, MPH[3]; Howard M. Julien, MD, MPH[1,4]; Mary Elizabeth Deleener, MBA, BSN, RN[3]; Srinath Adusumalli, MD, MSc[1,2,3]

HEPATOLOGY AASLD

SPECIAL ARTICLE | Free Access

Telemedicine in Liver Disease and Beyond: Can the COVID-19 Crisis Lead to Action?

Marina Serper, Allen W. Cubell, Mary Elisabeth Deleener, Tara K. Casher, Dale J. Rosenberg, Dale Whitebloom, Roy M. Rosin

First published: 10 April 2020 | https://doi.org/10.1002/hep.31276

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This article has been accepted for publication and undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the Version of Record. Please cite this article as doi:10.1002/hep.31276

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journal homepage: www.elsevier.com/locate/ymsy

Healthcare

Presented at the Academic Surgical Congress 2017

Patient preference for time-saving telehealth postoperative visits after routine surgery in an urban setting

Jacqueline M. Soegaard Ballester [a,b,c,*], Mary F. Scott [b], Lily Owei [b], Christopher Neylan [b,e], C. William Hanson [c,d], and Jon B. Morris [a,b]

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ARTICLE INFO

Article history:
Accepted 9 August 2017
Available online 3 February 2018

ABSTRACT

Background. Focusing on high-value delivery of health care, we describe our implementation of telephone postoperative visits as alternatives to in-person follow-up after routine, low-risk surgery in an urban setting. Our pilot program assessed telephone postoperative visit feasibility as well as patient satisfaction and clinical outcomes.

Methods. We offered telephone postoperative visits to all clinically eligible, in-state patients scheduled for appropriate low-risk operations. An advanced practitioner conducted the telephone postoperative visit within 2 weeks of the operation and discharged patients from routine follow-up if recovery was satisfactory. We reviewed the medical records to identify encounters and adverse events in the 30-day postoperative period.

Results. Telephone postoperative visits were opted for by 92/94 (98%) clinically eligible, in-state patients. Most patients cited convenience (55%), travel (34%), and time (22%) as their main motivations. The average patient opting in was 55 ± 16 years old (range 23–88, 8% >65) and lived 22 ± 26 miles from our clinic (range 0.9–124). Of 50 patients completing telephone postoperative visits, 48 (96%, 2 were not asked) were satisfied with the telephone postoperative visit as their sole postoperative visit, 44 (88%) of whom required no additional follow-up. On average, telephone postoperative visits lasted 8.6 ± 3.9 minutes, compared with the 82.8 ± 33.4 minutes for preintervention, postoperative visit time. Adding travel times, we estimate each patient saved an average of 139–190 minutes or 94–96% of the time they would have spent coming to clinic. No instances of major morbidity or mortality were identified on chart review.

Conclusion. Many patients find telephone postoperative visits more convenient than in-clinic visits. Moreover, estimates of time saved are compelling. Amid changing regulations and reimbursement, our findings support the growing use of telehealth for postoperative care of routine, low risk operations.

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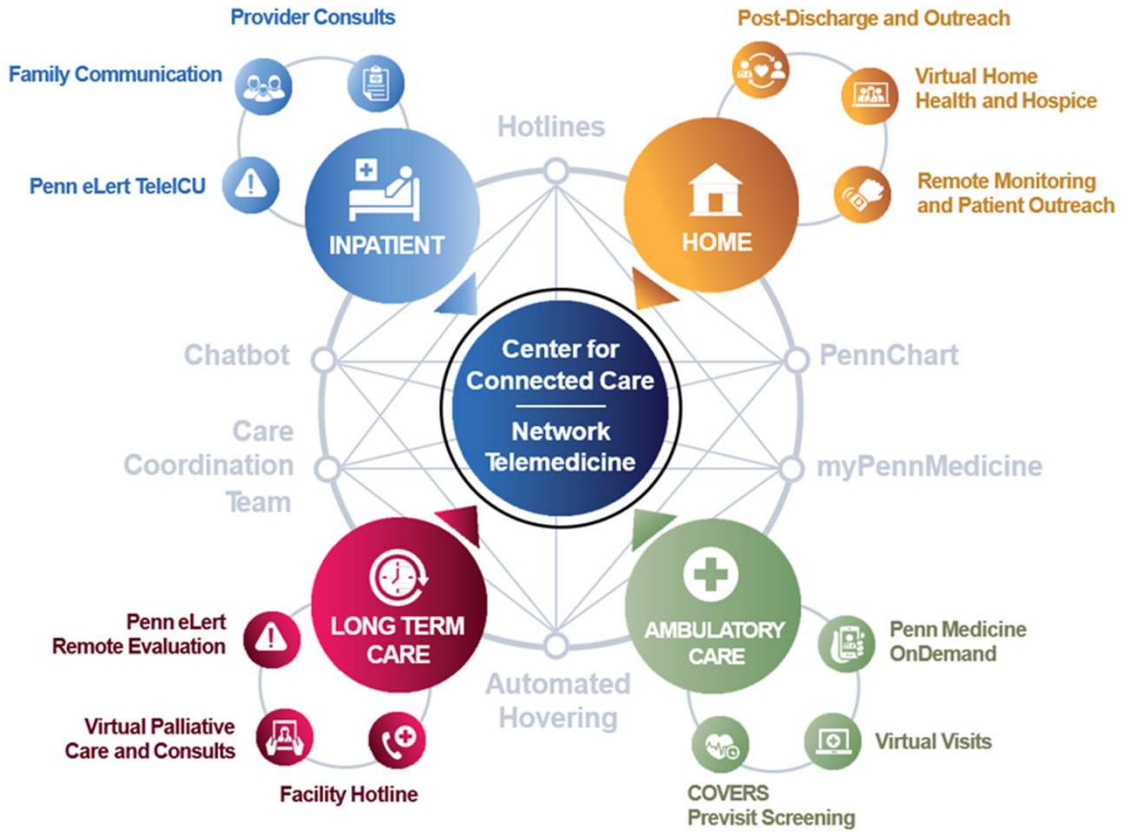
Penn Medicine

Connected Health – Reaffirming our Goals



- Meet people where they are in their care journeys
- Leverage the power of technology to engage with them "in the other 5,000 hours"
- Foster 1:1 human interactions, collaborate and partner to:
  - advance innovative care paradigms
  - improve clinical outcomes locally, regionally, and globally.


Penn Medicine