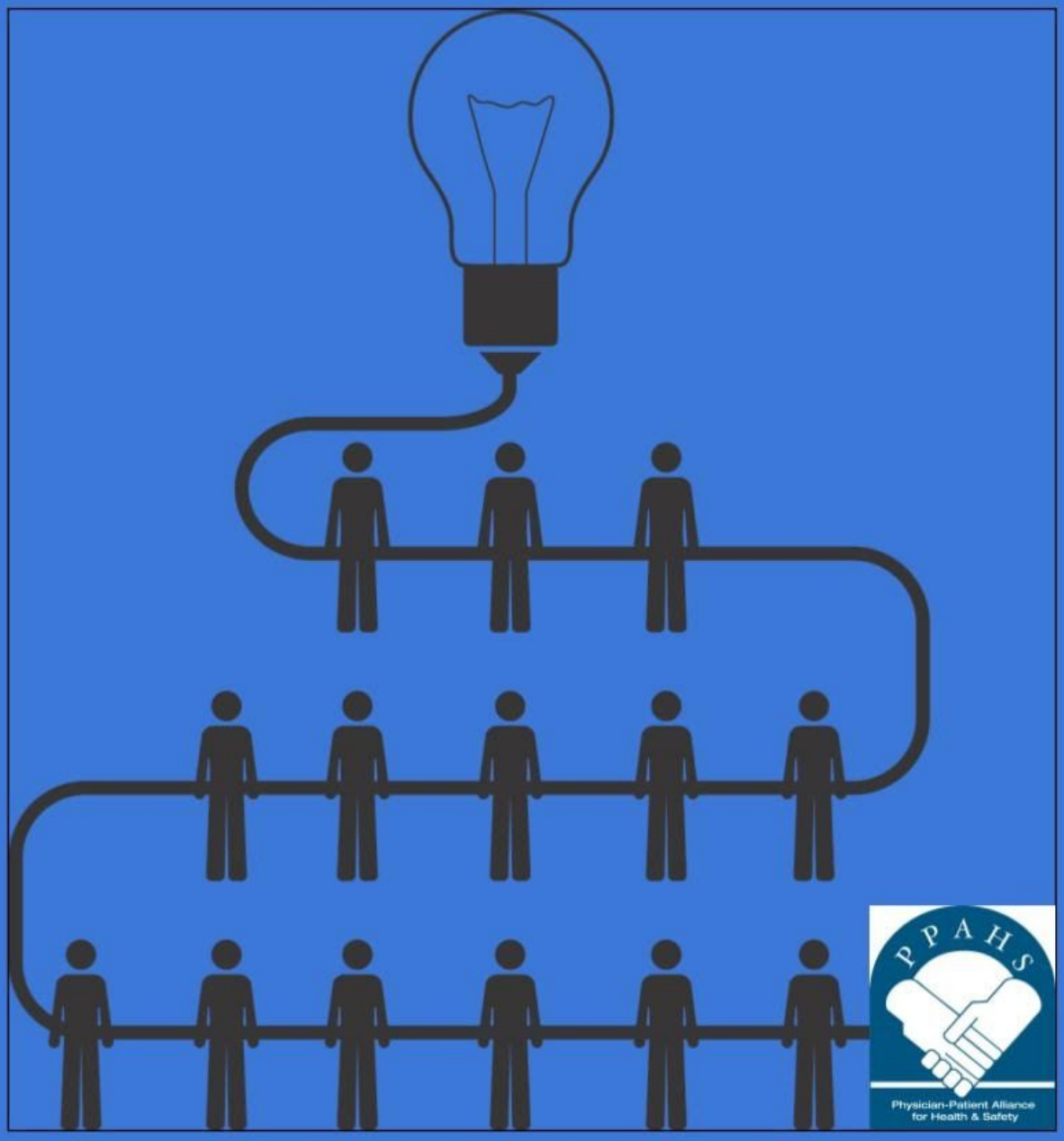
Physician-Patient Alliance for Health & Safety
2020 Perspectives on Trends and Use of Technology for Improving Patient Safety



COVID has Accelerated Innovation and Technology Adoption in Healthcare

As of June 15, 2020, the World Health Organization reports that there are more than 2 million confirmed cases or COVID-19 and 115,000 deaths due to COVID-19 in the United States (worldwide, there are more than 7.8 million confirmed cases and more than 430,000 deaths).

With the necessity for social distancing brought by COVID-19, the healthcare industry is being forced to be innovative - to do things differently so that clinicians can continue to provide patient care and patients can continue to be cared for. As Cheryl Pegus, MD writes:

> *"In healthcare, our adaptability and innovative execution in the weeks since the novel coronavirus outbreak has been faster than at any time in the decades the industry has been pursuing systemwide innovation.*
>
> *"Healthcare innovation combining technology, data integration and data sharing with a core of human-centered care has become our battle cry against COVID-19 today and in the near future.* ***This pandemic has shown us that access to care, personalized behavioral health support and mobile health solutions are imperative to not only overcome a public health crisis, but to the future of the U.S. healthcare system. [emphasis added]"***

So, even though the COVID pandemic presents a fluid and evolving situation, as new data and information is gathered and reported daily, we present below 5 healthcare innovation and technology predictions for 2020 (the uses of technology discussed below are not new, we believe that their adoption, acceptance, and use will increase) and what we at the Physician-Patient Alliance for Health & Safety (PPAHS) have done to foster that innovation and technology adoption:

#1 - Wearing Healthcare Devices Benefits Both Patient and Their Clinicians

The Case for Wearing Healthcare Devices

There will be a greater demand for healthcare technologies that can be worn by patients.

For the clinician looking to encourage recovery of their patients, movement is a critical factor to improving patient health. Patient ambulation, the ability to walk from place to place independently with or without an assistive device, is necessary to improve joint and muscle strength, as well as prevent pressure ulcers during extended bed rest. It is a critical factor in improving patient well-being while in hospital, as well as reducing total length of stay (LOS).

For patients recovering from procedures directly impacting mobility, such as hip and knee arthroplasty, the effects of early ambulation are drastic. A 2014 study of 1,504 knee arthroplasty patients associated early ambulation with as little as a one-day reduction in LOS, with the potential for a greater reduction. In addition to the improvement to patient quality of life, reducing LOS translates to large cost efficiencies for hospitals; a 2015 review published in the Journal of Arthroplasty estimated that the costs billed for one inpatient day after total hip arthroplasty was $3,300.

And the positive effects of early ambulation are not limited to ambulation-related procedures. A 2010 study of patients over the age of 65 admitted for a range of conditions including cardiopulmonary, infection, gastrointestinal, and neurologic diagnoses showed that patients who increased their total steps total to 600 or more saw a reduction in LOS by nearly 2 days. For patients admitted to the ICU for acute respiratory failure, the implementation of an earlier out of bed protocol (5 days vs 11) reduced ICU LOS by 1.4 days, and hospital stay by 3.3 days.

Given the well-documented positive effects on patient care, it makes sense that ambulation should be a clinical priority. Patients wearing technology, rather than being

tethered to a bed connected to monitoring devices, provides the impetus to realize that priority.

For patients, wearable technology allows patients to track their own health parameters and thereby allow them to know when an escalation or change in their care is needed. During this current COVID pandemic, this has meant that a patient would know changes in their health.

PPAHS on Wearable Technology

In February 2017, PPAHS released a position statement on patient ambulation. In that position statement, we urged hospitals to prioritize ambulation as a key metric. As Sandra K. Hanneman, PhD, RN, FAAN (Jerold B. Katz Distinguished Professor for Nursing Research, University of Texas Health Science Center at Houston (UTHealth), School of Nursing, Center for Nursing Research) stated about the need for patient ambulation:

> *"Our work as nurses is prevention and early detection of deterioration to keep patients safe and facilitate rapid recovery," said "At times current patient monitoring technology contributes to the development of complications because it hampers patient movement."*

Dr. Hanneman is a member of PPAHS' board of advisors.

To encourage ambulation, the use of wearable technology needs to be a priority.

To read the PPAHS position statement on ambulation, please click here.

#2 - Using Remote Patient Monitoring Allows for Real-Time Intervention

Remote patient monitoring collects physiological data on a patient - which can either be done in a healthcare setting (such as from a hospital room to a nursing station) or elsewhere (such as from the home to a monitoring service).

By receiving data in real time, a clinician or caregiver can intervene in the patient's care. For example:

- A patient is discharged to his home after successful total hip replacement. He is given a prescription of opioids to manage his pain. A remote monitoring device determines that the patient's oxygen saturation has fallen to below 75 millimeters of mercury (mm Hg). His clinician receiving that data, after making sure his patient is ok, adjusts the patient's opioid dosage to prevent opioid-induced respiratory depression.
- A diabetec patient forgets to take her insulin. Her low glycemic score is sent to her caregiver who calls the patient to remind her to take her insulin.

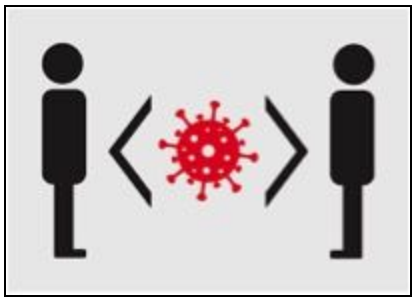
For the clinician, the benefits of remote patient monitoring includes:

- Ease of access to patient data.
- Ability to deliver patient care without the need to be in the same room.

For the patient, the benefits of remote patient monitoring includes:

- Assurance that any deterioration in their health status will be recognized.
- Improved support and feedback from attending clinicians.

During the current COVID pandemic, use of remote patient monitoring would mean that the patients and clinicians don't have to be in the same room.



PPAHS on Continuous Patient Monitoring

In February of 2017, the Physician-Patient Alliance for Health & Safety issued a statement in support of continuous monitoring of all patients in-hospital who have been given an opioid.

"Measuring vital signs every four hours is an outdated and dangerous practice. Patients on our hospital wards deserve continuous vital sign monitoring so they are not found 'dead in bed,'" said Dr. Frank Overdyk, a Charleston-based anesthesiologist and expert on respiratory compromise. Dr. Overdyk is also a member of our board of advisors.

"One of the key complications resulting from opioid use in hospitalized patients is respiratory distress that can lead to ICU transfers and sadly, even death. Moreover, respiratory depression is a key risk factor across the healthcare continuum, from hospitals to skilled nursing facilities," explained Michael Wong, JD, Executive Director of The Physician-Patient Alliance for Health & Safety (PPAHS). "For this reason, all patients receiving opioids should be continuously electronically monitored, to help provide early detection of the risk of respiratory depression and enable timely intervention."

To read PPAHS position statement on continuous monitoring, please click here.

#3 - Taking Care of Patients Virtually: The New Normal in Patient Care

The current COVID pandemic has necessitated social distancing. To keep both patients and clinicians safe, use of virtual technologies allows for clinicians to care for patients without having to be in the same room.

Such technologies include:

- Chat lines.
- Video calls.

PPAHS on Taking Care of Patients Virtually

On April 23, 2020, PPAHS launched a free virtual clinic and website, Virtual Patient Care, in response to the COVID-19 crisis, to meet the pressing needs of patients with atrial fibrillation (Afib), who are at the highest level of risk from stroke, and to help Afib patients cope with the difficulties imposed by COVID-19.

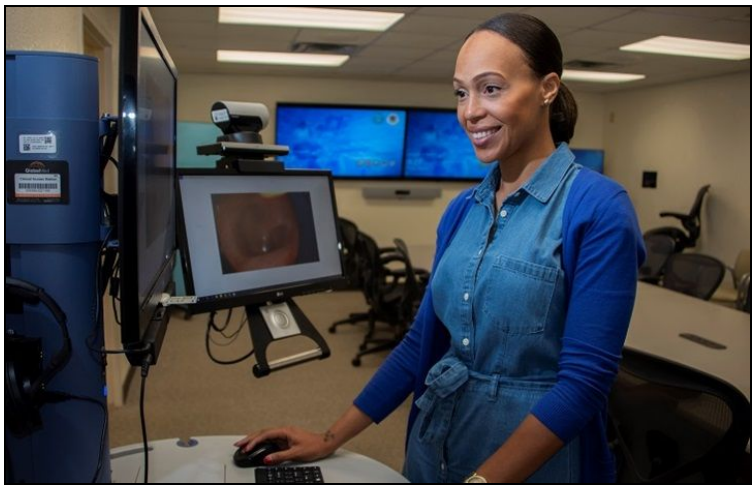
"Under current COVID-19 conditions, patients face the burdens of social distancing and increased difficulty in reaching clinicians busy with emergencies. Telehealth has proven essential in addressing patients' pressing health needs and ensuring good patient-to-clinician dialogue," said Michael Wong, JD, Founder and Executive Director of the Physician-Patient Alliance for Health & Safety.

The goal of Virtual Patient Care, conceived of and managed by the PPAHS in response to the COVID-19 crisis, is to foster an adherence rate greater than the reported 50% for patients at the highest ranges of stroke risk. The free telehealth service is supported by an unrestricted grant from the BMS-Pfizer Alliance, as well as the efforts, involvement, and/or resources of the American Heart Association, AC Forum, Heart Rhythm Society, StopAfib.org, Mended Hearts, and Preventive Cardiovascular Nurses Association.

#4 - Learning Through a Virtual Learning Environment: Filling the Gap in Continuing Medical Education

Clinicians are required to complete on-going medical education to maintain their clinical competencies. The traditional mode of delivering such continuing medical education is through a lecture-style format (whether delivered live through a webinar or recorded through a podcast).

This method of delivering education does not require active participation by the learner (other than asking questions of the teacher).



Susan C. Aldridge, PhD and Marci Powell describe the disconnect between today's classroom experience and what both teachers and students expect in today's technology-driven environment:

> *"Students and educators, alike, live in a technology-driven world, where by simply browsing the Internet, they have access to smart recommendations and personalized solutions, delivered through multiple modalities on any device. So, to replicate that experience in the academic world, we must create a VLE [virtual learning environment] that is every bit as powerful and multi-faceted."*

In the post-COVID world, continuing medical education will evolve to be the virtual learning environment that Aldridge and Powell have described. This will result in clinicians being better educated and prepared.

PPAHS on Learning Through a Virtual Learning Environment

As of June 15, 2020, PPAHS has released 27 clinical education podcasts and videos. These videos feature patient stories and clinicians discussing ways to improve delivery of patient care, and have been viewed more than 700,000 on YouTube.

Although these videos and podcasts provide useful learnings, they are not interactive. In future clinical education materials, PPAHS will be using an educational format that demands learner participation and engagement. By working with a technology startup, PPAHS will soon be able to offer continuing professional development credits (CME) in an interactive environment.

#5 - Collaborative Models of Care: The Future of Healthcare Delivery

The COVID-19 pandemic poses unique challenges that exacerbate transitions of care and create risks not only to the patients but to their caregivers and the community. According to a JAMA article, these complications include:

1. There is still uncertainty around how long patients remain contagious after clinical recovery; patients who are recovering from COVID-19 cannot receive care at existing facilities while potentially contagious.
2. Facility/home caregivers lack appropriate safety equipment and training to provide care safely.
3. Social distancing and strained health systems make it harder for patients and hospitals to communicate with primary care physicians and vice versa.
4. The current average level of home-care agencies is insufficient to manage higher acuity patients with COVID-19 transitioning from the hospital

The current COVID situation necessitates innovative solutions to deliver care. More importantly, those innovations will be necessary even in the post-COVID healthcare system. As Cheryl Pegus, MD writes:

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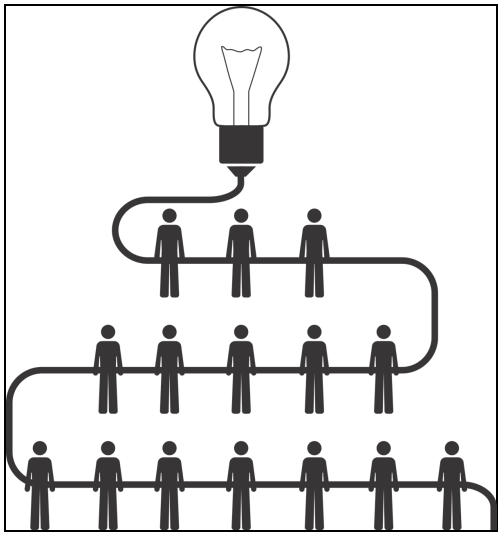

PPAHS on Collaborative Healthcare Delivery

Virtual Patient Care - which brought together the efforts and resources of the American Heart Association, AC Forum, Heart Rhythm Society, StopAfib.org, Mended Hearts, and Preventive Cardiovascular Nurses Association - is illustrative of the key elements necessary for a collaborative model to deliver healthcare to patients:

- Deliver personalized care to each patient.
- Assemble a team of nurses to answer patient questions.
- Utilize existing online technology to allow nurses to answer patient questions and interact with them virtually.
- Engage patient advocates and clinicians to script answers.
- Use patient educators to most effectively phrase answers.
- Prepare guidelines on interacting with patients to answer questions most effectively.
- Ensure communications with patients is effected in a cultural-racial-social unbiased manner.
- Engage family and local caregivers and resources to ensure delivery of essentials, such as medications and food.
- Utilize real-time patient monitoring to alert the nursing team of needed interventions on an “as happens” basis.
- Engage psychological clinicians to help ensure mental care.
- Engage physical rehabilitation experts to advise on physical activity.
- Ensure adequate training of the project team.

PPAHS encourages the use of a collaborative model to deliver patient care. A collaborative model breaks down silos that exist between professions, creates bridges to non-clinical disciplines, and helps foster innovative care models.