

Incorporation of Patient-Centered Outcomes Research into Clinical Practice: A Digital Technology Case Study

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Disclosures

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(PI: Delgado; Co-PI: Chaiyachati)

Dr. Krisda Chaiyachati reports:

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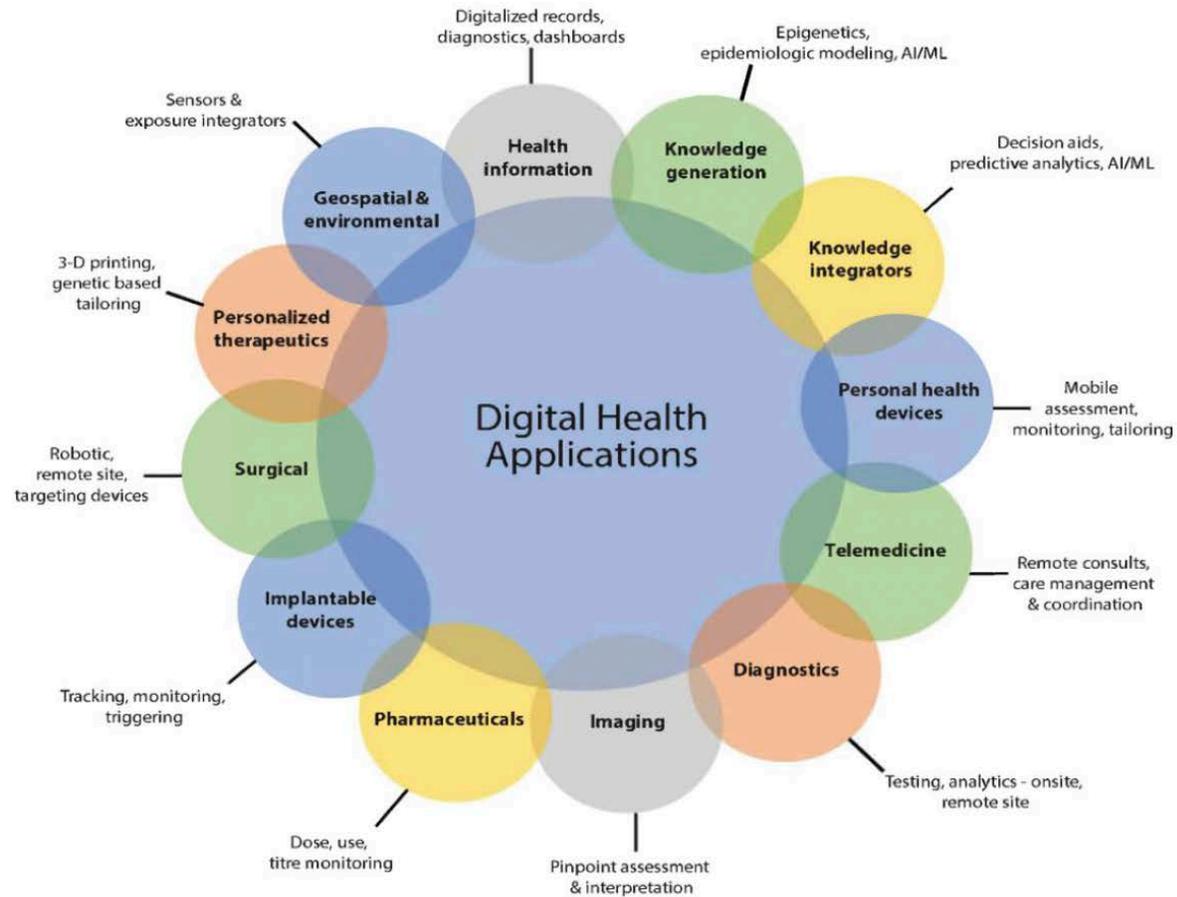


FIGURE 1 | Evolving Applications of Digital Technology in Health and Health Care

SOURCE: National Academy of Medicine. 2019. *Digital Health Action Collaborative, NAM Leadership Consortium: Collaboration for a Value & Science-Driven Health System.*

Monday, March 9, 2020

- Stories from northern Italy are scaring the world
- Cruise ships with infected people are not allowed to dock
- ICUs in Seattle and New York are bursting
- Not much is happening in Philadelphia, but...
- Scared patients are jamming Penn's phones and emergency departments

[Adapted with permission from Dr. David Asch]

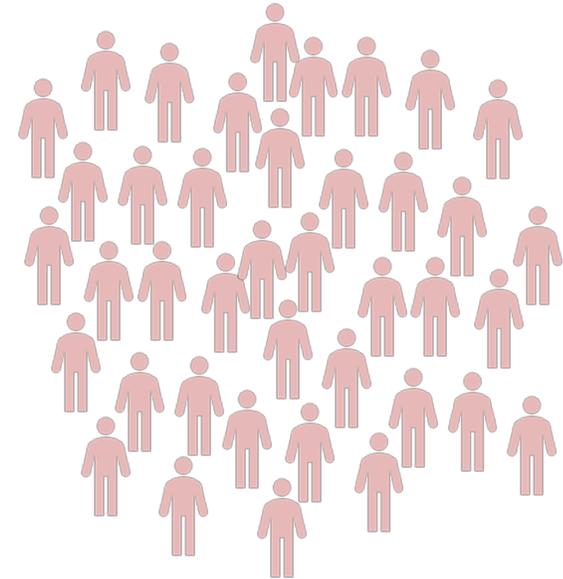
Design context

- Everyone was focused on the ICU
- For every 1 patient with COVID in our ICUs, there might be 50 infected in the community
- Most would get better on their own

Hospital



Home



[Adapted with permission from Dr. David Asch]

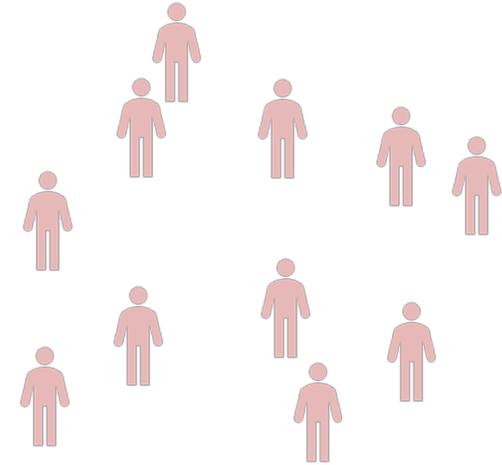
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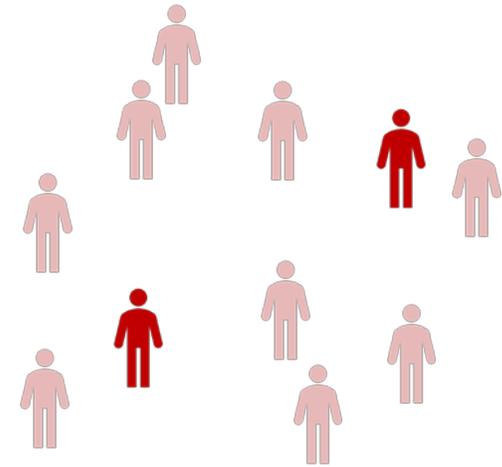
Design context

- Everyone was focused on the ICU
- For every 1 patient with COVID in our ICUs, there might be 50 infected in the community
- Most would get better on their own
- Some would get very **sick**

Hospital



Home



[Adapted with permission from Dr. David Asch]

Design consideration 1

- Early approaches aimed at telling whether you were infected or not
- A different question was whether you needed a hospital or not

We wanted to get patients to the ED when they needed it, but keep them at home when they didn't

[Adapted with permission from Dr. David Asch]

Design consideration 2

- Covid can cause many symptoms:
 - Fever
 - Malaise
 - Anosmia
- But what can *kill* you is respiratory failure

*We decided the most important thing to watch for was
shortness of breath*

[Adapted with permission from Dr. David Asch]

What is COVID Watch?

- Twice daily SMS check-ins on shortness of breath
- Automated escalation to a 24/7 telemedicine team
- Reach a clinician any time if feeling worse
- 2 weeks, with patient-led option for another week
- Available in English or Spanish



**CENTER FOR
HEALTH CARE
INNOVATION**

Accelerating Ideas to
Transform Health Care



Observation and experimentation

- Adjusting the timing
- Adding other symptoms (e.g., fever, diarrhea)
- Supplementing with objective pulse oximetry
- Interviewing patients who dropped off or stayed on
- Surveilling the city for patients admitted to ED or hospital
- Transitioning manual processes to automation
 - Enrollment through Epic
 - Automatic enrollment based on test results
 - Opt in → opt out

[Adapted with permission from Dr. David Asch]

Two cities

	Chicago	Philadelphia	
Patients/day	1000	1000	Patient Satisfaction 80 NPS
Monitoring period	8a – 8p	24/7	
Daily staff hours	500	64	Mortality ↓ 64% NNT = 400
Patients sent to ED	9 per day	6 per day	
Savings		↓ \$2.3 m/100 days	

[Adapted with permission from Dr. David Asch]

Could manage volumes...efficiently

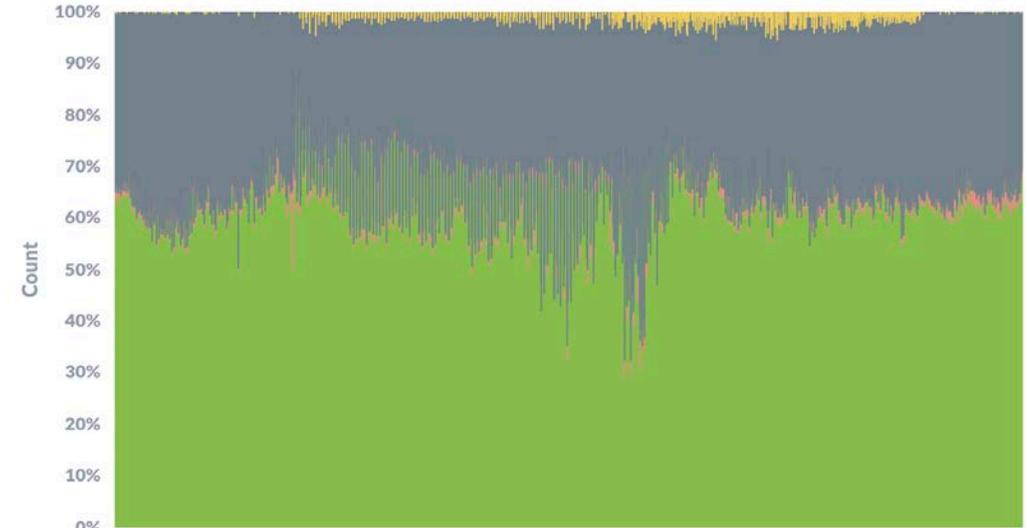
Aggregated Daily Enrollments

● Daily Enrollments ● Cumulative Enrollments



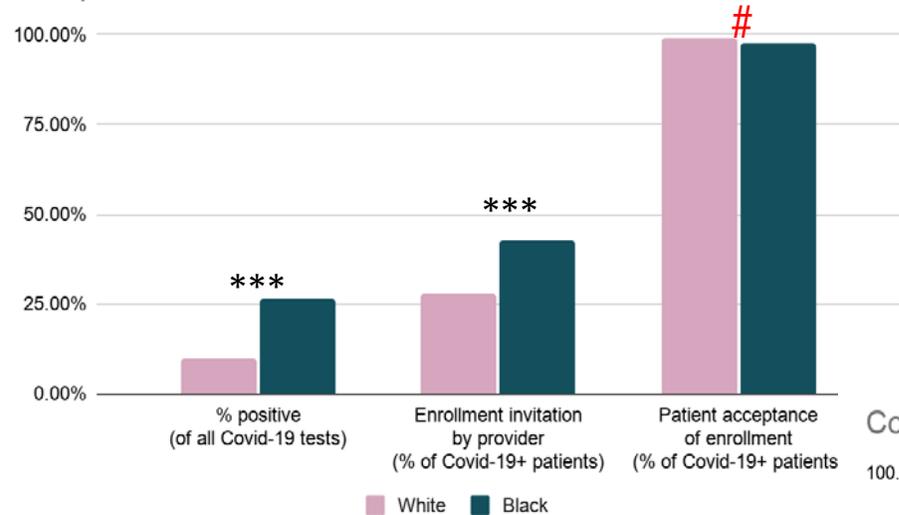
Aggregated Daily Patient Activity, Percentages

● Active, Checked-In ● Active, Escalation ● Inactive ● End

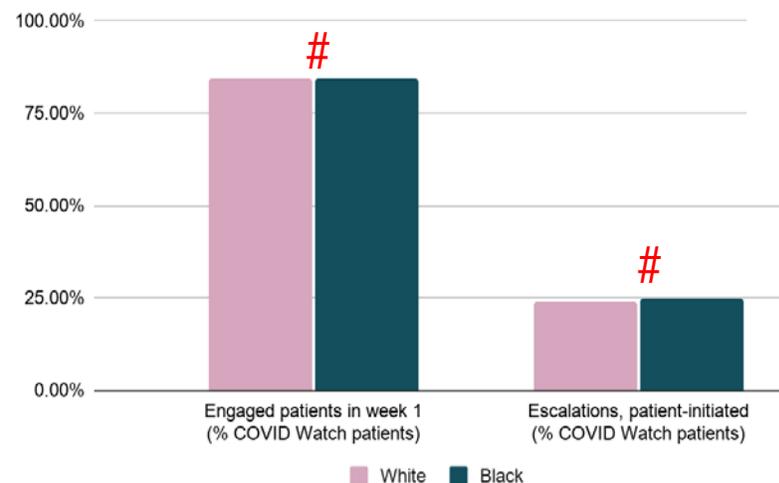


Larger proportion of black patients invited, no differences afterwards

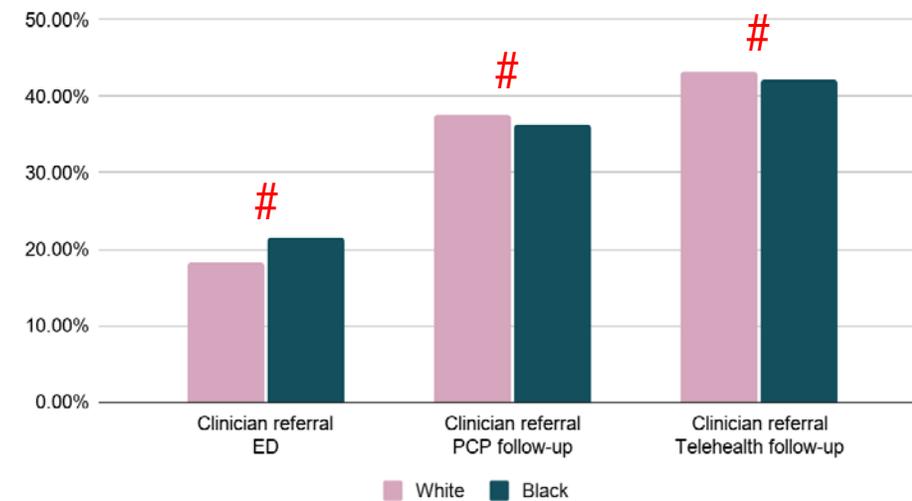
Comparison of Enrollment into COVID Watch



Comparison of Patient Engagement with COVID Watch



Comparison of Escalation Outcomes



March-May 2020

*p<0.05; **p<0.01; ***p<0.001; # No Difference

Patients found COVID Watch comforting

"I was grateful that at least they would text me, because my daughter was in the hospital. My grandkid had to go to school, and my granddaughter had to work ... sometimes I needed to know if I could ask for help or something. I mean, my desperation was based on not having help if needed it."

(White/Hispanic, Spanish speaker)

But not all did...

"I thought it was in between helpful and annoying."

(White/Non-Hispanic, English speaker)

"I just think the phone call could've been better because they also would [hear] how you sound as well, because sometimes people can't really – they hear how they sound. I think that helps as well."

(Black/Non-Hispanic, English speaker)

"They should call because sometimes you speak Spanish. Even more if you don't know how to use the telephone...I don't text, I don't chat with anyone, because I don't know anything about that."

(White/Hispanic, Spanish speaker)

Collaborators

Emergency Medicine

- M. Kit Delgado, MD, MS
- Kathleen C. Lee, MD
- Austin S. Kilaru, MD, MSHP
- Ari B. Friedman, MD, PhD
- Zachary F. Meisel, MD, MSHP

Innovation Center/Way to Health

- David A. Asch, MD, MBA*
- David Do, MD
- Doreen Lam, BA
- Christopher K. Snider, MPH
- Christina J. O'Malley, MHA
- Lauren Hahn, MBA
- Mohan Balachandran, MA, MS
- Neda Khan, MHCJ

Center for Connected Care

- Ann Marie Huffenberger, DBA, RN
- Penn Medicine OnDemand

Internal Medicine

- Anna U. Morgan, MD, MSc, MSHP
- Krisda H. Chaiyachati, MD, MPH, MSHP

Clinical/Nursing Team

- Nancy Mannion, DNP, RN
- Susan McGinley, CRNP
- COVID Watch Clinical Teams

Research Team

- Ruiying Xiong, MS
- Dina Abdel-Rahman, BS
- Jeffrey Ebert, PhD
- Medha Ghosh, MPH
- Julianne Reilly, BS
- Deena L. Chisholm, MPH
- Sheila Kelly, MPH
- Jessica E. Hemmons, MS
- Judy A. Shea, PhD
- Nandita Mitra, PhD
- The Mixed Methods Research Laboratory at Penn



Lessons learned and questions for the future of digital health tools in health care...

Digital health tools can enhance human-powered care

Efficiency of care delivered was key for patients and providers

Ensure equity and define the measures

The design of digital health interventions is critical

How to speed up discovery to implementation?

What is needed for scalability and spread?

Can we develop personalized health journeys?

What partners and infrastructure is needed?