

NCATS Vision of a National Clinical Translational Research Network

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October 15, 2019



Curr

TheUpshot

THE NEW HEALTH CARE

The Huge

A study finds evic
large blind spot o



Marcelo Del Pozo/Reuters



igh in 2018

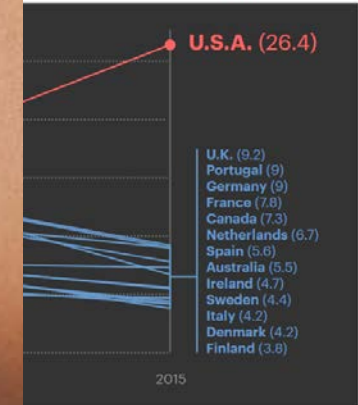


Longer, A New

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U.S. As It Declines Elsewhere



al mortality, 1990-2018 is a systematic analysis for the Global Burden of Disease Study 2018. Data were made available in the journal.

Does the Chairman deal with 'chairs'?

- **Artificial light at night**
 - Researchers have also linked night shift work and exposure to artificial light to heart disease, obesity, diabetes, mood disorders, and macular degeneration across numerous epidemiological studies. In fact, the International Agency for Research on Cancer characterized shift work as a “probable carcinogen to humans” due to circadian disruption.
- **Chairs**
 - In an article published in [Scientific American](#), endocrinologist James Levine, MD, PhD, professor, Department of Endocrinology and Nutrition Research, Mayo Clinic, Scottsdale, AZ, ties sitting in your office chair to a slew of health problems, including slowed metabolism, obesity, heart disease, diabetes, arthritis, blood sugar spikes, and death. Yikes!
- **Computer screens**
 - Spending hours in front of your computer screen is no good because it results in physical inactivity and interferes with your sleep. Moreover, when you look at a computer screen from less than arm’s length away, experts warn that it could result in [computer vision syndrome](#), also known as digital eye strain. First, your eyes dry out because you don’t blink as much in front of a computer screen, which results in decreased tear film, discomfort, and blurry vision. Second, eye strain from focusing up close can lead to headaches.
- **Door handles**
 - It probably comes as no surprise, but door handles are often covered in various strains of bacteria, including *Staphylococcus*, *Streptococcus*, *Escherichia coli*, and *Enterococcus*.
- **Toilet Seats**
 - ‘nuff said

Featured Articles in Internal Medicine



Everyday things that could be hazardous to your health

Naveed Saleh, MD, MS, for MDLinx | October 04, 2019

Manufacturing and technology have brought us in contact with more everyday items than ever before. Some of these items, however mundane, can affect health in a myriad of ways—without you even knowing it. Let’s take a look at five everyday objects that could be damaging your health, and how to minimize these health risks.

On the Horizon, coming up fast!

TECHNOLOGY

Health Care Providers Using Telehealth, Partnerships To Break into Home Health Sector

By Bailey Bryant | March 10, 2019

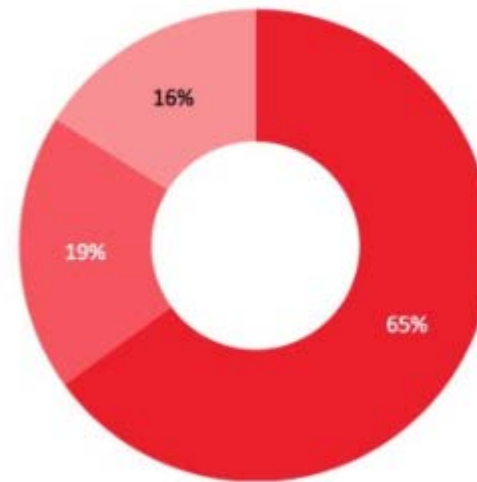
Share



With spending projected to reach \$173 billion by 2026, the home health industry is booming like never before. As such, a growing number of health care providers want a piece of the pie.

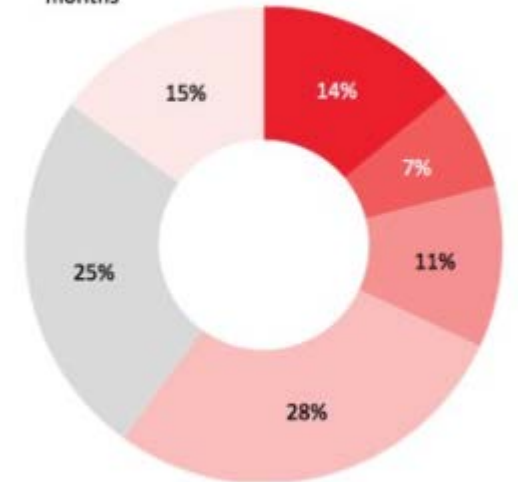
US Providers Recognize AI's Value But Have Been Slow To Adopt

- Important
- Neutral
- Not important



AI importance

- Been using for a while
- Just adopted
- Planning on adopting in the next 12 months
- 1-2 years away
- 3+ years away
- Don't think we'll ever utilize AI



AI adoption timeframe

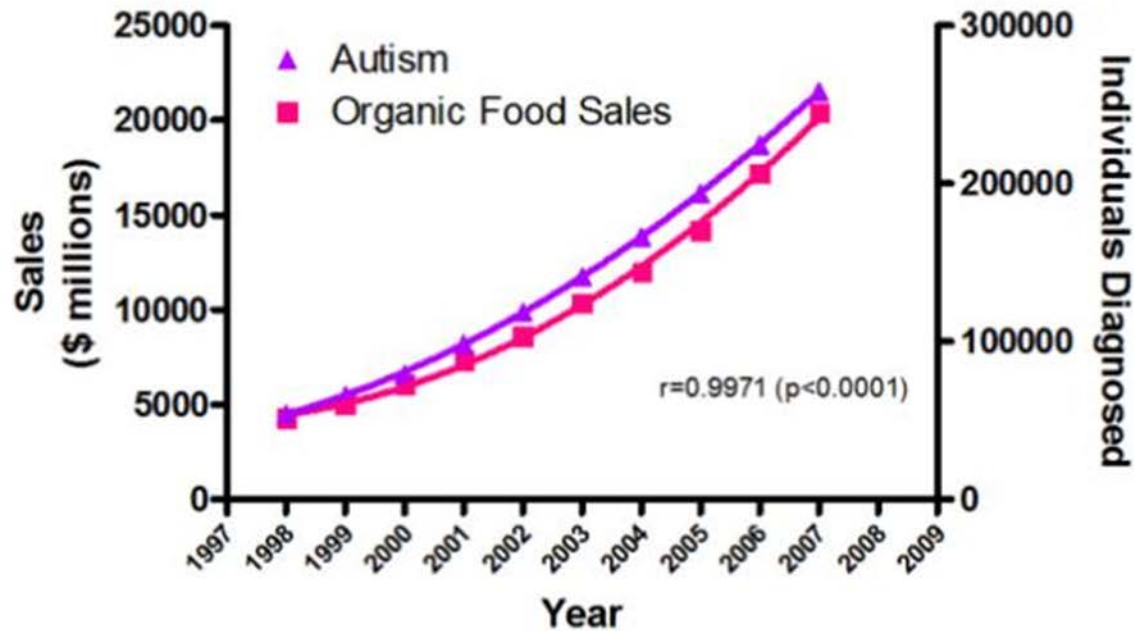
Source: Reaction Data, n=97 directors or C-suite level execs from US provider organizations, August 2018

Business Insider Intelligence

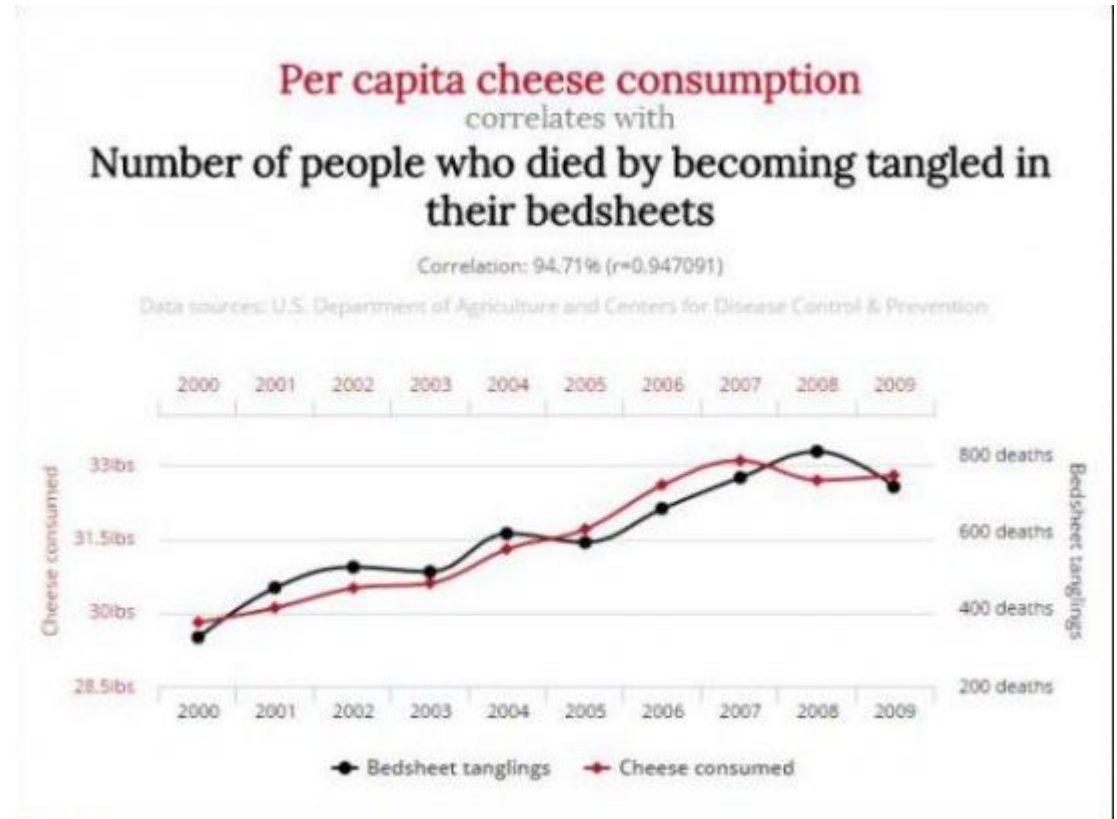
BUSINESS INSIDER INTELLIGENCE

Public perception of risk

The real cause of increasing autism prevalence?



Sources: Organic Trade Association, 2011 Organic Industry Survey; U.S. Department of Education, Office of Special Education Programs, Data Analysis System (DANS), OMB# 1820-0043. *Children with Disabilities Receiving Special Education Under Part B of the Individuals with Disabilities Education Act



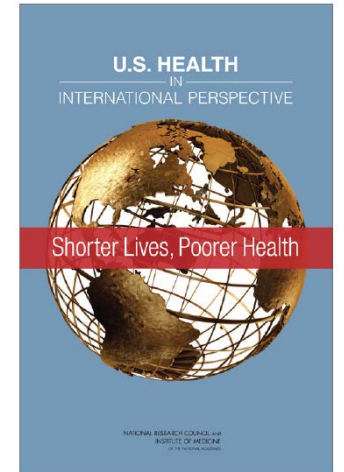
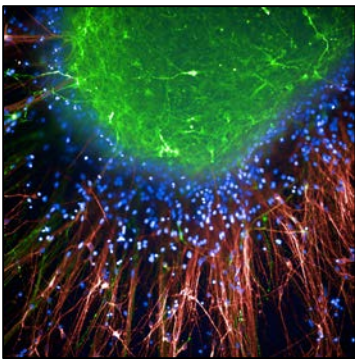
It's the Best of Times, It's the Worst of Times

Fundamental science unprecedentedly advanced, but



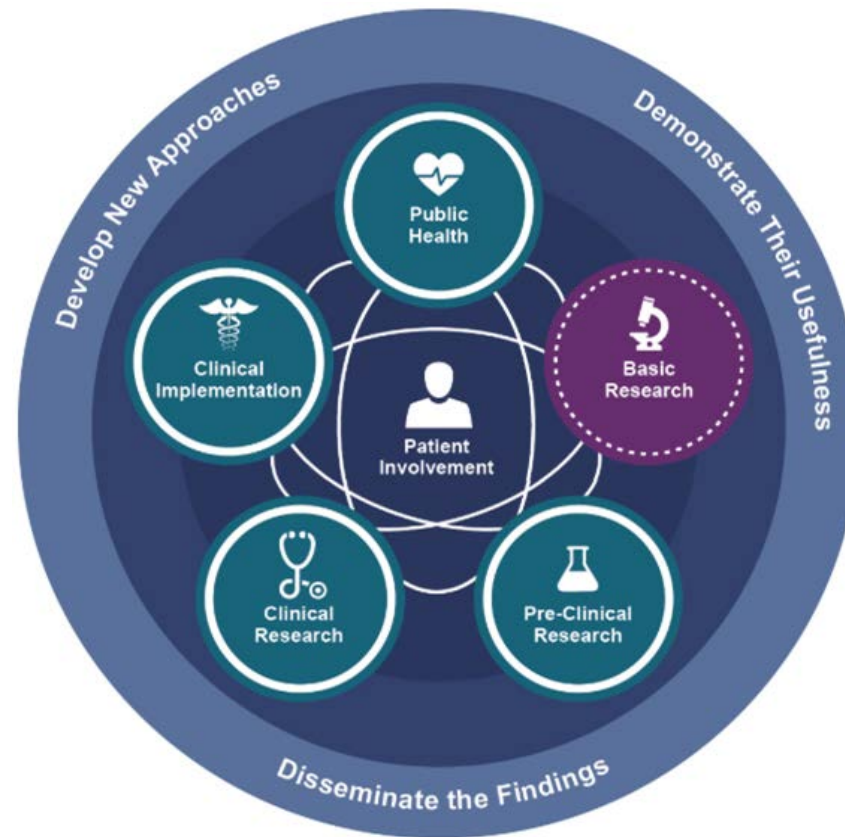
- Poor transition of basic or clinical observations into interventions that tangibly improve human health
- Intervention development failure-prone, inefficient and costly
- Poor adoption of demonstrably useful interventions

Enormous opportunity/enormous unmet needs



What We Do

NCATS leverages the power of data, new technologies and teamwork to develop, demonstrate, and disseminate innovations that reduce, remove or bypass costly and time-consuming bottlenecks in translational research.



NCATS Director
Christopher P. Austin, MD

NCATS Clinical Programs to Accelerate Translation

Preparing for clinical trials

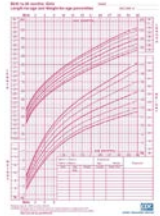
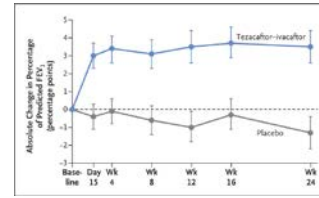
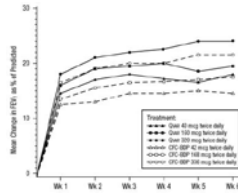
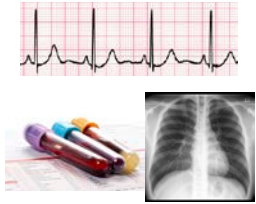
Assess safety

Assess multiple doses vs. exposure/activity

Assess efficacy (Controlled setting)

Assess effectiveness against patient heterogeneity

Assess pragmatism across health care systems



Registries
Natural History

Phase 1
Clinical Trial

Phase 2
Clinical Trial

Phase 3
Clinical Trial

Implementation

Dissemination

Clinical and Translational Science Awards (CTSA) Program

RaDaR

New Therapeutic Uses

Rare Diseases Clinical Research Network



NIH National Center for Advancing Translational Sciences

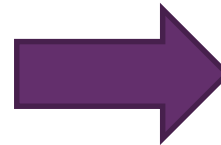
NCATS Clinical and Translational Science Awards (CTSA) Program

- Collaboratively facilitates and accelerates translational projects locally/regionally/nationally
- Scientific and operational innovation to improve the efficiency and effectiveness of clinical translational research
- Creates and provides domain-specific translational science training



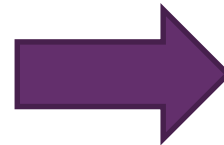


Software as a Service (SaaS)



Problems

- Data sharing = data copying
- Decreased security (data lots of places)
- Huge infrastructure needed



Advantages

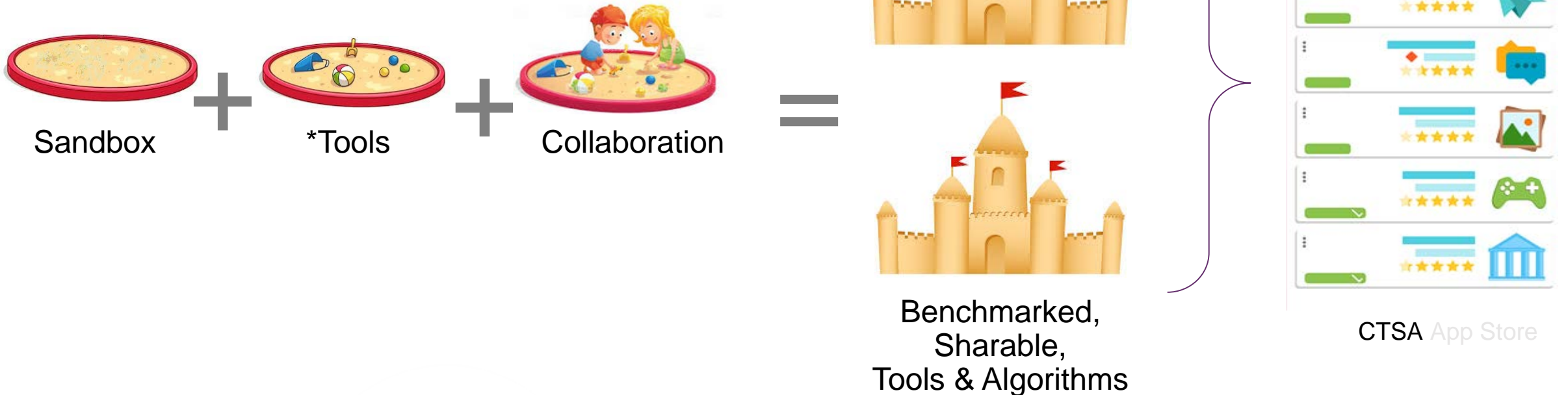
- Improved security and auditing
- Increased accessibility to researchers
- Shared compute
- Promotes collaboration



Develop, Test, Share; Tools, Software, and Algorithms

NCATS Sandboxes

- Machine Learning – Mortality Prediction
- Natural Language Processing (NLP)
- Data Quality



*Federation, IDE, Google Suite, JIRA, GitHub, Docker, AWS/GCP, Synthetic Patient Data Sets



There's an app for that!

- Currently >165,000 health care apps available to patients (which means they are also available to health care providers and clinical researchers)
- A recent review focused on psychiatric related apps highlighted the dearth of literature (14 / 7 articles on bipolar disorders and schizophrenia, respectively) and mostly limited to pilot and feasibility studies *J Clin Psychiatry*
[dx.doi.org/10.4088/JCP.15com10619](https://doi.org/10.4088/JCP.15com10619)

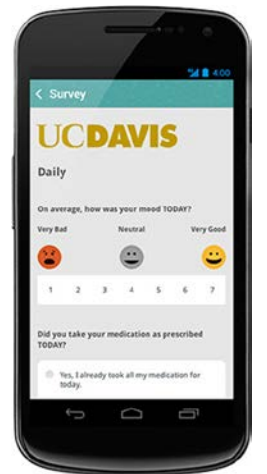
Detecting signs of psychosis with an App (UC Davis)

Application: Ginger.io,

Purpose: detect early warning signs of psychosis

Target Symptoms: Alteration in sleep, communication and movement patterns

Platform: Patient app, behavioral analytics engine and provider dashboard

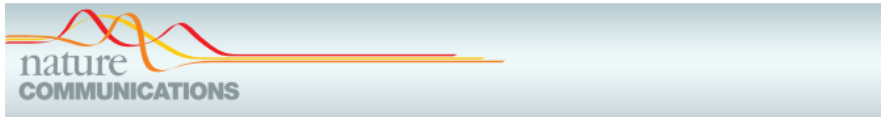


There's an app for that?

Smartphone-Based Blood Pressure Measurement Using Transdermal Optical Imaging Technology

Hong Luo, Deye Yang, Andrew Barszczyk, Naresh Vempala, Jing Wei, Si Jia Wu, Paul Pu Zheng, Genyue Fu, Kang Lee ✉, Zhong-Ping Feng ✉

Originally published 6 Aug 2019 | <https://doi.org/10.1161/CIRCIMAGING.119.008857> | Circulation: Cardiovascular Imaging. ;12:e008857



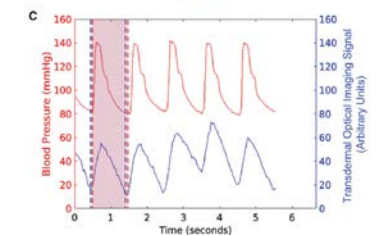
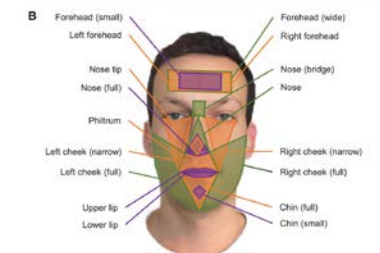
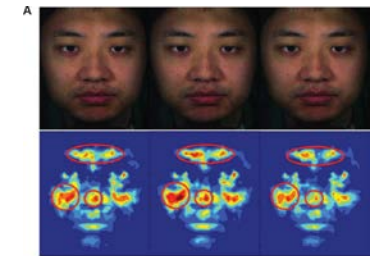
ARTICLE

DOI: 10.1038/s41467-018-07262-2 OPEN

Smartphone app for non-invasive detection of anemia using only patient-sourced photos

Robert G. Mannino^{1,2,3}, David R. Myers^{1,2,3}, Erika A. Tyburski^{1,2,3}, Christina Caruso², Jeanne Boudreaux², Traci Leong⁴, G. D. Clifford^{1,5} & Wilbur A. Lam^{1,2,3}

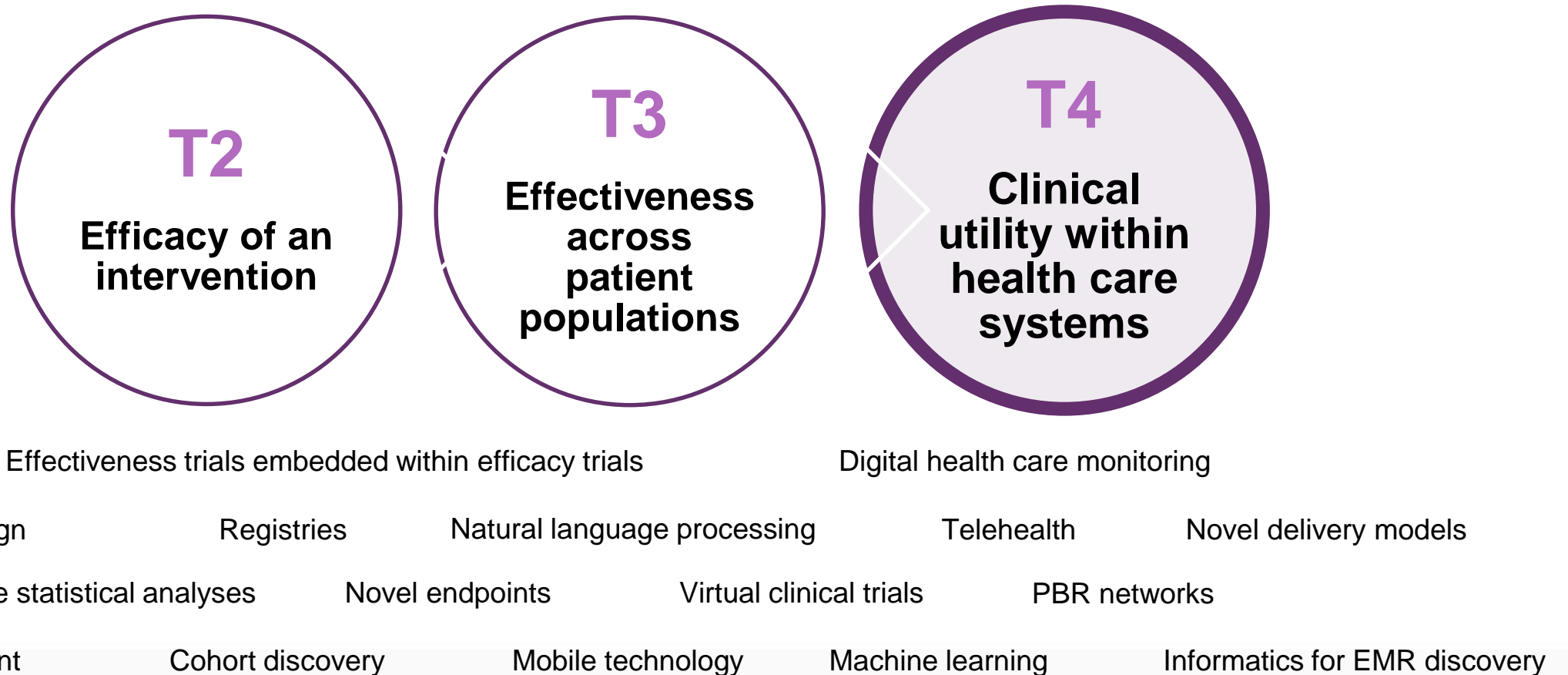
We introduce a paradigm of completely non-invasive, on-demand diagnostics that may replace common blood-based laboratory tests using only a smartphone app and photos. We initially targeted anemia, a blood condition characterized by low blood hemoglobin levels that afflicts >2 billion people. Our app estimates hemoglobin levels by analyzing color and metadata of fingernail bed smartphone photos and detects anemia (hemoglobin levels $<12.5 \text{ g dL}^{-1}$) with an accuracy of $\pm 2.4 \text{ g dL}^{-1}$ and a sensitivity of 97% (95% CI, 89–100%) when compared with CBC hemoglobin levels ($n = 100$ subjects), indicating its viability to serve as a non-invasive anemia screening tool. Moreover, with personalized calibration, this system achieves an accuracy of $\pm 0.92 \text{ g dL}^{-1}$ of CBC hemoglobin levels ($n = 16$), empowering chronic anemia patients to serially monitor their hemoglobin levels instantaneously and remotely. Our on-demand system enables anyone with a smartphone to download an app and immediately detect anemia anywhere and anytime.

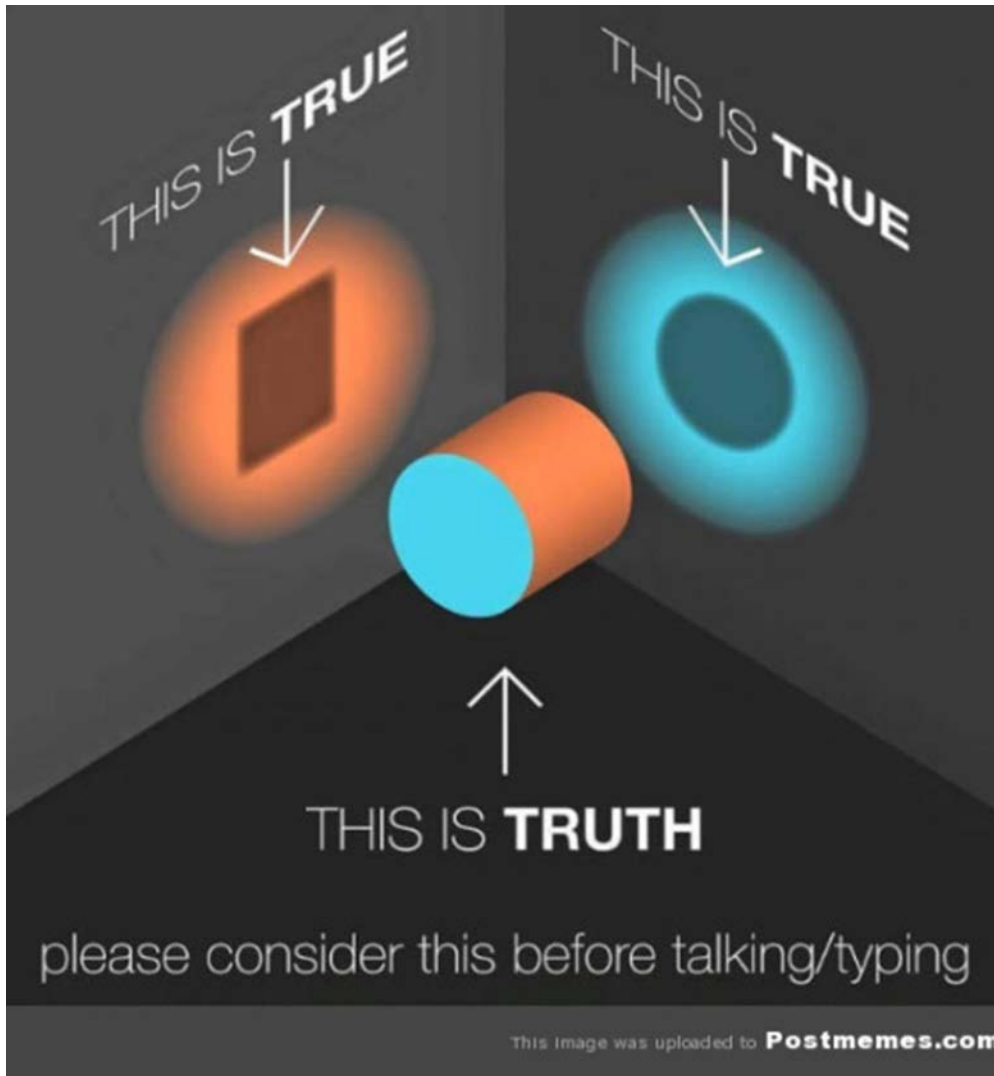


NIH National Center for Advancing Translational Sciences

CTSA Landscape of the Translational Spectrum

Develop → Demonstrate → Disseminate





HUMANITY DOES
NOT ASK US TO BE
HAPPY. IT MERELY
ASKS US TO BE
BRILLIANT ON ITS
BEHALF.

ORSON SCOTT CARD
(ENDER'S GAME)

