New Medical Technology and WC

Montana State Fund

Your presenter

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Do you recognize this famous quote from a prominent and well known speaker?

"*The Future of Tech in medicine looks **very promising**…*"

- **Advances in artificial intelligence**, machine learning, and robotics are set to revolutionize the healthcare industry in the coming years.

- **AI-powered diagnostic tools** will be able to analyze vast amounts of medical data to identify patterns and predict outcomes with unprecedented accuracy, enabling doctors to make more informed decisions about patient care.

- **Wearable technology** such as smartwatches and health monitors will become even more sophisticated, allowing people to track their health in real-time and make lifestyle changes to improve their wellbeing.

- **Robotic surgery** will become more widespread, allowing for more precise and less invasive procedures.

- **Telemedicine** will become increasingly common, making it easier for people to access medical services from the comfort of their own homes.

*Overall, **technology will play an increasingly important role in medicine** in the future, helping to improve the quality of life for millions of people around the world.*

Who said this?

Who

said

this?

GPT – 3
(Microsoft's AI)

New medical technology will impact WC through…

- Causation
  - Clarifies medical condition DX (stop cost shifting)
- Improved triage
  - Care based on "evidence based medicine"
- Injury diagnosis
  - "evidence based causation"
- Improved Communication
  - Google Translate and Google Medicine
- Improved Treatment

- Clarifies PD
  - Clarifies nature and extent of permanent disability
- Improved functional improvement facilitation
- Improved medical treatments
- Improved safety and/or injury prevention programs

Commentary on New Medical Technology

- **New Technology = Good *AND* Bad**
  - *All new tech has potential for good*
  - *Can also be "weaponized"*

- **Costs for new technology**

  - *Not included in this discussion.*
  - *Some new tech very expensive (e.g., Retuximab)*

- **Unintended consequences**

  - *Common with All new technology*
  - *many unknown risk factors.*
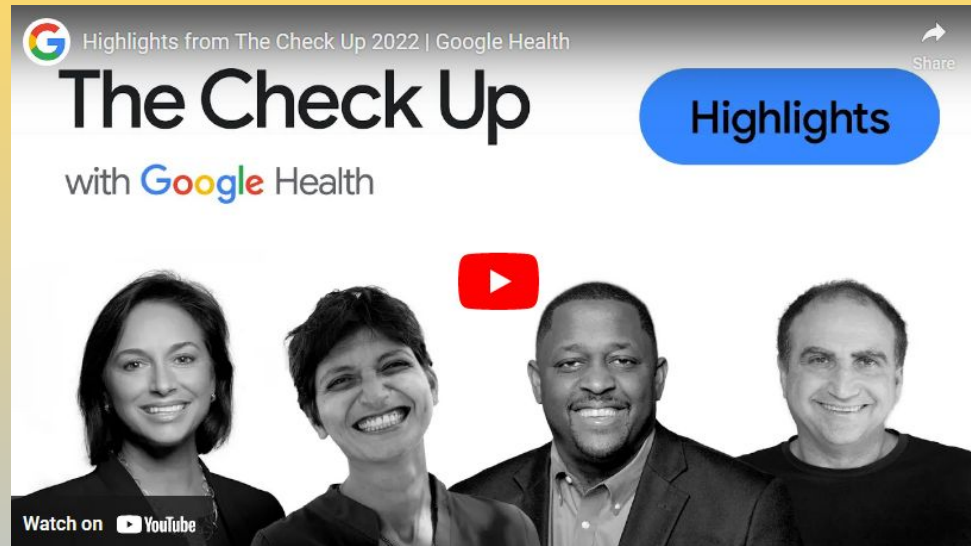 - *Costs initially high – typically come down with time*

Implications for workers' compensation

- **Reduce** lost time for severe injuries

- **Eliminate** PD for many orthopedic injuries

- **Eliminate** PD For cosmetic disfigurement

- **Treat** for industrial or non-industrial diagnoses?

Is it possible that the worker will actually be stronger or more capable after the replacement? (Tommy John Surgery)
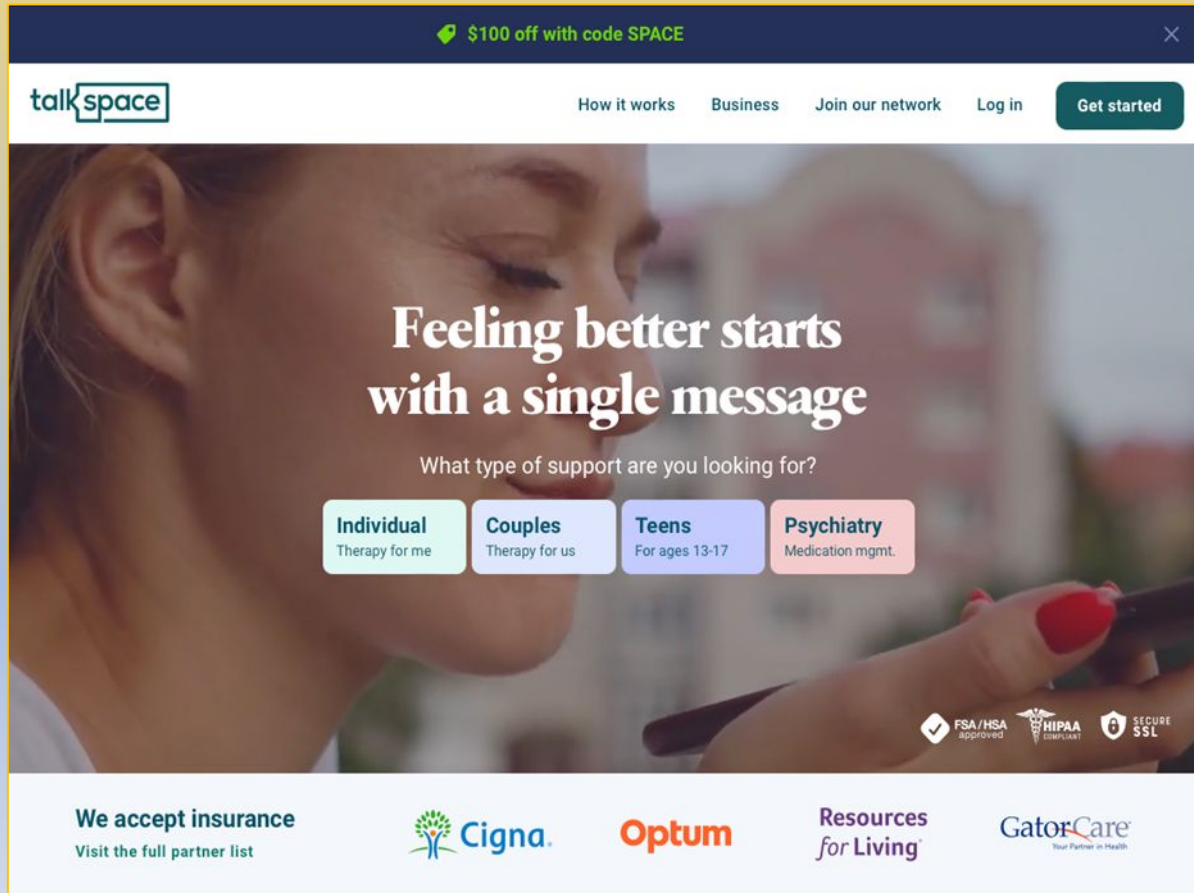
Medical Unicorns trying to break into medicine

- Talk Space
- Cerebral
- Better Up
- Point Click Care
- Whoop
- Noom
- Calm
- Gym Pass
- Unicorn bio manufacturing

Highlights from The Check Up 2022 | Google Health

The Check Up

with Google Health

Highlights

Share

Watch on YouTube

"If Google is your doctor,

you need a second opinion"

(Google has changed how the patient interfaces with the doctor.)

The Online Health World Is Getting Crowded

What did not work

- Unicorns, products and Predictions which were not successful
  - Theranos (Lied about product)
  - Proteus (Could not overcome the cost per chip problem)
  - Pulse oxy meters (Machine was calibrated for white skin. Sent minorities with severe respiratory distress home)
  - Surface EMGs

What no longer works

End of an era as New York removes last public payphone

'The future is already here...

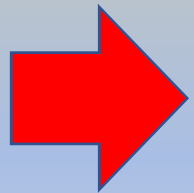– it's just not evenly distributed.'

William Gibson
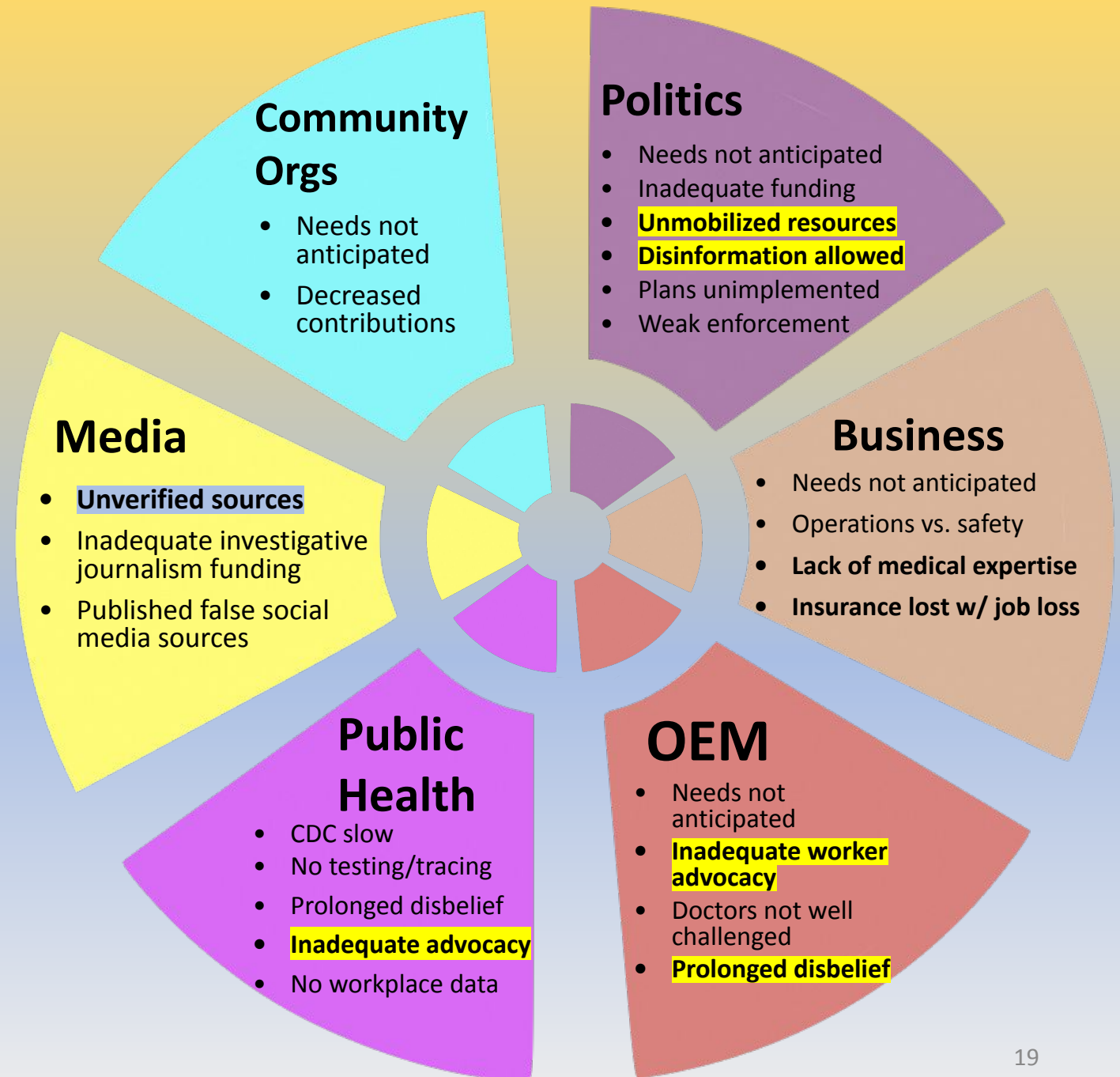
Medical Technology lessons from the Covid pandemic

TRENDS

Many Positive Changes

- **Medical technology** "on steroids"

- Shifting greater patient numbers to **remote care**

- Development of **communication technology**

- Emphasis on **surveillance systems** and data analysis

Missed
Opportunities

Community Orgs
- Needs not anticipated
- Decreased contributions

Politics
- Needs not anticipated
- Inadequate funding
- **Unmobilized resources**
- **Disinformation allowed**
- Plans unimplemented
- Weak enforcement

Media
- **Unverified sources**
- Inadequate investigative journalism funding
- Published false social media sources

Business
- Needs not anticipated
- Operations vs. safety
- **Lack of medical expertise**
- **Insurance lost w/ job loss**

Public Health
- CDC slow
- No testing/tracing
- Prolonged disbelief
- **Inadequate advocacy**
- No workplace data

OEM
- Needs not anticipated
- **Inadequate worker advocacy**
- Doctors not well challenged
- **Prolonged disbelief**

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WHAT DID WE LEARN?

The medical system is inefficient with many nonessential processes.

- *Many clinic visits, laboratory tests, and diagnostic procedures can be safely postponed or canceled*
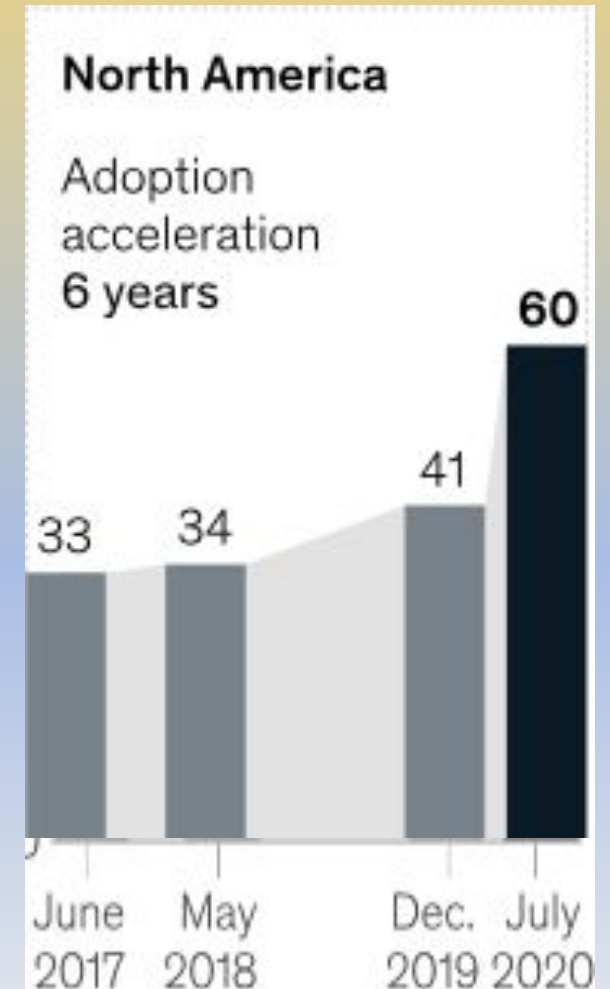
Technology can save the day, but it takes collaboration.

- Need to be aware of technology.

What the Pandemic Taught Us about Technology

MIT Sloan Business School

- **Health Care was open to technological Change** *(telehealth)*

- **IT kept pace** with digital transformation efforts

- **People will pay full price** for digital-only

- **Consumers moved to Online** channels

North America

Adoption acceleration 6 years

60

41

33   34

June 2017   May 2018   Dec. 2019   July 2020

https://mitsloan.mit.edu/ideas-made-to-matter/digital-transformation-after-pandemic

Digital Wonders

What dreams may come true.

Machine learning is

A self-learning <u>subset</u> of AI - uses data to learn without being externally programmed by refining algorithms.

- *EG.: iPhone neural network distinguishes photos of pizza from ice cream.*

AI is

An umbrella term for simulated processing of human intelligence by machines – i.e., the ability to "sense, think, act and learn itself."

- *AI is <u>making decisions</u> based on information (data, pattern recognition, prior mistake assessment, etc.) to project trends and probabilities of likely outcomes.*
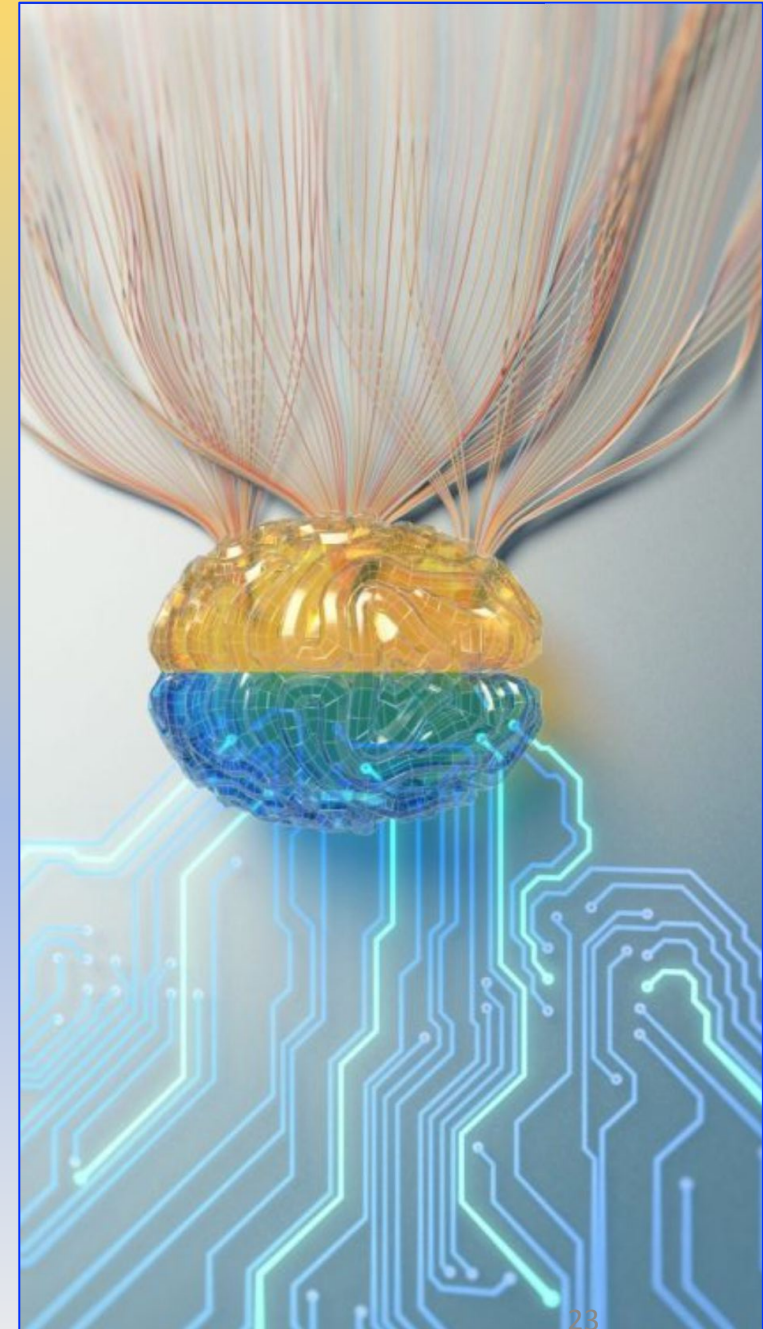
*Underlying WC data **VERY** poor!*

- 50 Different Systems
  - *E.g., Med Only claim = 7 days in TN and 3 days in CA*

- Data dictionary definitions differ everywhere

- Systems upgrade degrades data

AI Implications for Workers' Comp

- *Injury prevention Improved*
- *Better Diagnosis*
- *Improved treatment protocols*
- *More accurate reserving*
- *Faster case resolution*

Use claim data to ID treatments with better outcomes!
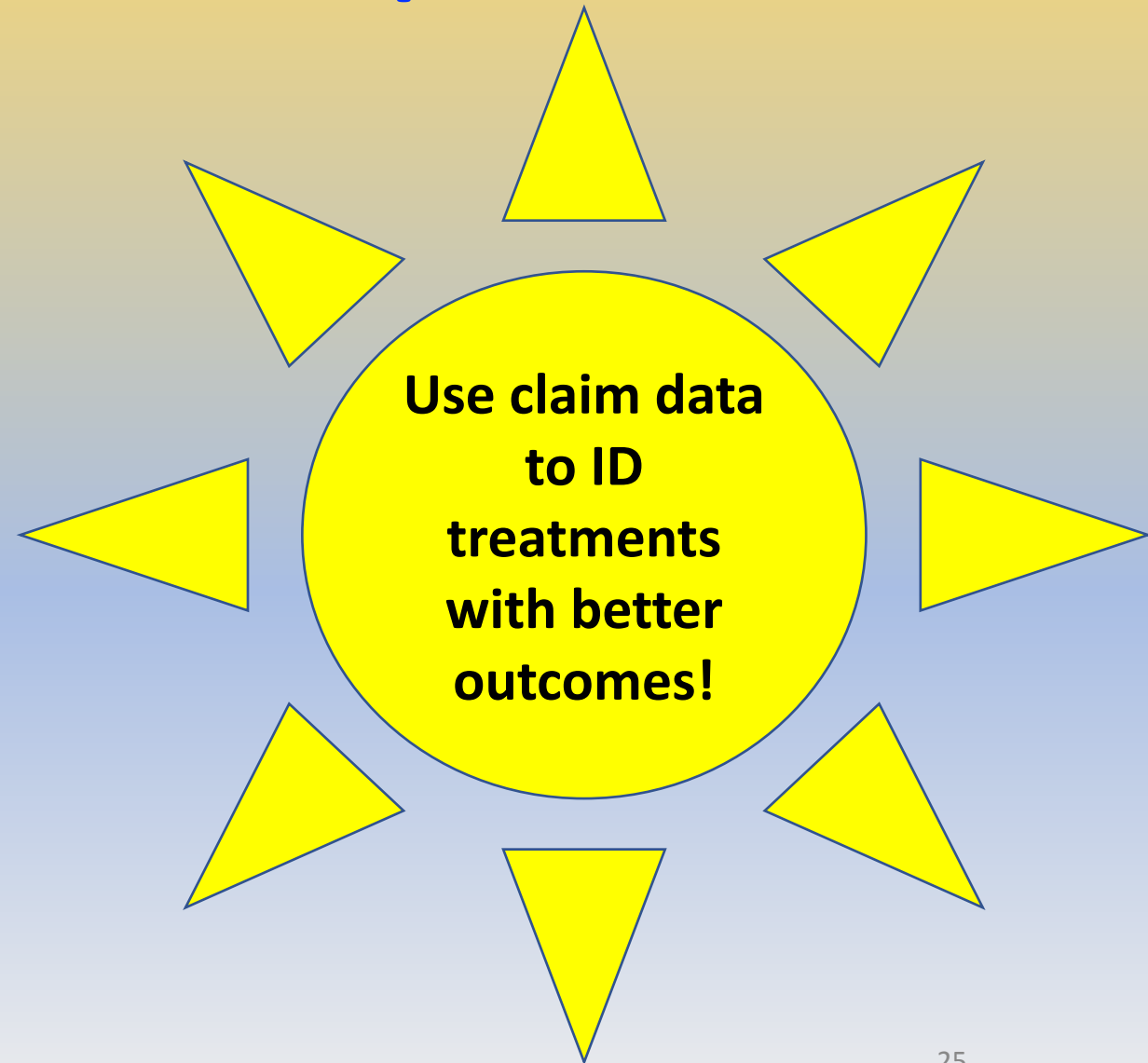
Another Possible WC AI Application

1ST Level Review □ Automated UR

- "Assisted authorization"

  Definition:
  - *paying or denying requests for medical treatment and procedures quickly without reviewing each claim manually*

Genetic technology

- **CRISPR**
  - *Clustered Regularly Interspaced Short Palindromic Repeat*
- **Targeted Biological Drugs**
  - *Chimeric Monoclonal Antibody Drugs*
    - *Retuximab*
  - *Immunotherapy that uses monoclonal antibodies to bind specifically to certain cells or proteins*
- **Organ cloning**
  - *3D printers spraying cells, cloning*
- **Personal Genomics**
  - *The Era of Personal Genomics Has Arrived*
  - *"23 and Me", etc.*
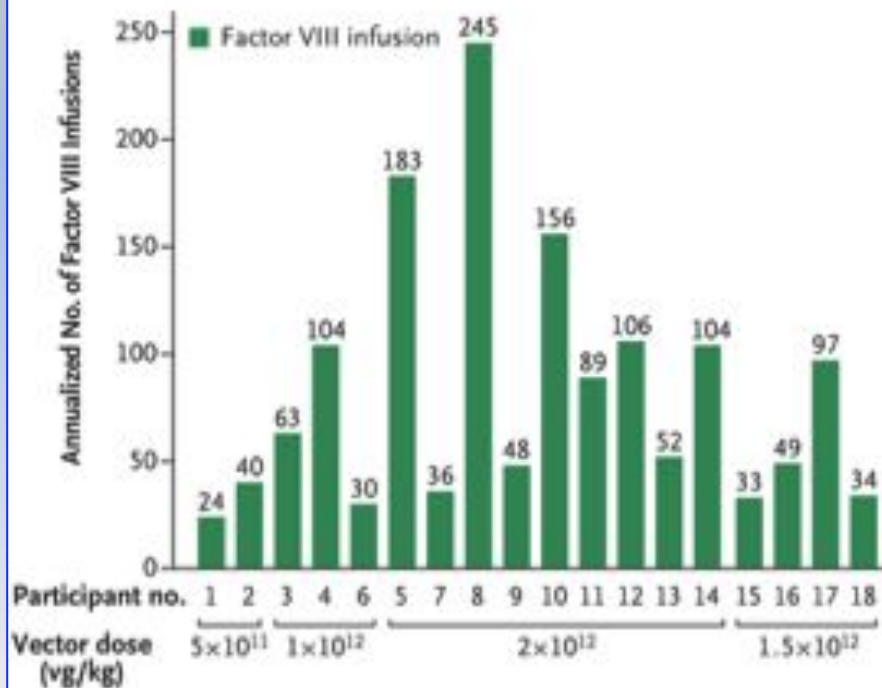
CRISPR Update

- **CRISPR**
  - "**C**lustered **R**egularly **I**nterspaced **S**hort **P**alindromic **R**epeat"

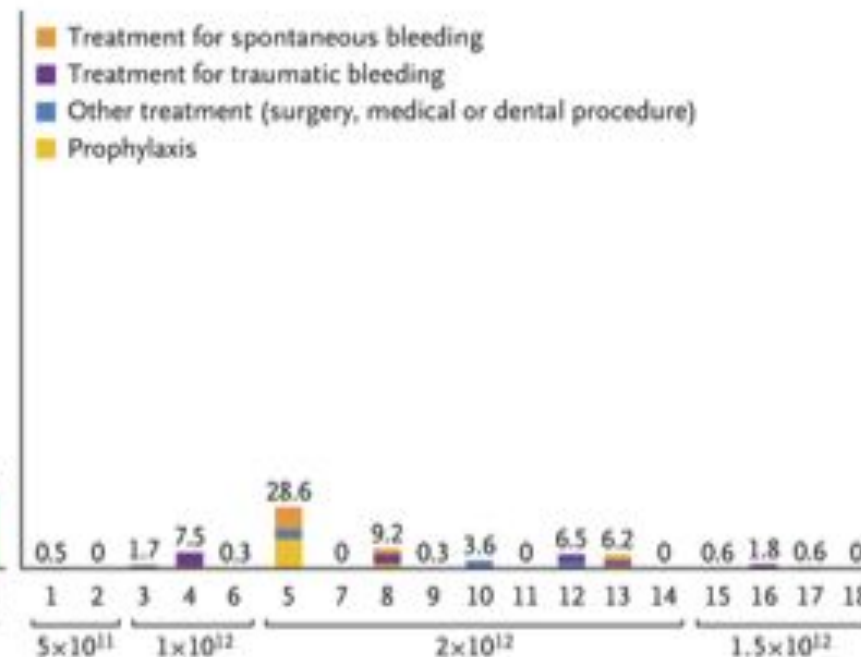- **Successful Human Trials for Hemophilia !!!**
  - *Corrective genes implanted into human beings – and they work!*

Factor 8 needed BEFORE Vector Infection   **AFTER Vector Infection**
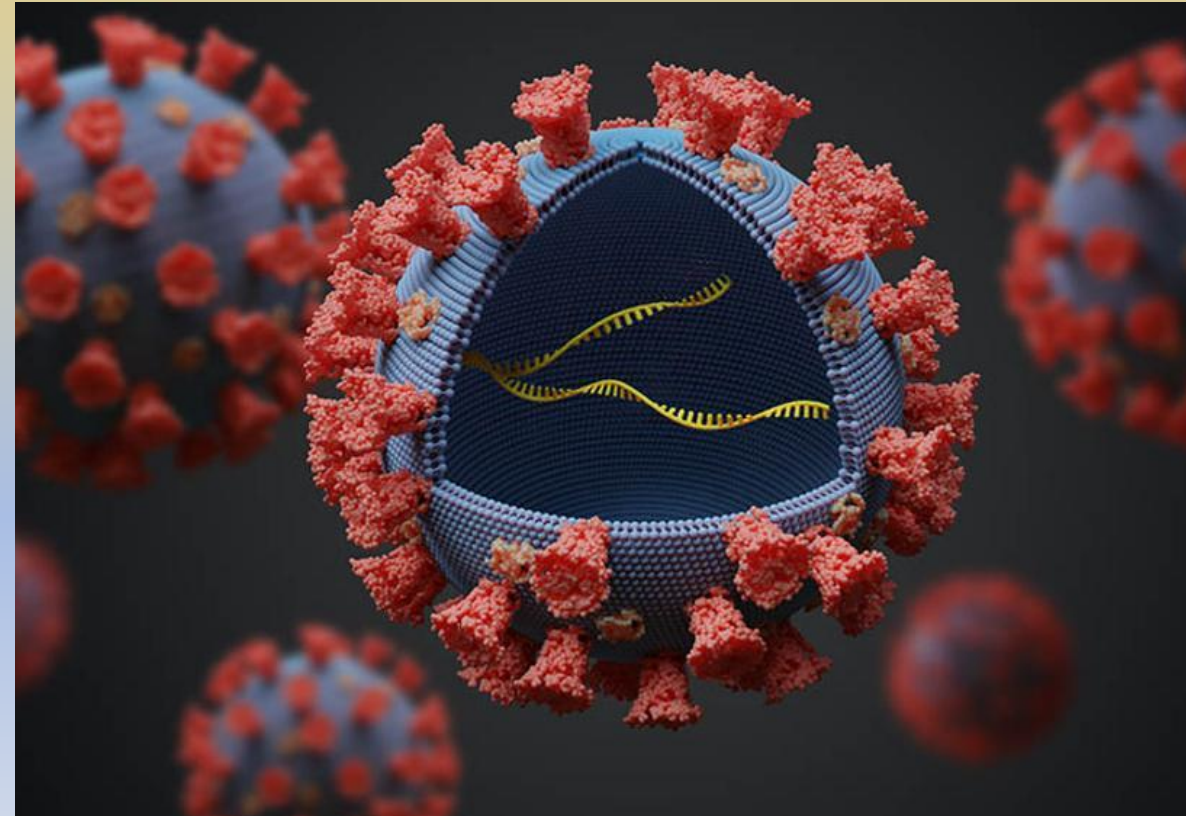
The NEW ENGLAND JOURNAL of MEDICINE

Gene Transfer for Hemophilia A

Sustained factor VIII expression in 16 of 18 participants

28

mRNA Vaccines
The new genetic technology that makes the COVID-19 vaccine

GOBSMACKED !

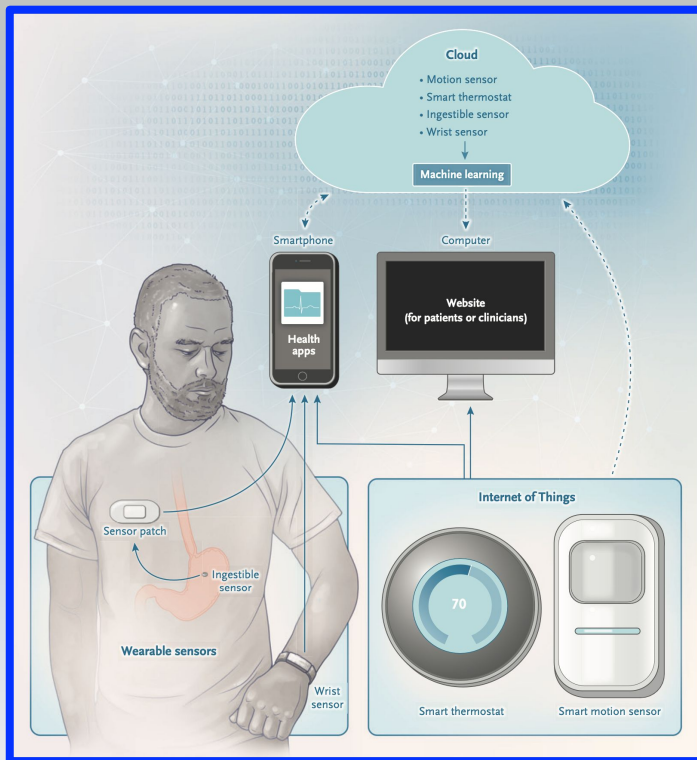*Allowed vaccine to be made in MONTHS, instead of years.*

Mobile Devices

Implications for Workers' Compensation

Remote Monitoring

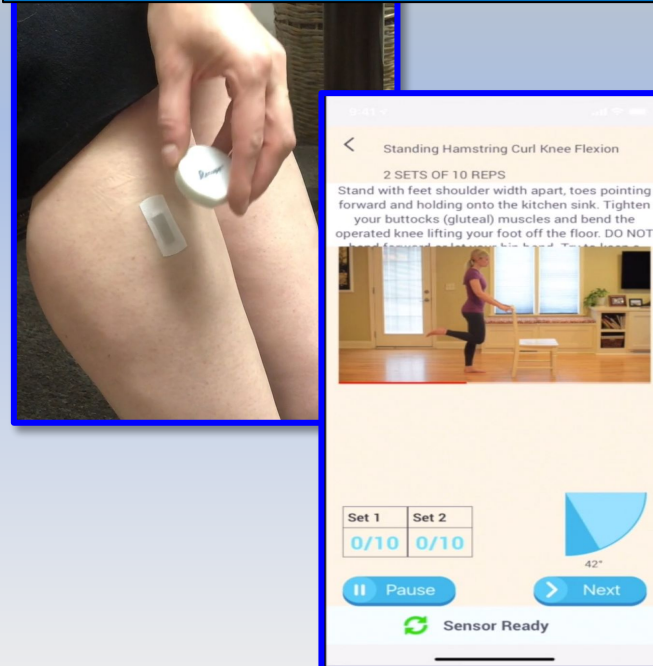- *Treatment compliance*
- *Phone device (blood sugar, EKG, etc.)*
- *Outcomes known!!*

Recovery/Rehabilitation Monitoring

- *"Quantified self" movement*
- *Fitness and health trackers*

APP + SERVICE: Recupe
Plethy.com

Pocket Ultrasound

Mobile phones/watch
Multiple Implications for WC

Diagnoses/Prevention/Treatment
- *AI utilizing algorithms*
- *Diagnostic devices*
- *Blood Sugar Monitoring*
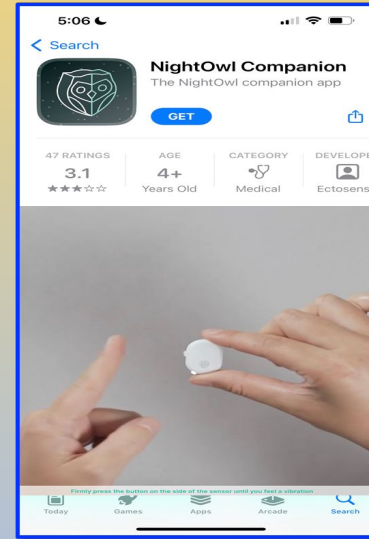- *Sleep Study*
- *Multiple Apps for Treatment*

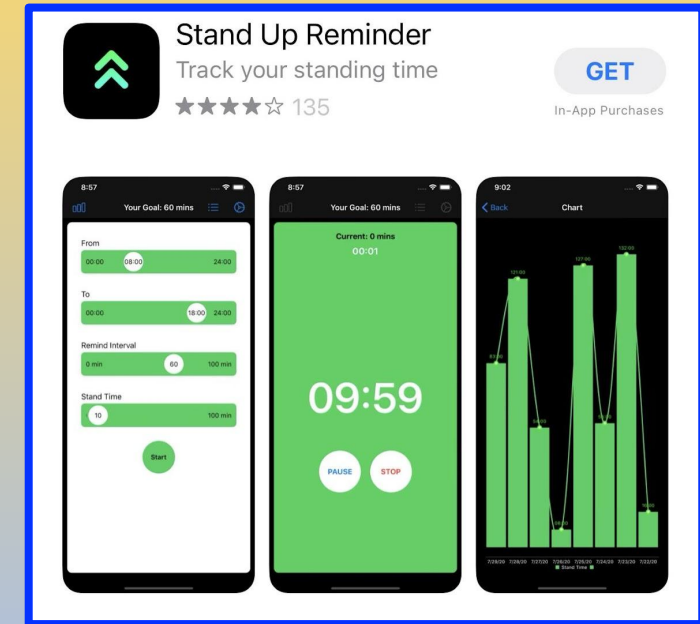### Transportation
- *Uber and Lyft prepaid transport*

Banking/Payments for EE's
- *Apple Pay*
- *Phone–phone $ transfers*
- *Direct Indemnity payments*

Sleep Apnea

Ergonomics

Diagnostics

Apps are now Medicine's "*Front End*"

2015

2022

SELF DX

TELEMED PORTALS

MEDICAL DX

MONITOR

MEDICAL DEVICES

iPhone 2007

Interesting Developments in Apps

- **Teladoc– 24/7 access to a doctor**
  - Teladoc connects patients to a board-certified doctor 24/7 through the convenience of phone or video visits.
- **Plethy**
  - Home physical Therapy
- **NigtOwl**
  - Home Sleep Study
- **Better Help – Online Counseling**
  - Better Help allows patients to have quick, inexpensive, easy access to mental health professionals.
- **Heal – Physician house calls are back**
  - "Uber-ization" of physician house calls.

Apps for anxiety and depression - UCSF

Sanvello – *includes a coach or groups.*

Meru Health – *uses an app and therapist, and biofeedback monitor is optional. Referral from a health care provider is necessary.*

Happify – *stress reduction and cognitive techniques to address anxiety (some free content)*

MindShift CBT – *Free content, w/ CBT strategies for general worry, social anxiety, and panic.*

PTSD Coach – *VA's PTSD Center: PTSD education, self-assessment, support options and tools*

PTSD Family Coach – *VA for PTSD patient family members. Extensive information on: PTSD, how to self-care, relationship advice w/ loved one or children, how to access needed treatment*

Mothers and Babies Online Course – *web-based program for depression for pregnant women, new mothers, and those who want to support them.*

COVID Coach – *Created to support self-care and overall mental health during the pandemic.*

Spinal Implant Enables Paralyzed Man With Severed Spine to Walk Again
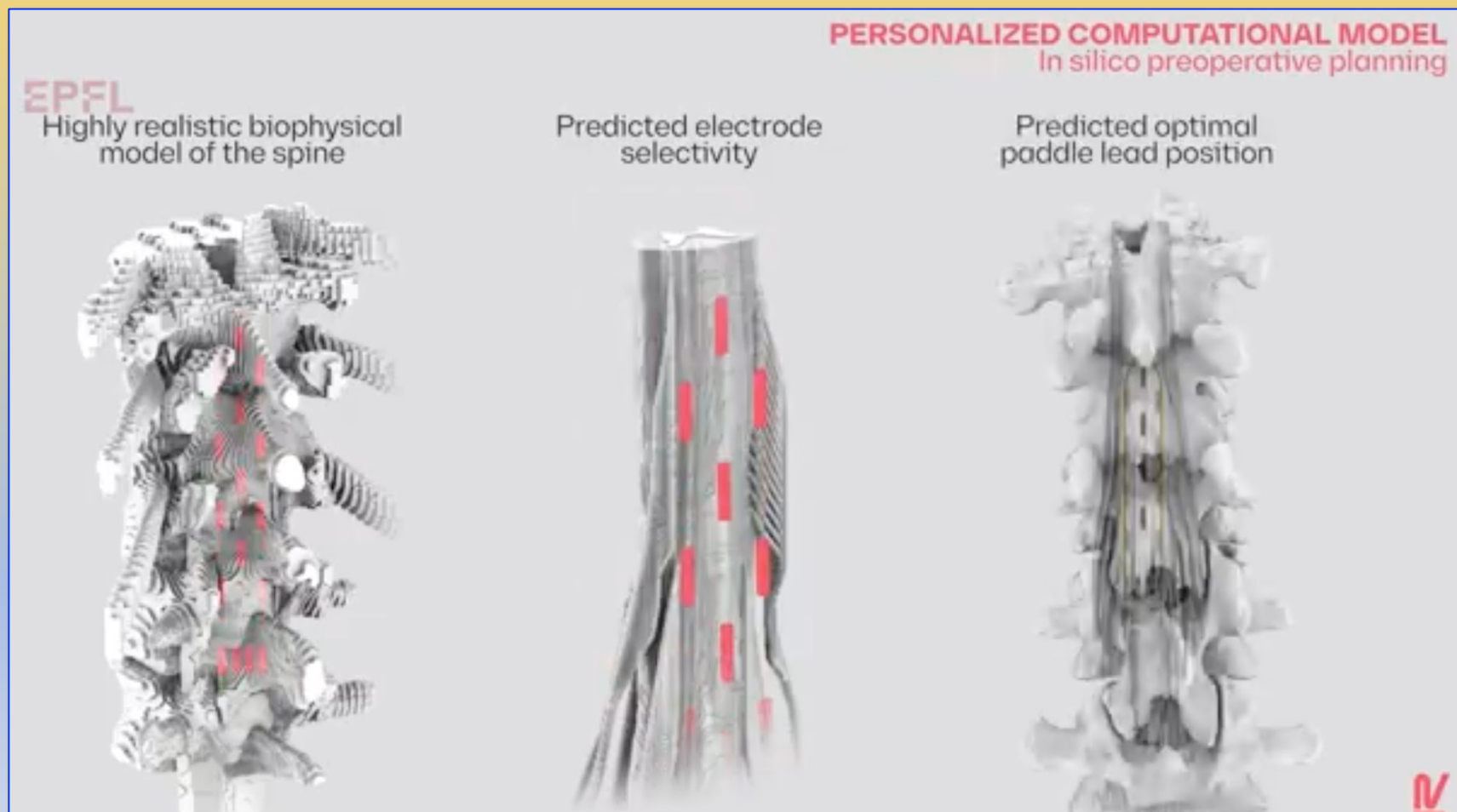
The Patient is now "*able to stand for two hours – he walks almost one kilometer without stopping*".

Activity-dependent spinal cord neuromodulation rapidly restores trunk and leg motor functions after complete paralysis
Nature Medicine 07 February 2022

https://www.nature.com/articles/s41591-021-01663-5

3D Printers

Lower costs

Biomaterials build Complex Organs

- hydrogel + smooth muscle cells
  + valve interstitial cells = heart valve
- Blood vessels, bone, ears

Prosthetic Limbs & Orthotics

- Especially developing countries

Customized Medical Implants

- CT Scan gives info for printer

3D Printing Labs in Hospitals

- Surgeon practices on patient-specific models
- Medical equipment – IV tubes, etc.

Protective Devices and Aids

- Hearing aids, sensors

Forearm and Hand

Trachea

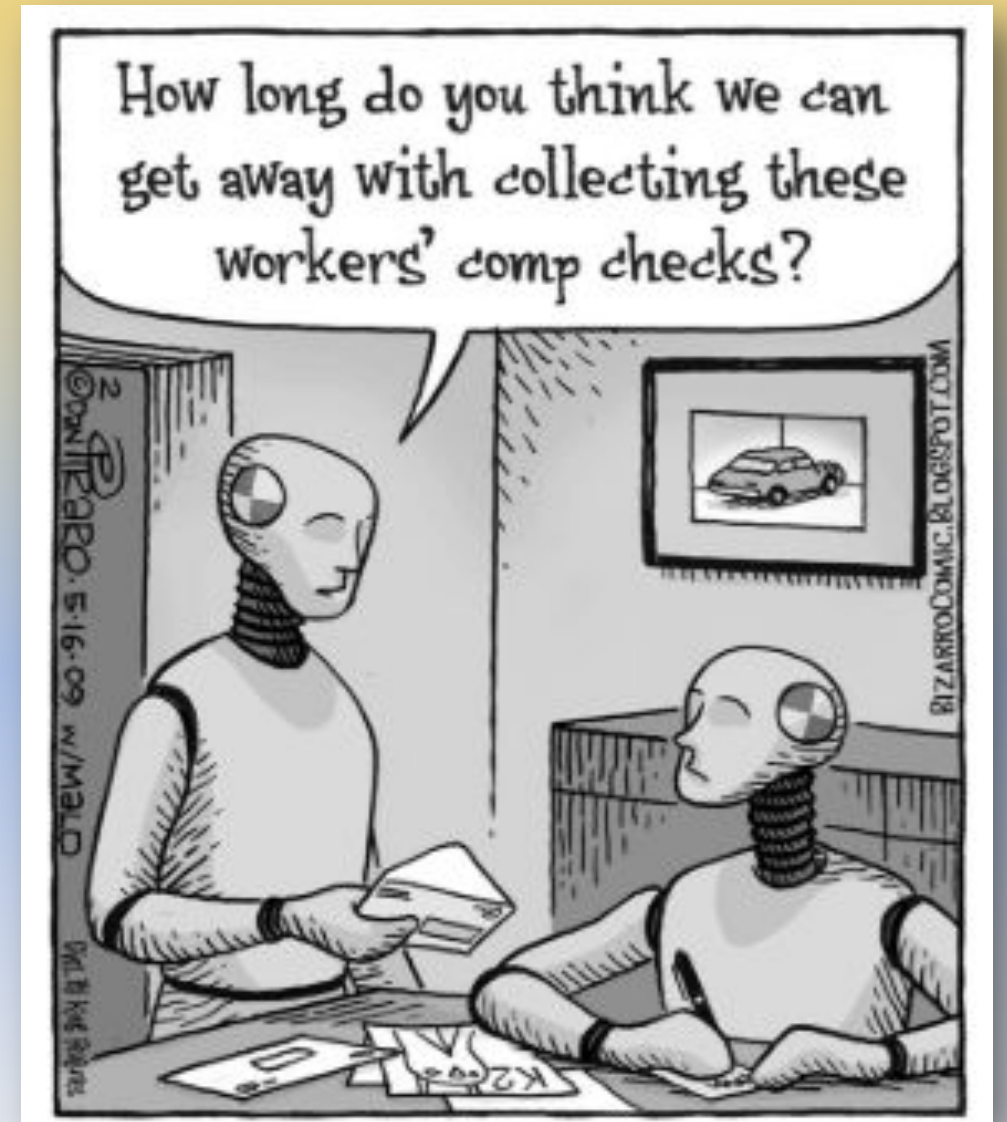Heart Valve

Augmented and virtual reality

- Virtual reality
  - *Standard stroke rehabilitation*
- Augmented reality
  - *Microsoft Hololens*
- What's after that?
- What are API and gamification?
  - *And who cares?*

VR Implications for workers' compensation

- Safety training
- Amputations
- Stroke rehab
- Pain management
- Surgery augmentation

… Only one link of the chain of destiny can be handled at a time."

- Winston Churchill

This tech is coming
– we have a chance to grab on and go for a ride!
(and avoid being run over :)

JASON

(Defense Advisory Panel Reports)

- [Perspectives on Research in Artificial Intelligence and Artificial General Intelligence Relevant to DoD](#), JSR-16-Task-003, Jan. 2017
  - *AI technologies are of great importance to DoD missions. Defense systems and platforms with varying degrees of autonomy already exist. More importantly, AI is seen as the key enabling technology of a 'Third Offset Strategy' that seeks for the U.S. a unique, asymmetric advantage over near-peer adversaries.*

- [A Robust Health Data Infrastructure](#), JSR-13-700, November 2013
  - *HHS asked JASON to address the nationally significant challenge of developing comprehensive clinical datasets, collected in real world environments and accessible in real time, to support clinical research and to address public health concerns. These datasets could be used to guide clinical research, enhance medical decision-making, and respond quickly to public health challenges.*

- [Data Mining and the Human Genome](#), JSR-99-310, January 2000
  - *As genomics research moves from an era of data acquisition to one of both acquisition and interpretation, new methods are required for organizing and prioritizing the data. Powerful data mining techniques have been developed in other fields that, with appropriate modification, could be applied to the biological sciences.*