

June 2022



The Future of EHRs

What if medical records were actually...good?



About me

Nikhil Krishnan is the founder of [Out-Of-Pocket](#), a company teaching people how the business of healthcare works and trends that are shaping the industry through his newsletter, courses, and more. He's trying to make it funny and accessible, which is a pretty low bar for the industry to be honest.

Previously he was a senior research analyst at CB Insights, where he built out the healthcare research team. He authored the weekly CB Insights Digital Health Newsletter, which grew to 90K+ subscribers.

He was also on the Strategic Partnerships team at TrialSpark, a technology company creating a distributed network of clinical trial sites to run faster and more efficient clinical trials.

Currently he is also an investor in early stage healthcare companies.

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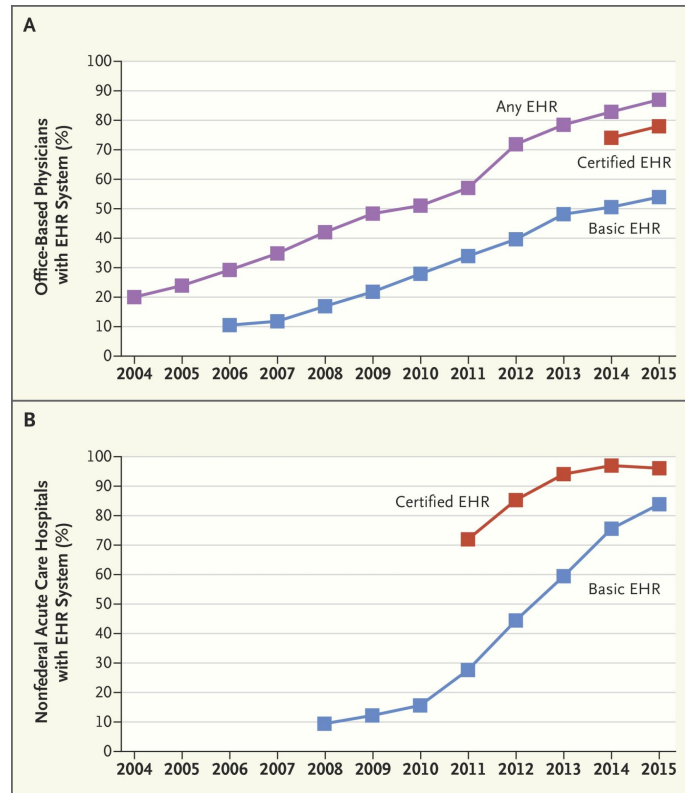
How did we get here?

Why are EHRs so bad today?

The HITECH Act + Meaningful Use incentives accelerated EHR adoption

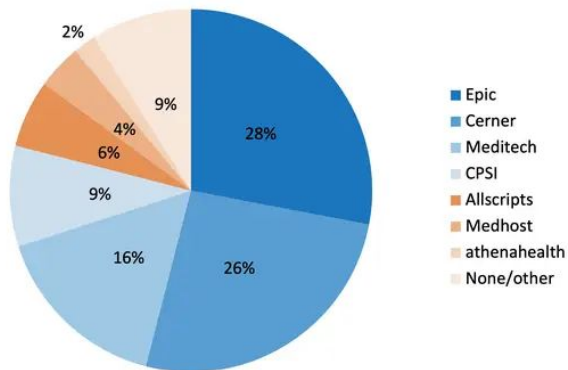
In 2009 the HITECH Act allocated \$36B in incentives for providers to adopt electronic health records.

They money was attached to Meaningful Use Incentives in different stages. Each stage was meant to add more features to EHRs, then promote data interoperability between providers, and finally to allow interoperability with any third-party a patient wanted.



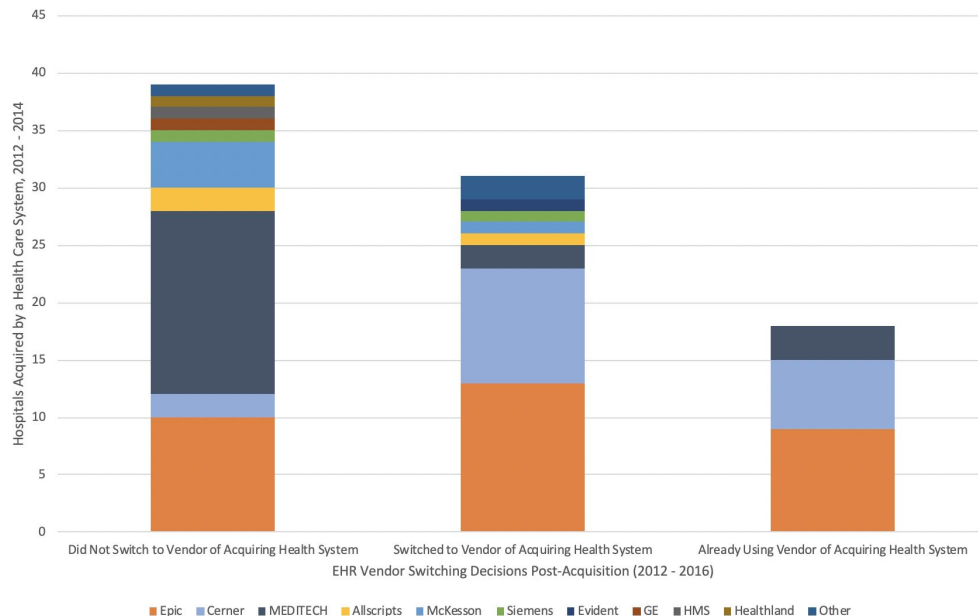
Hospital consolidation in the last decade has led to EHR consolidation as well and the need to support much more complex + customer-specific workflows

Epic Bested EHR Vendor Competitors In US Hospital Market Shares In 2018



BUSINESS
INSIDER
INTELLIGENCE

Source: KLAS Research, 2019



The result is EHRs optimized for

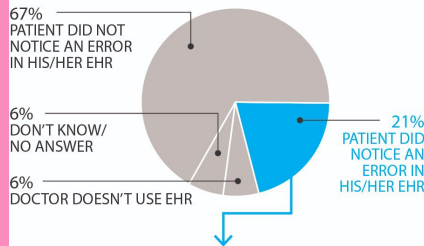
- **Meeting the basics of Meaningful Use requirements**
- **Site specific workflows and first-party development**
- **Turning clinical documentation in claims**
- **Top down sales into hospital administration**

This creates missing/wrong information and safety issues

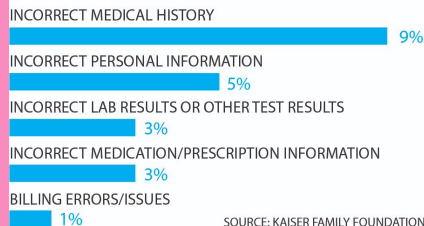
BROKEN RECORDS

One in five people surveyed this year by the Kaiser Family Foundation has found a mistake in their EHR. Of those, nearly half have incorrect medical histories.

RELIABILITY OF EHR



TYPE OF ERROR NOTICED IN THE MEDICAL RECORD

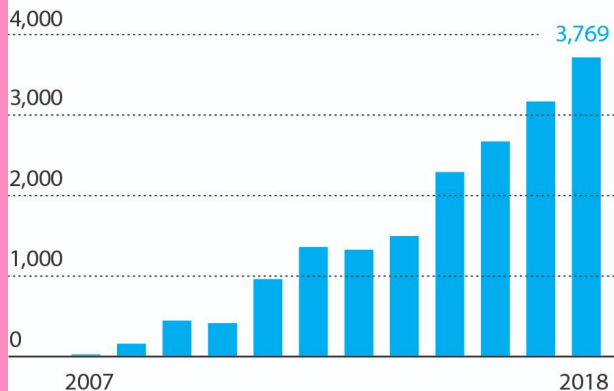


SOURCE: KAISER FAMILY FOUNDATION

DANGER SIGNS

Safety events owing to EHR and other health IT issues have been steadily rising. Even so, experts say cases are widely underreported.

SAFETY-RELATED INCIDENTS LINKED TO EHR OR OTHER IT



SOURCE: QUANTROS

EHRs are rife with errors in the record itself, difficult matching patients to other health records in the system, and an increasing number of alerts which are causing doctors to burnout and miss important information

What's lacking is:

- **Standardized data that's interoperable and usable by third-parties**
- **Ability to ingest real-time data feeds**
- **Surfacing relevant information at the point of care (alert fatigue, safety issues, etc.)**
- **Any sense of usability from the physician's perspective or bottom's up adoption**



**I love my EHR and it really helps me in my
day-to-day**

-no doctor



But some things are changing today...

Why now?

Haven't we already tried making better EHRs but they fail?



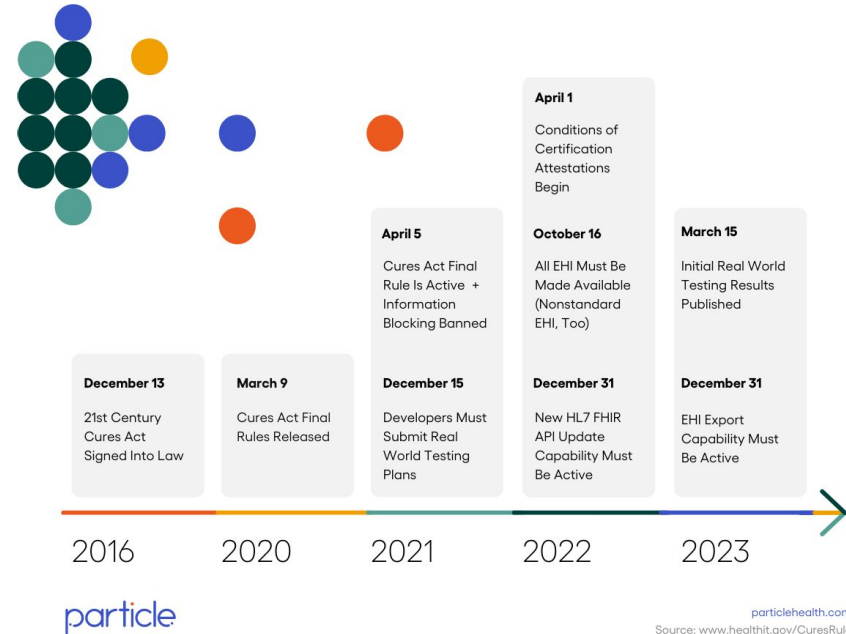
It's true, we've seen lots of attempts through the last decade at building a better EHR. The issues bringing one to market have historically been:

- Patients don't like logging their own data into PHRs
- Replacing well-known names at larger health systems, both because they're risk averse purchases and have lots of feature requirements
- The focus was billing, which current EHRs do well so new “killer” features or business models weren't a priority

21st Century Cures Act + Information Blocking Rules

The slow rollout of the 21st Century Cures Act has:

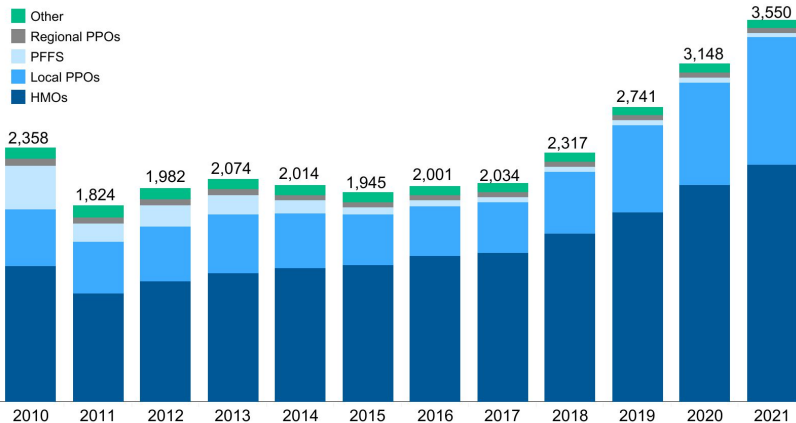
- 1) Allowed immediate release of information to patients (e.g. labs, notes, etc.)
- 2) Pointed to a data standard + required data elements to be available via API
- 3) Set timelines for when this needs to be available



New payment models (cash pay, value-based care) are proliferating and need new documentation tools

EHRs were built in a fee-for-service world, what happens for companies that move away from that?

Figure 2
More Medicare Advantage plans are available in 2021 than in any other year..



NOTE: Excludes SNPs, EGHPs, HCPs, and PACE plans. Other category includes cost plans and Medicare MSAs. Numbers may differ from previous publications in cases where the Landscape File for the year was updated after initial publication.
SOURCE: KFF analysis of CMS's Landscape Files for 2010 – 2021.

SESAME Symptoms Types of care Services SesameRx NEW

In-person doctor visit

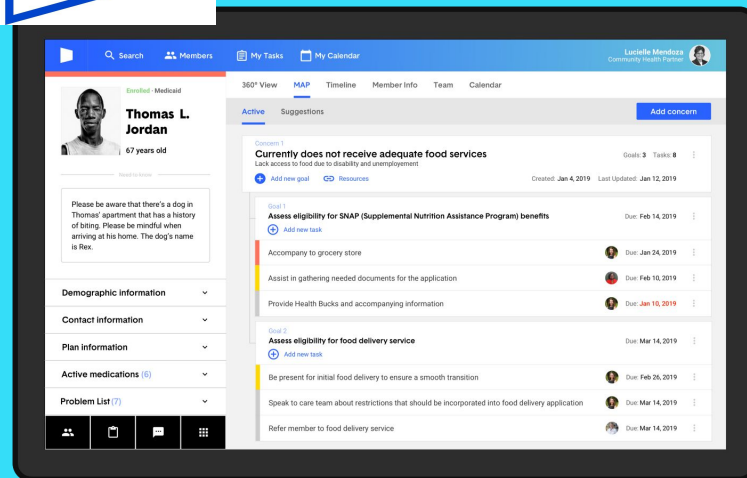
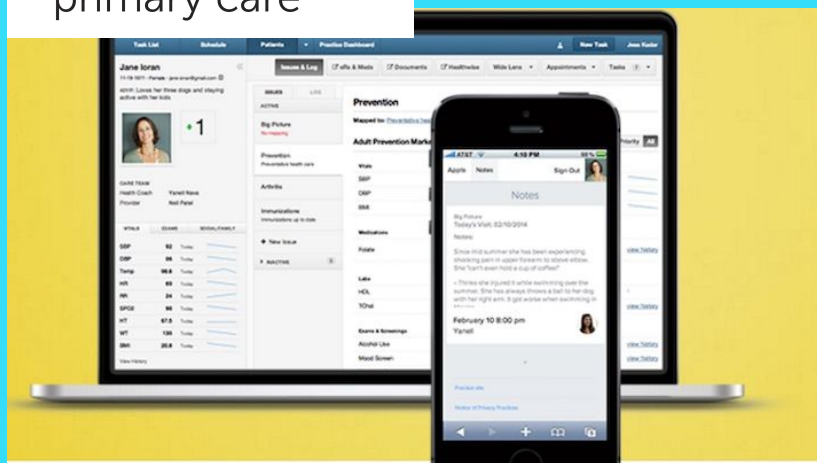
Map view

Jenny Delaleu, FNP-BC
294 West Merrick Road, Freeport, NY 11520
Internal medicine
AVAILABLE TODAY
\$5 MEDS
SEE TIMES | \$97

Dr. Matthew Pabis, MD
57 St. Marks Place, New York, NY 10003
Family medicine
4.9
AVAILABLE TOMORROW
"Great customer service! Love the doctors and the entire staff"
SEE TIMES | \$116

Vitaliy Gavrylyuk, FNP
73-09 Myrtle Ave. Floor 1, Suite 1, Glendale, NY 11385
Family medicine
5
AVAILABLE TOMORROW
SEE TIMES | \$138

There are increasingly new, tech-first providers that are already building their own EHRs in-house



Advances in machine learning

Instruction:

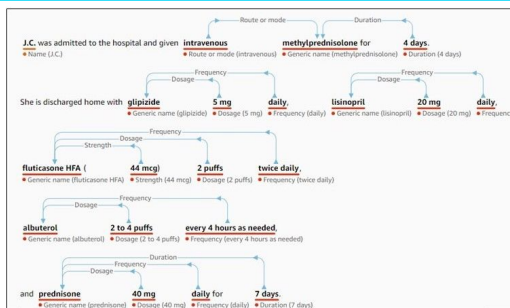
Given an input question, respond with syntactically correct PostgreSQL. Be creative but the SQL must be correct.

Ask GPT-3:

Get GPT-3 Response

J.C. was admitted to the hospital and given intravenous methylprednisolone for 4 days. She is discharged home with glipizide 5 mg daily, lisinopril 20 mg daily, fluticasone HFA (44 mcg) 2 puffs twice daily, albuterol 2 to 4 puffs every 4 hours as needed, and prednisone 40 mg daily for 7 days.

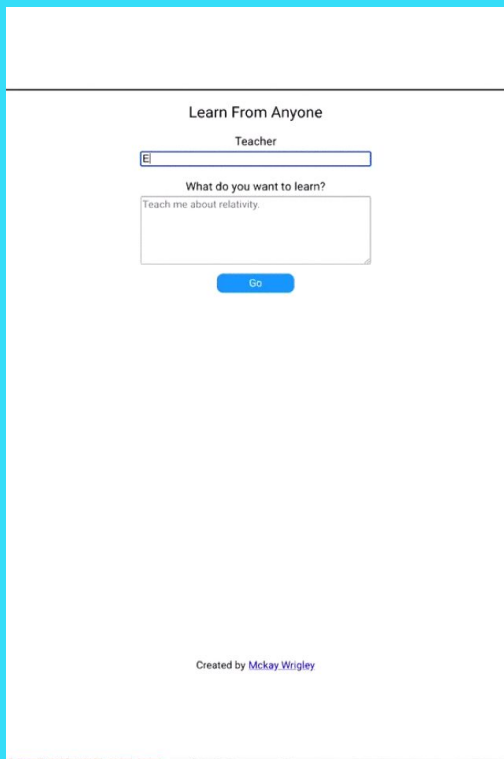
A. Sample clinical text note



B. ACM Output

Natural language processing, parsing, and voice-to-text dictation have significantly developed in the last few years, with many companies training specifically on healthcare data

Advances in machine learning



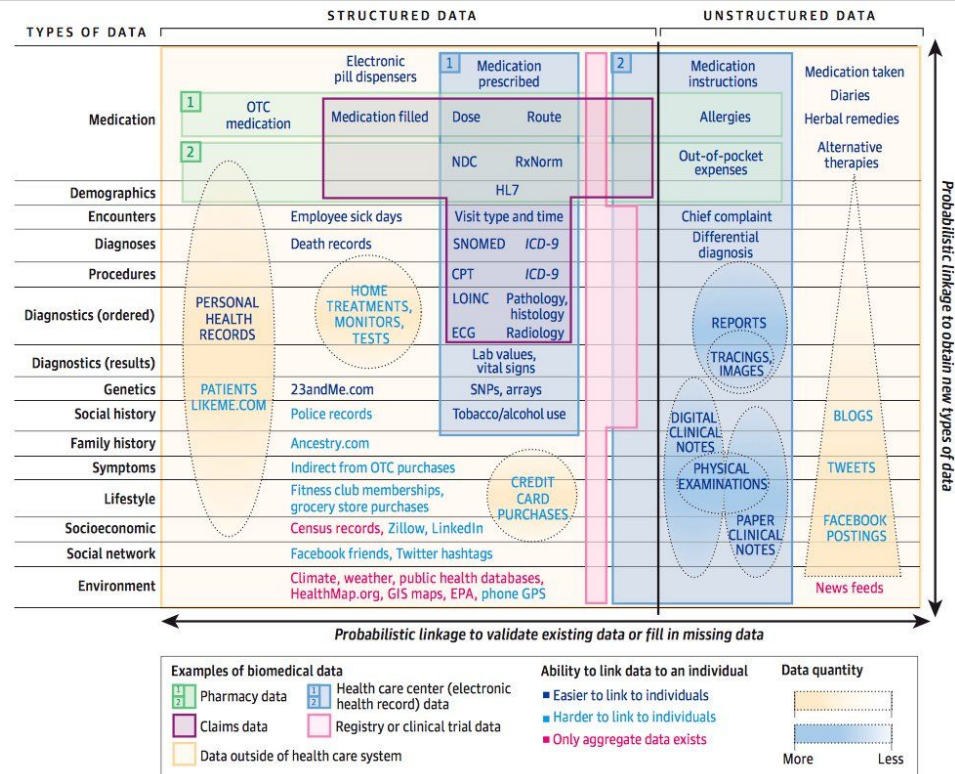
The screenshot shows a web interface titled "Learn From Anyone". It features a "Teacher" input field with the text "El" entered. Below this is a "What do you want to learn?" section with a text area containing "Teach me about relativity." and a blue "Go" button. At the bottom, it says "Created by Mckay Wrigley".

GPT-3 models can output text that takes existing information and personalizes it to the end reader. You can imagine auto-generated SOAP notes or discharge information patients can actually digest

There is increasingly more useful data being generated outside of the clinic



Figure. The Tapestry of Potentially High-Value Information Sources That May be Linked to an Individual for Use in Health Care



Real-World Evidence is maturing

What role does RWE play in FDA approvals?

As we prepare for FDA's guidance on real-world evidence (RWE), we systematically assessed new drug and biologic approval documents in 2019 to understand how RWE influenced its decision-making.

RWE is prevalent in FDA approvals.

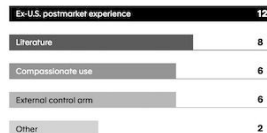
1 in 2 New Drug Applications (NDAs) and Biologics License Applications (BLAs) included an RWE study to support safety and/or effectiveness.*

FDA's decision on the RWE studies:

- Supportive evidence
- Inconclusive
- Substantial evidence or primary evidence
- Not addressed



RWE submission types included:



RWE informs prescribing.

61% of decisions' resultant package insert refer to the RWE studies & findings. (11 of 18 applications)



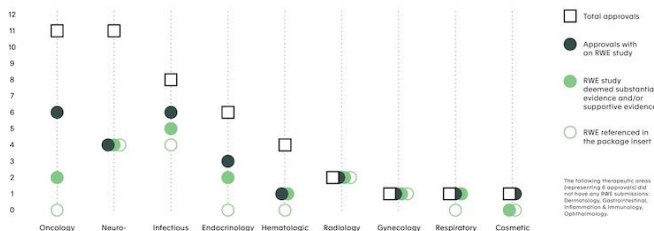
Principled database epidemiology is key to approval.

Due to major methodological issues (including immortal time bias, selection bias, misclassification, confounding, and missing data), the FDA does not consider the RWE adequate to support regulatory decision making.

Recent example in which FDA identified several issues with an external control arm — many of these issues can be proactively addressed in study design and planning stages.

RWE spans therapeutic areas.

FDA approvals that included RWE studies were largely for treatments of serious conditions.



Subscribe to receive our latest analyses: aetion.com/fda-decision-alerts

*For the 72 NDAs and BLAs in 2019, we analyzed 51; we excluded the 21 assays, blood grouping reagents, and solutions. Source: Aetion analysis, FDA approval documents.

AETION

As real-world evidence becomes integrated into approvals/commercial activities, having data that's standardized and queryable across sites becomes critical

A tight labor market for clinicians means better tools attract talent

Contributors to Burnout

Physicians and advanced practice clinicians only (n=6849)



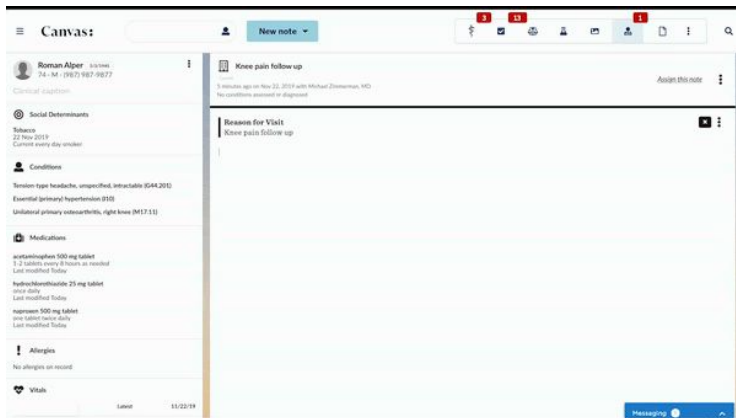
Key Finding:
The EHR is often perceived as a driver of burnout.

Burnout is rampant across healthcare and labor market for clinical staff is extremely tight. Providers that invest in tooling can attract physicians, nurses, etc. who are burning out partially because of their EHRs

Some new approaches to EHRs

Rethink completely? New interfaces? How “out there” should we get?

New, programmable EHRs are built for value-based care



Value-based care contracts requires workflow changes for clinicians, are oriented around care teams vs. individuals, and utilize more data from inside and outside of the physical clinics. New EHRs like Canvas allow developers to insert new rules and surface real-time actions that need to be taken at the point of care.

oop

Provisioning instance

API Documentation

API Canvas UI Third Party Integrations (Coming Soon) Monitoring and Alerting (Coming Soon)



Bearer token

Getting started

Introduction

Creating a Sandbox Environment

API

Authentication

Create a Patient

Create an Appointment

Also

Review our API Documentation

Create Your First Appointment

Now we're ready to create our first appointment. Once again, we've provided some boilerplate code to get you started quickly. All you need to do is following:

- Again, update the `--url` and the Authorization header with your instance name and Bearer token, respectively.
- Replace `[patient_id]` with the Patient ID you copied down after creating your patient above
 - If you've lost this, you can always search for it again using our [Patient Search](#) endpoint.
- Replace `[practitioner_id]` with your Practitioner ID from the previous step

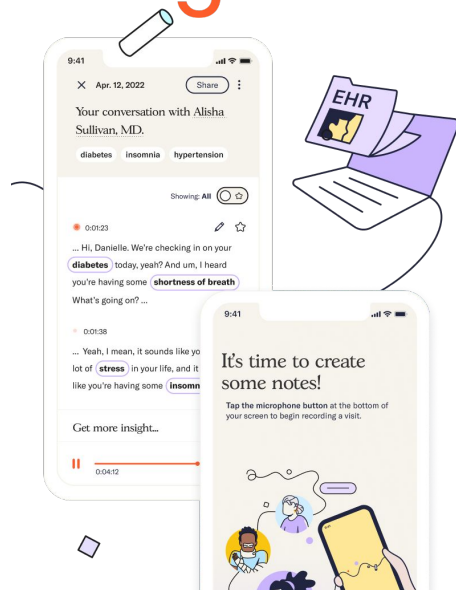
Run the cURL command with your inserted credentials along with the JSON body below, and that's it!

If you navigate to 5/20/2021 on the Schedule of your Canvas instance's home page, you will see you have created your first appointment.

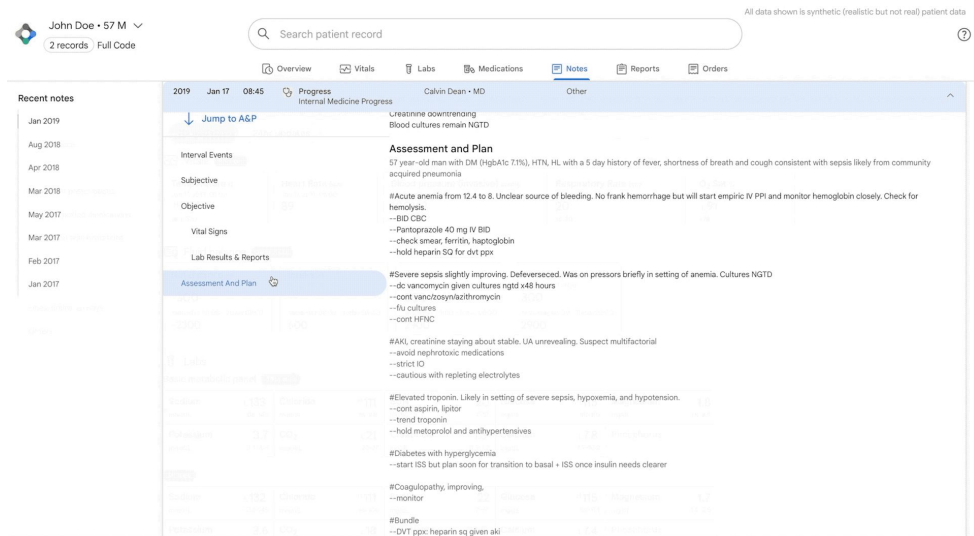
```
curl --request POST \
  --url https://(your-instance-name).preview.canvasmedical.com/Appointment \
  --header 'Authorization: Bearer (your-token-here)' \
  --header 'Accept: application/json'
```

New interfaces like voice or integrated search abstract the existing EHR behind a more usable interface

abridge




Care Studio



Wearables and research applications are becoming a longitudinal records

More patients are participating in research, including ones that begin from a “healthy” baseline. These biobanks capture data from both inside and outside the hospital.



Join over four million members getting paid for health actions.

“Evidation is my accountability buddy for logging food, activity, and water intake.”

Over 4 million app downloads, millions of people participating in cutting edge medical research. Top 10 best health tracking App.

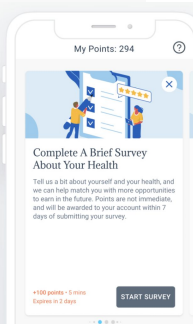
SIGN UP

Download on the **App Store**

GET IT ON **Google Play**

Participate in Cutting Edge Research

Join Evidation Studies and make contributions to our understanding of human health. We share insights back to you and our scientists publish findings in top medical journals for the benefit of all.



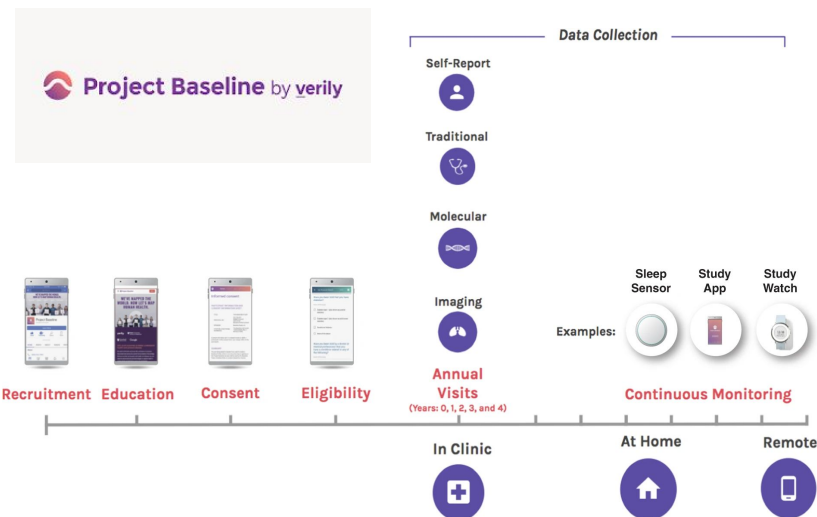
My Points: 294

Complete A Brief Survey About Your Health

Tell us a bit about yourself and your health, and we can help match you with more opportunities to earn in the future. Points are not immediate, and will be awarded to your account within 7 days of submitting your survey.

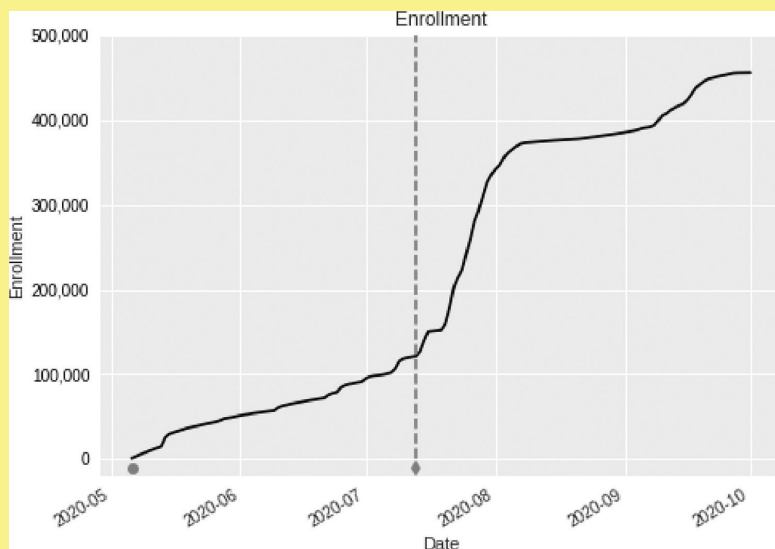
+100 points - 5 mins
Expires in 2 days

START SURVEY

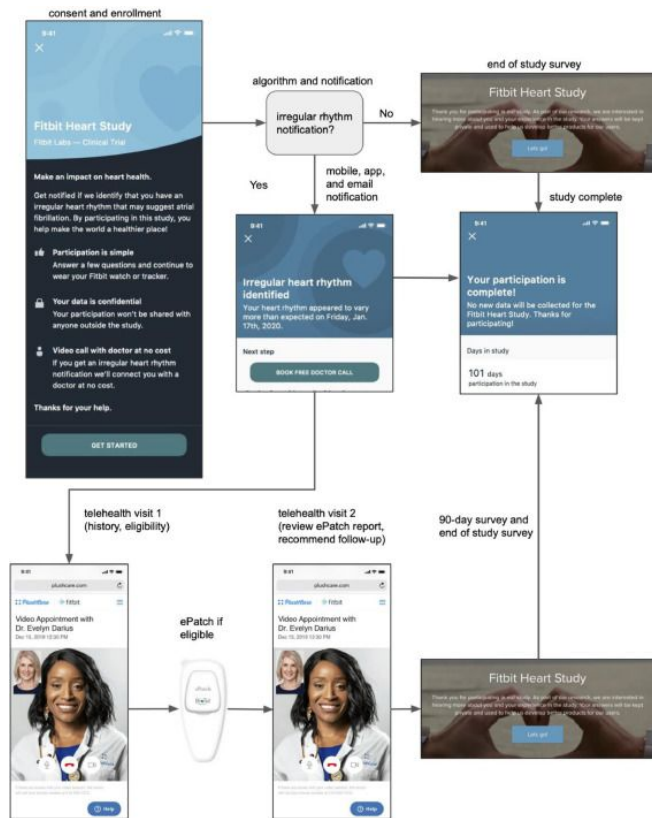


Example: Fitbit Heart study

Fitbit app becomes defacto EHR, customers become research participants and some become patients, consent is given for 90 days of retrospective data



source



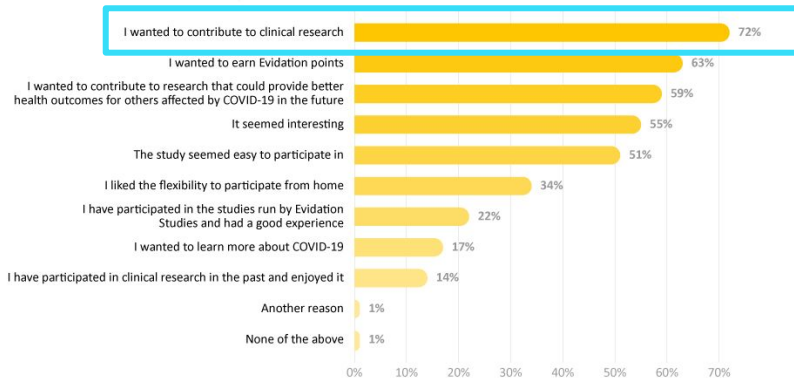
COVID increased the exposure to research for everyone encourage more longitudinal research

During COVID people were motivated to contribute their data and take part in research with identifying COVID early. Today long COVID registries are proliferating.

36121 PARTICIPANTS ANSWERED THE FOLLOWING QUESTION:





“Why did you participate in the COVID-19 Symptoms and Experiences Study? Select all that apply”



Footnote: COVID-19 Experience Study. Participants were able to select more than one response.


Feasibility of continuous fever monitoring using wearable devices

You + ME 

M.E. IMPACT TOOL COMMUNITY RESEARCHERS ABOUT 

[JOIN THE REGISTRY](#) [DONATE](#)

A Registry for the ME/CFS + Long Covid Communities



Help us uncover causes + identify treatments for ME/CFS, Long Covid + other post-viral illnesses.

[JOIN THE REGISTRY](#)

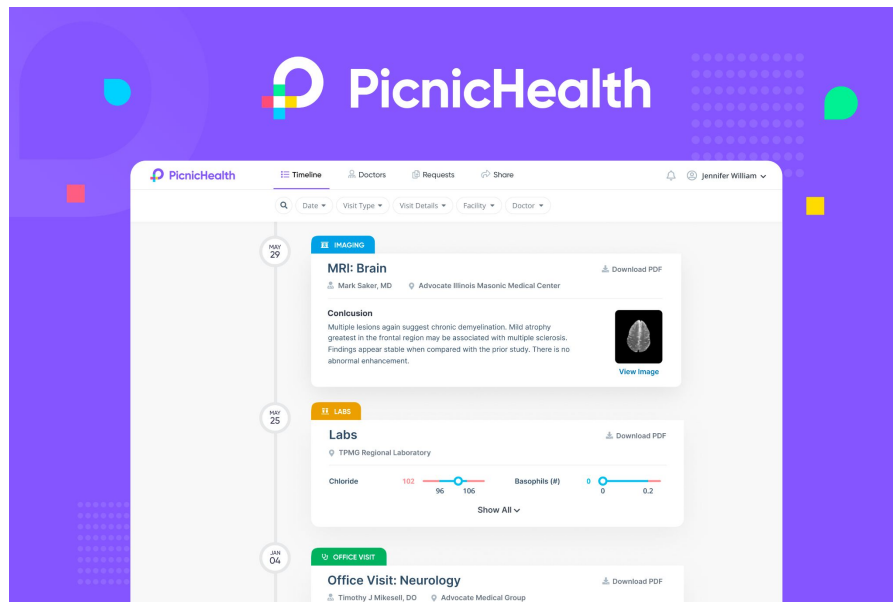
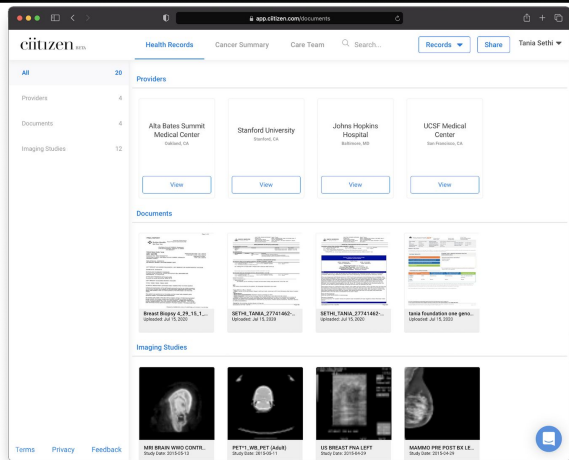
We promise to protect your privacy. We will not share your contact information with any outside parties.

The return of the personal health record

Is it different this time? Automation of medical release forms + retrieval, new APIs + authentication like SMART on FHIR, passive data collection, and a life science focus has opened new opportunities

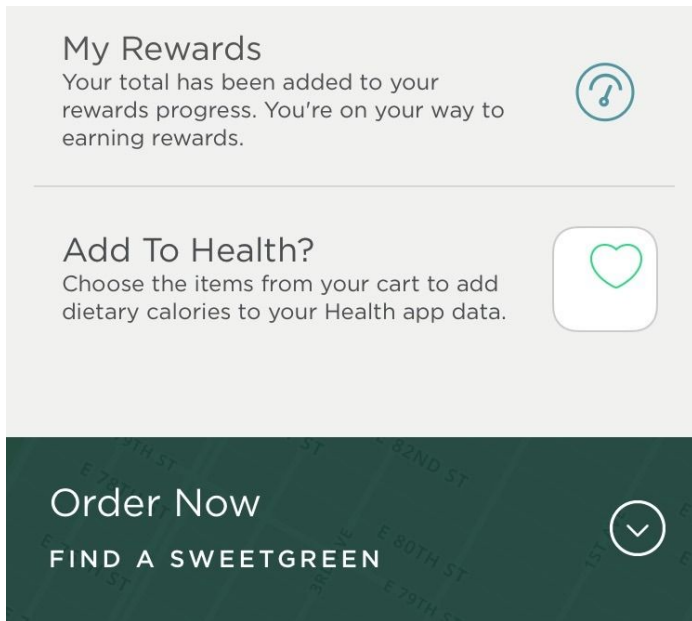
Invitae to Acquire Consumer Health Tech Firm Ciitizen for \$325M

Sep 07, 2021 | [staff reporter](#)



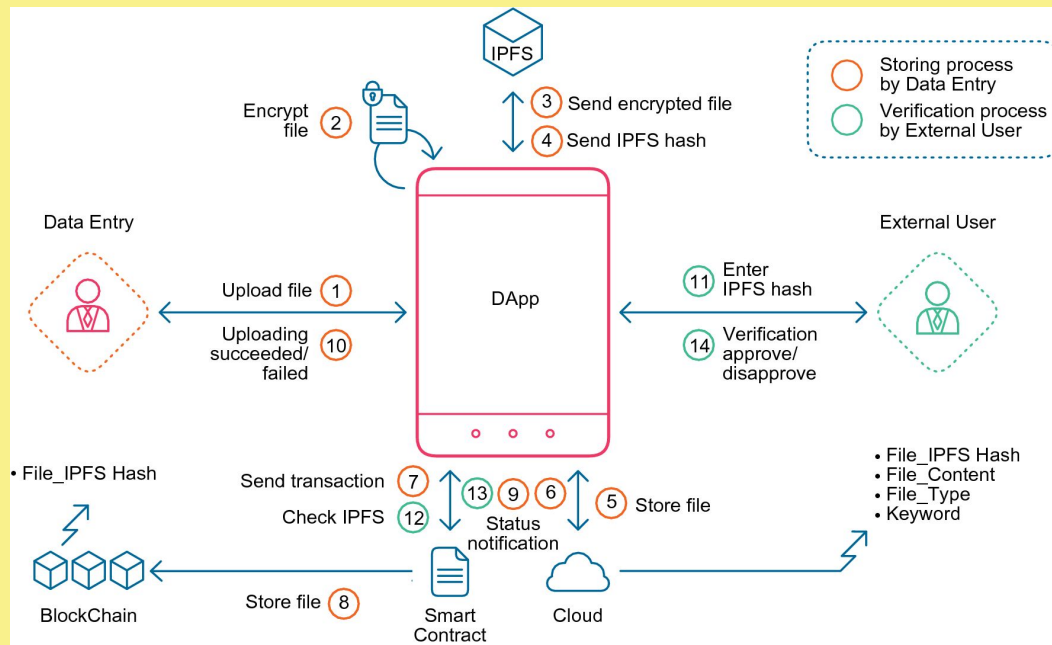
Health records as a platform for third-party developers

There have been almost no platform businesses in healthcare - usable SDKs for third-parties allow for bidirectional data flows with lots of different applications (including non “healthcare” ones)



HealthKit

Maybe way down the road...blockchain-based EHRs and decentralized applications (dApps)



If you think of blockchains as distributed databases where no single entity controls it, it sounds appealing vs. the oligopoly of EHR providers who currently get to determine all the rules of where data goes.

There are lots of implementation challenges here (how PHI is stored and retrieved, etc.) but would be much more appealing for third-party developers and enable true patient-mediated record exchange.

Thank You!

Happy to talk about anything healthcare related, trends in the space, and starting a company.

See my other posts and analyses at outofpocket.health

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Instagram: [@outofpockethealth](https://www.instagram.com/outofpockethealth)

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