CIRCLE SQUARE

HEALTH INFORMATION TECHNOLOGY

Digital Health Trends

December 2019

Year in Review

CONSUMER HEALTH AND TECHNOLOGY

The Ups and Downs of Digital Health

Digital Health Trends (December 2019) – Year in Review

From the co-editors…

Interoperable EHRs. Epic and Cerner cement leadership this year in EHRs for hospitals as client mergers encourage consolidation. Epic continues to dominate the large practice market and specialty EHR solutions are finding success. EHRs struggle with usability as ambient clinical intelligence and better search are emerging as potential support. Progress is slow and steady in interoperability. Social determinants of health, robotic process automation, and the Internet of medical things are strong innovation trends.

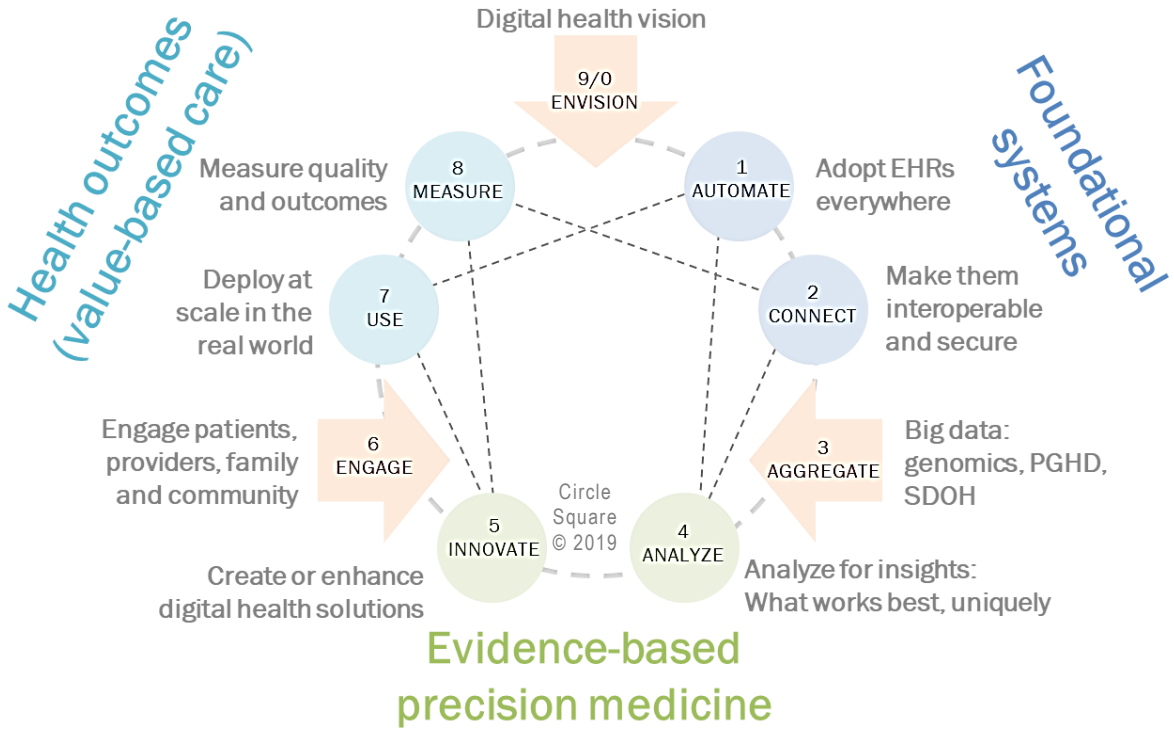
Analytics and genomics. EHR data are driving this phase of analytics in population health, enterprise efficiency, and clinical research. Industry analysts see EHR leaders playing a significant role, as are analytics focused solutions such as Health Catalyst and Arcadia. Value-based care has also been a segment driver as market competitors acquire companies that differentiate their solutions. Clinical research and organ-specific image analytics are continuing trends.

Consumer health and technology. 2019 saw the digital health IPO drought finally end, with six companies going public, including Livongo, Progyny, and Health Catalyst. Femtech and mental health startups got the attention of investors, as did telehealth companies, with adoption up among physicians. And big tech made a lot of headlines in digital health in 2019, though the verdict is still out on whether they can disrupt the market in a meaningful way.

Michael

Michael Lake and Dave Lake
Co-editors *Digital Health Trends*

Circle Square tracks digital health as a transformation process



Contents

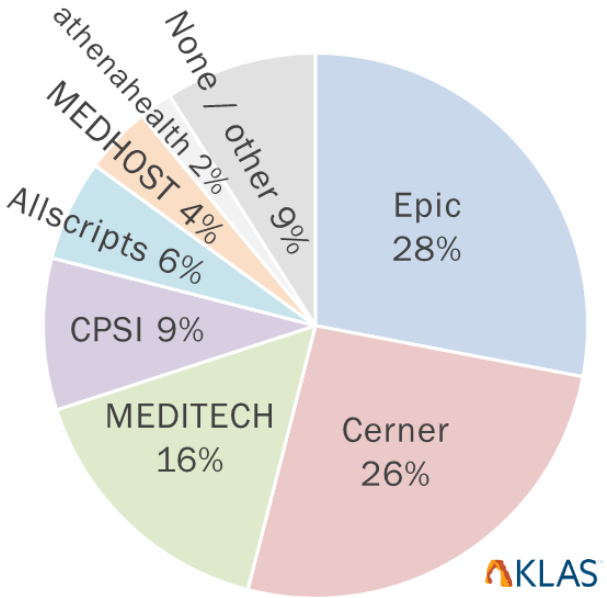
Digital Health Trends (December 2019) – Year in Review

Electronic Health Records

There is significant recent movement in the US hospital EHR market as US firms are also successfully competing globally

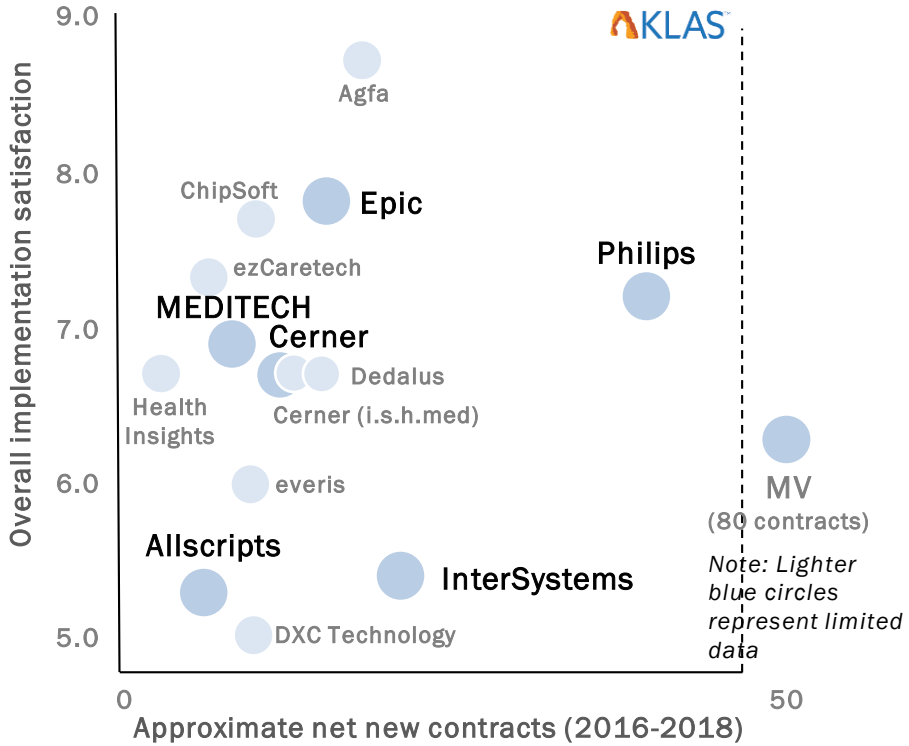
US hospital EHR vendor market share

n=5,447 acute care hospitals



In 2018, 445 hospitals were impacted by an EMR decision with most driven by consolidating providers and choosing Cerner or Epic.

Global EHR implementation satisfaction and number of net new contracts

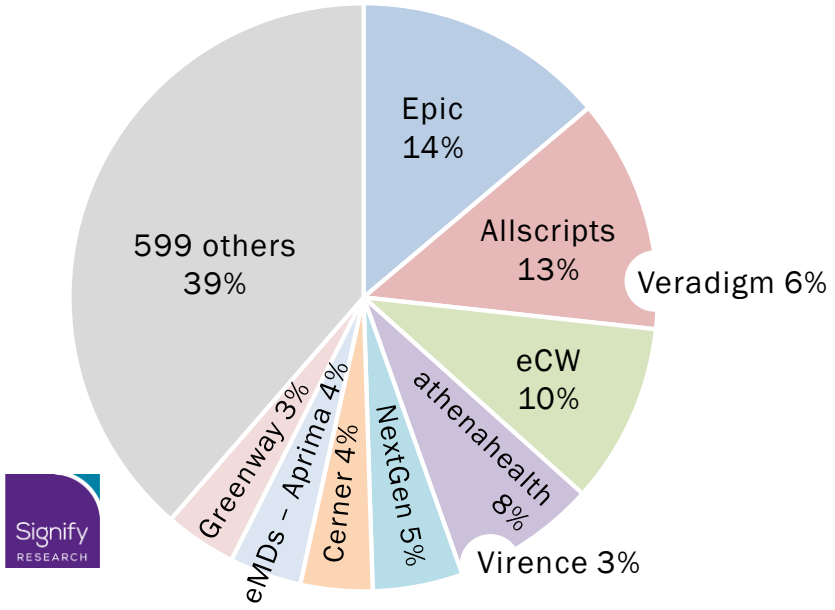


Editorial: KLAS Research reports its annual update on the US hospital EMR market. In larger hospitals, over 500 beds, Epic (58%) and Cerner (27%) combine (85%) to dominate that segment in 2018. Epic benefits from consolidation and Cerner from its VA contract rollout. Athenahealth, having dominated the very small acute care hospital market in 2017, largely because its cloud RCM and basic EMR functions, slows down, as competitors respond and the market settles in. KLAS provides insights in the market dynamics in all segments in the report linked below. In the global market KLAS finds that regional solutions, such as Health Insights, MV, DXC Technology, and Agfa are the fastest to implement, though satisfaction varies.

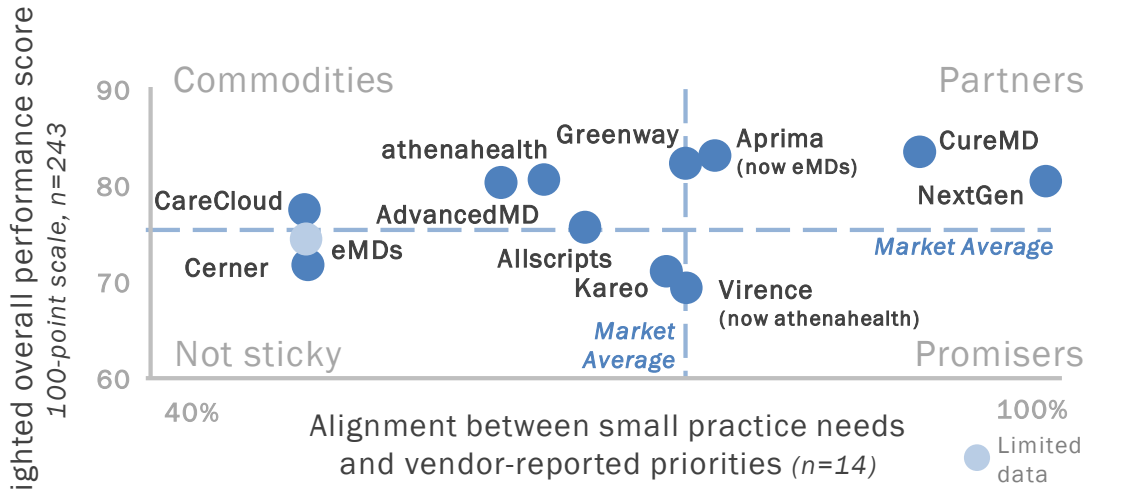
Source: KLAS Research: US; Global

The US physician practice EHR market has matured with some consolidation among the top tier

US physician practice EHR vendor market share



Which vendors are most aligned with small practice needs? *Top priorities for small practices are: (1) product functionality; (2) ease of use; (3) support and guidance*



Note: Weighted overall performance scores are weighted based on the relative importance to small practices of the following metrics: (1) product functionality; (2) ease of use; (3) support and guidance; (4) price and value; (6) tangible outcomes; (7) new technology

KLAS

Editorial: Signify Research (UK), an emerging research firm in digital health and HIT, analyzed the US ambulatory EHR market focusing on revenues to reveal share in its global EHR report due in June 2020. KLAS interviewed customers of 14 of the largest EMR/PM solutions targeted to small practices and invited vendor executives to share how their companies plan to meet small practices' needs and vendor reps shared their plans for the future, what factors they believe are most impacting customer satisfaction, and the areas they are currently focusing on to better meet clients' needs. eClinicalWorks declined to participate. Their findings make sense as a natural consequence of the real market catching up with customer needs post government incentives.

Source: Signify Research; KLAS Research;

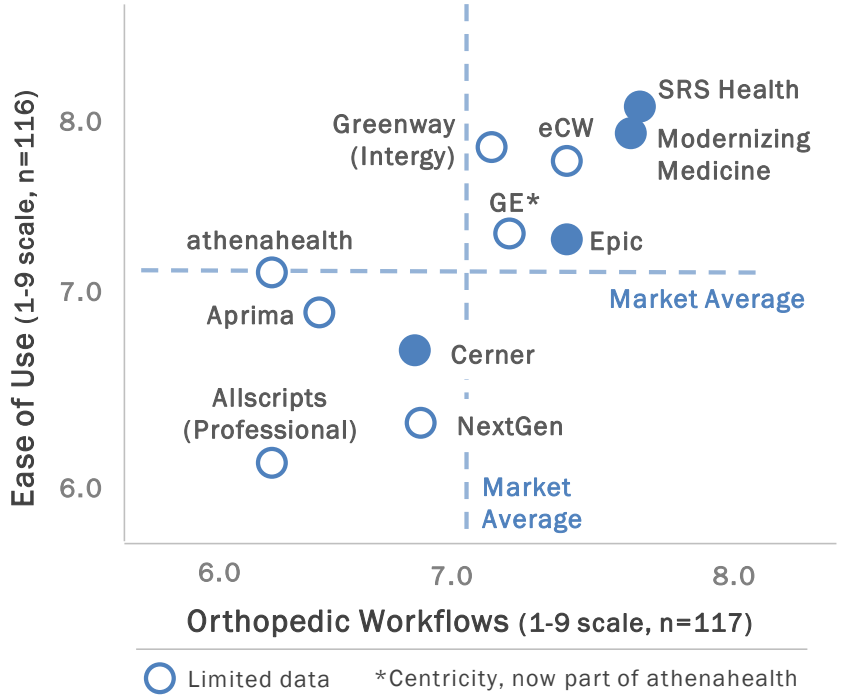
Adoption by specialties outpaces primary care and niche EMRs outperform market share leaders in some specialties

Physician practice adoption of EMRs by specialty (2017)

Specialty	Any EMR (%)	Certified EMR (%)
Orthopedic surgery	96.7	---
General surgery	95.8*	94.2*
Obstetrics / gynecology	95.7*	90.7*
Otolaryngology	94.6*	---
Pediatrics	92.1*	84.9
Other	89.3	81.1
Urology	88.7	86.7
General / family practice	86.1	81.5
Internal medicine	84.9	81.6
Dermatology	80.0	79.5
All physicians	**85.9**	**79.7**

*Significantly higher than the average of all physicians; (---) means the data were unreliable

Orthopedic workflows versus ease of use by leading orthopedic EMR vendors



Editorial: The CDC report focuses on identifying those characteristics of physician practices that are associated with higher or lower adoption of any EMR or federally-certified EMRs, self-reported by physicians. For this report, KLAS interviewed 120 healthcare professionals including orthopedists, directors, CMIOs, practice administrators, nurses, and others, at both hospitals and standalone orthopedic practices. While not quite as strong as leading specialty EMRs, Epic is notable. Successes include usability by SRS, ModMed, Epic and NextGen. Notable challenges include improving functionality by Cerner, SRS and athenahealth; and usability and revenue cycle functions by Greenway.

Source: CDC; KLAS Research; Arch Collaborative

Notable transactions in the physician practice EMR segment include both primary care and specialty solutions

athenahealth virence

Physician practice EHR
Acquisition

Veritas Capital buys athenahealth for $6.5b and combines it with Virence, recently acquired assets from GE Healthcare, with both operating under the athenahealth brand

eMDs aprima EHR • PM • RCM

Ambulatory EMR/RCM
Acquisition

eMDs, EMR/RCM, buys Aprima, a leading competitor and top-rated by KLAS; the combined business serves 63k providers in 26k practices; now sixth in market share at 4.5%

nextgen healthcare medfusion

EHR patient portal
$43m acquisition

NextGen (NXGN) buys Medfusion, a patient experience platform for patient intake, scheduling and payments, used by 16m patients, via APIs with 40 EHR brands

Medsphere

Comprehensive EHR
$32m late stage

Medsphere, hospital and physician practice EHR and revenue cycle, gets late stage funding ($94.2m total); led by Morgan Stanley; previously acquired ChartLogic, Stockell, and HealthLine

WARBURG PINCUS WebPT

Rehab EMR
Private equity

Warburg Pincus, private equity, buys WebPT, rehab practice EMR for 15k clinics, from Battery Ventures; WebPT is highly rated by analysts; 50% of the population suffer musculoskeletal issues

Nextech SRS Health

Orthopedic EMR
Acquisition

Nextech, EMR, practice management and revenue cycle for specialty practices in ophthalmology, dermatology and plastic surgery, acquires SRS Health a leader in orthopedic EMR

net health Optima

Therapy EMR
Acquisition

Net Health (Pittsburg), EMR for PT, OT, speech therapy, wound, and urgent care, buys Optima, EMR for cloud EMR for post-acute care; combined company serves 14k practices

DASHealth Automated Medical Systems

Physician practice EHR
Acquisition

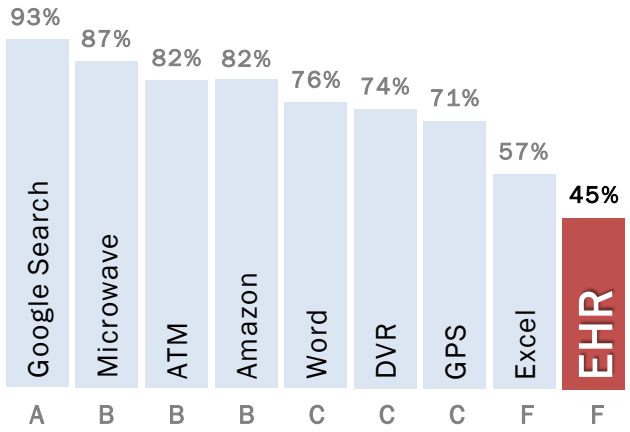
DAS Health, practice IT manager, acquires another practice software reseller, bringing its reach to 15k health professionals; largest eMDs and Aprima reseller; acquired eight companies over about a year

Editorial: Themes in the segment include (1) consolidation among mid-tier leadership (athenahealth, Virence, eMDs, Aprima, DAS) focused on primary care practices; (2) late stage funding (WebPT, Medsphere, athenahealth), (3) often private equity support (Veritas, Warburg Pincus, Morgan Stanley Expansion Capital), and (4) an increasing investor interest in specialty solutions,

The crisis of usability and visions for solutions

Mayo Clinic study links EHR usability with clinician burnout

EHRs get a failing grade on the System Usability Scale. Neurologists, ER doctors, and anesthesiologists give lowest grades.



AI in the exam room could reduce physician burnout

Ambient clinical intelligence (ACI) is being piloted by Nuance, Microsoft, Google, Amazon, and Apple.

ACI typically includes a flat screen display, hidden microphones that include bio-metrics to identify speakers by voice and position.

The system can alert or respond to queries in real-time and when the visit is over can provide a summary for the patient.

Behind the scenes, the EHR patient record is updated with billing codes for review by the physician. In early results, physicians are positive about the experience. Harvard Business Review

Google envisions better search for healthcare

Doctors could start typing into the EHR search bar and the system would automatically offer up predicted information of interest.

It wants to improve YouTube videos of surgeries, as some physicians use it prior to operating.

It wants to improve health search results for consumers to make them more authoritative. It also announced it is working with Mayo Clinic on better health content.

Click the logo to see a four-minute video on Google's health search vision: YouTube

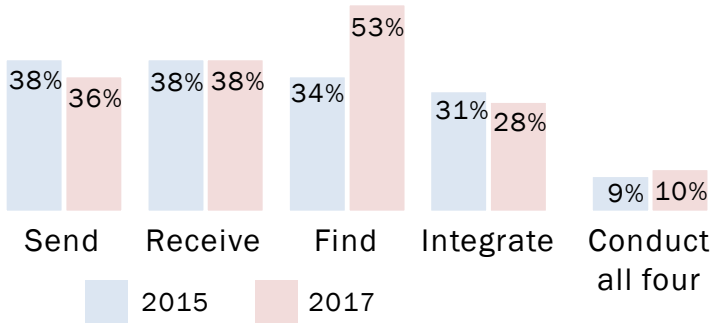
Editorial: A Mayo Clinic study graphically illustrates EHR usability compared to other technology as a key to clinician burnout. One important idea being piloted by big tech is ambient clinical technology that can passively capture, organize, analyze, and record the patient visit as well as provide clinical decision support in the process. And as David Feinberg, ex-CEO at Geisinger, takes the lead at Google Health, he stresses Google's future role in better applying search to health issues in a variety of use cases in a keynote at the recent HLTH conference.

Source: Mayo Clinic; HBR; CNBC

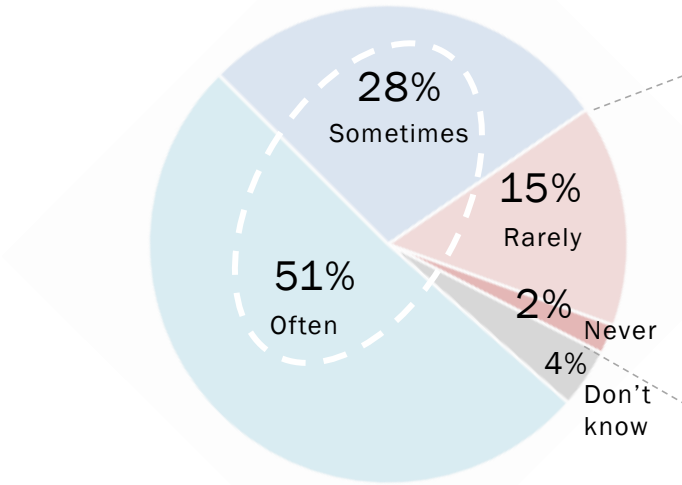
Interoperability and Security

ONC reports an uptick in physician queries for information outside their organization, but other sharing is unchanged

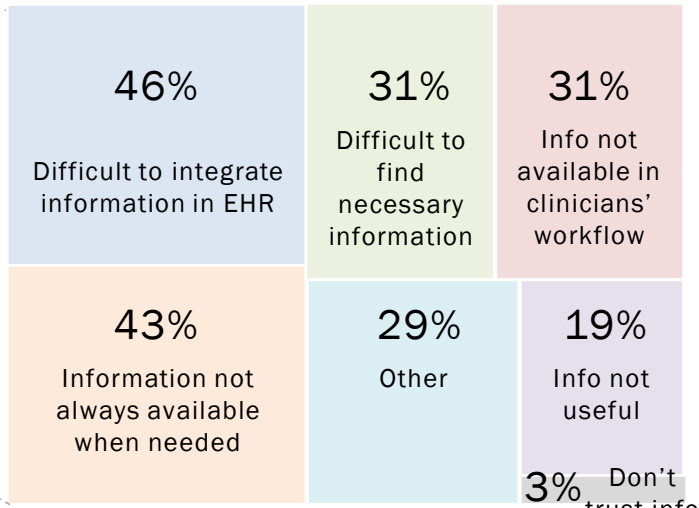
38% of physicians receive patient health information from outside sources



About 80% use the info for clinical decision-making often or sometimes



Here's what's in the way for those that don't (17%)



Other key findings

Physicians who used certified EHRs and participated in value-based payment models had higher rates of engaging in each of the four domains of interoperability compared to their counterparts; Among physicians who engaged in all four domains of interoperability, eight in 10 had patient health information electronically available at the point of care in contrast to one-third of physicians nationally. About one in five primary care physicians electronically received emergency department notifications in 2017.

Editorial: This ONC update (Data Brief #47) reports a significant improvement in physicians' use of EHR patient data from outside organizations for clinical queries with most including medications and lab results. Otherwise, physician interoperability reported as of 2017 is generally unchanged from 2015.

Source: ONC

Social determinants of health (SDOH) continue to get attention across stakeholder segments

CVS Health platform connects at-risk Aetna plan members to social services via Unite Us

The tool, called Destination: Health, was built from a collaboration with social services-focused software maker Unite Us and will roll across certain Aetna plans later this year. First efforts include Medicaid plans in Louisville, Tampa and SE Louisiana.

Kaiser and Unite Us partner for an EHR-linked network to address social community needs

Thrive Local connects health care and social services providers to address social needs like housing, food, safety, and utilities. In certain regions, over 1/5 of its sickest members are dealing with food insecurity and have concerns about housing stability.

HL7 FHIR accelerator to improve interop of social determinants of health data

HL7 standards org and the American Association of Family Physicians collaborate to standardize medical codes to facilitate the use of SDOH data in the Gravity Project developed by SIREN of UCSF.

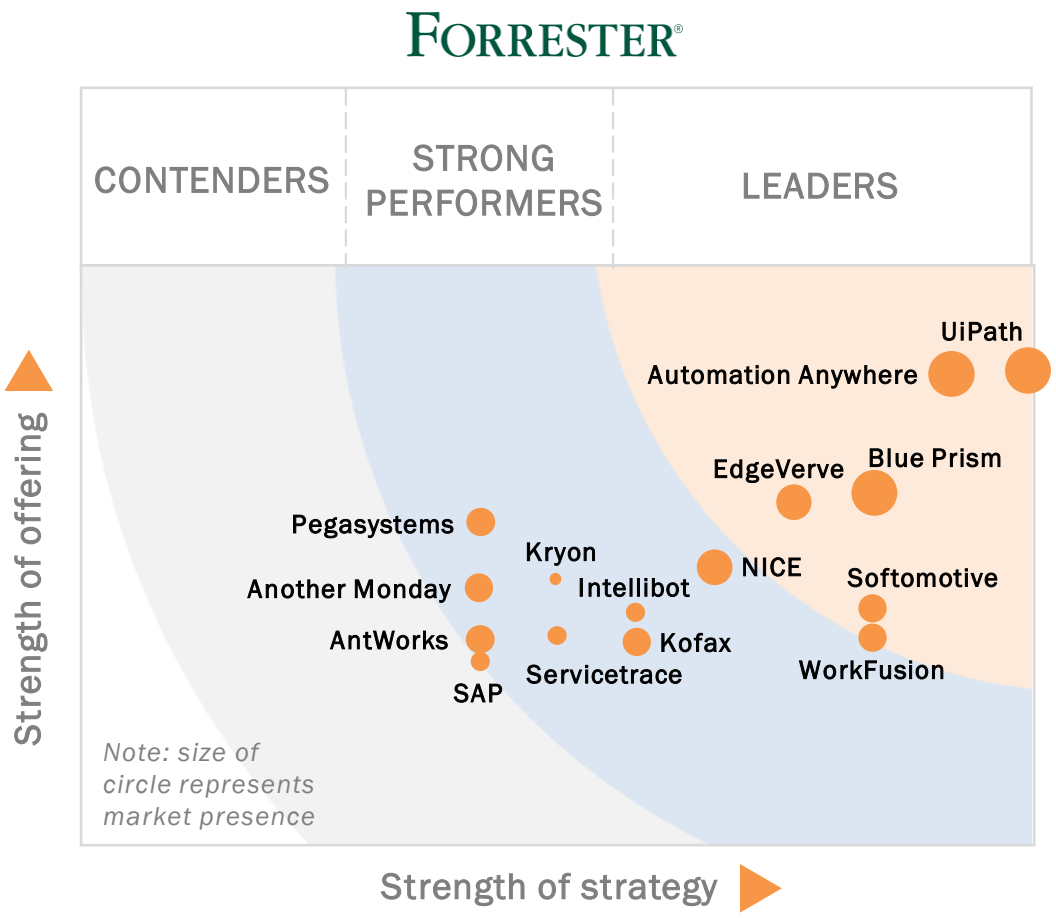
UnitedHealth and AMA partner on ICD-10 codes that express social determinants of health

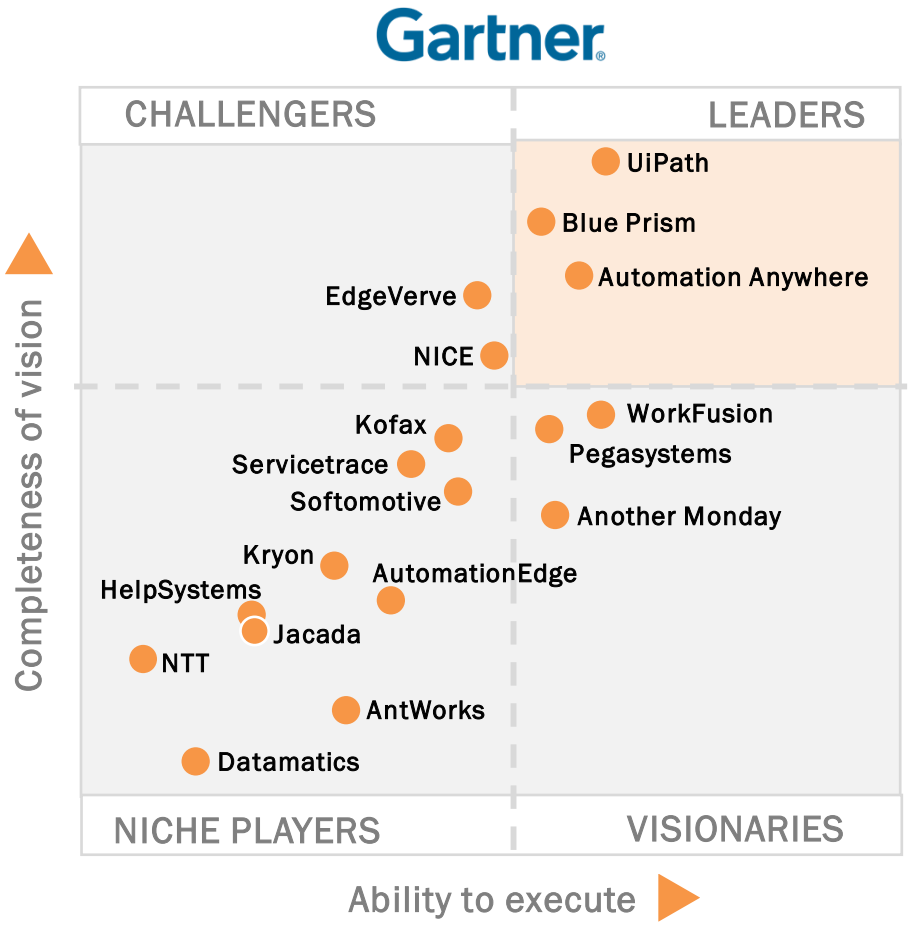
UnitedHealthcare and the AMA are supporting the creation of nearly two dozen new ICD-10 codes related to SDOH. The codes trigger referrals to social and government services to address people's needs.

Editorial: The integration of social determinants of health and associated risk factors into day-to-day care and EHR systems are gaining traction with Kaiser rolling out its Thrive Local with Unite Us, UnitedHealth and AMA working on coding structures and supporting evidence in JAMA that social and behavioral risks contribute to chronic disease. Kaiser also reported investing $20m in grants to efforts in Oakland, Seattle, and Los Angeles. Unite Us and competitor Cityblock recently raised $35m and $65m, respectively. Earlier, Blue Cross Blue Shield Institute and Solera Health announced a similar program, as did Northwell Health and NowPow. An Allscripts e-zine on the topic highlights the policy implications.

Source: Company logos linked to websites; text boxes linked to story sources

Analysts assess leading solutions as all healthcare segments deploy robotic process automation (RPA) to better workflow





Editorial: RPA is a technology trend across industries as a natural maturation of easier to use tools to harness the value of the web. RPA replaces repetitive human interactions with software with automated agents. The three leaders all have a presence in healthcare and life sciences. UiPath clients include Max Healthcare, large Indian health network, and Health Fidelity, NLP services for healthcare organizations. Automation Anywhere clients include Hart County Medical Center, Kentucky. Blue Prism clients include Walgreens and NHS University Hospitals Birmingham.

Source: Gartner; Forrester

Protenus rings the alarm mid-year as breaches are up four-fold, likely leading to another record year

The number of breached patient records in the first half of 2019 number 32m, twice the number for all of 2018.

285 breaches were reported in 2019.

- Most (59%) involved hacking; 21% insider errors
- Most (72%) were by healthcare providers; 11% health plans

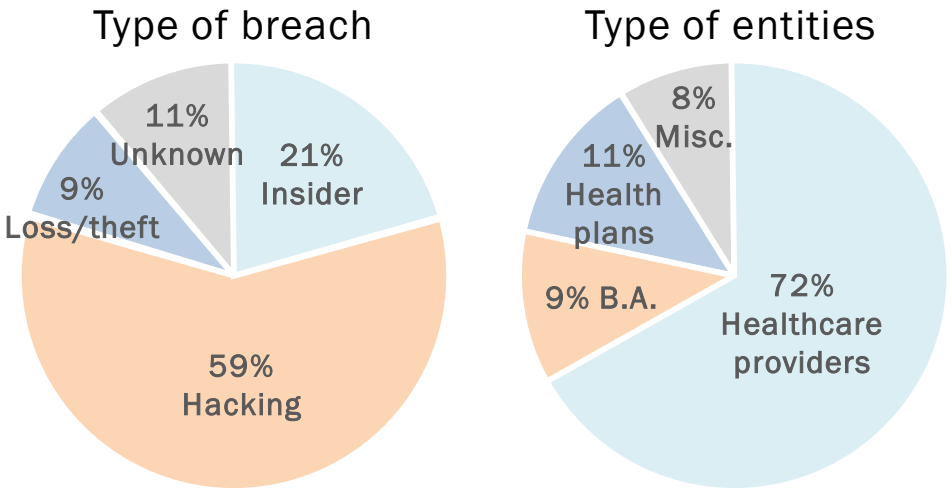
The largest breaches by month:

Largest breaches	Organization type	Breach type	# records (,000)
January	Business associate	Hacking	111
February	Provider	Insider error	973
March	Provider	Hacking	645
April	Business associate	Insider error	1,565
May	Business associate	Hacking	20,522
June	Health plan	Hacking	2,964

To reduce risk privacy offices can deploy compliance analytics to audit every access to their patient data.

PROTENUS

Characteristics of 2019 breaches



Editorial: Protenus and DataBreaches.net release the Protenus Breach Report for the first half of 2019 with alarming data, as to the numbers of breached records, due largely to the hacking of healthcare providers. The single largest was a medical collection agency in May with 20m SSNs, DOBs and home addresses, affecting Quest Diagnostics, LabCorp and Optum. Authors discuss the importance of time to discovery to eliminate risk by utilizing analytics that can capture every interaction with patient data, every day. The report is linked below.

Source: Protenus

Here's an early look at the future, as KLAS analyzes the Internet of Medical Things (IoMT) citing the top ten considered solutions

Zingbox (cross-industry) 79%
Early market leader with broad IoT capabilities with healthcare focus, considered for accuracy and discovery elements; acquired by Palo Alto Networks

Ordr (cross-industry) 59%
Early leader reputation; CloudPost has broad healthcarefocused capabilities with UI seen by some as a differentiator; culture may set them apart where core functionality is commoditized

Medigate (healthcare) 44%
Leader among healthcare-specific solutions in growth mode; solid research background; strong integration cited by customers; expanding to broader IoT devices

CyberMDX (healthcare) 38%
Focused solution on the rise with a solid research background; selected for its partnership and culture; accurate device ID; product maturity cited as issues by some

Asimily (healthcare) 26%
Focused solutions with recent indications of interest; risk profiling, stratification and accurate discovery cited as advantages; some concern over company maturity

Armis (cross-industry) 20%
Broad solution beginning to sell into the healthcare market; cited for partnership, low cost and expertise with general and medical devices

Cynerio (healthcare) 13% Early
Customers like the UI

Forescout (cross-industry) 10%
Few considerations

Great Bay (cross-industry) 8%
No KLAS-validated wins

Virta Labs (healthcare) 8%
No KLAS-validated wins

Note: Percent consideration in 39 provider organization decisions

Editorial: KLAS spoke with 47 unique organizations that have recently selected an IoMT vendor to determine which vendors they considered and ultimately selected, what factors contributed to their decision, and how they engaged with third-party services firms. Future KLAS research will delve further into how these IoMT vendors perform. KLAS identified eight key IoMT capabilities discussed in the full report, linked below (requires KLAS subscription): discovery monitoring, risk assessment, asset management, reporting, integration, protection and remediation, and coverage.

Source: KLAS Research

Healthcare Analytics

Google's US patent reveals how deep learning models for predictions can use EHR data

Google US Patent Application 2019/0034591

ABSTRACT

A system for predicting and summarizing medical events from EHRs includes a computer memory storing aggregated electronic health records from a multitude of patients. This includes diverse age, health conditions, and demographics including medications laboratory values, diagnoses, vital signs, and medical notes.

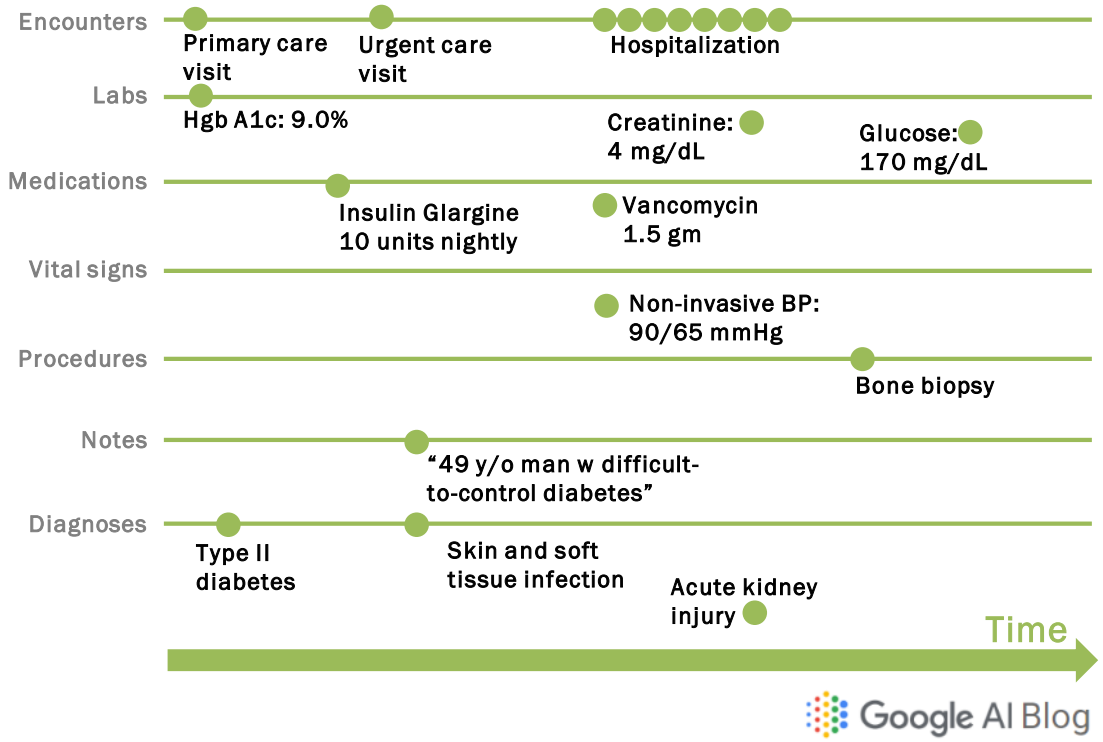
The aggregated electronic health records are converted into a single standardized data structure format and ordered arrangement per patient, e.g., into a chronological order.

A computer (or computer system) executes one or more deep learning models trained on the aggregated health records to predict one or more future clinical events. And summarize pertinent past medical events related to the predicted events on an input EHR of a patient having the standardized data structure format and ordered into a chronological order.

An electronic device configured with a healthcare provider-facing interface displays the predicted one or more future clinical events and the pertinent past medical events of the patient.

Patient Timeline

All available EHR data for each patient are converted to events and placed in time order to enable predictions

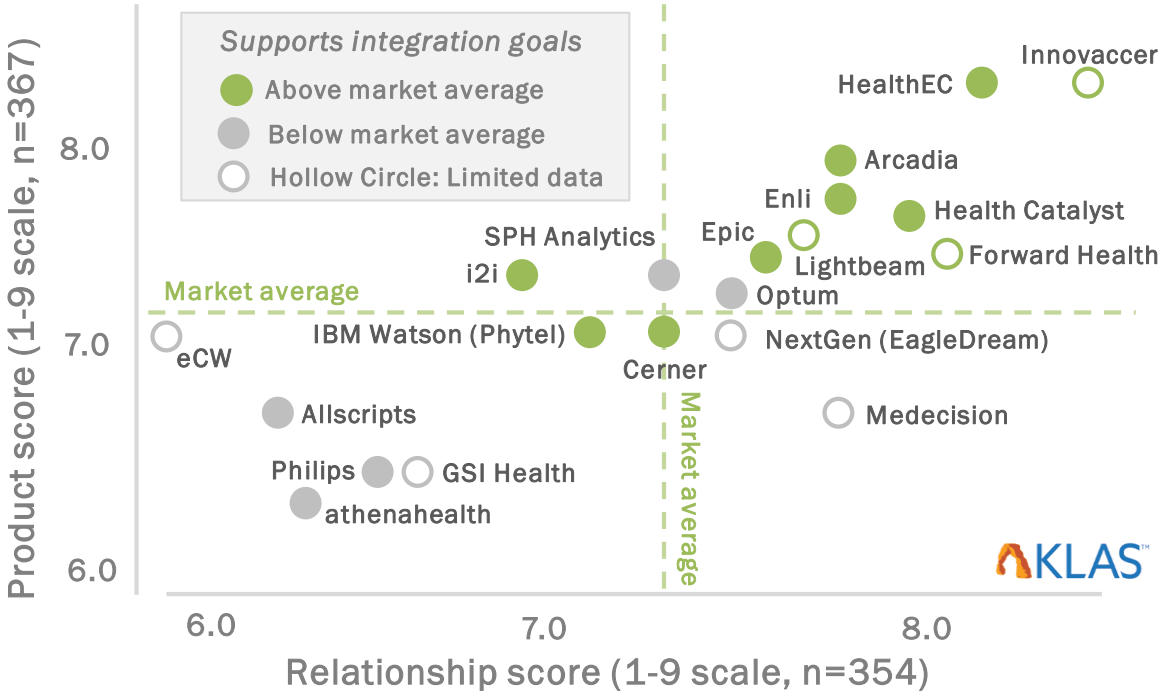


Editorial: Google updated a patent, abstracted above, addressing how EHR patient data can be organized into a patient timeline (see diagram above from a May 2018 Google AI blog post linked below) so that deep learning can be applied to predict future clinical events, such as in-hospital mortality, 30-day unplanned readmission, prolonged length of stay, and all of a patient's final discharge diagnoses, as reported in Nature (May 2018) and linked below. This research demonstrated the utility of using a representation of the patients' entire raw EHR data based on the FHIR format to facilitate deep learning.

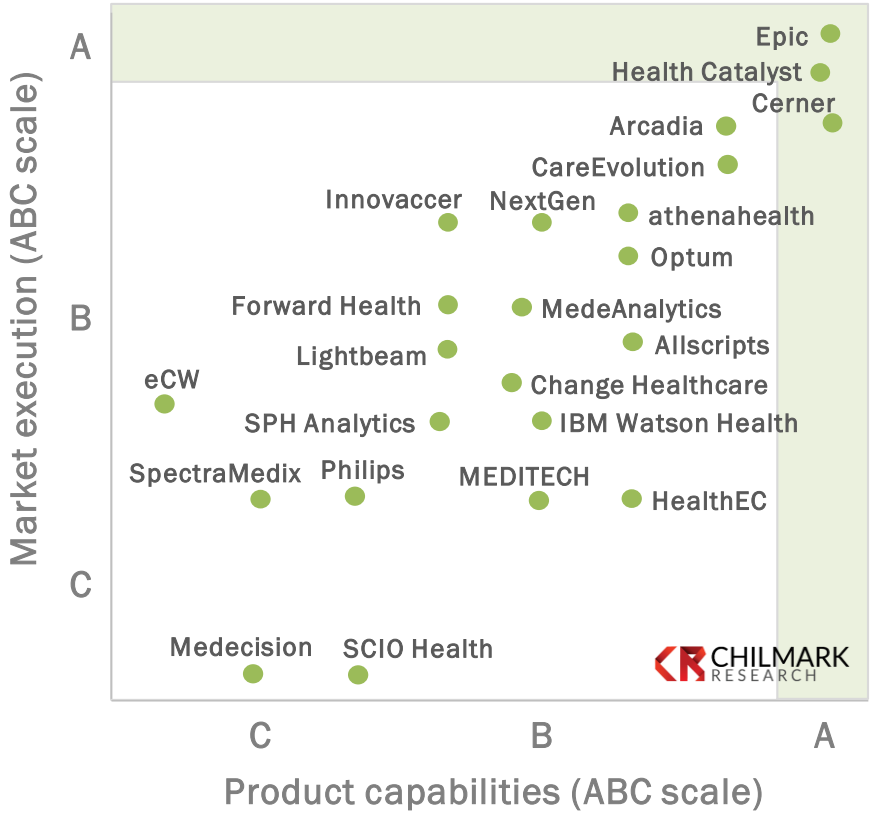
Source: EHR Intelligence; Patent Filing; Google AI Blog; Nature

Consensus among top analysts point to Epic, Health Catalyst, and Arcadia as leadership in provider analytics

Vendor strength of partnership: Product and relationship highlighting support of integration goals



Bearing for provider analytics



Editorial: KLAS Research finds that population health programs and value-based care initiatives succeed based on vendor partnering and vendor guidance. Top five in its 9-point scale ratings are: HealthEC, Health Catalyst, Arcadia, Enli, and Epic with Innovaccer and Forward Health notable with limited available data. The report is linked below. Chilmark finds three types of vendors competing in provider analytics: EHRs, independents, and payer-focused solutions. It sees core reporting is the "killer app" and value-based care a key driver. It generously made its vendor grading available at a public webinar on the topic, linked below.

Source: KLAS Research; Chilmark Research Webinar; Blog Post; Report

Studies show that AI and machine learning can better outcomes prediction and care in cardiology patients

Abbott

Abbott announces new data that shows its AI technology can help doctors better assess which patients are having a heart attack.

Particularly within the first three hours of admission; the algorithm used in the study takes into consideration the patient's age, sex, and the dynamics of the troponin blood test results over time.

British Heart Foundation

AI can identify people at high risk of a fatal heart attack five years before it strikes, according the British Heart Foundation. The fingerprint detects biological red flags in the perivascular space lining blood vessels. It identifies inflammation, scarring and changes to these blood vessels, which are all pointers to a future heart attack.

Medial EarlySign MAYO CLINIC

Medial EarlySign shows, with Mayo Clinic, machine learning can predict high risk cardiac outcomes post discharge.

The peer-reviewed study suggests the AI solution can be more effective than traditional models to identify patients at risk of death or readmission for congestive heart failure.

BWH UTSW WATCH-DM

Brigham and Women's and UT Southwestern develop a risk score, WATCH-DM, to predict heart failure in diabetes patients.

Researchers identified the top ten predictors of heart failure, which included weight, age, hypertension, diabetes control, and other factors, and used them to develop the WATCH-DM risk score.

jvion NOVANT HEALTH

Novant Health partners with Jvion to use predictive analytics to reduce readmissions for congestive heart failure patients.

Jvion's predictive analytics pinpoint the impactable patients who are on a risk trajectory that can be changed and provide the patient-specific recommendations that will drive toward a better outcome, according to the company.

TEXAS A&M UNIVERSITY

Researchers at Texas A&M use machine learning to predict bleeding during coronary procedures.

The team looked at the categorization of high- and low-risk patients as a spectrum, rather than a black-and-white decision, shifting away from traditional pattern recognition techniques that match a data set to a specific conclusion.

Editorial: Six research studies show how healthcare analytics algorithms and machine learning are driving innovation in cardiology, particularly in predicting risk and outcomes in heart attack patients.

Source: Company logos linked to websites; text boxes linked to story sources

Value-based care drives acquisitions in analytics

In an early VBC support market, leaders are acquiring resources to best compete

Payer-focused analytics

HMS, payer-focused solutions, acquires VitreosHealth for $36.5m, a partner underlying its Elli population health management solution, and other analytics, previously having raised $5m

Payer-provider VBC

Apervita (Chicago), payer and provider data analytics and app development platform ($43m raised to date), buys Qcentive (Boston), value-based contract and alternative payment launched by BCBSMA in 2016

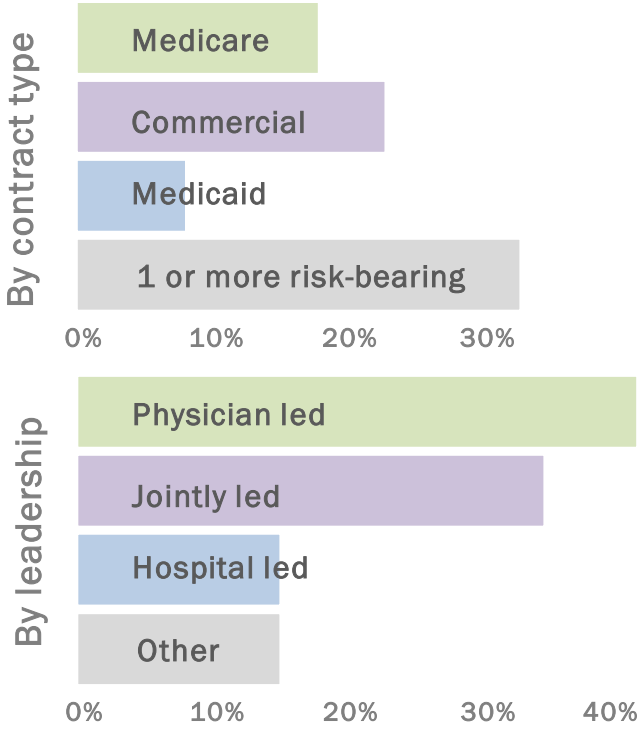
Pop health and VBC

SPH Analytics (Atlanta), payer-focused population health, buys SA Ignite (Chicago), tools for CMS merit-based incentive program (MIPS); the combined organization serves 21k providers; partners with Medecision, and half of the NCQA top-rated US health plans

Value-based care solutions

Signify Health (Dallas), mobile health risk and care management platform, buys Remedy Partners (Norwalk), bundled payments services; both are portfolio companies of New Mountain; serving 300 health systems, 2k post-acute orgs

ACO contracts with downside financial risk are growing, but still in the minority



Editorial: Researchers from Dartmouth used the National Survey of ACOs to explore ACO structure and contracts in 2012–18. Though the number of ACO contracts and the proportion of ACOs with multiple contracts have grown, the proportion bearing downside risk has increased only modestly. There were 1,011 ACOs in 2018, covering an estimated 32.7m lives and representing 1,477 different public and commercial payment arrangements. In 2018, 33% of ACOs take downside risk, up from 28% in 2012. Notable VBC-related investments include Aledade (ACOs for physician groups) and Innovaccer (population health).

Source: Health Affairs

Late stage investments and strategic acquisitions highlight clinical analytics of real-world evidence data as a key trend

$5.3b Acquisition

Dassault Systems (France), technology and design across industries, buys Medidata, clinical analytics, including Acorn AI and SHYFT, 1,300 clients 150k certified users

$76m Series B

BlackThorn (SF), AI for neuro-behavioral health, via a cloud computational psychiatry and data platform, gets Series B ($130m total), Google and J&J investing

$40m Series D

TriNetX (Cambridge, MA), real world evidence (RWE) for clinical trials via analytics applied to clinical and claims data, gets Series D ($102m total), led by Merck's GHIF

$36m Series C

Senyi Intelligence (China), AI solutions integrated into smart hospitals, get Series C ($80m total), led by Tencent; partners with Huawei and CLP Data; award-winning solutions

$78m Private Equity

Boston Health Economics (BHE), clinical data analytics, gets a private equity investment from Silversmith and Leerink; its Instant Health Data (IHD) RWE platform is used by two dozen life sciences companies

$23m Series D

GNS Healthcare (Cambridge), creates in silico patients matching therapies, procedures and interventions, gets Series D ($77m total); including Cigna (led the round), Amgen, Celgene

$40m Financing

Saama (SF), analytics supporting clinical trials, gets funding from Perceptive ($75m total) to expand its Life Sciences Analytics Cloud platform; Roche, Otsuka, Celgene, Kaiser, Trinity, Dignity

$56m Series B

Healx (UK), AI for rare disease drug development, gets Series B ($68m total); partners with patient groups for data targeting new treatments within two years; first has been autism Fragile X

Source: Company logos linked to websites; text boxes linked to story sources

Another continuing investment trend is image analytics generally focusing on a disease area

Radiology

ENLITIC

$25m Series B-1
$55m total

aidoc

$27m Series B
$40m total

Pathology

PathAI

$15m Series B-1
$90m total

SIGTUPLE

$16m Series C
$40m total

deep lens

$14m Series A
Hospital spinout

IBEX

$11m Series A
Israel

Brain

iz.ai

$50m Series B
$80m total

icometrix

$18m Series A
Belgium

Shukun Technology 数坤科技

$30m Series B
$45m total

Lung

Riverain TECHNOLOGIES

$15m Venture
Ping An investing

aidence
human sense in artificial intelligence

$11m Series A
Netherlands

Breast

Therapixel

$5.6m Series A
Paris

KHEIRON MEDICAL TECHNOLOGIES

$22m Series A
UK

Dental

Pearl

$11m Series A
Los Angeles

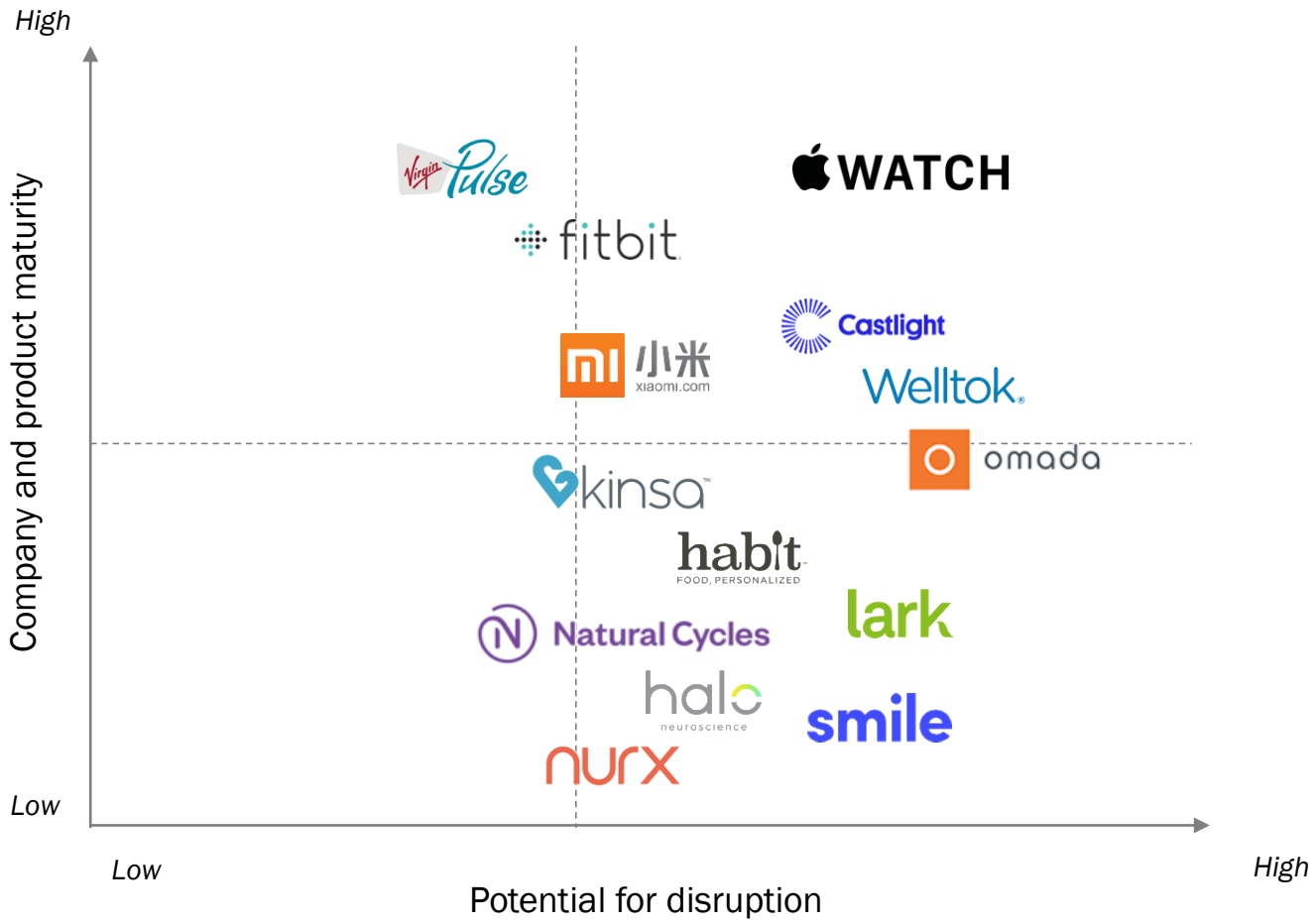
VideaHealth

$5.4m Seed
MIT algorithms

Source: Company logos linked to websites; text boxes linked to story sources

Consumer Health and Technology

Leaders and disrupters in fitness and wellness



This diagram plots the leaders and potential disrupters in phase one of the patient journey, fitness and wellness.

Virgin Pulse has been a leader in employer wellness. This segment is being disrupted by **Welltok** with a new digital health architecture and **Castlight**, an emerging leader and disrupter in health cost transparency (via their Jiff acquisition), is notable in this segment also.

Fitbit, which is now owned by Google, and China's **Xiaomi** have been leading the activity tracking segment, though **Apple** has been disrupting and is poised for segment leadership.

Health and lifestyle coaching leveraging digital tools is showing an ability to impact health outcomes. **Omada** is the most disruptive with **Lark** and **Habit** also emerging.

Kinsa is a leader in connected thermometers with their ability to track colds and flu in real-time.

Natural Cycles is notable in tracking fertility, having been the first app FDA-cleared as a contraceptive, while **Nurx** is likely disruptive in the birth control market.

Halo Neuroscience makes a headset that accelerates muscle memory when paired with training.

SmileDirectClub is a disrupter in the braces market with clear aligners and a kit that takes a mold of a user's teeth at home. They IPO'd in late 2019.

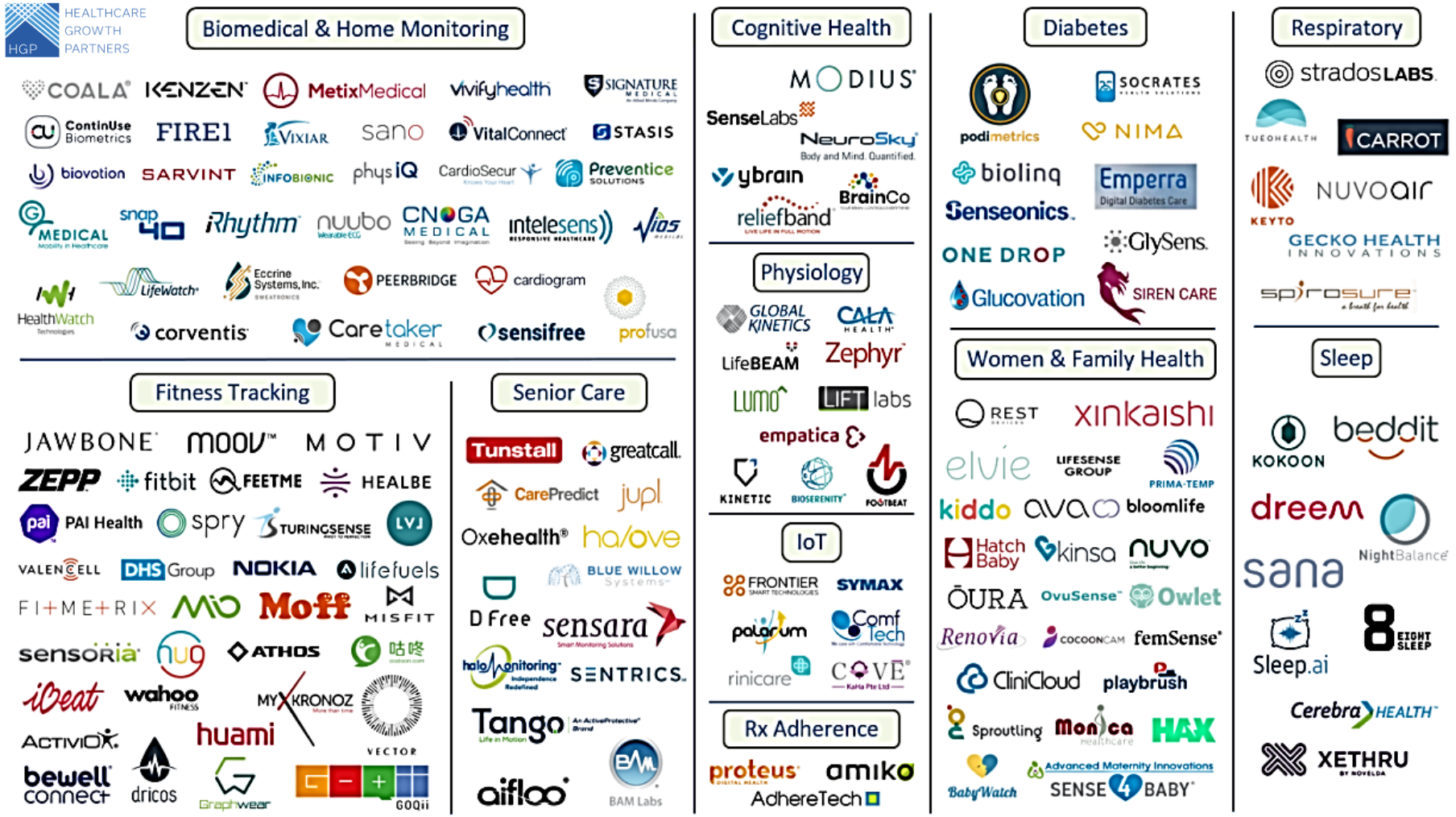
Wearables have passed the tipping point into mainstream adoption

Wearables are reaching maturity and mass-adoption.

Remote patient monitoring may be the most valuable.

A key barrier to adoption has been overcome now that Medicare has adopted a policy of reimbursing RPM services.

Wearables provide a new data-feed to the insurance industry that can inform the pricing of premiums as well as coverage limits.



Editorial: "With all of these favorable market dynamics converging on the wearables industry," says the report, "We have seen significant investment and M&A activity around companies developing wearable technologies. The [above] market landscape displays the companies for which we have seen investment in recent years, grouped by their associated categories as we at HGP see them." The report also includes a list of wearable-related transactions from 2011 through May of this year, available here.

Source: Healthcare Growth Partners

Femtech was important in 2019 with investments slated to cross the $1.3b mark in 2020

Notable funding in the space in 2019 includes: Elvie ($42m), Nurx ($32m), NextGen Jane ($9m), Cora ($7.5m), Natalist ($5m), Kindbody ($4.5m), Genneve ($4m), Mahmee ($3m), Emjoy ($1.1m)

The fertility space was especially hot, with investments that include: Modern Fertility ($15m), Extend Fertility ($15m), Apricity ($6.7m), Med Answers ($5m), Fertility Focus ($2.7m), Legacy ($1.5m)

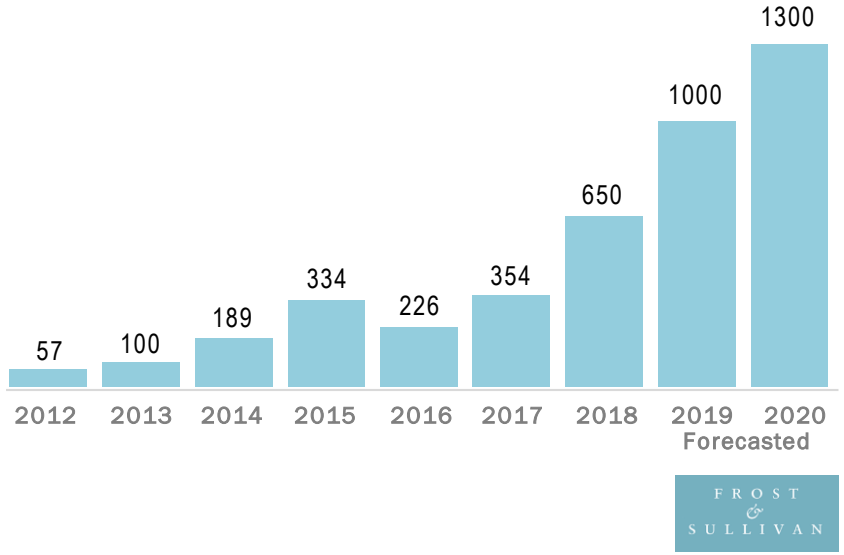
The Femtech segment garnered nearly seven times more funding in 2018 compared to 2013, at $650 million. The market has the potential to garner $1.3 billion worth of investments in 2020.

The biggest investment challenges facing startups in the segment include:

- Women's health issues are not always understood by investors
- Female underrepresentation in the investment community
- Women founders shy away from demanding and out-right asking for money

Several VC firms, including Astarte, Portfolia and Neome, are committed to exclusively funding women's health enterprises.

Global VC investments in Femtech 2012-2020 ($ million)



Editorial: According to the article, 94% of decision-makers in US venture capital firms are men, making it difficult for women founders of femtech companies to freely discuss their health issues. Rock Health says just 10.2% of CEOs at digital health startups are women.

Source: Forbes

Consumer interest in mental health apps remains high, given the download numbers, but usage is low over time

Study published in JMIR looked at English-language apps with 10,000 installs or more on Google Play targeting anxiety, depression, or emotional well-being. 93 apps met the inclusion criteria.

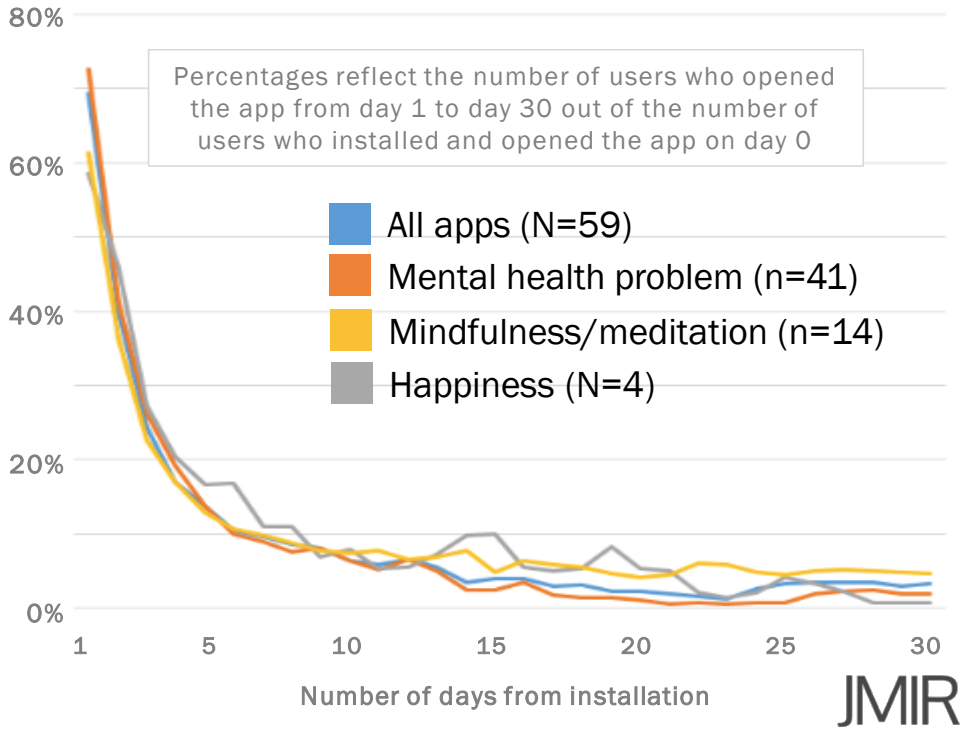
Findings revealed that daily active users use apps for a median of 13 minutes, however most people with the app installed on their device do not open it in any given day. The median open rate was 4%.

There are significant differences in app usage and user retention that are associated with the app's incorporated techniques:

- Daily minutes of use were significantly higher for mindfulness/meditation (median 21) and peer support (median 35) apps than for apps incorporating other techniques
- Daily open rates were significantly lower for breathing exercise apps (median 1.6%) than for apps incorporating the two techniques with the highest open rates (tracker: median 6.3%; peer support: median 17.0%)

User retention patterns might indicate the low burden associated with the simplicity of opening the Google Play Store and clicking the app download and installation buttons.

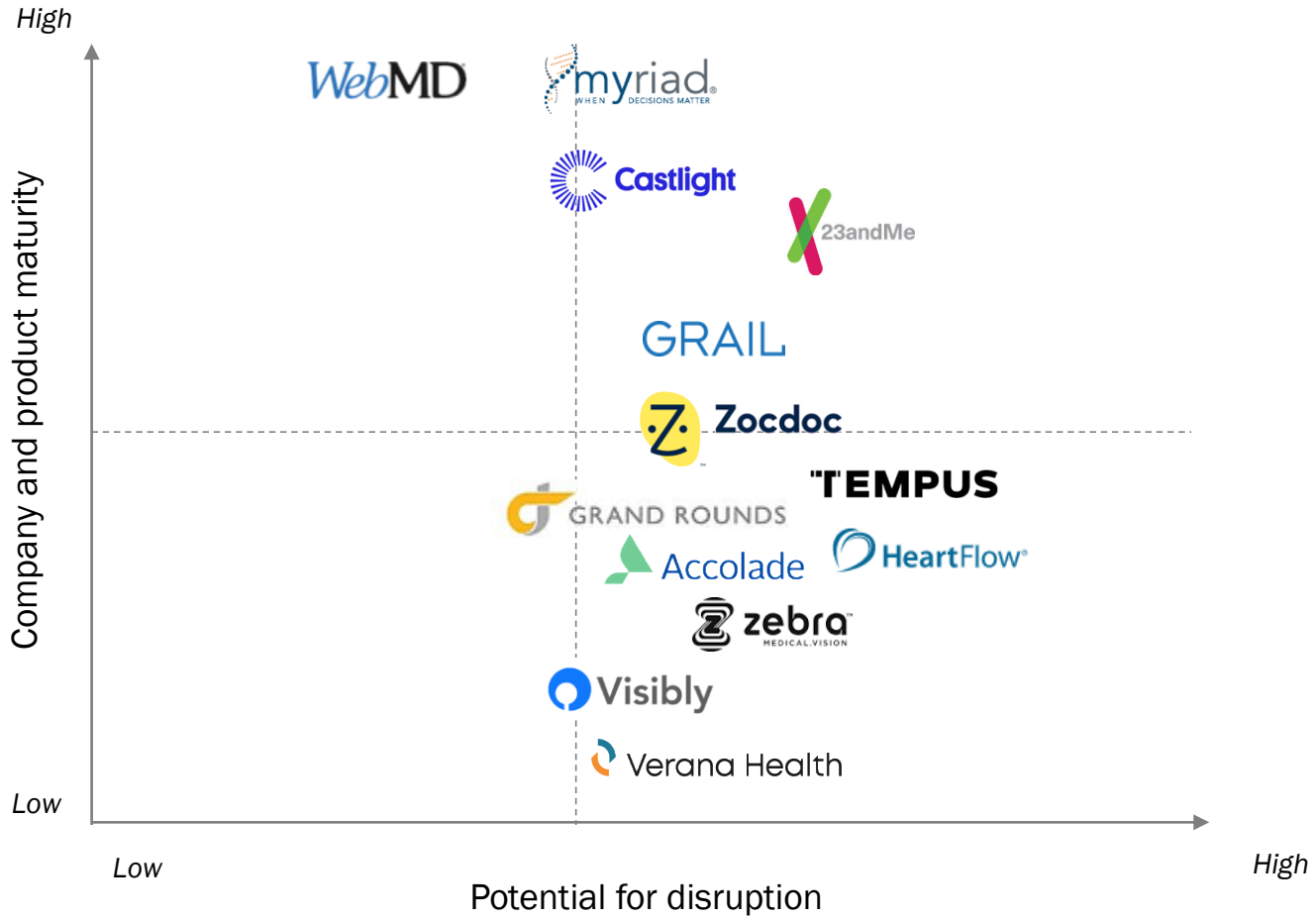
App 30-day retention by focus



Editorial: This is the first study to report the usage and retention metrics of a large number of frequently installed, unguided mental health apps as recorded "in the wild" and independent of developer-led data. According to researchers, although some developer-led studies have published results on the use of individual mental health apps deployed in real-world settings, no study has examined a large sample of mental health apps relying on independently collected data.

Source: JMIR

Leaders and disrupters in diagnosis and decision



This diagram plots the leaders and potential disrupters in the diagnosis and decision phase of the patient journey.

WebMD leads the health search and information segment. **Grand Rounds** is a potential disrupter in an adjacent segment of diagnosis support apps by offering second opinions and physician appointments through its employer-based services.

A key trend in this phase is the impact of genomics on initial diagnosis and therapy choices. **Myriad**, is among the leaders in pioneering liquid biopsy for cancer diagnostics among public companies. **Grail**, an Illumina-backed start-up, is a potential disrupter with a decided focus on initial diagnosis. **Zebra** focuses on image analytics for cancer diagnostics and is a leading disrupter. HeartFlow is using image analytics to diagnose cardiac problems.

23andMe has been leading direct-to-consumer genomics. And **Tempus** is an emerging leader in integrating genomics into provider workflows.

Castlight is leading the health transparency sub-segment. **ZocDoc**, valued at almost $2b, is driving the segment for booking physician appointments in the US and is positioned well for further market momentum. **Accolade** has raised over $200m for their insurance navigation platform.

Innovations with best disruptive potential in condition-specific areas include **Verano Health**, for ophthalmology and **Visibly** for vision testing.

Government site for comparing docs lacks data on most MDs, as health quality data for consumers remains rare

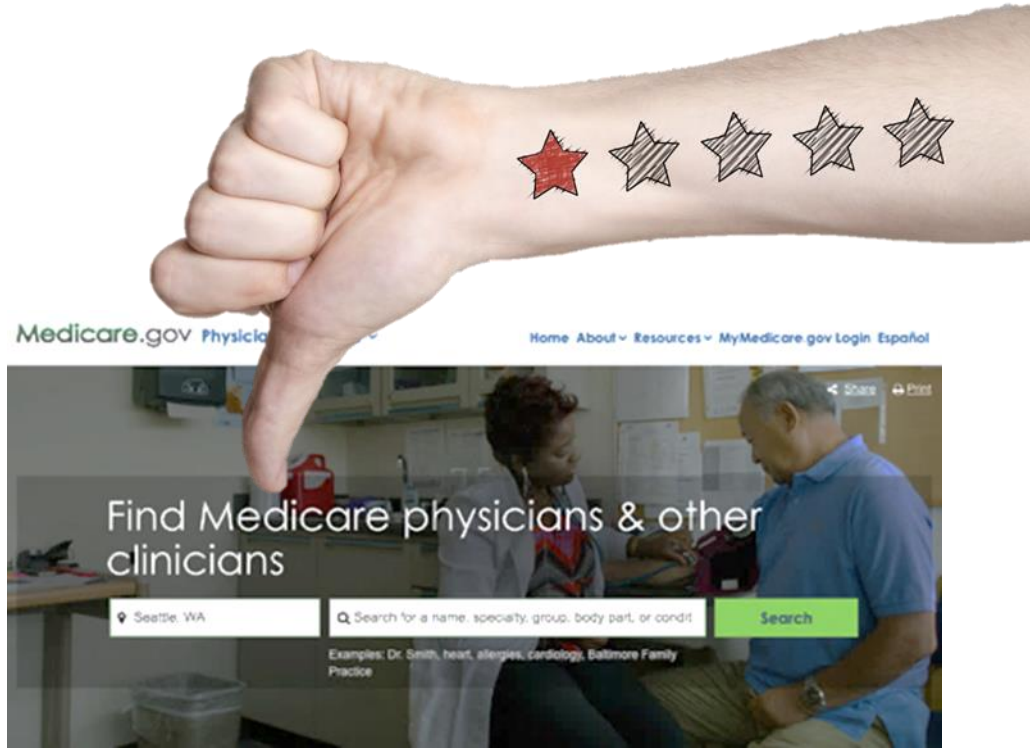
Study published in JAMA Internal Medicine found that Physician Compare, a website created to help patients find high-quality doctors, is missing so much information on individual providers that it may not be helpful.

Only 23% of the physicians analyzed had any quality information available on their site, and most of that was quality information about their physician group. Virtually none of the doctors had data tied to their individual job performance.

21% of primary care providers reported some individual or group information related to outcomes from their practice. Almost all this data was at the practice level, making it hard for patients to know who might be a better or worse choice among several physicians at one clinic.

Doctors who did share individual level outcomes tended to have very high-quality scores. This suggests that physicians may only opt into the voluntary reporting system when they know the results will make them look good.

Clinicians aren't required to report data on outcomes for every patient, however there are small reimbursement incentives for participation.



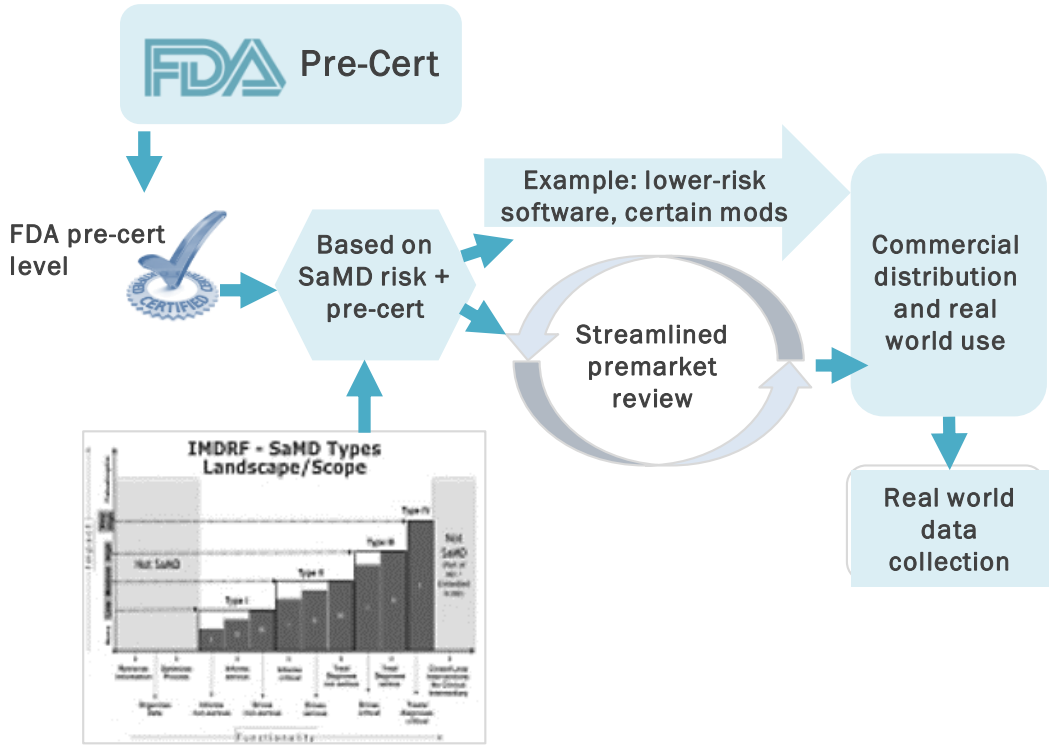
Editorial: Researchers suggest considering major revisions to the website, or determining whether a different approach might help achieve the Department of Health and Human Services' goal of increasing transparency around the quality of healthcare. For their analysis, the researchers used data from the Physician Compare National Downloadable File and the 2015 Medicare Data on Provider Practice and Specialty database, and included 1,025,015 US providers caring for Medicare beneficiaries.

Source: Reuters; University of Michigan

FDA releases a digital health innovation action plan with three primary elements to ease and speed the certification process

1. Issuing guidance to provide clarity on the medical software provisions of the 21st Century Cures legislation including:
   - Implementation guidance for mobile medical apps, e-transfer of device data, medical image storage and communications, low-risk wellness and lab workflow
   - Clinical decision support software
   - Multifunctionality
   - Guidance on when to submit changes for existing devices
   - Approach to clinical evaluation of Software as a Medical Device (SaMD)
2. Launching an innovative pilot precertification program to work with FDA customers to develop a new approach to digital health technology oversight *See FDA Pre-Cert for Software flowchart at right.* Under a company-based approach, FDA would pre-certify eligible digital health developers who demonstrate a culture of quality and organizational excellence based on objective criteria.
3. Building FDA's bench strength and expertise in CDRH's digital health unit. We are growing our digital health expertise within FDA by hiring new staff for our Digital Health Program within the Center for Devices and Radiological Health, as supported by additional user fee funding.

High level concept of the reimagined approach using FDA Pre-cert for Software



Editorial: The FDA releases its plan for pre-certification of digital health software vendors to speed the process. Once vendors are pre-certified based on past performance, a more streamlined process can monitor the market. It is also planning on growing its digital health expertise within the agency. This is a generally welcomed approach by the industry, as digital therapies are beginning to find traction among investors, pharma and device companies, clinicians and patients.

Source: FDA; Commissioner statement

Dentistry startups attract investor interest demonstrating confidence in the segment

weave

$70m

Utah-based company makes patient communications software focused on the dental and optometry markets;
Weave charges about $500 / month for access to its Voice Over IP-based unified communications service

beam

$55m

Beam raised Series D round for their connected toothbrush that lowers dental premiums based on how well users brush using their Bluetooth-enabled sonic toothbrush; Top brushers earn just over 10% off

tend

$36m

Tend raised Series A round for a patient-friendly, tech-forward dental experience; Startup offers online appointment booking and tech-heavy dental studios featuring sleek waiting areas, Netflix in the chairs, and high-end Bose headphones

CARESTACK

$28m

CareStack nabbbed a Series B round for their cloud-based management tool for dentists; Platform includes access to a patient portal, scheduling capabilities, business analytics, claims data, billing information, charting and patient engagement tools

LEGWORK

$17m

Legwork's patient engagement software and website platform work alongside dental teams and their customer to provide automated communications throughout the patient journey to grow the practice

Henry

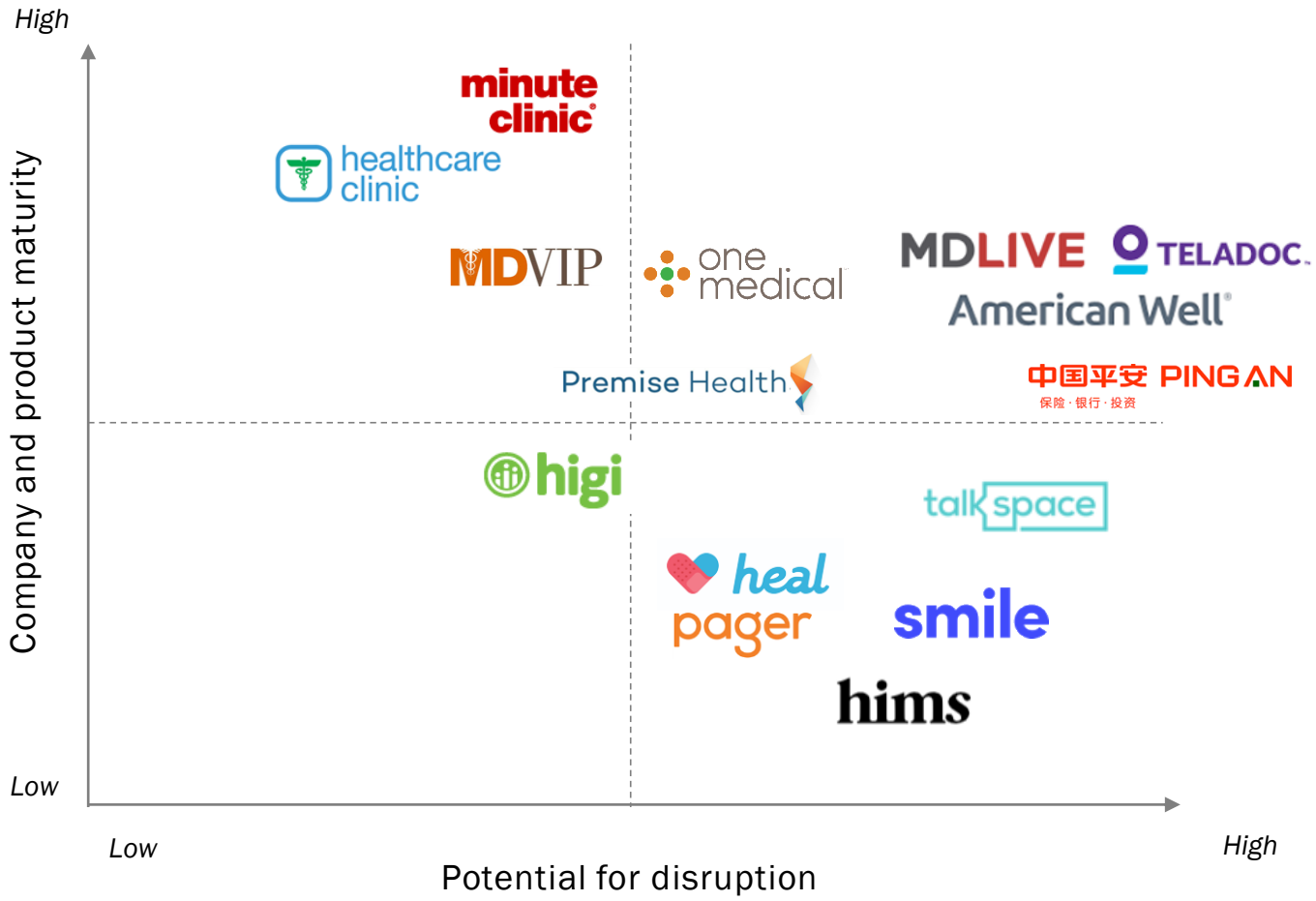
$10m

Henry raised a Series A to expand its fleet of mobile dental practices; The company offers either mobile dentistry busses that can park onsite or mobile pop-ups for businesses without dedicated parking; No cost for employers to bring Henry onsite

Editorial: Innovations in digital dentistry are just starting to emerge. SmileDirectClub, which aims to disrupt the clear aligners market, IPO'd in 2019. Most of the innovations in digital oral health are aimed at kids, with several companies gamifying the toothbrushing process. Quip offers a subscription service for their sleek electric toothbrushes. Henry the Dentist is taking a novel approach by trying to capture the large percentage of employees who are overdo for a dental visit because it isn't convenient.

Source: Logos are linked to company websites, text linked to story sources

Leaders and disrupters in care online



This diagram plots the leaders and potential disrupters in phase three of the patient journey, care online (virtual visits and convenient care).

The market dynamics find well-funded innovators in real-time virtual visits (**American Well**, **MDLIVE**, **Teladoc**) well positioned to compete with retail convenient care (**Walgreens**, **CVS**,). Overseas, **Ping An Good Doctor** had a $1.1b IPO in 2018 for virtual visits in China.

Technologies focused on behavioral health (**Talkspace**), orthodontia (**SmileDirectClub**), and prescriptions (**Hims**) are potentially carving out important niches.

Kiosks (**Higi**) are generally partnering with retailers and are finding best adoption in wellness and health tracking.

Housecalls (**Heal, Pager**) is an innovation that's in early stages and launching in major cities in the US.

Concierge services (**MDVIP** and **One Medical**) are exploring convenience for an extra subscription fee from $200-$6,000 a year. Employers are increasing support for worksite clinics (**Premise Health)** that are onsite or near site.

Physician telehealth adoption is up 340%, dwarfing EHR's early adoption rates

Survey from American Well found that more than three-fourths of US hospitals are currently using or implementing a telehealth program. 69% of physicians said they would be willing to use telehealth, up from 57% in 2015.

22% of physicians have used telehealth to see patients, up 340% from 2015 when only 5% of physicians reported having ever used telehealth. As the chart on the right shows, when compared to a similar three-year-span in the early adoption days of EHRs, telehealth's adoption growth is striking.

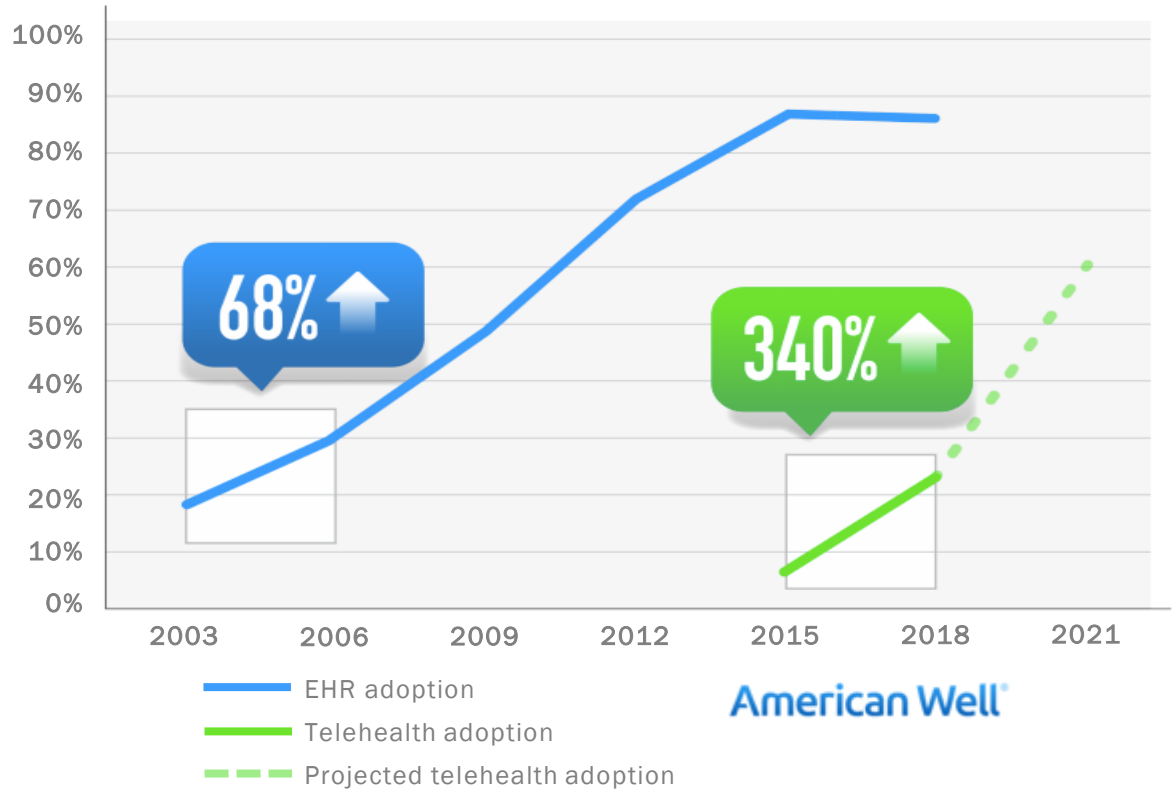
Younger physicians are more willing and less unsure about telehealth compared to older physicians.

Physicians' reasons for being willing to see patients via telehealth include: Increase access for patients, flexible work-life balance, attract and retain new patients, improve patient outcomes, to be on the leading edge of medicine.

Specialists want to use telehealth, especially those who are burnt out. The top specialties willing to practice via telehealth include urology, neurology, emergency medicine, infectious disease.

The biggest physician barriers to telehealth include: uncertainty around reimbursement (77%), questions about clinical appropriateness (72%), lack of physician buy-in (60%), poor leadership support (44%).

Comparing EHR and telehealth adoption



Editorial: The report suggests telehealth is at an inflection point. It recommends health systems can take several steps to promote tele health physician adoption growth, including creating integrated workflows, defining clinical appropriateness, and finding specialist champions. The survey was conducted among 800 doctors: 62.5% of which were primary care providers and 37.5% specialists.

Source: American Well

Telehealth use is increasing most among non-hospital-based providers

A FAIR Health white paper found that private insurance claims for non-hospital-based provider to patient telehealth grew 1,393%.

In 2018, non-hospital-based provider to patient telehealth accounted for 84% of all telehealth claim lines, compared with 52% in 2014. The increase was greater in urban than rural areas.

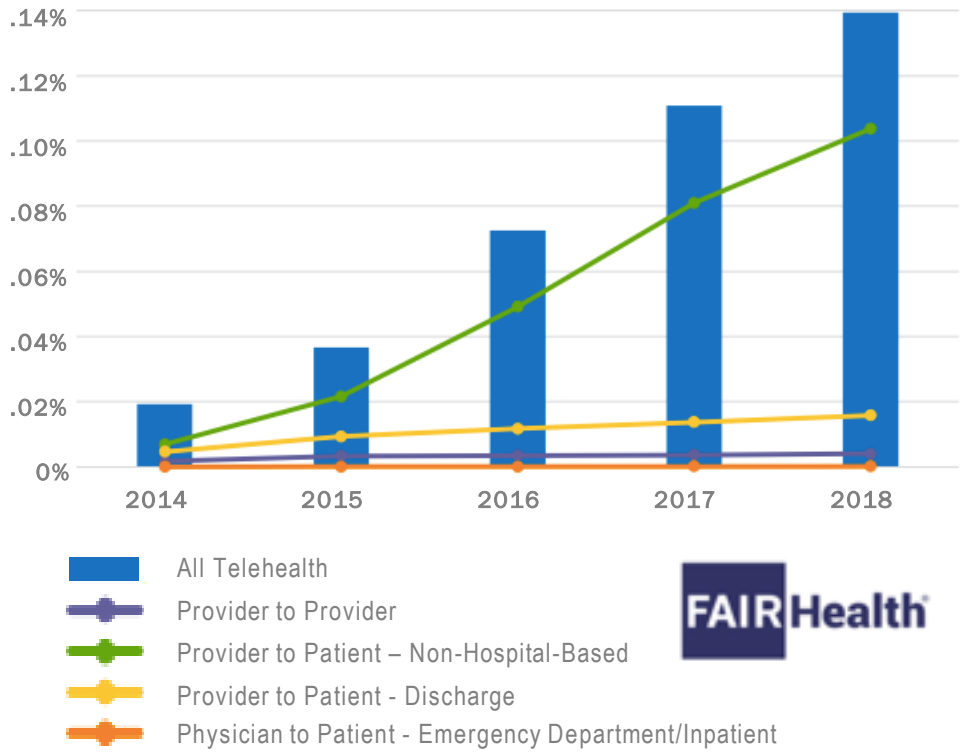
Claims related to telehealth overall grew 624% from 2014 to 2018.

Those most likely to use telehealth services were aged 31 to 40, accounting for 21% of claims. Women used telehealth more often than men, accounting for 65% of claims.

Conditions most associated with telehealth use were upper respiratory infection, mood disorders and anxiety or other non-psychotic mental disorders.

The telehealth diagnosis with the highest rate of patients who had an in-person visit within 15 days of a non-hospital-based provider to patient telehealth visit for the same or a very similar diagnosis was heart failure.

Claim lines with telehealth usage by type



Editorial: The report, which is linked at right, analyzed more than 29 billion private health claims records. While there has been increased usage due to the Affordable Care Act, several obstacles still hinder broader adoption, including reimbursement, providers facing accrediting hurdles, and rural areas struggling to get the high-speed internet access necessary to implement telehealth.

Source: PR Newswire; FAIR Health

Recent telemedicine M&A activity points to a healthy, maturing segment with notable telehealth funding

InSight Telepsychiatry and Regroup merge to become largest telepsychiatry provider in US

The resulting entity is now the largest and most comprehensive telepsychiatry service provider in the US, specifically in regard to the joined company's combined revenue, national footprint, diversity of client types, and diversity and quantity of their provider base; Founded in 1999, InSight delivers on-demand and scheduled telepsychiatry to hundreds of orgs; Regroup was founded in 2011 and has provider partnerships with more than 175 centers

Virtual clinical trial platform VirTrial acquires enterprise telemedicine startup SnapMD

The acquisition supports VirTrial's goal of making hybrid decentralized clinical trials seamless for sponsors, sites, and patients; SnapMD's virtual care management solution is used by providers to engage patients via a HIPAA-compliant, cloud-based software platform; The company will operate as a subsidiary of VirTrial and will continue to provide its telemedicine solution across the healthcare space

French telemedicine service Doctolib raised $170m Series E ($271m total) and its valuation to more than €1b; 30m visits per month; 750 employees

Hims, which sells skin care, hair loss treatments, and ED meds directly to consumers, raised $100m Series C ($197m total); $1b valuation

Ro, Hims' rival in the men's health space, raised $85m ($176m total); Roman brand sells hair loss and erectile dysfunction meds to men; Rory brand targets menopausal women

Talkspace, provider of text, video, and audio messaging with 5k therapists, announced a $50m Series D raise led by Revolution Growth; 5m patients; $107m raised total

Editorial: Virtual visits in real-time with physicians and other healthcare professionals remains a fast-growing segment in digital health despite widespread adoption. And it's a robust segment not just in the US, but overseas as well, where dozens of companies across Europe, Asia, and Africa have all attracted big money. Most offer video and phone calls and target common health conditions. Payers, providers, and retail pharmacies are supporting the trend.

Source: Logos are linked to company websites, text linked to story sources

Mental health platforms were attractive to investors

Quartet

$60m
Series D

Quartet Health (NY) raised a round led by insurer Centene, with a focus on expanding access to traditionally underserved Medicaid patients

ginger

$35m
Series C

Ginger (SF), app-based behavioral health coaching to reduce stress and anxiety, raised Series C ($63m total); Customers incl. CBS, Netflix, Sephora

Calm

$27m
Series B

Meditation app Calm's Series B extension brings total funding to $143m and valuation of $1b; 2m paid subscribers and 50m downloads

two chairs

$21m
Series B

Two Chairs (SF) operates five mental health clinics and deploys a client-therapist matching system to pair patients with therapists

FOREFRONT TELECARE

$15m
Series A

Forefront Telecare, providers of behavioral telehealth solutions for vulnerable seniors in rural communities, raised a growth round ($16m total)

octave

$11m
Series A

Octave (SF) offers evidence-based therapy virtually as well as in physical locations; Services incl. individual therapy, group therapy, coaching and psychiatry

Modern Health

$9m
Series A

Modern Health (SF), a mental well-being benefits platform for employers, raises Series A ($11.4m total) led by Kleiner Perkins

WAVE

$5.7m
Seed round

WAVE mixes guided meditation with music on an app, and a pillow that vibrates according to the beat; Pillow & headphones are $199; subscription is $10/mo.

feel

$4.5m
Seed round

Sentio raised seed funding for Feel, their emotion-sensing wearable that detects physiological signatures of emotional distress

nocd

$4m
Series A

NOCD's platform identifies and manages people with obsessive-compulsive disorder; Members receive diagnostic assessments and therapy

Editorial: The mental health segment continues to attract investor interest. In Rock Health's third quarter funding wrap-up, the org says, "Digital behavioral health is showing signs of a maturing investment sector with: more funding and larger deals, a greater number of later stage companies, and a consistently strong pipeline of early stage innovation."

Source: Company logos linked to websites; text boxes linked to story sources

HIPAA-compliant Alexa typifies the move to increased use of chatbots in healthcare services

Express Scripts (a leading Pharmacy Services Organization): Members can check the status of a home delivery prescription and can request Alexa notifications when their prescription orders are shipped.

Atrium Health (a healthcare system with more than 40 hospitals and 900 care locations throughout NC, SC and GA): Customers in North and South Carolina can find an urgent care location near them and schedule a same-day appointment.

alexa

Cigna Health Today (by Cigna, the global health service company): Eligible employees with one of Cigna's large national accounts can now manage their health improvement goals and increase opportunities for earning personalized wellness incentives.

Swedish Health Connect (by Providence St. Joseph Health, a healthcare system with 51 hospitals across seven states and 829 clinics): Customers can find an urgent care center near them and schedule a same-day appointment.

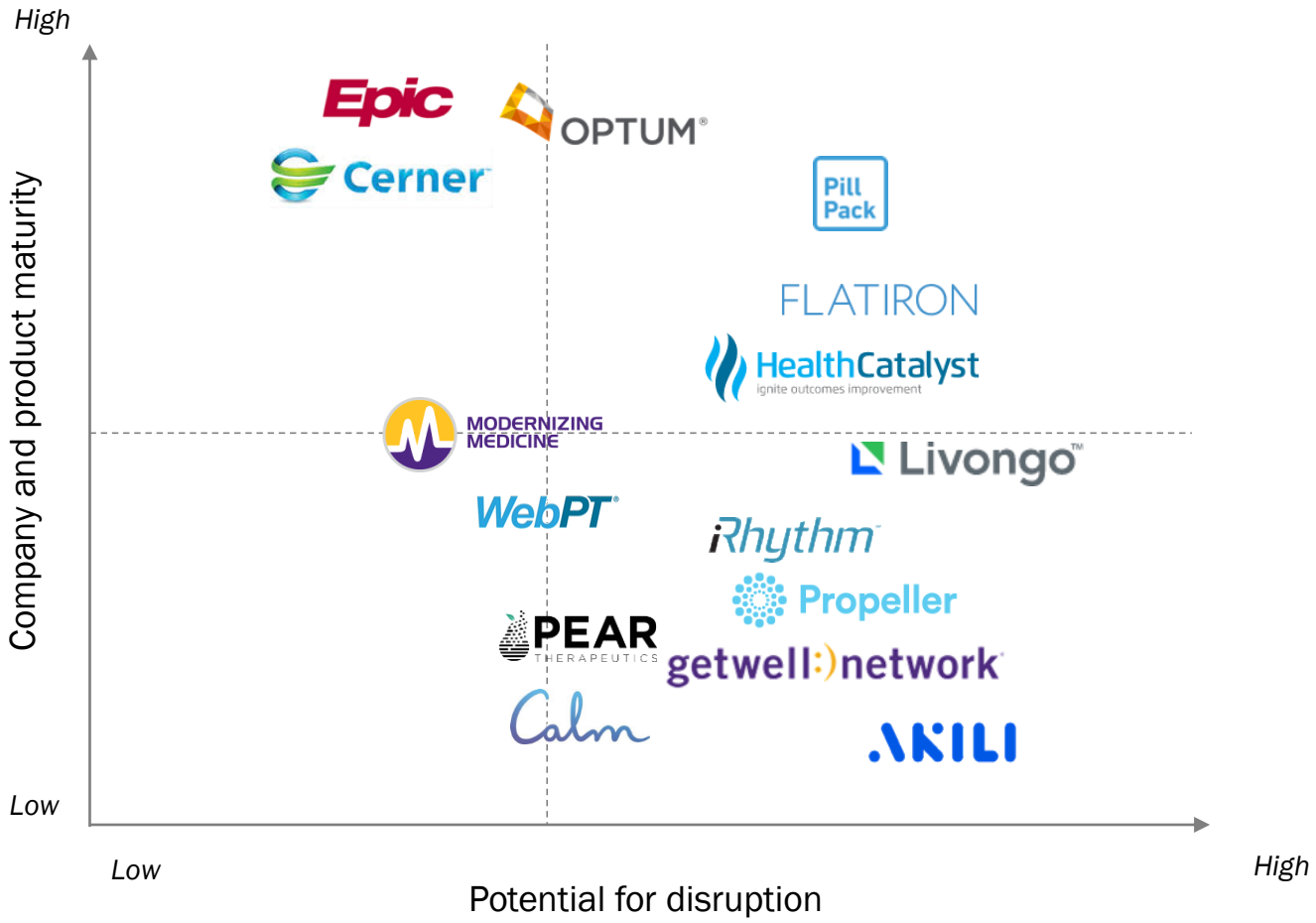
My Children's Enhanced Recovery After Surgery (ERAS) (by Boston Children's Hospital, a leading children's hospital): Parents and caregivers of children in the ERAS program at Boston Children's Hospital can provide their care teams updates on recovery progress and receive information regarding their post-op appointments.

Livongo (a leading consumer digital health company that creates new and different experiences for people with chronic conditions): Members can query their last blood sugar reading, blood sugar measurement trends, and receive insights and Health Nudges that are personalized to them.

Editorial: Amazon announced that Alexa is now HIPAA-compliant, opening the door for the device to be used in homes and hospitals for healthcare uses, via its Alexa Skills Kit, a collection of tools for building voice programs, which can be used to create products that transmit and receive patient data. Amazon initially invited the six above companies to use its HIPAA-compliant skills kit, but partnerships have expanded. In November, Amazon announced that customers of Giant Eagle pharmacy, a regional retailer in the Midwest and East Coast, will be able to set up their own medication reminders and request voice refills using their prescription information.

Source: Amazon; STAT

Leaders and disrupters in condition management



This diagram plots the leaders and potential disrupters in phase four of the patient journey, condition management and monitoring.

Enterprise EHR vendors, **Epic**, and **Cerner** have been leading the patient care communications segments with their patient portal functions. Independent portal and patient engagement solutions have yet to break through.

Niche EMR solutions, **Modernizing Medicine** for derm and gastro; and **WebPT** for rehab, are potential disrupters. Another potential disrupter is **GetWellNetwork**, a leader in patient communications during the hospital stay is acquiring leaders in adjacent segments.

Independent solutions for care management and population health have potential for disruption. Functional leaders are being acquired by big tech competitors, but it hasn't moved the market. IBM acquired Phytel and Explorys; Philips acquired Wellcentive. **Health Catalyst** is taking a different path by partnering with its large clients (Partners HealthCare, Allina Health and UPMC). **Optum**, owned by UnitedHealthcare, has been an early leader.

Several potentially disruptive innovations have emerged in condition-specific segments. **Flatiron** (oncology) has been acquired by Roche for $2b, rewarding it for its data management capabilities. Others include **Livongo** (diabetes), **iRhythm** (cardiology), **Propeller** (asthma), **Pear** (addiction), **Calm** (stress) and **Akili** (ADHD and depression).

Amazon-owned **PillPack** can better disrupt the medication adherence segment with its on-demand home delivery service.

ONC reports that about 30% of individuals could access their EMR and did, at least once, about the same as the prior year

The percentage of individuals who were offered access to their online medical record did not change between 2017 (52%) and 2018 (51%).

In 2018, about three in 10 individuals were offered access to their online medical record and viewed their record at least once within the past year.

Individuals' rates of being offered access and viewing their online medical records at least once in the past year varied by their health care use, socio-demographic characteristics, internet access and use, and health.

Among individuals who viewed their online medical record at least once in the past year, the percentage that downloaded their health information increased by about one-third between 2017 and 2018.

In 2018, half of smartphone or tablet owners had health or wellness apps which were commonly used to track progress towards a health-related goal (75%).

Half the patients using an EHR messaged with providers

Uses of online EHR	2017	2018
Request refill of medications	38%	39%
Fill out forms or paperwork related to your health care	38%	44%
Request correction of inaccurate information	8%	7%
Add health information	19%	24%
Securely message health care provider and staff (e.g., e-mail)	48%	53%
Help you make a decision about how to treat an illness or condition	19%	24%
Consider online medical record useful for monitoring health	84%	83%

Editorial: This ONC update (Data Brief #48) reports that there was little change in patient portal access from 2017 to 2018, with half of patients being offered access, and 58% using it at least once, resulting in about 30% of individuals. Note that Morphisec, a cybersecurity firm, reported this month and linked below, that their consumer survey finds an uptick to 42% of respondents accessing their EHR online coupled with increased consumer risk.

Source: ONC; Morphisec

Patient-centered remote monitoring is the new paradigm

KLAS's first look at RPM vendor performance sees the market shifting from the old paradigm of rigid, hardware-based products to the new age of RPM, in which solutions empower patients and facilitate expansion of RPM use cases. See chart at right.

Newer entrants HRS and Vivify lead amid a shifting RPM paradigm, leaving Resideo to play catch-up. Provider orgs need RPM vendors who help them do more with less—and this means more advanced and flexible solution offerings.

Resideo and Vivify struggle with support in the wake of vendor changes. Vendor guidance and support are essential to help clients expand their RPM use cases, optimize the platform, and mitigate issues that come with still-evolving technology.

HRS stands out by avoiding extra fees. Despite its strong ROI, RPM is perceived as expensive, but vendors can help orgs start or expand RPM programs by not charging exorbitant fees for software upgrades or hardware repair/replacement.

The RPM landscape

The old age of RPM	The new age of RPM
Provider-centric	Patient-centric
More focused on gathering data, monitoring	Focused on patient engagement and empowerment
More basic functionality, static tools, limited analytics	Tools for patient/provider interaction
Proprietary hardware	Consumer-based hardware

Moving away from the old age	In or near the new age
resideo	HRS Health Recovery Solutions
Medtronic	vivifyhealth
PHILIPS	careinnovations

KLAS

Editorial: Few vendors were eager to have their customer experience evaluated for the report. Only Health Recovery Solutions (HRS) and Vivify Health shared client lists and are fully rated in the report. Profiled vendors include Care Innovations, Health Recovery Solutions, Medtronic, Philips, Resideo (Honeywell), and Vivify Health. The full report is available below for KLAS subscribers.

Source: KLAS

Patient engagement solutions cluster around a handful of segments with a few companies particularly well-positioned

Key Findings

(80 industry-supported HIT capabilities)

In a sea of options, vendor-agnostic Allscripts, CipherHealth and GetWellNetwork stand out for multi-product offerings that are fairly-well aligned with clients.

EMR-based solutions from Epic, athenahealth, and NextGen are closely aligned with provider energy.

SONIFI Health and pCare provide strong options in high priority area of patient experience.

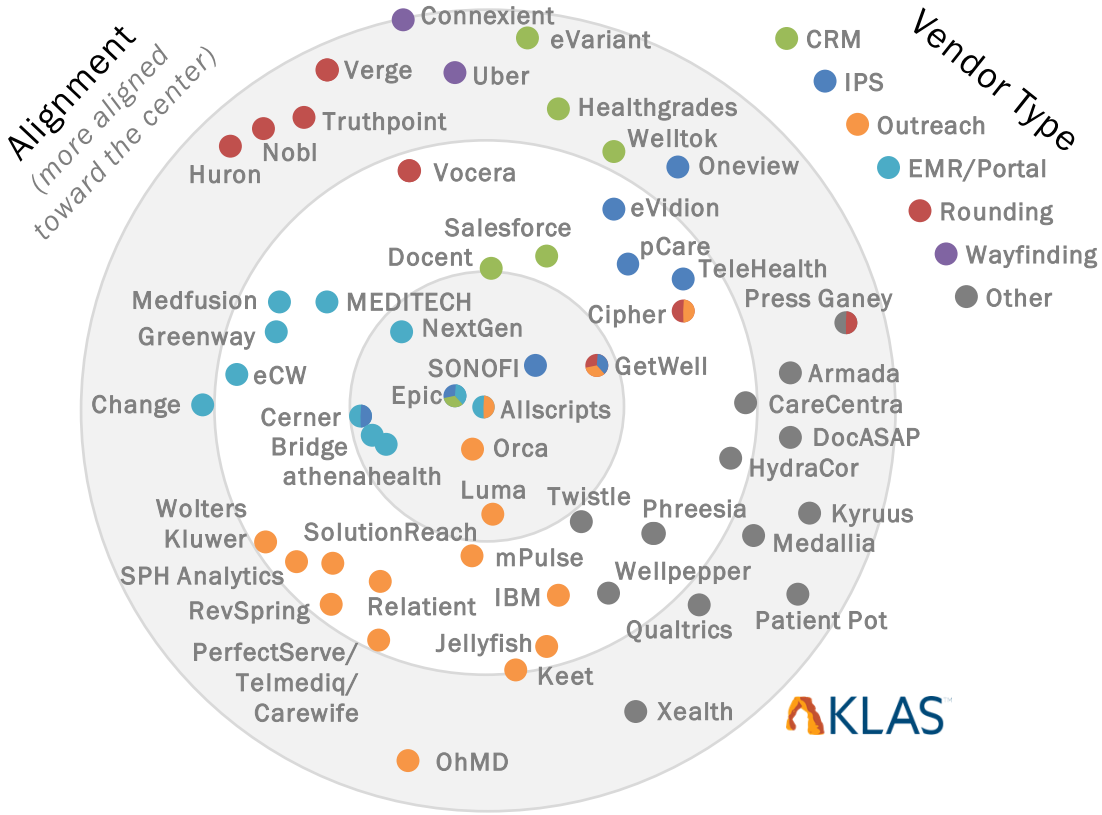
Among many solutions for outreach options, Orca and Luma report deep access and navigation capabilities.

Of the more focused solutions, Salesforce's flexibility and Docent's breadth cover a wider variety of needs.

Achieved outcomes are still largely provider-centric with patient satisfaction leading the way.

Vendor alignment to provider energy

(based on vendor-claimed capabilities)



Editorial: In this report, KLAS Research analyzes the Patient Engagement Ecosystem, exploring how closely vendors' claimed capabilities align with provider organizations' patient engagement priorities. It uses 80 weighted capabilities developed in collaboration with vendor and provider leadership. Two types of solutions achieve high alignment: (1) multi-product suites that cover all or nearly all patient engagement needs and (2) narrower offerings that are focused on areas of high purchasing energy. For KLAS members the report is linked below.

Source: KLAS Research

Livongo, Health Catalyst, Phreesia, and others IPO, breaking a years-long digital health drought

Livongo (LVGO), **Health Catalyst** (HCAT), and **Phreesia** (PHR) rallied in their trading debuts. Share prices soared following each IPO, indicative of the enthusiastic response and a desire to see more health IT companies make their way toward public debuts.

Livongo, a digital health management platform for chronic conditions, raised roughly $355m in the IPO, after pricing at $28 a share.

Health Catalyst, data and analytics technology and services for healthcare orgs, was priced at $26 and closed at $39.17.

Phreesia, customized patient intake software, opened up on the NYSE at $26.75 after being originally priced at $18 per share.

While clear dental aligners company **SmileDirectClub** (SDC) opened strong in their debut, the company is in danger of seeing its public valuation fall under its final private valuation.

Progyny's IPO, under the ticker symbol PGNY, makes it the first fertility benefits company to go public. Progyny is profitable and reported $103.4m in revenue in the first half of 2019.

	Phreesia	HealthCatalyst	Livongo
CAGR (2018 - 2020E)	21%	27%	95%
Comp. of revenue and growth (2019E)	Subscription: $43.9m Payment processing: $36.9m Life science: $19.1m	Technology: $81.8m Services: $68.3m	100% PMPM
Gross margin (2019E and 2020E)	2020E: 39%	2020E: 51%	2020E: 69%
Revenue multiple (2020E)	10.2x 2020E	8.3x 2020E	12.3x 2020E

Editorial: According to The Wall Street Journal, "The public performances of Livongo and Health Catalyst, which are seen as a litmus test for the digital-health sector overall, show that investors valued them more as technology companies than healthcare companies, which typically trade at lower multiples of their sales." In a recent interview, Livongo's CEO Glen Tullman said that the company had to overcome the fact that a lot of tech investors felt they'd been burned in healthcare and a lot of healthcare investors felt they'd been burned in tech.

Source: The Wall Street Journal

Et Cetera

In memoriam: Six notable digital health shutdowns in 2019

Microbiome testing

Once valued at $600m, uBiome sold its patents to Psomagen for just south of $8m; In May, the FBI began investigating the company for routinely charging patients' plans twice for tests, using the same sample and without notifying them; Company had raised nearly $110m

Personalized health coaching

The company, which was founded in 2014, had raised more than $50m and shut down after failing to find a sustainable D2C business model; Seattle-based startup used biomarker and genomics testing to inform personalized health coaching

Connected breast pump

Naya Health, makers of a $1,000 breast pump, shut its doors after it was unable to find an investor or buyer; Company had raised $5m; CEO said Naya "could no longer serve our customers in the way they deserve"

Alcohol addiction

Founded in 2016 and had raised $6.4m; The app provided an alternative to rehab for heavy drinking, and had announced a partnership with Cigna, the first to pilot its program with employer clients

Telehealth for nursing homes

Call9, providers of medical equipment and a platform to video chat with a doctor for nursing homes, shuttered in 2019; Company had raised $34m but struggled to secure additional capital to scale its business

Wellness incentive app

Four years after launching, Canadian wellness platform Carrot Rewards announced that it would shut down its app-based service due to lack of investment; Company had registered 1m+ users

Editorial: In addition to the above, Veritas Genetics, a startup that can sequence a human genome for less than $600, announced in December that it would cease operations in the US and is in talks with potential buyers. It laid off the bulk of its 50 employees. It had raised $51m. As well, Microsoft HealthVault, the tech giant's web-based personal health record system, officially shut down in November. Microsoft remains committed to healthcare however, refocusing its efforts in the industry toward the enterprise market instead.

Source: Company logos linked to websites; text boxes linked to story sources

Partnerships between pharma and digital therapeutics broke down in 2019

Despite the headlines, MobiHealthNews says these types of deals are risky and shouldn't be shocking, nor should they worry the industry at large.

Pharma investors are unlikely to back off. The breakups don't suggest a failure of the digital health products themselves, but rather a go-to-market execution problem. The key going forward will be for investors and other stakeholders to learn from these hiccups.

When exploring the unknown, mitigate the risks. Both sides of the aisle would be best served exploring these partnerships more pragmatically via a portfolio approach. Some of these investments were made too big and too early.

Misaligned expectations. Cultural factors could drive larger entities away from their newest collaborators, including misalignment over which entity 'owns' the customer.

Lack of evidence. Proteus appeared to have run out of funding before it could generate enough evidence to support a strong return on investment. Pharma generally has lots of patience for molecular entities, but many still believe that anything digital must show a return in a matter of months.

Editorial: News broke in December that Proteus Digital Health, once valued at $1.5b, failed to close an expected $100m financing round and furloughed many of their 300 employees for several weeks. The company eventually secured $5m in emergency funding and says it is restructuring. As well, Sanofi announced it was backing away from it's $500m investment in Onduo, a joint venture with Verily focused on diabetes management. Sanofi said it would also be restructuring its role in the project but would stay on as a financial backer.

Source: MobiHealthNews

And other digital health and pharma innovations and partnerships get momentum

Sanofi will combine its insulin dosing information with Abbott's FreeStyle Libre, a continuous glucose monitoring system, to create smart pens and insulin titration apps. It also partners with Happify, to help manage psychological symptoms in MS patients

Bayer leads a $40m Series B funding for OneDrop ($54m total) and licenses the platform which uses AI to recommend lifestyle changes to people with chronic conditions including device connectivity, condition management and coaching

Microsoft and AstraZeneca announced their joint launch of the AI Factory for Health, a European accelerator for digital health startups focused on AI. The co-innovation lab is meant to link startups, researchers and industry players, another sign of more inter-sector cooperation

Veeva, a leader in cloud solutions to pharmaceutical manufacturers, buys Crossix, an analytics platform that provides technology connecting health and non-health data for more than 300m US patients including Rx, OTC, clinical, claims, consumer, hospital, and media data

OptimizeRx, platform for life sciences messaging providers and patients, buys RMDY Health, multipurpose digital therapeutics SaaS platform for $16m; adds payers, medtech and medical associations segments

Editorial: Other collaborations between digital health and pharma have been steady, including digital therapeutics in diabetes with Sanofi and Bayer investments and partnerships; and commercial communications as Veeva and OptimizeRx acquire additional capabilities. AZ and Microsoft partner on an EU accelerator for digital health. In December, SidekickHealth inked a partnership with Bayer to provide a digital medication management and lifestyle change platform to patients with Peripheral Arterial Disease. The program will launch in Sweden.

Source: Company logos linked to websites; text boxes linked to story sources

Big tech had significant impact on healthcare in 2019

amazon

Online pharmacy, Alexa skills, employer health, analytics

Pill Pack is marketed to Amazon Prime members; Pill Pack partnership with Blue Cross Blue Shield of Massachusetts

Acquired Health Navigator, online symptom checking and triage tools, for integration into their virtual health offering for Amazon employees

Alexa feature that reminds customers when to take meds

Launched Amazon Transcribe Medical, an automated speech recognition service that will let developers add medical diction and documentation to their apps

Research results, new Watch health features, health records expand

Published its Apple Heart Study results, which found a-fib alerts from Apple Watch were inline with readings from an ECG patch; study with Eli Lilly and Evidation Health found that consumer devices are collecting enough data to differentiate between users with or without cognitive decline

New health tracking features on Apple Watch; partnerships with payers (Aetna, Devoted Health) on the device

Apple Health Records inked a deal with the VA to roll out to 1,200 health centers

Alphabet

Acquisitions, funding, health system partnerships

Verily announced $1 billion in new venture funding

Acquired smartwatch tech from Fossil Group for $40m; Acquired Fitbit for $2.1b

DeepMind reported losses for the financial year of roughly $571m

Project with health system Ascension to collect and analyze detailed medical records from 50 million patients

Former FDA Commissioner joined Alphabet as its full-time head of strategy and policy

Editorial: Despite the many headlines this year involving big tech and healthcare, a Forbes editorial outlines why these companies will struggle with disrupting the market: 1. Consumer preferences are different than medical needs. 2. No major tech company is willing to accept medical liability. 3. Tech companies will face major data ownership issues. "Big tech firms have the engineering and technical knowhow to create powerful healthcare tools," the article says. "But they won't be willing to take the risks involved or able to access the patient data required." Ultimately, the author feels that none of the recent acquisitions or consumer plays will make a substantial impact where it matters most: On the quality and cost of healthcare.

Source: Company logos linked to websites; text boxes linked to story sources

Leading tech companies are also investing in digital health

The most active tech companies investing in digital health startups (based on the number of portfolio companies) are Google, Microsoft, and China's Tencent. These three companies represent over 70% of digital health deals made by big tech.

Google is the leader with 92 deals to 57 portfolio companies. 70% of its digital health investments have been made through its corporate funds, though subsidiaries such as Verily Life Sciences invest in companies that have a direct link to their projects.

Most of Microsoft's investments originate from its accelerator/incubator programs. These programs count 35 digital health companies as graduates.

Tencent Holdings is the third most active big tech investor in digital health, having invested in 40 unique companies in 52 financing events. 18 of the investments are US-based, reflecting Tencent's international ambitions.

Other big tech companies that have backed at least 5 digital health companies since 2010 include Intel, Samsung, Alibaba, Amazon, and Comcast. Comcast investments include Accolade, K Health, and Shine.

Select list of investments by the three most active big tech investors

Google	Microsoft	Tencent
23andMe	Livongo	GRAIL
flatiron	innovaccer	KARIUS
freenome	SWORD HEALTH	practo
OSCAR	Genoox	Circle Medical
Clover	KenSci	企鹅医生 TENCENT DOCTORWORK
citizen	SIGTUPLE	homehero

Editorial: Since 2012, based on the number of companies backed in each category, global tech giants have invested most heavily in companies focused on data management and analytics, wellness, and genomics. Eight companies have received funding from at least two tech giants, including GRAIL (Google, Tencent, Amazon), Practo (Google, Tencent), and CognitiveScale (Intel, Microsoft).

Source: CB Insights

Health systems are managing the shift to value-based care via three main digital health initiatives with many data sources

Patient engagement

82% of respondents identify the patient portal as one of their top three currently leveraged engagement strategies.

Patient portals and telemedicine are the technologies most often deployed in health systems' patient engagement efforts.

17% of organizations report a high level of patient participation with engagement tools.

70% are at least somewhat confident in their ability to change patient behavior via engagement platforms, mechanisms, and technologies.

Actual patient adoption is still low with 35% of patients having adopted the patient engagement technologies that are in place today.

Data aggregation and analytics

Orgs report 71% of the way to complete clinical integration and 61% of the way to full integration with larger orgs leading the way.

Nearly all leverage their EMR as a central component of their integration strategy and deploy two or three additional analytics tools supporting integration.

Most employ an internal analytics team as part of their strategy.

70% report patient-centered motivators as the top factors driving their integration efforts.

Limited resources/funding and poor data normalization are common barriers.

Half report that the barriers they encounter are due largely to health IT vendors.

Precision medicine

70% report low maturity or no deployment of precision medicine efforts.

On average these have been live for about three years and have adopted three precision medicine use cases.

Oncology is the predominant use case, with the deepest deployment and adoption.

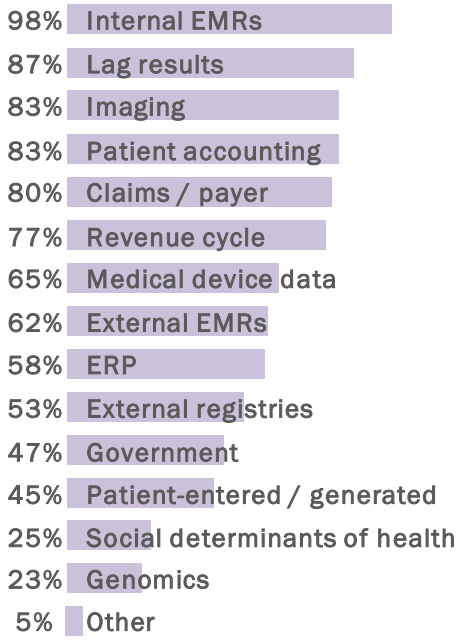
Improving patient care is the primary focus among recently launched their efforts; clinical research is tops for those doing it for years.

While its early to say, most cite lives saved and improvement to quality of life as success metrics.

Half say reimbursement and generating ROI are significant barriers.

While now fee for service, most expect precision medicine to move towards value-based in the future.

Integrated data sources



KLAS | Center for Connected Medicine

Editorial: The Center for Connected Medicine, an initiative by UPMC, Nokia and GE, partnered with KLAS in surveying 65 health systems about their priorities for 2020 in three areas related to their moving from fee-for-service to value-based care. These are patient engagement, data aggregation and analytics and precision medicine. The report summarizes the issues, priorities and challenges for health systems in these three central areas in digital health transformation. Patient portals and clinical integration are leading the way. The full report is linked below.

Source: CCM

10% Happier
100Plus
1-800 Contacts
23andMe
3Derm
6over6
7 Cups
98point6
Abbott
Abilife
AbleTo
Accolade
Activate Healthcare
Active Cues
ActiveProtective
Acuity Link
Ada
AdhereTech
Adherium
AFC
Agfa
AiCure
Aldoc
Akili
Akili Labs
Aktiia
Alavida
Aledade
Alerje
Align Technology
AliveCor
Allergy Amulet
AllerPal
Allscripts
Altibbi
Alto
Altoida
Altra
AMC Health
AMD
American Well
Amiko
Amino
AMRA
Analytics 4 Life
Antidote
AnyLabTestNow!
Apervita
Apostrophe
Apple
AppScript
Aprima
Arcadia
ArchForm
Arivale
Artemis
Arterys
Aspen RxHealth
Asthma Buddy
Asthma Health
AsthmaMD
athenahealth
Athos
Audiojack
Aura
Ava
Ava
Availity
Babycenter
Babylon
Babyscripts
Bardy Diagnostics
Bay Labs
Beam
BeatO
Bedddr
Beddit
Bellabeat
Beneufit
Best Doctors
BetterDoctor
BetterPT
Beyond Verbal
Biobeat
Biocept
BioCorRx
Biodesix
Biofourmis
BiolQ
BL Healthcare
Blink Health
Bloomlife
BrainCheck
Brainomix
BrainScope
Breathometer
Bright.md
Buoy
Cala Health
Calm
Candid
Capsule
Cardiac Insight
Cardiogram
Cardiologs
Care ATC
Care Innovations
CareDash
CareHere
CarePredict
Carevive
CareZone
Carrot
Castlight Health
Catalia Health
Cellmatix
CellMax Life
Cellscope
CellTrak
Cerner
Change Healthcare
ChessHealth
Chrono Therapeutics
Chronometriq
Ciitizen
CipherHealth
Circle Cardiovascular
Imaging
Circle Link Health
Circle Medical
Circulation
CirrusMD
Clara Health
Clear Health Costs
Cleo
CleverCap
Cloud DX
Clue
Cocoon Cam
Cognifit
Cognizant
Cognoa
Cohero
Color
CompanionMX
Concentra
Concerto HealthAI
Concierge Choice
Physicians
Conduent
Conifer
Connexion Health
ConsejoSano
Conversa
Cora
Corti
COTA
CPSI
Crossover Health
CrowdMed
Cue
CureMD
Curology
Current Health
CVS
Cynvenio
Dadi
Dario
Deep6 AI
DermatologistOnCall
Dermio
Dexcom
D-Eye
Digitsole
DocASAP
DocDoc
Docent
DocPlanner
DocsApp
DocsInk
Doctena
Doctolib
Doctor On Demand
Doctor.com
Doctors Making
Housecalls
Dose Healthcare
Dot
DOTS
Doximity
Dreem
Drugs.com
DynamiCare Health
Eccrine
eClinicalWorks
Eight Sleep
Eko
Eko Devices
Ekso Bionics
Elekta
Elevate
Elite Health
Elligo
Elli-Q
Elvie
Emfit
eMindful
Emotiv
Endotronix
Enli
Enlitic
Epic
EverlyWell
Everyday Health
eVisit
Evolent
Exosome Diagnostics
Experian
Extend Fertility
EyeNetra
EyeQue
Facebook
FAIR Health
FastMed
Feel
FeetMe
FertilityIQ
Fever Smart
FibriCh
First De
First M
First Op
First St
Fitbit
Flatiron
Flo
Flo Livi
Foc.us
Force T
Forefro
Forwar
Founda
Freeno
Friendl
Fruit Street
Future Family
G Medical
Garmin
GE Healthcare
Genela
GenePeeks
Genneve
Genoa
Genomic Health
Genospace
GetDoc
GetWell Network
Global Kinetics
GlobalMed
Glooko
Glow
Glucose Buddy
GlySens
Go Ride Health
GoCheck Kids
GoHealth
GoodRx
Google
GOQii
GRAIL
Grand Rounds
Graphwear
Gravie
GreatCall
Greenway
Grush
Guardant Health
Guroo
H4D
Habit
Halo
Halodoc
Happify
HCA
Headspace
Heal
Health at Hand
Health Catalyst
Healthcare Bluebook
HealthEC
HealthEngine
Healthgrades
HealthGrid
Health Iq
Hims
Hinge Health
Hitch Health
Hometeam
Honor
HTC
Huawei
i2i
IBM Watson
Icometrix
Ideal Life
IDX
Ieso Digital Health
iHealth
IKnowMed
Imagen Technologies
ImPACT Applications
Imprivata
Independa
InfoBionic
InformedDNA
Inivata
Innovaccer
Inside Tracker
Integra Connect
InteraXon
InterSystems
InTouch Health
Intrado
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IQFIT
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Joany
Joint Academy
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Karuna
Keeps
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Kick Health
Kiddo
Kiio
Kindara
Kindly Care
Kinesia 360
Kinsa
Klara
Livongo
Lola
Lose It!
Lumity
Lumosity
LVL
Lybrate
Lyft
Lyra
M2Gen
Mahmee
Mango Health
Manual
MAP Health
Management
Maple
Marathon Health
Marigold Health
Markit Medical
MatrixCare
Mattel
Maven
Mavencare
Maxwell Health
McKesson
MD Insider
MD Revolution
MD Squared
MDLIVE
MDsave
MDVIP
MedAdvisor
MedAssist
Medcor
Medecision
MedExpress
MEDHOST
Medibio
Medical EarlySign
Medically Home
Medici
MedicineNet
MediRevv
Medisafe
MEDITECH
Medivizor
MedlinePlus
MedMinder
Medocity
Misfit
Modern Fertility
Modernizing Medicine
Motiv
Motus
MPIRICA
mPower
mPulse
Muse
MV
Myriad
MySpiro
MySugr
MyVision Track
Nanit
Nanowear
NarrativeDx
Natural Cycles
Navigant
Navigating Cancer
Naya
Nectarine Health
Netsmart
Neuroflow
NeuroSky
Neurotrack
New Ocean
NextCare
NextGen
NextGen Jane
Nima
Nimble
NimbleHeart
NOCD
Nokia
Noom
Noona
Notable Labs
NowRx
nThrive
Numan
Nurx
Nutrino
NuvoAir
Obino
Oculogica
OhMD
Omada
Omsignal
Pager
Paige.AI
PainChek
Pair Eyewear
Paladina Health
Paragon
Parallon
Pathway Genomics
PatientWing
pCare
PCC
Peak
Peanut
Pear Therapeutics
PediaQ
Peek Vision
Peerbridge
PeerWell
PGDx
Philips
Physitrack
Picwell
Pill Pack
PillDrill
Pillo Health
Pillsy
Ping An Good Doctor
PinnacleCare
Pip
Platejoy
Playbrush
PlushCare
pMDsoft
Podimetrics
Polar
Popit
POPSI
Posit Science
Practo
Precision Health AI
Prelude
Premier
Premise Health
Press Ganey
Private Medical
Progyny
Propeller
Proscia
Proteus
Providence Express
Ranked Health
Real Self
RedBrick
Reflexion Health
Regroup Therapy
Reliefband
Remedy
Renew
Renovia
ResApp
Resideo
Respiri
Rest Devices
ReThink Medical
RevSpring
RiaHealth
Ritual
Roman
Rootine
Roundtrip
RxList
RxUniverse
Salesforce
Samsung
Sandstone Diagnostics
Sanvello
Savonix
Science 37
Scio
Scipher Medicine
Seenso
Seismic
Senseonics
Sensium Healthcare
SensoGenic
Sensoria
Sensyne Health
Sherpaa
Shimmer
Shine
Sidekick Health
Sightbox
SignatureMD
SigTuple
Simple Contacts
Simple Habit
SingFit
Siren
Siren Care
Sivan
SkinVision
SkyMD
Sleep Genius
Sleep Number
Sleepace
Sleepbot
SleepCycle
Sleepio
Sleeprate
SleepScore
Smart Vision Labs
SmartCap
SmartSole
SmileDirectClub
Smilelove
SMRxT
SnapCorrect
SnapMD
Snoozeal
Snuza
SoberGrid
SOC Telemed
SocialWellth
Solera
Solutionreach
Solv
Sonde
Sondermind
SONIFI
Sophia Genetics
Sotera Wireless
SpecialDocs
Consulting
Spire
Spire Health
Spirosure
Spring Rain Doctor
Sprout
Sproutling
Spry Health
Sqord
Starling
Staywell
Straight Teeth Direct
Strata Oncology
Stride
SubjectWell
Suggestic
Sweetch
Sword Health
Syapse
Symcat
SyncThink
Synzi
Talkspace
Tango
Techcyte
Teckro
Teladoc
Teleclinic
TeleHealth
Tellspec
Tempest
Tempus
Teslong
Teva
text4baby
The Learning Company
Thync
Tia
TigerConnect
Total Brain
Totohealth
TrialSpark
Triggr Health
TrovaGene
Truven Health
Analytics
Twine Street
TytoCare
Tzoa
Uber
uBiome
UCB
UE LifeSciences
Ultromics
Under Armour
Uniform Teeth
Vector Oncology
Vera Whole Health
Veracyte
Verana Health
Veritas Genetics
Vermillion
Veyo
Vezeeta
Vida
VideoDoc
VideoVisit
Vidyo
VieCure
Virgin Puls
Virta
Visibly
VisionTree
VitalConnect
Vitality
Vivify Health
VIZ
VoxelCloud
VSee
Walgreens
Walmart
Warby Parker
WAVE
Waystar
WebMD
WebPT
WeCare TLC
WeConnect
WeDoctor
WellBe
Welldoc
Wellframe
WellnessFX
Wellthie
Welltok
Welltory
Whil
Whoop
Wildflower
Willow
WiserTogether
Withings
Wivv
Woebot Labs
Wolters Kluwer
Workit Health
Workpath
WuXi NextCODE
Wysa
Xcertia
Xealth
Xenoma
Xiaomi
Yelp
Youper
Your.MD
Zava
Zebra
ZeOmega
Zesty
ZhorTech
Zipdrug
Zipnosis
Zipongo
ZocDoc
Zoom

We covered 1,600 companies this year in digital health
and profiled 800 of them as Leaders or Disrupters

CIRCLE SQUARE

Digital Health Trends (December 2019) – Year in Review

Michael Lake | Dave Lake | www.circlesquareinc.com

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