William Blair

November 30, 2018

Ryan Daniels, CFA +1 312 364 8418
rdaniels@williamblair.com

Jeffrey Garro, CFA +1 312 364 8022
jgarro@williamblair.com

Bhavan Suri +1 312 364 5341
bsuri@williamblair.com

Healthcare Mosaic

Patient Engagement—The New "IT" in HCIT

Summary: In our quarterly *Healthcare Mosaic Report*, we select a far-reaching topic of interest in the healthcare space and provide a variety of data points and analyses to offer a more complete picture of what it means for the broader healthcare marketplace (and investors in the space).

In our fourth quarter 2018 *Healthcare Mosaic Report* (our 15th in the quarterly series), we take a deeper dive into the area of patient engagement, which we believe presents one of the most compelling near-term growth opportunities in the healthcare information technology (HCIT) space.

More specific, in this thematic report we analyze:

- why patient engagement is becoming an increasingly important aspect of healthcare—especially in a world of value-based care and consumer-centric healthcare delivery;
- why healthcare providers are increasingly seeking out technology solutions that help drive patient engagement—both to improve the quality of care and to increase patient satisfaction levels;
- why such solutions are critically important to engaging millennials, who represent the single largest population cohort in the United States—roughly half of whom do not have a primary care physician;
- the myriad payment, physician reimbursement, societal, and healthcare delivery model changes that are increasingly pushing financial and care management responsibilities onto patients themselves;
- the various types of, and settings for, patient-engagement technologies (patient education, intake management, patient outreach, point-of-care interaction, etc.); and
- our thoughts on potential winners and losers (in both the public and private markets) as a result of these changes.

Introduction

As our most avid readers should recall, in early 2005 we published the first of our continuing series of reports on the evolving role of the consumer in the U.S. healthcare market. The report, titled *The Power of Choice: On the Brink of a Consumer Revolution in Health Care*, provided our expectations for the most significant developments in the healthcare marketplace over the coming years. More than a decade later, our thesis remains intact and continues to unfold rapidly. More specific, we continue to believe that consumers—in tandem with disruptive healthcare technology and services providers—are the key to solving many of healthcare's woes, particularly the unsustainably high cost of care in the United States.

While this thesis never wavered, the migration to a truly consumer-centric healthcare marketplace took longer to play out than we anticipated—as numerous regulatory, political, payment, and technology challenges created myriad roadblocks to broader market acceptance. ***However, entering 2019, we believe the stage is set for a consumer revolution in healthcare, and the alignment of incentives across payers, patients, and physicians ("the three P's") is driving industry participants to rethink their care delivery models.***

Moreover, the entry of nontraditional players in the healthcare marketplace (e.g., Amazon [AMZN $1,673.57; Outperform]) as well as the consolidation of industry giants from disparate areas in the value chain (e.g., CVS Health-Aetna) are forcing massive change in how healthcare providers both interact with healthcare *consumers* (not patients) and manage the health of entire populations (moving from event-driven care to long-term consumer engagement and care management).

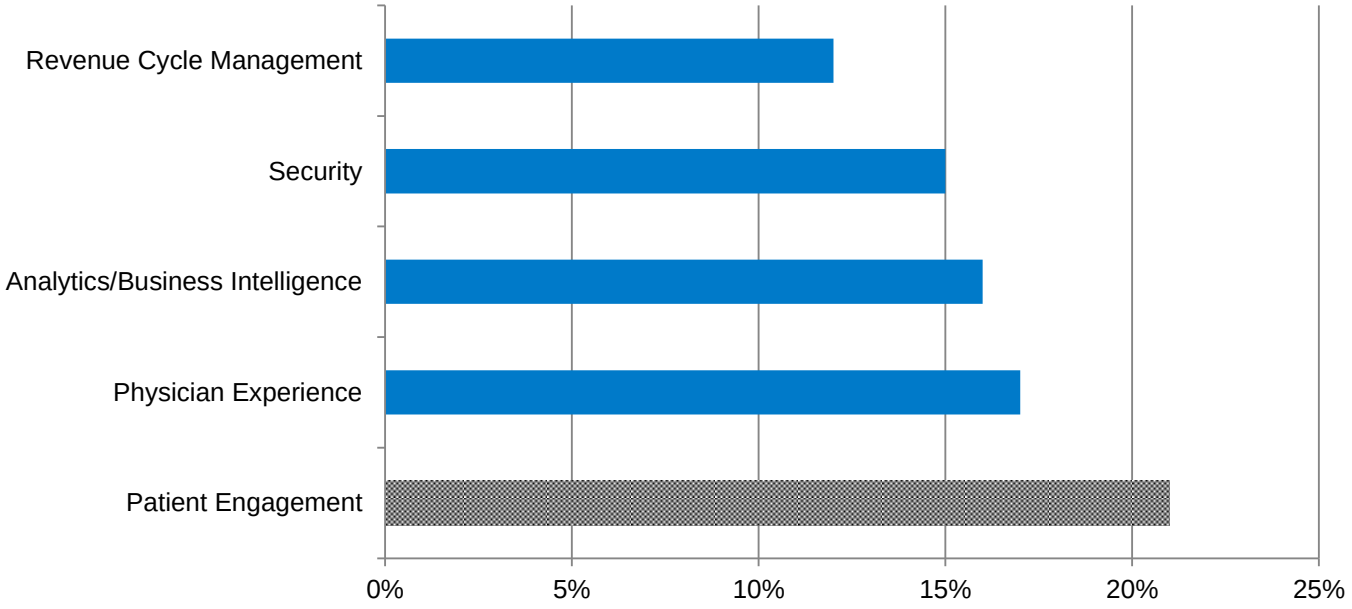
For example, the recent CVS Health–Aetna merger was described by management as an opportunity "to remake the consumer healthcare experience." And management referred to the "shift of healthcare decision-making into the hands of the consumer" as the key impetus behind the combination—highlighting the U.S. healthcare "consumer" 23 times in its prepared comments announcing the transaction.

We also believe that growing consumer expectations for price transparency and convenience in healthcare are changing the way healthcare will be consumed—and thus delivered—in the very near future. For example, recent data from the Kaiser Family Foundation (KFF or Kaiser) shows that ***only about half of individuals age 18-29 have a primary care doctor, compared with 82% between age 50 and 64 and 88% above age 65. And this represents what is now the largest generation in U.S. history—comprising more than 83 million Americans born between 1981 and 1996.***

This dynamic, combined with increased financial responsibility for healthcare across nearly every age spectrum, is causing a massive change in the marketplace—one where driving consumer engagement to increase loyalty, satisfaction, and self-management of health conditions will become paramount to long-term success. Stronger customer engagement will also become a prerequisite for revenue cycle management (RCM), in our opinion, as getting consumers to pay when (or before) care is delivered is becoming increasingly important for all healthcare providers.

For these reasons, we were not surprised to see a recent KLAS study (*Emerging HCIT Companies 2018: Who's Getting Traction?*) indicate that ***patient engagement was the single most-mentioned area of interest in interviews with more than 120 leaders of provider organizations***—with patient engagement highlighted in 21% of all conversations (exhibit below).

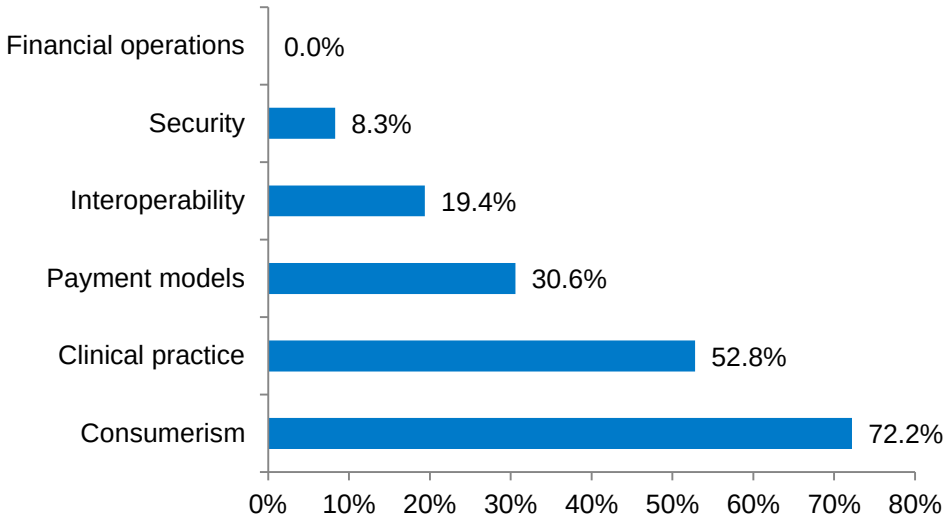
Patient Engagement Was the Most-Mentioned Area of Interest in KLAS' Interviews of Healthcare Provider Leaders



Source: KLAS Research

Similarly, when *Modern Healthcare* surveyed 75 hospital CEOs regarding where they are seeing innovation, consumerism was the clear selection—with the majority of respondents also indicating that the word "patient" is "rapidly fading from the healthcare lexicon," as healthcare executives now talk about "consumers and customers" more often than not.

In What Areas of Healthcare Are You Seeing the Most Innovation?



Source: *Modern Healthcare,* CEO Power Panel

So what does all this mean? In our view, the combination of these trends holds the potential to meaningfully impact healthcare delivery in the United States over the next three to five years—ranging from a new set of industry participants providing care (from nontraditional players such as retail stores/online retailers to novel advanced practice care models, such as those profiled in our third-quarter Mosaic Report: *Death of the Independent PCP; Hospitals, Advanced Practices, and Managed*

Care Orgs Increasing Control of the Provider Market) to entirely new healthcare delivery models (telehealth, home-based care delivery and patient monitoring, urgent care clinics, healthcare apps that foster self-management of conditions, etc.).

In our view, this also means that consumer expectations regarding the care experience will increase markedly going forward. To this end, we found a quote from Amazon CEO Jeff Bezos (in his 2017 letter to shareholders) to be particularly relevant:

> One thing I love about customers is that they are divinely discontent. Their expectations are never static—they go up. It's human nature. We didn't ascend from our hunter-gatherer days by being satisfied. People have a voracious appetite for a better way, and yesterday's "wow" quickly becomes today's "ordinary." I see that cycle of improvement happening at a faster rate than ever before.
>
> It may be because customers have such easy access to more information than ever before—in only a few seconds and with a couple taps on their phones, customers can read reviews, compare prices from multiple retailers, see whether something's in stock, find out how fast it will ship or be available for pick-up, and more. These examples are from retail, but I sense that the same customer empowerment phenomenon is happening broadly across everything we do at Amazon and most other industries as well. You cannot rest on your laurels in this world. Customers won't have it.

In the past, investors may have argued that healthcare is unlike other industries—given often misaligned incentives, antiquated payment rules and regulations, and a divergence between the consumers of care and those that pay the bill. However, entering 2019 we believe many of these incentives are finally aligned, and also note that the U.S. consumer is, at long last, becoming the largest payer for healthcare in the United States (perhaps a key factor in Amazon's recent move into the healthcare market as well—as highlighted by its nearly $1 billion acquisition of consumer-centric online pharmacy PillPack in the summer of 2018).

In this vein, we believe the time is now for healthcare providers to invest more in consumer engagement technologies and the overall patient experience—and, therefore, the purpose of this *Quarterly Mosaic Report* is to focus on this topic and why it is so important going forward.

Changing Consumer Dynamics Are Driving the Need for Stronger Customer Engagement

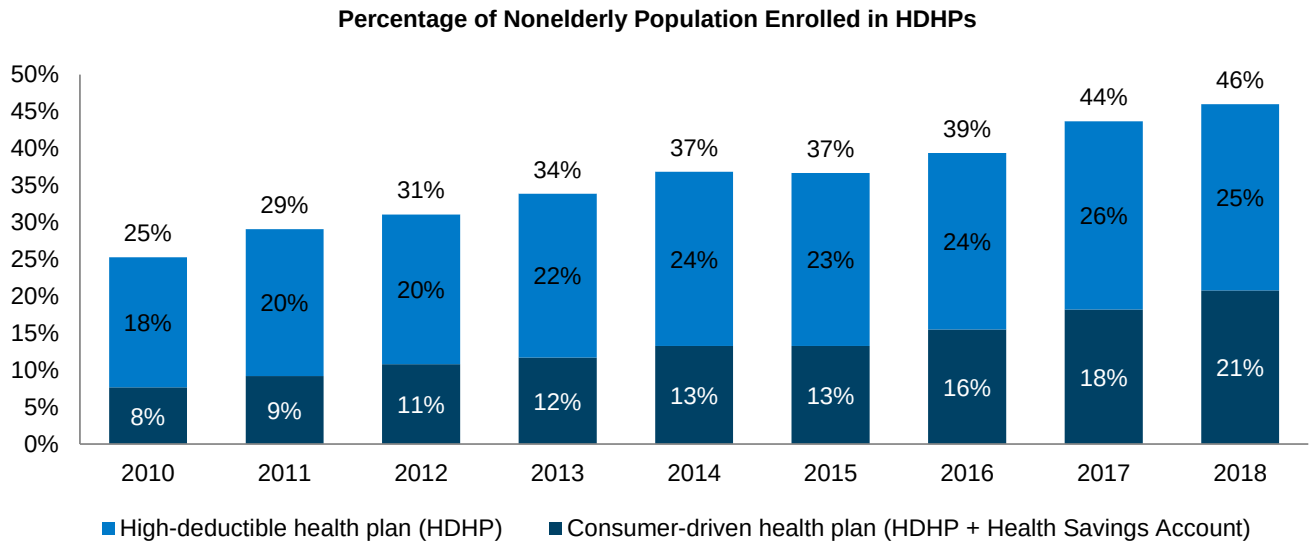
In our view, there are three primary reasons that a more engaged healthcare consumer is becoming the norm in the United States: 1) increased financial responsibility for healthcare expenditures; 2) favorable experiences in other industries (as it relates to digital technologies and self-service applications); and 3) the rise of millennials (and their unique expectations and demands on the marketplace).

We discuss each of these three factors in more detail below.

1) Increased financial responsibility for healthcare expenditures. At the forefront of this change is the increased level of consumer responsibility for healthcare, which is a topic we discuss in detail in our annual *Consumer-Centric Healthcare Report.*

More specific, high-deductible insurance plans—which put markedly more financial responsibility into the hands of consumers—have been the only type of commercial insurance coverage to experience consistent growth over the past decade. In fact, such plans likely accounted for about 30% of the commercially insured population in 2018—up from only 5% as recently as a decade ago. Moreover, with increasing co-payments and higher co-insurance levels, we believe that the consumer is becoming the largest buyer of healthcare in the United States—a drastic change from a decade ago, when this was merely our thesis of what was to come.

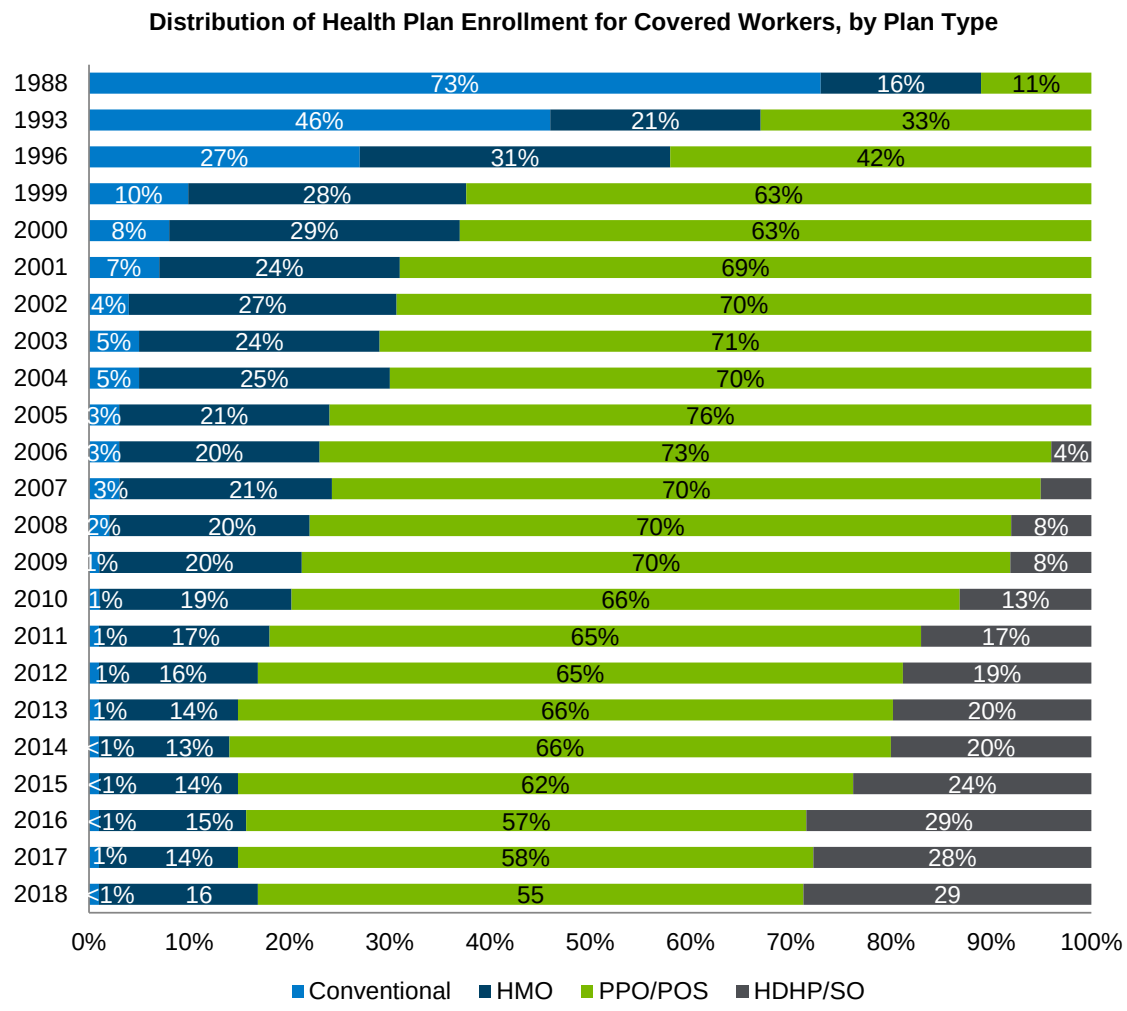
Regarding actual statistics behind this—the percentage of nonelderly (i.e., under the age of 65) Americans with a high-deductible health plan or a consumer-driven health plan (CDHPs, a high-deductible plan paired with a health savings account) has risen steadily over recent years. For example, in 2010, about 25.3 million persons were covered under some form of HDHP; however, this number rose by about 70% through the beginning of 2017, to a record 42.9 million.



Source: CDC/NCHS National Health Interview Survey

At the same time, the percentage of covered workers who enroll in HDHPs has increased markedly over recent years, while plan structures like HMOs and PPOs have seen their market share shrink over time.

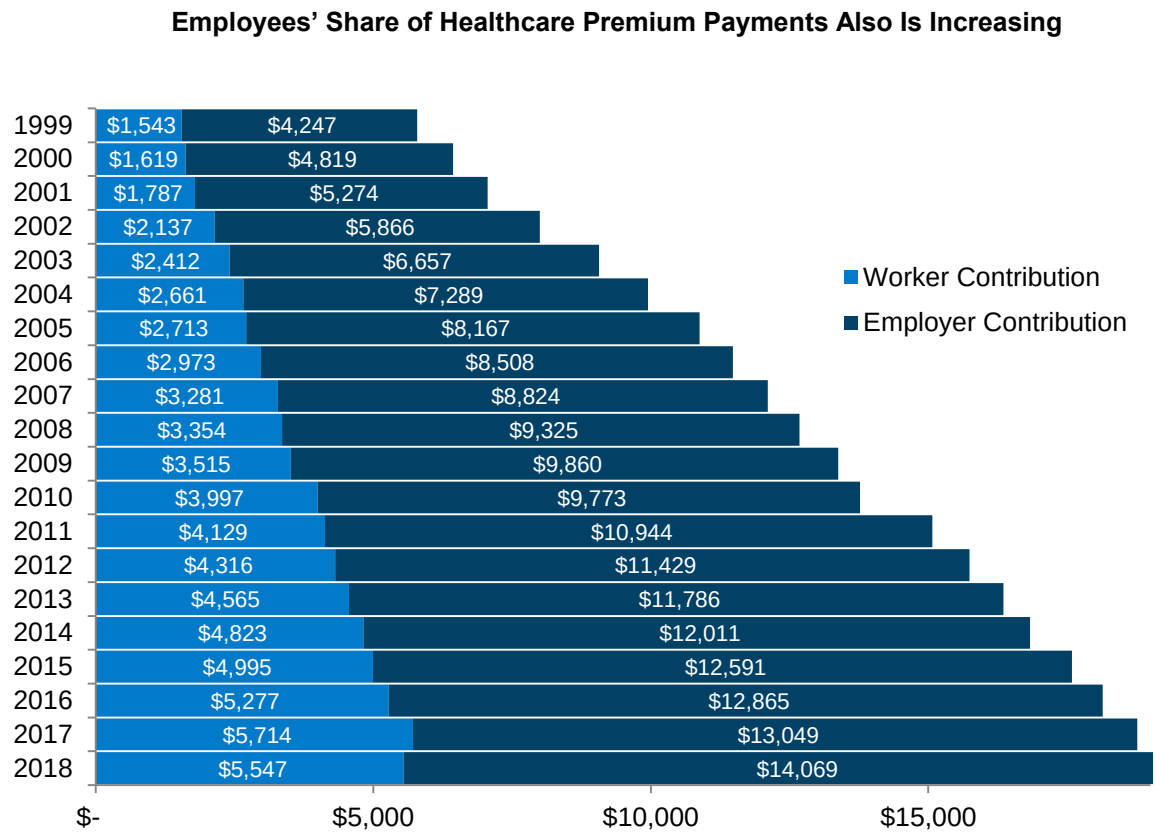
In 2018, for example, nearly 30% of employer-sponsored beneficiaries were enrolled in HDHPs, significantly above the 4% mix when they first appeared in 2006. *Furthermore, HDHPs have the second-largest enrollment percentage (behind only PPOs) for the eighth year in a row, demonstrating the growing prevalence of this type of plan in the marketplace.*



Source: Kaiser Family Foundation/Health Research & Educational Trust, Employer Health Benefits Survey (2018)

Moreover, despite incurring markedly higher deductibles for healthcare utilization, employees also are facing higher overall costs related to annual insurance premium contributions. More specific, employee contributions for family healthcare coverage increased to $5,547 in 2018 (see the following exhibit)—a near-record level and an increase of about 75% over the last decade. This contrasts with employer contributions of $14,069, which are up only 50% over the same period—indicating that the typical employee now contributes roughly 28% of total premium spending, despite facing markedly higher deductible payments as well.

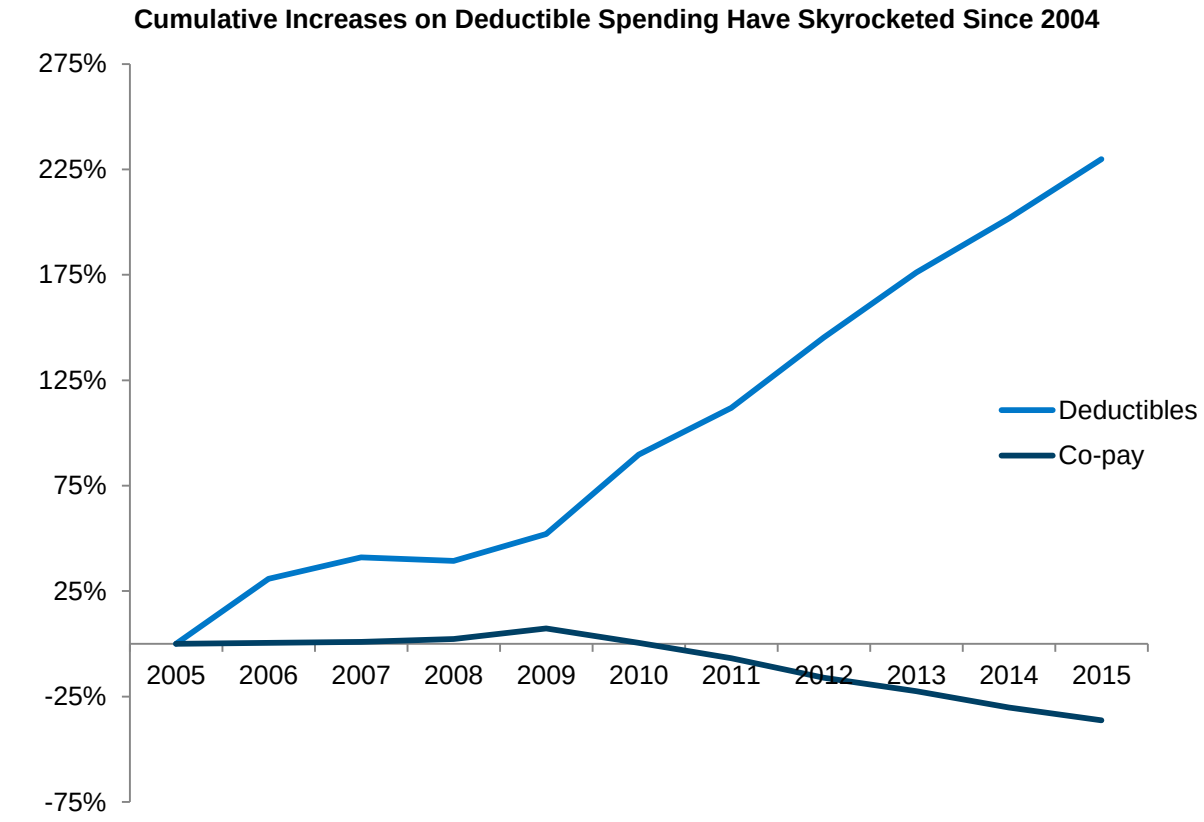
Also of note, since 1999, workers' earnings have risen about 68% (versus U.S. inflation of 51%), while **worker contributions for healthcare premiums have risen a whopping 259%**.



Source: Kaiser Family Foundation/Health Research & Educational Trust, Employer Health Benefits Survey (2018)

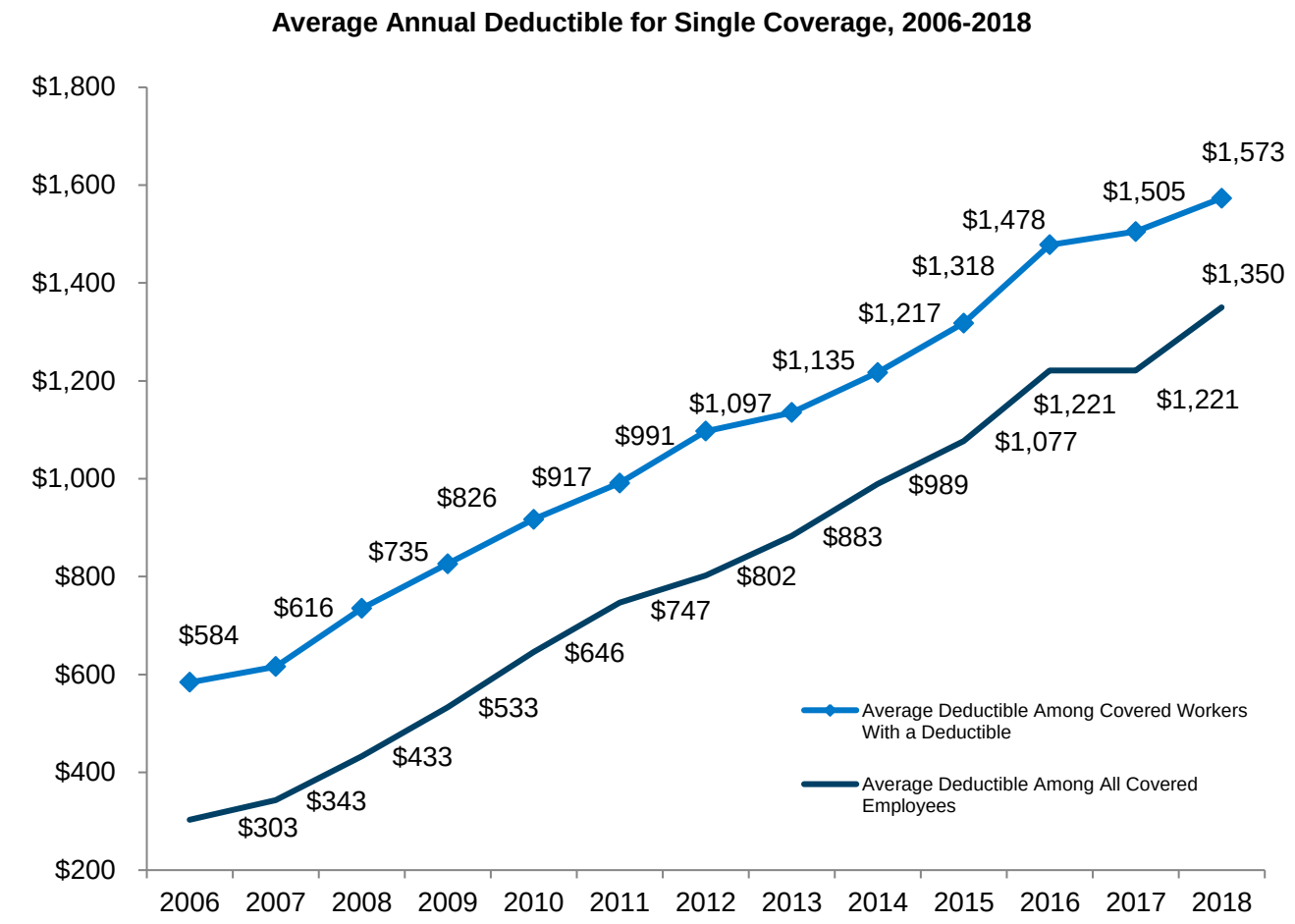
Given these increases in HDHPs, it should come as no surprise that individuals' overall cash payments toward deductibles have increased markedly over the past several years as well—a point that was confirmed by a 2017 study completed by KFF.

KFF analyzed a variety of large employer data sets from Truven Health Analytics and the Bureau of Labor Statistics and determined that *cumulative payments toward deductibles increased almost 230% over the past decade, while wages increased only 31% and co-payments actually declined by 36%.* In our view, this is important since deductibles typically drive more price sensitivity than co-payments (which are generally flat dollar amounts), thus indicating a significant uptick in overall consumer responsibility for healthcare spending.



Source: Kaiser Family Foundation

A similar trend also can be seen in analyzing the average annual deductible amount for single coverage in the United States, which has increased nearly threefold since 2006 alone, with the average deductible for a covered worker increasing from $584 in 2006 to $1,573 in 2018.



Source: Kaiser Family Foundation/Health Research & Educational Trust, Employer Health Benefits Survey (2018)

Moreover, Kaiser estimates that ***more than 50% of all U.S. employees now face deductibles in excess of $1,000***, compared with only 10% as recently as 2006. This likely is leading to significantly more comparison shopping and overall discretion in healthcare purchases, in our view, as more than half of all consumers with insurance now face material out-of-pocket costs for medical procedures (including areas that previously fell above historical deductible levels, such as imaging procedures and minor surgeries).

As a result, we believe consumers are increasingly using pricing tools and basic internet searches to find providers and discover more cost-effective points of care. We also believe this trend is dramatically increasing consumer expectations for more cost-efficient (and convenient) care delivery vehicles, such as telehealth.

2) Favorable experiences outside of healthcare. Beyond increasing financial responsibility for healthcare purchases, we believe consumers also have become accustomed to the ability to transact digitally in other industries (which have generally embraced this trend as well—as it materially lowers their labor costs by increasing customer self-service).

For example, most consumers no longer physically go to a bank teller to get cash (replaced by ATMs or smartphone apps) or require a physical location/ATM to deposit a check (now done with an application and smartphone with a camera); however, there are still myriad retail banking locations across the United States.

Similarly, the author of this note cannot fathom waiting in line for a coffee anymore—rather, the ability to find the nearest Dunkin', put in an order (or just select a recurring favorite order), pay via a pre-established credit card, and walk in and pick it up without waiting in line is prerequisite.

And for the company, it drives labor efficiencies (no checkout or ordering in line), increases the customer experience (for both the user and other customers at the location—who no longer need to wait for the app users to order and pay in person),

provides valuable consumer data, and offers the opportunity to garner greater customer loyalty (via points programs and digital couponing).

Of note, we believe Starbucks was the first major coffee chain to offer this type of application in September 2009, and it took until August 2012 for Dunkin' to provide a similar solution. And McDonald's only recently launched such an application (with initial trials of a pre-order and pickup application in March 2017)—indicating how even industry leaders in a purely consumer-centric market have taken time to adapt to this model.

Still, we believe such experiences are becoming ubiquitous among consumers, and as Amazon CEO Jeff Bezos stated in his abovementioned letter to shareholders: "These examples are from retail, but I sense that the same customer empowerment phenomenon is happening broadly across everything we do at Amazon and most other industries as well. You cannot rest on your laurels in this world. Customers won't have it."

We agree wholeheartedly and expect that healthcare providers will need to adopt such engagement solutions (many of which we discuss later in this report) as well—especially as novel competitors emerge with these solutions and start to garner increased market share (while also increasing consumer expectations for their providers to offer similar functionality in the future).

3) Unique demands/expectations of millennials. Lastly, we believe the need to engage millennials will further the need for patient engagement technologies going forward.

As mentioned earlier in this report, **millennials are now the single-largest segment of the U.S. population**—exceeding 83 million individuals and representing more than one-quarter of the entire U.S. population (a segment that surpasses the baby boomers at 74 million individuals).

And roughly half of this segment—or nearly 42 million potential customers—report not having a primary care physician (PCP), versus less than 9 million baby boomers without an established PCP relationship.

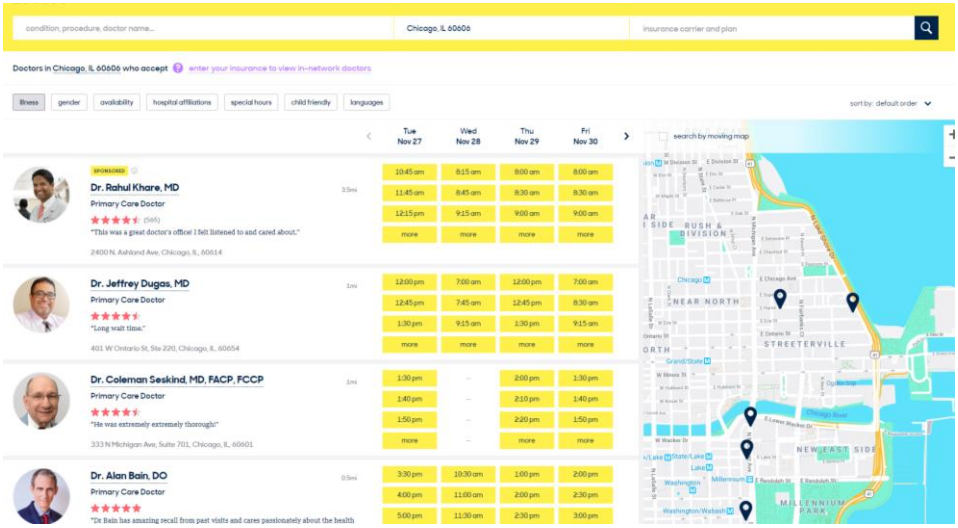
Accordingly, we see a massive opportunity for providers who can effectively meet millennial demand to gain market share over the coming years. Moreover, while some readers may suspect that these demands are only relevant to millennials, nearly 42% of adults ages 65 and older now report owning smartphones as well (up from only 18% in 2013), so we believe these solutions are growing increasingly important across all age cohorts.

Looking specifically at millennials, however, a recent study by Salesforce.com (*State of the Connected Patient*) found the following trends:

- 60% of millennials are interested in using telehealth versus a traditional office visit;
- More than 70% of millennials want a mobile app that allows them to manage their well-being, review medical records, and schedule appointments;
- More than 75% of millennials look at online reviews before selecting a physician; and
- Roughly 73% of millennials prefer the ability to book appointments online and pay for bills online when selecting a doctor.

Accordingly, we believe providers need to offer novel patients with convenient search capabilities (including the ability to enter insurance information to view in-network providers), reviews, local access to care, and online booking capabilities, such as those provided by private company Zocdoc, to gain market share in this large and increasingly important segment.

Example of Zocdoc's Physician Search and Scheduling Application



Source: www.zocdoc.com

Moreover, even when broadening the market to all age cohorts, it is apparent that the need for digital solutions is becoming a prerequisite for success. For example, an EY study on digital health—based on a survey of nearly 2,500 consumers (*Is Digital Health the Prescription for Improving Health*?)—noted that more than 50% of consumers are comfortable contacting their physician digitally, 61% would share information digitally to reduce wait times, and roughly 55% would share information if it helped lower costs.

Accordingly, we believe the need to invest in more digital engagement solutions is important across all age cohorts, but—again—particularly relevant to engage millennials.

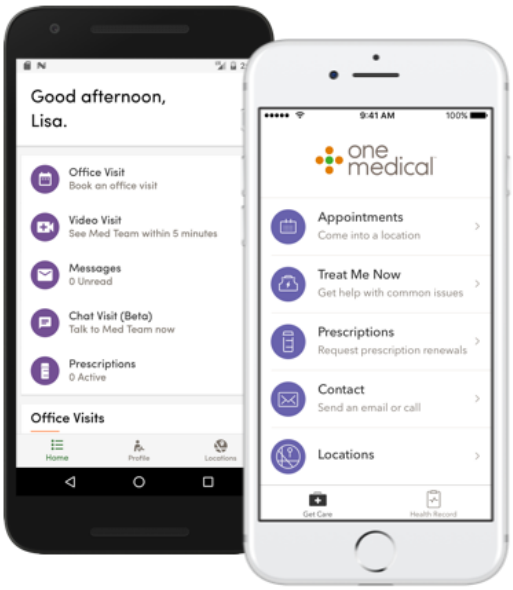
The Need for Patient Engagement Is Critical Across All Venues of Care

While the requirement to offer patient engagement solutions is most evident for outpatient care, we believe the need actually spans the entire healthcare continuum. For example, solutions like **Teladoc Health**'s (TDOC $64.09; Outperform) "virtual first" strategy can become an entry point for the entire healthcare experience—where the organization can guide a patient via a mobile application and phone/video consult to a treating physician, who can then treat the member at that point or "warm transfer" the patient to a higher level of care (like an introduction to a second-opinion service).

Moreover, if needed, the organization can refer a patient to an in-network or high-performing physician group (making the process seamless for the patient and ensuring effective provider network management for the provider/payer customer). The solution also is elegant in that it can provide both a highly convenient and cost-effective alternative to office visits or retail health clinics.

Similarly, advanced practice providers like **OneMedical** have invested heavily in mobile applications to help patients find offices and schedule visits, make online payments, request prescription refills, review and store test results and medication records, and request virtual consultations. And we believe this type of technology and convenience can also sway even those individuals with existing PCP relationships to more heavily rely on this service over their primary care doctors (the author of this note included).

Example of OneMedical's Smartphone Application



Source: OneMedical

Similarly, providers like Phreesia and PatientPoint have developed myriad solutions to enhance the quality of care, RCM activities, and the patient/provider experience *at the point of care itself*.

For example, **Phreesia** has established the industry's leading patient intake solution (exhibit below)—currently providing automated registration tools via mobile applications used pre-visit (nearly 25% of intake volume), mobile applications used at the point of care (about 15% of volume), and arrival kiosks and tablets (about 60% of volume)—all of which reduce the burden on office staff, improve patient throughput, and increase patient satisfaction with the intake/registration process.

Example of Phreesia's Patient Intake Modalities

Mobile

Allow patients to conveniently check in from their own device, at home or in your office.

PhreesiaPad

Give patients a private, secure office check-in experience with our easy-to-use intake tablets.

Arrivals

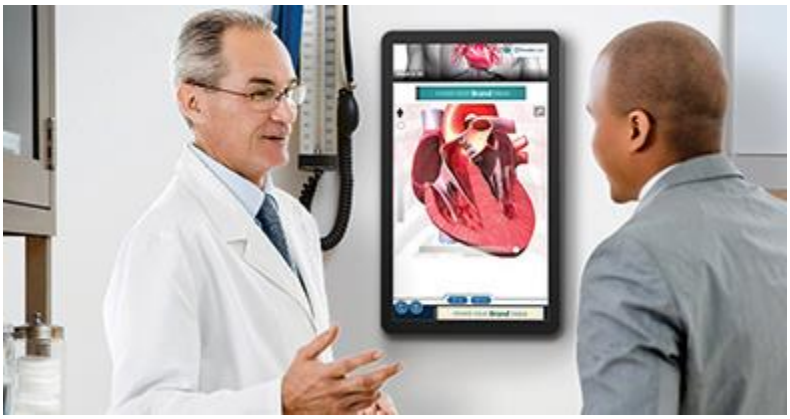
Give your frequently returning or Mobile patients a quick and easy self-service intake option.

Source: Phreesia

The company also works with providers on areas like patient-pay collections (before or at the time of service), clinical support solutions (e.g., customized risk assessments and behavioral screens at, or before, intake—which can be used to improve care [and reimbursements] during a visit), and a wide variety of patient activation activities, future appointments, and data analytics. Of note, the company has completed more than 140 million patient check-ins since its inception, and it currently works with roughly 40,000 healthcare providers across all 50 states.

Similarly, **PatientPoint** is the leading provider of patient education and point-of-care marketing in the healthcare industry, with solutions that help educate patients in waiting rooms, exam rooms (exhibit below), and outside the facility, while also providing healthcare providers with educational materials and novel research (often via digital boards in physician offices); the company's solutions thus help improve not only the level of care delivered to patients, but also adherence to clinical best practices. Of note, the company's digital communication solutions are already installed in more than 65,000 physician offices and more than 1,000 hospitals across the United States.

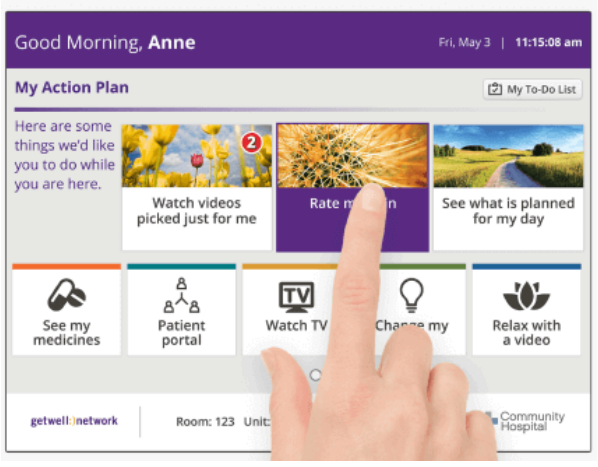
Example of PatientPoint's Interactive Exam Room Display



Source: PatientPoint

Likewise, HCIT provider **GetWellNetwork** currently reports more than 7 million annual patient interactions via the company's precision engagement solutions (such as inpatient entertainment and patient education, which targets both patients and family members—primarily in the acute-care setting; see exhibit below). The company also acquired HealthLoop in November 2018 (and will launch GetWell Loop) to engage patients post-discharge, thus bringing the company's patient education and precision engagement solutions across the entire care continuum.

Example of GetWellNetwork's Inpatient Education and Entertainment Platform



Source: GetWellNetwork

We also see a sizable market for ongoing (versus more transactional) patient engagement and care management solutions—which can help providers work with patients to enact healthier lifestyles and drive behavior change and mitigate risk factors related to other social determinants of health.

These applications can range from remote-patient monitoring to dietary and exercise programs and to broader chronic care management activities. Moreover, we believe these applications are applicable to patients of each age cohort, although we believe a focus on specific segments—such as **Tivity's** (TVTY $40.00; Outperform) flip50 healthy lifestyle application (for

individuals between ages 50 and 65) will prove to be the most relevant models here, as they can directly target the needs and wants of specific age cohort (versus trying to be everything to everyone). We also note that many of these care management applications where traditionally in the domain of payers and employers (as they were at risk for the costs of these individuals); however, we believe they are increasingly shifting into the provider and direct-to-consumer realm today (a direct result of the move toward value-based care and increased patient responsibility for healthcare consumption).

Of note, our analysis has identified a significant number of well-established and emerging patient engagement entities, and we discuss a greater variety of these vendors, their target markets, and key offerings in a later section of this report.

Provider Views on Patient Engagement: Will They Invest in Novel Technologies and What Factors Make This Investment More Pressing Than Ever?

To answer the first question presented above—**we firmly believe that leaders in the healthcare marketplace will heavily invest in patient engagement solutions over the next several years.** For example, a recent EY study (*EY Future of Healthcare Survey 2018*) of 195 healthcare executives found the following:

- 45% of executives expect to invest in technological adoption to improve the patient experience over the next 12 months;
- 38% will make specific investments to improve patient access;
- 47% intend to start initiatives to better capture patient experience metrics going forward; and
- 91% of respondents have undertaken, or plan to undertake, a tech adoption initiative to improve the patient experience in the next 12 months.

Similarly, a recent report by *Modern Healthcare (Patient Engagement: The Priority that Healthcare Executives Can No Longer Ignore)* surveyed 217 healthcare leaders and found that **80% said that patient engagement is a high priority at their organization, with only 20% satisfied with their current programs.** Accordingly, we see a material opportunity for a wide variety of technology vendors to thrive in this novel market.

Regarding specific areas of focus, the same survey indicated that:

- 83% of respondents noted that post-discharge follow-up was a key program in effective patient engagement (and we believe critical to both avoid readmission penalties and improve longer-term outcomes under capitated programs);
- 76% believe appointment scheduling and appointment reminders were important areas of engagement (which can augment sales in a fee-for-service environment and ensure continuity of care, network management, and more preventive health under capitation);
- 74% highlighted patient rounding technologies as a key area for investment (key to improving inpatient satisfaction and patient survey scores [e.g., HCAHPS scores]), which can drive higher reimbursements;
- 65% noted the need for screenings/preventive health outreach programs; and
- 63% noted the importance of patient portals to engage consumers outside the hospital, while 53% noted bedside education and entertainment as keys to engagement when an individual is inside the facility.

So What Factors Make Patient Engagement Investment So Necessary in Today's Healthcare Marketplace?

While each provider likely has a different reason (or specific pain point) that drives its desire to invest in patient engagement technologies, we believe there are four primary reasons it is such a key area of focus for today's healthcare leaders: 1) the need to drive patient loyalty and engagement to maintain/gain market share and referrals; 2) network management (e.g., keeping patients within an integrated delivery network or with high-performing and/or lower-cost physicians—particularly specialists), which is key in a value-based care environment; 3) reimbursement-related factors (readmission penalties, bonus payments based on patient experience scores and preventive health measures, etc.); and 4) emerging RCM needs.

We discuss each of these points in more detail below.

1) Patient loyalty and engagement initiatives can drive market share, retention, and referrals. One obvious reason to invest in the patient experience is to ensure that satisfied customers continue to use a provider's network and refer others into the same system (or medical practice).

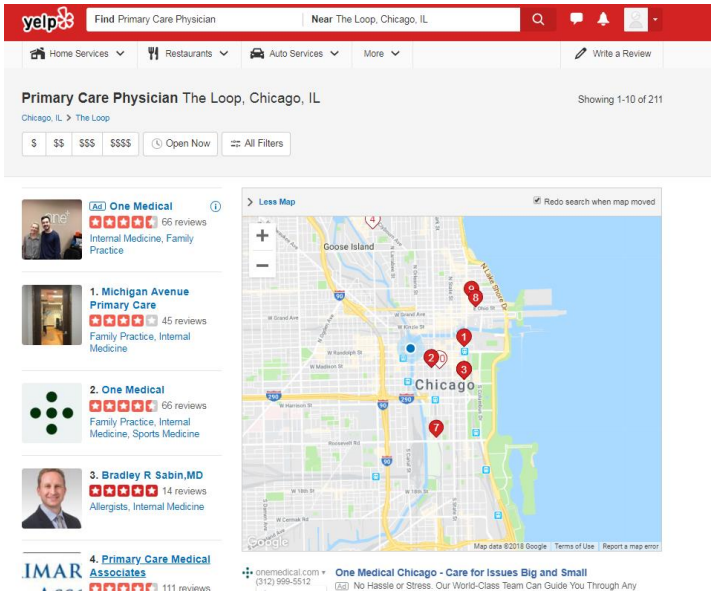
In our view, this is a future-proof reason for investing in patient engagement—as it can drive stronger sales in a fee-for-service market, and also will be a prerequisite for success in a value-based care environment (as discussed below). For example, in a recent consumer survey from the Beryl Institute:

- 91% of consumers stated that patient experience is extremely/very important to them and is a significant factor in their healthcare decisions;
- 69% of consumers reported that a good experience contributed to their healing as well as favorable health outcomes; and
- 72% identify positive recommendations of family and friends as important in their decisions about healthcare.

We also remind readers of the earlier data point that **more than three-quarters of the 83 million millennials look at online reviews** before selecting a physician. Thus, this enormous market segment (again, half of whom do not even have a PCP) is likely to rely heavily on online searches before deciding where to go for care.

Moreover, while providers might hope that this data is based on standardized data sets (HCAHP scores, quality data from payers or the Centers for Medicare and Medicaid Services, leading sites such as **Healthgrades** or **Zocdoc**), consumers also have access to such information via solutions as simple as a Yelp search (exhibit below). Accordingly, we believe that the importance of engagement to form a positive patient experience cannot be understated in today's consumer-centric healthcare market.

Example of Yelp Search for Primary Care Physician in Downtown Chicago



Source: www.yelp.com

2) Network management is a key to current/future success in healthcare. Engaging patients more actively has proved to drive loyalty to a given healthcare system/provider group. Continuing with the commentary above, this is not only key for providers to gain/maintain market share, but also to better manage a patient throughout his/her overall care journey. And the latter point has proved critically important for providers that desire to bear more total quality and financial risk for patient

outcomes under value-based care models. More specific, numerous studies indicate that *providers that are able to keep patients within their owned system (or physician groups) are much more likely to succeed in risk-based payment programs than those that do not.*

We believe there are myriad reasons for this, including: 1) better visibility into the patient journey (e.g., data is easier to capture real time within a system versus when a patient uses multiple different providers on multiple IT platforms), which allows for more robust risk-stratification and care management programs; 2) better transfer pricing (i.e., a provider will set lower rates for its owned physician groups than it will pay to unaffiliated providers it needs to contract with); and 3) an ability to drive patients toward more effective points of care (e.g., home or skilled nursing) or to specific providers (e.g., high-value practitioners who have a lower overall cost of care delivery with similar health outcomes).

In addition, stronger engagement can help drive preventive care and overall self-management of conditions (which also helps lower longer-term costs while improving health outcomes and satisfaction).

3) Patient engagement, and the overall patient experience, can affect reimbursements and provider profitability. There are clear financial benefits to stronger engagement and patient experiences beyond increasing referrals and in-network healthcare utilization.

For example, all hospitals are subject to Hospital Consumer Assessment of Healthcare Providers and Systems (or HCAHPS) surveys. And provider reimbursements from Medicare are tied, in part, to the patient satisfaction portion of the survey, which can affect Medicare payments by several hundred basis points. Moreover, as these payments are pure profit, they can have fairly dramatic effects on provider margins.

Similarly, as providers begin to bear more capitated risk, the patient experience can have a material impact on the profitability of a given program. For example, providers that offer Medicare Advantage (MA) plans are assessed on a system that rates plans on a five-star scale.

Of note, the scoring system *relies heavily on items related to the patient experience*, including items such as: 1) adherence to recommended screening tests and vaccinations (and preventive care adherence can be bolstered via stronger patient engagement); 2) management of chronic conditions (again, improved with better patient engagement and condition management); 3) members' overall satisfaction with the plan; 4) member complaints and overall plan performance; and 5) customer service.

Of note, if a provider's plan receives a five-star rating, it has the ability to accept patients beyond the typical open enrollment period, while members in lower-rated plans have the option to exit that plan outside open enrollment. Moreover, providers with higher star ratings can earn tens of millions of dollars of incremental bonus payments from Medicare, and with no associated costs these payments drop directly to a provider's bottom line.

4) Patient engagement has become a key activity in effective revenue cycle management. As discussed earlier in this report, high-deductible health plans have become the norm across many U.S. employers, which place more of the initial financial responsibility for healthcare payments directly into the wallets of consumers.

Accordingly, providers need the capabilities to capture more cash flow up front—either prior to the patient visiting the facility or at the point of service. If not, collecting this cash in arrears, after the patient receives the care and exits the facility, will not only be significantly more difficult and costly but also much less effective. For example, a McKinsey & Company study indicates that ***providers can expect to collect only 50% to 70% of an insured patient's balance after they are treated; however, studies indicate that 90% of patients are willing to pay before seeing their physician and 70% will pay at checkout.***

Patients also will require the ability to pay directly with credit cards (or cards linked to health savings/reimbursement accounts) and will likely demand that providers offer better estimates regarding the potential cost of services (or fixed prices) up front. In addition, providers now need to be able to securely store patient payment data to enable recurring payments over time (e.g., monthly credit card charges until a procedure is paid off or to cover monthly membership fees to advanced practice models, which requires adherence to payment card industry [PCI] compliant billing).

We believe providers also must invest in online bill payment capabilities, patient access/intake technologies, and patient portals (which can serve as front-end patient access and collection vehicles as well). Not only will this provide an opportunity to dramatically improve cash flows (reducing collection times by two to three months, on average), but it also will reduce the

costs and efforts associated with patient collections (e.g., reducing the need to mail patients invoices and deal with the cost associated with ongoing collection activities). Moreover, a more fluid and understandable billing process can dramatically reduce consumer confusion while also improving overall patient satisfaction with their healthcare provider.

In addition to more advanced patient-pay technologies, providers also need to invest in patient-access tools (pre-registration and preauthorization solutions, preventive screens, etc.). More specific, we estimate that only about half of all physician practices use patient-access solutions (while 75% or more of hospitals use them); however, these solutions can dramatically improve a provider's cash flows and working capital management. Accordingly, we believe the majority of physician practices and hospitals not currently employing patient-access technologies likely will add them over the next few years (with the majority of facilities likely to add bolt-on solutions and the majority of practices likely to buy from their incumbent technology vendor or one of their technology partners, in our view).

Of note, several recent studies also indicate that the most frequently used and most important solutions were the same: eligibility and benefits verification, patient registration/intake, payment processing, treatment authorization, and address and identify verification. As a result, we expect these to be major areas of investment over the coming years.

Patient Engagement Is Critical Across the Care Continuum (and Beyond)

In regard to the specific areas of investment for patient engagement, we believe they span the entire continuum of care and also directly into a consumer's daily life. That stated, we believe engagement solutions generally can be broken into two broad categories: **transaction-oriented** and **ongoing**.

In regard to the former, this typically involves discrete consumer activities that are directly related to an individual's need to receive some form of care (a telehealth consultation, an office visit, specialist referrals, a surgical procedure, follow-up visits, etc.). As it relates to this area of engagement, the solution set is fairly broad, and includes areas such as booking appointments, patient registration and check-in, patient education at the point of care, digital couponing for drugs, patient payments, patient surveys (either satisfaction or health risk assessments), and a variety of other RCM activities, among other areas.

Again, we believe providers can turn to the retail market for myriad examples of how to better manage the customer journey, and we believe the Starbucks "Customer Journey Map" presents an interesting example of how to manage an individual's overall healthcare experience.

More specific, the organization, roughly a decade ago, developed a customer experience map that looks at the customer journey in five areas and across myriad potential touchpoints: 1) anticipate (in the office or car), 2) enter (walking into a location), 3) engage (line, wait time, ordering, paying, siting, drinking, working at the location), 4) exit (packing up and walking out), and 5) reflect (post-experience reflection in the car or other venue). And, under each category, the company established a baseline experience as well as what it believes would elevate the experience to an "enriched level" versus a "poached experience." It was then able to leverage this experience map to develop operating standards that help drive an enriched experience for its consumers (and staff).

Here, we believe healthcare executives should consider a very similar customer experience map, as it relates to how to engage patients prior to heading to a venue of care (e.g., easy online appointments, visit reminders, text messages, education materials, health questionnaires, pre-pay technologies), at the point of care and during care delivery (simplified check-in, estimated wait times, onsite entertainment and healthcare education, digital couponing for pharma), and exit/ongoing (post-visit emails, easy payment options, online records and test results, easy scheduling of follow-up visits or referrals to specialty cares/procedures, longer-term preventive care reminders and care practices).

In regard to the latter, this could involve ongoing brand management activities, customer relationship management (CRM) tools, patient engagement and education materials, self-management of conditions, and a variety of activities related to social determinants of health (nutrition, housing, transportation, etc.) and ongoing care management. We believe advanced analytics to risk stratify patients and identify the most cost-effective engagement technologies also are a prerequisite to success here.

For example, depending on the individual, these solutions could be provided directly by care management teams (for the highest risk patients or older individuals unlikely to leverage digital solutions) or via applications or direct messaging solutions (such as SMS texts, provider-branded apps, or emails to those customers more responsive to digital technologies).

We review a number of such solutions, and the leading technology vendors that provide them, in the section below.

Our Take on Winners and Losers

Regarding ultimate winners in the space, we believe there will be many, given both the massive challenges ahead and the significant greenfield opportunity for those able to successfully address these issues.

For example, **Evolent Health** (EVH $26.15; Outperform) stands to benefit from this trend, as the organization works with healthcare providers to stand up and operate value-based care delivery models. The organization has myriad risk stratification and patient engagement tools (including tools used both by care managers and individuals) to help manage the ongoing care delivery lifecycle. Similarly, vendors like **HMS Holdings** (HMSY $35.31; Outperform) via its Essette care management technology and Elli population risk intelligence tools**, ZeOmega, Novu, Wellframe, Lightbeam Health Solutions, Change Healthcare, Premier** (PINC $39.39; Outperform)**, Welltok, Sharecare, Enli,** and **HealthCatalyst** should benefit from similar trends—either via their robust population health management tools or analytics and risk stratification technologies. Moreover, leading providers like **PatientPing** and **Collective Medical Technologies** also should thrive in this environment, as providers seek solutions to better manage patient care coordination around clinical events (another prerequisite to success in a value-based care environment, in our view).

Teladoc also should be a direct beneficiary of the need for greater patient engagement, via the provision of cost-effective and convenient care delivery (virtual consultations), second-opinion services, and ongoing care management (e.g., the novel virtual first strategy to manage the entire care continuum for patients). The company also works directly with health systems to power their emerging telehealth strategies. Other leading vendors in this space include **American Well, MDLive,** and **Doctor on Demand.** And we view **InTouch Health** as a unique player in this space, given the organization's leadership position in providing healthcare operators with a virtual care platform (its InTouch Operation System) that can help manage virtual care offerings across the entire care continuum.

Given the rise in high-deductible health plans, we also believe engaging consumers in price discovery will become a more important aspect in the healthcare purchasing process going forward. Of note, CMS recently launched a tool providing consumers access to an online site that compares prices and out-of-pocket costs for surgical procedures (the Procedure Price Lookup tool; https://www.medicare.gov/procedure-price-lookup/), which it hopes will drive seniors to lower care-delivery sites. And we believe providers that offer similar transparency and engagement tools to consumers, insurers, and employers--such as **Castlight Health** (CSLT; $2.60; Outperform), **Vitals**, and **HealthCare Bluebook**—will experience strong growth going forward. A key differentiator for these vendors is moving beyond pure price transparency to framing cost options within an individual's benefits environment (i.e., eligibility, impact on deductible, or other cost sharing), steering or highlighting higher value options (e.g., including telehealth in—or at the top of—search results), and possibly recommending a "next best action" throughout an individual's care journey.

There also are a number of patient engagement, activation, education, and care access vendors that stand to thrive in this marketplace, several of which (**Phreesia, PatientPoint, GetWellNetwork**) we already highlighted.

We also believe vendors like **HealthGrades, Zocdoc, doctor.com, NexHealth, Vitals, BetterDoctor, Trilliant Health, DocPlanner, par8o, SCI Solutions, PatientPop,** and **Phynd** (which also offers provider enrollment and network management solutions) will experience material growth by helping providers better manage their web presence, online search and scheduling, patient analytics, and/or customer acquisition, referral management, and retention strategies.

Overall, we believe these vendors stand to experience some of the most robust growth over the coming years, as their solutions are perfectly positioned to benefit from the macro trends discussed in this report, yet their installed base of customers is still small relative to the total addressable market.

Similarly, leading customer relationship management vendors stand to benefit from these mega trends. For example, **eVariant** offers a healthcare-centric CRM solution that enables healthcare providers to better manage the entire patient experience across the continuum of care (with solutions ranging from initial customer segmentation and marketing and acquisition to long-term retention and consumer engagement). And industry leaders like **Salesforce** (CRM $139.72; Outperform) (via its Salesforce Health Cloud) now integrate with a variety of leading EHR vendors to perform consumer analytics, patient communications, and a variety of care management solutions. Other leading vendors in this space include **Solutionreach**, **Tea Leaves Health**, **Influx MD, ReferralMD,** and **Influence Health**.

More broadly, we also believe there is a growing opportunity for **leading EHR vendors** to partner with patient engagement vendors to improve their value proposition to clients. For example, these solutions can be integrated (or even white labeled)

into the patient portals offered by EHR vendors (and widely adopted by providers) more easily than before, thanks to momentum for interoperability standards such as FHIR. Increasing functionality and use of such applications (particularly mobile-focused apps) also can lead to shifting workloads from providers to patients (in a Starbucks-like manner, which ultimately improves the consumer experience by eliminating the dreaded clipboard and wait times) and provide reimbursement efficiencies (e.g., eligibility and patient-pay collection).

In addition to improving consumer experiences and creating RCM efficiencies, this also should help EHR vendors convert more of their customer base to sticky and recurring managed service offerings over time (including RCM). Again, we view Phreesia as a strong example of an organization set to thrive in this market.

We also view a number of vendors in the pharmacy management space as well positioned to thrive in this market. For example, **OptimizeRX** (OPRX $16.24) is a leading provider of digital, point-of-care communication solutions that helps improve affordability and adherence for the life sciences space via its messaging and digital couponing solutions. Similarly, **GoodRx** allows consumers to compare prescription drug prices and find coupons at more than 60,000 pharmacies across the United States, while providers like **CoverMyMeds, DrFirst, and SureScripts** can help streamline the prior authorization process and make the consumer experience more fluid and faster with e-prescribing solutions.

And **Tabula Rasa Healthcare** (TRHC $74.98; Outperform) is working with providers to help drive adherence and reduce dangerous adverse drug interactions, while empowering consumers to manage their care via tools such as its novel My MedWise Advisor (where patients can update their data and receive immediate risk scoring via the company's proprietary medication risk matrix).

Similarly, we believe that organizations like **Transaction Data Systems** (a medication management therapy and prescription processing provider), **PipelineRx** (which provides telepharmacy solutions and cloud-based clinical medication management), **TrialCard, ConnectiveRx, Eversana, and CareMetx** (all of which off essential outreach, patient education, payment assistance, and analytics to pharmacy consumers and manufacturers), and **Omnisys** (which offers patient communications, medical billing, patient engagement solutions, and immunization services) are set to experience material organic growth over the coming years. And entities like **IntegriChain** (which offers patient access analytics which drive increased patient access to therapies) are likely to see increased demand from pharmaceutical manufacturers for their services--especially as consumers continue to bear more responsibility for the cost of care.

Press Ganey Associates also stands to benefit from this trend as the industry's leading provider of CAHPs surveys, patient experience solutions, workforce engagement technologies, and consulting services. Of note, Press Ganey has one of the largest client bases we have seen in the healthcare industry—covering nearly two-thirds of all acute-care hospitals, nearly three-fourths of all large medical practices, and more than 80% of all teaching hospitals in the United States. This affords the company a comparative database that is unmatched in the industry—an asset that our channel conversations reveal as a critical, and sustainable, competitive advantage for the organization.

There also are myriad patient and clinical communication vendors that stand to thrive in the new consumer-centric healthcare market, including **Luma Health, Everbridge** (EVBG $53.38; Outperform), **Halo Communications (formerly known as Doc Halo), Mobile Heartbeat, PatientSafe Solutions, PerfectServe, QliqSOFT, Spok, Voalte,** and **Vocera** (VCRA $40.14; Outperform). As an example, Luma Health has been able to leverage its text-based patient engagement solutions to reduce patient no-shows at certain locations by as much as 50%, while increasing the number of referred patients by nearly 25%. And Vocera not only provider workflow solutions for providers (for which the company is best known) but also offers novel patient rounding and engagement solutions (Vocera Care Rounds) and a variety of discharge management and communication technologies for patients and their families (its Vocera Good to Go suite of solutions).

Lastly, we believe a wide variety of healthcare services providers that target specific populations and drive stronger customer engagement and care management activities will win this in this market. We already highlighted these vendors (e.g., **Oak Street Health, One Medical, LandMark Health, Iora Health, InnovAge, Privia Health, MDVIP**) in our third quarter 2018 Mosaic Report (*Death of the Independent PCP; Hospitals, Advanced Practices, and Managed Care Orgs Increasing Control of the Provider Market*) so we refer investors to this note for more details.

In regard to losers in this market, we believe the ***largest potential risk exists at incumbent vendors (especially acute-care operators) that do not embrace the need for stronger customer engagement solutions, digital marketing, and movement to value-based care and population health management***.

Over time, these providers may not only experience a negative patient and procedure mix shift (toward more lower-margin patients and elderly patients/procedures covered by public insurance programs) but could also lose market share—especially of the most profitable commercially insured patients—to more innovative vendors (i.e., lower-priced care delivery venues such as urgent care or retail clinics, telehealth providers, and advanced practice models).

Accordingly, we believe it is imperative for these providers to invest in the solutions discussed above, although we expect some laggards will hold off on these capital investments and IT solutions, only further exacerbating their longer-term risk profile.

To access prior copies of our Healthcare Mosaic Series, please see https://williamblairlibrary.bluematrix.com/client/library.jsp or contact the author of this report at rdaniels@williamblair.com.

IMPORTANT DISCLOSURES

This report is available in electronic form to registered users via R*Docs™ at https://williamblairlibrary.bluematrix.com or www.williamblair.com.

Please contact us at +1 800 621 0687 or consult williamblair.com/Research-and-Insights/Equity-Research/Coverage.aspx for all disclosures.

Ryan Daniels and Jeffrey Garro attests that 1) all of the views expressed in this research report accurately reflect his/her personal views about any and all of the securities and companies covered by this report, and 2) no part of his/her compensation was, is, or will be related, directly or indirectly, to the specific recommendations or views expressed by him/her in this report. We seek to update our research as appropriate. Other than certain periodical industry reports, the majority of reports are published at irregular intervals as deemed appropriate by the research analyst.

DOW JONES: 25338.80
S&P 500: 2737.76
NASDAQ: 7273.08

Additional information is available upon request.

Current Rating Distribution (as of November 30, 2018):

Coverage Universe	Percent	Inv. Banking Relationships *	Percent
Outperform (Buy)	67	Outperform (Buy)	21
Market Perform (Hold)	32	Market Perform (Hold)	8
Underperform (Sell)	1	Underperform (Sell)	0

*Percentage of companies in each rating category that are investment banking clients, defined as companies for which William Blair has received compensation for investment banking services within the past 12 months.

The compensation of the research analyst is based on a variety of factors, including performance of his or her stock recommendations; contributions to all of the firm's departments, including asset management, corporate finance, institutional sales, and retail brokerage; firm profitability; and competitive factors.

OTHER IMPORTANT DISCLOSURES

Stock ratings and valuation methodologies: William Blair & Company, L.L.C. uses a three-point system to rate stocks. Individual ratings reflect the expected performance of the stock relative to the broader market (generally the S&P 500, unless otherwise indicated) over the next 12 months. The assessment of expected performance is a function of near-, intermediate-, and long-term company fundamentals, industry outlook, confidence in earnings estimates, valuation (and our valuation methodology), and other factors. Outperform (O) - stock expected to outperform the broader market over the next 12 months; Market Perform (M) - stock expected to perform approximately in line with the broader market over the next 12 months; Underperform (U) - stock expected to underperform the broader market over the next 12 months; not rated (NR) - the stock is not currently rated. The valuation methodologies include (but are not limited to) price-to-earnings multiple (P/E), relative P/E (compared with the relevant market), P/E-to-growth-rate (PEG) ratio, market capitalization/revenue multiple, enterprise value/EBITDA ratio, discounted cash flow, and others. Stock ratings and valuation methodologies should not be used or relied upon as investment advice. Past performance is not necessarily a guide to future performance.

The ratings and valuation methodologies reflect the opinion of the individual analyst and are subject to change at any time.

Our salespeople, traders, and other professionals may provide oral or written market commentary, short-term trade ideas, or trading strategies-to our clients, prospective clients, and our trading desks-that are contrary to opinions expressed in this research report. Certain outstanding research reports may contain discussions or investment opinions relating to securities, financial instruments and/or issuers that are no longer current. Always refer to the most recent report on a company or issuer. Our asset management and trading desks may make investment decisions that are inconsistent with recommendations or views expressed in this report. We will from time to time have long or short positions in, act as principal in, and buy or sell the securities referred to in this report. Our research is disseminated primarily electronically, and in some instances in printed form. Research is simultaneously available to all clients. This research report is for our clients only. No part of this material may be copied or duplicated in any form by any means or redistributed without the prior written consent of William Blair & Company, L.L.C.

This is not in any sense an offer or solicitation for the purchase or sale of a security or financial instrument. The factual statements herein have been take from sources we believe to be reliable, but such statements are made without any representation as to accuracy or completeness or otherwise, except with respect to any disclosures relative to William Blair or its research analysts. Opinions expressed are our own unless otherwise stated and are subject to change without notice. Prices shown are approximate.