



Digital health and disruption in diabetes

**Identifying opportunities for
life sciences manufacturers**

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Executive summary

Digital Health is a term that has been used in so many different contexts, the definition has become blurry. We have come to define it as the combination of healthcare, life sciences and technology capabilities to fill unmet needs in the patient journey.

Looking at the issue a little more closely, the digital health landscape already consists of a set of players with varying capabilities who address some, but not all, aspects of patient wellness and healthcare. As the web of digital health participants evolves and becomes more complex, the race will be on to devise new ways to achieve better patient outcomes, reduce healthcare spend and improve customer experiences. Life sciences companies are well-positioned to identify those digital health opportunities that most closely align with not only patients' needs, but their own long-term growth objectives. (For KPMG's Digital Health Ecosystem Framework, please refer to the chart on page 15.)

Although we will explore how digital health solutions can impact other disease states in upcoming publications, our first case is diabetes for a number of reasons:

- **Both Type One and Type Two Diabetes are chronic conditions.** As such, there are many unmet patient needs throughout the lifecycle from awareness and diagnosis to acute care and long-term lifestyle and health management.
- **Diabetes affects a large population,** so there are significant opportunities to improve patient outcomes and quality of life.
- **Despite many established drugs, devices and technologies,** diabetes remains a condition where patients are still searching for differentiated solutions.

This paper and those that follow are intended to serve as guides for life sciences organizations seeking to determine where the opportunities and threats lie as digital health becomes more mature and ubiquitous. As reflected in KPMG's 2018 CEO Outlook Survey, the idea of *disrupting the disruptors* has taken hold in all industries, with more than half of CEOs actively disrupting the sectors in which they operate, rather than waiting to be disrupted by competitors.¹ It is critical that life sciences companies seize opportunities to build, buy or partner to create digital health solutions that span the patient journey, before they are overtaken by technology leaders seeking to do the same.

Where are we today?

Managing diabetes is a day-to-day endeavor. It differs from other chronic illnesses that may only rise to a patient's consciousness during a flare-up or set-back. From keeping blood sugars in range; to ensuring that wearable and injection devices are working properly; to anticipating the impact of illness, exercise, and stress on glycemic control, managing diabetes requires constant vigilance.

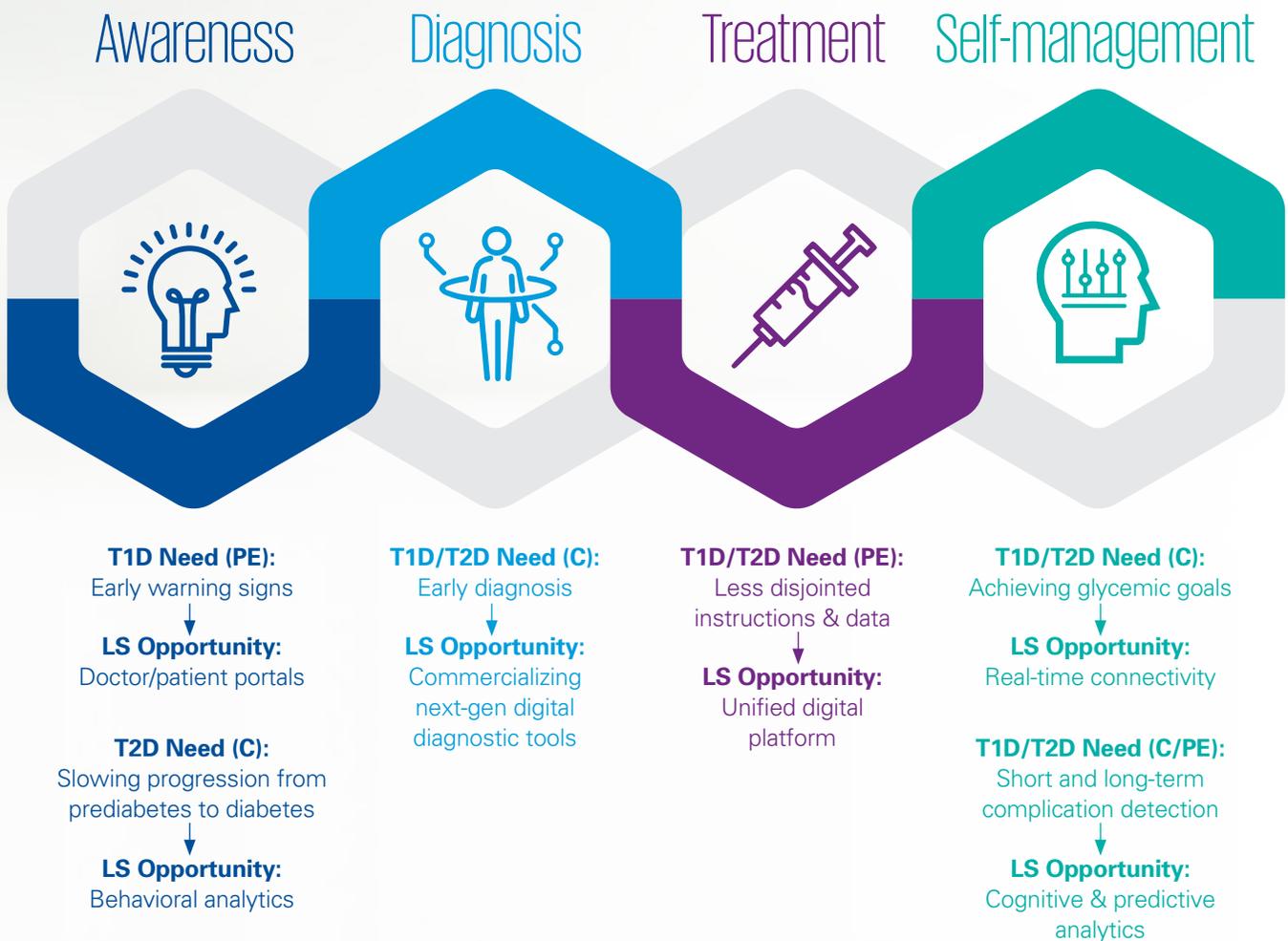
This is true for both the typically pediatric Type One Diabetes (T1D) population, and the mostly adult Type Two Diabetes (T2D) population. In fact, despite a crowded therapy market with multiple mechanisms of action, only 45 percent of T2D patients and 25 percent of T1D patients are able to achieve their target glycemic goals, according to the CDC.²

The diabetes patient journey

There are four major steps in the typical patient journey for any disease state. Although the diabetes patient has many needs throughout the life cycle of the illness, the unmet needs highlighted in the chart are ripe for digital health solutions. These needs can be classified as “clinical,” “patient experience” or both.

Although there are many available medical devices that make diabetes less burdensome, many believe digital health solutions could be the missing key to better diabetes control and a reduction in the \$245 billion diabetes patients bear in direct and indirect costs each year.³ This view is supported by the American Diabetes Association (ADA), which describes digital health in diabetes as “connected devices gathering data... software and apps making those data useful, and... new care models that use technology to improve the outcomes.”⁴

The diagram below summarizes the touchpoints across the T1D and T2D patient journeys where there are unmet needs, and offers high-level guidance on untapped opportunities life sciences organizations should pursue as digital health gains currency. These opportunities are explored in greater detail in the paper that follows.



Clinical = C | Patient Experience = PE

Awareness Patient Journey Stage One



Diabetes Type	T1D	T2D
Unmet Patient Need	Early warning signs	Slowing progression from prediabetes to diabetes
Digital Health Opportunity	Doctor/patient portals	Behavioral analytics

Diabetes Awareness Remains a Challenge.

T1D Most people don't know that T1D is a dramatically different illness than T2D, i.e., an autoimmune disease that is not diet- or weight-related and associated with some very specific early warning signs. In many cases, lack of awareness can lead to diagnosis after the disease has already progressed, with potentially life-threatening consequences ranging from loss of consciousness and seizures to ketoacidosis, coma or death.

T2D While most people know that T2D is commonly associated with excess weight and high carbohydrate diets, those with the propensity for the disease – due to heredity and/or lifestyle risks – are not well-versed in how to detect prediabetes or prevent it from escalating to full diabetes.



T1D Unmet need: Recognizing early warning signs

While there are numerous fundraising events sponsored by the Juvenile Diabetes Research Foundation (JDRF) and some attempt at education through Diabetes Awareness Month, there is no systematic approach to using digital tools to raise community awareness about T1D. And this lack of a grassroots effort even extends to pediatricians' offices. As a result, a significant number of new pediatric patients come into endocrinologists with long-standing T1D symptoms that were not recognized. The outcomes for these patients are not always positive. More than a third of T1D patients are first identified in the emergency room.⁵ And, although only a small percentage of new T1Ds present with diabetic ketoacidosis (DKA), with those that do, the risk of morbidity is quite high.



T1D Digital health opportunities: Doctor/patient portals

Clearly, there is a need for greater T1D education and, to date, it has been unclear which sector should take the lead. In our view, there are opportunities for insulin and device manufacturers to partner with pediatricians on T1D-focused digital education tools that could be offered on doctor/patient portals and sent to parents via smart devices.

According to Dr. Jonathan Williams, Program Co-Director at Harvard Medical School and a practicing endocrinologist, "Digital health mechanisms could be used to grab societal attention via use cases that illustrate the impact of type one diabetes not only on patients and their parents, but also on pediatricians who miss the signs."



THE NEXT STEPS

If payers continue to move toward value-based contracts with life sciences companies, efforts such as this could be used to quantify improved population-based outcomes, e.g., a reduction in ER-based T1D diagnoses.

84.1 million U.S. adults over the age of 18 have prediabetes and could benefit from early intervention according to a CDC estimate

CDC Diabetes Report Card 2017. Atlanta, GA: Centers for Disease Control and Prevention, US Dept of Health and Human Services; 2018.

T2D Unmet need: Preventing progression from prediabetes to diabetes

Only a fraction of people with diabetes participate in prevention programs, due to lack of time, resources and psychological commitment. This gap spurred the CDC to create the National Diabetes Prevention Program (DPP) through which certified organizations offer online digital therapeutics programs that replicate real-world patient experiences, e.g., a small-group approach tailored to the individual; evidence-based curricula; live health coaches; real-time weight loss tracking; support at moments of indecision or crisis; and behavioral methods of driving engagement.⁶

To date, some of the more successful DPPs include *Blue Mesa Health* (prediabetes management), *Care Matters Prevent* (online community support), *Good Measures* (nutritional guidance), *Noom* (motivational weight loss), *Livongo* (real-time data pattern analysis), and, of particular note, *The Omada Program* (behavior modification for weight loss), the largest DPP provider to receive full recognition from the CDC.⁷



THE NEXT STEPS

Pharmaceutical and medical device manufacturers should explore the value proposition of creating their own diabetes prevention programs and adding them to their *beyond-the-pill* offerings. Such efforts will not only help ensure that life sciences manufacturers maintain economic viability if the entire ecosystem moves to a value-based reimbursement model, but also strengthen direct patient relationships and trust in their brands.

T2D Digital health opportunities: Behavioral analytics

Although there are a few standouts among the programs on the market, the size of the diabetes population warrants more digital solutions that incorporate evidence-based behavioral analytics and behavior modification tools. Life sciences companies have the opportunity to take online DPP programs to the next level given their access to large patient, claims and adherence datasets, as well as the economic wherewithal to add advanced patient experiences via interactive features and virtual reality.

Some might question whether physicians would prefer to develop DPPs for their patients themselves. Maybe not. Given restraints on physicians' and nurses' time, having life sciences organizations take the lead on such programs would be welcomed by most provider organizations, according to a prominent endocrinologist at Dartmouth Medical School, who regularly treats both T1D and T2D patients. "It just isn't practical for doctors and nurses to coach patients on a daily or even a weekly basis. If pharmaceutical and device manufacturers offered such programs, my advice would be to target unproductive behaviors for modification, offer customized dietary guidelines based on culture and preference, and acknowledge individual learning styles."

In this effort, there is great potential in partnerships between life sciences organizations and technology companies. Since just giving someone a pill won't change behavior, cross-sector collaboration on bundled offerings has the potential to increase adherence and outcomes. The hope is that this will lead to greater willingness among payers to reimburse for these solutions.



Diabetes Type	T1D / T2D
Unmet Patient Need	Earlier diagnosis
Digital Health Opportunity	Commercialization of next-gen digital diagnostic tools

T1D T2D The moment a patient is diagnosed with diabetes can be overwhelming. After absorbing the emotional impact of a major diagnosis, patients must learn how to test glucose levels, prevent/treat hypoglycemia, and, in many cases, administer insulin. Adding an emergency diagnosis to the mix, which happens in approximately 30 percent of T1D cases,⁸ takes the stress of this life-changing event to a whole new level. With T2D, it is critical to acknowledge that warning signs and early symptoms can vary widely by individual. According to Dr. Williams of Harvard: “There are more than 80 different mechanisms by which the disease develops, and the medical community only knows about a fraction of them. This requires a flexible approach to diagnosis and treatment that must evolve as a patient shows a propensity for certain risk factors.”



Unmet need: Earlier screening

In development now, there are a number of potentially revolutionary apps and devices for detecting diabetes markers earlier on. Although only those with a family history receive regular screening for T1D, there may soon be some devices available for more widespread, accessible screening. For example, a microchip diagnostics tool from Stanford University-affiliated *IGI Stat* will be used to detect diabetes auto-antibodies in only a few drops of blood. And, the University of Oxford is developing a hand-held device that detects the presence of acetone in breath – a marker for T1D. For prediabetes and T2D, the *Scout DS Device* from Veralight is now being used to test individuals non-invasively in Canadian retail pharmacies, a model that could be replicated in the U.S.⁹



Digital health opportunities: Commercializing next-gen digital diagnostic tools

Although there is a great deal of research occurring at universities and start-ups, support from the life sciences and healthcare ecosystem will be essential to bringing advanced detection technologies to the mainstream marketplace. Life sciences companies could use predictive analytics capabilities to stratify potential geographic and demographic risk pools (such as T2D in the southeastern U.S.¹⁰ or T1D in northern climates) and target them for screening and preventive treatment.

Once diagnosis has occurred, it is important to reach out to potential diabetes patients with a recommended call to action. Early intervention can begin after a primary care physician warns of elevated blood sugars, following biometric screening at work, or when a blood glucose or A1C reading is out of the normal range.



THE NEXT STEPS

Life sciences organizations should look for opportunities to partner with diagnostics companies to develop companion diagnostics to their drugs and devices. In these partnerships, molecular biology findings and clinical study costs can be shared, the diagnostic product can be tweaked to reflect learnings from clinical studies, health economics and pricing can be analyzed in one true *cost to system* picture, and, most important, regulatory approval agencies can look at diagnostic and drug data and provide combined approval. In co-development scenarios, it is critical to be clear on expectations for performance on both sides, determine how performance will be measured, and specify what happens if performance criteria are not met. When diagnostics have already been developed, drug companies can add value by helping target patient populations for screening and generating interest in the products. Finally, life sciences organizations should ensure that their payer negotiations advance the idea that using next-gen digital diagnostic tools to more systematically identify biomarkers will ultimately give patients and their providers more control over diagnosis events.

Treatment Patient Journey Stage Three



Diabetes Type	T1D / T2D
Unmet Patient Need	Less disjointed instructions & data
Digital Health Opportunity	Unified digital platform

T1D T2D For both T1D and T2D, follow-up visits after diagnosis can be grueling: T1D appointments are usually several hours long, during which patients are assessed for their ability to carb count, calculate insulin doses and adjust for unusual circumstances. Patients also undergo exhaustive analyses of their A1Cs and data from wearables, as well as adjustment of carbohydrate ratios and insulin dosages. While T2D appointments may be shorter, patients still have to absorb quite a bit of information on nutrition, exercise, lifestyle considerations, and comorbidities.

Unmet need: Less disjointed instructions & data

Since many day-to-day diabetes decisions will be made by patients alone, providers send patients off with multiple charts, graphs and instructions for self-management, as well as videos, websites and printed instructions to elucidate the functionality of devices like continuous glucose monitors (CGMs) and insulin pumps. Then there are apps patients may want to use to calculate carbs, track glucose numbers, and communicate with physicians. Finally, there is the issue of tracking variable dosing, i.e., when remaining pancreatic function allows patients to start off at a lower insulin dose than they will eventually use.

According to David Walton, former commercial lead at several major life sciences companies and founder/CEO of the digital health company Chronicare, “Adherence is problematic for both type one and type two diabetes. This a widespread issue, whether patients have good intentions, forget to take medication, or intentionally skip doses due to fear of hypoglycemia or weight gain.”

The challenge of managing an array of devices, guidance and data is a major hurdle in diabetes that has been recognized by the ADA. Many people with diabetes say they would find it less burdensome to adhere to prescribed guidelines if all of this information could be channeled into one centralized repository.



Digital health opportunities: Unified digital platform

There are a number of digital platform solutions in development to help manage diabetes data. The problem is that few have been recognized as medical interventions, i.e., bundled health offerings eligible for reimbursement.¹¹ Life sciences companies should consider developing digital health tools that work in tandem with drugs and devices to help patients meet A1C improvement targets promised in clinical trials. Meeting these goals could result in reimbursement to the manufacturer at the full contracted rate, while less-than-promised results would require returning a portion of the payment to the payer. Solutions could include applications that walk patients through the dosing process, as well as adjunctive devices that capture the time and amount of an insulin dose, e.g., Chronicare’s *SmartCap* attachment, Companion Medical’s bluetooth-enabled *InPen*, and the *NovoPen Echo*.

“Right now, most adherence studies are reactive, looking at whether or not patients have filled their prescriptions,” says Walton. “However, this approach doesn’t address whether patients are actually taking their medications and administering them correctly.” Life sciences companies could apply analytics to this data by, for example, stratifying adherence results based on day of the week, geographic location, age of patient, specific insulin or medication, type of provider managing the patient’s care, etc.



THE NEXT STEPS

Taking the reins on creating a unified digital platform is critical for life sciences companies, lest technology companies beat them to the punch. This is a real risk as, despite lack of direct healthcare experience, some high-profile technology companies have already expressed interest in using their powerful analytics platforms to aggregate and analyze patient data on an unprecedented scale. Life sciences organizations should push back with their own strengths – namely, their expertise in adhering to patient privacy regulations while still pursuing the connectivity that is so critical to improved outcomes via solutions like block chain and other distributed ledger technologies.

Self-management Patient Journey Stage Four



Diabetes Type	T1D / T2D	
Unmet Patient Need	Achieving glycemc goals	Short- and long-term complication detection
Digital Health Opportunity	Real-time connectivity	Cognitive & predictive analytics

T1D T2D Depending on the age of diagnosis, managing diabetes can be a lifelong effort. Given the breadth of self-management tasks, it is easy for frustration and fatigue to set in. In our view, there are two major sub-categories of self-management: a) achieving glycemc goals and b) managing short- and long-term complications.

Unmet need: Achieving glycemc goals

T1D With T1D, many agree that the most important tool for keeping blood glucose in check is the CGM. There is already an evolution occurring to make glucose monitoring less invasive, i.e., progressing from finger prick to semi-invasive to implantable and, ultimately, to non-invasive tools. Some examples of next-generation glucose monitoring products in development are:

- Microneedle patch sensors that detect glucose in interstitial fluid
- Earlobe glucometers paired with transmitters, e.g., *Glucotrack*
- Laser-based fingertip scanners
- Ingestible *smart pills*, including those containing insulin that adapts to sugars in the bloodstream
- Contact lens-based monitors

Although non-invasive monitors will improve patients' quality of life, getting value from device data requires complex glucose log-sharing tools, or even filling out extensive paper logs. Perhaps due to the heavy burden of manual data entry required by current tools, only half of T1D patients and caregivers and a third of T2D patients regularly download their CGM data for analysis,¹² according to recent studies.

T2D With T2D, achieving glycemc goals is more about diet, particularly since payers are not yet reimbursing T2Ds for CGMs, except in cases of severe hypoglycemia requiring hospitalization. When it comes to diet, however, there is still widespread resistance to change, particularly if patients believe that taking insulin and/or oral medication alone is sufficient to lower their blood sugars. For these patients, it is critical to provide customized behavior modification programs that, in the words of Dr. Williams from Harvard, "fit an individual's capacity and desire to do something about their disease."



Digital health opportunities: Real-time connectivity

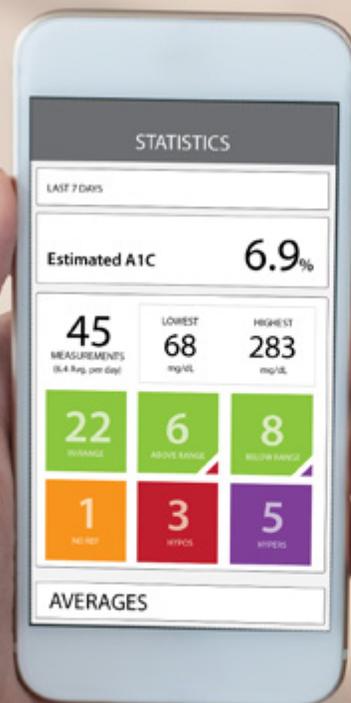
Of course, device manufacturers are already at the center of next-generation glucose monitoring. However, as advanced devices come to fruition, they should partner with technology companies on developing connected tools for analyzing glucose levels, insulin dosages and food choices and making real-time adjustments, with or without the guidance of a physician.

And, as life sciences is one of the better prepared industries when it comes to the eventuality of a cyber-attack, according to KPMG's 2018 CEO survey, they are in a stronger position to invest in robust cybersecurity and encryption methodologies than start-ups might be.¹³

As life sciences companies consider creating data-sharing tools, the following are some important concepts to bear in mind:

- Data-sharing apps should allow real-time synchronization with patients' CGMs so that providers can receive instant alerts and updates on patients requiring medical intervention.
- Developers should also consider the possibility of integrating data-sharing tools with electronic health records (EHRs), as this would better equip providers to take clinical action on the findings.

- Longer-term plans should include incorporating self-learning algorithms that would, for example, reflect patient habits and preferences in recommended self-management techniques and activities.
- Offerings should be consumer-grade, e.g., incorporating gamification and social media features for younger patients and ease-of-use for older people with diabetes.



THE NEXT STEPS

In the short term, life sciences organizations should continue to push the agenda of reimbursement for CGMs for type two diabetes. In the longer term, they must conduct the extensive analysis required to determine how value should be apportioned among all components that comprise a care plan, e.g., digital tools such as connectivity apps, plus drugs, devices, and diagnostics. Such analyses will need to include real-world evidence that quantifies whether a solution improves quality of life and lessens the burden of the illness over time, and accommodate for the likelihood that aspects of the care plan may come from different manufacturers.

Self-management Patient Journey Stage Four (Continued)

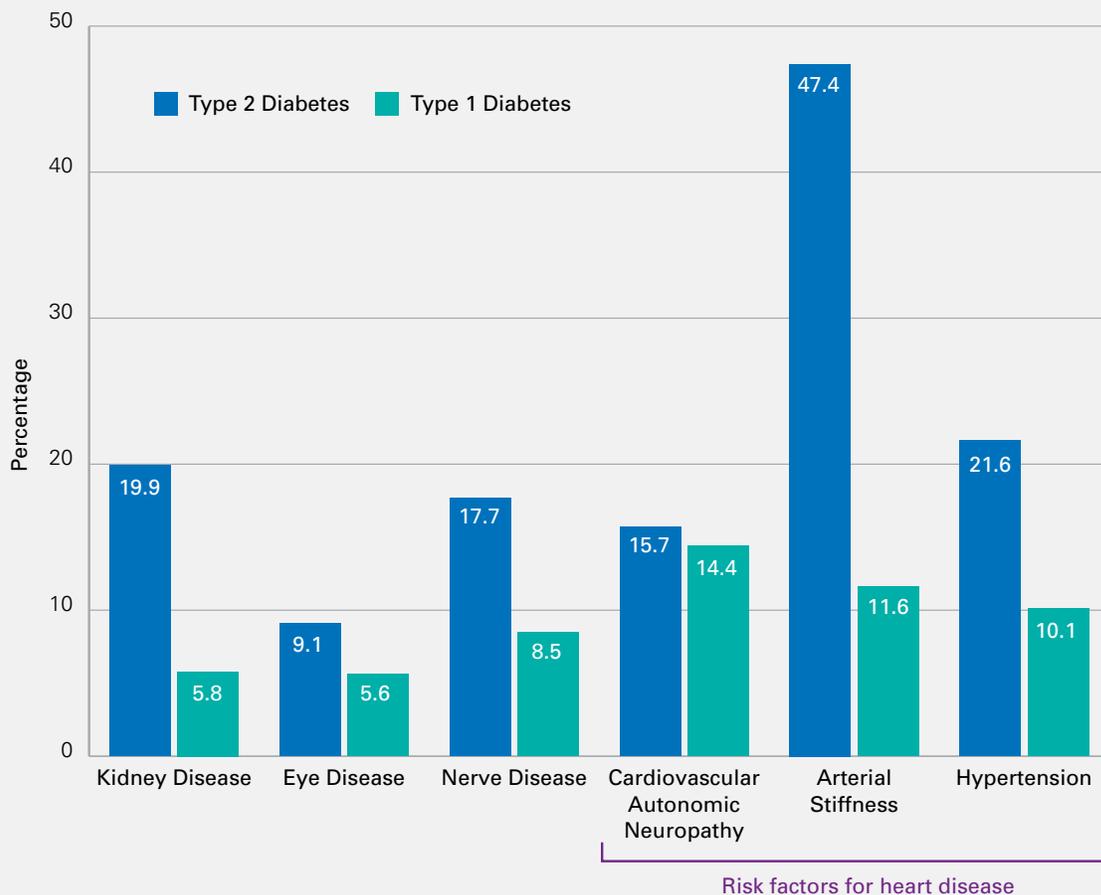


Unmet need: Short- and long-term complication prevention

Although more than 20,000 T1D and more than 200,000 T2D patients are hospitalized annually for hypoglycemia,¹⁴ a pattern that costs more than \$83 billion, most patients have to rely on CGM alerts and their own vigilance to identify symptoms of low-blood sugar. For a longer-term outlook, there are currently limited options for predicting patients' likely disease progression and potential complications, which can exacerbate patients' emotional distress, particularly given the strong correlation between diabetes and depression/anxiety.

As discussed, users can gain insights into current and past glucose trends by aggregating data from wearable devices and data-sharing apps. However, none of these tools can predict what may happen in the near or distant future. That said, some early work being done in the predictive analytics realm includes: (1) the *Sugar.IQ* diabetes assistant, from Medtronic and IBM Watson, which uses supercomputing technology and pattern recognition analytics to predict low blood sugar events up to three hours before they occur; (2) a cognitive analytics tool from IBM Watson and the ADA that promises to advise patients and caregivers on potential long-term prognoses; and (3) more accessible tools that use intelligent automation for long-term complication screening, e.g., recently announced diabetic retinopathy screening tools that use images of patients' retinas stored in the Cloud for comparison.

Percentage of young adults with diabetes developing complications from the disease



Source: "Association of type 1 diabetes vs. type 2 diabetes diagnosed during childhood and adolescence with complications during teenage years and young adulthood," *Journal of the American Medical Association*, Feb. 28, 2017

Credit: NIH/NIDDK



Digital health opportunities: Cognitive and predictive analytics

For short-term complications, life sciences companies should consider working with technology companies to create predictive analytics tools that anticipate short-term problems before they develop. According to Dr. Williams of Harvard, such tools would need to offer device-agnostic connectivity, as well as regulatory safeguards that protect providers from liability if the apps should fail.

Life sciences organizations should also tap their considerable resources to develop cognitive tools for stratifying patients according to genetic, environmental and lifestyle risk factors:

T1D For T1D, factors to analyze could include age of onset, rate of progression, adherence, number of emergency episodes, comorbidity with other autoimmune diseases, etc.

T2D As T2D is “actually a more complex illness than T1D,” according to Dr. Williams, factors to analyze include not only blood sugar readings, but also cardiovascular impairment, lipid levels, inflammation and, of course, family history.

In both cases, it is critical that the authenticity and accuracy of patient data can be verified to earn public trust and secure partnerships with entities from different sectors.

Dr. Williams sums it up well: “Diabetes should take a page from the oncology world. We need corporations to put the time and resources into developing cognitive tools that will yield granular profiles of patients and their disease subtypes.”



THE NEXT STEPS

Right now, life sciences organizations are in a better position than pure technology companies to curate and index scientific data that might come

from clinical trial databases, patent offices, the government, academia and regulatory bodies, and to conduct predictive analyses from the data. Longer term, life sciences organizations that invest in cognitive computing solutions can also use them for breakthrough drug development, clinical trials and personalized medicine.

The Opportunity for Digital Health in Diabetes

30.3 million

Americans, or 9.4% of the population, have diabetes.

1.25 million

American children and adults have T1D.

86 million

 Americans age 18 and older have prediabetes.

7.2 million

people with diabetes are undiagnosed.

1.5 million

 Americans are diagnosed with diabetes every year.

The annual rate of increase is 1.8% for T1D, and 4.8% for T2D

Centers for Disease Control and Prevention. Diabetes Report Card 2017. Atlanta, GA: Centers for Disease Control and Prevention, US Dept of Health and Human Services; 2018.

In summary

Critical pre-launch considerations

Life sciences organizations seeking to launch a digital health solution should ensure they have considered the following:

- **New solutions improve upon existing processes** through personalization, predictive analytics, learning software, etc.
- **The solution forwards the agenda of outcomes-based contracting**, e.g., by tracking and billing patient outcomes vs. per member/per month pricing.
- **Regulations are in place** or pending that will support widespread use of the offering.
- **It is possible to collect real-world evidence and/or conduct randomized controlled trials** to demonstrate that promised outcomes are achievable with actual patients.
- **It is clear where the offering fits** in the healthcare system and clinical workflow vis-a-vis other components of a care plan.

Digital health opportunities for life sciences

Awareness

T1D educational tools offered to families through pediatrician portals and via smart phones.

Online T2D diabetes prevention programs that replicate real-world experiences; leverage behavioral analytics; and reflect patient habits, cultures and lifestyles.

Diagnosis

Non-invasive screening tools brought to the mainstream marketplace and used in conjunction with predictive analytics to stratify geographic and demographic risk pools.

Treatment

Unified digital platforms that accept and store data and guidelines transmitted from multiple sources and devices.

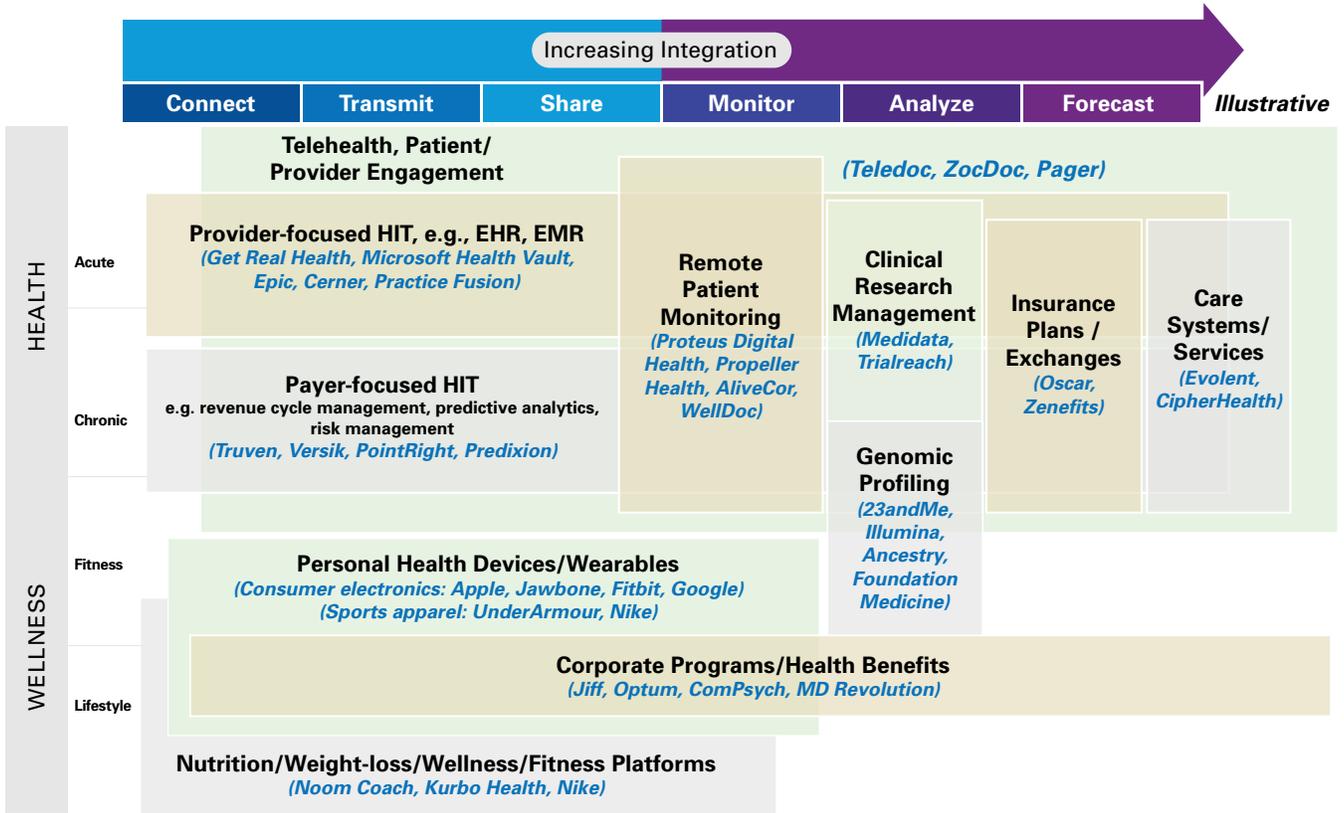
Self-Management

Glucose pattern analysis tools that are device agnostic, require minimal manual input, and carry enough bandwidth to generate statistically significant findings.

Cognitive computing solutions that can anticipate short- and long-term complications before they arise.

Despite some progress toward individualized treatment regimens and a very competitive market with a variety of first-line and adjunctive treatments, no diabetes therapy is disease-modifying at present. Therefore, life sciences companies have a unique opportunity to either take the lead or partner with technology companies and healthcare providers to create digital health solutions that make life easier throughout the complex and often onerous diabetes patient journey.

KPMG Digital Health Ecosystem Framework



How KPMG can help

KPMG's member firms provide strategic counsel to global and US-based life sciences companies.

As life sciences organizations seek to make inroads into digital health amid industrywide disruption, KPMG's professionals help them identify value measures and demonstrate clinical evidence of that value to payers; create a long-term roadmap for realizing return on digital health technology investments as the timeline for business model or systemic change is longer than the norm; ensure portability, security and reliability of patient data and medical records across solutions; work with regulators to safeguard participants from liability; and determine where solutions fit within both the overall healthcare landscape and the individual patient's journey.

About the authors



Mark Ginestro is a principal in KPMG's strategy practice focused on life sciences and healthcare. He has more than 20 years of experience in strategy; business model evaluation

and business transformation; and market research to determine viable product categories, market segments and pricing. He has a deep understanding of all aspects of life sciences, including pharmaceuticals, biotechnology, medical devices, diagnostics, and healthcare distribution. Mark is a graduate of the University of Michigan and the Executive Education program at Harvard Business School.



Angelina Carvajal is a director in KPMG's strategy practice focused on life sciences and healthcare. She has more than 10 years' experience in strategy; business model transformation;

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His areas of expertise are growth and operating strategy – from corporate and business unit strategy through to commercial strategy and organizational effectiveness across pharma,

MedTech and new technology entrants into the sector. Adam has a key focus on digital health and the opportunities it provides industry stakeholders to enhance commercial value and drive improved patient outcomes. Adam holds an MSc in Drug Development and a BSc in Pharmacology from University College London, UK.

Research methodology:

Research methodology comprised extensive qualitative interviews with leading endocrinologists from Dartmouth Medical School and Harvard Medical School and several successful digital health start-ups; *voice of the patient* insight and analysis; and secondary research, including review of published literature and market analysis/reports.

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