US Healthcare Investor Guide

A PULSE CHECK ON THE HEALTHCARE INDUSTRY

Healthcare providers are facing significant pressure from the rise of COVID-19 as the total number of cases in North America surpassed 2.492 million. This demand is creating exceptional pressure on hospitals and care facilities as governments and industry leaders reconsider established norms and operational practices. The response to the pandemic has unveiled opportunities for fundamental shifts across the care continuum as the US CARES Act offers over $100 billion in relief to the American healthcare system. This potential lies in the design and construction of facilities, employee training, sourcing of critical care equipment, management of personal protective equipment (PPE), and the care delivery and reimbursement model.

This report presents an overview and analysis of the structure, past dynamics and current state of the American healthcare industry with a focus on the payer-provider, pharmaceutical and digital health sectors. Through considering the impact of recent trends such as the COVID-19 pandemic, the report will include an outlook for each sector and key growth drivers that healthcare investors should evaluate moving forward.

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Introduction

Industry Overview

The American healthcare industry consists of companies working to treat patients through curative, preventative, rehabilitative and palliative care. The US Healthcare system is a publicly and privately-funded collection of fragmented systems. Approximately 30% of Americans are covered by two publicly-funded insurance programs: Medicare and Medicaid (Fig. 1).

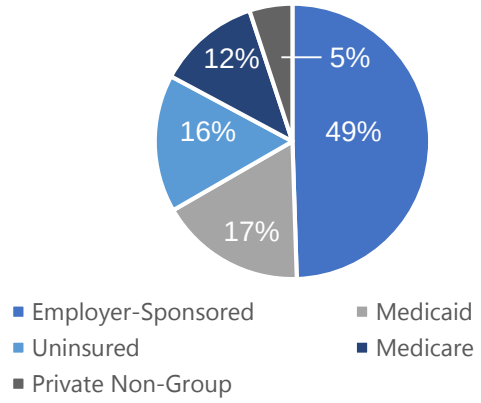
The US has the highest spending on healthcare out of any OECD country reaching $3.6 trillion in 2019, representing 17.7% of national GDP. Due to the size and abstractive nature of the industry, this report will cover the three most relevant subsectors: payer-provider, pharmaceuticals and digital health. The payer-provider sector includes companies that finance or deliver healthcare services, pharmaceuticals consists of companies that develop, produce and sell medications and digital health is comprised of companies that leverage technology to improve care delivery.

As seen below, healthcare valuations declined in early March when pandemic lockdowns began and have since recovered due to revived investor confidence from the US CARES act and a positive long-term outlook (Fig. 2).

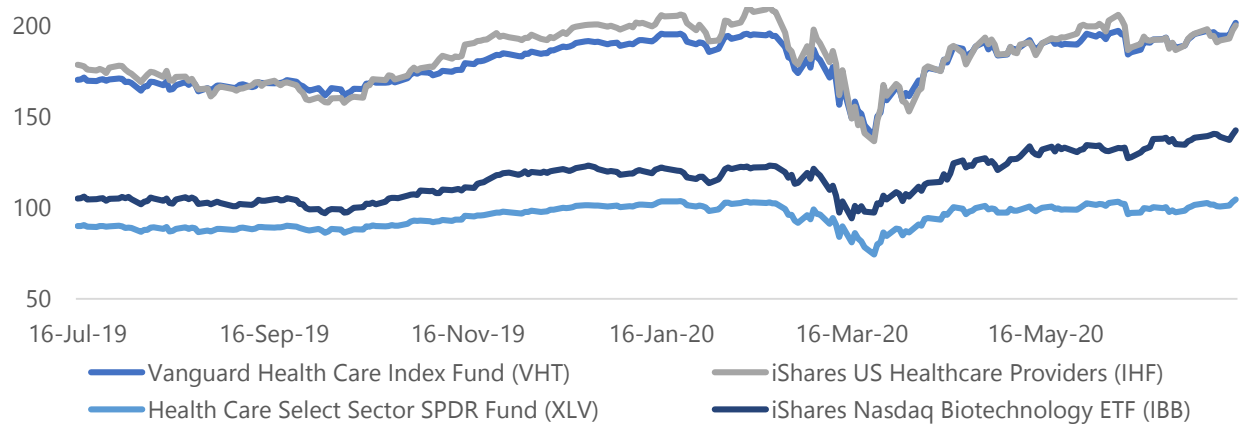
Emerging Trends

The healthcare industry is entering the era of digital innovation as patients and professionals seek on-demand healthcare online. Companies such as Nomad Health are connecting doctors with medical facilities for short-term work, which optimizes the process of matching physicians based on talents, expertise and schedule. The entrance of big data in healthcare provides several benefits such as patient record analysis to flag inconsistencies between a patient's health and drug prescriptions or predictive analysis to allow for more accurate staffing in hospitals and clinics to reduce wait times.

US Healthcare Funding Sources (2019) Fig. 1



Healthcare ETF Performance Fig. 2

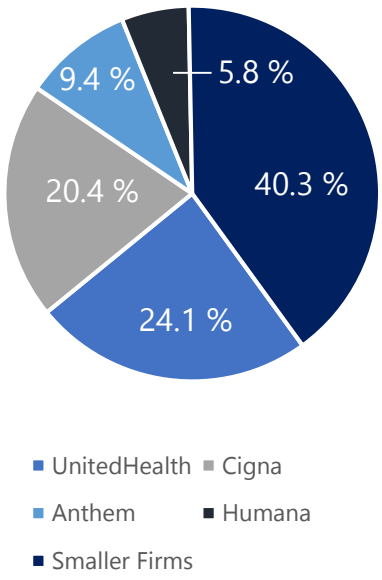


Insurance

Introduction

The payer industry can be divided into three main sectors: private insurance, government-sponsored schemes (ie. Medicare and Medicaid) and self-insurance. The largest of the three sectors is private employer-sponsored healthcare, accounting for the 53.7% of the American population's healthcare coverage. The private sector is dominated by four key players (Fig. 3).

Market Share (Private Insurance) Fig. 3



Types of Insurance Plans

The options for private insurance plans include: Exclusive Provider Organization (EPO), Health Maintenance Organization (HMO), Preferred Provider Organization (PPO), High-Deductible Health Plans (HDHP), Point-of-Service (POS), and Fee-for-Service (FFS) (Fig 4).

HDHPs incentivize young and healthy individuals who do not see the need for health insurance to buy coverage due to the lower premiums. The option for Health Savings Accounts (HSA) help patients afford out-of-pocket medical costs by providing access to a tax-deductible savings account that rolls over contributions and can be used to pay premiums when over the age of 65. As HDHPs place most of the financial burden on patients, the plan increases individuals' awareness of the costs of medical services and decreases overall expenditure. For these reasons, HDHPs are an increasingly popular option for healthcare coverage and are a way to attract the uninsured without incurring too much of the financial risk.

Likewise, the differences between Medicare and Medicaid, often considered to be one homogenous service, are best represented in Figure 5 (next page).

Fig. 4

Type of Plan	Deductible	Require PCP	Out-of-Network Coverage	Other Details
EPO	No	No	Except Emergencies	Managed care
HMO	Low	Yes	Except Emergencies	Insurer employs physicians
PPO	Medium	No	Additional Cost	
HDHP	High	Varies	Varies	Eligible for Heath Savings Account
POS	Medium	Typically	Additional Cost	
FFS	No	No	No	Direct to physician reimbursement

Sources: IBIS World, Investopedia, Medium

Medicare & Medicaid

Fig. 5

	Medicare	Medicaid
Who Qualifies?	(1) 65 and over (2) Disability status	Need-based, by income
Coverage	Part A: hospital care, deductibles, coinsurance Part B: doctors, medical tests, some medical equipment and procedures Part C (Medicare Advantage): administered by private insurance, often includes Parts A, B, and D and items not covered by Medicare (ex. hearing, vision, dental) Part D: prescription drug coverage, administered by private insurance and required unless covered by another source	In-and out-patient hospital services Nursing and in-home care Laboratory x-ray services Medical facility transportation
How is it Funded?	Medicare taxes deducted from income (like social security)	State and federal income taxes

Cost Drivers

(1) The Affordable Care Act (ACA) mandates that insurance companies achieve at least an 80% medical loss ratio (MLR). The MLR is the percentage of premium payments used to pay for patients' claim expenditures. Due to this legislation, gross profits in the health insurance industry are capped at 20% of revenues. As a result, reducing operating expenses is crucial. In fact, this was a key factor contributing to CVS Health's acquisition of Aetna and Cigna's merger with Express Scripts in 2018. Both transactions were meant to reduce costs at scale and maximize profits within the MLR requirements. Despite these attempts, expectations of industry profit margins have decreased to 7.9% of revenues for 2020.

(2) Purchases, better known as healthcare costs, amount to approximately 75.7% of industry revenues. As the number of doctor visits increases, costs per insured increases and profits fall. To decrease the cost of care, insurers can pursue agreements with service providers or adopt new cost saving strategies (i.e. value-based care, pg. 8)

(3) To a lesser extent, costs are also impacted by the fact that most insured do not require extensive care and are less of a burden to the system. Due to the MLR, benefits are negligible.

Political Drivers

Politics plays a substantial role in the health insurance industry. Depending on the composition of the legislature, sentiments towards the industry vary and can have a massive effect on profitability. For instance, Republicans are generally friendlier to health insurance firms than Democrats. A major talking point in the 2020 Democratic Primary was the idea of "Medicare for All", which would transform the American healthcare landscape into a single-payer system and relegate health insurers to specialty coverage. As such, insurers have been increasing their expenditure on lobbying services to prevent this "Medicare for All" legislation from passing but should also look to diversify revenue sources in case sentiments towards this issue change.

Sources: IBIS World, Investopedia

Revenue Drivers

Mandatory insurance
ACA required individuals to have insurance or face a fine. When repealed in 2017, demand for insurance decreased. HDHPs attempt to attract these customers

Medical cost inflation
Cost of medical services increases yearly, but due to price sensitivity, premiums increase at a slower rate, negatively impacting profitability

Aging population
While those 65 and older are eligible for Medicare, they may supplement their coverage with private insurance or subscribe to Medicare Advantage, increasing demand

Employer-sponsored insurance
As unemployment falls, employers' need for insurance rises
US employment is expected to grow 4.5% annually until 2025

Impact of COVID-19

As a result of the COVID-19 pandemic, there have been three main impacts on insurers:

	Care Coverage	Tele-Health	Premium Volumes
Cause	The largest insurers have agreed to cover testing and treatment costs for their patients regardless of their plan type	(1) Individuals are seeing physicians' care through digital platforms (2) Many firms are waiving cost sharing for non-COVID-19 uses	(1) Reduced levels due to increased unemployment and employers' financial distress (2) State legislation allowing delayed premium payments
Impact on Business	Sudden increase in expenses while premiums have not increased, and margins are pushed lower	Opportunity to save on in-person visits, but, due to MLR, benefits are limited Without cost sharing, expenses increase	Increased number of policy cancellations Firms likely have cash flow issues Due to increasing unemployment, recovery may take time

Before the pandemic, consumers were concerned with affording out-of-pocket costs, the rising cost of drugs, and surprise bills. Now, with the mass levels of unemployment, individuals desire stability and "Medicare for All" plans become more appealing. Due to healthcare issues the pandemic has highlighted, it is increasingly important that insurers diversify revenue sources.

Sources: American Journal of Managed Care, IBIS World, Investopedia

Impact of COVID-19

According to the Kaiser Family Foundation, approximately 27 million Americans will lose their healthcare coverage due to COVID-19. While the majority will qualify for Medicaid's need-based coverage, six million will not. As employers are having more difficulty affording healthcare coverage for their employees, there is more pressure for state governments to provide Medicaid coverage. With increasing levels of pressure, state governments are struggling to afford the costs of Medicaid and will likely advocate for federal support on this issue.

The COVID-19 pandemic cemented the importance of healthcare coverage in the 2020 presidential election in November.

As such, it is beneficial for health insurance firms to invest in the product lines that cater to Medicare offerings. For example, Parts C (Medicare Advantage) and D are both provided by private insurers. Parts C and D cover vision, dental and hearing care as well as pharmaceutical coverage. By bolstering their ability to effectively cover the above four areas, firms can increase their likelihood of survival if a single-payer system is implemented.

Additionally, due to the increased number of expenses insurance firms have incurred as a result of the pandemic, it will be increasingly difficult for them to invest in lobbying to combat any policy changes.

Share Price of Top Firms From July 2019-2020 Fig. 6

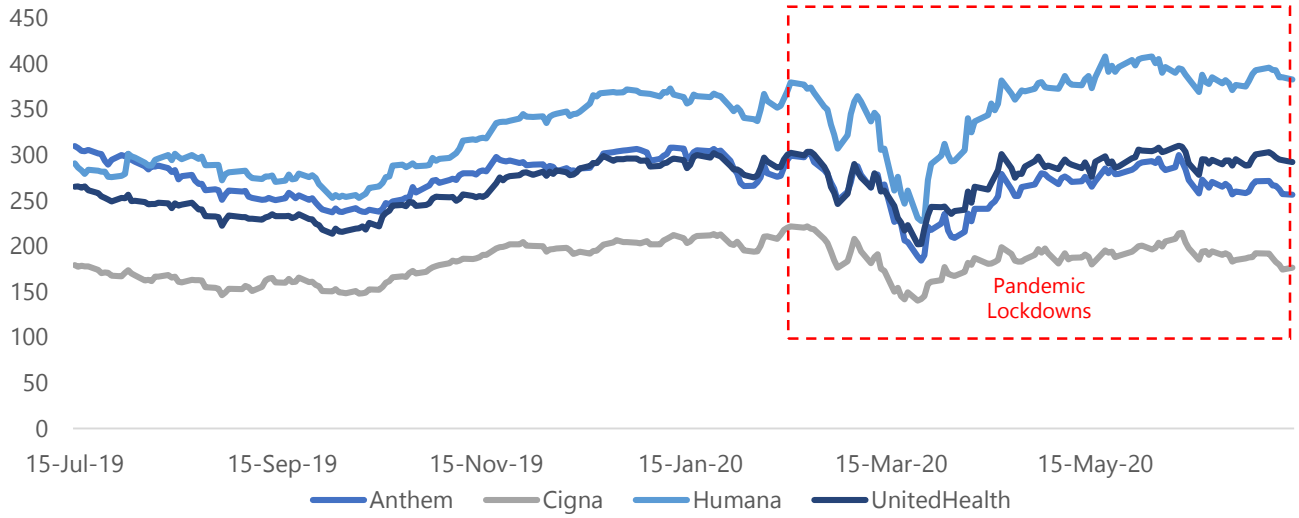


Figure 6 compares the performance of the top four private insurers over the past year. Humana's stock increased in Oct. 2019 due to contracts providing Medicare Advantage (Part C).

At the beginning of the pandemic, investor confidence was low, so firms experienced decreases in stock prices along with the market but recovered in April when confidence rose. Two main factors influenced recovery:

(1) The postponement of elective procedures allowing insurers to delay payment of costly expenditures.

(2) Increased funding for Medicare through the CARES Act, which increased expenditure on Medicare Advantage. As Humana is heavily involved with Medicare Advantage, the firm experienced greater recovery.

Alternatives to Traditional Health Insurance

In addition to competition from government agencies, traditional private insurance is threatened by three popular alternatives:

	Self-Insuring Employees	Primary Care Memberships	Medical Cost Sharing
Definition	Employers bypass insurance industry and underwrite employees' health risks themselves	Individuals pay a flat monthly fee for services provided by medical practice (like gym memberships)	Communities (often religious-based) collectively pay for healthcare through monthly contributions
Coverage	At employers' discretion	Physicians visits Often paired with HDHP for emergency and specialty care	Cost of service (excluding incident fee)

According to the National Business Group on Health, 11% of large US employers adopted trial direct-to-employee agreements with care providers for 2019. While employers have enough employees to benefit from self-insuring, their employees are geographically dispersed while provider systems are geographically concentrated. This leads to difficulties capitalizing on scale, increases complications in execution of employer-sponsored plans, and the cost of managing multiple plans across many networks.

Haven Healthcare

Coalition between Amazon, Berkshire Hathaway, and JP Morgan Chase to self-insure their employees

Plan was heralded as revolutionary but as of March 2020, has yet to disrupt industry due to difficulties with execution

GM & Henry Ford Health Systems

Five-year contract for 24,000 of GM's 180,000 employees in Michigan

Provides direct access to ConnectedCare network of 3,000 primary and specialty care physicians

Cigna specializes in self-funded plans, "issues health cards, handles billing and negotiates rates with doctors and hospitals" but passes on the risk of medical costs to plan sponsors, namely employers. This strategy allows Cigna to benefit from this trend by helping employers execute plans and solve geographically issues.

Value-Based Care

There has been a trend in the industry towards value-based care, in which providers are compensated based on the wellbeing of their patient population rather than the specific services rendered. This system promotes a higher level of health, thus driving down future costs of care to insurers. When designed well, value-based care systems can have a significant impact on EBITDA - improving levels by 20% to 50% - due to higher profit margins. Additionally, primary physicians can use patient journey analytics[1] to refer their patients to specialists, hospitals and post-acute facilities that provide the best cost performance, patient outcomes and service. To aid in this transition, the Medicare Access and CHIP Reauthorization Act (MACRA) was passed in 2015. MACRA provides financial incentives for healthcare providers and supports payers' transition to value-based care.

Sources: Bloomberg, Deloitte, HBR, IBIS World, McKinsey, Milliman, NPR

[1] Process used to better understand the causes of patient's health concerns.

Valuation (as of July 17, 2020)

Market capitalization in billions of USD

Company	Ticker	Price	Market Cap	P/E	P/NAV	P/TBV	P/GWP
Anthem	ANTH	$266.37	$67,719	21.7x	2.1x	26.5x	0.7x
Cigna	CI	$179.81	$67,364	10.5x	1.5x	-1.9x	1.7x
Humana	HUM	$404.49	$53,721	18.2x	4.5x	6.6x	0.9x
UnitedHealth	UNH	$306.53	$295,271	17.1x	4.8x	-21.3x	1.6x
Mean			$121,019	29.3x	3.1x	2.3x	1.2x
Median			$67,542	27.3x	3.1x	2.2x	1.2x
Max			$295,271	41.8x	4.6x	25.6x	1.7x
Min			$53,721	20.9x	1.5x	-20.8x	0.7x

Gross written premiums (GWP) represents income from insurance premiums without factoring in sales commissions and other COGS items. This metric provides an understanding of how price relates to premium revenues per share.

Premiums comprise the majority of revenues (86 to 97 percent), therefore the P/GWP multiple is comparable to the P/Sales multiple and indicates expected growth and risk of the company's top line.

Tangible book value (TBV) provides a better understanding of price to asset value by removing intangible assets and goodwill. The TBV/share represents the floor for the share price as it is the value received in a liquidation scenario. The P/TBV represents the price paid for each dollar of underlying tangible assets, therefore the higher the value, the greater the risk for potential losses in a distressed situation.

UnitedHealth and Cigna have notable negative P/TBV values.

UnitedHealth's value can be attributed to its recent acquisitions at premium rates yielding an intangible and goodwill value of $76B, 40% of total assets. Acquisitions include payment processor Equian, remote patient management firm Vivify Health, disease management company Kaia Health, and three other healthcare firms in 2019. All six of those 2019 acquisitions were for UnitedHealth's subsidiary, Optum. Optum focuses on the provision of healthcare by providing value-based patient care, pharmaceutical services and business solutions for providers. UnitedHealth's acquisitions allow the firm to decrease health expenditures in the long-run by investing in value-based care and other preventative care measures. Additionally, UnitedHealth's investments in companies focused on the provision of healthcare help the firm to diversify its revenue streams and be less reliant on premium revenues.

Cigna's negative P/TBV value can be attributed to the firm's merger with Express Scripts, a firm specializing in providing prescription drugs at the most affordable prices, in 2018. This acquisition allows Cigna the opportunity to better compete with CVS after its acquisition of Aetna and UnitedHealth's Optum. This acquisition is especially advantageous given the changing sentiments towards "Medicare for All" plans. As pharmaceutical coverage is typically covered by private insurance in Medicare plans, Cigna is now better equipped to survive if a single-payer system is adopted.

Sources: Becker's Hospital Review, Cigna, UnitedHealth, Company Fillings (10-K & 10-Q), Yahoo Finance

Big Tech & Pharma

To justify their massive valuations, Big Tech will have to add trillions of dollars to top line revenues in the coming years. Only two sectors are currently large enough to warrant these company's attention: education and healthcare. The entrance of big tech would disrupt both traditional pharmaceutical channels (hospitals and pharmacies) and devastate pharma's recent attempt to increase over-the-counter medication and direct-to-consumer sales. It appears Alphabet is looking to disrupt traditional healthcare, with purchases of biopharma developers Calico and Verily, and partnering with Ascension, the second-largest private provider of healthcare facilities in America.

Amazon, who dominates DTC distribution, has rolled out their own healthcare service in Seattle – diagnosed over the internet, low priced, generic medication shipped directly to the door - exclusively for Amazon employees. The ability of either company to amalgamate data, through search or home devices, and bundle services is a competitive advantage that will vastly enable Tech to provide superior services and prices in the sector.

Big Tech & Insurance

While big tech firms have yet to officially enter the insurance industry, there are two developments with Alphabet and Amazon that have the potential to disrupt the industry.

(1) To assist with a project investigating disease and its causes, Alphabet is building a database of anonymous patient data. While it is not the goal of the project, Alphabet's software has the potential to be the world's largest medical risk calculator. Due to the sheer volume of data, the company will be able to calculate risks more efficiently, be less reliant on buffers to cover unexpected risks, and capable of undercutting traditional health insurance. Figure 7 demonstrates the current process.

(2) In April 2020, Amazon sent its sellers account holders a survey inquiring about the health insurance coverage those companies provide for their employees. The survey asked about satisfaction with current coverage, how much employers are paying and ending by saying "[w]e will keep you informed as we explore how Amazon may be able to support your needs better." While Amazon has yet to enter the insurance market, their acquisition of PillBox in 2018, involvement with Haven Healthcare that same year, and the launch of Amazon Care at the beginning of 2020, it is not unreasonable to assume that Amazon will explore this venture in the future as well.

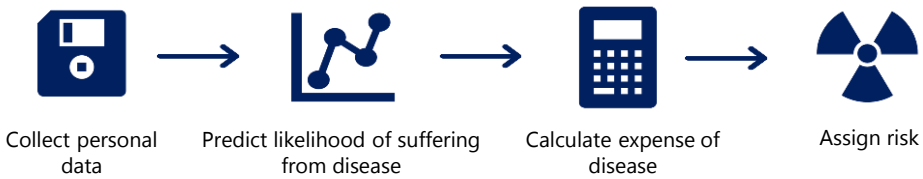


Fig. 7

Sources: Amazon Care, Google Cloud, Medium, Mobile Health News, Vox

Hospitals

Introduction

The US hospital industry can be divided into two categories, for-profit and non-profit.

Together the two are expected to generate 1.2 trillion dollars in 2020. Given the size, it is understandable that the industry is highly fragmented with no one player holding more than five percent of the market and the top five firms occupying an accumulated 9.6%. Regionally though, some hospital conglomerates occupy much more of the industry. For example, in Florida and Texas, the Hospital Corporation of America holds 20 to 40% market share.

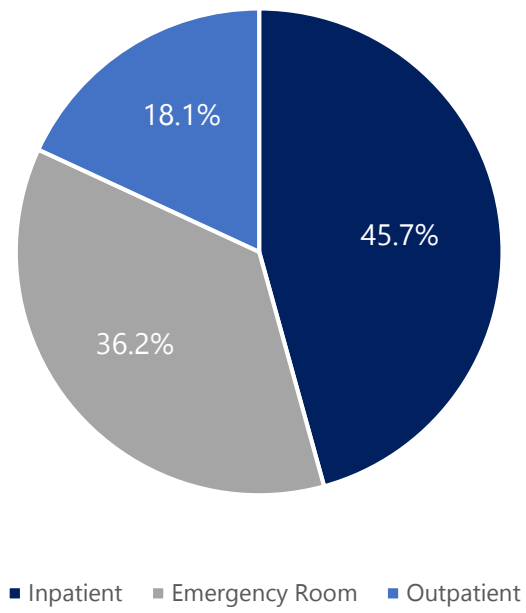
Minor Cost Drivers
(1) Purchases (medical equipment and devices, pharmaceutical supplies), 10.4% of revenue
(2) Rent, 0.8% of revenue
(3) Utilities, 0.6% of revenue

Major Cost Drivers

Wages	(1) By 2023, there will be a shortage of 21,000 to 55,000 primary care physicians (2) Mandatory nurse to patient ratios in some states will either raise costs or decrease the number of patients accepted
Bad debt	Can reach 10% of revenues Legislation in ACA protects individuals who get sick from losing their insurance coverage, decreasing the number of people who are unable to pay their bills, decreasing bad debt Increased use of cost sharing and number of uninsured have made it difficult to reduce bad debt

Share of Hospital Revenue

Fig. 8



Revenue Drivers

Hospital revenue is split into three distinct categories: inpatient, outpatient and emergency room (ER) care (Fig. 8).

While inpatient care is the most profitable, emergency rooms pose revenue challenges primarily due to legislation prohibiting ER units from refusing treatment based on citizenship, legal status, or ability to pay. In fact, an estimated 55% of those seeking emergency care are unable to pay for the services, severely limiting hospital revenues. To increase their revenue potential and decrease the number of unprofitable visits, many hospitals have been adopting the free-standing clinic and specialty hospital model without emergency rooms and to avoid abiding by this law.

Another factor contributing to industry demand, and revenues by consequence, is

Sources: HBR, IBIS World, Medium

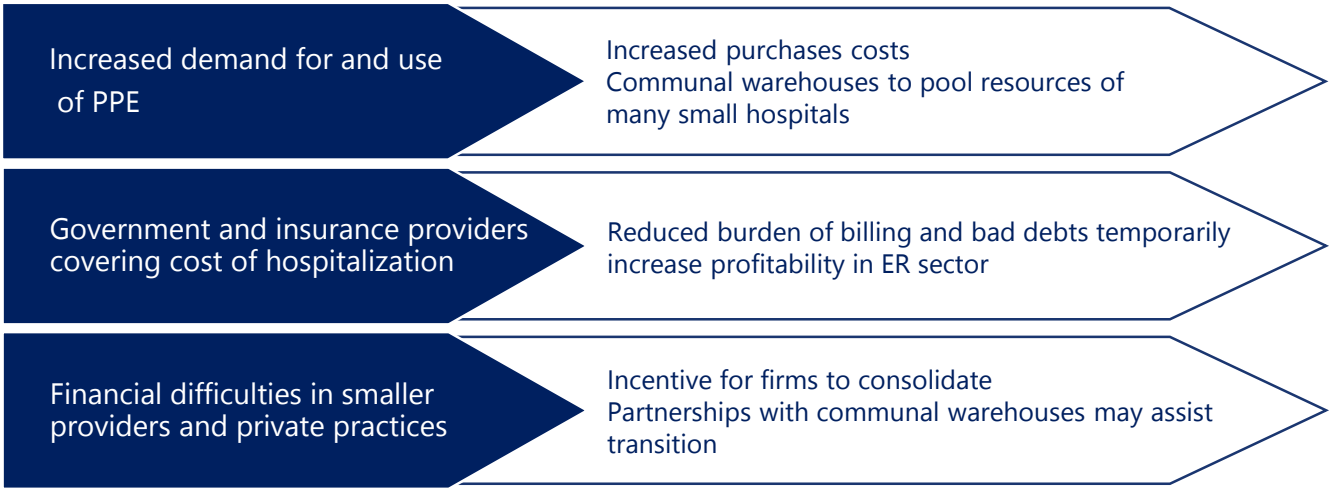
Revenue Drivers

healthcare funding and coverage. With higher levels of government healthcare funding, there are higher levels of reimbursement and fewer out-of-pocket expenses. When it is less costly for individuals to visit the hospital, revenues increase. A similar rule can be applied with private insurance coverage. Individuals with private coverage are more likely to use the services more often and pay more for procedures, increasing revenues by volume and price. In 2020, the number of individuals with private insurance is expected to decrease due to the removal of ACA's non-enrollment fee.

The final two factors impacting industry revenue are the aging population and increased competition. People over the age of 65 spend three to five times as much on healthcare as any other demographic. As the size of that demographic rises in the next few years, so will revenues in the hospital industry. As previously mentioned, the hospital industry is highly fragmented, but the level of competition is only increasing due to the rise of physician-run outpatient surgery centers, specialty hospitals and diagnostic centers. All three of these healthcare competitors provide a sector of hospital services but can do so on a smaller scale with less complex infrastructure and higher margins.

Impact of COVID-19

The most lasting impact of COVID-19 comes from decreased demand for non-emergent care. Due to the risks associated with visiting hospitals while individuals are being treated for infectious diseases, non-emergent care has decreased and elective care facilities outside of hospitals have emerged. In the long-term, hospitals will experience less traffic for fear of infection, and revenues will decrease in the out-patient sector. Hospitals that find was to separate infectious disease treatment from other services will be successful at conquering this obstacle.
COVID-19 also impacts hospitals through:



In the next five years, funding for Medicare is expected to increase at an annualized rate of 4.4%, thus increasing the number of individuals with insurance, but due to generally low government reimbursement rates, that profit growth will be limited. An increase in the use of electronic health records is expected to increase the risk of hacking and thus expenditures on cybersecurity. Due to limitations to their access to debt, non-profit hospitals are likely to be purchased by for-profit institutions. Lastly, advances in medical technology are likely to reduce demand for hospital care as payers explore less expensive options.

Sources: IBIS World, Investopedia, Marcum LLP, McKinsey

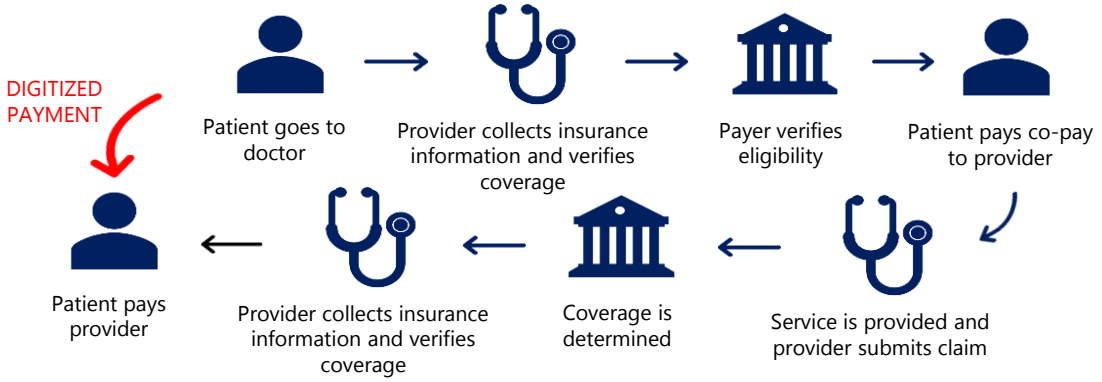
Impact of Technology

There are two main technological advances that will have a large impact on the future profitability of the hospital industry: digitized payments and predictive care analysis.

(1) The hospital industry currently follows the process outlined in Figure 9. As a result, revenue has been negatively impacted in two ways: through the cost of administrative tasks (three steps for providers) and undermining patient loyalty with surprise payments (patients billed twice). With digitized payments, hospitals can use an online portal with automated claims processing and SMS billing reminders to rectify those issues. Providing options to pre-pay for services online or using digital wallets (such as ApplePay and Google Pay) can also increase customer satisfaction.

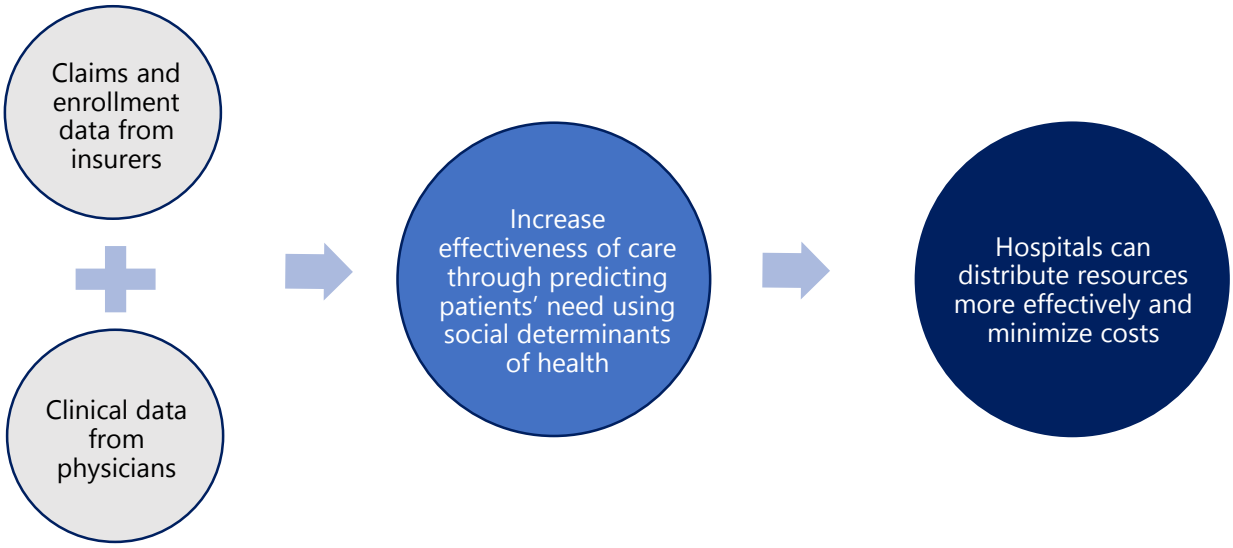
(2) Labour shortages require physicians and nurses to be more efficient and hospitals to find ways to optimize resource expenditure. Prescriptive analytics allows providers to compare multiple "what-if" scenarios to determine the optimal course of action. The technique aids hospitals maintain adequate staffing levels, capacity requirements, manage inventory, and schedule home health services (Fig. 10). These benefits help hospitals mitigate unnecessary costs.

Fig. 9



Benefits of Prescriptive Analytics

Fig. 10



Sources: Business Insider, Deloitte, IBM Big Data

Nursing Homes

Introduction

The nursing home industry is expected to generate $73.4 billion in revenues in 2020. Similar to the hospital industry, the nursing home industry is highly fragmented with the top four firms occupying 10.8% of the market and its largest player, Brookdale Living holding 6% market share.

Cost Drivers

The largest cost driver for nursing homes is labour costs and they are expected to comprise 40.9% of 2020 revenues. Due to a shortage in professionals trained in geriatrics, this number may increase in the future. A $338 million investment from 2011 to 2017 towards nursing development programs in the Affordable Care Act has helped mitigate increases in wages over the past five years. Regardless, wages are expected to climb over the next five years. Adding to their labour problems, the number of unionized nursing home workers is expected to increase from its current level of approximately 14%. In the next five years, nursing home wages are expected to increase by 30% annually.

To reduce labour costs and protect themselves against labour shortages, nursing homes are investing in digital healthcare (Fig. 11), which can decrease the amount of time nurses and physicians spend with each patient.

In addition to labour shortages, industry costs are driven by residents' age and the high level of fixed costs. As residents age, they require more assistance and become more expensive for nursing homes to care for. To reduce the burden of high fixed costs for food and advertisement, brand recognition and scale are helpful. As such, consolidation has increased over the past five years and the trend is expected to continue.

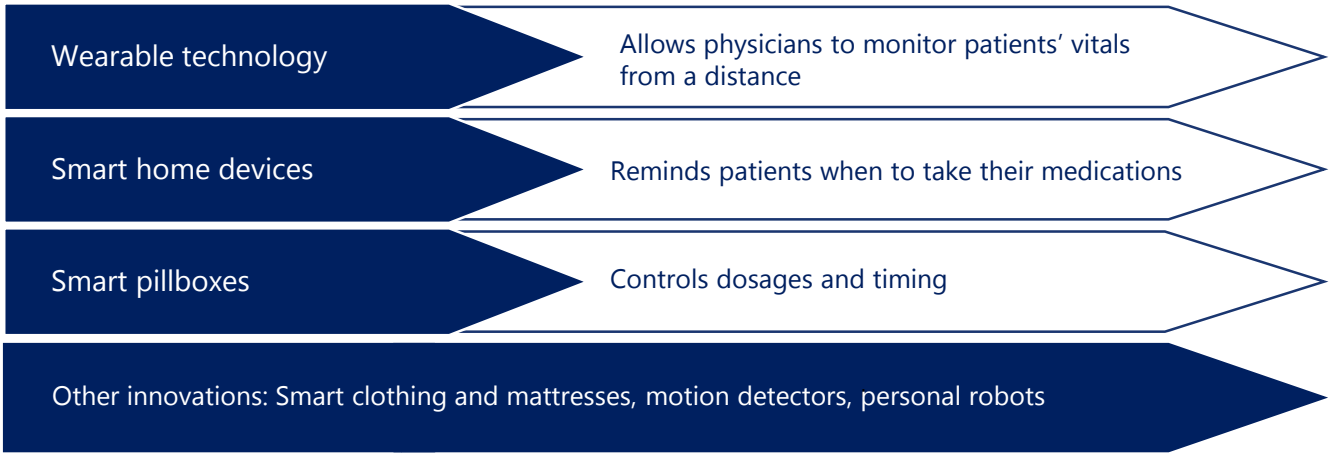


Fig. 11

Revenue Drivers

Nursing homes generate revenue from their residents in two streams: entry and monthly fees. On average, entry fees can range from $100,000 to $1 million depending on the type of home residents choose and monthly fees can range from $3,000 to $5,000 depending on the level of attention a resident requires. To pay for these expenses, individuals can use their retirement savings, long-term care insurance, or Medicaid. As all nursing home residents are eligible for Medicare coverage, only those qualifying

Sources: Business Insider, IBIS, Investopedia

Revenue Drivers

for Medicaid can receive government assistance while a lower percentage is covered through long-term care insurance. As such, most residents pay out-of-pocket until they are eligible for Medicaid coverage.

As the burden for financing nursing home care is widely felt by residents and their families, the housing market, disposable income and the availability of insurance have a large impact on driving revenue in the industry (Fig. 12).

Additionally, most states require seniors whose care needs pass a certain threshold to move into nursing homes, further driving revenue for firms. Lastly and most importantly, the rising elderly population will have a large impact on industry revenues in the future. The rising elderly population is expected to grow revenues to $225 billion by 2024. By 2060, individuals aged 65 and older will account for almost 24% of the population compared to 16% in 2018. As the number of individuals in need of care rises, so does the number of people able to afford and are mandated by the government to seek care.

Over the past five years, many nursing homes have experienced operating losses in the short-term due to economic conditions and high levels of consolidation within the industry. As consolidation decreased the supply of nursing homes, occupancy rates have increased, and the industry was able to benefit overall in the long-term. Typically, profit margins lie between 2 to 10%.

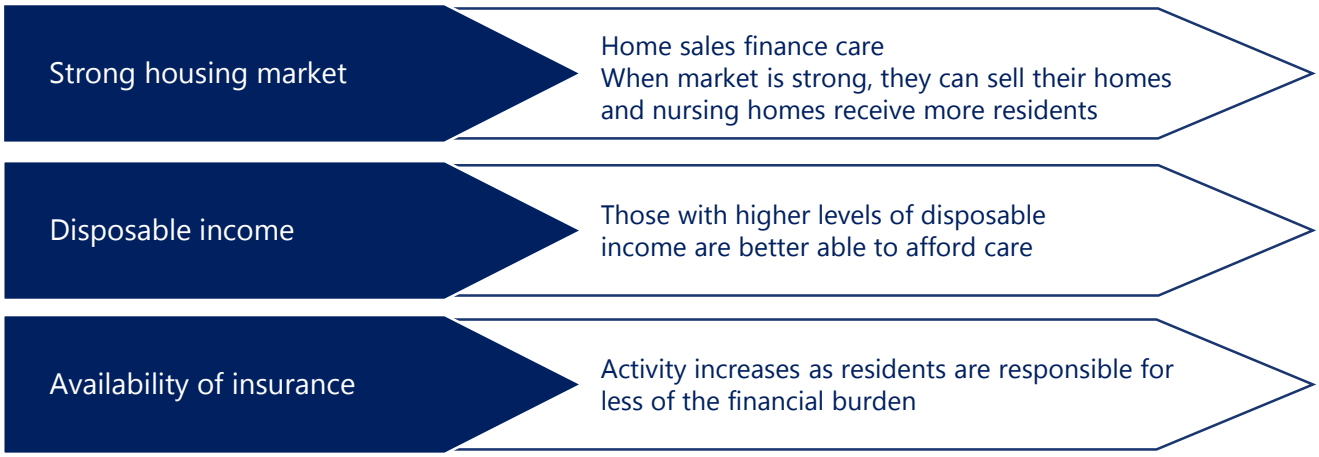


Fig. 12

Impact of COVID-19

As of July 10, 35,517 nursing home residents have died of COVID-19. That is approximately one-fourth of the total US COVID-19 deaths (over 136,000). Reports have shown that the past two years, 40% of nursing homes inspected had issues with infection control and prevention. If they were addressed, it is likely that the number of COVID-19 deaths in the industry could have been highly mitigated. After the crisis ends, there is likely to be an increase in regulatory oversight for the industry to review nursing homes' actions before and during the pandemic. Additionally, homes must deal with lower occupancy rates in 2020 as individuals are hesitant to move into residence after their poor response to the virus.

In the future, there are two major threats to the nursing home industry: (1) decreasing levels of retirement, and (2) the perception that long-term care facilities are the last resort. To change perceptions, firms must invest in advertising. As these efforts would benefit the whole industry, there is no incentive for individual firms to bear the cost burden.

Sources: Globe & Mail, Investopedia, IBIS World, PRB

Pharmacies & Drug Stores

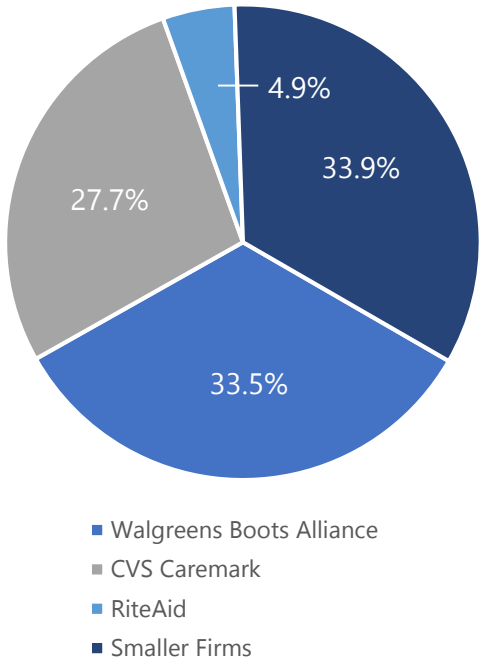
Introduction

According to the National Association of Chain Drug Stores, nearly all Americans live within five miles of a pharmacy. As such, it is difficult to find unexplored markets and drive revenues forward in the industry without expanding into new revenue streams. In 2019, the pharmacy industry generated $311.9 billion in revenues. The industry's three biggest firms dominate the industry with 66.1% of revenues, leaving smaller retailers to hold an accumulated 33.9% (Fig. 13).

Pharmaceutical companies produce highly priced, patent protected drugs. Most manufacturers sell to pharmacies, resulting in little price control for consumers. As physicians may not profit from drug sales, and insurance companies only dictate a percentage of the price they are willing to pay, pharmaceutical companies dictate margins, often resulting in government intervention.

Market Share (Pharmacies & Drug Stores)

Fig. 13



Cost Drivers

Purchases	Generic drugs offer highest margins Consolidation in the generic drug industry has decreased competition, increased prices and lowered margins
Bargaining power	As large players in the industry continue to acquire small and independent chains, their bargaining power increase and purchase costs can decrease
Rent	Sales are driven by convenience, but plazas and shopping centers with the best anchors are expensive Must find ways to optimize customer visits and increase revenue per visit
Technology	Electronic data interchange software assists with inventory management Automatic medication dispensing decreases costs and improves reliability and with increased competition, service is important

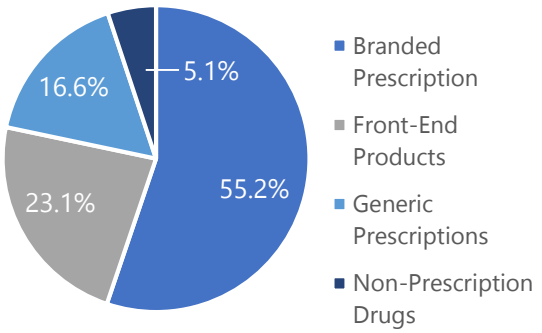
Sources: IBIS World, McKinsey

Revenue Drivers

Revenues are divided into three main categories: prescription and non-prescription medications and front-end products (Fig. 14).

Share of Pharmacy Revenues

Fig. 14



Prescription Medication	(1) Elderly population: Usage and spending on prescription drugs increases with age (2) Health insurance: Individuals are better able to afford medications (3) Preventative care: Increases awareness about conditions and their treatments
Non-Prescription Drugs	Growth in over-the-counter drug market: Decreases revenues as supermarkets and big-box stores can carry products at a more convenient location for a lower price

Trends & Disruptions

The biggest disruption to the pharmacy sector is increased competition from big-box stores and online retailers (Fig. 15). In general, these new competitors have an advantage over pharmacies due to their rent savings. Additionally, big-box stores and online retailers can take advantage of their scale to provide savings on prescription drug purchases.

In order to compete with their new competitors, pharmacies must find ways to innovate and offer a wider variety of services.
(1) CVS: Acquired Aetna, an insurance company, and began operating HealthHUB clinics in select stores
(2) Walgreens: Partnered with FedEx and Kroger
(3) Rite Aid: Merged with Alberton's grocery chain
Smaller firms will have difficulty forging the necessary bonds to diversity their revenue and will likely suffer.

Lastly, American pharmacies face competition from Canada as diabetic individuals have noticed the cost-savings available for insulin and travel across the border for the essential drug. As diabetes is a chronic disease, pharmacies are losing recurring predictable revenue, but cannot lower insulin prices to attract customers.

Walmart	Amazon	Costco
Offers 360 generic drugs each for less than $4 a prescription Capitalizes on scale to purchase merchandise at lower prices	Acquired PillPack, an online pharmacy retailer, in 2018 Uses distribution network to provide convenience without having to incur high rent costs	Caters to individuals without insurance and offers savings programs for individuals below a certain threshold

Fig. 15

Sources: IBIS World, Yahoo Finance

Pharmaceutical Sector

Industry Overview

The pharmaceutical industry (pharma) develops, produces, and sells medications. Pharma is characterized by large companies, expensive R&D costs, and patent protected drugs, often resulting in large profits.

In 2019, worldwide sales reached $1250.4 B, with North America having a 43.2% market share. The largest market belongs to the United States, with China recently overtaking Japan (Fig. 16).

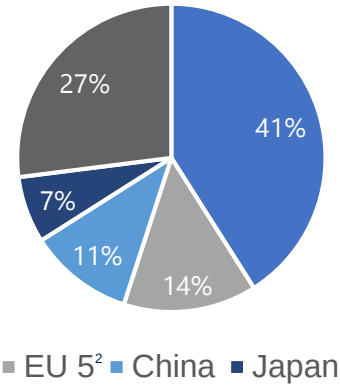
Over five million individuals are employed in the pharmaceutical industry. 6% work in the USA while China employs more than 60% of all pharmaceutical workers.

Figure 17 illustrates historical pharmaceutical index growth; the Affordable Care Act (2010) and a corresponding increase in insurance coverage resulted in greater revenues for pharmaceutical companies.

Developed Nations Market Share	65.7%
North American Market Share	43.2%
Emerging Markets Market Share	24.4%

Global Pharmaceutical Sales[1]

Fig. 16

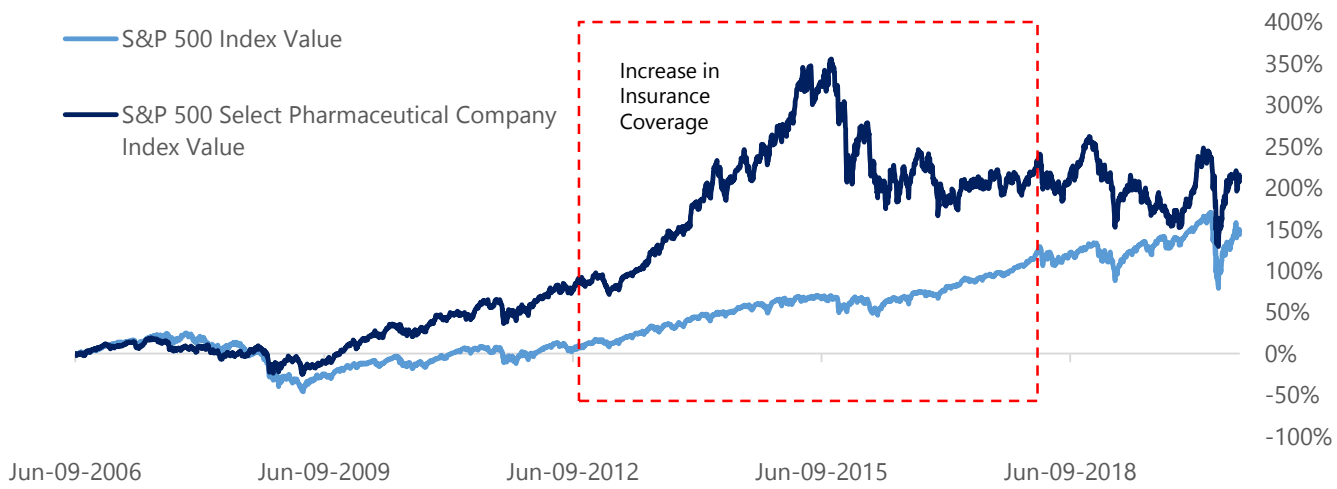


Pharma grew at a CAGR of 10% from 1980 – 2010. Global pharmaceutical growth is projected to grow at 5.2% in the coming years but nearly double in emerging markets. China is expected to experience growth closer to the global average, while India, South America and Africa will experience the most growth.

In the pharmaceutical industry, innovation is a requisite for success. The search for effective and profitable medicines resulted in approximately 17% of revenues being spent on R&D ($182 B) in 2019. The cost to develop a new drug has grown 13 times since the 1970s, and currently sits around $2.6 B.

Historical Pharmaceutical vs S&P500 Index Growth

Fig. 17



Sources: IQVIA Institute, IFPMA, CapIQ

[1]Global Invoice Spending
[2] Germany, UK, France, Spain, Italy

M&A

Increasing generic drug quantities, patent expiry, and decreasing R&D success has resulted in pharma moving away from R&D spending, towards improving distribution, increasing sales of over the counter drugs, and turning towards M&A and licensing strategies in a search for growth. Many large conglomerates merged to realize synergies in distribution and sales networks. Some significant M&A activity in the past has been:

(1) Pfizer acquiring Warner-Lambert $112 B (1999)

(2) Bristol-Myers Squibb acquiring Celgene $79 B (2019)

(3) AbbVie, Allergen Merger $62 B (2020)

Since 1985, pharma has been the 33rd most active but is the 4th largest market by deal value.

Revenue & Cost Drivers

Revenue Drivers	
Population: Size, Age, Lifestyle Choices	Quality and Number of Substitutes
Income/Drug Prices	Healthcare Infrastructure
Quantity of Sickness (epidemic)	Alternative Medicine
Government Policy	Insurance Policies
Cost Drivers	
R&D	Marketing
Litigation	Patent Expiry

Sales By Therapeutic Class

Fig. 18

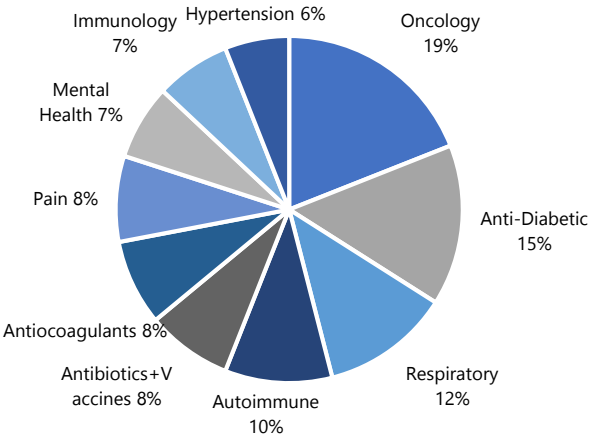


Figure 18 shows 2018 pharmaceutical sales by therapeutic class. Oncology drugs are expected to make up the most significant revenues for companies in 2024, growing ~90% since 2018, while the second-largest segment, anti-diabetics, is expected to grow its sales ~19%. Oncology growth will be driven by increases in disease, and greater increases in treatment costs. The FDA has also granted less strict measures when considering oncology drugs.

Key Drugs

Pfizer – Lipitor (patent expired 2011)
- Treats high cholesterol
- Considered the most successful drug ever
- Lifetime sales $131 B
- 25% of company revenue from 2001-2011

Humira – AbbVie (current)
- Treats autoimmune disease
- $20 B in 2018 Revenue (61% of company revenues)
- Competitors will remain out of market until 2023 despite European patent expiry to avoid litigation

Bristol-Myers Squibb – Eliquis (expires 2023)
- Anticoagulant, (prevents clots and stroke)
- $10 B in annual revenue
- Joint approval granted by the FDA to Pfizer and BMS in 2011

Sources: IMAA Institute, Pharmaceutical Technology

Pharmaceuticals vs. Biotech

The primary distinction between pharma and biotech is the focus on using chemical bases as opposed to living organisms, respectively. Despite similar R&D success rates in both industries, pharma is considered a safer investment; companies enjoy many advantages due to their size. Pharmaceutical companies have multiple drugs at all stages of approval. This diversified revenue base allows companies to decrease operational costs and rely on existing products. Due to this diversified revenue base, pharmaceutical companies can afford to shift away from risky R&D costs and improve their marketing and sales efforts. Pharma conglomerates also look towards non-organic revenue growth strategies (M&A, partnerships, licensing) to provide guaranteed revenue. As more companies look to minimize R&D spend while having a strong pipeline of drugs, the cost of marketing has risen, with the largest companies spending approximately 1.5 times their R&D expense on persuading hospitals and doctors to either buy or form a partnership with a drug. These companies are valued with normal cashflow and asset valuations.

Biotech companies, on the other hand, are usually unprofitable, smaller, and risky investments. Due to lack of real revenue, biotech companies are subject to binary success or failure. Succeeding in clinical trials usually results in large movements in stock price, or biotech "pops". Most biotech firms are private, however, and may receive VC-type funding for developing a new technology. This results in a reliance on R&D, meaning Biotech is at a cost disadvantage relative to pharma. Many of these companies are formed with a specific purpose in mind: to develop and sell drugs, be acquired for cash and royalties, or partner with pharma to access their distribution channels. As more pharma companies look to acquire innovation, small biotech companies are becoming increasingly favourable targets.

Biopharma companies are a combination of the two industries, producing both chemical and organic medicines.

Pharmaceuticals	Biotech
Pays Dividends	No Dividends
Can cut costs of R&D, marketing, and rely on inventory of patented + generic drugs	Limited product offering, must focus on innovation, maintain R&D costs
Steady revenue from existing drugs	Often no revenue, may be VC funded
Multiple drugs at all stages of the approval pipeline	One/multiple drugs in one phase of approval
May create new or augment existing drugs	Focussed on producing new drugs
Receive approximately 5 years of patent protection after FDA approval (USA)	Receive approximately 12 years of patent protection after FDA approval (USA)
Competition more relevant + costly	Often faces limited or even no external competition

Sources: Investopedia

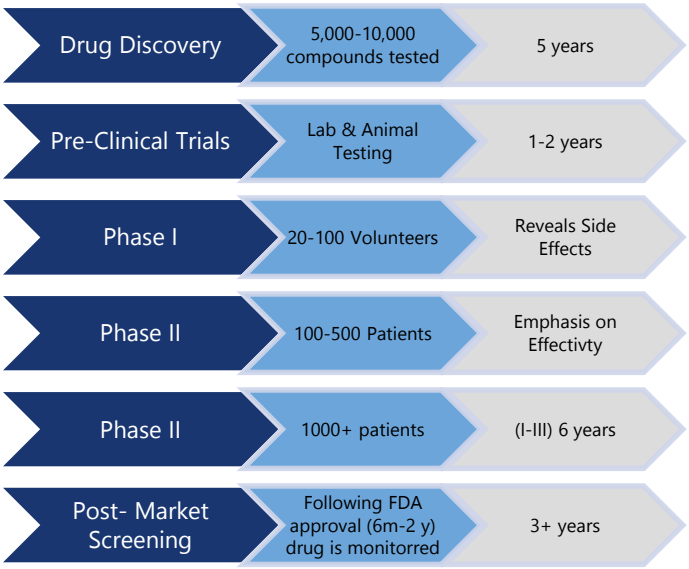
The FDA Approval Process

Fig. 19

The Food and Drug Administration (FDA) approves, regulates, and permits pharmaceutical trials in the USA.

Prospective compounds are filed with an IND (Investigational New Drug) application. Companies then pay a significant filing fee (PDUFA). At least three clinical trials are needed to provide evidence of safety and effectivity (Fig. 19), although fast track and accelerated approval programs are granted to treatments for life-threatening diseases. Phase I is conducted with healthy patients to reveal side effects, phase II reveals what the drug specifically treats, and phase III is given to varying populations with varying doses, underlying conditions, and alongside different medications. Following phase III, companies submit a New Drug Application alongside patents for review by the FDA.

At any stage, the FDA may issue a complete response letter (CRL) or reject the medication – both ending trials. A CRL provides feedback and the opportunity to reapply. Once approved, the company must periodically update the FDA on the drug. Medicines may be discontinued due to effects discovered years later. Alternatively, social issues (such as refusal to use GMO's, or lack of physician prescriptions) can result in an effective drug failing in the market.



Orphan Drugs

Companies usually develop drugs with a large addressable market, resulting in the FDA incentivizing treatments for diseases with less than 200,000 patients (orphan drugs). The FDA provides an additional 7 years of market exclusivity and less stringent trial enrollments, resulting in favourable returns for the developer.

UniQure is developing a treatment for Huntington's (AMT-130) currently in phase I/II trials. Huntington's affects around 15,000 people in the USA.

Patents and Litigation

To recoup the cost of development, companies rely on patent protection to create a temporary monopoly for a specific drug. Patents include a pre-determined period, usually 20 years after filing (or 5-10 years in the market) with an extension of 5 years often available. Following the patents' end, generic drug manufacturers enter the market producing similar or identical drugs while charging a lower cost and drastically reduce profit margins. Specific chemicals/biological processes are patented, resulting in 5+ patents protecting a single drug. In different markets, the patents' lifetime may differ. Agreements from the WTO ensure standardized submission and regulation for pharmaceutical patents across different geographic and regulatory markets.

Pharmaceutical companies are constantly fighting to maintain their market exclusivity. Companies threaten litigation as a means of keeping out potential entrants as well as having to pay expensive settlements for false claims. Large settlements are often in the range of $100 M, with the 5 historically largest settlements exceeding $10.5 B.

Sources: FDA

Valuation (As of July 17, 2020)

Company	Ticker	Market Cap	Enterprise Value	EV/Revenue	EV/EBITDA	R&D/Revenue
Pfizer	PFE	$201,362	$244,004	4.8x	11.9x	17%
Merck & Co.	MRK	$201,600	$217,590	4.6x	11.7x	18%
Novartis AG	NOVN	$193,179	$231,650	4.4x	12.3x	32%
Roche AG	RO	$295,740	$304,870	4.7x	12.0x	19%
AstraZeneca	AZN	$151,168	$167,501	6.7x	27.7x	11%
Mean		$208,610	$233,123	5.0x	15.1x	19%
Median		$201,362	$231,650	4.7x	12.0x	18%
Max		$295,740	$304,870	6.7x	27.7x	32%
Min		$151,168	$167,501	4.4x	11.7x	11%

Big Pharma includes the largest publicly traded pharmaceutical companies. 5/10 of the largest companies by sales volume are American. Companies spend millions lobbying for favourable tax policies and on litigation against competitors. Individual drug segments may be dominated by different firms to varying degrees. Roche AG has a significant share in the oncology market, while the biotech conglomerate Biogen leads in central nervous system and neurology treatments.

Metrics That Impact Valuation

Avg. Development Cost per Product	Drugs in Phase I-III
Revenue From Patented vs. Generic	Time on R&D
% of Sales Due to New Products	Sales to Time on R&D
# of Regulatory Approvals Received	R&D as a % of Sales

Large pharmaceutical companies may be valued with standard methods (DCF, comparables). The table above outlines key items that impact the share price of a pharmaceutical company. Aside from large legal settlements impacting share prices in the short term, investors heavily focus on metrics concerned with R&D. Pfizer, with 6% less spent on R&D for every dollar of revenue than AstraZeneca, may be considered either more efficient at developing drugs, or falling behind its peers in innovation. These conclusions are drawn after examining each companies 'drug pipeline', or the drugs in each stage of approval or out in the market.

Investors gauge the quality and likelihood of approval for drugs still undergoing the FDA process, or project sales, factoring in generic drugs and patent expiry, of drugs in the market.

Generic drug companies may be bought as a hedge against larger pharmaceutical companies selling medicine for the same disease (branded vs. generic). Diversification of companies working on similar treatments is also recommended when betting on certain drugs receiving approval.

Sources: CapIQ, Nature Biotechnology

Recent Trend of Licensing

To overcome expensive R&D and M&A costs, the pharmaceutical industry has turned to licensing. Instead of both developing and marketing a new drug, smaller companies often turn to Big Pharma for help. The small company will "out-license" a drug (the other company "in-licensing" the drug) in certain geographic regions. These deals may be struck up at any point in the development process. The "in-licensing" company pays a licensing fee (a rule of thumb being 25% of profits) and may take on costs of clinical trials as well. These deals include upfront cash and future larger milestone payments if certain trials are successful (or withholding of payment in the case of trial failure). Most licensing deals occur with drugs still in clinical trials – with initial phase II and advanced phase III trials resulting in large milestone payments or large companies trying to form an agreement. Licensing helps smaller companies bring a product to market and limits the downside risk/upfront investment of larger companies. Big Pharma signs 2-3x as many in- than out-licensing deals every year.

Recent State Litigation

In June 2020, 51 US state and territory prosecutors accused 26 drug makers of generic drug fixing in an unprecedented lawsuit. Specific divisions within Novartis, Teva Pharmaceuticals, Mylan, and Pfizer are being accused of price fixing more than 80 drugs between 2009-2016. This includes the glaucoma drug Xalatan, acne drug Differin, anti-seizure medicine Dilantin, and ADD medication Ritalin. The suit purports to have hard evidence of collusion.

Leaders in Covid-19 Vaccine Research

AstraZeneca
CanSinoBIO
moderna
BIONTECH
SANOFI GENZYME
gsk

COVID-19

COVID-19 has accelerated change in an otherwise slow-moving industry. Revenues are expected to miss last years estimates, but significant losses from shutdowns and would-be consumers avoiding hospitals are being mitigated by the increased sales of products treating underlying diseases of COVID-19 patients. Americans have cut back on pharmaceutical expenditures – a trend that may carry forward if COVID-19 hospital admittance rates stay high, and revenues are expected to drop in developing countries hit hard by the virus. While some stocks have risen or experienced positive spikes throughout the year due to vaccination news, the overall pharmaceutical indexes are down 5% - 7%.
Companies are rushing to develop a vaccine, focussing significant amounts of R&D efforts to find a cure that would be extremely lucrative. Big Pharma has also implemented donation programs, decreased monthly payments, and supplied consumers with alternative, cheaper medication.

Recently AstraZeneca (in collaboration with Oxford) has been focussing on late stage II trials and preparing for phase III trials with a US pledge of $1 billion and 30,000 trial members standing ready. Moderna also recently saw development of antibodies in 45 patients in its phase III trials.

In the long run, the pharmaceutical supply chain is expected to shift to a more patient centric model; while telehealth and preventative medicine will grow, Big Pharma will invest in last-mile transportation and improve their global presence to best respond to the end consumer. Focus on patient service may accelerate the shift away from R&D and increase the use of licensing or contract research organizations (CROs).
The number of new Biotech companies may also decline due to the economic recession affecting private funding.
The COVID-19 vaccine is being developed with mRNA technology; the companies on the left have shown leadership in developing a vaccine.

Sources: Pharmaceutical Technology Institute, McKinsey, JP Morgan, AstraZeneca

Long-Term Outlook

Recently, healthcare markets received a boost from lower tax rates and more generic, lower-priced drugs entering the market. GDP growth has resulted in increases in healthcare spending, and an aging population, paired with sedentary lifestyles, means increases in chronic diseases will continue to bolster pharmaceutical revenue into the future.

In the drug discovery phase of development, high throughput screening (HTS) is used to narrow down compounds. Improvements in data services will improve this process, improving the efficiency of drug discovery and clinical trial simulations, allowing companies to move to clinical trials more efficiently. The improvements within the next decade are expected to be incremental.

Developing countries will also draw significant attention from large pharmaceutical companies. Growing middle classes, who are beginning to spend on healthcare, paired with governments looking to cut spending due to decreasing tax revenues, will provide pharmaceutical companies a significant opportunity to grow. Asia is experiencing particularly rapid urbanization and increases in GDP per capita; this brings together individuals from the supply chain to service the growing consumer base, making the pharmaceutical market particularly attractive overseas.

There are expected to be lower regulatory barriers and increased innovation from smaller companies in the USA: the number of FDA approvals is expected to grow to 45 per year vs. 25 per year since 2000. Americans will also continue to increasingly spend on healthcare: the amount individuals spend annually on pharma (over $2000) rose more than 25% from 2017 to 2020, and if pharma continues to raise prices, will surely outpace the overall 2.5% - 4.6% expected growth in overall pharmaceutical spending.

Industry Pressures

The industry will experience slow growth rates, with sub-5% rates in North America, and around 10% in emerging markets (Fig. 20). Asia Pacific will continue to separate itself from Western Europe as the second-largest pharma market. Revenue growth from low priced generics is expected to grow above the overall market at 8.4% for another year. Branded Generics - generic drugs produced by brand name companies, sold at a premium - will also experience significant growth in emerging markets. Lack of quality alternatives and regulation has resulted in Big Pharma using this as a key strategy in maintaining profits despite loss of patent protection.

The next large drop-off in patents for American companies will arrive in 2025.

Pharmaceutical Market Growth Rates — Fig. 20

Worldwide Spending	5.2%
North America	4.2%
EU + UK	3.6%
Japan	0.6%
Non – EU	9.7%
China	5.7%
Latin America	10.5%
Africa	7.5%
CIS[1]	9.3%
Indian Subcontinent	9.9%

[1]Commonwealth of Independent States (Russia, Armenia, Georgia etc.)

Sources: Pharmaceutical Technology Institute, McKinsey, AstraZeneca, Deutsche Bank

Digital Health

Industry Overview

Throughout the last decade, digital health, or health tech, has grown from a blip on the radar of investors to a robust sector leading the transformation of the global healthcare industry. In 2019, the global digital health market was valued at $106 billion, and the sector received nearly one in ten venture capital dollars invested in the United States. In addition to enabling video visits or teleconferencing appointments, digital health can act as a complement to, or even a substitute for, in-person care delivery. The goal is to expand patient and physician access to critical health services, increase consumer engagement, improve clinical outcomes, enhance care coordination, reduce costs, and improve efficiencies in care provision. The applications of digital health are divided into three categories: telehealth, digital therapeutics, and care navigation. COVID-19 has generated a host of problems for healthcare providers and their return to normalcy. Digital health provides an intriguing framework for building a new normal within the context of healthcare.

Key players in the digital health sector include McKesson Corporation, GE Healthcare, Siemens Healthcare, Oracle Corporation, Hewlett Packard, Athenahealth, Allscripts Healthcare Solutions, eClinicalWorks, and Carestream Health (Fig. 21).

Key Players

Fig. 21

McKesson Corporation (NYSE: MCK) is an American company which distributes pharmaceuticals and provides health IT, care management tools, and medical supplies. McKesson's 2018 revenue was $208.4 billion.

GE Healthcare is part of the GE conglomerate (NYSE: GE), and is an American manufacturer and distributer of diagnostic imaging agents and radiopharmaceuticals that are used in medical imaging procedures. GE Healthcare's 2018 revenue was $19.78 billion.

Siemens Healthcare (ETR: SHL) is the parent company of several medical technology companies, particularly medical imaging and laboratory diagnostics. Siemens Healthcare's 2019 revenue was $16.26 billion[1].

Oracle Corporation (NYSE: ORCL) is an American computer technology company which sells database software and technology and cloud engineered systems, particularly its own brand of database management platforms. Oracle had a 2019 revenue of $39.5 billion.

The Hewlett Packard (HP) Company (NYSE: HPQ) is an American multinational IT company. HP had $58.47 billion in revenue in 2018.

Sources: McKesson, GE, Siemens Healthcare, HP, Oracle, Global Market Insights [1] EUR to USD Dec 31, 2019

Revenue Drivers

The key drivers of current and future revenues for digital health companies are patient engagement and institutional investment. Widespread consumer and provider adoption of digital health will be imperative to capturing revenue growth opportunities.

Expanding Patient Engagement

Consumers now demand integrated and accessible care solutions more than ever before. Digital health will be critical in capturing this growth opportunity. According to a 2020 McKinsey consumer survey, 48% of respondents over 50 years of age said they would be likely to seek virtual care channels in addition to or in place of in-person visits. Citing the convenience of accessing healthcare from home and easier access to doctors as their primary motives, it is a promising statistic that a large percentage of this demographic is comfortable with the move to digital care, due to the lower rate of tech adoption in older populations compared to younger demographics.

Health Institution Adoption

As both companies and legislators work to reduce health costs while increasing the effectiveness of care solutions, digital tools are increasingly attractive options to reduce the inefficiencies and costs associated with the expensive and slow traditional methods of care provision.

As previously mentioned, care provider investment in digital health is expected to increase, with remote monitoring investment expected to increase by 61% over the next 5-10 years. This increased investment will allow institutions to better integrate digital health into traditional care systems to ensure more efficient uses of the available digital health technologies.

Global Growth Drivers

Growing Investment in Development of Healthcare Infrastructure in Asia Pacific Region

Governments of developing nations are focused on the growth of their healthcare services as well as improving the overall healthcare infrastructure. For example, the Indian healthcare system received $3.1 billion in foreign investment between 2000 and 2015. This demand for advanced healthcare services coupled with investment towards improving healthcare infrastructure will drive the adoption of a cheaper, more efficient digital health sector in the future.

Growing Adoption of Artificial Intelligence

Artificial intelligence helps provide assistance and decision support to practitioners with regards to patient diagnosis and symptom analysis. With the potential to help spot disease outbreak, streamline the development process for new drugs, and improve overall care outcomes, AI will help propel widespread adoption of digital health.

Other

There will be widespread adoption of electronic health records in developed countries, partially driven by growth of digital health software. Favourable government initiatives and regulation (ex. FDA demystifying use of digital therapeutics). Increasing demand for more cost-efficient healthcare delivery will be followed by large institutions seeking partnerships with smaller innovators (ex. Target partnered with online diagnostic firm EverlyWell in 2019). Lastly, continued product development and desire for virtual clinical trials through continued flow of investment from both venture and public markets.

Sources: Forbes, Global Market Insights, McKinsey

Trends in Equity Markets

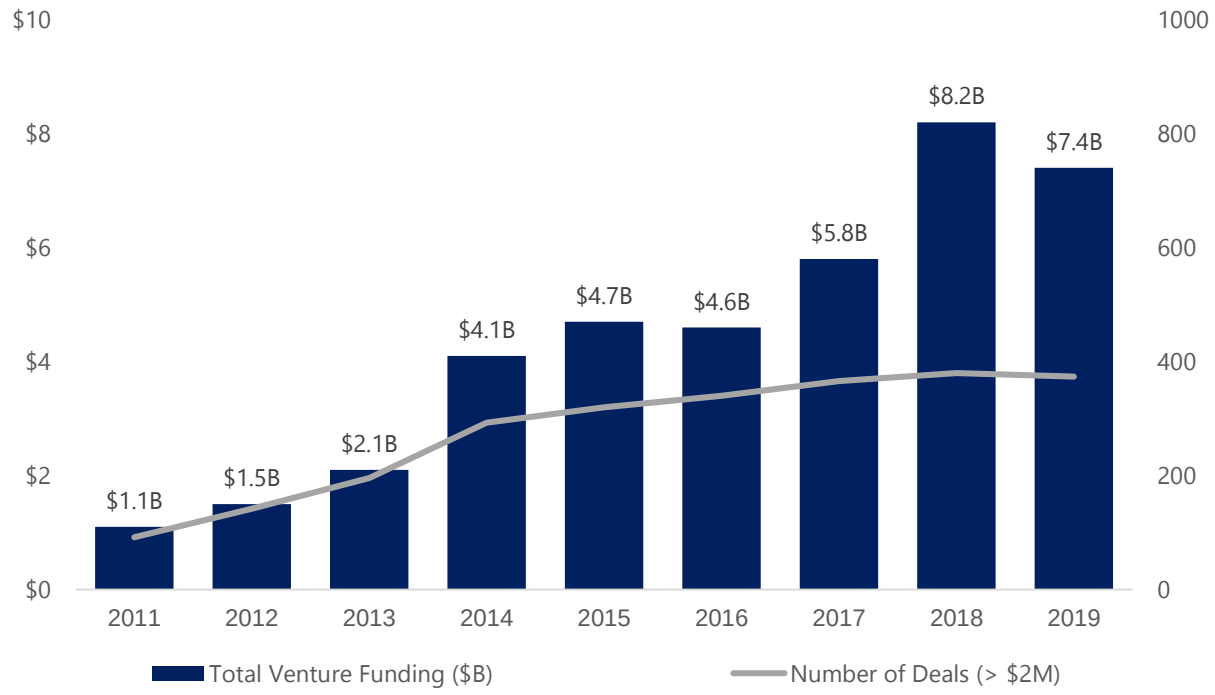
In 2019, 359 US digital health start-ups raised $7.4 billion from 627 investors – the second-highest funding year ever. 2019 funding represented a 10% decline from the record-setting $8.2 billion raised in 2018 (Fig. 22). Investment in digital health was not expected to be able to maintain the growth trajectory experienced in prior years. Fortunately, the decline represents a trend in investment towards moderation as opposed to contraction. In 2019, the average deal size dropped 8.3% from $21.6 to $19.8 million, after a 32% jump from 2017 to 2018; there was also a small change in the number of late-stage deals year over year (YoY) (Fig. 22). In 2018, two late-stage deals accounted for nearly the entire $0.8 billion YoY decline in funding. Taken public in the IPO class of 2019, Peloton and Livongo represented 80% of the difference in funding, having raised $655 million in 2018.

Trends in Initial Public Offerings

Through a flurry of public offerings, financing of digital health has begun to shift from private investors to public markets. In 2019, after a three-year IPO drought, six companies had IPOs with a combined market capitalization of $17 billion: Livongo, Health Catalyst, Phreesia, Change Healthcare, Peloton, and Progyny. This bout of IPOs is welcome validation for the venture model of long-tail investing within digital health – where a small number of companies generate a large share of the returns. Despite concerns of inflated valuations of later-stage tech start-ups in private markets, investors appear to remain eager for further digital health IPOs, especially considering the over $30 billion in liquidity overhang.

Digital Health Venture Funding

Fig. 22



Source: Rock Health, Forbes

M&A

In terms of deal count, M&A currently provides the majority of liquidity to digital health investors, despite a decline in deal quantity over the past several years. In 2019, 112 US digital health companies were acquired. Halfway through 2020, the market has been very active, with 35 deals already having occurred. This frenzy of deals is the result of a higher rate of consolidation, as large healthcare companies and new entrants are buying their way into the digital health sector (Fig. 23, 24).

Technology & Innovation

A recent acceleration in the innovation of regulation of digital health has created a fertile landscape for technological innovation within the sector. The US Food and Drug Administration (FDA) has the intention to be as progressive as possible, to keep pace with and focus on the innovation of the sector. As a result of this innovation, drivers in the digitization of healthcare have been able to gain momentum. Two of these drivers are virtual clinical trials and artificial intelligence (AI). Virtual clinical trials are a new type of decentralized digital clinical trial aimed at reducing the costly inefficiencies plaguing the traditional clinical development process.

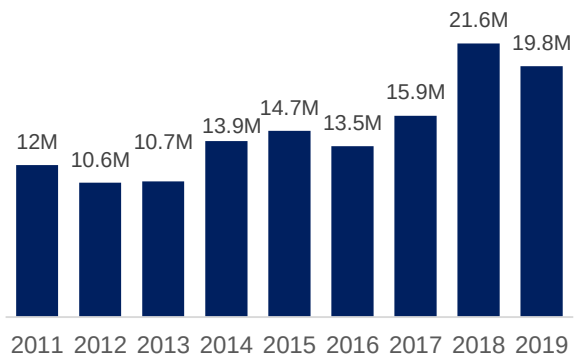
Technology & Innovation

A landmark study in this field was the Apple Heart Study, which recruited 400,000 participants in record time and demonstrated the ability of wearable tech to help detect atrial fibrillation.

AI companies broke funding records in 2019, with investment eventually expected to reach over $6 billion. The key to AI taking advantage of this opportunity is the provision of real value in its applications. For example, there is a vast quantity of health data available; however, it is equivalent to raw crude petroleum that cannot be utilized in its current form. Thanks to AI's ability to refine raw data and generate valuable insights, it is expected to generate cost savings of over $150 billion.

Digital Health Venture Average Deal Size

Fig. 23



Recent Notable Acquisitions

Fig. 24

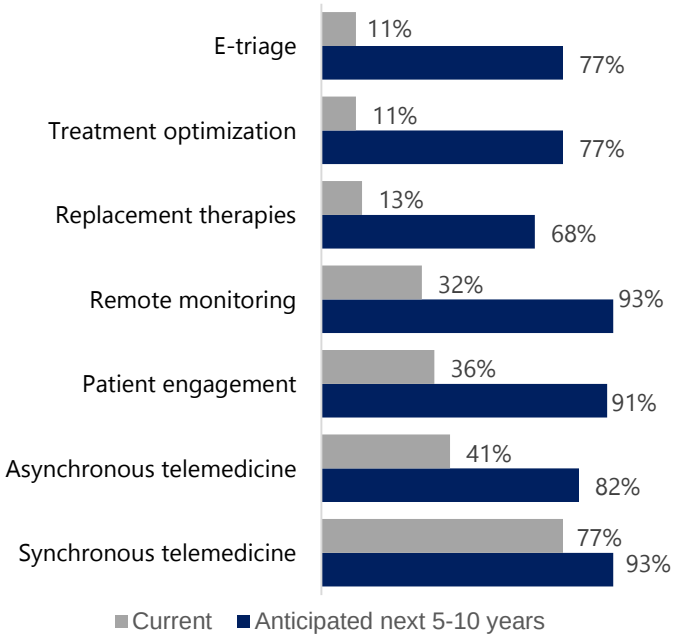
Amazon Acquisition of Health Navigator (2019)	Amazon's 2019 acquisition of Health Navigator, an online symptom checking and triage tool which Amazon has added to Amazon Care, a virtual and in-person healthcare offering currently being piloted to Amazon employees.
Alphabet Acquisition of Fitbit (2019)	Alphabet's 2019, $2.1 billion acquisition of Fitbit provided the tech giant with access to vast amounts of personal health data and healthcare partnerships, in addition to the actual health tracking hardware.
UnitedHealth Group Acquisition of Vivify Health (2019)	Further cementing the insurance giant's interest in the sector, Vivify Health provides connected devices and other technologies to track at-risk patients at their home, giving UnitedHealth a foothold in the expected $30 billion global remote patient monitoring system market.

Sources: Rock Health, Forbes, CNBC, MobiHealthNews

Telehealth Subsector

Telehealth is composed of three sub-categories: synchronous, asynchronous, and remote patient monitoring. Synchronous telehealth, or telemedicine, is live, two-way video interaction between either patients-to-providers or providers-to-providers. Synchronous telehealth is the largest recipient of provider investment within digital health, with 77% of providers making investments into the subcategory. Asynchronous telehealth, or store-and-forward, is the direct provider-to-provider transmission of medical data history and the direct provider-to-patient transmission of patient information, such as the sharing of photos for diagnosis or review (Fig. 25). Lastly, remote patient monitoring is simply the collection of personal medical data which is then transferred for review by a remote care provider. The data is primarily collected through consumer-friendly, personal-tech products, such as tablets or wearable patches, as well as through daily questionnaires.

Care Provider Investment in Virtual Health Applications (% of Providers) Fig. 25



Digital Therapeutics Subsector

Traditional digital therapeutics can be broken down into two sub-categories: replacement therapies and treatment optimization.
Replacement therapies use software in order to prevent, manage, or treat a particular condition in lieu of conventional therapies. Treatment optimization focuses on increasing the value of pharmaceutical treatments by increasing adherence and the monitoring of side effects. Bioelectronics is an emerging trend that will disrupt the digital therapeutics space. Bioelectronics uses miniaturized implantable devices which deliver electrical stimulation into nerves to help control a broad range of bodily functions. The advantages of bioelectronics are twofold. First, the promise of treating conditions which in the past have been labelled as either untreatable, such as severe spinal cord injuries and blindness, or as only partially treatable, such as Chron's disease. Second, the miniaturized electric stimulations have the potential to finally deliver true precision medicine, meaning a severe reduction in the number and extent of side effects.

Care Navigation

There are two streams of care navigation: patient self-directed care, and e-triage.

Patient self-directed care simply refers to patients accessing their own personal information from a website.

E-triage, which is expected to experience considerable investment growth in the coming years, consists of tools that provide support in searching for and scheduling appropriate care, based on the symptoms or conditions as well as the price and quality of providers. Specifically, as shown in Figure 25, provider investment in e-triage is expected to grow from 11% to 77% in the next 5 to 10 years.

Source: McKinsey, Deloitte

Integration of Bioelectronics

The potential market growth of bioelectronics is tightly tied to the breadth of diseases that can be addressed using bioelectronic therapies. Today's applications of bioelectronics is likely only scratching the surface, and as more therapies can be converted to a bioelectronics approach, the economics of the sector becomes more and more exciting. There are three main hurdles remaining, however, before bioelectronics can be adopted in widespread therapeutic approaches:

(1) Biological hurdles, including the decoding of neural language

(2) Device engineering difficulties, including miniaturization and biodegradation resistance

(3) Commercial adoption hurdles – including regulatory approval, pricing models, and patient & physician adoption

If these hurdles can be overcome, bioelectronics will become a fundamental pillar in future medical treatments and will help bring forward a new wave of therapeutic innovations.

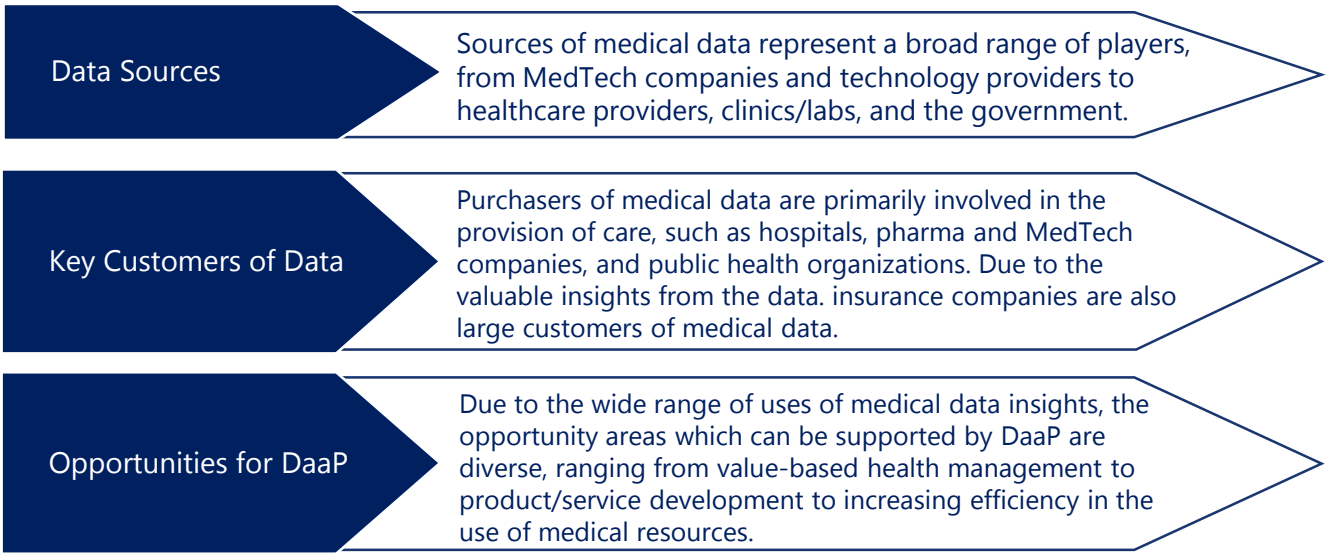
Innovations in Med Tech

Rising technologies such as artificial intelligence (AI), cloud computing, 5G, Natural Language Processing, and Internet of Medical Things will help streamline the delivery of medical care. As devices such as heart monitors and fitness trackers increasingly become imbedded with Internet of Medical Things, wearables will become a critical component in the future of digital healthcare. In particular, the data accumulated through these devices will contribute to the transformation in the way healthcare providers treat patients. Data-as-a-Platform (DaaP) extracts insights from medical data, and those insights can be applied to several different opportunity areas. DaaP represents a shift in the way data is managed within healthcare organizations. Instead of simply storing data, DaaP extracts insights from it which can be monetized and used to support various opportunity areas (Fig. 26).

The full potential of biomedical devices will only be unlocked through a focus on interoperability, meaning a standardized system for collecting and organizing data. This will allow different devices and product platforms to work symbiotically to increase the effectiveness of the larger care system.

Data-as-a-Platform (DaaP) Overview

Fig. 26



Source: Deloitte, McKinsey, Medical Device and Diagnostic Industry

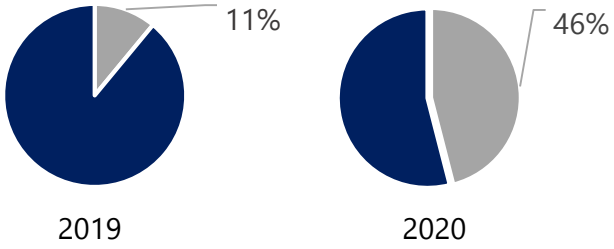
COVID-19 Impact

Despite the existence of most of today's digital health technology for the past 10-15 years, there hasn't been the expected widespread adoption by payers, providers, and consumers. The COVID-19 pandemic has changed this. The highly contagious nature of the virus has forced care providers to adopt digital health technologies, pushing against the structural barriers which previously had limited health system investment in the applications of digital health. These barriers included funding mechanisms, consumer adoption, and provider adoption.

Remote-care solutions, particularly telehealth and wearable MedTech devices, have been thrust to the forefront of healthcare business models as care providers look to service their patients in a post-pandemic world. Consumer adoption has increased substantially, from 11% of US consumers using telehealth in 2019, to 46% now using telehealth, mostly to replace cancelled in-person healthcare visits (Fig. 27). Furthermore, 76% of consumers are now interesting in adopting telehealth moving forward.

Increased regulatory flexibility combined with rising demands for remote care solutions has led to a steep decrease in the development times of new digital health products. This faster level of innovation will allow the sector to accommodate the growing rates of adoption of remote care solutions by both providers and patients.

US Consumers Using Telehealth — Fig. 27



Short-Term Outlook

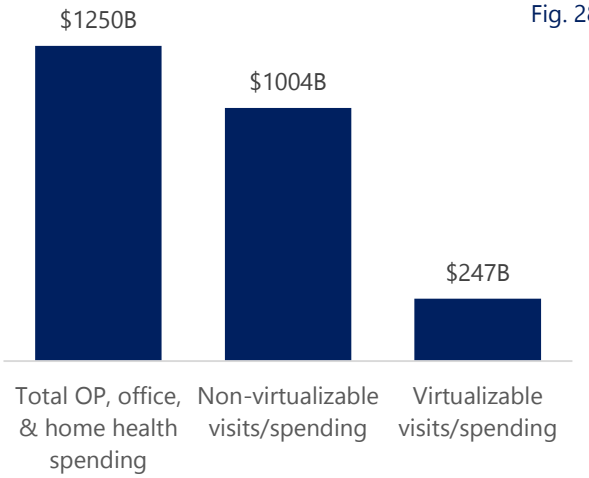
The healthcare response to COVID-19 will remain the top priority for the next 18-24 months as countries continue to implement phased relaxations and restrictions of quarantine measures aimed at suppressing the spread of the virus, expand their testing and treatment capacity, and look for better therapies. During this period of relative uncertainty, the attitudes and care preferences of consumers will continue to evolve, and there is an opportunity for digital health to further embed itself as an alternative to the traditional care delivery system.

The success of companies during this period will be determined by their ability to adapt to the new normal, deal with any potential challenges, and capture growth opportunities efficiently. The enablers which will allow companies to effectively adjust to this new normal are further technological/ product innovations, fully integrated consumer and provider adoption, and continued regulatory leniency.

Figure 28 below illustrates the potential market of current US outpatient (OP), office, and home health spending that can become virtualized.

Current US Outpatient, Office & Home Health Spending that can be Virtually Enabled

Fig. 28



Source: McKinsey, Medical Device and Diagnostic Industry

Long-Term Outlook

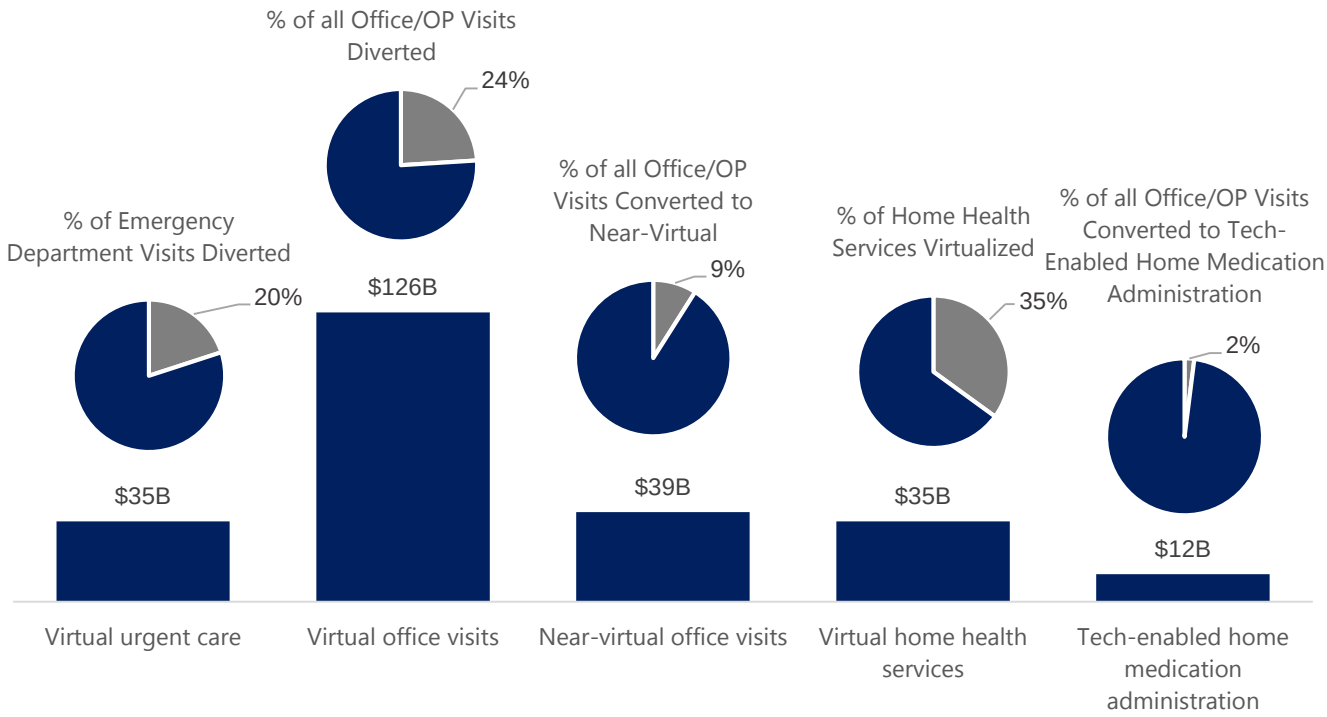
As the healthcare sector learns to better adopt the wide array of digital health technologies, the market size will continue to grow exponentially. In 2019, the global digital health market was valued at $106 billion, and is expected to experience an approximately 28.5% compound annual growth rate (CAGR) until 2026, reaching a projected value of $639.4 billion by 2026. The US digital health market is expected to reach $141.7 by 2025, partly due to the American Recovery and Reinvestment Act (2009), which approved significant funding for the development of digital health tech.

Adoption of Telehealth

Due to the forced switch to remote-care solutions post COVID-19, telehealth has been able to showcase its legitimacy as an efficient alternative to traditional care solutions. The recent consumer and provider adoption, in addition to the expansion of telehealth past virtual urgent care, has enabled the potential for an annual $250 billion of US healthcare spending to become virtual or near-virtual. This represents nearly 20% of all US outpatient, office, and home health spending. Figure 29 differentiates between the components of the potential US virtual care market. For this potential to be realized, there are steps stakeholders must take. They must scale the uses of virtual care for both urgent and office visits. Furthermore, they need to continue to virtualize home care services such as medication administration through increased MedTech adoption. Lastly, there needs to be an integration of near-virtual office visits into care solutions. While there is a gap between interest and usage in the market, increasing awareness of the offerings of virtual care will work to increase the understanding and adoption rates of patients.

Adoption of Telehealth

Current US Outpatient, Office & Home Health Spending that can be Virtually Enabled Fig. 29



Source: McKinsey, Medical Device and Diagnostic Industry

Limiting Factors & Challenges

While new technologies such as AI, robotics, and automation can generate better health outcomes in cheap, efficient, and accurate care delivery, employee input is limiting how much healthcare organizations are able to get out of their technology investments.

According to a US national survey by Eagle Hill Consulting, there is a gap between the value of a healthcare company's technology investments and how employees experience them. This means that healthcare companies are not maximizing their return-on-investment (ROI) from technology or automation. Figures 30 and 31 highlight two notable results from the survey.

So how can healthcare companies get the most out of their tech investments? First, the upskilling of current employees. Second, gain a proper understanding of what tech can and cannot do. Lastly, they must consider the human factor involved and how the tech solution will impact people's experiences, skills, and roles.

In addition to employee input, a major restriction on adoption of digital health technologies are issues and concerns relating to the security and integrity of the platforms and products collecting and sharing private medical data. Stakeholders must work to prioritize the security and confidentiality of medical data to ensure patients feel comfortable providing their medical records to virtual data platforms.

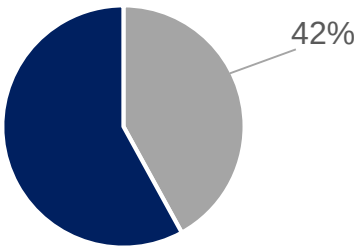
Yet another limiting factor is the high upfront costs of adopting digital health solutions. Stakeholders must look at the long-term benefits of a digital transition in order to justify initial spending increases. These costs will be exacerbated by the highly volatile economic environment caused by COVID-19.

Next Steps

Healthcare organizations should consider several key elements when making future investments in digital health. First, look to drive growth in new markets, populations, and applications. For example, reimagine sites of care with a "virtual first" mindset and embed virtual care within ambulatory workflows to ensure seamless provider experience. Second, companies should also focus development of a consumer-focused virtual "front door" that acts as seamless digital access point to providers, while ensuring capabilities and incentives of the care provider workforce coincides with digital healthcare. Lastly, healthcare organizations need to make a defined shift from COVID-19 urgent solutions to long-term, sustainable, fully integrated digital health system.

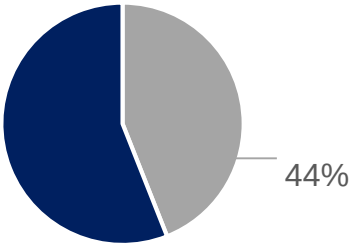
% of US workers who believe that healthcare tech investments have made a positive impact

Fig. 30



% of US workers who report that they are given an adequate level of support to properly understand & benefit from tech installments

Fig. 31



Sources: Healthcare Innovation, McKinsey