STATE OF THE CHICAGO HEALTH CARE INDUSTRY

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Health Care Council of Chicago

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INTRODUCTION: CHICAGO'S HEALTH CARE BUSINESS CLIMATE

Historically bolstered by its proximity to the Great Lakes and railroad infrastructure, Chicago has long operated as the crossroads of American commerce, and much of the country's historic trade has graced the terrain of the Windy City. Unsurprisingly, Chicago's history is replete with manufacturing and transportation expansion, spawning new enterprises and industries across a wide swath of fields. Although the nature of these industries continues to evolve, Chicago's entrepreneurial spirit has maintained an inventive identity, especially in the areas of health care, technology, and molecular science. Headquartered in Chicago are leading academic medical centers, medical device manufacturers, health care information technology (HIT) companies, and pharmaceutical innovators.

For this report, we define Chicago proper and the outlying areas commonly referred to as "Chicagoland" (including the city of Chicago and the surrounding counties of Cook, DeKalb, DuPage, Grundy, Kane, Kankakee, Kendall, Lake, McHenry, and Will) as 'Chicago'. Although this expansive geographic footprint contains varied communities and neighborhoods, they are bound together by their proximity to Chicago and its unique role in American industry.

POLITICAL AND ECONOMIC CLIMATE

Part of Chicago's emerging role as a health care hub can be attributed to the political and economic climate of the past several years. However, political and economic challenges that are germane to Illinois have started to introduce unique pressures on this progress. Having been stymied by political impasse, the State of Illinois passed its first budget in three years in July 2017, having accrued an additional $6 billion in debt over the span of the last fiscal year alone. Prior to July, spending had continued at levels set by the 2014 budget, when revenues were higher. These spending rates—coupled with the impasse—ushered in an era of economic instability. And, until the July 2017 budget was passed, Illinois was on track to become the first state to have its credit rating downgraded to "junk" status.

The budget impasse drastically affected many components of day-to-day life, including public schools, social services, and health care. *The Chicago Tribune* reported that in June 2017, a federal judge ordered the state to start paying $293 million towards monthly Medicaid receivables and an additional $1 billion over the next year to pay down $3 billion in overdue payments to providers. In Chicago alone, hospitals that serve Medicaid patients are owed an estimated $10 – $32 million *each*.[2] With claims still awaiting payment, hospital executives have had to make drastic cuts, stall payments to vendors, and delay upgrading facilities and equipment.

Despite the tumultuous political and reimbursement climate, Chicago's health care industry—mirroring the rest of the U.S.— comprises an estimated 12.2 percent of Chicago's total economic production, or $69.7 billion in combined health care services-related Gross Regional Products (GRP) in 2016.[3,4] Chicago, itself, is home to more than 26,000 health care-related companies and over 600,000 health care-related employees, with many workers and consumers relying on this growing sector.

EXHIBIT 1: ESTIMATED IMPACT OF ILLINOIS HOSPITALS' SPENDING AND EMPLOYMENT[5]

	Direct Impact ($Billion)	Indirect Impact ($Billion)	Total ($Billion)
Payroll	$16.9	$23.9	$40.8
Supplies	$17.0	$23.9	$40.9
Capital	$3.0	$4.1	$7.1
Total:	**$36.9**	**$51.9**	**$88.8**

	Direct Jobs	Indirect Jobs	Total
	201,828	290,995	492,823

OVERVIEW OF SECTIONS

This report aims to capture the multi-faceted aspects of Chicago's health care industry. Although it is not exhaustive, we hope that this analysis will provide a useful overview for health care professionals, industry leaders, policy makers, and others invested in Chicago's health care sector. We have outlined this report in five sections:

Section I: Chicago Health Care Sectors

This section evaluates the health care industry through its sectors (i.e., providers, commercial health insurance, Illinois Medicaid managed care, digital health, medical devices and technologies, life sciences, and associations). Understanding the background, trends, and recent milestones in each of these sectors provides context to Chicago's overall health care landscape.

Section II: Workforce Development

Here we address medical education and vocational training. Chicago is home to numerous teaching hospitals and has a strong vocational ecosystem, providing training for a breadth of health care workers. Medical education in Chicago brings energy, academic rigor and funding, and a steady workforce pipeline of physicians, nurses, technicians, and other health care workers.

Section III: Capital Formation

This section examines Chicago's health care industry through the lens of mergers and acquisitions (M&As), capital formation, and investment. It also reports intelligence gathered through HC3 interviews of more than a dozen Chicago-based venture and private equity firms.

Section IV: Health Care Innovation and Incubation

Chicago's entrepreneurial spirit is most apparent in its innovation hubs, incubators, and accelerators. The driving motivation of these entities is to hasten innovation and develop solutions for tomorrow's challenges. Corporate investors are forging partnerships with Chicago's academic medical centers and research hubs, providing the opportunity for universities and industry to collaborate on scientific development. Incubators and accelerators located in Chicago help health care startups connect with the resources and capital needed to bring their solutions to market.

Section V: Health Equity and Public Health

Any analysis of Chicago's health care industry would be incomplete without addressing the health of its citizens. A major challenge to industry and political leadership lies in connecting Chicago's most vulnerable inhabitants with key social and medical services. A 2016 public health initiative, Healthy Chicago 2.0, outlines a plan for improving environmental conditions and reducing health inequity.

SECTION I: CHICAGO HEALTH CARE SECTORS

Chicago's diverse and growing health care ecosystem is a critical element to the city's evolving future. Driving innovation and contributing to Chicago's economic development are companies that generate services provided outside of Chicago and core clinical services provided within the city, including services rendered by hospitals, primary care, specialty care, behavioral health, health insurance plans, and employers.

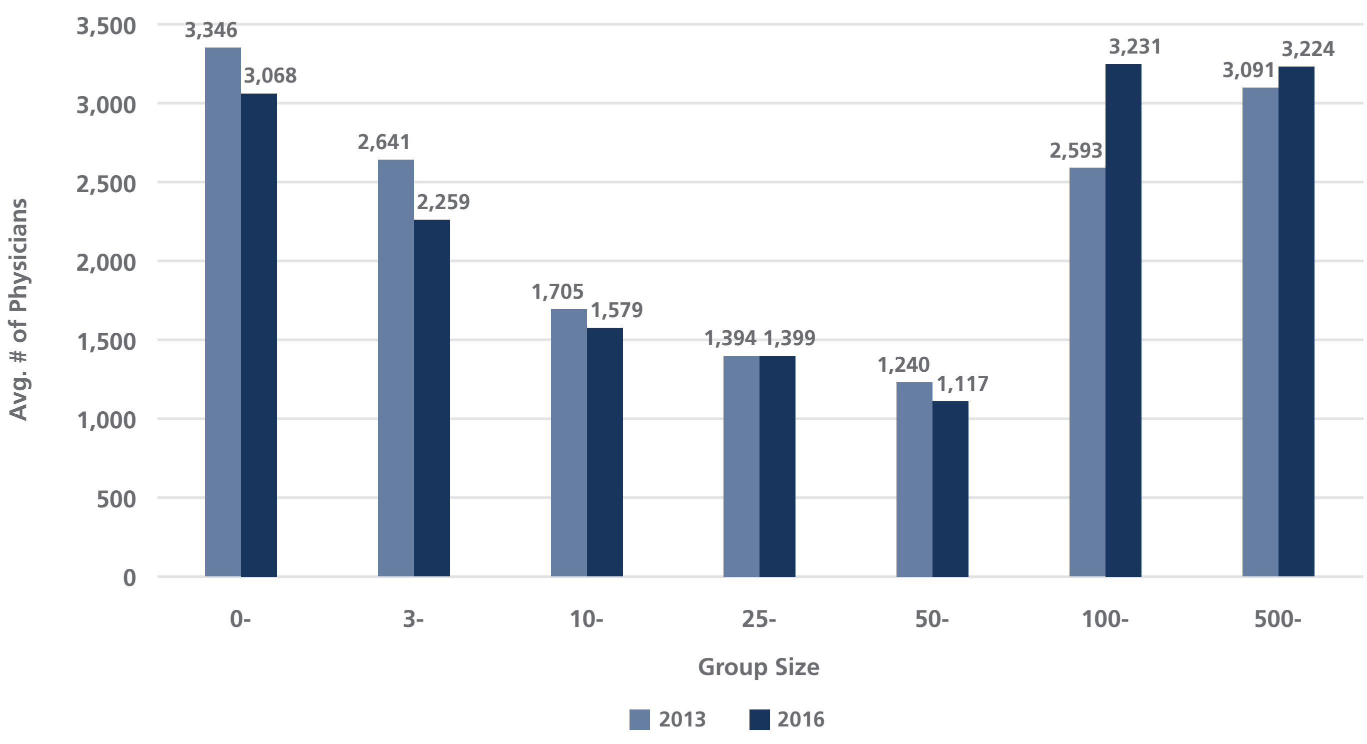
PROVIDERS

Provider systems are integral to Chicago's health care ecosystem, and the escalating competition between these organizations is changing the health care landscape in the area. With six accredited academic medical centers and 95 hospitals,[6] Chicago has a large number of health care professionals: 2,260 family and general practitioners, over 8,200 hospital-based professionals, and 17,900 specialty physicians.[7] High-ranking facilities in U.S. News & World Report's 2017 annual review include a number of Chicago entities: Northwestern Memorial Hospital, ranked thirteenth overall in the nation; Shirley Ryan AbilityLab (formerly Rehabilitation Institute of Chicago), ranked first in rehabilitation; Rush University Medical Center, ranked fifth nationally for orthopedics; and Ann & Robert H. Lurie Children's Hospital, tied for seventh in children's hospitals. Rush University's Doctor of Nursing Practice (DNP) program was also ranked fourth in the nation.

In recent years, there has been an increase of proposed mergers as various clinical entities have sought to expand their market share. In Chicago, there is a plurality of hospitals with smaller market share, establishing benefits to consolidation.[8]

There has also been a shift in physician practice ownership. Chicago's physician community is experiencing the same pressures found among their national counterparts, namely, the financial and technical challenges of running a modern medical practice; regulatory and market movement toward population-based contracting arrangements; and changing preferences of younger physicians seeking larger practice

EXHIBIT 2: AVERAGE NUMBER OF PHYSICIANS BY GROUP SIZE IN CHICAGO



settings. As a result, Chicago has seen a steady decrease in small group practices and a corresponding increase in large group practices, typified by larger health systems consolidating smaller or independent physician practices. Between 2013 and 2016, the number of practices with 100 – 500 physicians grew by 25 percent.

Key 2016 – 2017 Events:

2016

August Advocate Health Care paid the largest HIPAA settlement in history—at $5.55 million—to the Office of Civil Rights for security lapses that compromised information for 4 million patients (linked here).

Advocate Health Care took steps to commercialize a new insurance product for employers starting in 2018, after savings were generated in its own employer-sponsored health plan run on an exclusive provider organization (EPO) network (linked here).

September Reversing a previous decision, University of Chicago Medicine opted to build a $43 million emergency department with a 24-hour trauma center to serve the South Side of Chicago. The projected completion date is early 2018 (linked here).

2017

January The Regenstein Foundation gifted $10 million for the Center for Bionic Medicine at Shirley Ryan AbilityLab, a new research hospital that would open in spring 2017 (linked here).

Lurie Children's Hospital announced plans for a $51 million expansion to increase their critical care capabilities for pediatric patients (linked here).

Silver Cross Hospital announced plans to build a brand new, $22 million psychiatric facility, to be completed in 2019 (linked here).

February Northwestern Medicine received $2.5 million to expand its cardiac program to three of the system's west suburban hospitals (linked here).

Medicare Advantage insurer MeridianCare entered into a value-based contract with Oak Street Health (linked here).

March Advocate Health Care and NorthShore University Health System ended a proposed merger after a federal judge ruled against it (linked here).

April Thirty-eight Illinois hospitals received top rankings in safety by Leapfrog Group Hospital Safety Grade (linked here).

May The University of Illinois at Chicago received an $8 million grant from Bloomberg Philanthropies to develop smoking cessation strategies for poor and middle-income countries (linked here).

June Sinai Hospital announced plans to cease offering pediatric trauma and inpatient care (linked here).

What to Watch For:

Expanded Physical Capacity

Chicago providers are adding square footage at a time when the U.S. is predominately seeing hospitals close. Construction of Northwestern Medicine's newest Lake Forest Hospital is on schedule for the fall, and inpatient services are expected to open in early 2018. Additionally, the University of Chicago will add a Level-1 adult trauma center, and Mercyhealth's 13-bed micro-hospital has recently been approved. Amita Health is also expected to build a $43 million orthopedics institute and heart and vascular center, dovetailing its recent announcement that the system is expanding outpatient facilities throughout the western suburbs. These trends indicate ongoing physical expansion that will eventually require reconciliation with an oversaturation of clinical capacity.

COMMERCIAL HEALTH INSURANCE

Chicago health insurers have not been immune to challenges related to the implementation of the Affordable Care Act (ACA). Collectively, plans in Illinois lost $104.2 million in 2015, compared to a collective profit of $407.9 million in 2014.[9] Although payers drew down on their reserves, the ACA did expand coverage of private insurance and Medicaid by 850,000 people (ranging from 2010 through 2015). As of February 2017, 656,875 people in Illinois had gained coverage under Medicaid expansion, with 217,498 of those beneficiaries residing in Chicago.[10]

Despite the market dominance of BlueCross BlueShield of Illinois (BCBSIL), insurance marketplace competition has remained relatively steady.[11] Since 2011, aggregate market competitiveness has increased, largely due to dominant players' eroding market shares.

In 2016, one of the newest market entrants, Land of Lincoln Health, which operated under the Consumer Operated and Oriented Plan (CO-OP) program, was forced to close after losing a reported $90.8 million. In 2014, Land of Lincoln Health entered the individual insurance market and captured more than 5.6 percent of individual market share before closing in 2016.

Other than Land of Lincoln Health, Illinois has seen new commercial market entrants consisting of organizations like Centene (which has traditionally been involved as the Medicaid managed care company IlliniCare) and Harken Health (a subsidiary of UnitedHealthcare that sponsored clinics and aimed to reduce barriers to care, but will be closing later this year). Chicago has not seen notable development of provider-sponsored health plans.

While some market analysts predicted that employer-sponsored health insurance would decline after the ACA went into effect, the portion of the population covered by employer groups in Illinois actually rose to 58.2 percent in 2014, up from 56 percent in 2011.[12]

From 2013 to 2016 the small group insurance market competition in Chicago became more concentrated than both the individual and large group insurance markets. This decreased level of competition could be related to BCBSIL absorbing small group market shares, and the simultaneous exits by Aetna, American Alternative Insurance, John Alden Life Insurance, and Trustmark Life Insurance over the same time period.

Insurance market volatility could have a deleterious effect on Chicago's broader health care industry. As analysts look towards the Trump administration's regulatory posture following the ongoing legislative challenge of repealing and replacing the ACA in Congress, insurers and other stakeholders will continue to make difficult decisions in an uncertain environment.

Key 2016 – 2017 Events:

2016

August Aetna exited the individual market business in 11 of the 15 states it operated in, including Illinois (linked here).

Illinois's marketplace experienced an average premium increase of 45 percent for 2017 (linked here).

2017

January UnitedHealth Group agreed to purchase Deerfield-based Surgical Care Affiliates Inc. for ~$2.3 billion in a move to diversify its portfolio (linked here).

March According to a Fair Health study, insurance claims related to opioid abuse increased 329 percent in Illinois between 2007 and 2014, echoing trends nationwide (linked here).

Health Care Service Corporation (HCSC), the parent of the largest insurer in Illinois—BCBSIL—reported profitability after two years of annual losses (linked here).

May UnitedHealth Group closed its Harken Health plan, an Atlanta and Chicago pilot that featured staff providers who offered unlimited primary and behavioral care at no charge (linked here).

August BCBSIL, Cigna, and Celtic Insurance Co. — which will offer plans on the exchange in Cook County next year — announced that they would be raising prices by as much as 43 percent. Rationale included rising medical and prescription drug costs. These hikes are likely correlated with the Trump administration's threat to cut cost-sharing subsidies to low-income individuals. Illinois is a "file and use" state, meaning that the state Department of Insurance cannot change or reject the proposed rates, but can negotiate (linked here).

What to Watch For:

Reform Uncertainty Persists as National Marketplaces Take Shape

Ongoing efforts to repeal the ACA have added uncertainty to 2018 open enrollment. Based on the data available as of July 2017, Bloomberg analysts believe that most of the 12 million people who purchased insurance through the ACA's individual marketplaces will have the same number of companies to choose from in 2018 as they did in 2017. However, statewide, analysts are predicting that rural and central Illinois counties will have fewer plans to choose from.[13]

For insurance filings that have already been disclosed, some insurers have noted that uncertainty over continuing cost-sharing subsidies have caused substantial rate increases. As cost-sharing reduction subsidies have not yet been appropriated by the U.S. Congress, health plans have generally hedged in their pricing to establish non-payment contingencies. Several companies also wrote in their filings that if cost-sharing subsidies are not funded, they will withdraw from the marketplace entirely. The Trump administration will have to undertake significant regulatory action to restore confidence and stabilize the individual insurance markets and their corresponding risk pools. Much of what happens in Q3 2017 will determine how insurance carriers adjust in 2019, having significant bearing on the premiums and competition remaining in the marketplace.

ILLINOIS MEDICAID MANAGED CARE

In 2011, Illinois passed an ambitious law which mandated that half of all Medicaid beneficiaries must be moved to managed care by 2015. Today, more than 65 percent of Illinois's roughly 3.2 million Medicaid patients have shifted to Medicaid managed care plans and the state projects it will spend $9 billion on managed care, alone, in 2018.[15]

Managed care currently exists in only a portion of Illinois's counties, with services delivered in the other counties through fee-for-service (FFS) or provider-based care coordination programs. All Medicaid managed care plans[16] operate in the greater Chicago region, in which the majority of Medicaid enrollees live. For example, nearly 50 percent of all Medicaid and CHIP enrollees in Illinois live in Cook County alone.[17]

Under the previous gubernatorial administration, the Illinois General Assembly approved participation in the ACA's Medicaid expansion.[18] In 2015, over 206,000 newly-eligible adults in Chicago enrolled in Medicaid expansion plans (19–64 years of age).[19] Access to health insurance has helped many of these individuals receive needed care. For example, 2014 data shared by the Cook County Health and Hospitals System in Chicago revealed that, among the Medicaid expansion enrollees, more than half the new patients had not seen a doctor in the previous 12 months; 85 percent were unable to obtain needed medications prior to having access to Medicaid; nearly one-fourth had spent time in a hospital in the prior six months; and an additional one in five were worried about finding a place to live in the near future.[20]

After expansion, policymakers sought to drive payment and delivery system reform through Accountable Care Entities (ACEs) and Care Coordination Entities (CCEs). Both were new approaches to increasing lowering costs and improving health outcomes for the population. When enacted after the Medicaid expansion, 17 entities (including nine ACEs) collectively treated 275,000 Medicaid enrollees.

The original plan called for ACEs to include shared savings within the first 18 months, partial risk after 18 months, and full risk after three years. During the first 18 months of operation, Medicaid would reimburse claims through traditional fee-for-service payments, but also provided ACEs with an additional care-coordination fee of $9 per-member-per-month. However, with the election of a new governor in 2015, the original plan was accelerated to full financial risk under an undetermined capitated payment for providers.[21] Since the transition, ACEs and CCEs have worked to become Managed Care Community Networks (MCCNs) or partner with MCOs to provide care coordination services within risk-based managed care delivery systems.

EXHIBIT 3: ILLINOIS MEDICAID MCOS: (AS OF MARCH 2017)

Medicaid MCO	Total Medicaid MCO Enrollment
Aetna Better Health	215,269
Blue Cross Community Plan*	326,761
Cigna-HealthSpring of Illinois*	4,854
Community Care Alliance of Illinois	8,229
CountyCare* (Cook County only)	141,908
Family Health Network*	225,087
Harmony Health Plan	155,591
Humana Health Plan*	5,094
IlliniCare Health	201,820
Meridian Health Plan	375,903
Molina Healthcare	188,650
Next Level* (Cook County only)	57,379
Total:	**1,849,166**

**Only operate in the greater Chicago region.*

Given that 57 percent of the proposed 2018 budget for Illinois is marked for health care, Governor Bruce Rauner outlined a plan in early 2017 to reboot the state's Medicaid managed care program in an effort to reduce expenditures. The plan's key tenets include limiting participating insurers in the state Medicaid program to between four and seven entities (with total contracts valued at a collective $15 billion)[22]; moving another 15 percent of Medicaid enrollees into managed care; and expanding managed care statewide to fill coverage gaps.

The governor also wants managed care organizations to focus on behavioral health, given that roughly 25 percent of Medicaid participants have a mental illness or addiction, and account for 56 percent of total costs.[23] In 2011, there were 60,031 hospitalizations for behavioral health-related conditions in Chicago alone, which is almost double the rate of hospitalizations for heart disease.[24] The proposed plan also calls for insurers to establish stronger ties with nonprofit entities that provide ancillary services (e.g., housing, food safety) to hard-to-reach enrollees, a tactic that could help Chicago's high-need populations.

In early August 2017, the winners of the redesigned Medicaid managed care program request for proposals (RFP) were announced and include: BlueCross BlueShield of Illinois, Harmony Health Plan, IlliniCare Health Plan, Molina Healthcare of Illinois, and Meridian Health. These five insurers will administer Medicaid benefits statewide. The health plan run by the Cook County Health & Hospitals Systems – CountyCare – will operate in Cook County only.[25] It is estimated that more than 500,000 statewide residents on Medicaid will be impacted by this reduction of insurers.[26]

Trusted Health Plan and Aetna Better Health, which previously noted it may leave the state Medicaid program because the state owes it back payments, did not win; nor did NextLevelHealth, which plans to appeal the state's decision, according to Crain's Chicago Business.

Key 2016 – 2017 Events:

2016

September The State of Illinois changed the rules for providing vaccines to CHIP recipients. State Medicaid recipients still receive vaccines for free, but CHIP recipients must pay for their vaccinations (linked here).

2017

July A federal judge ordered the State of Illinois to increase Medicaid payments to clear a $3 billion payment backlog owed to providers as a result of Illinois state budgetary issues (linked here).

August The Illinois Department of Healthcare and Family Services, which implements Medicaid, announced the six winners of its Medicaid managed care redesign (linked here).

What to Watch For:

A Turbulent Path Ahead for Medicaid

Medicaid health insurers are owed a combined $3 billion. Meridian Health is owed at least $591 million by the state. Aetna Better Health, which is owed roughly $698 million, gave the state notice that it plans to terminate its Medicaid contracts.[27] Both of these plans operate in the greater Chicago region, and these budgetary complications will potentially impact the services and programs delivered to their Medicaid enrollees in Chicago.

Changes in Care Plans for Medicaid Enrollees

Although the list of winners in the Governor's redesigned Medicaid managed care program have been announced, we should take note of which institutions did not respond to the RFP to participate. Four of the current 12 insurers participating in Medicaid managed care in Illinois—Family Health Network (FHN), Humana, Cigna-HealthSpring, and Community Care Alliance of Illinois—did not submit proposals by the state's deadline.

There is concern surrounding the potential impact that the market exit of these four plans will have on Medicaid enrollees, particularly in Chicago, since three of these four plans only operate in the greater Chicago region. For example, Medicaid makes up most of FHN's total revenue, which was nearly $600 million at the end of 2015. In April, the board chairman said he feared that the Rauner administration was locking FHN out of a new contract and, if so, the plan likely would dissolve. A group of state lawmakers have been racing to save the plan, fearing that the exit of FHN would further destabilize critical patient access to services.[28,29]

Medicaid is expected to be a subject of much debate during the upcoming gubernatorial race.

DIGITAL HEALTH

At the intersection of technology and health care, digital health companies capture Chicago's most innovative characteristics. The diverse sector of digital health spans from general wellness trackers to clinically focused solutions that require U.S. Food and Drug Administration (FDA) approval, and it includes subfields of diagnostics, electronic health records (EHRs), telemedicine, mobile health, HIT, and health care analytics.

According to the California Healthcare Foundation, of the nearly 100 health care incubators and accelerators in the U.S., over 70 support digital health.[30] This trend to digitize health care is thriving in Chicago via groups such as AVIA, MATTER, and Healthbox. In addition to being home to a confluence of startups and entrepreneurial activity, Chicago is also home base for the Healthcare Information and Management Systems Society (HIMSS), the American Medical Association (AMA), and the American Hospital Association (AHA)—all institutions that are invested in advancing HIT and digital health innovation. Chicago is also home to several leading digital health and HIT businesses.

According to StartUp Health, 2017 has been an important year for digital health funding. As of Q2 2017, the sector has seen $6.5 billion in funding (more than 2015's total funding of $6.1 billion and on track to surpass 2016's $8.3 billion in funding). Chicago, alone, was home to $897 million of Q2 funding.[31]

EXHIBIT 4: TOP 10 MOST ACTIVE DIGITAL HEALTH MARKETS, Q1 2017[32]

Subsector	Total (Raised YTD; $Millions)	Deals Closed	Average Deal Size ($Million)
Big Data/ Analytics	$1,200	30	$40.0
Education/ Training	$622	4	$155.5
Patient/ Consumer Experience	$579	56	$10.3
Personalized Health/ "Quantified-Self"	$571	13	$43.9
Wellness	$507	28	$18.1
Med Device	$507	45	$11.2
Workflow	$471	46	$10.2
Research	$465	18	$25.8
Population Health	$457	30	$15.2
EHRs	$374	6	$62.3

Tracking movement in the digital health and HIT sectors can prove difficult, as both have seen significant regulatory changes over the past decade, driven by the ACA and Health Information Technology for Economic and Clinical Health (HITECH) Act. However, because Chicago already had a foundational presence of health care innovation, it provides a fertile environment for digital health and HIT industries that are encouraged by provisions which advance care information. Such provisions, found in the Medicare Access and Chip Reauthorization Act (MACRA) and HIT-related policies passed under the 21st Century Cures Act, represent the ongoing proliferation of value-based reimbursements that require new care models and clinical integration.

Policy engineered by Chicago or Illinois lawmakers to drive clinical information-sharing and to provide for payments under technology-provided services could incubate the market's maturing and developing technology infrastructure. Not only would such policy attract innovative technology companies, but these entities would also advance citywide goals to lower health care costs while increasing access and quality.

Key 2016 – 2017 Events:

2016

August AVIA, a Chicago-based technology business, raised $7.2 million to expand its core network of hospitals (linked here).

October Chicago health software maker Emmi Solutions was bought by Dutch health care company Wolters Kluwer for $170 million (linked here).

December HIMSS, the AMA, the American Heart Association, and the DHX Group launched a new mHealth app evaluation and certification partnership (linked here).

2017

March In the hope of making EHRs more open and accessible, Chicago-based Allscripts announced that they would work with Cerner and Epic to foster innovation and enable interoperability (linked here).

May Chicago's Outcome Health received $500 million from local and national investors to continue its health care platform expansion (linked here).

June Epic announced plans to move into medical billing. The new service, which should launch in late 2017, is aimed at smaller customers hoping to outsource revenue cycle management (linked here).

July PhysIQ, a Chicago-based health technology startup, raised $8 million from an investment fund in Madison, WI to continue to develop their health analytics platform (linked here).

What to Watch For:

The Next Big Thing

With $178 million raised by 25 companies in 2016, Chicago's digital health and HIT environment is on a steady climb. As doctors' offices and hospitals become more technology-enabled, Chicago investors and startups are betting on growth. For example, higi, whose cloud-connected wellness stations can be found in pharmacies and grocery stores nationwide, kicked-off 2016 with a $40 million round of investment. Endotronix and Maestro Health brought in $32 million and $24 million, respectively.[33] Most recently, Outcome Health, hailed as a HIT unicorn, raised $500 million, and Outcome's $5 billion valuation makes it the most valuable tech business in Chicago. This valuation was a significant milestone for Chicago's larger tech ecosystem, as it draws a higher volume of larger funding rounds and successful exits like other technology-centric cities, such as San Francisco and New York.

Cybersecurity and Interoperability

Cybersecurity and interoperability will remain top issues in digital health and HIT. As data breaches become more difficult to detect, HIT companies and health systems will invest in tools to keep data and records safe. The emerging HIT subsector of artificial intelligence, for example, can identify malicious activity and protect systems and data.

Additionally, interoperability of medical devices and EHRs continues to be an important factor, as companies evaluate how their products share information. In 2016, the Office of the National Coordinator for HIT and CMS began simplifying HIT regulations, releasing the Health IT Playbook to help clinicians assess their needs and navigate the EHR market.[34] CMS released an EHR contracting guide to help clinicians and hospitals ensure that contract terms do not inhibit EHR use. After the passage of 21st Century Cures Act, we anticipate traditional clinical data—such as claims—to be joined by more useful and actionable comprehensive analytics, integrated into platforms that use big data to create a more holistic view of health. The 21st Century Cures Act also prohibits information blocking on clinical information. As this provision is administered, data liquidity will increase, creating significant value for population health and analytic tools to create sustained value.

MEDICAL DEVICE

As an emerging leader in the medical device sector, Chicago hosts numerous corporate headquarters and employers that develop medical devices and related technologies. World Business Chicago estimates the medical technology workforce at roughly 26,000, producing a gross regional product of $4.8 billion in 2016. With engineering, business, and medical schools, Chicago has a fertile talent pipeline that makes it an appealing place for medical technology and device innovators and manufacturers—local universities are graduating nearly 3,000 biomedical science and engineering graduates each year.

Chicago is home to three companies aimed at fostering innovation in the medical technology space: Healthbox, MATTER, and Insight Accelerator Labs. North of the city sits Argonne National Laboratory and Fermilab, with the highest concentration of energy experts in the world. This research has supported many medical device innovations.

Key 2016 – 2017 Events:

2016

June Medical device startup, Endotronix, raised another $32 million to get hardware and software for monitoring the most serious heart patients heading toward clinical trials (linked here).

November Vyaire Medical moved its corporate headquarters to the northern suburbs. After a joint venture was finalized in October, the company was expected to have annual revenue of more than $800 million (linked here).

2017

March Rosalind Franklin University of Medicine and Science announced that it is building a $50 million research park on its campus, with the first building expected to open by July 2019 (linked here).

June Edge Surgical raised $1.4 million in seed money. Edge surgical builds the Ortho Edge device that digitally measures depths for screws in orthopedic surgery (linked here).

Stryker, a medical device and equipment manufacturing firm, expanded its imaging portfolio with acquisition of a fluorescence firm, which marked the company's jump into surgical imaging. The $701 million acquisition of Toronto-based Novadaq is expected to close in Q3 2017 (linked here).

What to Watch For:

Cybersecurity Concerns

In late 2016, the FDA published guidance documenting post-market management of cybersecurity in medical devices.[35] In the guidance, the FDA outlines a risk-based management approach to cybersecurity and medical devices. The guidance served as a wake-up call for device manufacturers to the potential hacking of medical devices, whether connected to a network or not.

Movement from the FDA

In 2016, just 38 first-time, premarket approvals were granted by the FDA to innovative devices, down from the 51 awarded in 2015. The cardiology space had the most new products approved, with 12 in 2016. The FDA took an average of 18.1 months for approval, compared with 17.3 months in 2015.[36] The 21st Century Cures Act, which seeks to set review priorities, streamline processes, and utilize innovative data sets, may accelerate the process in subsequent years.

LIFE SCIENCES

Chicago's life sciences sector employs over 52,000 individuals. In 2017, *Genetic Engineering & Biotechnology News* ranked Chicago in the top ten of the nation's most nurturing regions for biopharma clusters.[37] The ranking reflects the considerable amount of National Institutes of Health (NIH) funding injected into the Chicago area (317 awards totaling $252.5 million) and 3.5 million square feet of lab space.

To the north and west of Chicago sits the "life sciences alley"—the second largest pharma hub in the U.S.—home to Horizon, Pfizer, Takeda, AbbVie, and Astellas, among others. These companies neighbor over 100 other biotech/pharma companies—including 10 corporate headquarters—located in Lake County, accounting for over six percent of the county's workforce in 2015. Biopharmaceutical companies in Chicago received just $65 million in venture capital in 2016.

Key 2016 – 2017 Events:

2016

August Bayer and AbbVie moved to human trials for therapies designed to thwart endometriosis, a disease with $78 billion in annual cost impact to women's health (linked here).

Walgreens announced an agreement with HealthPrize Technologies to digitally engage patients in taking their medications (linked here).

December Exicure negotiated a licensing deal to further develop its gene-regulation technology with Purdue Pharma, which could be worth $800 million (linked here).

AbbVie and the University of Chicago entered a partnership and initiated their first round of research projects, focusing on oncology (linked here).

August Fresenius Kabi announced a $250 million expansion of their Melrose Park location, adding four new buildings and 130,000 square feet. This expansion was partly subsidized ($15 million) by the city of Melrose Park (linked here).

2017

March Iterum Therapeutics closed $65 million in Series B financing, and proceeds will help it develop its first product candidate sulopenem, an antibiotic designed to treat Gram-negative multidrug-resistant infections. The trial is expected to begin in the first half of 2018; Iterum expects to file a new drug application with the FDA by the end of 2019 (linked here).

Paragon Pharmaceuticals agreed to sell the rights to a recently-approved treatment to PTC Therapeutics (linked here).

May University of Chicago received a $100 million from the Duchossois Family Foundation to establish a center focused on the science of wellness and prevention (linked here).

What to Watch For:

Emerging Partnerships

Pharma companies have been pursuing new partnerships, entering into open-ended agreements with academic researchers in an attempt to develop new life-saving therapies. The revolution in engineering and computing power has increased scientists' ability to collect and analyze data, while technology has improved understanding of diseases' genetic underpinnings. These advancements have quickened the pace of pharma breakthroughs, but also increased costs; in 2016, it cost roughly $2.6 billion to develop and win marketing approval for a new drug.[38] At the same time, federal funding via the NIH has remained mostly flat for a decade. Moving forward, the Trump administration has proposed reducing 2018 NIH funding by $5.8 billion (19 percent), which could prompt more academic researchers to partner with pharma for funding.

21st Century Cures Act

The 21st Century Cures Act will likely offer both challenges and opportunities for the pharmaceutical and medical device industries. The law allocates $500 million in new funding for the FDA over the next 10 years to accelerate product approvals, including expedited processes for innovative drugs and devices or products that serve a rare need.[39]

ASSOCIATIONS

Nationally, membership-based health associations, professional societies, and state and local governments invested nearly $3 billion in medical and health research and development (R&D) in 2016.[40] Chicago is home to over 100 such medical and health trade associations. Leaders in these organizations have a wide array of expertise in intellectual property, data, and national/state policy. Physicians (American Medical Association), hospitals (American Hospital Association), osteopathists (American Osteopathic Association), dentists (American Dental Association), finance executives (Healthcare Financial Management Association), health plans (Blue Cross Blue Shield Association), HIT professionals (Healthcare Information and Management Systems Society), surgeons (American College of Surgeons), pediatrics (American Academy of Pediatrics), and administrators (American College of Healthcare Executives) are all based in Chicago. While these organizations operate nationally, many of them collaborate closely with Chicago-based interests, establishing a tremendous asset for Chicago's health care system, convening leaders and experts.

Key 2016 – 2017 Events:

2016

November The American Hospital Association released a report offering hospital leaders nine innovative ways to preserve access to essential health services in vulnerable rural and urban communities (linked here).

2017

February The American College of Surgeons (ACS) announced a goal of recruiting 750 hospitals for a new program to lower costs, improve safety, and shorten recovery times for surgical patients (linked here).

The American Academy of Pediatrics (AAP) released a new, two-page, comprehensive action plan that should be provided to all caregivers of children with severe allergies (linked here).

The American Medical Association (AMA) released its 2016 annual report, highlighting increased membership (linked here).

May The ACS Committee on Trauma lent strong support for implementing a National Trauma Action Plan (linked here).

The Blue Cross Blue Shield Association and Lyft rideshare joined forces to increase access to care (linked here).

June At the 2017 AMA Annual Meeting, the House of Delegates voted to take action on sugar-sweetened beverages and the availability of healthy foods in hospitals, food banks, and food-assistance programs (linked here).

What to Watch For:

Driving Value in a Complex World

As national health care reform continues, professional associations are closely monitoring the indirect effects. In the face of uncertainty and as administrators look for ways to reduce costs, organizations are culling back on membership and conference travel budgets, putting downward pressure on trade associations that rely on member dues and attendance. Likewise, the rise of teleconferencing and social networking has created new ways for professionals to connect and share advancements in their fields, challenging the value of week-long conferences and expert panels. Additionally, millennials—now a large contingent of the health care workforce—are generally less inclined to join associations.

To this end, professional and trade associations will likely continue to evolve programing and enhance member engagement platforms to attract diverse audiences. This shift is taking shape as associations broaden the scope of their content, partner on large-scale strategic initiatives with other trade associations, and launch mentor or "next generation" programs to attract young talent and employees.

SECTION II: WORKFORCE DEVELOPMENT

An important component of nurturing Chicago's health care sector is attracting and retaining talent and supporting skill development. Chicago is home to three nationally-recognized teaching hospitals in its metro area, more than any other metropolitan region in the nation.[41] There is also a strong vocational environment, providing training for varied health care workers.

MEDICAL EDUCATION

Chicago's medical education environment is vast and varied, boasting 5,700 medical residents in 2016.[42] However, Illinois is having a difficult time retaining this talent. At one medical school, graduates who remain in-state has fallen from 48 percent in 2014 to 21 percent in 2017. Across the four campuses of the University of Illinois College of Medicine, only 28 percent of its graduates are remaining in Illinois for their residencies, down from nearly 37 percent in 2016.[43] However, private medical schools in Chicago are not seeing the same erosion. At Loyola University's Stritch School of Medicine, the percent of graduates remaining in Illinois has hovered around 39 percent for three consecutive years. At Northwestern's Feinberg School of Medicine, 44 percent of 2017 graduates will remain in the state—a five-year high for the school.

Chicago also boasts a market largely saturated with primary care physicians (PCPs). Of U.S. metro areas, Chicago has the third highest number of family medicine/general practitioners and medical, surgical, and other specialists. Total, more than 28,400 physicians are directly involved in patient care.

OTHER HEALTH CARE PROVIDER TRAINING

With a non-physician workforce of over 250,000 people, Chicago colleges enroll nearly 60,000 students and grant more than 28,000 annual degrees in health care-related fields, including nursing, health administration, and technology. Adding to this capacity, the City Colleges of Chicago School of Health Sciences opened in 2016 and consolidated all health care programs to Malcolm X College, adjacent to the Illinois Medical District.

While national industry reports are predicting a shortage of skilled health care professionals, Chicago remains a strong city for producing talent. Over the last few years, the city has developed public-private partnerships to bolster the number of health care-related apprenticeship programs, providing critical education opportunities in health care technical jobs that require only a two-year technical degree.

This presence of health professional programs will help maintain Chicago's prominence as a health care hub. Although medical students may be leaving the state, these schools seek to attract health workers that are looking to live (and work) locally.

EXHIBIT 5: NON-PHYSICIAN HEALTH CARE EMPLOYMENT, 2016

Occupation[44]	Employment in Chicago, 2016
Registered Nurse	84,620
Nursing Assistants	35,560
Personal and Home Care Aides	34,750
Home Health Aides	32,440
Medical Assistants	15,190
Licensed Practical and Licensed Vocational Nurses	11,330
Medical Secretaries	9,750
Dental Assistants	9,270
Physical Therapists	8,630
Medical and Clinical Laboratory Technicians and Technologists	8,140
Dental Hygienists	5,820
Occupational Therapists	3,760
Total:	**259,260**

SECTION III: MERGERS, ACQUISITIONS, AND CAPITAL FORMATION

Chicago's robust health care sector establishes manifold opportunities for businesses to gain numerous efficiencies through the merging of assets through various means. Our market also gains in diversity as Chicago health care companies merge with or acquire businesses outside of the city, and vice-versa. In recent years, merger and acquisition activity for core health care institutions has increased nationwide, and Chicago has been no exception.

Further, in recent years we have observed an abundance of new angel, venture, and private equity capital raised to drive new innovation into a health care market searching realignment of incentives through payment and delivery systems. Chicago is home to an impressive community of investors, who are disrupting health care through diverse investment theses.

MERGER AND ACQUISITION (M&A) ACTIVITY

The architects of the ACA posited that health care consolidation would lead to decreased health care spending: consolidation would eliminate duplication, standardize treatment protocols, and incentivize improved coordination and care delivery.[45]

Recently, the Federal Trade Commission (FTC) and Department of Justice (DOJ) have been more opposed to provider and payer mergers, arguing that such mergers would lead to higher health care costs through reduced competition. Nevertheless, we anticipate an ongoing proliferation of M&A activity, keeping federal regulators and state attorneys general busy in determining the market effects of such transactions.

Notable M&A Activity:

2016

April AbbVie purchased cancer drugmaker Stemcentrix for $5.8 billion (linked here).

August Pfizer paid $14 billion in cash for cancer drug company Medivation (linked here).

September Horizon Pharma bought Raptor Pharmaceutical Corp for $800 million to bolster its rare-disease treatment business (linked here).

Harrison Street bought Highland Park medical offices for $12.5 million (linked here).

Johnson & Johnson announced it would purchase Abbott Medical Optics, a unit of Abbott Laboratories, for $4.33 billion (linked here).

October University of Chicago Medicine and Ingalls Health System completed their merger, providing care to Chicago's South Side and Southland (linked here).

December Baxter International announced plans to acquire India-based Claris Injectables for $625 million (linked here).

2017

January Takeda agreed to buy U.S. cancer drug developer Ariad Pharmaceuticals for $4.7 billion in a cash deal (linked here).

April Lake Forest-based generic drugmaker Akorn was purchased by Fresenius SE (European drugmaker) for $4.3 billion (linked here).

May Care Capital Properties (Chicago-based nursing home provider) agreed to a $7.4 billion merger with Sabra Health Care REIT (based in Irvine, California) (linked here).

The U.S. Court of Appeals for the District of Columbia upheld a lower-court ruling blocking a proposed $54 billion merger between Anthem and Cigna (linked here).

June DuPage Medical Group announced the intended purchase of Northwest Health Care Associates (purchase price not disclosed) (linked here).

Walgreens cancelled its deal to purchase Rite-Aid, opting instead to purchase half of its stores. The new agreement will make Walgreens Boots Alliance the nation's largest pharmacy by number of locations (linked here).

Below, we break down the major sectors of health care to examine recent M&A activity and trends pertinent to Chicago.

Providers

The FTC rejected several proposed hospital mergers in 2016 nationwide, and is likely to maintain rigid standards for transactions in the short and medium term, even with the new administration. Despite this, 77 hospital transactions were closed across the U.S. by Q3 of 2016, compared to 112 hospital transactions in 2015, and 95 in 2014.[46] As of early 2017, the FTC lacked sufficient commissioners to conduct a timely review of the high volume of proposed mergers, leading some states to explore authority under Certificate of Public Advantage policy.

For the first time, the FTC challenged a hospital merger in an urban setting, and judges adopted a narrowly defined geographic area where the hospitals compete. The merger of note—between Advocate Health Care and NorthShore University HealthSystem—was suspended in March 2017, as antitrust regulators worried that the merger would result in higher prices for consumers. If the merger had been completed, the new health system would have been the 11th largest nonprofit hospital network in the nation.[47]

Meanwhile, in early 2017, Rush University Medical Center (Near West Side in Chicago), Rush-Copley Medical Center (Aurora), and Rush Oak Park Hospital (Oak Park), officially began operating as one academic health network: Rush. Large Chicago health systems such as Advocate Health Care, Northwestern Medicine, and University of Chicago Medicine have made moves to acquire smaller entities, expanding their brands in new directions.

In light of the Advocate-NorthShore merger failure, coupled with previous provider M&A activity and reform uncertainty, large provider M&A activity in Chicago is likely to slow. The recent announcement of the potential University of Pittsburgh Medical Center and PinnacleHealth affiliation will help further determine and establish the Trump administration's stance on hospital M&As.

Payers

Two potential insurance megamergers were announced in 2016: Aetna and Humana, and Anthem and Cigna. Former Attorney General Loretta Lynch announced in July 2016 that the DOJ was filing lawsuits to prevent both mergers, citing decreased competition on the ACA exchanges, among other reasons. Only hours after the announcement, Humana announced its exit from most ACA markets; a week later, Anthem said it would expand its ACA offerings if the merger with Cigna was approved.

In February 2017, Aetna and Humana mutually called off the merger. Within hours, the Anthem and Cigna merger was also cancelled. No other payer merger activity had any impact on the Chicago market over the past year.

Medical Device and Technology

In 2015, there were no less than ten megamergers and acquisitions, with several medical device and technology transactions exceeding $1 billion in value.[48] The large medical device and technology players continue to acquire business units to expand product offerings, remain attractive to innovative talent, and acquire startups for their R&D capabilities. Activity in late 2016 and early 2017 was predictably lower in value, due in part to political and policy uncertainty. We have observed that when larger medical technology companies do acquire or purchase mid-to-large sized companies, it is done to acquire new product lines and diversify, offer more product bundles, and ultimately boost market share. Two major acquisitions in the last year demonstrate this point:

- Abbott acquired St. Jude Medical Inc. for $25 billion to expand its heart device business, allowing it to more effectively compete with Medtronic and Boston Scientific. (Deal finalized January 2017)
- Becton Dickinson purchased C.R. Bard for $24 million, aiming to improve BD's market position in cardiac and urological products, medication management, and infection prevention by broadening its product portfolio. (April 2017)

Life Sciences

Nationally in 2016, the life sciences sector announced $215 billion in deals, including $75 billion in pharmaceuticals. Sector deal-making declined to approximately half the level of 2014–2015, driven by a decline in megadeals.[49] The last year brought exponential uncertainty: with many life sciences companies operating multi-nationally, news of Brexit and the U.S. presidential elections as factors clouding deals.

Last year, two Chicago health care companies announced acquisitions totaling over $30 billion: the $25 billion purchase of St. Jude Medical by Abbott and the $5.8 billion acquisition of cancer drug firm Stemcentrix by AbbVie.[50] While Chicago may not see deals of this magnitude in 2017, the Trump administration is expected to relax corporate tax rates, and the Chicago-based health care companies looking to acquire promising, smaller companies may leverage that opportunity and further diversify their asset portfolios.

Nontraditional Entrants

Nontraditional players and industry outsiders are beginning to actively invest in health care-related pursuits. Players such as Google, Apple, and AT&T have all entered HIT. Mattel Corporation announced its decision to develop health devices for babies and children. In June 2017, it was rumored that Amazon was exploring ways to leverage its technology, analytics, and logistics assets to disrupt the pharmaceutical supply chain.

CHICAGO CAPITAL STOCK

In July 2017, researchers supporting HC3 interviewed over 15 private equity and venture funds that are wholly or materially invested in health care. Combining these interviews with publicly available data and industry projections, we have approximated certain key metrics that represent the capital dynamics of the Chicago market. These interviews focused on capital under management, capital stock, investment focus areas, and observations regarding investible businesses in Chicago, and how the city could improve the environment to form and channel capital.

Private Equity

Based on our interviews, diligence, and publicly available data, we estimate that Chicago-based health care private equity (PE) funds have raised roughly $4.4 billion from 2014 to 2016. Further, we estimate that unallocated capital through the city's health care private equity funds equals $1.75 billion, representing a material capital stock, which could, in part, continue to bolster lower middle market health care businesses in the city.

Nationally, seven of the 12 health care only-focused private equity firms are located in Chicago.[51]

The numerous provider networks, rich startup environment, and diverse base of health care corporate headquarters in Chicago provide private equity firms with a rich intellectual pool to leverage.

Venture Capital

PitchBook estimates that as of July 2017, $2.8 billion has already been invested in Illinois's health care market, compared to an estimated $3.74 billion in 2016. While cash investments in that state's health care are up, the number of deals is down. In 2016, 28 were recorded; in 2017, only 11 deals have so far been made.[52]

In 2016, PitchBook Inc. ranked Chicago seventh in overall size of venture capital ecosystems. Since 2010, Chicago ventures have invested $8.3 billion across all sectors. Venture-backed startups take advantage of the region's lower operating costs, dubbed "the Midwest discount." According to analysis by Hyde Park Angels, it costs tech firms approximately 42 percent more to operate in San Francisco than it does in Chicago.[53]

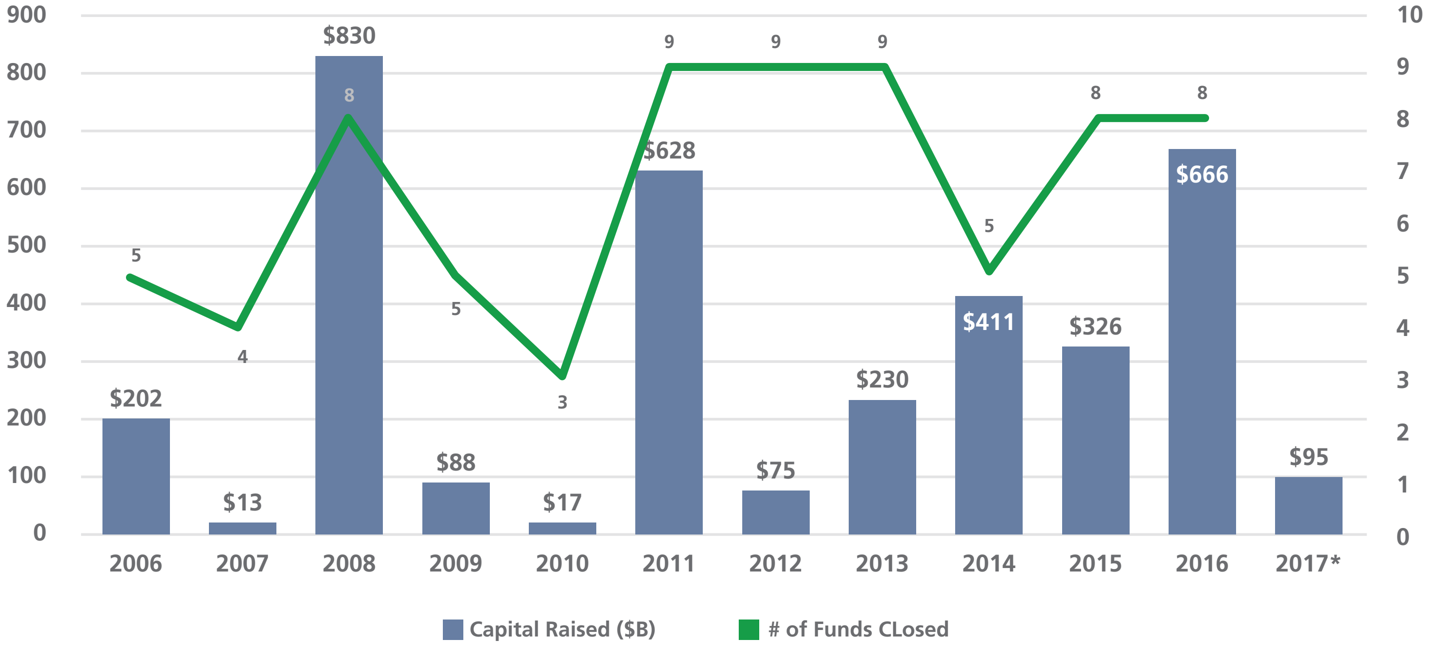
CAPITAL ALLOCATION

Chicago enjoys a rich ecosystem of private equity and venture capital firms, with firms experiencing two record-breaking fundraising years in 2015 and 2016. As a result, most firms interviewed are replete with dry powder, with only one-third to a half of their current funds deployed. Moreover, Chicago has deep roots in health care investing with roughly half of the nation's private equity firms solely focused on health care. A dominant provider network also offers firms a strong network for health care intelligence and advisory positions. Nonetheless, investments in Chicago-based companies remains low.

Investor Expectations

Consensus among the professionals we interviewed indicates that the lack of Chicago-based investing is partially due to the provider ecosystem. The provider dynamics and slow pace of change to different models of delivery and reimbursement restricts the ability of start-ups to thrive, as risk-averse hospitals and health systems are slow to adopt innovative solutions. As such, new technologies are difficult to scale. Yet, firms recognize potential within Chicago, including the rich talent pool that exists from the bevy of health care and academic institutions.

EXHIBIT 6: CHICAGO VENTURE FUNDING



**As of 4/30/2017, not-health care specific funds*

Investment professionals expect growth in Chicago in four major segments:

1. HIT and Analytics: Investors expect that HIT and data analytics will be a dominant investment area, given the segment's ability to scale across markets rather than be tied to a specific location. As the federal government encourages interoperability between EHRs and cybersecurity threats challenge patient privacy controls, investors are expecting to target emerging software companies that connect and protect health care data.
2. Pharma, Biopharma, and Specialty Drugs: Investors also expect to target traditional pharma companies partnering with high tech companies to develop pills that can assist with diagnostics, monitoring, and compliance.
3. Senior Care: As baby boomers continue to age, companies (both provider practices and technology firms) are expected to target investments in senior care. Researchers are continually obtaining data on this aging population, which in turn helps produce more sophisticated solutions, particularly as payment systems evolve.
4. Consumer Health: Bucketed under this segment is dental (largely because it is an optional benefit for most), telehealth (including dermatology), and other technologies that help providers transition to value. Patients are eager for convenient, streamlined health solutions, such as mobile applications and portals. Patients also want to be more engaged in the solutions. An emergence of "smart" doctor offices and hospital rooms—connecting patients with reliable medical information—has already begun, and investors expect this area to grow.

Chicago firms are not seeing significant investment in the payer space. Since the ACA marketplaces have built widespread dissatisfaction with traditional stakeholders, venture capital funds and entrepreneurs have been investing in new insurance and related solutions on the coasts. Health insurance-related startups raised more than $1.2 billion in venture funding in 2015, but only a small portion of that was raised in Chicago-based firms. Chicago firms are also shying away from medical technologies with physical components, such as devices, which often include lengthy FDA regulatory processes that sometimes do not receive approval. This is likely due to a lack of expertise, upfront capital requirements, and delayed cash flows.

INCREASING CHICAGO INVESTMENT POTENTIAL

Expanding Chicago's investment community and city-specific investment can take several paths. One is in closing the gaps in communication and knowledge between area private equity and venture capital investors. These groups are viewed as being isolated, and better coordination of investment activity will help Chicago's investment opportunities thrive.

Through our interviews, investors throughout the city expressed an underlying feeling that the city and state's unfunded liabilities could stunt future economic development through insufficient capital formation and Chicago-specific investment. In the short-term, investors and talent that come to Chicago may be concerned with tax increases; in the long-term, the fear to enter the Chicago market could have consequential impacts. The city also presents a case of the innovator's dilemma: Chicago is heavily influenced by large health systems and other market players who are risk averse, despite being committed to creating new opportunities for innovation. Expanding investment opportunity in Chicago will balance stability and innovation.

Some Chicago firms we interviewed posited that Chicago exists on a tipping point to transition to larger investments; for example, the recent $500 million capital injection to Outcome Health. Additionally, the Duchossois family donation of $100 million to University of Chicago Medicine—which will be used for research on disease prevention—is tilting Chicago toward additional large donations and innovation, and the minority investment of $250 million by Summit Partners to DuPage Medical Group demonstrates that Chicago is beginning to invest in its own care. These larger capital infusions signal that the Chicago market may be transitioning to a bigger scale.

EXHIBIT 7: MAJOR HEALTH CARE DEALS IN CHICAGO SINCE JANUARY 2016

Company Name	Total Raised ($M)	Active Investors	Last Financing Size	Last Financing Deal Type
Texture Health		Gary Comer, Medical Home Network, Safety Net Connect		
Dermio	N/A	StartUp Health		Accelerator/ Incubator
Vivacelle Bio	1.48	Cuthbert Simpkins, Diane Simpkins, National Institutes of Health, The Bunker Incubator, University of Illinois, Urbana Champaign	0.20	Series A1
Analyte Health	28.32	Western Technology Investment, DFJ Portage, Mohr Davidow, Apex Venture Partners, DFJ	6.50	Series C1
Opternative	10.04	Apex Venture Partners, Armando Pauker, Brian Hirsch, Caerus Investment Partners, Catapult Chicago, Chicago Ventures, Corazon Capital, Craig Duchossois, David Herrmann, DRW Venture Capital, Duchossois Capital Management, Healthbox, John Rompon, Jump Capital, Lakewest Venture Partners, Lon Chow, McNally Capital, Michael Sachs, NextGen Venture Partners, Pallasite Ventures, Pritzker Group Venture Capital, Sam Yagan, Tao Huang, Trebuchet Fund, Tribeca Venture Partners, United Enterprise Fund, Wasson Enterprise, Wayne Boulais	6.00	Series A
Rexuti	0.25		0.25	Angel
GoHealth	3.00	GoHealth	3.00	Corporate
Tract Therapeutics				Series A
Cearna	0.81		0.66	Angel
Retrofit	17.80	Chicago Ventures, Correlation Ventures, DFJ, HPA, FireStarter Fund, Cambia Health Solutions	4.80	Early Stage VC

Company Name	Total Raised ($M)	Active Investors	Last Financing Size	Last Financing Deal Type
Surgical Innovation Associates	0.75	Northwestern University Endowment	0.75	Angel
Ao1 Solutions	0.70	Catapult Chicago, Corey Ferengul, Individual Investor, Mark Gundry, Tom Hassfurther, Tribal Ventures	0.38	Convertible Debt
Procured Health	15.10	Accelerator Technology Holdings, Blueprint Health, Catapult Chicago, Clayton Associates, Foley Ventures, F-Prime Capital Partners, Health Insight Capital, Heritage Group, Individual Investor, Jump Capital, Kal Vepuri, Oxeon Partners, Silicon Badia, Waterline Ventures, Zimmerman Ventures	10.00	Series B1
Aligned Modern Health		Harbour Point Capital, Matter		
SwipeSense	16.50	BCBS Venture Partners, Eclipse Ventures, Jumpstart Ventures, Matter, New Ground Ventures, OCA Ventures, Sandbox, Healthbox	4.00	Convertible Debt
Caremerge	20.22	1871 Chicago, Aging2.0, Arsenal (Winter Park), Cambia Health Solutions, GE Ventures, Generator Ventures, Grazyna Kulczyk, Individual Investor, Insight Venture Partners, Link-age, Matter, StartUp Health	14.00	Series C
CareSkore	4.42	1871 Chicago, Cota Capital, Liquid 2 Ventures, Mandra Capital, Rising Tide Fund, Storm Ventures, Y Combinator	4.30	Seed
Briteseed	1.00	BD Ventures, Insight Product Development, Johnson & Johnson Innovation - JJDC, Matter, MedTech Innovator, National Institutes of Health, PROPEL, Research Corporation Technologies, TechWeek LA, The National Science Foundation, TMCx Innovation, U.S. Department of Health and Human Services, VentureWell		
CancerIQ	2.10	1776, 1871 Chicago, David Davidovic, Fawn Capital Partners, KGC Capital, Kiran Nimmagadda, Konyin Ajayi, Lightbank, Maryam Bashir, Matter, Patrick Callahan, Ravi Lingarkar, Rock Health, Sola Olopade, University Innovation Fund, University of Chicago Booth School of Business	2.00	Seed
Health Smart Technologies	N/A	Catapult Ideas		Accelerator/ Incubator
Attune Medical	9.90	Accelerate Michigan Innovation Competition, Gopher Angels, Heartland Angels, National Science Foundation, Perkins Coie	4.00	
Explorer Surgical	1.02	CJM Ventures, M25 Group, Matter, National Science Foundation, New Venture Challenge, Polsky Center, Pritzker Group Venture Capital, SymphonyAlpha Ventures, Wasson Enterprise	1.00	Seed
Skincure Oncology	2.50		2.50	Seed
Level EX	2.15	JAZZ Venture Partners, Matter, Pritzker Group Venture Capital	0.40	Series A
vCareConnect		Gary Comer, Matter, Safety Net Connect		
Prescript IQ	0.55	Matter, National Science Foundation, Polsky Center	0.45	Seed
4D Healthware	1.47	HealthXL, Matter	0.70	Series 2

Company Name	Total Raised ($M)	Active Investors	Last Financing Size	Last Financing Deal Type
Cubii	0.68	1871 Chicago, David Appel, G2T3V, Healthbox, Howard Tullman, Jai Shekhawat, Joel Appel, Polsky Center	0.03	Angel
Third Eye Health	1.08	Healthbox, Matter	1.08	Angel
Genivity	N/A	Envestnet|Yodlee, RootsTech		Accelerator/ Incubator
AltaThera Pharmaceuticals	6.08	Matter Ventures	3.58	Angel
Kaizen Health	N/A	1871 Chicago, Ekistic Ventures, Impact Engine, The Bunker Incubator, Village Capital		Early Stage VC
ChattrMD		Matter		
MyPeople Health		Matter, StartUp Health		
Quiddity Solutions	N/A	Matter		Seed
First Stop Health	5.90	Tim Schumacher	1.60	Angel
ECD-Network	0.77		0.77	Angel
Livongo	132.00	7wire Ventures, American Investment Holdings, Cowen Private Investments, Draper Fisher Jurvetson, General Catalyst Partners, Glen Tullman, Healthcare Growth Partners, Humana, Kevin Colleran, Kinnevik, Kleiner Perkins Caufield & Byers, Merck Global Health Innovation Fund, Microsoft Ventures, Sapphire Ventures, Singapore Economic Development Board, Slow Ventures, Wanxiang America, Zaffre Investments	52.50	Series D
Jellyvision	26.66	Updata Partners, Sigma Partners, Jackson Square Ventures	20.00	Later Stage VC
Evariant	89.77	Dignity Health, Health Enterprise Partners, Lightspeed Venture Partners, McKesson Ventures, Salesforce Ventures, The Goldman Sachs Group	63.53	Series C
higi	N/A	BlueCross BlueShield Venture Partners, Merrick Ventures		Series B
Regatta Medical		GTCR		
SA Ignite	9.39	Aligned Partners	2.05	Series B
Triggr Health	4.20	Drive Capital, KohFounders, Matter	4.20	Series A
PreparedHealth	4.20	Beverly Capital, Chicago Ventures, Meridian Street Capital, Pritzker Group Venture Capital	4.00	Seed
Sword Diagnostics	6.08	Elevate Ventures, Jumpstart NJ Angel Network, Keiretsu Forum, Tech Council Ventures, Vencore Capital		
Upfront Healthcare Services	6.00	Echo Health Ventures, Hyde Park Venture Partners, Martin Ventures, Nashville Capital Network	6.00	Series A
Outcome Health	609.98	Alpha Venture Partners, Balyasny Asset Management, CapitalG, Goldman Sachs Investment Partners, Juna Equity Partners, Leerink Transformation Partners, Paul Freedman, Pritzker Group Venture Capital	609.88	Series A

Company Name	Total Raised ($M)	Active Investors	Last Financing Size	Last Financing Deal Type
Regroup Therapy	8.40	Craig Wiley, Furthur Fund, Greg Klein, HBS Alumni Angels New York, HLM Venture Partners, Hyde Park Angels, Impact Engine, Jon Hulme, KohFounders, Lon Chow, M25 Group, Mark Agnew, Matter, Mike Evans, New Stack Ventures, OCA Ventures, OSF Ventures, Sandalphon Capital, Seph Hall, Wasson Enterprise	6.00	Series A
Resonance Medical	1.29	Matter	0.33	Angel
EDGe Surgical	1.61	IBIO Institute, Matter	0.21	Angel
EazyScripts	2.00	Bluff Point Associates, Matter	2.00	Series A
Groove Health	1.60		1.60	Angel
ResQ Pharma	1.05	Francis Wisniewski, Henry Shatkin, Matter, National Institutes of Health, The Bunker Incubator	5.00	
Bold Diagnostics		Jesse H. Jones Graduate School of Business, Matter, National Science Foundation		
Latona Therapeutics		Matter, Polsky Center		
Output Medical		Insight Product Development, Matter		Angel
Vaylenx		e-Fest, TechGROWTH Ohio, Texas Christian University Endowment		
WellRight	4.63	KDWC Ventures		Early Stage VC
Healthy Amplified	0.35	Matter	0.35	Seed
ImmersiveTouch	0.10	Healthbox, Matter, National Institutes of Health, U.S. Department of Health and Human Services, United States Department of Defense		Accelerator/ Incubator

SECTION IV: HEALTH CARE INNOVATION AND INCUBATION

Over the last decade, the U.S. has vastly increased the number of innovation hubs,[56] accelerators,[57] and incubators.[58] The U.S. is home to over 1,400 incubators, compared to 1,900 in 60 other nations. 100 of these U.S. incubators focus solely on health care. Chicago has gained innovative momentum and is home to prominent institutions that align with each category: innovation hubs such as the Illinois Science and Technology Park in the North suburbs and Illinois Medical District on the North West side; incubators such as MATTER; and accelerators such as Healthbox and AVIA.

CORPORATE INNOVATION

Chicago is home to over 140 medical research centers, including Takeda, AbbVie, Abbott, Hospira, Argonne National Laboratory and the U.S. Department of Energy's FermiNational Accelerator Laboratory (Fermilab). These innovation centers are being leveraged across multiple industries to develop new products, advance economic development, and address challenges in medicine. For example, Fermilab operates the largest, most powerful accelerator in the western hemisphere (the Large Hardon Collider), and Argonne's Advanced Photon Source is used by researchers who perform both basic scientific discovery and applied research, including initial findings that led to AbbVie's HIV drug, Kaletra®.

Corporate innovators are expanding their traditional partners and R&D portfolios to include research out of top Chicago academic medical centers. In 2016, AbbVie and the University of Chicago launched the Cancer Research Alliance, a five-year collaboration to advance oncology research.

During the past decade, Chicago's top universities have increased their R&D expenditures to over $1.5 billion in FY 2015, creating new opportunities for med and biotech startups.[59]

While not only producing R&D, top Illinois universities are also incubating startups. According to the Illinois Innovation Index, Illinois universities produced more than 800 startups from 2012 – 2016. As of 2016, 76 percent of these startups founded from 2012 – 2016 are either still active or were acquired, and 81 percent remained in Illinois; 17 percent of the startups were in biomedical/health care.[61]

EXHIBIT 8: CHICAGO COLLEGES AND UNIVERSITIES, R&D EXPENDITURES 2014-2015

College or University[60]	R&D Expenditure	Deals Closed	Average Deal Size ($Million)
Northwestern University	$645.3	$656.2	Private
University of Chicago	$390.1	$421.1	Public
University of Illinois, Chicago	$347.9	$354.6	Private
Rush University	$80.6	$79.0	Private
Loyola University Chicago	$50.1	$48.7	Private
Rosalind Franklin University of Medicine and Science	$17.7	$16.6	Public
Total:	**$1,531.7**	**$1,576.1**	**-**

INNOVATION HUBS

Research hubs, like the Chicago Technology Park, University Technology Park at the Illinois Institute of Technology (IIT), and Illinois Science + Technology Park, provide the opportunity for universities and the industry to establish a community-based approach to research and scientific development. The Illinois Medical District (IMD), situated on Chicago's west side along I-290, fosters economic growth by supporting health care, research, program, technology commercialization, and real estate development initiatives. Annually, the IMD generates $3.4 billion in economic activity and is home to over $392 million in university R&D, annually.[62] Doubling as a health care incubator, the IMD currently houses 30 emerging technology-based companies.

INCUBATORS AND ACCELERATORS

The ability to secure funding—from seed to Series B—is fostering growth among Chicago startups. In addition, Chicago is home to more than 90 co-working spaces and incubators, which provide space for innovation, help startups secure capital, and create new jobs. MATTER, University of Chicago's Polsky Center, and Blue1647 are among the most prominent incubators in the area. In 2016, PitchBook crowned Chicago as the second-best city for startups, only after New York City, based on total venture dollars and exits.[63] Backed by accelerators and coupled with the increase in common workspace cooperatives, Chicago's entrepreneurs have more resources at their fingertips.

Chicago hosts nationally ranked business education programs, in which students and graduates participate in annual pitch competitions and produce venture-backed startups. University-supported funds, in addition to a rich venture capital community, contribute to the area's innovative environment. The University of Chicago's $20 million Innovation Fund and $25 million Startup Investment Program provide funding for point-of-concept testing and early-business development. They also provide early-stage companies with Series A funding. Northwestern University has established two funds to accelerate the growth of university startups: the $10 million N.XT Fund and the $4 million NUseeds Fund. Additional statewide innovation funding sources include the University of Illinois at Chicago Chancellor's Innovation Fund and Southern Illinois University's Saluki Concept Fund. These universities are tied to the larger venture community through their business schools and entrepreneurial institutes.

Incubated out of the mayor's office, MATTER, a health care technology incubator and community hub, launched in February 2015 under a public private partnership. MATTER is strategically located in Chicago's Merchandise Mart and has grown to be the largest health care-focused incubator in the nation. Since its inception two years ago, MATTER has been a catalyst for health care entrepreneurship and innovation in Chicago, currently incubating 200 health care companies across the entire spectrum of the industry. To date, MATTER members have raised over $260 million in seed funding through Series B capital, created more than 1,300 jobs, and supplied solutions in the market that touch more than 63 million patient lives.

SECTION V:
HEALTH EQUITY AND PUBLIC HEALTH

One of the challenges facing Chicago's health care environment is the need to better connect its own community with the services it provides. Chicago is comprised of 77 unique neighborhoods and hundreds of townships and cities throughout the surrounding areas. If you ride the CTA red line from Howard to 95th Street, you can watch the city transform from stop to stop, beginning with the affluence of the North Shore, the youth of Lincoln Park, the commerce of the Loop, and ending with the poverty further south. A key area of interest for HC3 members is to mobilize the business community and deploy resources that address some of the city's health and social challenges.

In 2016, the Chicago Department of Public Health (CDPH) released its second seminal report and strategic recommendations for the city's public health, titled Healthy Chicago 2.0.[64] The CDPH recommends key action areas consisting of:

1. Expanding partnerships and community engagement
2. Improving social, economic, and community conditions
3. Improving education
4. Increasing access to health care and human services
5. Promoting behavioral health
6. Strengthening child and adolescent health
7. Preventing and controlling chronic disease
8. Preventing infectious diseases
9. Reducing violence
10. Utilizing and maximizing data and research

A myriad of contributors exacerbate these challenges, and this report does not provide a comprehensive analysis of these issues; however, we do feel it is pertinent to observe key determinants driving these disparities, while recognizing the business community's current engagement with local communities and its aspirations to increase such engagement in the future.

At any given place in Chicago, you are standing miles from another part of the city where life expectancy is markedly different. The average life expectancy, for example, between West Garfield Park (69 years) and the Loop (85 years) is 16 years. On average, in areas of high economic hardship, life expectancy is five years lower than those in better economic conditions.

These differences are driven, largely, by a confluence of economic situations, social realities, and access to the health system.

ECONOMIC ENVIRONMENT

In Chicago proper, Healthy Chicago 2.0 reports that there are 835,249 people living in conditions of high economic hardship. The most extreme hardship is on the West Side, with pockets of disproportionately higher hardship in the south. Further, 48 percent of Chicago's children live in communities labeled as "low child opportunity areas," which are more pervasive on the southern-most part of the city. These parts of the city lack educational and commercial infrastructures to produce access to jobs and post-secondary education that would break key economic disparities. Unemployment is 22 – 40 percent in most southern neighborhoods and 14 – 22 percent in the western parts of the city.

SOCIAL DETERMINANTS

Daily behavior, to an extent, explains why some Chicagoans are healthier than others. Numerous social and community factors vary depending on ethnicity or geography. There are many factors that contribute to a healthy life, and while municipalities cannot control individual behavior, Chicago can work with local programs to promote healthy living.

Understanding that health is impacted by economic opportunity, education, and public infrastructures is key. Chicago's supply of infrastructure that provides access to active, reliable, and safe transportation is strong in some neighborhoods, but is woefully absent in others. 37 percent of Chicagoans utilize public transportation to commute to work, and yet many low-income neighborhoods do not have access to public transit routes. Housing conditions vary across the city, with many children being exposed to lead and other chemicals that curtail healthy development. Walking and bike paths, access to grocery stores, basic safety amenities in the home, and access to safe educational settings are all key factors that require redress in much of Chicago.

HEALTH SYSTEM ACCESS

A great irony to the incredible health care infrastructure of Chicago is that many of its most vulnerable inhabitants do not have access to it. This inaccessibility remains an elusive component of Chicagoans' health. Chicago is home to vast networks of community health centers and private and public clinics that serve their neighborhoods with distinction.

According to Healthy Chicago 2.0, 18.7 percent of Chicagoans have no health insurance; on the west side, 11 contiguous neighborhoods have uninsured rates of 22 – 35 percent. This disparity represents a deficit in Chicagoans' access to primary care physicians, medications, behavioral health services, and other basic forms of care that promote good health. With the state's changes to the Medicaid program and national trends to reorder the financing system of health care, there are significant opportunities to improve local conditions required to advance access.

DISEASE PREVALENCE

Access to the health care system is increasingly vital because of the prevalence of chronic physical and mental disease which exacerbates Chicago's health inequity.

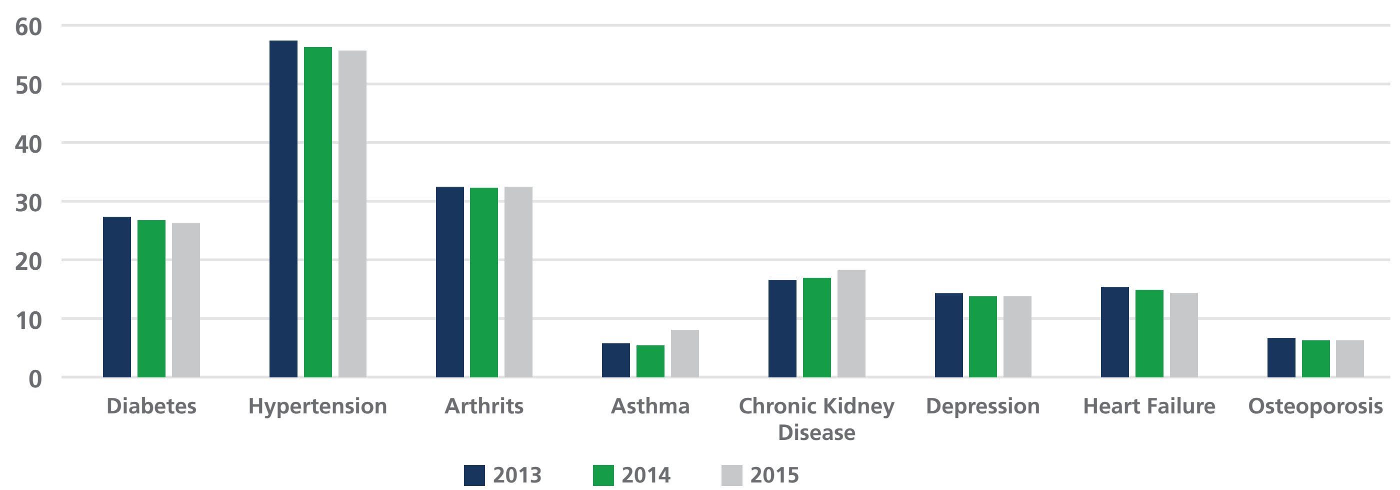
Utilizing county-level data from CMS' Medicare Chronic Condition Dashboard, estimates show that overall in Chicago in 2015:[65]

- 34.5 percent of fee-for-service Medicare beneficiaries had one chronic condition
- 29.5 percent had 2-3 chronic conditions
- 20 percent had 4-5
- 16 percent had 6+

During the same time period, out of the fourteen counties that comprise the greater Chicago area, four counties (including Cook County) had a higher percentage of beneficiaries with diabetes than the national average of 26.5 percent. Additionally, in 2015, 55 percent of Medicare beneficiaries in Chicago were hypertensive, and over 14 percent of the same population had depression.

Our businesses and citizens form a symbiotic relationship in Chicago. Businesses will not reach their full potential when the safety net is fractured, economic disparities abound, and a material number of Chicagoans remain unhealthy. While these problems are real and challenging, the innovation, capital, and accompanying economic development can help make Chicago healthier.

EXHIBIT 9: PERCENT OF MEDICARE BENEFICIARIES WITH CHRONIC CONDITION, 2012-2015



CONCLUSION

The city of Chicago boasts a vibrant health care industry with unique conditions for capital allocation, incredible talent, world-class care institutions, and innovative researchers, scientists, and technologists. The confluence of these assets in our city has the potential to establish Chicago as America's preeminent hub for health care disruption and innovation, leading the way for the rest of the country in achieving triple-aim results.

We believe Chicago's greatest strengths lie in:

1) A strong presence of private equity and venture capital firms, and its designation as the second best city in the nation for startups.
2) Its environments for development and growth through the 90 co-working spaces and incubators throughout the city, its community of accelerators, and corporate partners seeding innovation.
3) The graduate medical education and vocational training system that pumps talent into our city for productivity gains and expansion to meet tomorrow's needs.
4) The unique collaborations amongst and between all stakeholders that identify new opportunities and investments through partnerships, association platforms, community events, and HC3.
5) The sheer volume and diversity of health care industry expertise, across all industry sectors.

Major areas of opportunity for our city consist of:

1) A diffuse and fragmented delivery system that fails to coordinate care and lacks an aligned incentive structure with health insurers.
2) A need for greater continuity between investors with companies moving along the development spectrum.
3) Low insurance coverage rates, with 2017 open enrollment for Medicaid and the individual market to see significant churn of enrollees and limited resources to assist individuals in attaining such coverage.
4) Investor sentiment that the city and state's unfunded liabilities could stunt future economic development through insufficient capital formation and Chicago-specific investment.
5) Communities with extreme health disparities and inequity, and the underlying social determinants that prevent improved health, productivity, and safety.

The Health Care Council of Chicago (HC3) is in its first year and we continue to learn about the things that our business and community partners value. We continue to believe that there is a valuable role for Chicago's health care leaders and businesses to collectively play in improving the environment for local health care businesses, driving innovation for the nation, and improving the conditions of the less fortunate among us. There are manifold opportunities on each of these fronts and we look forward to working with business and civic leaders to advance our common cause in making Chicago the envy of all other cities in health care.

ABOUT HC3

The Health Care Council of Chicago (HC3) is a collaboration that enables Chicago health care companies to expand the intellectual, technical, human, and financial capital required to succeed in the value-based health care economy while concurrently raising Chicago's profile as an American health care epicenter. As the health care industry continues to rapidly change, HC3 works to ensure that the change is in the right direction to increase health care efficiency and improve outcomes. Through HC3, MATTER and Leavitt Partners have developed a platform to facilitate Chicago business interaction and strategic alignment. HC3 pursues this objective in four ways:

1. Convening Chicago's health care business executive leadership through regular programming focused on intellectual, technical, human, and financial capital in the value economy;
2. Expanding membership through active community engagement and ensuring strong continuity between members through unique interactions and partnerships in the market;
3. Developing and supporting subgroups that form around specific strategic focus areas related to programming or other ad hoc interests; and,
4. Supporting new business development and innovation in Chicago by serving as a collaborative platform that lends connections and insights to Chicago's rapidly growing startup community and the underlying providers of capital.

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6 American Hospital Association; hospitals included are U.S. Community Hospitals, defined as non-federal, short-term, general, and other special hospitals.

7 World Business Chicago, Health Services Report, Updated Oct. 2016.

8 M&As are examined by the Department of Justice and Federal Trade Commission (FTC) to determine impacts on competition, as measured by the Herfindahl-Hirschman Index (HHI). The HHI index measures market concentration which informs how competitive the market might be. A score closer to 1 means that a few companies own a large share of the market (less competitive). A score closer to 0 means that many companies own a small share of the market (more competitive). The HHI of Chicago (.0509)—calculated using patient net revenue—reflects that competition in the Chicago area is relatively more robust than the national average (.3183).

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