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HEALTHCARE'S HOLY GRAIL BETTER OUTCOMES AT LOWER COSTS

What if health providers were paid for making people healthier rather than for the volume of procedures and services they provide? After years of fits and starts, the US healthcare system is rapidly evolving toward this "value-based reimbursement" model, with the potential to improve care and reverse the rapid rise in healthcare costs. In this report, we explore why the shift is gaining momentum and what it means for payers, providers, drug and medical manufacturers, and technology enablers.

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Healthcare's Shifting Sands



For a short video summary of this report and more on the pricing pressures reshaping healthcare delivery, visit our [“Healthcare’s Shifting Sands” webpage](#). Recent highlights include:

[2017 Healthcare Outlook: Sands Shifted, Now Stuck in the Mud](#)

[US Daily: Obamacare ‘Repeal and Replace’ Harder Than It Looks](#)

[The Drug Pricing Shakeout: Separating Winners from Losers Without the Cushion of Price Hikes](#)



PM Summary – Shift to “value” to reshape healthcare landscape

We are at an inflection point where the shift away from traditional ‘fee-for-service’ (FFS) model will begin to more rapidly move toward value-based reimbursement (VBR).

Payers and Healthcare IT stand to gain the most while Providers and Manufacturers bear the greatest risk of disruption.

Population Health: Improving clinical outcomes and access to care in a cost efficient manner to a broad patient population.

On its current trajectory, healthcare spending in the US is expected to represent more than 20% of the Gross Domestic Product and consume nearly 40% of the government’s total budget by 2025 per CMS. Yet there is little correlation between the elevated level of US healthcare spending and health outcomes, as the US spends ~2.5x more per capita on healthcare than the average OECD country but exhibits lower life expectancy, higher infant mortality, and greater incidence in multiple chronic conditions among ages 65+. This seemingly unproductive trend is the driving force behind a change in the approach to reimbursement, toward a system where providers and manufacturers are paid more on the basis of clinical outcomes than on the volume of patients they treat or procedures they perform– an approach called “value-based reimbursement.”

Done right, we estimate this transition to value could bend the healthcare cost curve in line with GDP growth and generate upwards of \$650bn in savings by 2025 through shifting care to lower-cost settings (eg, alternate site providers), moderating price inflation (a continuing trend for mature/competitive categories and non-innovative products), and reducing some of the more than \$1.4tn in annual healthcare waste (unnecessary services, excess administration, etc) by 2025.

With the foundation for the transition seemingly set, we explore the winning subsectors and those at risk. While we expect there will be clear beneficiaries in the value shift, including the federal government, states, employers and patients, a change in gross healthcare spend would present challenges to incumbent healthcare companies, both on the services and product side. As such, we anticipate meaningful structural changes with Payers and Healthcare IT companies positioned to gain the most. Large Payers will be in a place to help facilitate the transition to VBR by leveraging scale and helping to administer more complicated contracting for providers. On the other end of the spectrum, providers and manufacturers bear the greatest risk from business model disruption. Hospital providers will need to significantly adjust internal policies and procedures to focus more on coordination of care with a much greater emphasis on population health management. For Pharma, Biotech, and Medtech manufacturers, we see risk to current pricing practices under VBR as aligned incentives and greater cooperation between payers and providers could pressure manufacturers to moderate price inflation and set initial new product prices at lower rates. However, we believe a greater focus by providers and payers on patient adherence and more proactive care could spur greater product and procedural volumes.

Why now? Confluence of factors

A key driver of the shift to VBR is the unsustainable level of US healthcare costs with sub-optimal results, with growing patient cost burdens threatening demand and ability to afford care. On the positive side, VBR is becoming more feasible given technological adoption (enables risk-assumption by providers) and increasing provider consolidation (allows for Population-level care and greater operating efficiencies).

VBR programs have shown enough early promise to encourage payers and providers to continue down the value-based path. To that effect, earlier in 2015 the Department of Health and Human Services announced a goal of tying 30%/50% of total Medicare payments to alternative payment methods (such as bundled payments) by 2016/2018. Additionally, from the private sector, an industry alliance including 6 of the top 15 health systems and 4 of the top 25 payers committed to migrate 75% of their businesses to value-based arrangements by 2020. Multiple new value-based initiatives are slated to begin in early 2017, after a significant push over the past two years by both CMS and private payers for healthcare constituents to build upon prior value-based pilots and move further down the value and risk continuum.

Value-based reimbursement has received bipartisan support thus far.

While the recent presidential election has left some investors questioning the outlook for healthcare reform and value-based payment adoption, we note that the reimbursement approach has been an area of bipartisan support and is likely to be a key component of any Republican health policy agenda from the new administration and Congress (though the pace of adoption and severity of regulatory mandates could moderate). In addition, continued elevated pharmaceutical cost pressures could trigger regulatory or legislative cost control measures across healthcare. Through the Affordable Care Act (ACA), some regulatory structures aimed at changing the reimbursement landscape such as CMMI (Center for Medicare and Medicaid Innovation) and IPAB (Independent Payment Review Board) already exist, though these specific regulatory entities could be subject to change under proposals to “repeal and replace” ACA. Nevertheless, broad bipartisan scrutiny of drug prices could still spur federal action and States could look to more tightly regulate healthcare costs at the local level.

THE TRANSITION TO VALUE by the numbers

NEARING UNSUSTAINABLE COSTS....

20%

The share of US GDP per CMS healthcare spend is expected to comprise by 2025—nearly 40% of the federal government’s total budget per the CBO.

25.8%

Medicaid’s share of state budgets in 2014—making it the single largest expenditure (630 basis points greater than education spending).

\$9,068 vs. \$3,661

Average 2013 healthcare spending per capita in the US vs. the average for OECD countries.

...WITH LIMITED PAYBACK

76.4 vs. 77.8

Average life expectancy in the US vs. OECD developed country average.

6.0% vs. 4.1%

Infant mortality rate in the US vs. OECD developed country average.

35.3% vs. 23.2%

Obesity rate in the US vs. OECD developed country average.

PATIENTS PAYING AND DELAYING

29%

The percent of covered employees enrolled in high-deductible health plans as of Kaiser’s 2016 benefits survey—triple the number enrolled in 2009.

37.8 → 40.7

The average number of days in accounts receivable for ATHN’s physician client base in 2015 vs. 2013.

34%

The percentage of privately insured Americans delaying medical treatment in 2014 according to Gallup—a 900bp yoy increase.

PROVIDER CONSOLIDATION LAYS THE FOUNDATION FOR POPULATION HEALTH

65%

The share of hospitals per AHA data that were part of a health system in 2015, vs. 46% in 2001.

33%

The percentage of employed physicians Accenture surveyed that expect to be independent (not employed by a hospital/health system) in 2016, vs. 57% in 2000.

66 → 112

The increase in acute care facility acquisitions between 2010 and 2015 per Kaufman Hall. Meanwhile, the number of hospitals has declined.

TECH TRENDS SUPPORT TAKEOFF

83%

Physician EMR adoption rate in 2014, vs. 21% in 2004 per the CDC. 97% of hospitals reported owning a certified electronic health record system in 2014 per CMS/AHA data.

+50%

The increase in smartphone usage among elderly Americans (65+) between 2014 and 2015 per Pew.

How do we define “value”?

Simply put, the concept of value-based or risk-based reimbursement refers to paying providers and manufacturers for “Outcomes vs. Inputs”, with higher revenue and margins paid for quantifiable improvements in clinical results with the hope of reductions in the cost of care over time. Across the healthcare sector many constituents characterize this change as a “shift to value” over “volumes”.

As background, VBR initiatives have typically included one or more of the following aspects that distinguish it from traditional fee-for-service (FFS): (1) incentive payments that are tied to specific quality/cost targets, (2) lump sum payments (‘case rates’) for bundles of services/products related to specific diagnoses / treatments, (3) per capita payments for all necessary care (‘global’ or within a specific category) for a defined population.

Continuum of reimbursement models along risk/reward curve

As opposed to the traditional no-risk FFS model, VBR initiatives enable payers/providers to take on varying amounts of risk to realize savings associated with patient outcomes. The most comprehensive level of risk represents a complete convergence between the payer and provider such that the combined entity owns the entirety of medical and administrative revenue and costs and seeks to manage the patient most effectively by offering in-network care through the entire care continuum; this has mainly been accomplished through Provider-Sponsored Health Plans (such as those run by Kaiser Permanente, UPMC, or Geisinger where the insurance plan is owned by the health system).

We identify four categories of increasing risk/reward along the continuum: (1) no risk (FFS), (2) upside incentives (eg, sharing savings), (3) upside and downside risks (eg, fixed fee for managing all aspects of patient health), (4) full risk (complete convergence between payer and provider).

We identify 4 categories of healthcare reimbursement: (1) no risk (fee-for-service), (2) upside-only incentives, (3) upside and downside risks (shared risk or capitated payments) and (4) full risk (provider-sponsored health plans).

Exhibit 1: Full value/risk continuum of healthcare reimbursement models

Continuum of Reimbursement Models								
Category	No Risk	Upside Incentives Only			Upside and Downside Risk			Full Risk
Reimbursement Model	<u>Fee-For-Service (FFS)</u>	<u>Pay-For-Performance (P4P)</u>	<u>Patient-Centered Medical Home (PCMH)</u>	<u>Shared Savings</u>	<u>Bundled Payments / Episodes of Care</u>	<u>Shared Risk</u>	<u>Global Payments / Full Capitation</u>	<u>Provider-Sponsored Health Plans</u>
Description	A specific price for each specific service and input	FFS payments + incentive payments for quality and efficiency	Additional PMPM or higher FFS rates for coordinated primary care team	Provider shares in savings if certain cost and quality benchmarks are met	Lump sum for all services and inputs to treat a disease for a defined time period	Provider shares in savings/losses depending on performance vs. cost/quality benchmarks	Periodic, fixed fee for managing all health aspects of a patient for a defined time period	Full financial risk a patient population through owning the insurance component

Less risk, less value More risk, more value

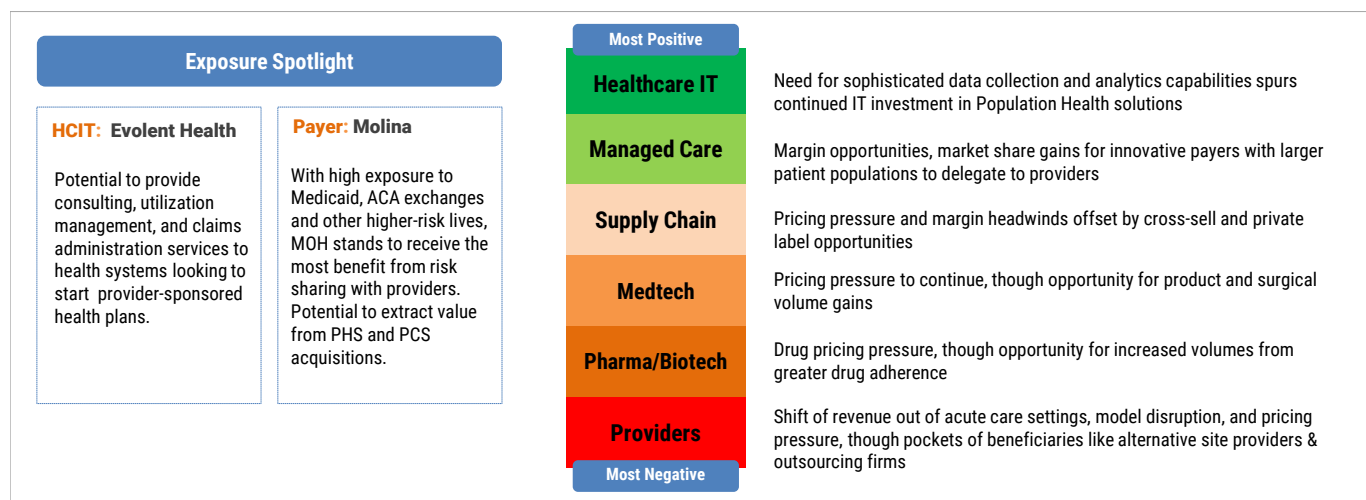
Source: Goldman Sachs Global Investment Research.

Assessing sector positioning, Payers and HCIT clearest beneficiaries

We expect the most significant direct impact from VBR on Healthcare Services sectors, as Managed Care and Providers converge to manage patient care – a positive for Managed Care given increasing share in higher risk/reward savings alternatives but negative for Providers given disruption to business models as they are pressured to demonstrate efficacy and expand scope. To a lesser extent, we also expect to see a negative impact to Products sectors (and the related Supply Chain), given a greater focus on cost control, tighter formulary management, and linking of product price to outcomes. The cleanest upside would be from Healthcare IT as the need for data collection spurs continued IT investment.

Exhibit 2: Subsector and company exposures

Healthcare IT and payers best-positioned, providers at the greatest risk



Source: Goldman Sachs Global Investment Research

Winners: Payers and HCIT

Among healthcare subsectors, we view large, public payers and Healthcare IT as the main beneficiaries of the shift to VBR. At the highest level, we see the potential for VBR to drive savings within the broader healthcare system as MCOs benefit from incremental margin expansion. From a strategic perspective, we see the shift to VBR as enabling market share gains among larger, more sophisticated payers (and potentially generating further consolidation) as only the largest payers have the required geographical scale to offer sufficiently sizeable delegated patient populations to interest providers (larger populations have less cost variability and provide health systems an opportunity to drive meaningful incremental volume in-network). Moreover, given the meaningful reporting requirements for government alternative payment models and commercial ACOs, larger, sophisticated payers bring to bear a sturdier infrastructure to providers to ensure better compliance and measurement of results. Taking a step back, this would suggest an even wider ‘competitive moat’ for the health insurer business model as scale and technology becomes increasingly important in an ever-more-complex ecosystem.

In addition, we think both the Managed Care and Healthcare IT sectors will be natural partners to sell a host of wrap-around population health services and software to the healthcare industry. These include adoption of sophisticated revenue-cycle management systems, variabilization of operating costs through the outsourcing of billing and IT departments to 3rd parties, and software investments in Analytics, Care Management solutions, and Digital Health. Outside of internal development of these solutions by HCIT

vendors such as **CERN, MDRX, and ATHN**, we have seen an increasing appetite within and outside the sector to acquire niche vendors to build Population Health platforms (with **UNH, AET and IBM** the most notable new competitive entrants to the HCIT space). HCIT could also be a beneficiary of potential M&A, as Managed Care continues to blur the lines between industries (e.g., recent acquisitions from UNH's OptumHealth segment).

Near-term challenges and opportunities: Providers

We think the provider industry is subject to the most near-term risk around the shift to VBR, particularly among more acute-focused firms, including hospitals with limited portfolios of outpatient/freestanding assets. Though VBR could negatively impact other healthcare constituents from a pricing or utilization standpoint, such impact would be mainly indirect and easier to navigate for innovative firms. However, providers stand to see direct disruption to their current business model and will have to demonstrate at a system-wide level continued annual savings or navigate direct downside risk. For context, we polled C-suite executives from most of the public hospital chains on VBR at our annual healthcare conference last June – nearly all shared a view that VBR is still a long way from meaningfully impacting hospital economics and that the vast majority of their revenues (i.e. high 90%*s*) are still purely volume-based/fee-for-service.

That said, we do expect there to be some ways to gain leverage to VBR within the provider space. First of all, a growing focus on shifting to lower cost settings and standardizing/variabilizing the cost of care delivery in our view should support growth for physician outsourcing firms such as **EVHC and TMH** as well as alternative-site providers that includes freestanding ambulatory surgery centers “ASCs” (e.g. **SCAI and SGRY**).

In addition, there is opportunity for progressive health systems to diversify revenue streams through both vertical consolidation and launching integrated health plans, which would enable health systems to capture premium revenue and more effectively drive patient volume within their network. Though the economic success of provider-sponsored health plans remains mixed, we expect more health systems to look to compete with Managed Care firms, particularly in more defined markets such as Medicare Advantage and Managed Medicaid, and see attractive runway for HCIT vendors such as **EVH** to provide consulting, utilization management (assuring appropriate patient utilization of healthcare services and locations), and claims administration to interested parties.

Long-term challenges and opportunities: Biopharma, Medtech and Supply Chain

Though we expect a more significant near-term and direct impact from VBR on payers and providers, drug manufacturers could also see disruption given the growing debate around drug pricing decision-making, particularly in light of increased patient out-of-pocket responsibility. In some cases these pricing practices threaten the affordability of important drugs for many patients and potentially restrict access to new, innovative therapeutic categories. Therefore, we think a greater systemic focus on cost containment through VBR, outcomes-based pricing models, and realigned incentive structure for the prescribing physicians could supplement existing tools (formulary management, step therapies, clinical pathways) to bend the cost curve for pharmaceuticals. Furthermore, even if pharmaceutical cost savings do not materially impact biopharma P&Ls in the near-term, the specter of greater action in our view could lower the terminal value investors are willing to assign to pipeline assets and weigh on valuations.

We think this pressure could manifest more acutely on (1) less innovative manufacturers who have historically relied on price inflation to drive greater share of top and bottom line growth and (2) in chronic/expensive drug categories such as Rheumatoid Arthritis, Oncology, Multiple Sclerosis where pricing pressure could yield a significant amount of savings over the patient lifetime and there already are several competing compounds. Within these therapeutic categories, we see the following companies among the most exposed: **Rheumatoid Arthritis – ABBV, AMGN and JNJ; Oncology – CELG; Multiple**

Sclerosis – BIIB and TEVA (see our September 27, 2016 report, *The Drug Pricing Shakeout*, for our views on winners and losers within the large-cap pharma, biotech, and spec pharma industries in a more constrained product inflation environment). AMGN has already engaged in value based contracts with some payers for Repatha (PCSK9 cholesterol drug) and BIIB has begun to discuss the potential for value based pricing in MS.

We see a similar dynamic playing out for Medical Technology companies, though we would note the sector has historically faced substantial pricing pressure (low to mid-single-digits annually), and therefore in our view is less reliant than pharma and biotech on price inflation for growth. Accordingly we believe the increased focus on clinical and financial value could **pressure less innovative manufacturers which operate in crowded areas (traditional joint replacement, rhythm management, and legacy in-vitro diagnostics)**. We believe hospitals/providers are more incentivized to make purchasing decisions based on price, in these competitive markets. We believe this environment favors companies with economies of scale that can offer providers/hospitals a comprehensive suite of offerings across various diseases and treatment paradigms (**MDT, ABT, HOLX**).

However, for both biopharma and Medtech, a greater focus by providers and payers on patient adherence and more proactive care could spur greater product and procedural volumes. In addition, we have seen incremental organic and inorganic investment in both service and diagnostics businesses that complement traditional medical devices and implants and expand manufacturer wallet shares.

For the Supply Chain, we think the majority of interaction with VBR will likely come as a second derivative impact from Services and Manufacturer customers. As a result, the magnitude of downside pricing and mix shift risk in our view will be partly dependent on how fast and successful customers are at adopting VBR and whether customers ultimately view the Supply Chain as more of an enabler of that change or an area of cost that can be rationalized further. We also think increased pricing pressure could spur more blurring of the line between the Supply Chain and customer segments, as with **CAH's** push into private label medical/surgical manufacturing and **MCK's** expanded ownership of community oncology practices.

Exhibit 3: Healthcare subsector positioning for VBR

Sector	Positioning	Headwinds	Tailwinds	Key Highlighted Stocks
Payers	Winner	Pricing risk, increased regulatory scrutiny, market share shifts	Margin expansion, market share gains for larger payers, and 3rd party IT and services	UNH, AET, HUM, MOH, ANTM, CI
Healthcare IT	Winner	Market share shifts, competition from other sectors	Adoption of new 3rd party IT and services	CERN, MDRX, ATHN, EVH, IBM
Providers	NT challenges and opportunities	Loss of revenue for acute care providers, negative mix shift	Reduction in facility and infrastructure costs, shared savings, revenue diversification	Challenges: HCA, THC, UHS, CYH Opportunities: EVHC, TMH, SCAI, SGRY
Pharma/Biotech	LT challenges and opportunities	Reduced pricing on mature and new drugs	Increased volume and drug adherence, higher pricing for more efficacious drugs	Challenges: ABBV, JNJ, AMGN, Roche, CELG, BIIB Opportunities: LLY, BMY, AGN, VRTX
Medtech	LT challenges and opportunities	Reduced pricing on mature and new medical devices and supplies	Increased product and surgical volumes in preventative areas, 3rd party IT and services	Challenges: BCR, BDX, SNN, SYK, ZBH Opportunities: MDT, BSX, ABT, HOLX
Supply Chain	LT challenges and opportunities	Reduced pricing on mature and new drugs, pressure on distribution margins	Consulting and IT solutions, private label, formulary management	Challenges: ABC, CAH, MCK, OMI Opportunities: CAH, MCK, ESRX

Source: Goldman Sachs Global Investment Research.

VBR case studies remain early but show promise

We analyze several of the largest mature VBR programs on pp. 34 to 40.

The ability of VBR to drive sustainable cost savings as well as improvements in clinical quality is still a work in progress. However, results from more mature pilots have shown early promise and continued participation by payers and providers in public and private programs should deliver improving results over time. Within, we detail several of the most significant recent CMS and private value-based initiatives (see pages 21-33) as well as case study analyses of results from longer-running programs such as the Medicare Shared Savings Program (MSSP), Bundled Payments for Care Improvement (BPCI), and Commercial ACOs (see pages 34-40).

New companies helping to drive the shift to VBR

We profile the growing list of private companies enabling the shift to VBR on pp. 47 to 51.

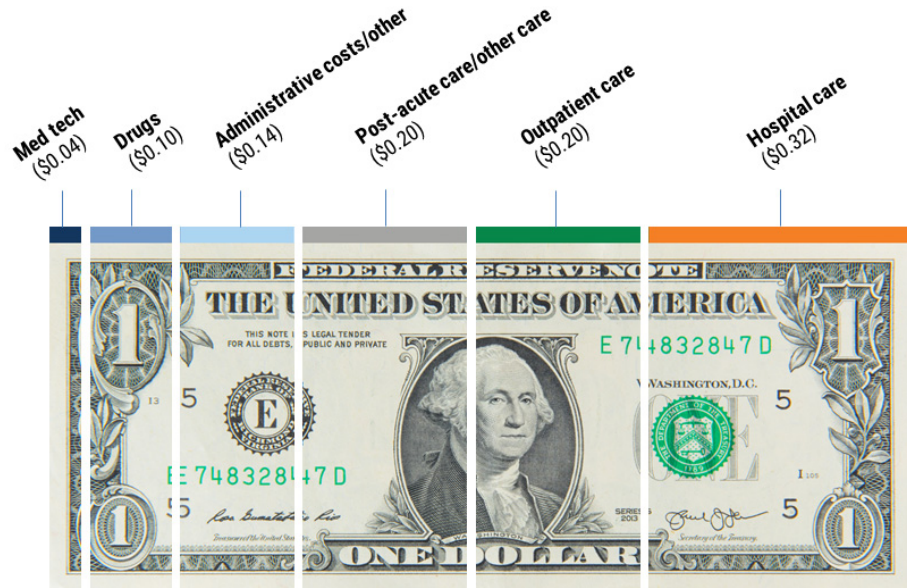
We have identified 49 private companies along with 7 recently acquired or IPO'd companies (see pages 47-51) that are helping to develop the technology and service infrastructure to enable the shift to VBR. While we believe that much of the value within the VBR space will accrue to healthcare constituents and larger companies with the resources, capital and relationships needed to scale VBR businesses, we expect that venture capital, entrepreneurs, and technologists will continue to create new companies, help commercialize provider expertise, and offer an attractive M&A opportunity for legacy stakeholders looking to expand their VBR footprints.

VBR could save the US Healthcare system \$650bn by 2025

After a roughly 50% reduction in National Healthcare Expenditure (NHE) growth in 2008-2013 vs the prior decade (3.6% CAGR per CMS data vs. 7.2%), 2014 NHE data suggests a return to mid-single-digit growth in 2014 of 5.3% and a projected 5.8% NHE CAGR through 2025 – outpacing GDP growth by 130bp through 2025. However, we believe greater adoption and experience by healthcare constituents (primarily payers and providers) of value-based reimbursement could help bend that cost curve more in line with GDP growth. We estimate lowering healthcare expense growth to nominal GDP growth by 2025 would reduce total US healthcare spending by \$650bn, or 11.7%. We expect these savings to be generated through three main buckets:

- 1) **Shift to lower-cost care settings** including homecare, telehealth, retail clinics, and outpatient surgery centers. A 2016 report commissioned by the Ambulatory Surgery Center Association estimated a comprehensive shift to outpatient surgery centers from hospital outpatient departments alone could generate up to \$55bn in annual industry savings by reducing costs by ~20%. Assuming the shift to VBR could generate a relatively similar savings rate on the NHE baseline \$1.8tn of Hospital Care spend by 2025, **we think VBR could yield ~\$350bn in site of care savings by 2025.**
- 2) **Moderation of price inflation** on mature or non-innovative clinical and operational healthcare products. National Health Expenditures for prescription drug, durable medical equipment, and other non-durable medical products are projected by CMS to grow at a 6.4% CAGR through 2025. Assuming ~2% of that growth comes from utilization (per our recent analysis of prescription trends from IMS data), the remaining expenditure growth (~4.5%) would be a result of price inflation and mix. We believe VBR can reduce that price component of product growth by a 1/3 by 2025, which would **generate annual pricing savings of ~\$100bn by 2025 vs. the current NHE baseline.**
- 3) **Reduction in healthcare industry system waste** presents the largest area of opportunity in our view. An Institute of Medicine report estimated \$750bn in annual US healthcare waste in 2010, roughly \$660bn of which includes unnecessary services, excess administration, fraud, and prevention failures. That \$660bn represented ~26% of total National Health Expenditures in that year. We assume a similar 26% fraud, waste, and abuse rate in future years, which implies more than \$1.4tn of industry waste by 2025. We think VBR – through aligned incentives for providers and payers to manage costs – could **generate at least a 15% reduction in waste (which we view as relatively conservative), or ~\$200bn in annual savings by 2025 vs. the current NHE baseline.**

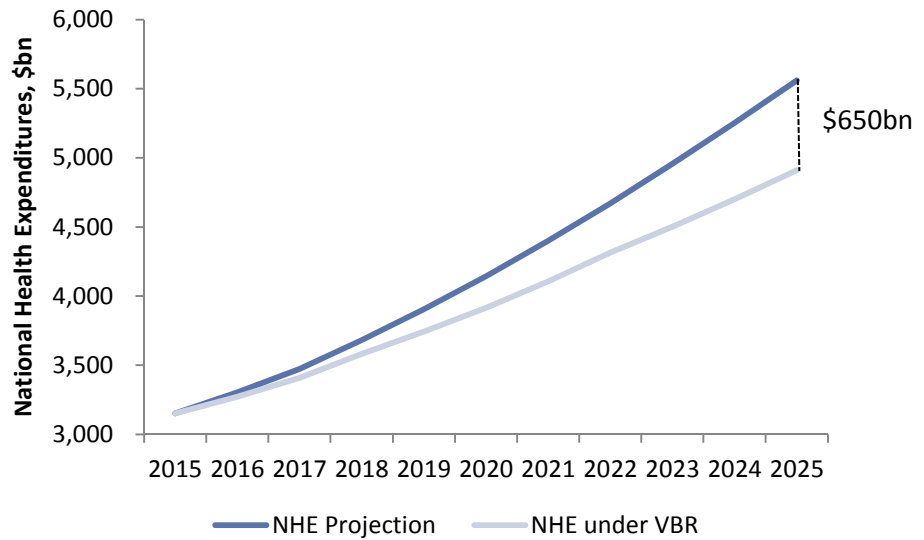
Exhibit 4: How US healthcare dollars are spent
 2015 National Health Expenditures by category



Source: CMS.

Exhibit 5: We estimate VBR moderating HC growth to in line with GDP growth could generate \$650bn in annual savings by 2025

National Health Expenditure (NHE) projections vs. healthcare spending under VBR



* We assume GDP growth of 4.5% as projected by CMS

Source: CMS, Goldman Sachs Global Investment Research.

How do we define “value”?

What is value-based reimbursement?

Simply put, the concept of value-based or risk-based reimbursement refers to paying providers and manufacturers for “Outcomes vs. Inputs”, with higher revenue and margins paid for quantifiable improvements in clinical results with the hope of reductions in the cost of care over time. Across the healthcare sector many constituents characterize this change as a “shift to value” over “volumes”.

Continuum of Reimbursement Models

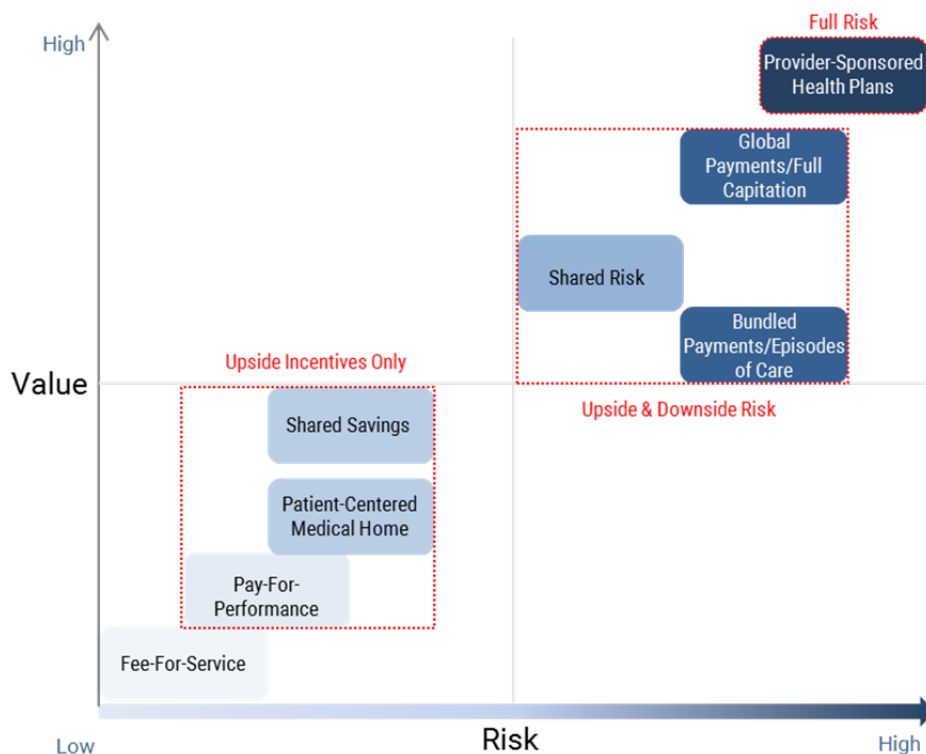
Though sharing some elements, fee-for-value reimbursement models cover a broad spectrum ranging from fee-for-service linked to value/quality benchmark upside payments, to collaborative value-based arrangement such as Patient-Centered-Medical-Homes and Accountable Care Organizations (ACOs), to capitation or “bundled payments” (providers reimbursed a pre-determined sum by payers to manage a patient’s overall health or deliver a specific health outcome). Not surprisingly, provider adoption and success has been stronger at the lower end of the risk/value curve and there have been many initiatives over the years that could be bucketed under Pay-for-Performance. That said, public and private payers have been pushing providers to embrace alternate payment models, and increased experience and data should allow for greater adoption of higher risk/value approaches.

Below, we lay out the 4 major categories of provider reimbursement across the value /risk continuum:

- 1) **No Risk:** This category refers specifically to **Fee-for-Service (FFS)**, in which a provider charges a specific price for each service performed and product used. FFS remains the dominant reimbursement model in the US.
- 2) **Upside Incentives Only:** The 2nd category includes 3 main value-based models, which have existed for a few decades in a variety of forms. This includes:
 - **Pay-For-Performance (P4P):** Combines the traditional FFS model with potential incentive payments for reaching quality and efficiency benchmarking (current examples include PQRS and Physician Value-based Payment Modifier).
 - **Patient-Centered Medical Home (PCMH):** Reimburses participating providers at higher levels for providing a care management, preventative level of service to associated patients.
 - **Shared Savings:** Providers share in savings generated below negotiated benchmarks if certain cost and quality metrics are met.
- 3) **Upside and Downside Risk:** Further down the risk continuum, these arrangements incite providers to deliver care at predetermined reimbursement levels. Though for low-performing providers this could result in meaningful losses, high-performing providers that can deliver care at costs below the reimbursement level would potentially keep the generated difference. Paramount in these set-ups is the associated quality metrics used to ensure providers do not achieve savings by withholding care. Specific models include:
 - **Bundled Payments / Episodes of Care:** Lump sum for all services and inputs to treat a disease or perform a procedure for a defined time period or clinical outcome.

- **Shared Risk:** Provider shares in savings and losses depending on performance vs. cost and quality benchmarks.
 - **Global Payments / Full Capitation:** Providers receive a periodic, fixed fee for managing all health aspects of a patient for a defined time period.
- 4) **Full Risk:** The most comprehensive level of risk, we define full-risk as a complete convergence between the payer and provider. This has mainly been accomplished through **Provider-Sponsored Health Plans** such as those run by Kaiser Permanente, UPMC, or Geisinger, where patients are enrolled in narrow-network health plans owned by the health system and a decline in the cost and quality of care could directly impact health system profitability and health plan enrollment. Additionally, some payers have started to acquire providers (UNH’s OptumHealth being the most notable example) in the effort to provide a fully-integrated level of care.

Exhibit 6: Matrix of healthcare reimbursement models based on value and risk



Source: Goldman Sachs Global Investment Research.

Drivers of value-based adoption today

The traditional fee-for-service reimbursement model has been seen as having major drawbacks as it can create incentives for providers to drive higher levels of volume and pricing without enough of a correlation to quality outcomes. That said, adoption of alternative payment models in the past has been impeded by limited urgency and feasibility for providers to deliver Population Health level care. However, several factors have made the shift away from fee-for-service to value-base reimbursement more vital and achievable.

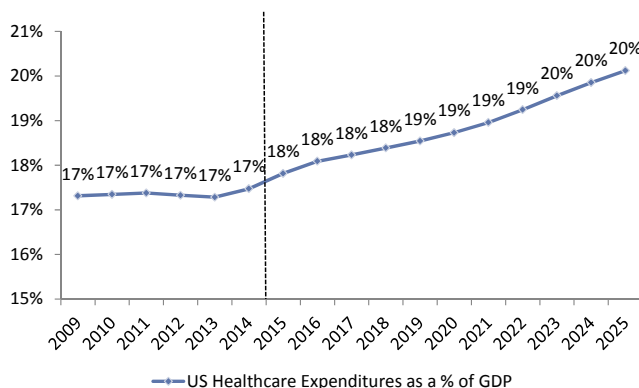
The need for a change is being driven by: **(1) the unsustainable level of US healthcare costs** (which are expected to consume 20% of GDP and 38% of the Federal Budget in the next decade), **(2) growing patient cost burden** (driven by adoption of high-deductible plans and rising costs), **(3) provider consolidation** (which allows major health systems enough breadth of coverage to deliver more comprehensive, Population-level care), and **(4) technological adoption/advances** (EMR adoption, Analytics, IoT/Remote Health monitoring).

Healthcare costs are reaching unsustainable levels with limited payback

- US Healthcare costs becoming unsustainable:** The spiraling growth in healthcare spend (which after 4 straight years of growing roughly in line with GDP), accelerated in 2014 and is expected to outpace GDP growth by 130bp through 2025) is reaching unsustainable levels for public and commercial payers. US healthcare costs now constitute roughly 18% of GDP, with the expectation to rise to just over 20% by 2025 due to cost inflation and increased utilization from an aging demographic. In this vein, healthcare as a % of the federal budget is expected to rise by 600bp by 2025, increasing the deficit and crowding out investments in other segments of the economy.

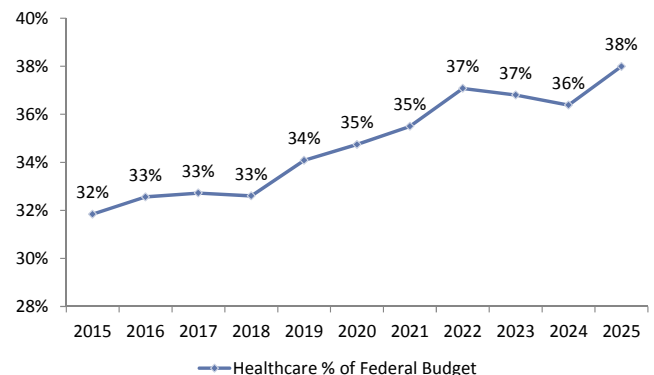
US healthcare costs are expected to rise to 20% of GDP and 38% of the Federal Budget by 2025

Exhibit 7: US Healthcare Expenditures as a % of GDP are expected to continue rising to ~20% in 2025 ...
US National Health Expenditures as a % of GDP



Source: CMS.

Exhibit 8: ...and consume a larger portion of the federal budget
Includes Medicare, Medicaid, CHIP, and insurance subsidies for the public exchanges

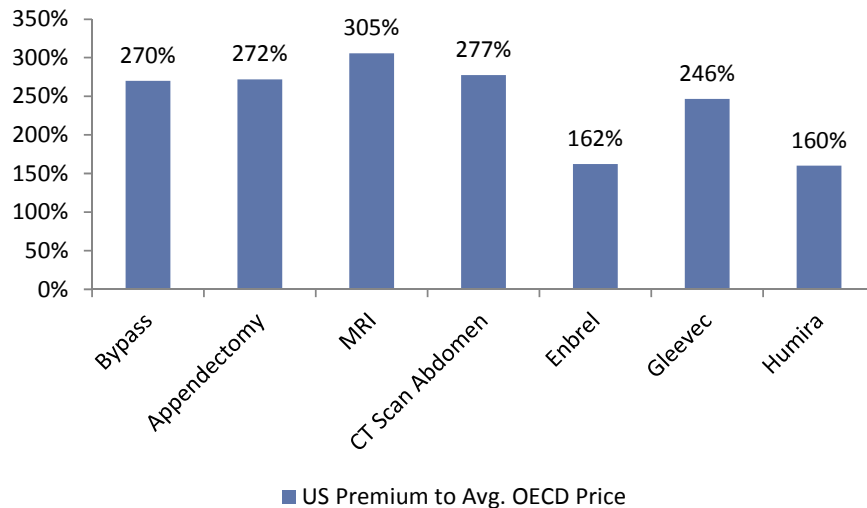


Source: CBO.

- Spending more than others with limited payback:** Despite spending ~2.5x more per capita than the average OECD country, among 13 major developed countries

that report the statistics, the US has the lowest life expectancy, highest rate of infant mortality, highest elderly incidence of multiple chronic conditions, and highest obesity rate.

Exhibit 9: US healthcare costs are multiples above other developed countries
US cost premium to OECD country average for frequent procedures and drugs



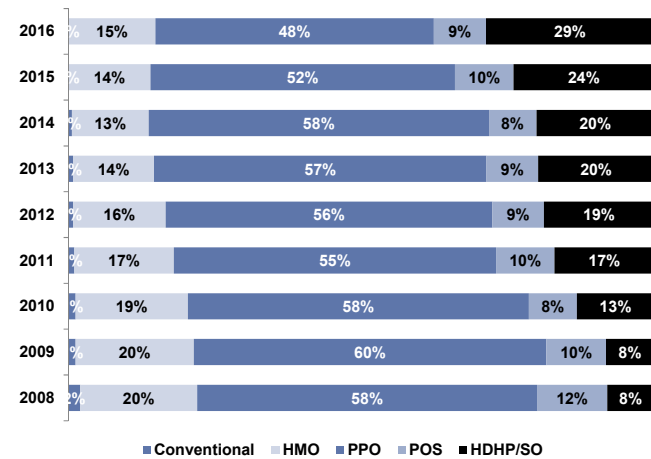
Source: OECD Health Statistics 2015.

Rising patient cost burden threatens demand/affordability of care

At the same time costs are nearing unsustainable levels, more of the burden is being shifted to consumers who will have greater difficulty paying, reducing access to care, consumption of care, and provider profitability.

- Consumers bearing more costs:** Per data from the 2016 Kaiser Family Foundation Employer Benefits survey, the % of covered employees enrolled in high-deductible health plans (insurance plans where an individual/family is responsible for at least the first \$1,300/\$2,600 of non-preventative healthcare expenses) has more than tripled since 2009 to 29%. Despite the delay of implementation of the Cadillac Tax to 2020 and uncertainty around its ultimate implementation if the ACA gets revised or repealed, we expect this trend towards greater patient cost-sharing will likely continue to accelerate over the next several years.
- More patients with coverage are forgoing medical treatment:** Though ACA coverage expansion over the past several years has increased total healthcare coverage and consumption by low-income individuals, rising healthcare costs and the shift to high-deductible plans are causing an increasing number of middle and high-income patients to delay medical care.

Exhibit 10: A growing share of the population is being enrolled in high-deductible health plans ...
 Distribution of employer-sponsored healthcare coverage by plan type



Source: Kaiser Family Foundation Employer Benefits Survey.

Exhibit 11: ... which given the cost of medical care is causing an increasing number to delay medical care
 Percent of Americans delaying medical treatment by income level and payer

% of Americans Delaying Medical Treatment			
By Annual Household Income	2013	2014	Δ
Under \$30,000	43%	35%	-8%
\$30,000 to \$74,999	33%	38%	5%
\$75,000 or more	17%	28%	11%

By Healthcare Coverage	2013	2014	Δ
Private	25%	34%	9%
Medicare/Medicaid	22%	22%	0%
Uninsured	59%	57%	-2%

Source: Gallup.

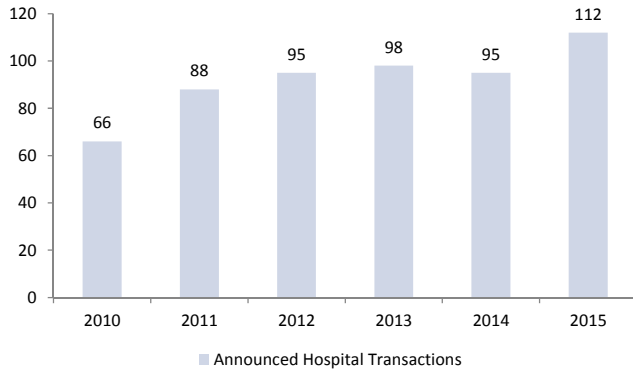
- Consumers are having a harder time paying healthcare bills:** Also, the growing out-of-pocket cost burden on patients also threatens to impact both cash flow and bad debt with providers, as Days in Accounts Receivable (DAR) for ATHN's physician client base spiked 290bps in 2015 from 2013 lows.

Provider consolidation allows for Population-level care and savings

The prospect of rising reimbursement pressure and increased regulatory demands has spurred a growing level of consolidation across the healthcare ecosystem. Not surprisingly, this has become a dominant theme among providers, with accelerating combinations across acute, ambulatory, post-acute, and alternate sites. Though consolidation has its downsides for the system under the current fee-for-service model (increased provider consolidation in geographic markets has been correlated with higher FFS pricing), it should enable hospitals and physicians to provide Population-level care for a lower cost under a VBR model. This is due to their ability to deliver greater standardization of care (clinical and operational), improve operating efficiencies (bargaining power with vendors and shared resources), benefit from revenue diversification, and coordinate care across the system.

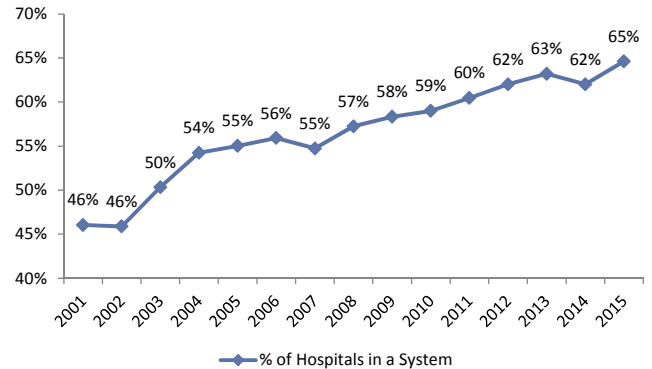
- Hospitals are increasingly owned/aligned with larger health systems:** Per data from Kaufman Hall, the number acute facilities being acquired annually has increased by 70% since 2010 (112 in 2015 vs. 66 in 2010). Furthermore, per AHA Hospital Data, 65% of hospitals were part of larger health systems by 2015, a significant increase from 46% in 2001.

Exhibit 12: Hospital M&A has increased 70% since 2010
Announced US hospital transactions



Source: Kaufman Hall.

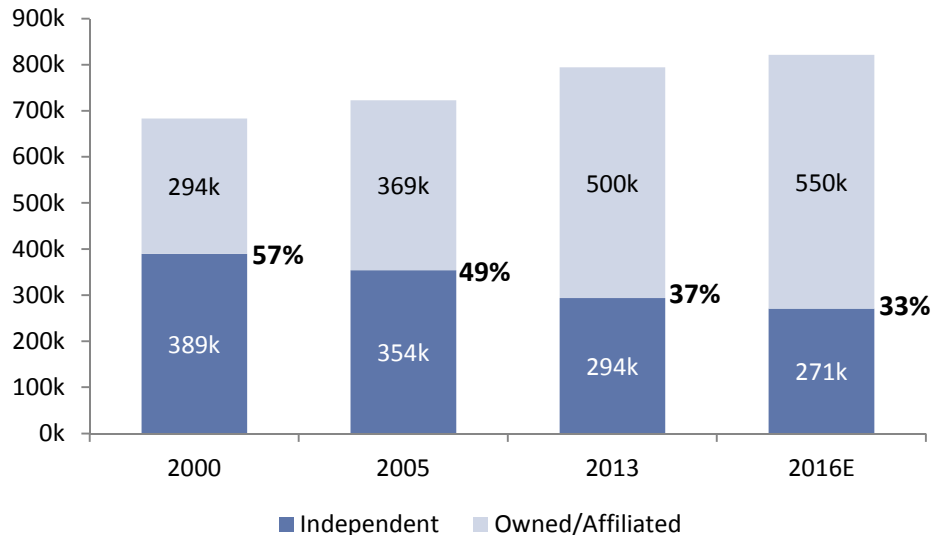
Exhibit 13: Nearly 2/3 of hospitals were part of a larger health system in 2015, up from 46% in 2001
Non-federal hospitals that belong to a larger health system



Source: AHA Hospital Data.

- The majority of physicians now operate under a larger organization:** Regulatory IT and reporting requirements as well as reimbursement concerns have pushed a significant portion of US physicians to join hospital-owned/affiliated organizations and large physician groups. As a result, only 33% of employed physicians per a recent Accenture survey expect to be independent in 2016, vs. 37% in 2013 and 57% in 2000.

Exhibit 14: Only 1/3 of physicians remain independent in 2016, vs. nearly 60% in 2000
Percent of physicians identifying as Independent or Owned/Affiliated



Source: Accenture

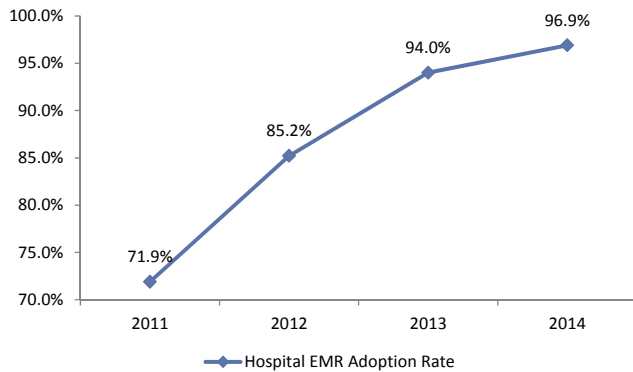
- Provider consolidation is driving meaningful operating efficiencies:** Hospital-owned multi-specialty physician groups report needing 36% less support staff than physician-owned counterparts, and physician-owned multi-specialty groups spent 12.2% less on general operating costs if part of an ACO per the MGMA.

Rapid HCIT adoption is making value-based care possible

In order to effectively stratify risk for a patient population and make timely, clinical interventions prior to an acute episode occurring, providers need sophisticated IT tools. As a result, one of the greatest enabling forces for value-based reimbursement has been the broadening adoption of Healthcare IT among healthcare providers, including the digitalization of clinical data through Electronic Medical Records (EMRs) and the implementation of advanced Population Health solutions above the EMR to utilize the collected data. Though most current IT offerings still leave much to be desired (particularly as it relates to interoperability), forward-thinking health systems and ACOs have been investing in best-of-breed technology to derive clinical/operational benefits, engage with physicians/patients, and better price the actuarial risk inherent in value-based reimbursement.

Exhibit 15: Hospital EMR penetration has now reached ~97%...

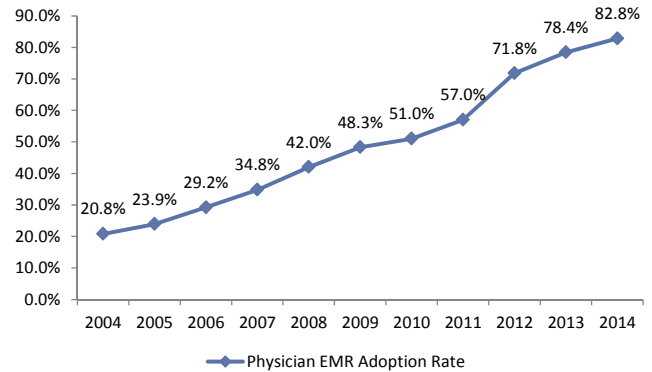
Acute adoption of certified EMRs



Source: ONC, AHA.

Exhibit 16: ... and Physician EMR penetration has increased by ~35pp over the past 5 years

Ambulatory adoption of certified EMRs



Source: CDC.

Sectors in Scope: How Healthcare Responds

As public and private payers continue to push adoption of value-based reimbursement and the growing cost burden of our healthcare system threatens patients' ability to afford care, we believe incumbent healthcare companies will need to adapt their investment priorities and business model to fit a more cost-conscious, evidence-driven environment.

Though this structural shift in healthcare reimbursement would inevitably create losers in the market place, we think early movers and innovators will be able to manage the transition more effectively and position themselves to benefit through market share gains or new revenue streams. In this section, we lay out how value-based reimbursement is impacting the major healthcare subsectors, opportunities and recent programs that demonstrate how early adopters are responding to change, and our view of how the subsectors will evolve/fare over time.

- **Managed care** (p. 20)
- **Providers** (p. 22)
- **Supply chain** (p. 25)
- **Healthcare IT** (p. 27)
- **Pharma & Biotech** (p. 29)
- **Medtech** (p.32)

Managed Care

Sector impact

The shift to value-based reimbursement offers both potential risks and rewards for the sector. On the plus side, VBR could open up more collaborative relationships with industry stakeholders, deliver new revenue streams for payers (care management, Healthcare IT, consulting), and provide for greater predictability and visibility into cost trend (by reducing cost variances and giving payers more real-time insight into provider data). That said, restructuring contracts with provider networks in new, untested models carries pricing risk and the greater focus by both government and employers to contain costs could prove difficult for payers to balance with quality measures. Moreover, payers that are not ahead of the curve could face market share risk from more sophisticated Managed Care firms or the growing number of providers exploring health plan ownership.

How the sector is responding

The Managed Care industry has rapidly been expanding their participation in Commercial and government-led ACO programs (Medicare Shared Savings Program, NextGen ACO, Medicaid ACOs). Per Leavitt Partners, the number of operational ACOs in the US reached 838 in 1Q16, up more than 5-fold vs. 1Q12, and the number of patient covered under ACO contracts rose to 28.3mn, roughly 10% of the insured US population. In addition, more progressive payers like UNH and AET have been expanding their IT and Services capabilities (primarily through M&A though also increasingly through organic headcount and R&D investments) to better enable providers to succeed in their risk-based contracts as well as capture additional revenue streams. Though most ACOs remain in the early stages (and therefore it still is difficult to evaluate their long-term viability), new models such as the NextGen ACO (detailed below) have been met with interest (21 participants in 2016) with payers and providers attempting to assume greater levels of financial risk and therefore capture greater potential financial upside.

Our view

We do not see VBR moving the needle for Managed Care meaningfully from a financial standpoint in the next 1-2 years. For starters, the immediate savings are relatively small when compared against absolute healthcare spend still being managed. Secondly, current participation in value-based initiatives remains a relatively small (but growing) portion of Managed Care enrollment. That said, we expect increased participation as the industry proceeds along the road to value, perceived risk of participation declines as the ACO model proves viability, and insurers take a greater role in driving savings. Currently, UNH is the only public HMO to run a NextGen model ('Optum ACO', AZ) while others have just partnered (i.e., AET, HUM). On a near-term basis, we expect programs like the NextGen ACO model to continue to adapt as the program gains traction. Over the long-term, we would expect newer generation ACO models to build off the NextGen ACO. More importantly, we expect broader participation as the ACO model becomes more widely accepted. As the original ACOs trail blaze and develop their individual care structures, perceived risk could decline as participants begin to pave paths to success. We expect that plans will hone their processes and begin to identify the most important factors for savings.



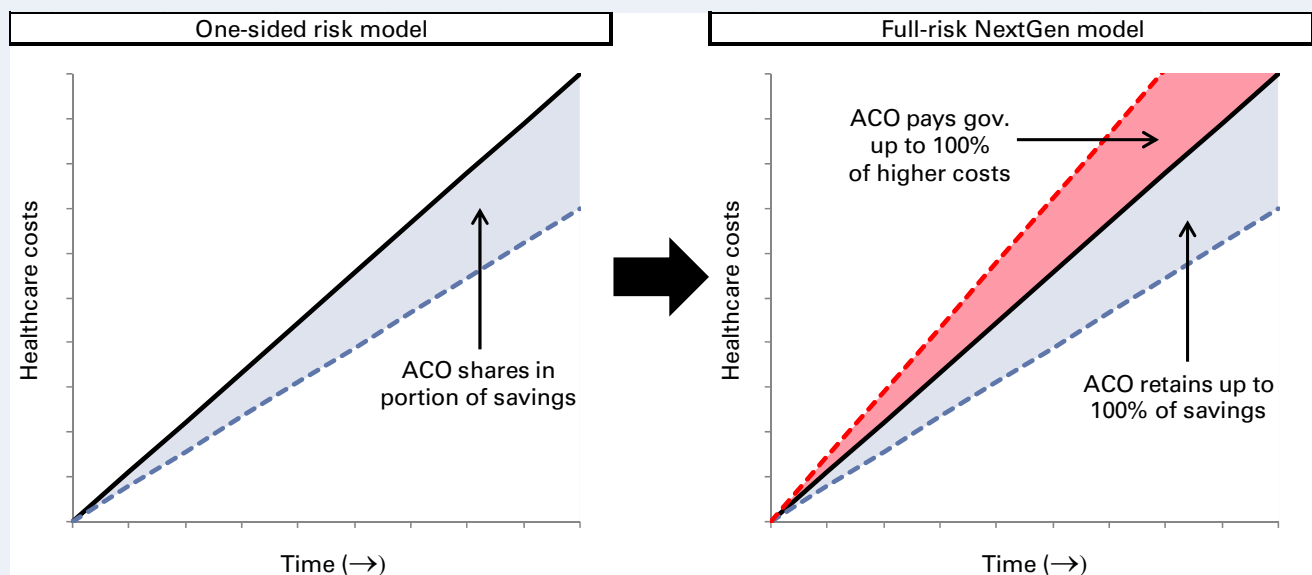
NextGen ACO Program

Purpose background/description: With the launch of the Pioneer and MSSP models (2012), there have been significant strides toward developing a sustainable comprehensive care model. At the same time, there is room to improve the care model after lessons were learned from the first trial of ACO participants (such as beneficiary turnover and difficulty earning yoy savings). In an effort to build upon the earlier experiences, CMS launched the Next Generation ACO (NGACO) in 2015 as a high intensity shared risk model, where participants can share up to 100% of the financial risk (with a +/- 15% cap). In simple terms, this means the ACO participants could capture any and all savings driven from better outcomes and lower expenses. Conversely, they would also be at risk for the inability to generate savings against the benchmarks (i.e., they would pay the government if savings are not generated).

Desired outcome: At a high level, CMS' goal is to improve the quality of care, improve population health, and lower growth in health expenditures. The increased cost sharing is meant to drive increased savings by allowing participants to be more invested in outcomes. Since many of the applicants have already participated in prior demonstrations and all the NGACOs are already experienced with risk-sharing, this is meant to be the next step of the ACO evolution. On a micro level, the goal is to create a more sustainable model with increased risk sharing among participants and enhanced medical savings. CMS hopes to improve patient engagement via (1) better medical access (telemedicine, home visits, SNFs), and (2) reward payments for participating with the ACO (e.g., the patient could receive a cash reward for primarily using the ACO). Separately, CMS planned to reduce participant attrition by introducing relative efficiencies versus the ACO benchmark (i.e., plans that have already achieved certain cost synergies will not be expected to generate the same degree of cost savings versus those that haven't), whereas inefficient networks may have previously had an advantage since it would be relatively easier for plans with a higher cost base to improve savings.

The shift to the NextGen ACO model

Illustration of costs vs. time, against the individualized cost benchmark



Source: CMS.

Providers

Sector impact

As the major healthcare cost center and deliverers of care, providers stand the potential to see the most disruption and risk from the shift away from FFS to VBR (particularly for late adopters or less efficient organizations if contract benchmarks aren't built with a sufficient amount of flexibility). As a result, the ultimate pace of VBR adoption will depend on the financial and organizational success the majority of providers have in navigating the changing landscape.

How the sector is responding

From a high-level, the shift to value and general industry cost pressures have led to a significant wave of horizontal and vertical consolidation by providers. Per AHA Hospital Data, 65% of hospitals were classified as part of larger health systems by 2015 vs. 46% in 2001. In addition, the % of primary care physicians employed by hospitals doubled between 2012-2014 and the % of independent physicians has declined significantly to only 33% in 2016. Under a VBR model, this increase in consolidation should allow for multiple benefits to providers including the ability to deliver greater standardization of care (clinical and operational), improved operating efficiencies (bargaining power with vendors and shared resources), revenue diversification, and greater ability to gain regional market share.

Furthermore, through CMS programs such as the Comprehensive Primary Care Model (CPC and CPC+) and private payer collaborations, many providers have been transforming the incentives and workflow for physicians and other clinical staff to have a greater focus on and direct financial tie-in to care management and coordination with peers across the health system.

Additionally, we have seen an increased number of providers looking to operate owned health plans similar to a Kaiser Permanente, UPMC, or Geisinger to better learn how to navigate risk, steer greater volumes in network, and capture a greater portion of revenue/profit to offset any future provider cost pressures.

Our view

We expect provider consolidation to remain a significant trend within the industry and expect horizontal consolidation or partnerships to increasingly include other settings of care (Home Care, post-acute, specialists). That said, we expect the provider market (particularly the public systems) to approach VBR carefully and at a moderate pace as FFS remains the vast majority of revenue for most health systems and carries significantly less operational risk in the near-term. However, we are constructive on many of the care and quality initiatives underway (particularly on the quality side) and expect to see more programs like CPC/CPC+ that aim to improve coordination of care by empowering physicians at the local level make the right decisions for their patients through appropriate incentives and access to data.

Aside from the broader theme of provider industry consolidation, we believe the public physician outsourcing firms and alternate site providers, including freestanding ambulatory surgery centers ("ASCs"), offer another angle to invest in the VBR theme. Larger physician outsourcing chains (EVHC and TMH) are uniquely positioned to leverage IT/data analytics and best practices across their national client portfolio to the benefit of local hospital clients focused on improving quality of patient outcomes and improved care coordination within the hospital setting as well as in the post-acute space (e.g., skilled nursing facility, rehab, home healthcare). The latter has become increasingly important to hospitals with the rise of new bundled payment models from CMS and given recent regulations that limit reimbursement in the event a patient has to be readmitted to the

hospital. We also see opportunity for ASC companies (SCAI and SGRY), which have a distinct cost advantage over hospitals – this has become increasingly important with the “consumer-ization” of healthcare and increased patient cost-sharing (e.g., high deductible health plans). On a comparative basis for similar types of procedures, ASC reimbursement rates are approximately 55% to 60% (on average) of those charged by hospital outpatient departments. Moreover, physicians and patients tend to prefer ASC settings due to ease of scheduling and specialization of support staff. Similar to the physician outsourcing firms, national ASC chains are able to leverage scale and share best practices/expertise across their portfolios to improve patient outcomes while lowering costs. Going forward, we see these ASC companies as uniquely positioned to facilitate adoption of quality-/risk-based reimbursement models either for themselves or in coordination with other healthcare providers.

Comprehensive Primary Care Model



Purpose background/description: To address the need for coordination of care and promote “population health management”, CMS implemented the Comprehensive Primary Care Model (CPC) program in 2012 and followed with the CPC+ model that will begin in early 2017.

CPC (1st generation, Oct 2012 – Dec 2016): In the first generation of CPC, CMS worked with insurers in seven U.S. regions to offer population-based care management fees (monthly, non-visit based payments) and opportunities for shared savings to primary care practices to support five core functions: (1) Risk-stratified Care Management; (2) Access and Continuity; (3) Planned Care for Chronic Conditions and Preventive Care; (4) Patient and Caregiver Engagement; (5) Coordination of Care across the Medical Neighborhood. The seven regions were selected based on interest from payers while practices were selected through a competitive application process. As of October 2015, there were 2,188 participating providers (445 practices) serving ~2.7mn patients (incl ~410k Medicare/Medicaid patients) and 38 participating public/private payers.

CPC + (2nd generation, Jan 2017 – Dec 2021): CPC+ expands on CPC to accommodate up to 20 regions, 5,000 practices (20,000 clinicians), and 25mn patients. CPC+ builds on learnings from the first generation CPC while also providing practices with patient-level cost/utilization data to support decision making. CPC+ also introduces alternative payment tracks to provide greater flexibility to encourage doctors to focus on health outcomes rather than the volume of visits or tests.

Results: During the first 12 months of CPC, the program appeared to have reduced monthly Medicare expenditures by \$14 (~2%) on a per beneficiary basis, excluding the monthly care management fee that averaged \$20. In 2014, which was the first shared savings performance year reported (results announced in October 2015), 90% of CPC practices met patient experience targets, CPC regions had lower-than-targeted readmission rates and CPC participating PCPs were scored highly by patients in communication and timely access to care. On costs, four out of the seven regions generated gross savings; \$24mn overall gross savings (excluding care management fees). While cost vs quality benefits results were mixed, it may be too early to extrapolate success of the program as experts had anticipated it would take 18 months to three years to transform practices and witness the real effects on quality, service use and costs.

Summary of impact estimates on key outcomes for the first year of CPC (Oct 2012 - Sep 2013)

Medicare expenditures and service use	All Regions	Quality-of-care process measures	All Regions
Expenditures without fees	-2%**	Compliance with all 4 diabetes measures	3%
Expenditures with fees	1%	Continuity of care: % of primary care visits at attrib practice	1%
Hospitalizations	-2%*	Transitional care: 14-day follow-up to hospitalization	0%
Outpatient ED visits	-3%***	Quality-of-care outcome measures	
		ASCS admissions	1%
		Readmissions	-4%

Statistically significant at 10%*, 5%** and 1%*** levels, two-tailed test.

Source: CMS, Mathematica Policy Research (January 2015).

Supply Chain

Sector impact

Though there are some examples where Supply Chain participants could be included within VBR programs and join directly in the financial risk/reward, the majority of interaction for the Supply Chain will likely come as a second derivative impact from Services and Manufacturer customers. As a result, downside pricing and mix shift risk in our view will be partly dependent on how fast and successful Supply Chain customers are at adopting VBR and whether customers ultimately view the Supply Chain as more of an enabler of that change or an area of cost that can be rationalized further. That said, there is ample opportunity for the Supply Chain to offset any margin pressure through expanding their existing footprints in private label, Healthcare IT, and Consulting as well gaining greater leverage to lower-cost growth segments such as post-acute and retail clinics.

How the sector is responding

Though admittedly still a small piece of their overall revenue and earnings, Supply Chain participants through M&A and organically have been bundling more higher-margin Consulting and IT solutions to increase customer loyalty and economic value. Furthermore, we've seen several Supply Chain acquire into adjacent Supply Chain sectors to offer a more complete, end-to-end portfolio including Home Care distribution, infusion services, retail clinics, Specialty Pharmacy.

In addition, the Supply Chain has looked to get more aggressive with its existing cost control solutions. PBMs such as ESRX and CVS have announced therapeutic category specific value-based models that include greater downside protection for payers through utilization of narrower formulary/retail networks and higher care management/adherence solutions for patients. Distributors have expanded private label offerings for generic drugs and less complex medical surgical supplies and clinical products.

Our view

For the Supply Chain, the shift to value-based reimbursement should not in our view meaningfully alter business models for distributors or PBMs in the near-term and therefore not present much risk to earnings. Longer-term, we see revenue and margin opportunities for the sector as companies leverage their scale and clinical breadth to deliver value-add services, though potential pricing pressure for its Pharma and Medtech clients could bleed into rates and top-line growth throughout the chain. We would also note that some increased blurring of the line between the Supply Chain and providers could provide some direct exposure for the group. For example, MCK's significant ownership presence in the community oncology space (through its acquisitions of US Oncology and Vantage Oncology) makes it one of the largest participants in CMS' Oncology Care Model program.

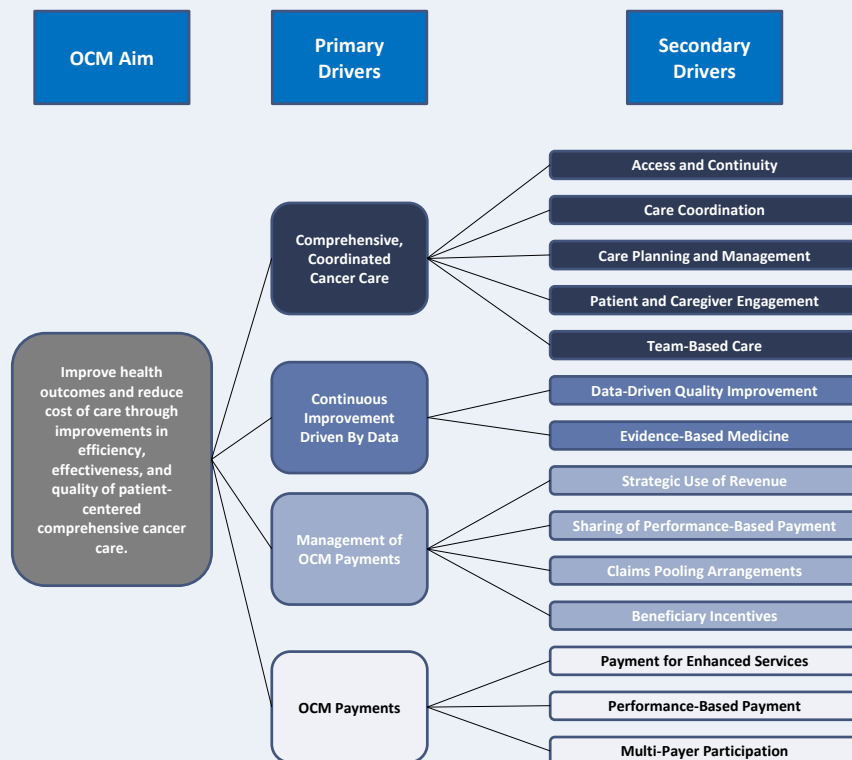
Oncology Care Model



Purpose background/description: Cancer diagnoses are amongst the most common and deadly diseases in the United States, with >1.6 million people diagnosed each year. Oncology represents the largest market for Specialty drugs at \$39bn in 2015 (growing at a 13% estimated CAGR between 2011-2015) and, according to the NIH, cost the US an estimated \$263.8bn in medical expenses and lost productivity in 2010. To better manage oncology care, CMS announced in 2015 the Oncology Care Model (OCM), an innovative new program for oncology practices and centers related to episodes of care for patients undergoing chemotherapy during a 6-month episode. Practices will enter into payment arrangements that offer retrospective, incentive-based payments linked to cost and quality benchmarks. Also, providers will receive a \$160 per-beneficiary-per-month fee to provide 24/7 access to clinicians with access to the patient’s medical record.

Desired outcome: OCM aligns financial incentives to improve care coordination, appropriateness of care, and access to care for beneficiaries undergoing chemotherapy. OCM provides an incentive to participating physician practices to rely on the most current medical evidence and shared decision-making with beneficiaries to inform their recommendation about whether a beneficiary should receive chemotherapy treatment with a heightened focus on furnishing services that specifically improve the patient experience or health outcomes. Practices will also receive monthly care management payments for each Medicare fee-for-service beneficiary during an episode to support oncology practice transformation, including the provision of comprehensive, coordinated patient care.

Oncology Care Model (OCM) Key Drivers and Changes



Source: CMS.

Healthcare IT

Sector impact

The shift to value-based reimbursement has been a growth driver for the HCIT industry, as the ability to identify, analyze, and manage at-risk patients requires a robust clinical and financial IT infrastructure as well as next-generation solutions beyond the electronic medical record. Though the bolus of provider IT spend between 2011-2013 driven by the 2009 stimulus act (which allocated ~\$35bn in incentive payments to hospitals and physicians for the adoption of EMRs) has mainly played out, the prospects of new reimbursement models and growing cost pressures have spurred health systems to adopt more sophisticated revenue-cycle management systems, variabilize operating costs by outsourcing their billing and IT departments to 3rd parties, and start major investments in Analytics and Care Management IT solutions.

How the sector is responding

Our HCIT coverage has prioritized Population Health as a strategic area for R&D investment and a necessary building block in its long-term growth model. Though most of the focus has been in internal development, we have seen an increasing appetite within and outside the sector to acquire niche vendors to build Population Health platforms (with UNH, AET and IBM the most notable new competitive entrants to the HCIT space). With regards to the types of products being developed, we have seen the greatest traction with Data Aggregation platforms, Analytics/Patient Stratification solutions, Care Management/Communication platforms, and Enterprise Data Warehouses. In addition, for providers looking to launch integrated health plans, Population Health-focused vendors such as EVH have also been providing consulting, utilization management, and claims administration.

Our view

We view Healthcare IT – as a 3rd party service/technology provider – as the cleanest way to gain leverage to the shift to value-based reimbursement, though for most vendors a more significant ramp in Population Health bookings and revenue could take several more years to materialize. That said, our channel checks and survey work suggests ample demand for Population Health solutions. Furthermore, the growing number of value-based initiatives such as Medicare Access & CHIP Reauthorization Act (MACRA) and ACO contracts has created data collection and reporting requirements which necessitate higher levels of IT adoption and utilization, which in our view should support a virtuous cycle of continued IT investment.

MACRA – MIPS and APMs



Purpose background/description: Despite attempts in the past to link reimbursement to cost and quality, most prior large-scale efforts by CMS to bend the healthcare cost curve have utilized less sophisticated tools such as reimbursement cuts and capped reimbursement growth. The most notable example of this was the Sustainable Growth Rate (SGR), part of the Balanced Budget Act of 1997, which attempted to limit increases to Medicare physician reimbursement to GDP growth.

However, provider rate cuts were continuously delayed by legislators as the statutorily required cuts continued to widen amid fast-paced healthcare growth. As a result, Congress changed the framework for how physicians will be reimbursed by Medicare within the Medicare Access & CHIP Reauthorization Act of 2015 (MACRA). The new legislation combines existing quality and IT reporting programs and ties increases in physicians reimbursement to participation in existing and future value-based programs (with non-participating physicians to experience reimbursement cuts).

Desired outcome: MACRA replaces a patchwork system of Medicare reporting programs (the Physician Quality Reporting System, or PQRS, the Physician Value-based Payment Modifier, and the Medicare Electronic Health Record Incentive Program, or Meaningful Use) with a system that allows physicians to choose from two paths that link quality to payments: the Merit-Based Incentive Payment System (MIPS) or Advanced Alternative Payment Models. MIPS is a base payment framework linking higher reimbursement starting in 2019 to a scorecard including quality metrics, IT reporting requirements, clinical practice improvement activities, and cost benchmarks. However, physicians may choose to join specific Alternative Payment Models (including the Comprehensive Primary Care Plus or Next Generation ACO model) sanctioned by CMS and receive at least the financial rewards eligible under MIPS.

Physician reimbursement will increasingly be dependent on value-based participation in 2019

Fee schedule for physicians participating in the Merit-Based Incentive Payment System (MIPS)

	2016	2017	2018	2019	2020	2021	2021-2025
Automatic Fee Schedule Updates	0.5%	0.5%	0.5%	0.5%	0.0%	0.0%	0.0%
MIPS	Quality			+/- 4%	+/- 5%	+/- 7%	+/- 9%
	Resource Use						
	Clinical Practice Improvement Activities						
	Meaningful Use of Certified EHR Technology						

Source: CMS.

Pharma & Biotech

Sector impact

Pharmaceutical spending remains a relatively small portion of overall healthcare spend (~10% of total US health expenditures in 2015). However, a growing disconnect between drug price setting and economic value to the system (particularly for Specialty categories), along with increased patient out-of-pocket responsibility, threatens to make drugs costs unaffordable for many patients and payers. Several recent high-profile cases of outsized drug price inflation (such as MYL's Epipen inflating 270% over a 5 year period), and higher-than-expected initial pricing for new drugs (such as GILD's Sovaldi for hepatitis C and BIIB/IONS' Spinraza for SMA, a lethal genetic disease, and potential IO-IO or even triple IO combos) have heightened public scrutiny on manufacturers and in some instances caused payers to restrict usage of certain drugs to contain cost. With respect to orphan drugs, we believe these are likely to remain insulated from significant pressure (European governments continue to pay for orphan drugs) given they represent a smaller proportion of total drug spend and many deliver significant benefit to patients.

This backdrop in our view has led to a moderation in brand price inflation (~8% in 2016 vs. ~11% in 2015) per our analysis of IMS data on the top 500 mature branded drugs, and thus far price increases announced on January 1st reflect this moderation. Nevertheless, most of the top drug franchises continue to experience price increases well above inflation or GDP growth, and announced commitments (eg, AGN's social contract to keep inflation rates below 10% annually) seem insufficient for what has become an acute problem for the system. Furthermore, Specialty drug launches such as hepC and PCSK9 that have been priced at high gross list prices have caused payers to simply restrict patient access to drugs until competition and greater rebating can be secured.

Beyond more aggressive private sector solutions, pharmaceutical cost pressures could trigger regulatory or legislative cost control measures on the industry. Through the Affordable Care Act (ACA), some structures aimed at changing the reimbursement landscape such as CMMI and IPAB already exist, though these specific regulatory entities could be subject to change under proposals to "repeal and replace" ACA. Nevertheless, broad bipartisan scrutiny of drug prices could still spur federal action and States could look to more tightly regulate drug reimbursement at the local level.

How the sector is responding

For the pharma and biotech sectors, we have seen several announcements of value-based arrangements between payers and manufacturers in therapeutic areas with potentially outsized impact on payer budgets (cancer, diabetes, cardiovascular) and where it is relatively easy to measure the outcome (tumor response, blood sugar, cholesterol level). These outcomes-based contracts have taken several different forms, including (1) linking a portion of drug reimbursement to specific patient outcomes, (2) charging different rates for different disease indications (based on varying clinical outcomes demonstrated from clinical trial and real world observation data), (3) providing better reimbursement levels for access to continued real world clinical data, and (4) more narrow and tiered formulary placement.

We also expect pharma and biotech companies to continue investing in real world observation and technology that can greater identify and justify clinical and financial value of products to avoid losing market share or margins. As a result, we expect manufacturers to look for ways to collaborate with payers and providers in an increasing number of procedural or disease-based bundled-payment initiatives to better ensure clinical guidelines are being followed to deliver value.

Our view

Though it remains uncertain whether current VBR models have enough direct mechanisms to rein in drug price inflation, a greater systemic focus on cost containment and realigned incentive structure for the prescribing physicians could supplement existing tools (formulary management, step therapies, clinical pathways) and further shift biopharma growth strategies from increasing price to increasing volume. We think this pressure could manifest more acutely on (1) less innovative manufacturers who have historically relied on price inflation to drive greater share of top and bottom line growth and (2) high-priced, chronic drug categories such as Rheumatoid Arthritis, Oncology, and Multiple Sclerosis where pricing pressure could yield a significant amount of savings over the patient lifetime and there already are several competing compounds. Reimbursement for certain indications within these categories could decline or payers could adopt a more expansive view of competitive alternatives if price concessions are substantial enough. Within these therapeutic categories, we see the following companies among the most exposed: Rheumatoid Arthritis – **ABBV, AMGN** and **JNJ**; Oncology – **CELG**; Multiple Sclerosis – **BIIB** and **TEVA**. Furthermore, even if the actual savings generated in the near-term are not enough to materially impact biopharma P&Ls, the specter of greater action in our view could lower the terminal value investors are willing to assign to pipeline assets and weigh on valuations.

From an investment perspective, we continue to favor innovative/volume based growth stories (LLY, BMY, REGN) that might be more immune to pricing pressure down the road. Please see our 2017 *Healthcare Outlook: Sands Shifted, Now Stuck in the Mud...* Dec 16, 2016.



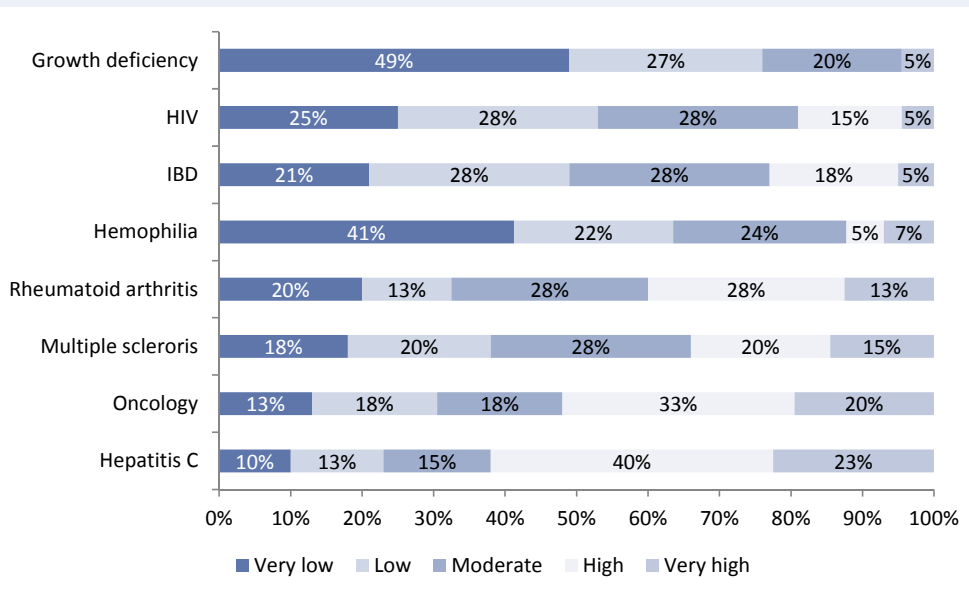
Outcomes-based Pharmaceutical Pricing

Purpose background/description: There has been increased interest from payers and manufacturers in exploring outcomes-based reimbursement or pay for performance, as a potential option for controlling specialty drug spend. In this model, payers and manufacturers will set clinical and/or cost benchmarks related to a specific drug, and then tie reimbursement and/or formulary tiering to achievement of those benchmarks. This is not a new idea, as some form of it has been in place for some drugs in Europe. In 2007, JNJ reached a risk-sharing proposal with the UK’s National Institute for Health & Care Excellence (NICE) to refund the cost of Velcade for multiple myeloma patients if their cancer did not respond to the drug after initial treatment. Per EMD Serono, 14% of U.S. payers have at least one pay-for-performance pricing arrangement, up from 10% in 2014, and another 30% of plans say they’ll have an outcomes-based deal in place within 12 months.

Desired outcome: Two examples of value-based drug agreements were for recently launched cardiovascular drugs, Amgen’s Repatha (PCSK9) and Novartis’ Entresto. For reference the annual gross prices of Repatha and Entresto are \$14,100 and \$4,500, respectively. Upon approval both companies announced novel pricing programs linking net price (post rebate) to outcomes. In Cigna’s most recent value-based pharmaceutical agreement, it contracted separately with Amgen and Sanofi/Regeneron for their PCSK9 inhibitors Repatha and Praluent. If Cigna plan members are not able to reduce their cholesterol levels at least as well as what was experienced in clinical trials, Amgen and Sanofi/Regeneron will further discount the cost of the drugs. Cigna and Aetna also signed a contract earlier this year with Novartis for Entresto, with the magnitude of rebates tied to whether Entresto can generate a reduction in the proportion of plan members with heart failure hospitalizations. Given a more general clinical endpoint, Novartis’ Entresto agreements require an even more sophisticated level of data collection and clinical measurement than other value-based pharmaceutical arrangements.

~70% of US Health Plans expressed very low to moderate interest in outcomes-based models for most Specialty categories

US Health Plan interest in entering into outcomes-based contracts with manufacturers by therapeutic category



Source: EMD Serono.

Medtech

Sector impact

A shifting reimbursement landscape and new delivery models may simultaneously threaten price and provide opportunities for Medical Technology companies to take wallet share across the care continuum. As a sector, Medical Technology has historically faced pricing pressure (low to mid-single-digits annually), and therefore relied on innovation to offset these headwinds. However, a shift to VBR could place an incremental burden on those companies which are unable to innovate their way through potential pricing headwinds. In contrast, a greater focus by providers and payers on patient adherence and more proactive care could also create revenue opportunities for those companies with a focus on early detection and treatment of disease (Cardiology, Cancer Diagnostics).

How the sector is responding

There have been some early examples of outcomes-based pricing models within Medtech, however the practice remains less prevalent as it is harder to link specific outcomes to use of devices. Practically speaking, it has been difficult to define the span of time to measure outcomes associated with procedures employing Medical Devices. That said, VBR initiatives such as the CMS's Comprehensive Care for Joint Replacement (CCJR) program have suggested that change within the Medical Technology sector is likely on the horizon. Accordingly, management teams have responded by increasing focus on scale, digital health, remote patient monitoring, and connected devices (see our June 29, 2015 Internet of Things report, *The Digital Revolution comes to US Healthcare*). Notably, we have seen incremental organic and inorganic investment in both service and diagnostics businesses that complement traditional medical devices and implants. Management teams are attempting to capture additional wallet share and profit pools associated with each patient's treatment protocol (MTD & BSX are two key examples).

Our view

We expect the scope and breadth of value-based arrangements for Medical Technology to stay relatively limited in the near-term until there is greater ability to collect and analyze more complex patient data and outcomes. That said, we believe initiatives such as CMS's CCJR reimbursement model suggest that VBR plans are likely to take hold in Medtech in the coming years.

Accordingly we believe the increased focus on clinical and financial value could pressure less innovative manufacturers operating in crowded areas. We highlight basic hospital supplies (BCR, BDX), traditional joint replacement (SNN, SYK, ZBH), rhythm management (ABT, BSX, MDT), and legacy in vitro-diagnostics (ABT, DHR, QGEN) as potential areas where pricing pressure could be more acute. Also, we believe hospitals/providers are more incentivized to make purchasing decisions based on price in these competitive markets. We think this environment favors companies with economies of scale that can offer providers/hospitals a comprehensive suite of offerings across various diseases and treatment paradigms (MDT, ABT, HOLX).

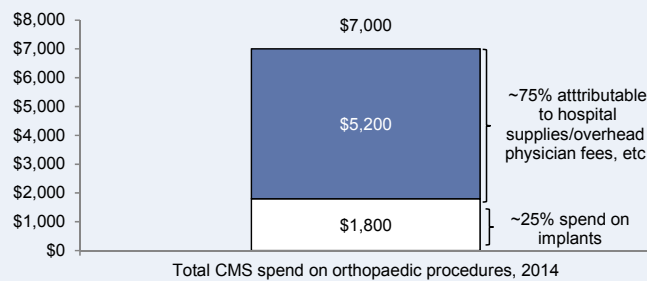


Comprehensive Care for Joint Replacement (CCJR)

Purpose background/description: Starting on April 1, 2016, CMS mandated that hospitals across 67 geographic areas will have their reimbursement for lower extremity joint replacement procedures linked to meeting cost and quality benchmarks, spanning the continuum of hospital, physician office, and long-term care services and stays occurring within 90 days of discharge. Specifically, over a 5-year period, participating hospitals that are able to keep total episodic costs below a blended regional/historical benchmark and attain a composite quality score will receive bonus payments, while hospitals that fall short of these benchmarks will have to reimburse Medicare for a portion of cost of care.

Desired outcome: CMS' goal is to provide hospitals a financial incentive to work with physicians, home health agencies, skilled nursing facilities, and other providers to make sure beneficiaries get the coordinated care they need. CMS expects to save \$343mn over a 5-year period while reducing the variability of clinical outcomes, and anticipates 23% of Medicare hip and knee replacements to be reimbursed under this model by 2020

CMS spend on orthopedic procedures \$ in millions; 2014



Source: CMS.

Source of hospital savings: implants vs. other % savings; based on 2014 total CMS ortho spend

		Change in other costs (hospital supplies, physician fees, hospital overhead etc.)				
		0%	(5%)	(10%)	(15%)	(20%)
Change in implant ASP	0%	0%	4%	7%	11%	15%
	(5%)	1%	5%	9%	12%	16%
	(10%)	3%	6%	10%	14%	17%
	(15%)	4%	8%	11%	15%	19%
	(20%)	5%	9%	13%	16%	20%

Source: Goldman Sachs Global Investment Research.

Case Studies: Policy Corner

The ability of value-based reimbursement to drive sustainable reductions in costs as well as improvements in clinical quality is still a work in progress, but early results show promise. Longer-running programs such as Medicare Shared Savings have demonstrated significant cost and quality outcomes, though success so far has not be as wide-scale as hoped. In this section we examine early results from these programs and discuss the evolution in managed care network design needed to help programs reach the scale needed for broad cost and care transformation.

- **Medicare Shared Savings Program** (p. 38)
- **Bundled Payments for Care Improvement** (p. 39)
- **Commercial ACOs** (p. 40)

Case Studies yielding mixed results but early promise

Over the past two years, there has been a significant push by both CMS and private payors for healthcare constituents to build upon prior value-based pilots and move further down the value and risk continuum. As a result, multiple new value-based initiatives are slated to begin by early 2017, including MACRA, Comprehensive Care for Joint Replacement (CCJR), Comprehensive Primary Care Plus (CPC+) and the Next Generation ACO program.

These programs mostly build upon prior pilots (such as Bundled Payments for Care Improvement and Medicare Shared Savings), with the primary differences being a greater number of mandatory programs and increased risk-reward from a reimbursement standpoint. Though execution within the programs will likely be challenging for some, the increased financial opportunity newer value-based programs are offering, greater experience by more sophisticated providers in managing risk-based reimbursement, and faster growth of public covered lives has per our conversations with industry participants led to significant interest in participation.

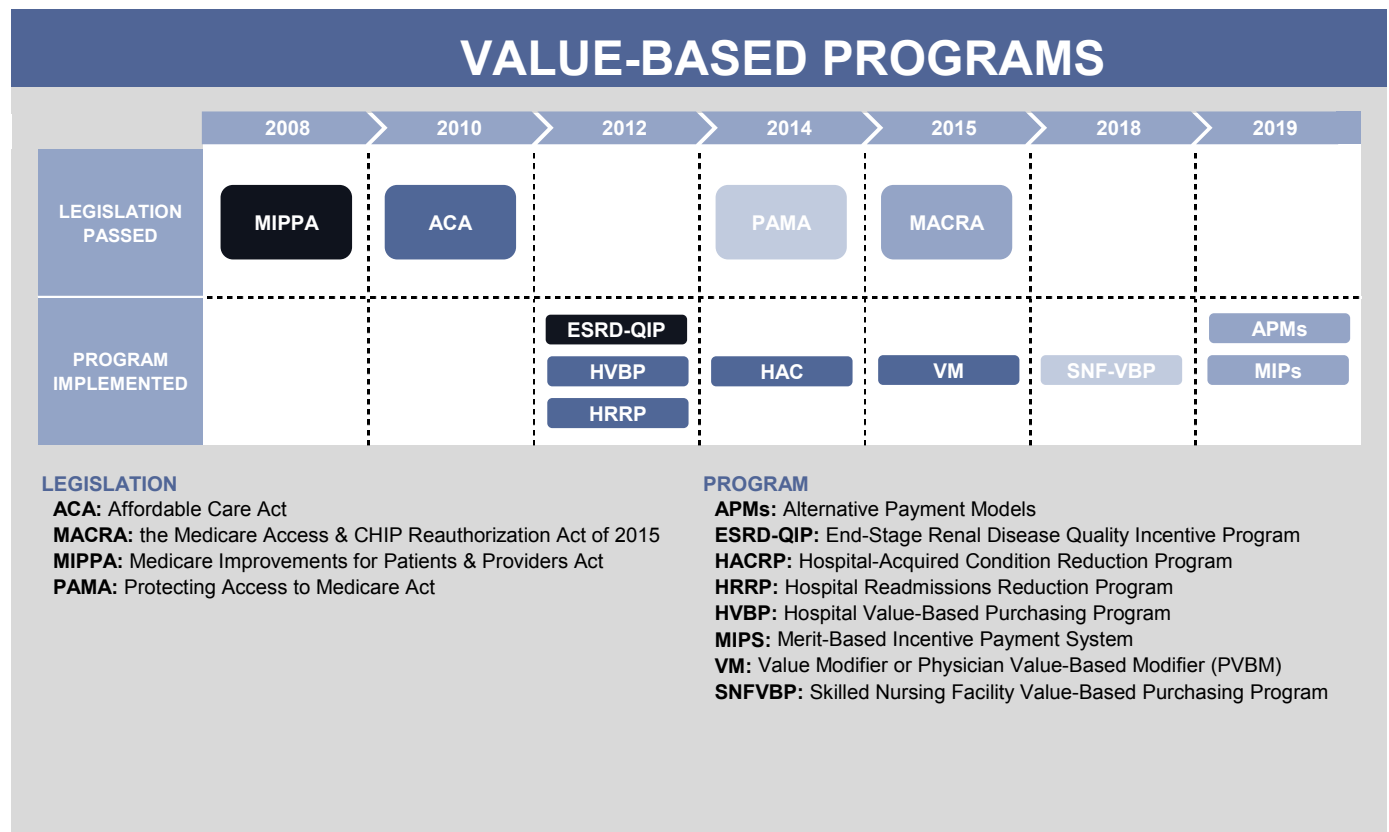
In addition, private sector value-based innovation continues to develop, with more sophisticated risk-based contracts, increasing expansion by providers into owned health insurance products, and new outcomes and pricing models for major healthcare cost drivers such as pharmaceuticals.

Exhibit 17: The recent proliferation of value-based initiatives is spurring greater uptake among healthcare constituents
Overview of older and newer public and private value-based programs

	Sponsor	Name	Description	Sectors
Existing	CMS	Bundled Payments for Care Improvement (BPCI)	Links payment for specific care episodes and involved providers to related expenditures and a target provider benchmark price	Providers, Medtech, and HCIT
	Commercial	Commercial ACO	Multiple structures, links reimbursement between commercial payors and a provider entity to quality and cost benchmarks	Providers, Payors, and HCIT
	CMS	End-State Renal Disease (ESRD) Quality Initiative Program	Covers ESRD care for outpatient dialysis facilities Includes both positive and negative adjustments based on meeting quality/cost benchmarks	Providers and HCIT
	CMS	Hospital Readmission Reduction	Reduces hospital reimbursement if it experiences high 30-day readmission rates for certain episodes of care	Providers and HCIT
	CMS	Hospital Value-Based Purchasing and Physical Value-Based Modifier	Withholds a portion of reimbursement for providers and links earning that portion based on reaching clinical/quality outcomes	Providers and HCIT
	CMS	Medicare Shared Savings Program (MSSP)	ACO structure with Medicare that allows participating providers to share in realized savings if also meeting quality benchmarks	Providers and HCIT
	Commercial	Provider-Sponsored Health Plan	Providers operating their own, narrow-network health plans and assuming full risk	Providers, Payors, and HCIT
New	CMS	Comprehensive Care for Joint Replacement Model	Links payment for joint and hip replacements to hospitals based on related expenditures and a target regional benchmark price	Providers, Medtech, and HCIT
	CMS	Comprehensive Primary Care Plus	National advanced primary care medical home model that increases reimbursement/adds monthly payments if physician meets quality benchmarks and demonstrates greater use of IT	Providers, Payors, and HCIT
	CMS	MACRA - MIPS and APMs	Change to physician reimbursement phasing in between 2015-2021 that links raises to quality metrics or participation in specific value-based programs	Providers, Payors, and HCIT
	CMS	Medicare Advantage Value-Based Insurance Design	Allows Medicare Advantage plans to test offering supplemental benefits or reduced cost-sharing to enrollees for specific chronic conditions	Payors
	CMS	NexGen ACOs	ACO structure with Medicare with higher levels of upside risk as well as downside risk	Providers and HCIT
	Commercial	Outcomes-based Pharmaceutical Pricing	Linking reimbursement for certain pharmaceuticals based on delivering clinical/financial outcomes	Pharma, Biotech, and Payors

Source: CMS, Goldman Sachs Global Investment Research.

Exhibit 18: CMS value-based program timeline



Source: CMS.

The ability of value-based reimbursement to drive sustainable reductions in costs as well as improvements in clinical quality is still a work in progress. From a macro level, older large-scale programs such as the Medicare Shared Savings Program (MSSP) and CMS Bundled Payments for Care Improvement (BPCI) initiative have yielded some early encouraging data points (86 successful MSSP ACOs generated \$777mn of total savings and BPCI participants in 1 scenario reduced costs by nearly 4x a comparison group). In addition, long-term surveys of major Commercial ACOs have demonstrated progress across a host of quality and clinical metrics as well as increased adoption of shared risk. However, success has not been as wide-scaled as hoped (only 26% of MSSP participants have generated savings) and therefore could be attributable to other factors (such as certain providers having more room for improvement to begin with). That said, given a high variance of cost and quality within geographic markets (per CSLT's *U.S. Costliest Cities Analysis*, even some preventative procedures such as mammogram screening, HPV tests, lipid panels, and primary care visits had price variances of 8x to 76x), bringing higher cost providers closer to the mean is a real accomplishment. Furthermore, early data indicates that providers are yielding greater savings the longer they participate in value-based strategies, and therefore suggests success rates will rise over time.

Major case study findings

Medicare Shared Savings Program (MSSP)

- 26% of participating ACOs earned shared savings payments, generating \$777mn of total savings and \$341mn of shared savings payments (\$252 per beneficiary).

- Successful ACOs achieved greater reductions in hospitalizations, emergency department visits leading to hospitalizations, and PAC/imaging utilization. Also, a notable trend among all participants was a substantial increase in primary care visits.

CMS Bundled Payments for Care Improvement (BPCI)

- Hospitalization length of stay declined from 4.6 days to 4.3 days in the first quarter under Phase 2 of BPCI.
- Despite higher baseline costs by BPCI patients than comparison patients (\$37,275 vs. \$34,102), average total costs by the Intervention period were \$32,369 for BPCI patients vs. \$32,948 for comparison patients.

Commercial ACOs

- Commercial ACOs improved performance on clinical quality measures for specific conditions such as diabetes (up 19%-25%) and medication adherence (+27%), increased prescribing of lower-cost medications (up 21%-52%), and a significantly higher referral rate to high performing specialists than the market referral rate (81% higher).
- Results demonstrated increased movement toward shared savings and risk contracts, with 43% of plan respondents including shared savings and 50% now including shared risk as part of the reimbursement structure.

Medicare Shared Savings Program (MSSP ACO)



Purpose and Methodology: As part of the Affordable Care Act (ACA), HHS created the framework for establishment of ACOs under the Medicare Shared Savings Program (MSSP). Participants committed to an initial 3-year period and accepted responsibility for the overall quality, cost and care of a defined group of beneficiaries. The program included 2 main structures: Track 1, in which providers can earn up to 50% of savings vs. a defined benchmark depending on quality metric performance, and Track 2, in which providers can earn up to 60% of generated savings but with downside risk of 5%-15% of any generated losses.

Conclusion: Results from its Performance Year Two (released on 8/25/15) **were mixed, though modestly encouraging**. The number of ACOs earning savings was modest, and successful ACOs were disproportionately weighted towards Track 1 participants (lighter, upside only program) and higher cost benchmarks. That said, **ACOs demonstrated higher success rates after participating for multiple years, which should help drive increased value to providers and Medicare in subsequent years**.

Results:

Financial performance: Among the 333 participating ACOs, **only 86 (26%) earned shared savings payments** by coming in below their cost benchmarks and reporting complete quality information (46% exceeded cost benchmarks, while 29% generated savings but were not able to earn shared savings). **Overall, the 86 successful ACOs generated \$777mn of total savings and received \$341mn of shared savings payments**, which equated to \$252 per beneficiary.

- Success was heavily weighted towards Track 1 ACOs (upside only), which constituted 84 of the successful ACOs.
- **ACOs operating for a longer time period were more likely to be successful** (35% of April 2012 starts earned savings with \$329 per beneficiary vs. 18% of 2014 starts with \$238 per beneficiary).
- **Savings were also partly skewed by benchmark levels, as successful ACOs had on average 9% higher cost benchmarks** than unsuccessful ACOs.
- Successful ACOs achieved greater reductions in hospitalizations, emergency department visits leading to hospitalizations, and PAC/imaging utilization. Also, a notable trend among all 333 ACOs was a substantial increase in primary care visits.

Quality performance: Earned savings were partly determined by quality performance against 19 of 33 MSSP quality measures. Though there was no direct correlation between high quality performance and savings (22% of ACOs with quality scores +90% earned savings), average scores were higher for the successful ACOs (86% vs. total average of 83%). The one disappointing area was preventative health, as scores among those quality metrics ranged from 39%-67%.

26% of MSSP participants earned savings, with greater success rates for 2012 starts

Total spending \$ in mns

ACO Results	ACO Count		Total spending			Per Beneficiary		
	# of ACOs	% of ACOs	Benchmark Spending	Savings Generated	Earned Savings	Benchmark Spending	Savings Generated	Earned Savings
Negative	152	46%	\$25,078	(\$683)	\$0	\$9,577	(\$261)	\$0
Positive w/in Corridor	89	27%	\$13,231	\$168	\$0	\$10,000	\$127	\$0
Shared Savings (Earned)	86	26%	\$14,190	\$777	\$341	\$10,478	\$574	\$252
Shared Savings (0% Quality)	6	2%	\$386	\$29	\$0	\$11,441	\$871	\$0
Total	333	100%	\$52,885	\$291	\$341	\$9,923	\$55	\$252

Start Date	ACO Count		Total spending			Per Beneficiary		
	# of ACOs	% of ACOs	Benchmark Spending	Savings Generated	Earned Savings	Benchmark Spending	Savings Generated	Earned Savings
2012	111	33%	\$20,235	\$294	\$179	\$10,037	\$146	\$280
4/1/12	26	8%	\$3,606	\$47	\$37	\$10,475	\$137	\$329
7/1/12	85	26%	\$16,629	\$247	\$142	\$9,947	\$148	\$270
2013	103	31%	\$17,623	(\$7)	\$95	\$9,939	(\$4)	\$220
2014	119	36%	\$15,028	\$5	\$68	\$9,754	\$3	\$238
Total	333	100%	\$52,886	\$292	\$341	\$9,923	\$55	\$252

Source: CMS, Health Affairs.



Bundled Payments for Care Improvement (BPCI) initiative

Purpose and Conclusion: Under its Bundled Payments for Care Improvement (BPCI) initiative, CMS has begun testing whether bundled payments can reduce Medicare costs while maintaining or improving the quality of care relative to prior cost/quality data attributable to the participating providers. Though at this early stage with small sample sizes it is hard to draw a large conclusion on cost/quality improvements, early data suggested some encouraging results and a noticeable change in provider behavior.

Methodology: We focus specifically on its Model 2, which included 8 active awardees (both hospitals and large physician groups) treating 48 clinical episodes. The bundled, episodic payments covered the anchor hospitalization, all concurrent professional services, and all other services delivered within the designated episode length of 30, 60, or 90 days. Individual providers utilized outside the program were still paid under a fee-for-service (FFS) basis. CMS constructed a baseline period (Q4 2010 – Q3 2013) and intervention period (Q4 2013) to analyze the change in results, a comparison group of non-BPCI providers operating on FFS as a control, and analyzed risk-adjusted cost/quality outcomes from enrollment/claims databases and periodic assessments.

Results:

Duration of care: Across all Model 2 episodes, CMS observed changes in the anchor hospitalization length of stay (LOS) and use of post-acute care (PAC) that began in the 6 months before the Intervention phase (Phase 2) of BPCI.

- **The LOS of the anchor hospitalization declined from 4.6 days at the beginning of the baseline period to 4.4 days in the year immediately before BPCI, to 4.3 days in the first quarter under Phase 2 of BPCI.** For comparison providers, LOS was 4.7 and 4.6 during the baseline, falling to 4.5 days in the intervention quarter.
- **The % of BPCI patients discharged to an institutional PAC provider declined from 66% to 47% during the intervention quarter. The reduction in institutional PAC use was statistically different from the pattern for the comparison providers,** where this proportion remained relatively steady at 62% to 60%, after risk adjustment.

Cost of care: CMS was not able to determine a statistically significant difference in ending cost across all clinical episodes. However, CMS noted for surgical orthopedic excluding spine patients in 90 day episodes (a narrower, more measurable episode of care), BPCI participants saw a more significant decline in cost from the baseline period to Intervention period comparison patients.

- Treatment requiring PAC stay: **Despite higher baseline costs by BPCI patients** than comparison patients (\$37,275 vs. \$34,102), **avg. total costs by the Intervention period were \$32,369 for BPCI patients vs. \$32,948 for comparison patients.**
- Treatment not requiring PAC stay: BPCI patients had higher costs during the baseline (\$17,672 vs. \$17,400) and lower average costs during the intervention (\$16,910 vs. \$17,600), although this was not statistically significant.

Quality of outcomes: Mainly due to early phase of the study, CMS was not able to determine significant changes in quality metrics.

- Mortality rates were similar for BPCI surgical orthopedic excluding spine episodes and for the comparison group.
- The 30-day unplanned readmission % was higher for BPCI episodes during the baseline period (8.6%) than for patients of comparison providers (7.3%) and declined for both groups through the intervention period (to 6.7%/6.3% respectively).

Discharges to PAC vs. home declined substantially more in the Bundled Payment cohort

% of surgical orthopedic excluding spine episodes discharged to institutional PACs

Bundled Payment Group					
	Baseline Period		Intervention Period	Total Change	
	Q1-Q8	Q9-Q12	Q1	#	%
Risk-adjusted	65.8%	58.9%	47.2%	-1,860bps	-28.3%

Comparison Group					
	Baseline Period		Intervention Period	Total Change	
	Q1-Q8	Q9-Q12	Q1	#	%
Risk-adjusted	61.8%	61.0%	60.2%	-160bps	-2.6%

Source: CMS, Lewin Group.

Costs declined more significantly for the Bundled Payment cohort

Surgical orthopedic excluding spine episode costs including PAC stay

Bundled Payment Group					
	Baseline Period		Intervention Period	Total Change	
	Q1-Q8	Q9-Q12	Q1	\$	%
Total cost	\$37,936	\$34,683	\$32,369	(\$5,567)	-14.7%

Comparison Group					
	Baseline Period		Intervention Period	Total Change	
	Q1-Q8	Q9-Q12	Q1	\$	%
Total cost	\$34,262	\$32,789	\$32,948	(\$1,314)	-3.8%

Source: CMS, Lewin Group.



Commercial ACOs

Purpose and Methodology: In order to understand the expansion and evolution of commercial ACO partnerships, researchers from AHIP (the major health insurance industry group) collected updated qualitative data from 8 major ACO plans (includes Aetna, Anthem, Blue Cross Blue Shield of California, Blue Cross Blue Shield of Illinois, Blue Cross Blue Shield of Minnesota, Cigna, HealthPartners, and Horizon Blue Cross Blue Shield) that had participated in an identical 2011 study. Also, they received survey results from an additional 28 health plans that had signed ACO contracts with providers. Survey results covered a range of topics including ACO design, implementation, clinical/quality methodologies, clinical/quality results, and data sharing/technical assistance.

Conclusion: Survey results indicated continued expansion of ACO implementation and **progress on a host of quality and clinical metrics as health plans and providers gained experience in re-engineering care delivery and network management.** In addition, health plans reported increased adoption of shared risk, expansion to smaller provider groups, and an increase in the scope and depth of technical assistance made available to providers in these contracts. Admittedly, some challenges continue to exist, including the alignment of quality measurement and reporting, broader inclusion of smaller practices in alternative delivery and payment models, and developing tools and materials to assist consumers in realizing the benefits of value-based care. However, **early results suggest a growing confidence and capability by payers and providers in expanding their value-based footprints.**

Results:

Improvement in clinical/quality metrics: Of the 8 case study plans with several years of ACO experience, there were notable advances across a host of clinical and quality areas.

- Improved performance on clinical quality measures for specific conditions, such as diabetes (up 19%-25%) and medication adherence (+27%).
- Reduced readmission rates (down 11%-32%).
- Increased prescribing of lower-cost medications (up 21%-52%) through approaches such as generic prescribing.
- A significantly higher referral rate to high performing specialists than the market referral rate (81% higher).
- Reduced emergency department visits (down 19%-50%).

Greater shift to risk: Health plans allowed for a transition from traditional FFS to alternative payment models by first introducing shared savings only, and then increasing the share of such potential savings as providers gradually accept downside risk. Over time, financial incentives associated with accepting risk significantly outweighed gains from shared savings only and traditional FFS payments. **Results demonstrated increased movement toward shared savings and risk contracts, with 43% of plan respondents including shared savings, and 50% now including shared risk as part of the reimbursement structure.**

Improved reporting/data sharing: Survey results indicated widespread health plan technical assistance to provider partners in areas of disease and care management (96%), exchanging health information (96%), population health management (89%), infrastructure needs/data platforms (82%), and financial risk management (64%).

Major commercial ACOs have demonstrated meaningful cost and quality improvements in select areas

Cost, quality, and network management results by surveyed commercial ACOs between 2011-2014

More efficient care	Improved quality perf.	Better network mgmt.
11%-32% decline in readmission rates	19%-25% quality measure improvement in diabetes	81% higher avg. referral rate to top specialists
21%-52% increased use of lower-cost medications	27% quality measure improvement in medication adherence	19%-50% fewer emergency department visits

Source: AJMC, AHIP.

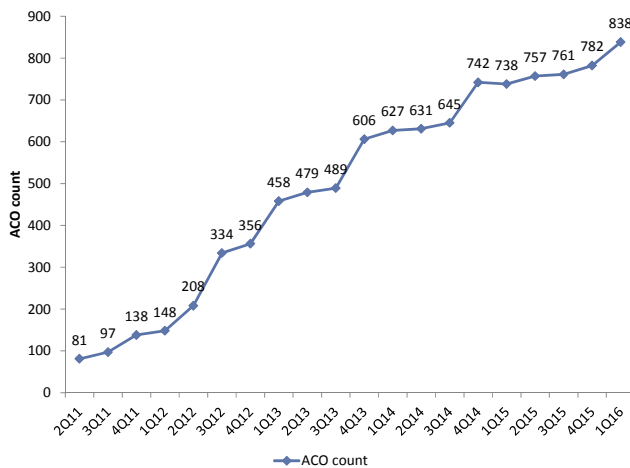
VBR penetration – how far are we and where could we go?

More mature programs such as the above value-based case studies (Medicare Shared Savings, Bundled Payments for Care Improvement, and Commercial ACOs) have shown enough early promise to encourage payers and providers to continue down the value-based path. To that effect, earlier in 2015 the Department of Health and Human Services announced a goal of tying 30%/50% of total Medicare payments to alternative payment methods (such as bundled payments) by 2016/2018 and achieved its 2016 goal a year ahead of schedule. From the private sector, an industry alliance including 6 of the top 15 health systems and 4 of the top 25 payers committed to migrate 75% of their businesses to value-based arrangements by 2020.

These initiatives have helped drive a more than 5-fold increase in ACOs between 2012 and 1Q16. Our proprietary research also corroborates this shift to VBR, as a GS survey of 50 US hospitals conducted in December 2015 suggested an intention to grow the % of payments under value-based arrangements to ~47% in 2020E, a 13pp increase vs. 2015.

Exhibit 19: ACO count has grown by more than 5x since 2012

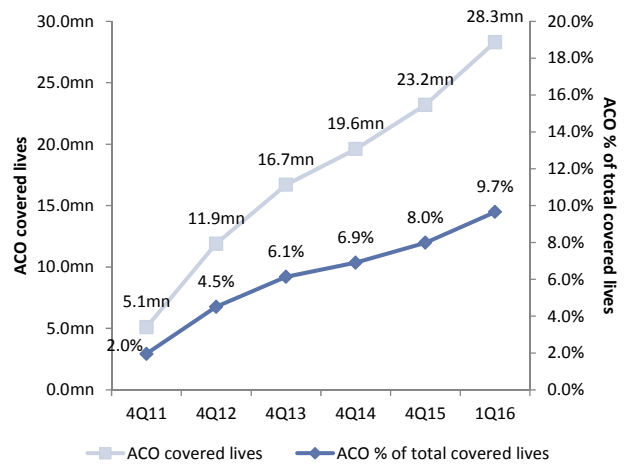
Number of public and private ACOs



Source: Leavitt Partners.

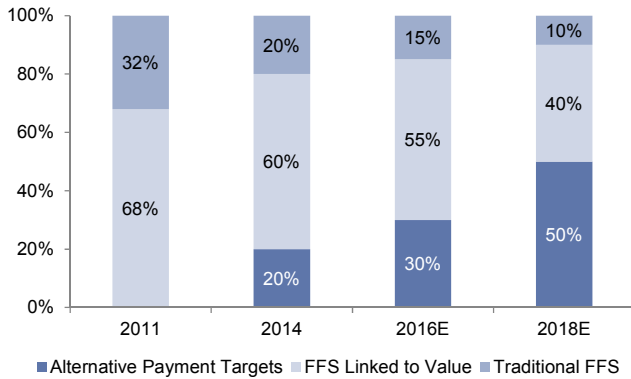
Exhibit 20: ACOs now cover 28.3mn people, or ~10% of the covered population

Number of lives covered by public and private ACOs



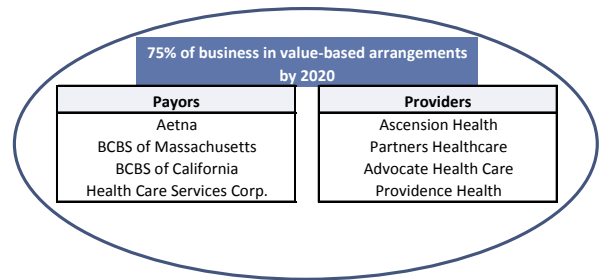
Source: CMS, US Census Bureau, company data, Leavitt Partners, Goldman Sachs Global Investment Research.

Exhibit 21: Medicare value/alternative payment targets
HHS announced goals for shifting payments to value



Source: CMS.

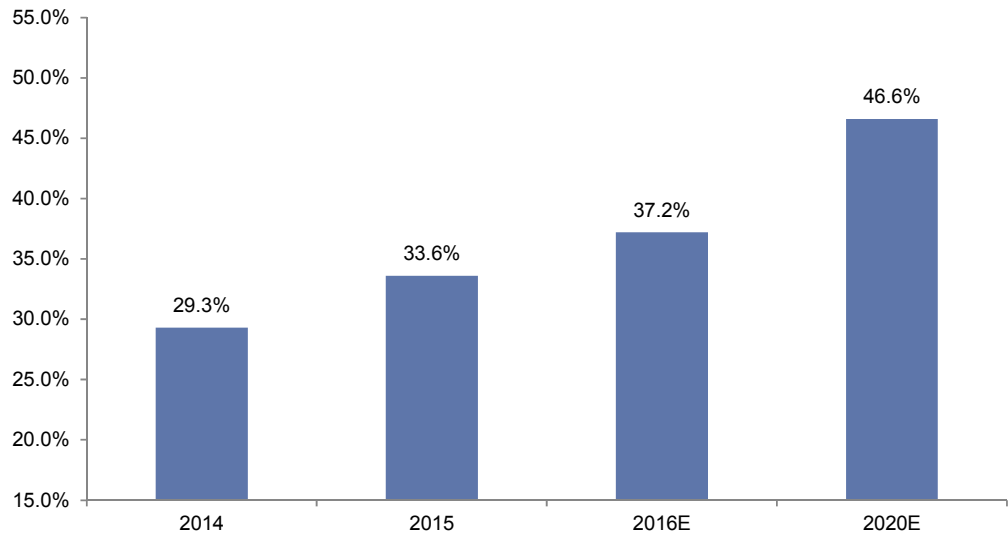
Exhibit 22: Industry leaders committing to value-based care goals



Source: Company data.

Exhibit 23: Value-based reimbursements are expected to constitute close to 50% of payments by 2020E

Value-based / bundled payments as a percentage of total reimbursement per GS surveyed hospital C-suite executives



Source: Goldman Sachs Global Investment Research, US Hospital Purchasing Manager's Survey.

Number of Provider-sponsored health plans

Though value-based adoption can be accomplished through multiple models, the greatest level of commitment to value-based care (and therefore greatest need to adopt Population Health tools) comes from providers operating their own health plans.

Per data accumulated from CMS and SNL Financial, after modest declines since 2011, provider-sponsored health plan market share increased significantly across most major products in 2015 with the exception of Managed Medicaid (where several new state conversions were mainly captured by large Managed Care companies). Overall enrollment growth for provider-sponsored health plans grew 6.7% in 2015, more than double the 2.7% enrollment growth generated by traditional Managed Care firms.

Though part of the increase is from a growing number of health systems entering the insurance market, we note the majority of the provider-sponsored enrollment growth came organically, with 26 plans growing total enrollment +10% including even more mature operators such as UPMC, Indiana University, and Intermountain Health.

Moving forward, we expect provider-sponsored health plan enrollment growth to continue to outpace Managed Care, driven by organic enrollment gains, acquisitions, and new entrants to the market. With regards to new provider-sponsored health plans, our proprietary GS survey of 50 US hospitals conducted in August 2015 indicated 62% of hospitals expect to operate an owned health plan by 2020E, up substantially vs. 42% in 2015.

Exhibit 24: Provider-sponsored health plan market share has accelerated

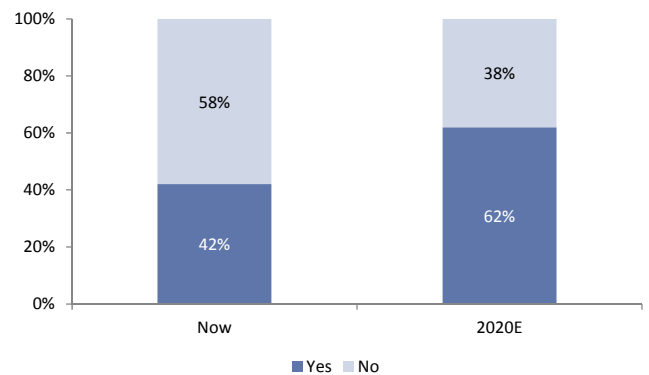
Enrollment market share for provider-owned health plans across multiple products

Categories	2011	2012	2013	2014	2015
Total C-risk	14.5%	14.6%	15.0%	14.9%	16.0%
MA	16.8%	15.9%	15.5%	15.0%	15.2%
MMC	15.0%	14.1%	13.7%	13.2%	12.6%
Total Fully-Insured	14.9%	14.6%	14.7%	14.4%	14.7%
Total ASO	0.8%	0.9%	1.0%	1.0%	1.1%
Total Market	8.9%	8.8%	8.7%	8.8%	9.1%

Source: CMS, SNL, Goldman Sachs Global Investment Research.

Exhibit 25: Nearly 2/3 of hospitals expect to operate health plans by 2020

Percent of hospital systems operating a health plan currently and by 2020E



Source: Goldman Sachs Global Investment Research, US Hospital Purchasing Manager's Survey.

Evolution in Managed care and network design enabling VBR

Managed care, VBR, and provider integrated care

Just as FFS reimbursement and fragmented care delivery have been self-reinforcing in the evolution of the healthcare system (in most markets), the shift to VBR is closely interrelated to the adoption of provider-led integrated care.

On the one hand, integrated care is necessary to successfully manage VBR. On the other hand, VBR is necessary for integrated care to be rewarding and meaningful. Meanwhile, a managed care health plan structure is arguably a precondition for both.

In particular, integrated care and VBR are difficult without assignment of patients to a specific provider or provider system which the patient is required to engage for provision and/or coordination of care as part of the health plan benefit structure. For this reason, managed care penetration (particularly stronger forms of managed care that require primary care coordination) is so important to the adoption of both VBR and provider integrated care. This penetration includes the growth of Medicare Advantage (MA) and Medicaid managed care (MMC) in public sector coverage (today, about one-third of total Medicare spending and about 40% of total Medicaid spending falls under such programs).

Evolution in commercial coverage may be needed to enable VBR

Relative to commercial coverage, successful VBR and integrated care may partly depend on further evolution of plan benefit structures. While commercial coverage, which is mostly provided through employer groups, is considered to be nearly 100% “managed care penetrated”, the majority of covered workers and dependents are in managed care ‘light’ plan structures (‘PPO’) that do not necessarily require provision or coordination of care by a specific provider or provider system.

These ‘loose’ commercial plan structures will likely to need to evolve (and “tighten”) to successfully accommodate and promote VBR and provider integration. We are witnessing such a shift occurring fairly rapidly in the ACA exchange marketplace in response to high patient care expense relative to premiums. Here, relatively restrictive ‘narrow network’ HMO-type plans are fast becoming the norm, while less restrictive PPO-type plans are increasingly unavailable.

Such a shift in the much larger category of employer coverage is underway, but the transition is gradual and still in early stages in most markets. Here, a key barrier is in the structure of employer-based healthcare itself. Since most employers (even very large ones) generally contract with no more than 3-5 health plans to cover a geographically and otherwise diverse workforce, it is generally not feasible for these employers to offer narrow network plans. At the same time, such narrow plans are often a precondition for successful adoption of VBR and integrated care.

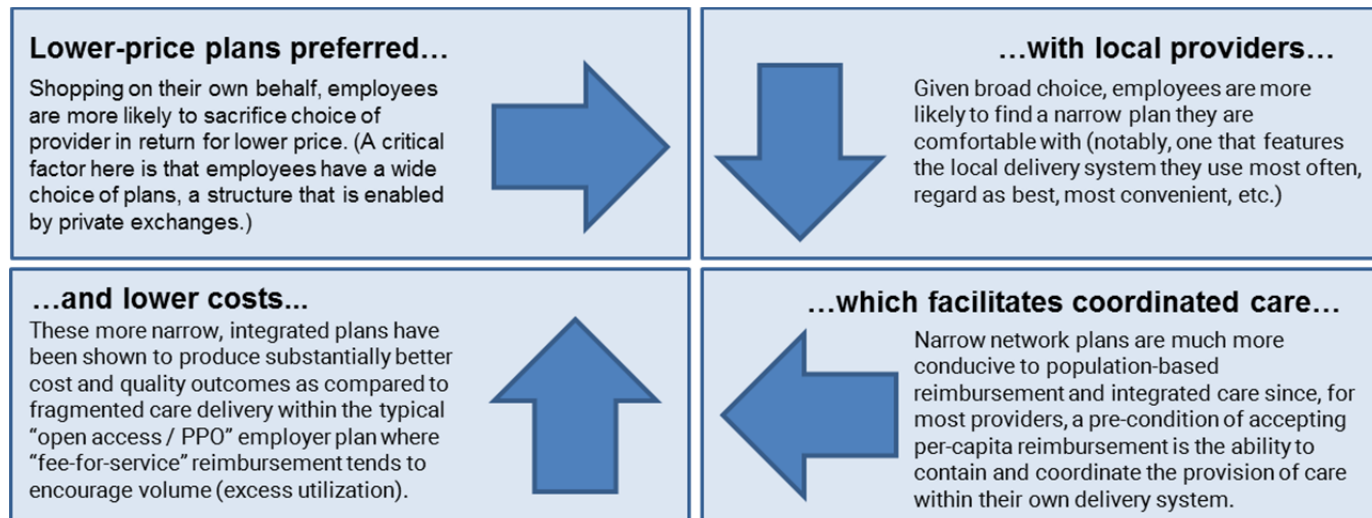
Private exchanges are seen as a potential vehicle for “retailization”

Partly due to the increasing need for tighter and narrower plan structures, many policy analysts look to the emerging structure of “private exchanges” as a potential solution, wherein workers are provided with a “defined contribution” to purchase their own health coverage from a broad menu of plans. As is already the case with ACA exchanges, MA, and MMC, this type of “retail” plan structure circumvents the barrier to narrow network plans (i.e., since workers need only find a delivery system that works for themselves and their own family).

The “virtuous cycle” of factors behind retail plan choice involves employees seeking lower prices, and likely finding narrower plans, which are conducive to coordinated care and produce better cost/quality outcomes.

Exhibit 26: The “virtuous cycle” of factors behind retail plan choice

Consumer preference for lower-cost care becomes self-reinforcing by enabling population-based healthcare



Source: Goldman Sachs Global Investment Research

Importantly, private exchange structures retain the tax preference for employer-sponsored coverage (i.e., the dollar value of the employee health benefits are not taxed as compensation), which is a key reason that most coverage remains through employers in the first place. Of course, retaining the ability to use pretax dollars to buy coverage may also mitigate the price sensitivity that is a demonstrated feature of the individual market, where the expense of health coverage is generally not tax deductible.

However, mixed results for attempts at retail plan structures

Despite the opportunity, we highlight that most attempts to harness retail market structures have failed or have had mixed results at best.

These include the results (so far) of employers who have been early adopters of private exchanges. Further back in the late 1990s, larger employers often contracted with many different regional health plans at varying price points visible to employees through their share of the premium. The intent in many cases was the same as a key goal of private exchanges today: to incent workers to choose plans that offered distinct provider networks featuring integrated care and population-based reimbursement while providing a broad choice of networks to avoid employee dissatisfaction.

However, contracting with a wide range of health plans proved to be expensive to administer. Other downsides included the dilution of purchasing leverage as well as fragmentation of the risk pool (health plans began to incorporate higher risk premiums in their pricing of these “slice contracts”). Meanwhile, many of the attempts to rapidly adopt

population-based reimbursement for providers (i.e., “capitation”) led to failures (e.g., the collapse of the nascent ‘PPM’ industry in 1998-2000).

VBR’s impact from a strategic and financial perspective

Since value-based care encourages a reduction in spend across the healthcare economy, a stable and functioning VBR model should allow for health insurer margins to expand—despite any compression to the top line. That said, it is unlikely that this will be a seamless transition for all the HMO players. In fact, the payers that can increase scale and encompass an entire region are best positioned to ‘capture’ all aspects of a patient’s spend and assist in managing care—and respective costs—effectively. The shift to VBR would also favor the technologically-savvy, since this process of ‘tracking’ the patient and appropriately adapting methods of care has become very data-intensive. If used effectively, plan clinical and financial data could be used in conjunction with VBR methods to alter and improve health outcomes while reducing the cost of healthcare. Considering both dimensions of technology and scale, we think the large, incumbent MCOs are most likely to dominate the value-based space. This includes AET, ANTM, CI, HUM, and UNH—with HUM and UNH having accelerated fastest along this path. We think ANTM and CI have shown solid progress as well with value-based adoption, but could benefit even more as they close the gap with some of the more progressive value-based organizations. We reiterate our Attractive view on Managed Care and see continued potential for margin expansion on the back of accelerated HC savings with the adoption of VBR into the future.

The Next Generation of Enablers

The increase in VBR penetration, healthcare cost pressures, and technological progress within the healthcare industry has generated a significant uptick in venture capital investment into value-based and Population Health private companies. Per Rock Health, Digital Health funding (which includes analytics, care/disease management, and next generation payer and provider segments we would characterize as VBR companies) has more than doubled since 2013 (\$4.4bn avg. annual funding in 2014/2015 vs. \$2.0bn in 2013).

Though most of the companies remain relatively early stage, several companies have received upwards of \$100mn in financing and EVH came public as the first pure-play VBR vendor in 2015. In addition, the growing strategic importance of VBR has caused some traditional healthcare and technology firms to start acquiring some of the more mature private VBR companies, most notably IBM's acquisition of Explorys and Phytel in 2014 and Royal Philips' acquisition of Wellcentive in 2016.

We lay out below the 3 main categories of private VBR enablers that are seeing traction in the market place.

- **Population Health IT vendors** (p. 48)
- **Next-gen insurers** (p. 50)
- **Next-gen providers** (p. 50)

Population Health IT vendors

The largest category of private VBR enablers that have sprung up over the past several years are 3rd party, Population Health IT vendors. Broadly, we would define this category as outside vendors offering analytics or care management technology and services to providers, payers, or employers.

This segment has already produced 1 IPO (EVH) and several acquisitions by major healthcare and technology constituents (Explorys and Phytel by IBM, Wellcentive by Royal Philips, NaviHealth by CAH). Many of these companies compete directly with products from the more traditional Healthcare IT and payor firms and could prove to be attractive acquisition targets should they demonstrate clinical/financial results for clients and build a client base.

Exhibit 27: Population Health IT vendors

Company Name	Location	Business Description	Year Founded	Latest Financing	Total Capital Raised (\$mn)	Select Investors	Ownership
Aledade	MD, Bethesda	Physician-based ACO technology	2014	15-Jun-15	34.5	ARCH Venture Partners, Venrock	Private
Alignment Healthcare	CA, Irvine	Population Health	2013	28-Apr-14	125.0	General Atlantic	Private
Ambient Clinical Analytics	MN, Rochester	Analytics for OR and ER	2014	25-Feb-16	1.9	Mayo Clinic, Rock Health, Social Capital	Private
Arcadia Healthcare Solutions	MA, Burlington	Data aggregation and analytics platform	2001	14-Apr-15	43.0	Merck Global Health Innovation Fund, GE Ventures, Peloton Equity, Zaffre Investments, Morgan Stanley	Private
Aver Analytics	OH, Columbus	Bundled payment analytics	2010	5-Jan-16	24.6	Cardinal Health, Drive Capital, GE Ventures, Hearst Health Ventures, StartUp Health	Private
Bigfoot Biomedical	CA, Milpitas	Diabetes Management Platform	2014	5-Oct-16	37.5	Cormorant Asset Management, Quadrant Capital Advisors, Senvest Capital, Visionaire Ventures	Private
Bjond	OH, Columbus	Care Management software provider	2012	8-Nov-16	5.5	Draper Triangle, Hopen Life Science Ventures, StartUp Health, TriStar Technology Ventures	Private
Cedar Gate Technologies	CT, Greenwich	ACO and IDN Data Analytics	2014	14-Aug-14	Undisclosed	GTCR	Private
Emmi Solutions	IL, Chicago Heights	Patient Engagement	2002	Acquired 4-Oct-16	170 acq price	Acquired by WKL	WKL
Envera Health	VA, Richmond	Care Management and Patient Engagement Platform	2014	4-May-16	14.0	Harbert Growth Partners, Noro-Moseley Partners, NRV	Private
Evolent	VA, Arlington	Value-based services and IT	2011	IPO 7-May-15	Public	The Advisory Board Company, TPG Growth, UPMC	Public
Explorys	OH, Cleveland	Clinical Analytics	2009	Acquired 16-Apr-15	Undisclosed acq price	Acquired by IBM	IBM
Flatiron Health	NY, New York City	Oncology EMR and Data, backed by Google Ventures	2012	6-Jan-16	313.0	Allen & Company, First Round, GV, LabCorp, Roche, Social Capital, Stripes Group, SV Angel	Private
GetWellNetwork	MD, Bethesda	Patient Engagement and Wellness	1999	3-Jan-13	9.0	Welsh, Carson, Anderson & Stowe	Private
Glooko	CA, Palo Alto	Digital Diabetes Management	2010	13-Sep-16	36.0	Canaan Partners, LifeForce Venture, Medtronic, Samsung Ventures, Social Capital, Xtreme Labs	Private
GNS Healthcare	MA, Cambridge	Data Analytics	2000	8-Dec-15	43.1	Cambia Health Solutions, Celgene, Global Health Fund LP, Heritage Provider Network, Mitsui & Co	Private
HealthCatalyst	UT, Salt Lake City	Enterprise Data Warehouse and Clinical Analytics	2008	12-Feb-16	222.0	Kaiser Permanente Ventures, Norwest Venture Partners, Sands Capital Ventures, Private Sequoia Capital, UPMC	Private
Jointly Health (Sentrian)	CA, Capistrano	Remote patient monitoring and analytics	2012	10-Nov-14	15.7	Frost Data Capital, REV, Tech Coast Angels, TELUS Ventures	Private
Kyron	CA, San Jose	Clinical Intelligence	2013	24-Oct-13	3.0	Khosla Ventures	Private
Kyruus	MA, Boston	Clinical Intelligence, patient/physician referral system	2010	18-Sep-15	58.3	GLG, Highland Capital Partners, Leerink Partners, McKesson Ventures, New Leaf Venture Partners, Venrock	Private

Source: Company data compiled by Goldman Sachs Global Investment Research.

Exhibit 28: Population Health IT vendors continued

Company Name	Location	Business Description	Year Founded	Latest Financing	Total Capital Raised (\$mn)	Select Investors	Ownership
Lantern	CA, San Francisco	Mental Health IT Platform	2012	10-Feb-16	21.4	Frontier Tech Ventures, Mayfield Fund, Rock Health, SoftTech VC, TEEC Angel Fund, UPMC	Private
LightBeam Health	TX, Irving	End-to-end Population Health for ACOs	2012	1-Sep-14	Undisclosed	7wire Ventures	Private
Livongo	CA, Mountain View	Diabetes Management Platform, Glenn Tullman's company	2014	22-Apr-16	90.7	BCBS of Massachusetts, Draper Fisher Jurvetson, General Catalyst Partners, Kleiner Perkins Caufield & Byers	Private
Lumeris	MO, St. Louis	Value-based services and IT	2001	24-Jul-14	Undisclosed	Undisclosed	Private
Lumiata	CA, San Mateo	Predictive Analytics	2013	26-May-16	20.0	BlueCross BlueShield Venture Partners, Intel Capital, Khosla Ventures, Sandbox Industries	Private
Lyra Health	CA, Burlingame	Behavioral Health Population Health tools	2015	15-Oct-15	38.1	Breyer Capital, Castlight Health, Greylock Partners, Providence Health & Services, Venrock	Private
MD Revolution	CA, San Diego	Patient-facing Chronic Care Management System	2011	4-Oct-16	39.7	Jump Capital	Private
MedCPU	NY, New York City	Clinical Decision Support and Advisory Platform	2008	12-May-16	50.9	Easton Capital, Merck Global Health Innovation Fund, NRV	Private
Mede Analytics	CA, Emeryville	Analytics, \$100mn of revenue growing 30% annually	1994	2-Sep-15	57.0	Thoma Bravo	Private
naviHealth	TN, Brentwood	Help manage post-acute care through clinical protocols and analytics	2011	Acquired 25-Aug-16	Undisclosed acq price	Acquired by CAH	CAH
Omada Health	CA, San Francisco	Online behavioral health programs for adherence/disease management	2011	16-Sep-15	76.5	Andreessen Horowitz, GE Ventures, Humana, Kaiser Permanente Ventures, Norwest Venture Partners	Private
Oncology Analytics	FL, Plantation	Oncology Decision Support	2009	28-Jan-16	7.5	BlueCross BlueShield Venture Partners, Sandbox Advantage Fund	Private
Phytel	TX, Dallas	Patient Engagement	1996	Acquired 4-May-15	Undisclosed acq price	Acquired by IBM	IBM
QPID	MA, Boston	Clinical Intelligence, New Leaf Venture Partners just invested	2012	Acquired 29-Feb-16	16.7	eviCore healthcare	Private
Quartet Health	NY, New York City	Behavioral Health Population Health platform	2014	14-Apr-16	47.0	Brainchild Holdings, GV, Oak HC/FT, Polaris Partners, Shulman Ventures	Private
Twine Health	MA, Cambridge	Chronic Condition Health Coaching	2014	25-Aug-15	6.8	Khosla Ventures, Provenance Ventures, Tower Capital Partners	Private
Vivify Health	Plano, TX	Remote Patient Monitoring	2009	26-Feb-16	23.4	Ascension Ventures, Envision Healthcare Holdings, Heritage Group, LabCorp	Private
Wellcentive	GA, Roswell	Population Health Platform	2005	Acquired 20-Jul-16	Undisclosed acq price	Acquired by PHG	PHG
WellDoc	MD, Baltimore	Remote Patient Monitoring for Diabetes	2005	1-Mar-16	54.9	Adage Capital Management, Johnson & Johnson Innovation, Merck Global Health Innovation Fund, Samsung Ventures	Private
ZeOmega	TX, Frisco	Population Health	2001	4-Sep-13	21.5	BlueCross BlueShield Venture Partners, Bregal Sagemount, Sandbox Industries	Private
Zirmed	KY, Louisville	RCM Services/Predictive Analytics	1999	10-Dec-10	Undisclosed	Sequoia Capital	Private

Source: Company data compiled by Goldman Sachs Global Investment Research.

Next generation insurance companies

As providers and employers look for more cost effective ways to deliver patient care, several next generation insurance companies have received a significant amount of funding over the past several years. These companies mainly fall into two groups. The first are technology-focused insurance startups like Oscar and Clover Health that look to engage patients and incentivize more convenient, preventative care (like telehealth or 2nd opinions). The second includes integrated health plan/clinic offerings like Zoom+ or UNH's Harken Health, that while similar in nature to provider-sponsored health plans, go even further with aggressive formulary and co-pay structures to incentivize behavior and in-network volume.

Exhibit 29: Next generation insurance companies

Company Name	Location	Business Description	Year Founded	Latest Financing	Total Capital Raised (\$mn)	Select Investors	Ownership
Beam Dental	OH, Columbus	Dental insurance focused on technology use and preventative care	2012	8-Aug-14	5.4	Drive Capital, Rock Health	Private
Bright Health	MN, Minneapolis	Managed care focused on technology use and preventative care	2016	5-Apr-16	80.0	Bessemer Venture Partners, Flare Capital Partners, GE Ventures, New Enterprise Associates	Private
Clover Health	NJ, Jersey City	Medicare Advantage focused on technology use and preventative care	2014	20-May-16	295.0	First Round, Sequoia Capital, Social Capital, Spark Capital, Summit Action, Wildcat Venture Partners	Private
Harken Health	NA	Integrated Health Plan and Clinic Network	2015	Undisclosed	Undisclosed	Subsidiary of UNH	UNH
Melody Health Insurance	CO, Denver	Managed care focused on technology use and preventative care	2015	8-Dec-15	3.8	Eduardo Cruz, other private investors	Private
Oscar	NY, New York City	Managed care focused on technology use and preventative care	2013	22-Feb-16	727.5	Fidelity Investments, General Catalyst Partners, Khosla Ventures, Wellington Management	Private
Zoom+	OR, Portland	Integrated Health Plan and Clinic Network	2006	8-Jul-14	Undisclosed	Endeavour Capital	Private

Source: Company data compiled by Goldman Sachs Global Investment Research.

Next generation provider companies

The 3rd category of new VBR enablers is next generation providers, who are incorporating a higher level of Population Health technology within care workflow and completely restructuring the responsibilities and incentive structure of owned physician practices. The largest companies here include Iora Health and Privia Health, which offer a technology and service platform for owned physicians to create high-performing physician networks. Though in some ways conceptually similar to an ACO, these companies offer a much more comprehensive and scalable structure for participating physicians completely independent of larger health systems. In addition, several firms including Qliance Medical offer essentially a concierge, à la carte care solution for patients under a subscription model (which effectively puts them at risk to deliver high quality care at a lower cost).

Exhibit 30: Next generation provider companies

Company Name	Location	Business Description	Year Founded	Latest Financing	Total Capital Raised (\$mn)	Select Investors	Ownership
ChenMed	FL, Miami Gardens	Provider-focused, Population Health based primary care	1985	Undisclosed	Undisclosed	Undisclosed	Private
Iora Health	MA, Boston	Provider-focused, Population Health based primary care	2011	13-Oct-16	123.3	Flare Capital Partners, GE Ventures, Khosla Ventures, Polaris Partners, Temasek Holdings	Private
MedLion	NV, Las Vegas	Provider-focused, Population Health based primary care	2010	Undisclosed	Undisclosed	Self-funded	Private
One Medical Group	CA, San Francisco	Technology-enabled primary care	2007	8-Dec-15	181.5	Benchmark, GV, J.P. Morgan Asset Management, Maverick Capital, Oak Investment Partners, Redmile Group	Private
Paladina	CO, Denver	Provider-focused, Population Health based primary care	2010	Undisclosed	Undisclosed	Subsidiary of DVA	DVA
Privia Health	VA, Arlington	Provider-focused, Population Health based primary care	2007	16-Sep-14	417.5	Brighton Health Group, Cardinal Partners, Health Enterprise Partners, Pamplona Capital Management	Private
Qliance Medical	WA, Seattle	Unlimited access primary care for a monthly fee	2006	13-Nov-15	20.6	Cambia Health Solutions, Clear Fir Partners, Drew Carey, Jeff Bezos, Michael Dell, Second Avenue Partners	Private
Vera Whole Health	WA, Seattle	Provider for employers delivered at on-site or near-site clinics	2008	30-Jun-15	2.0	Debt-funded	Private

Source: Company data compiled by Goldman Sachs Global Investment Research.

Appendix: “Value-based” frameworks in FFS

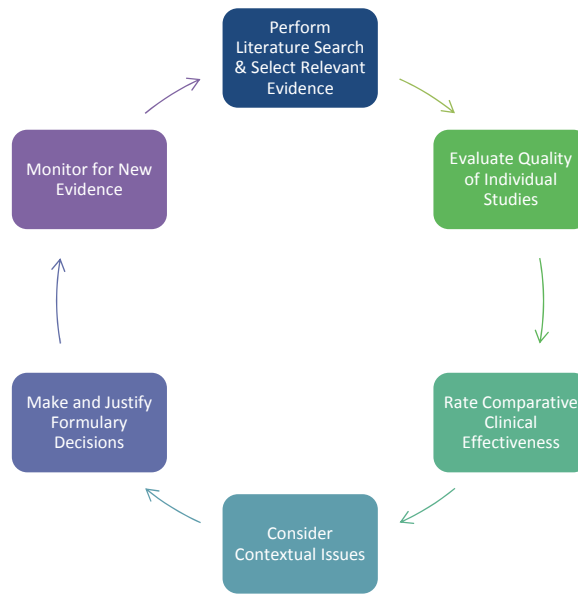
“Value-based” frameworks gaining traction even in FFS pricing

Even within the FFS construct, there has been a greater push by constituents to evaluate pricing within a more value-oriented framework. Pharmaceutical pricing is a good example of this, as public and private payers with increasing scale are looking for cost and access benchmarks that more comprehensively account for the clinical, financial, and competitive benefits of new treatments versus simply benchmarking against existing therapeutic categories (which often continue to see meaningful cost inflation).

There are a number of organizations in the US that are now exploring value-based pricing for drugs, including the **Institute for Clinical and Economic Review (ICER)**, **American Heart Association (AHA)**, **American Society of Clinical Oncology (ASCO)**, **Memorial Sloan Kettering Cancer Center (MSKCC)** and **National Comprehensive Cancer Network (NCCN)**. Some of the organizations focus exclusively on therapeutics, while ICER’s focus is on the broader healthcare system. Every framework essentially analyzes parts or all of the same core concepts, which include (1) clinical data, (2) treatment effects, (3) adverse events/toxicity, (4) cost effectiveness and (5) impact to the healthcare system. However, we note that there are material differences amongst the frameworks, most notably the weighting assumptions that each makes for individual components. This can lead to differences in outputs and recommendations. In our view, this variability highlights the nascent stages of value-based pricing models which are likely to continue to evolve over time. Furthermore, none of these organizations has direct authority to set the price of drugs.

ICER is a non-profit organization that performs analyses on effectiveness and costs of treatments, medical tests and delivery system innovations. ICER develops reports with recommendations to help make improvements in both practice and policy. ICER’s goal is to help “provide a foundation for a more effective, efficient and just health care system.” ICER has issued reviews of a number of therapeutic classes including Alzheimer’s Disease, Diabetes, Diabetic Macular Edema, Hepatitis C and High Cholesterol. ICER also has draft reports in various stages for other large therapeutic areas, including an upcoming review on Multiple Myeloma. For some therapeutic areas, ICER also releases an “Action Guide” for policy makers, clinicians and patients to provide specific action steps that stakeholders can take to improve patient outcomes and overall value. For example, the summary from ICER’s recent action guide on HepC includes the following recommendation: “payers can leverage the availability of multiple comparable treatment options to negotiate vigorously for lower prices.” Similarly, in its report on high cholesterol/PCSK9s, ICER recommended a value-based price benchmark for each PCSK9 inhibitor of \$2,177 annually in order to achieve cost-effectiveness to avoid “excessive cost burdens to the healthcare system.” We note that this represents a significant delta vs. the current list price of \$14,000 (though we estimate the net price is likely lower). However, ICER also noted that it is possible consumers are willing to pay up to \$100,000-\$150,000/Quality Adjusted Life Year for PCSK9s, which they estimate would warrant an annual cost ranging from \$5,404-\$7,735. Again this highlights the importance of the inputs into the model as well as the Quality Adjusted Life Year threshold.

Exhibit 31: ICER process for formulary decision making



Source: ICER.

Mindcraft: Our Thematic Deep Dives

Innovation & Disruption

Virtual Reality

Drones

Factory of the Future

Blockchain

Precision Farming

Advanced Materials

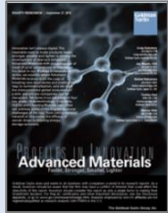
Artificial Intelligence

5G

Cars

Future of Finance

Internet of Things

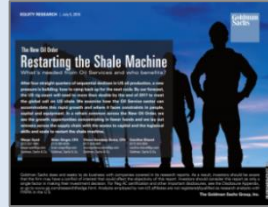
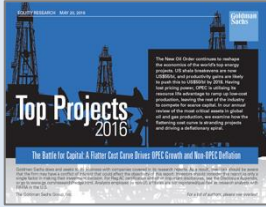


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Music's Return to Growth

Opportunity

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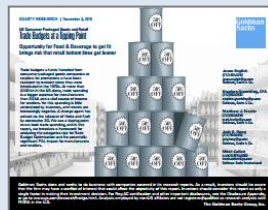
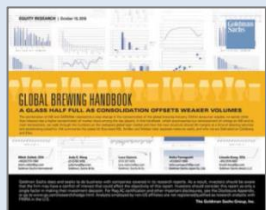
Consumer Currents

Big Beer's New Era

The Rise of Craft

eCommerce's Infinite Shelf

Trade Budgets' Tipping Point



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Logistics

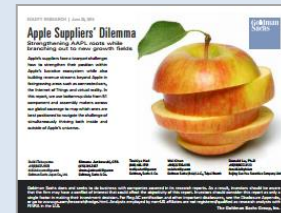


Asia Tech

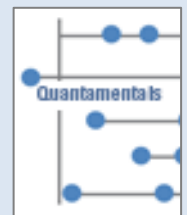
Apple Suppliers' Dilemma

Asia Digital Banking

India Internet



Quantamentals



Disclosure Appendix

Reg AC

We, Robert P. Jones, Matthew Borsch, CFA, Jami Rubin, Adam Noble, Terence Flynn, PhD, Isaac Ro and Salveen Richter, CFA, hereby certify that all of the views expressed in this report accurately reflect our personal views about the subject company or companies and its or their securities. We also certify that no part of our compensation was, is or will be, directly or indirectly, related to the specific recommendations or views expressed in this report.

I, Asad Haider, CFA, hereby certify that all of the views expressed in this report accurately reflect my personal views, which have not been influenced by considerations of the firm's business or client relationships.

Unless otherwise stated, the individuals listed on the cover page of this report are analysts in Goldman Sachs' Global Investment Research division.

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The precise calculation of each metric may vary depending on the fiscal year, industry and region but the standard approach is as follows:

Growth is a composite of next year's estimate over current year's estimate, e.g. EPS, EBITDA, Revenue. **Return** is a year one prospective aggregate of various return on capital measures, e.g. CROCI, ROACE, and ROE. **Multiple** is a composite of one-year forward valuation ratios, e.g. P/E, dividend yield, EV/FCF, EV/EBITDA, EV/DACF, Price/Book. **Volatility** is measured as trailing twelve-month volatility adjusted for dividends.

Quantum

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GS SUSTAIN is a global investment strategy aimed at long-term, long-only performance with a low turnover of ideas. The GS SUSTAIN focus list includes leaders our analysis shows to be well positioned to deliver long term outperformance through sustained competitive advantage and superior returns on capital relative to their global industry peers. Leaders are identified based on quantifiable analysis of three aspects of corporate performance: cash return on cash invested, industry positioning and management quality (the effectiveness of companies' management of the environmental, social and governance issues facing their industry).

Disclosures

Coverage group(s) of stocks by primary analyst(s)

Robert P. Jones: America-Dental services and Equipment, America-Drug Chains, America-Healthcare IT, America-Healthcare Services: CROs, America-Healthcare Supply Chain. Matthew Borsch, CFA: America-HCManaged, America-Healthcare Services:Facilities. Jami Rubin: America-Major Pharmaceuticals, America-Pharmaceuticals Generics. Terence Flynn, PhD: America-Large Biotech, America-SMID Biotech. Isaac Ro: America-Diagnostics, America-Labs and Services, America-Life Science Tools. Salveen Richter, CFA: America-Emerging Biotech.

America-Dental services and Equipment: Align Technology Inc., DENTSPLY Sirona Inc., Henry Schein Inc., Patterson Cos..

America-Diagnostics: Alere Inc., Exact Sciences Corp., Foundation Medicine Inc., Hologic Inc., Myriad Genetics Inc., Qiagen NV, T2 Biosystems Inc..

America-Drug Chains: CVS Health Corp., Rite Aid Corp., Walgreens Boots Alliance Inc..

America-Emerging Biotech: Acadia Pharmaceuticals Inc., Acorda Therapeutics Inc., Amicus Therapeutics Inc., Atara Biotherapeutics Inc., AveXis Inc., BioMarin Pharmaceutical Inc., bluebird bio, Dimension Therapeutics, GW Pharmaceuticals Plc, Incyte Corp., Intercept Pharmaceuticals Inc., Ionis Pharmaceuticals Inc., Juno Therapeutics Inc., Kite Pharma Inc., Radius Health Inc., Sage Therapeutics Inc., Sarepta Therapeutics Inc., Seattle Genetics Inc., Spark Therapeutics.

America-HCManaged: Aetna Inc., Anthem Inc., Centene Corp., Cigna Corp., Humana Inc., Magellan Health Services Inc., Molina Healthcare Inc., UnitedHealth Group, WellCare Health Plans Inc..

America-Healthcare IT: Allscripts Healthcare Solutions, Athenahealth Inc., Castlight Health Inc., Cerner Corp., Evolent Health Inc..

America-Healthcare Services: CROs: Charles River Laboratories, ICON Plc, INC Research Holdings, Parexel International Corp., Quintiles IMS Holdings.

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