

Health & Group Benefits

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A new horizon for COVID-19: Vaccination & herd immunity

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Considering the performance of select vaccines against other communicable diseases caused by viruses, a vaccine to combat the virus responsible for COVID-19 is expected to allow life to begin to return to what it was like pre-pandemic. The word vaccine is derived from the Latin word for cow, reflecting its origins during the late 18th century when the relatively milder cowpox virus was used to confer immunity against the devastating smallpox virus.¹ From 1958 to 1977, the World Health Organization (WHO) led a global campaign that eradicated smallpox worldwide (meaning intervention measures such as vaccination are no longer needed).

Several highly efficacious vaccines like the one against smallpox exist, though eradication of the diseases they can prevent is complicated by outbreaks caused by insufficient vaccine coverage (proportion of a population that receives vaccination) along with increased opportunities for exposure in a highly mobile era. One example of this is measles, for which WHO reported 863,000 cases globally for 2019, more than twice as many as the nearly 360,000 cases for 2018 and 2011, the two next-highest years over the past decade.²

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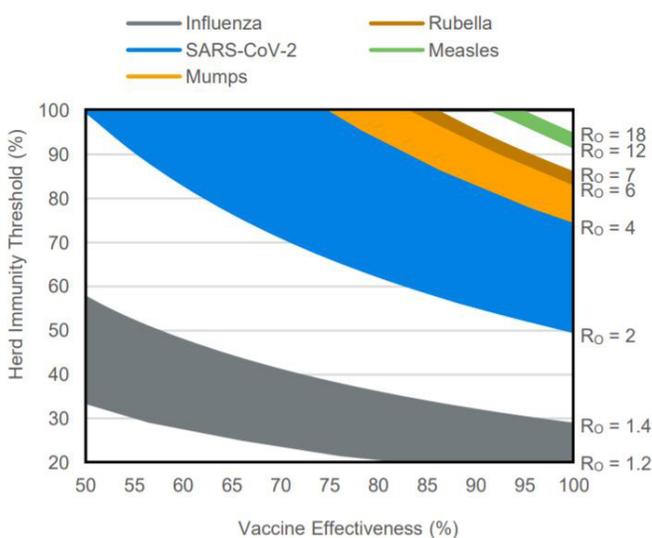
For other communicable diseases, though, vaccines are only moderately effective. Complicated by antigenic drift (small mutations to the virus that make it possible to evade existing immunity) and nonhuman reservoirs (habitats in which the virus normally multiplies), vaccination is far from eliminating the influenza virus at its current effectiveness and coverage levels. Even with relatively predictable seasonality and virulence, a moderately effective vaccine, and multiple antiviral treatment options, WHO estimates 290,000 to 650,000 influenza-related deaths occur annually worldwide.³

Given the impact of the novel coronavirus responsible for SARS-CoV-2 (COVID-19), there are high expectations for the performance of vaccines currently in development.⁴ A comparison to viruses for which widespread vaccination is recommended can inform these expectations. We selected influenza, measles, mumps, and rubella here as these viral illnesses vary in terms of how quickly they spread and the impact of vaccination on disease due to infection. We

focused on the herd immunity threshold, or the proportion of a population that must demonstrate immunity (through overcoming natural infection or vaccination) to an infectious agent for it to no longer be the cause of large outbreaks. The threshold for SARS-CoV-2 has been a focal point for decisions surrounding containment of the pandemic and will continue to be moving forward.

Vaccine effectiveness, in addition to the basic reproduction number, can be an input for calculation of the threshold. As a vaccine’s effectiveness drops below 100%, the threshold to achieve herd immunity increases (illustrated in Figure below; epidemiological parameters used are provided in Figure in Sources section).⁵ While evidence to more accurately inform how vaccine effectiveness may alter the herd immunity threshold for SARS-CoV-2 is lacking, we can infer from the estimates calculated that the level is higher than that of influenza, but lower than for measles, mumps, and rubella.

FIGURE: VACCINE EFFECTIVENESS AND HERD IMMUNITY THRESHOLD* FOR SELECT VIRAL INFECTIONS BY BASIC REPRODUCTION NUMBER (R₀)



* Immunity by vaccination as opposed to from prior infection(s).

Population vaccine coverage indicates progress toward the herd immunity threshold, particularly as vaccination is most effective prior to natural infection. If a recent survey’s findings that nearly three-quarters of respondents worldwide would receive a vaccine against SARS-CoV-2 are realized, the herd immunity threshold may be met by vaccination for vaccine effectiveness of 80% or higher.⁶ This may vary by location, though. Surveys in the United States suggest coverage may more closely resemble that of influenza, with less than one in two receiving vaccination.^{7,8} At this rate, herd immunity may not be attainable even with 100% vaccine effectiveness.

Planning for distribution of SARS-CoV-2 vaccine(s) is already underway.⁹ For the most recent influenza pandemic, which occurred with a novel H1N1 virus in 2009, the strategy for prioritizing a limited vaccine supply initially was relatively straightforward, vaccinate those who were:

- At high risk for becoming infected or suffering from influenza-related complications
- Likely to come in contact with the virus and expose others in medical care settings
- Close contacts of infants less than six months of age who were too young to be vaccinated¹⁰

Children and young or middle-aged adults represented the populations most at risk of severe disease from viral infection and for whom H1N1 cases most frequently occurred.¹⁰

For SARS-CoV-2, maximum infectivity occurs before or at symptom onset, and the proportion of individuals with mild or no symptomatic illness is high and facilitates undetected transmission.¹¹ Currently, cases occur most frequently among those who are generally young, healthy, and mobile: while individuals aged 65 years and older comprise nearly 80% of COVID-19-related deaths, they account for only 15% of cases in the United States.¹² Furthermore, it is too early to understand the extent of, and high-risk populations for, long-term health sequelae among survivors of infection.

Although this coronavirus has not demonstrated antigenic properties like those of influenza, there have been more warnings of coronavirus’s potential threats to the human population in the first 20 years of the 21st century than in the three decades following its initial identification in the mid-1960s.¹³ SARS-CoV-2 may be just a harbinger of more coronaviruses or other pathogens capable of causing severe disease that we may face in the future.

It took more than a century, including a dedicated 19-year effort, to eradicate illness caused by smallpox. The incidence of infection from measles has been eliminated (i.e., the disease is no longer occurring naturally) in many defined geographical areas, but continued measures to prevent resurgence of transmission are required. For influenza, on the other hand, we have become accustomed to a level of disease incidence, prevalence, morbidity, and mortality over the past century that varies across seasons and is, at times, unpredictable. Though vaccination is unlikely to be a silver bullet against COVID-19, its role in negating the worldwide burden of the pandemic to allow life to find a normal more similar to what it was pre-2020 remains promising as we learn more about SARS-CoV-2 disease epidemiology and the vaccine becomes more available.

###

COVID-19: Impact to dental utilization

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Early in 2020, Milliman consultants explored the potential effects of the COVID-19 pandemic on the dental industry, considering changes in utilization of dental services that could result from the pandemic and its containment efforts as well as economic ramifications. Milliman consultants developed a framework to model the potential impact using a set of broad assumptions, to be refined further as more information became available to develop more robust assumptions. In developing this framework, consultants assumed nationwide average utilization for a commercially insured population, and excluded impacts to orthodontic services. Data underlying the 2019 Milliman Health Cost Guidelines–Dental™ was used in developing this illustrative modeling framework.

Phase 1: Reduction in Dental Utilization During the COVID-19 Pandemic

Phase 1 of the pandemic impact was split into two subphases; first, a period of time when shelter-in-place orders may have been active and individuals were limiting social contact, and second, a period of time immediately following a lift on shelter-in-place orders when people began to return to daily routines and behavior.

(a) Provider-driven reduction in dental services

In March 2020, the American Dental Association (ADA) released guidance to dental professionals to postpone elective procedures for several weeks and to limit care to emergencies only.¹ Several states echoed the ADA's recommendations with similar or more stringent limitations on dental services to be provided during the key weeks of pandemic-related lockdowns.

(b) Patient-driven reduction in dental services

As of April 2, 90% of the nation or approximately 300 million people were under some form of “shelter in place” rules or recommendations.² In this environment, dentists were really like any other small business owner, subject to reduced office traffic because people simply were staying at home. Some dental procedures, especially nonurgent routine care, are relatively easy to postpone, and people may have considered these appointments nonessential. Added to this was the fear of exposure to the virus in a dental office environment in which bodily fluids are a part of everyday practice. Declines in utilization were especially pronounced for

routine dental care, while appointments for higher-level services such as endodontics were somewhat less likely to be canceled.

The Milliman analysis categorized the various types of dental services as high, medium, or low severity, and for each severity category, we made assumptions regarding the impact to utilization during each Phase 1 subphase.

During shelter-in-place orders, we assumed a sharp drop in utilization in the medium-severity and low-severity services and assumed the high severity utilization would remain at normal levels, consistent with the ADA guidance to dental providers. During the period immediately after shelter-in-place orders, we assumed that utilization for medium-severity and low-severity services would return at 70% of pre-pandemic levels, and high-severity emergency services would remain at normal levels. Given the unprecedented nature of this pandemic and the accompanying lack of historical data on provider and patient actions, these assumptions were initially entirely judgment-based and presented as broadly reasonable placeholders that could be adjusted as actual utilization data began to emerge.

FIGURE: CATEGORIZATION OF DENTAL SERVICES BY SEVERITY

Severity	Dental Services
High	Emergency, Surgical Extractions, Oral Surgery, Anesthesia, X-Rays
Medium	Simple Extractions, Restorations, Periodontics, Endodontics, Space Maintainers, Sealants, Inlays/Onlays/Crowns, Dentures, Bridges
Low	Oral Exams, Prophylaxis, Fluoride, Routine X-Rays, Lab and Other Tests

Phase 2: Reduction in Dental Utilization Due to Economic Effects of the COVID-19 Pandemic

Rising unemployment, such as was seen during the COVID-19 pandemic, correlates with a reduction in the number of people with access to employer-sponsored dental coverage—and having private dental insurance is a key predictor of one's use of dental services. Studies on the effect of the 2007-2010 global financial crisis may help to shed light on dental usage patterns during a potential economic downturn. An April 2019 ADA study using historical Medical Expenditure

Panel Survey (MEPS) data found that the percentage of people with general dentist visits “experienced a slow and steady decline” through the recession period.³ Visits to the orthodontist declined more sharply but rebounded after the recession more quickly than general dentist visits. It stands to reason that orthodontics, for which consumers bear significant out-of-pocket costs and which can in many cases be postponed until convenient and affordable, would be more sensitive to economic conditions than general dentist visits. A Dental Economics article analyzing dental industry performance during the recession found that dentist production dropped considerably between 2008 and 2010, driven by fewer patient visits. However, while relatively expensive procedures like restorations were more likely to be postponed, routine hygiene procedures like cleanings actually increased during that period. This could be due to people with private insurance taking advantage of no-cost or low-cost preventive and diagnostic services, because most plans fully cover those procedures, while postponing dental care that would cost them money at the point of service. Phase 2 of the Milliman model, meant to capture the expected impact of the economic downturn on dental utilization, was split into two subphases; first, a period of time after the immediate onset of the economic downturn occurring during the COVID-19 pandemic, and second, a sustained period of time representing the continued effects of the downturn similar to what was seen with the 2007-2010 global financial crisis.

We viewed the first subphase as a transition period, when the major disruption from the pandemic was still subsiding and the effects of the economic downturn had begun, both affecting consumer behavior. During the first subphase, we made an initial assumption that utilization levels for the medium-severity and low-severity procedures would be 85% of pre-pandemic levels. This assumption suggests that reduced utilization levels would persist, but not at levels as low as after the shelter-in-place order is lifted in Phase 1, due to a variety of factors including release of some pent-up demand for dental services, lingering fear of going to the dentist, and the beginnings of the economic impact on dental demand. Similar to the assumptions made for Phase 1, this assumption was entirely judgment-based given the lack of historical data, and could be updated as new information became available.

Finally, in the months during and directly following the height of the COVID-19 pandemic, there are a few factors that may have mitigated some of the expected decline in dental services. While teledentistry is still an emerging concept for many dental providers, using such technology to triage patients, diagnose problems that may require a live visit, and generally keep in contact with patients helped to serve the population and maintain patient relationships during this time. Several states developed telehealth rules governing insurer coverage and reimbursement of services provided through that medium. Demand may have also resurfaced from insured dental patients who have already satisfied their annual deductibles or spent considerable dental dollars during the current policy year and who wanted to get remaining services completed before their benefits reset.

The initial Milliman model developed in April 2020 estimated that calendar year 2020 dental claims could be reduced by approximately one-quarter to one-half compared with a normal year, with smaller reductions (less than 10%) persisting through 2021.

###

PBM Best Practices Series: Effective contracting

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Plan sponsors' prescription drug costs continue to increase year over year and remain as one of the fastest-growing components of the healthcare dollar. One of the most important ways plan sponsors can lower healthcare costs without significantly changing their benefits is to look for opportunities to improve their pharmacy benefit manager (PBM) contracts.

Important Contracting Provisions and Strategies

PBM negotiations typically involve the following contractual provisions, which are critical to delivering competitive pharmacy benefits on a cost-effective basis:

- *Aggressive guaranteed discounts and dispensing fee provisions* have historically been among the key metrics used to evaluate PBM contracts and to compare proposals from different PBMs. Special consideration should be given to how brand-name and generic drugs are defined for year-end pricing reconciliation versus how the same drugs are defined at the point of sale. For example, a generic drug might be considered a generic for the purpose of member copays but reconciled as a brand-name drug for the purpose of discount guarantees. The difference between these two pricing reconciliation strategies is typically relevant when calculating plan cost performance. Furthermore, plan sponsors should watch how their guarantees are structured so that over-performance in one area (e.g., brand-name discounts) cannot be used to offset underperformance in another area (e.g., generic discounts).
- *Adoption of limited retail and specialty pharmacy networks is an effective way* PBMs have been able to significantly improve discounts for plan sponsors. Adopting a tiered or select pharmacy network can immediately improve the discount guarantees offered by a PBM. In addition, PBM-owned mail order and specialty pharmacies would typically give large discounts to limit fulfillment exclusively at the PBM-owned operations.
- *Exclusionary language in minimum pricing and rebate guarantees* may exclude certain drugs or claims from discount and rebate guarantees. These exclusionary terms are presented in many different forms, and the lack of consistency and transparency is almost never to the health

plan's benefit. At a minimum, plan sponsors should ensure the exclusions are clearly understood and auditable. Plan sponsors should be wary of "proprietary" definitions when industry definitions are available for reference. Plan sponsors should also ensure that reimbursement mechanisms are in place if targets are not achieved.

- *Definitions and key terms* such as transparency, pass-through, generic and brand-name drugs, and rebates can have different meanings among PBMs, which can affect pricing and discounts if not clearly defined. For example, a less optimal definition of a *generic drug* might allow a PBM to re-classify single-source generic (SSG) drugs to be reconciled as brand name drugs. The way definitions are written can have a significant effect on plan cost performance. We often see that a PBM does not interpret a definition the same way that a plan sponsor might, which leads to confusion and often frustration.



...We see most of the change (resulting from COVID-19) across the PBM industry: pharmacy management, patient access, and supply chain."

— *How the pharmacy benefit industry is reacting to a pandemic. April 6, 2020*

- *Performance guarantees should be measurable and auditable* to allow the PBM account teams to track, measure, and clearly explain the guarantees to all stakeholders. Best-in-class language regarding missed performance guarantee payout allocation should state that the health plan has the right to allocate the full at-risk payout amount across its choice of performance guarantees. Not doing so allows the PBM to dilute the payout at risk, as some or most performance guarantees are easily achieved. Any customized performance guarantees should also be auditable and measurable.
- *A termination clause* should include a specific provision for the right for the plan sponsor to cancel without penalty. If penalties are assigned, then early termination should be weighed against any potential savings from switching PBMs mid-contract. Negotiating a best-in-class termination without cause clause will assist the health

plan in receiving the maximum performance from its PBM partner over the long term versus only in renewal years.

- *Auditing provisions should include language* that allows the health plan the right to choose and hire an independent auditor to periodically validate the PBM's contractual performance. PBM contracts often limit the ability of plan sponsors to audit the PBM's performance, so it is essential the contract allows for flexibility in auditing, permitting the health plan to perform this important oversight function.
- *Rebate terms should be clearly defined* as unclear definitions can take on alternate meanings and put rebate dollars at risk. For example, a poorly defined term "rebate" might include what is not in the definition, whereas a clearly defined term would include what is in the definition. The former allows for loopholes and assumptions, whereas the latter closes loopholes, which makes adding alternative meanings to terms more difficult for a PBM. Bonus tip: In the current environment of high trends in the Average Wholesale Price (AWP) for brand-name drugs, price protection may protect against inflation more than discount guarantees. It is best practice for plans to negotiate price protection terms as they prepare for their next contract iterations.

“ An estimated \$90 billion to \$100 billion in rebates is paid to plan sponsors each year, split across private health plans, Medicare Part D plans, Medicaid, and other payers.

A comprehensive audit usually takes place in two stages. The first stage is a review of the claims for the audit period. This starts with an electronic audit of all claims followed by a manual review of the potential issues identified in the first stage. The second stage may require an on-site review of pharmaceutical manufacturer or rebate aggregator contracts with the PBM.”

– *PBM Best Practice Series: Rebate audit services.*
May 15, 2020

“ The real value of including Performance Guarantee language in the contract is to 1) set a performance standard, and 2) make the PBM accountable for correcting systemic or repetitious errors, noncompliance with contractual requirements, or inadequacies in claims control procedures after they have been uncovered.”

– *PBM Best Practice Series: Performance guarantees.*
November 6, 2020

Every contract should have annual market checks

Market checks are a critical tool to ensure competitive PBM terms over the life of the contract. A market check often results in an improvement of plan pricing arrangements compared to currently contracted rates. There are strong financial incentives for plan sponsors to perform formal market checks every year throughout the PBM contract period and ensure pricing is consistent with market improvements and changes. When including a consultant's review of a mid-contract market check, the health plan can leverage the financial contract terms with those recently seen or negotiated with other vendors. The process includes a comparison of the aggregate program pricing terms with the market across product types and distribution channels, administrative fees, allowances, other financial guarantees, and rebates to determine whether the plan sponsor is receiving competitive market rates. The verification of competitive market rates may assist in renegotiating contractual rates with the existing PBM or may contribute to the decision to procure a new PBM service contract.

Conclusion

As the pharmacy industry continues to evolve and drug costs continue to rise, plan sponsors should always evaluate whether their PBM contract terms and provision strategies are in line with the changing marketplace. The PBM should be considered a partner in managing costs and not just a vendor to process claims. The evolution of the contract will give plan sponsors more control, allow them to mitigate risk, and provide comfort that the best possible deal is being actively maintained.

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Empowering employers through employee contribution strategies

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Employers offering healthcare benefits to their employees must consider a variety of factors when developing the portion of the medical gross cost or premium to pass along to various employee or retired populations. Employee contribution strategies should align with the employer’s motivation and philosophy surrounding its approach to offering health and welfare benefits.

Employee Contribution Approaches

Defined Contribution

A common approach to employee contributions is a defined contribution. In this structure, the employer opts to pay a fixed amount toward the employee’s total premium, regardless of the plan chosen by the employee.

FIGURE 1: DEFINED CONTRIBUTION EXAMPLE



Advantages of defined contribution approach

1. Maintains levels of fairness to employees regardless of plan chosen.
2. Protects the employer against high year-to-year trends in medical costs.
3. Offers ease of forecasting employer costs.
4. Provides ease of communication to participants.
5. Reduces adverse selection concerns because the employer contributes the same amount independent of the plan.

Disadvantages of defined contribution approach

1. May create unintended steerage to a given plan.
2. Places burden of trend solely on employee, if no adjustments are made to contribution amount. This impact can be quite onerous to employees due to trend leveraging. The total cost for the medical plans offered by the employer only increases by 5% in year 2. However, because the employer contribution stays flat, the employee contribution trend exceeds the total cost trend for every tier.

“By taking advantage of available expertise, research-based insights, analytics, and communications, plan sponsors of all sizes can keep costs low and get the most of their plans.”

– Five ways plan sponsors can manage their benefit spend. March 3, 2020

The disadvantages to the defined contribution approach often lead employers to increase the employee contributions by a fixed percentage upon renewal. Over time, this approach distorts the defined contribution amount and creates a structure that is no longer well defined. This distortion can lead to misperceptions of value to employees. It also creates misunderstandings regarding the goals of the benefit plans among management when contribution approaches are not viewed with historical context.

Defined Percentage

Another common approach to employee contributions is a defined percentage. In this structure, the employer opts to pay a fixed percentage toward the employee’s total premium, regardless of the plan chosen by the employee. The defined percentage approach will often use a different percentage for the employer share for dependent costs.

Advantages of defined percentage approach

1. Creates a proportional “partnership” between employees and employer that is maintained over time with trend changes. This is because any percentage increases to the

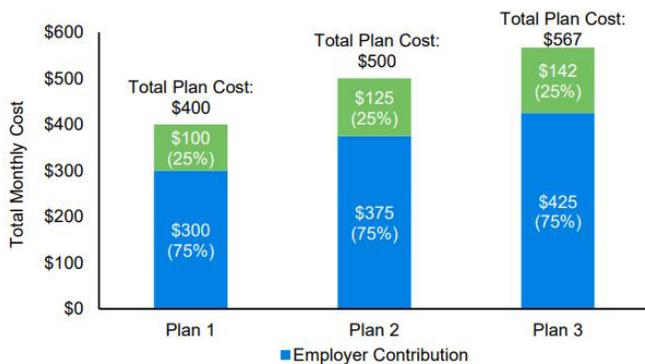
total cost will be the same percentage increase to the employer and employee share.

2. Provides ease of communication to participants.

Disadvantages of defined percentage approach

1. Can create steverage concerns and potential adverse selection.
2. Poses equitability concerns among employees who select different plans.
3. Cost forecasting is dependent upon medical trend.

FIGURE 2: DEFINED PERCENTAGE EXAMPLE



Other Considerations

Disability

Employers will often create reduced premium structures for participants who become disabled. Some employers offer a full medical premium waiver for some portion of the duration of the disability. While disability rates for many industries are low frequency, the high cost for a long-term medical premium waiver can still create large liabilities to the plan.

Retirees

Employers offering medical benefits to retirees is becoming increasingly rare. In 2019, only 28% of large firms that offer health benefits were offering some form of health benefits to retirees.¹ Alternative solutions to retiree medical coverage, such as employer-funded health reimbursement arrangements (HRAs) in lieu of medical benefits, may remove the need for employers to develop contribution strategies for this population.

Pre-65 Retirees

Pre-65 retiree costs per enrollee far outpace those of their active counterparts. If the pre-65 retiree experience is pooled with the active experience, a determination

will be made by the insurer or self-insured employer whether the extra costs will be reflected in separate active and pre-65 premiums. If the active and pre-65 premiums are pooled together, there is an implicit subsidy to the retired population borne by the active population.

Insurers usually vary premiums by coverage tier and plan. Similarly, insurers or plan sponsors will often reflect the additional retiree costs when setting those premiums. This approach allows for the insurer or plan sponsor to more closely reflect actual claims experience.

The employer ultimately determines how its population is exposed to the rates via the contributions it sets.

Post-65 Retirees

If an employer opts to offer post-65 coverage under the active plans, then an insurer or plan sponsor will need to determine whether the rates will reflect coordination of benefits with Medicare coverage. Care should be taken that any type of rate adjustment due to coordination of benefits for a post-65 enrollee requires confirmation of Medicare enrollment.

When an employer sets the contributions for retirees they will need to consider:

- *Retiree agreements in place:* Retiree contributions may need to be set in accordance with any contractual retiree labor agreements in place. These agreements will need to be reviewed over time to make sure they reflect the current healthcare environment.
- *Purpose of the plan:* Contributions should align with the purpose of the plan. If the purpose is to encourage early retirement, modest retiree contributions may be appropriate.
- *Anticipated future of the plan:* If the plan is expected to be terminated in the near future, it may be appropriate to steer people out of it.

Wellness

Employers seek to improve productivity and reduce absenteeism and medical claims among their workforces through the use of wellness programs.² An employer may use a reduced employee contribution schedule as an incentive for participation in a wellness program.

###

The digital health revolution is here. What's in it for providers and consumers?

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Recent advances in digital technology have revolutionized healthcare as we know it. In 2018, the global digital health market size was valued at \$95.8 billion, expected to quintuple to \$509.2 billion by 2025.¹ Increasing demand for remote monitoring devices to manage chronic ailments, a significant rise in the penetration of smartphones, and an abundance of mobile health apps are all potential drivers for the expected growth of market size.

Another contributing factor to the growth is global investment in digital health – it hit a record high of \$14.6 billion in 2018, marking the sector's eighth consecutive year in growth.²

What is the value of digital health tech in patient care?

Before we answer that question, let's first take a closer look at what encompasses digital health - it includes mobile health apps, wearables, big data, telehealth, personalized medicine, and everything in between. These technologies provide an overall picture of patient health abetting informed clinical decisions, better management of chronic conditions, early disease diagnosis, and timely intervention and prevention. Utilization of the right digital tools and strategy can improve the ability of the healthcare system to take a more consumer-centric, proactive approach to improve patient outcomes and increase operational efficiencies. It also has the potential to reduce costs all while building a system that benefits providers and consumers alike.

The Provider Perspective

From a provider's standpoint, benefits include:

- Improved diagnostic ability and quality of personalized care
- Increased patient access
- Reduced inefficiencies and costs

Unlike the point-in-time data acquired in a clinical setting, health data generated through smart devices and wearables provide an outlook on the patient's overall health over a period of time, rendering the data more useful for disease

detection and diagnosis and thus improved clinical decision making.

Furthermore, some mobile health apps go a step further and provide a portal for patients and providers to have a direct line of interaction, which increases patient satisfaction and quality of care.

Per the findings of a survey conducted by EY³, physicians polled widely agreed that digital technology will contribute to population health management, ease the burden on the healthcare system, and reduce costs. More specifically, 66% of the surveyed physicians think that technology that captures consumer data generated from mobile applications and digital sensors can reduce the burden on doctors and nurses, positively affecting the rate of physician burnout.



Spurred on by the COVID-19 pandemic, consumer adoption of telehealth has soared to 46%, up from 11% in 2019."

– *No appointment needed: The advent of mobile health. November 4, 2020*

The Consumer Perspective

Wearables and mobile health apps have substantially driven the consumer side of digital health; the modern patient/consumer can use digital tech to track physical, mental, and wellness aspects of their health. Instead of an annual physician visit painting the picture of patient health, consumers now have the ability to view and manage their health every day and in the comfort of their homes.

For the first time, this is putting the power of health management in the consumers' hands in a meaningful way. It also raises the hope and expectation that consumers will gain a deeper understanding of their health and will be engaged to make better self-care decisions.

What's next in the digital health revolution?

Based on the growth of the digital health market and associated investment, some key questions might get answered over the next half decade:

- *Will the consumer be King?* With increasing proactive engagement from consumers, will the current provider-driven system shift to consumer-centric care? Will consumers set their own health goals and preferences, driven by a better understanding of their health data? Perhaps the growth of digital health will lead to a consumerization of healthcare that hasn't been witnessed before.
 - *Will true integration and interoperability of data across platforms finally be achieved?* Consumer-centric healthcare and individual hunger for control over one's own health data could lead to a stronger push for a digital infrastructure that enables data interoperability, allowing data to flow between clinicians and patients.
 - *How will data governance evolve?* With the widespread use of data across health systems comes the growing risk to security and privacy that can compromise data integrity and ownership. Policy frameworks in a consumer-centric health system will need to strictly enforce safe and secure access of personal health data by providers and consumers to achieve the best outcomes.
 - *Will we finally shift to prevention?* Healthcare of the future could be preventive, predictive, and participative. With the rapid progress of digital and artificial intelligence capabilities, organizations could use predictive analytics to identify populations at high risk of developing certain preventable conditions, prioritize care, and proactively mitigate risk in a timely manner.
- The power of digital health tech rings especially true during the current COVID-19 pandemic that has battered the world. The ongoing crisis has definitely pushed digital tracking, remote monitoring, and telemedicine to the forefront, finding virtual ways to substitute in-person visits. Although every aspect of life seems unsteady at the moment, forging a path to progress through trying times has always been the American way – and in that way forward, the pulse of digital health tech in everyday life will be felt stronger than ever.

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Direct contracting strategies for employers

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For employers sponsoring health insurance benefits for their employees, maintaining competitive benefits packages is key to attracting and retaining top talent. As medical and prescription drug trends continue their indefinite rise, self-insured plan sponsors dissatisfied with the status quo are seeking out direct contracting opportunities with healthcare providers to lower costs, cede risks, enhance benefits, and improve employee satisfaction.

Shared Savings

A shared savings arrangement is a transfer of funds between an employer and a provider intended to reward a provider for its performance against established cost and quality targets by “sharing” a portion of the savings. These arrangements may also include provisions requiring the provider to compensate the employer for failing to meet the established cost and quality targets, in which case the arrangement may be referred to as “shared risk.” Providers are typically responsible for the medical (and, in some cases, prescription drug) spend for members attributed to them; members can be attributed to a provider based on enrollment or through an agreed upon algorithm that is used to establish the provider’s responsibility for the patient’s care.

There are numerous methodologies used to set cost targets, but they can generally be classified as either retrospective or prospective. A retrospective methodology is reliant on some sort of external information needed to measure the provider’s performance against the external benchmark (for example, comparison to a market trend index). Consequently, retrospective methodologies result in cost targets that aren’t known until the contract’s performance period has concluded. A prospective methodology establishes cost targets on an absolute basis (for example, trend = 4%) and is not reliant on contemporaneous external information. In contrast to retrospective methodologies, prospective methodologies have the advantage of knowing the cost targets before the contract’s performance period has ended.

There are seemingly infinite combinations of measures and methodologies used to assess a provider’s performance against quality targets, but the influence that quality performance has on the overall financial mechanism is generally classified as either binary or scalar. A binary approach requires achieving the quality target as a prerequisite for distributing savings to a provider, whereas

a scalar approach measures quality performance as a percentage of the target and reduces savings for performance below 100% of target.

Important Considerations

- Contracts often include several risk management provisions (e.g., large claims exclusions, risk adjustment) that may create a disconnect between observed health plan trend and the trend used to assess the provider’s performance—prudent employers will allocate resources to reconciling these differences and understanding their actuarial appropriateness
- The ease of negotiating a prospective methodology will be correlated to the provider’s expected network penetration— higher network penetration results in the provider having a larger influence over fee schedules and utilization management, and, therefore, a higher tolerance for prospective trend accountability
- If the methodology relies on allowed claims data (i.e., paid claims plus member cost sharing), it is important to confirm that the third-party administrator (TPA) is willing to supply this information—otherwise, the methodology will need to incorporate provisions to address the limitations of having only paid claims data (for example, reflecting the expected change in paid claims due to benefit plan design changes over time)

Bundled Payments

A bundled payment is a fixed-price agreement for a provider to perform a procedure or manage a condition and take responsibility for contractually defined related services for a specified period. In the case of a procedural bundled payment (for example, lumbar spinal fusion is a service that is suitable to a bundled payment), the contract may cover pre-operative and post-operative care in addition to the procedure itself. By assuming financial responsibility for these additional related services, the provider is incentivized to eliminate wasteful services and focus on efficient, cost-effective treatments.

There are several technical complexities associated with bundled payment contracts. In addition to identifying the covered services, the contract may also specify explicitly excluded services, diagnoses, and conditions that may cancel the agreement (thereby reverting payment to fee-

for-service), or high-cost outlier provisions. Additionally, administration of this payment model can be complicated due to differences in prospective and retrospective designs and associated challenges in determining when a bundle has been initiated.

Important Considerations

- Employers offering narrow network options can enhance employee satisfaction by establishing bundled payment arrangements with providers that are considered leaders in the chosen specialty of focus (e.g., orthopedics) but may not be included in the TPA's network
- Historical claims data for the employee population can be used to identify procedures and conditions that may be good candidates for bundled payments due to high variability in observed claims costs
- Reducing (or eliminating) the member coinsurance for a service covered through a bundled payment arrangement could increase the likelihood of members utilizing the preferred provider
- The reasonability of the bundled payment price and any associated outlier methodologies could be analyzed by applying the contractual provisions to historical claims data and/or external benchmark data

Reference-Based Pricing

Reference-based pricing (RBP) is another option that some self-insured employers are exploring to combat rising healthcare costs. RBP methods limit the amount that employers will pay toward certain healthcare services. Employers generally negotiate contracts with providers to accept RBP rates. The upper limit or “reference rate” that the employer pays a provider is often a function of the price Medicare would pay for a given healthcare service (e.g., 130% of Medicare). Members may still have the choice of utilizing providers that have not agreed to RBP, but they may be responsible for paying fees that exceed the RBP. RBP is generally used for services where there is wide variation in prices among providers, but less variation in quality and outcomes across the spectrum of providers. Some examples of such services include CT scans, laboratory testing, and joint replacement surgery.

Important Considerations

- Benchmark analyses may help in determining the appropriate reference-based price. Setting the level too high may not result in desired savings and setting it too low may not attract enough providers.
- Providers currently being reimbursed higher than RBP and with significant market share may be reluctant to

reduce prices to RBP levels unless there are substantial gains in volume that small to medium-sized employers may not be able to offer.

- It can be difficult to implement RBP in rural communities where there may be a limited number of providers.
- In the scenario where there is no negotiated RBP contract between employers and providers, employers may still pay RBP rates. However, balance billing may occur. Balance billing (if allowed in the state) can result in high costs for members if providers bill the difference between their charges and the RBP that the employer pays. This may result in potential litigation in some cases.

Direct Primary Care

Direct primary care (DPC) is a relatively new primary care delivery and payment arrangement in the healthcare landscape. In this emerging model, self-insured employers contract with medical providers to offer primary care services to their employees based on fixed monthly fees. Rather than paying for specific services based on utilization, employers pay the DPC providers on a periodic basis for all the negotiated primary care services (i.e., a capitation). The DPC model eliminates some of the administrative burden for primary care providers associated with billing on a fee-for-service (FFS) basis and there is no insurance carrier involved. Because the DPC model focuses on preventive care and allows for faster access to primary care providers by offering same-day or next-day appointments, it strives to achieve better health outcomes and stronger relationships between members and the primary care providers.

Important Considerations

- Identify the exact scope of services that will be covered under DPC, any cost sharing that members would pay while accessing DPC providers, and whether the cost sharing would accumulate toward the out-of-pocket maximums for the medical plan.
- Monitor emerging regulations around DPC and the ability of members to pay for DPC services using their health savings account (HSA) funds or to contribute to an HSA while being a member with DPC.
- Based on where the employees are geographically concentrated, determine if it makes sense to have the DPC provider on-site on the employer campus.
- Make sure primary care services are not being duplicated through both the DPC model and the traditional primary care FFS model to avoid any increase in primary care costs.

###

The paradox of layoffs: Engagement drops when you need it most

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Radhika Philip

Unemployment in the United States reached 17.7 million, according to the June Bureau of Labor Statistics Report; a staggering number when you compare it to last year's 5.9 million. Close to 12 million people have lost their jobs during the COVID-19 pandemic. Layoffs—research repeatedly shows—lead to declines in survivor engagement, that is, employee willingness to go the extra mile on behalf of the organization.

Paradoxically, declines in engagement and performance come at a time when the demands of the workforce are greater than they were before the layoffs. Employees are expected to do more—to support and lead efforts to navigate challenging economic times and often to pick up work that their terminated colleagues left behind. If employees are distracted, discouraged, and overburdened, they may resist doing more, and the organization will sputter rather than ride the tide.

How can organizations approach layoffs in ways that mitigate risks to employee engagement and performance? Consider these five ideas:

Establish a Workforce Transition Philosophy. Without an explicit philosophy to guide and ground decisions to eliminate a position or an individual, terminations can seem haphazard and create concern for employees. Sandra Sucher and Shelene Gupta of Harvard Business School advise that this philosophy should establish the values and principles that the organization will abide by as it plans for changes in the workforce, as well as its commitments and priorities. Communicating this philosophy to employees can manage their expectations and create confidence that leaders have an approach to handling change during uncertain times.

Commit to Fair Practice. If people feel that termination choices were not fair or that the process was conducted without dignifying the contributions of the terminated employee, then engagement will suffer. A study by Joel Brockner of Columbia Business School shows that organizations that demonstrate “process fairness” have zero or minimal wrongful termination cases as well as shorter dips in engagement compared to organizations that do not establish, practice, and communicate process fairness. For an organization planning layoffs, it is useful to define and communicate guardrails for fair practice. Develop these principles with consideration of the organization's values

and culture, the employee base, and the scale and type of workforce realignment anticipated.

Communicate the Basis for Decisions. When made in an opaque manner, termination decisions can accentuate feelings of uncertainty, fuel distrust in leadership, and cause declines in engagement. Joel Brockner tells a story about two companies that downsized their employee base. In Company A, the severance package was generous, but the message was delivered quickly—the managers “mumbled a few perfunctory words.” Management never explained to the rest of the organization how they chose which jobs to eliminate. Over the year, Company A's performance continued to worsen, wrongful termination suits were filed, and productivity and morale plummeted, leading to another round of layoffs. Company B, by contrast, didn't offer as rich

“ COVID-19 has been a massive shock—literally all over the world. It is presenting unprecedented challenges to the global economy, global health and well-being, social interaction and the future of the workplace everywhere. This has caused misalignments of current global benefits programs versus what employers want, employees value and the market demands. There is too much cost and too much at stake. Many global employers will need to go back to the drawing board to reassess what plans are affordable, appreciated, deliverable, sustainable and necessary.”

– *Rebalancing global benefits now for a post-COVID-19 world. November 17, 2020*

a severance, but management explained the rationale for the layoffs multiple times before they were implemented, made themselves available to answer questions, and expressed real regret about the job losses. In Company B, where investments were made in establishing and communicating a fair process, there were no wrongful termination lawsuits, performance improved, and morale strengthened. The employees understood why the layoffs happened and felt that they were treated with respect.

Be Generous and Gentle. Termination conversations are traditionally brief, one-sided, and transactional: Treating terminated employees with respect, and helping them

with the next stage of their career, is the right thing to do. Supporting employees through transitions is important not only to the employees who are terminated, but also to those who remain. Research by Jane Dutton from the University of Michigan and Peter Frost, cofounder of the Compassion Lab, demonstrates that the absence of compassionate leadership during difficult times erodes loyalty “not just among people who have directly suffered, but also among colleagues who witness the lack of care.” With this in mind, leadership should communicate the reasons for layoffs, an empathetic understanding of the impact of job loss, and actions taken to facilitate transitions. They should help build a culture of support by encouraging employees to assist terminated colleagues with relevant resources and connections.

Over Invest in Ongoing Change Management. After a layoff, employees who remain can feel uneasy about their own job security as well as the organization’s future. Their concerns are reasonable, given that we are in a recession and many organizations are rethinking their operating and staffing models. Under these circumstances, leaders should regularly share directional ideas for the future as well as progress made toward their plan of action. Most leaders do communicate, but at times of stress it is valuable to communicate far more frequently than is typically done. In the absence of constant communications, employees may think that leaders are not aligned on direction, or that they are being secretive. Rumors will proliferate with messages that might be inaccurate and accentuate difficult emotions. Transparent and regular communications from leadership will offer stability, assurance, and give employees a realistic sense of what lies ahead.

In addition to clear direction from leadership, employees need a strong connection to their manager during uncertain

times. Managers should closely monitor individual employee engagement and quickly address issues that may surface. In cases where workload has increased, the manager should ask affected staff how they are faring, and share thoughts on when their workload may normalize. Human Resources has a role to play in educating managers and helping them identify and address employee concerns as well as engagement setbacks.

“ Forward-looking multinational companies are looking at these five areas, asking key questions of the various angles of their (benefit) programs:

1. Employer drivers and alignment
2. Employee fit and engagement
3. Cost and risk management
4. Insights and innovation
5. Operations and oversight”

– *Rebalancing global benefits now for a post-COVID-19 world. November 17, 2020*

Manage The Impact on Reputation. If poorly done, a layoff can damage the organization’s reputation. Employees who feel that they have been unfairly treated can share their stories with family and friends, with clients, and frequently, with the world online. Fair practice, generous transition services, and sensitive change management can reduce the disengagement dip and protect, even strengthen, the organization’s reputation.

###

Eight tips for improving employee communication in a time of crisis

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Jennifer Bolton

In uncertain times, clear and consistent communication is more important than ever. Now is not the time to go radio silent even if you don't have all the answers. Frequent touchpoints can help decrease stress and provide reassurance during challenging times.

Try these tips to stay in touch with your employees.

1. **Be open and honest.** If there was ever a time for direct and down-to-earth messaging, it's now. Provide answers if you have them, and be honest if you don't.
2. **Update often.** Sometimes less is more, but right now employees want and need to hear from leadership on a regular basis. Don't wait until you have all the answers. Give updates as soon as you have them.
3. **Step outside your communication comfort zone.** Your tried-and-true communication channels may not work. Look for new ways to reach employees.
 - **Podcasts:** According to the New York Times, about one in three Americans listens to podcasts. Podcasts can be produced quickly, allowing timely responses to changing conditions. For example, Milliman released a podcast to retirement plan participants in response to recent market volatility.
 - **Virtual meetings:** With restrictions on group face-to-face gatherings and travel, people are turning to virtual meetings especially those with a video component as a replacement. When Milliman clients needed to cancel in-person meetings with our Retirement Educators, our Meeting Services team provided a virtual solution.
4. **Move quickly.** In a rapidly changing situation, your communication needs to keep up the pace. For example, Milliman added a COVID-19 resource page on our financial wellness website, which included: tips to settle nerves, stay informed, and make wise financial decisions; a link to the "What To Do When ... The Market Declines" podcast; and a video on what to remember when the market takes a downturn
5. **Note the date and time.** It's a good idea to date- and time-stamp your materials. When things are changing on an hour-to-hour basis, people need to know what information is the most timely.

6. **Provide resources.** Reassure employees that help is available. Direct them to resources like your Employee Assistance Program (EAP), mental health benefits, and financial education. Consider posting Frequently Asked Question (FAQ) updates, such as:
 - Are telemedicine visits covered?
 - How do I change my prescription to mail order?
 - Where can I get help to manage my child's anxiety?
 - How do I change my 401(k) contributions?



Ensure a smooth Open Enrollment process

- > Develop a comprehensive strategy with measureable objectives
- > Ensure leadership support and provide leaders advance notice to answer employee questions
- > Deliver the message across a variety of media
- > Clearly explain the changes and call to action"

– *Client case study: Milliman Open Enrollment.*
June 26, 2020

7. **Change course if you need to.** You may need to interrupt your regularly scheduled programming. Are the messages timely and do they still make sense in the current environment? Or do employees need to hear something else? In response to the market declines, we replaced the March retirement plan participant email with an email about market volatility.
8. **Cut through the clutter.** Make your communication easy to understand and avoid business jargon. Break down complicated concepts by using bullets, charts, and infographics. For example, we helped retirement plan participants understand the impact of the Coronavirus Aid, Relief, and Economic Security (CARES) Act with a chart that organized the details into logical components: what you need to know, the deadline to request relief, and how to apply for help.

###

Communicating to employees during a pandemic

ORIGINALLY PUBLISHED JUNE 23, 2020

Denise Foster

This spring has been an interesting and challenging time to be a business leader. As the workplace location, habits, and culture across the board have been turned inside out, leaders have had to think differently.

Returning to the workplace

While the move to working from home happened quickly, the return to work will be slower and more complicated. If you haven't made movement back to workspaces and office buildings, think carefully about all of the implications of our new six-feet-apart world. How will you handle an employee who refuses to wear a mask when required? When will you open the kitchens and make coffee and water available? How many people will you allow in a restroom at a time? Do people have to walk clockwise around the space? Where do you put hand sanitizer stations? Setting aside all of the logistics, how do and will employees feel?

Tips for employee return-to-workplace communication

Like any other workplace change, making sure employees are aware and understand this new world will be equally as important as the actual changes themselves. Training, education, and effective communication are key aspects of many of the local requirements for returning to office buildings. Required or not in your area, they should be your top priority in the process of returning employees to any common workplace, in any location. As you begin to think through your employee communication strategy, below are a number of tips to keep in mind as you communicate return-to-workplace situations. We recommend working in partnership with a trained consultant and your legal counsel to ensure that you meet the requirements for your location (if any) and so that your employees recognize you take their health and safety seriously and understand what is expected of them.

- Start with developing a clear and detailed safe work plan; review any policies that need to be updated
- Write in plain, easy-to-understand language
- Use images and diagrams where appropriate
- Outline what the building management is doing, how the company is supporting this effort, and clear expectations for employees
- Partner with Human Resources and legal counsel; they can help you steer clear of perceptions of discrimination and other potential employee relations or legal issues

- Get input from your senior leaders; they should be knowledgeable and included well before you communicate to employees
- Train your managers and supervisors on the safe workplan and what is expected of them; they are the front line of employee communications
- Use different media to supplement a written plan; hold a webinar and record it; create a video; leverage your online employee portal; do a podcast
- Make good use of signs throughout the office to help with key behaviors
- Be clear where employees should go with questions
- Start communicating well before individuals are allowed (or expected) to return to the workplace
- Explain that the situation is fluid and manage expectations by noting that when new information becomes available the plan will be updated; communicate those key changes with leadership and employees

Careful not to overdo it

Especially now, employees want to understand what you are doing to keep them safe and to believe that you care. But you don't want to overdo it either. Whether it's due to a lack of trust or excess worry, some organizations are holding many more meetings than usual to "check-in," which employees can find invasive and intrusive. If "eyes on your employees" was your primary form of performance evaluation, you might be feeling unsettled in this new work-from-home arrangement. In most situations, you've likely hired responsible, talented people who want to, and will, do good jobs under any circumstance. Trust they will and reward them when they do. Tip: Let them dictate the check-in frequency. Be willing to tailor your approach to the communication needs of the individual(s) or group(s). Then, over time, survey your employees and ask them how it's working (the frequency, content, etc. of the communications).

Wherever you are along this journey, just don't forget employees' needs have shifted and will likely continue to change. Be flexible and willing to adjust your communication approach constantly. As you prepare for the next phase, whatever that might be for you, look for that Goldilocks communication approach—not too much, not too little, but just right.

###

How do individuals with behavioral health conditions contribute to physical and total healthcare spending?

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This report was commissioned on behalf of The Path Forward for Mental Health and Substance Use by the Mental Health Treatment and Research Institute LLC, a tax-exempt subsidiary of The Bowman Family Foundation.

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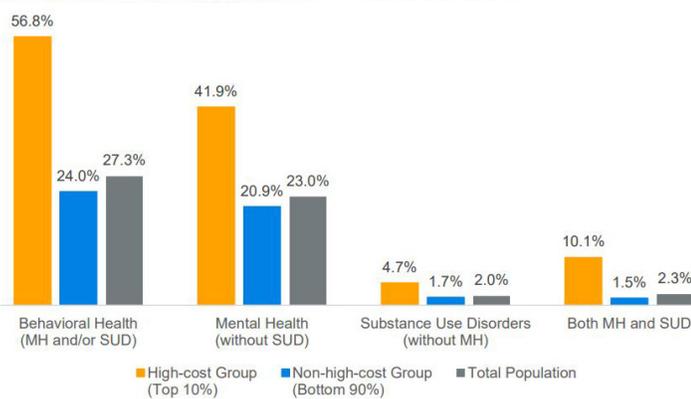
Milliman was commissioned on behalf of The Path Forward for Mental Health and Substance Use by the Mental Health Treatment and Research Institute LLC to examine in detail the characteristics of total healthcare costs for all patients, and separately for high-cost patients, with a focus on the role played by behavioral health conditions—mental health conditions and substance use disorders—and treatment. Our analysis of 2017 healthcare claims data for 21 million commercially insured lives focused on the prevalence of behavioral health conditions and the levels of spending associated with both medical/surgical (physical) treatment and behavioral health treatment (i.e., total healthcare costs) for these individuals. The Path Forward is a private sector initiative to drive market-based improvements in access and care for all Americans with behavioral healthcare needs. In order to achieve this goal, those who pay healthcare expenses (e.g., employers, unions, private health insurers, Medicaid, Medicare) and providers may benefit from understanding the key elements of total healthcare costs.

In this study, we focused on individuals with diagnoses for behavioral health conditions and/or receipt of behavioral-specific treatment, including services or prescriptions for behavioral drugs (hereinafter referred to as the “BH Group”). See the Methodology section of this report for further details.

Key findings

1. Within our study population of 21 million insured lives, the most expensive 10% of individuals accounted for 70% of total healthcare costs. In this report, these 2.1 million individuals are referred to as the “High-cost Group.”
 - The annual total healthcare costs for individuals in the High-cost Group averaged \$41,631—which is 21 times higher than the \$1,965 for individuals in the remaining 90% of the population, or the “Non-high-cost Group.”
2. Of the 2.1 million individuals in the High-cost Group, 57% (1.2 million individuals) were in the BH Group (referred to as the “High-cost Behavioral Subgroup”).
 - The High-cost Behavioral Subgroup constituted 5.7% of the total population of 21 million insured lives, yet accounted for 44% of total healthcare costs.
 - Annual total healthcare costs for individuals in the High-cost Behavioral Subgroup averaged \$45,782.
 - Half of these individuals (50%) had less than \$95 per year of total spending for behavioral health treatment (i.e., inpatient and outpatient hospital or facility services, and/or professional services coded as behavioral health services, and prescription behavioral health drugs).
3. Of the total population of 21 million insured lives, 27% (5.7 million) were in the BH Group.
 - The BH Group accounted for 56.5% of total healthcare costs for the entire study population.
 - Average annual costs for the BH Group for medical/surgical (physical) treatment were 2.8 to 6.2 times higher (depending on the BH condition) than such costs for individuals with no behavioral health condition.
 - Half of these 5.7 million individuals (50%) had less than \$68 of annual costs in 2017 for behavioral health treatment; the next 25% ranged from \$68 to \$502 of annual spending.
 - Of total healthcare costs for the entire study population, 4.4% were for behavioral health treatment.

FIGURE: PREVALENCE RATES BY COST GROUP, 2017



Conclusions and implications for employers, other payers, and providers

Our analysis found that a small minority of high-cost individuals drive a significant majority of total healthcare costs. The majority of those high-cost individuals have identifiable behavioral health conditions or prescriptions for behavioral drugs. In most cases, costs for behavioral health-specific treatment represent a small fraction of total healthcare costs for these individuals, and many had no or minimal spending on behavioral health-specific services.

Although the methodology of this study does not allow us to attribute causality between behavioral health conditions and very high medical/surgical spending, appropriate consideration and management of behavioral health conditions that are so prevalent among the population are important parts of a comprehensive strategy to manage total healthcare costs and contribute to positive outcomes for patients.

Implications

A fundamental principle of effective healthcare is early detection and, in most circumstances, prompt treatment of identified health risks. One prominent study found

that there is approximately an 11-year median lag between onset of behavioral health symptoms and initial behavioral health treatment.¹ Prompt and effective access to affordable behavioral health-specific care is critical to improving behavioral health outcomes, yet we reported in another recent study that individuals are significantly more likely to access behavioral health-specific care on an out-of-network basis than physical healthcare.²

The evidence base is growing for the favorable impact of effective behavioral interventions on health outcomes and total costs for patients and payers. We have previously reported on the potential cost savings for Medicare, Medicaid, and commercial insurers from effective integration of medical and behavioral healthcare (IMBH). Based on our review of the results of effective IMBH programs, we calculated that between 9% and 17% of the excess costs incurred by individuals with comorbid physical and behavioral health conditions might be saved through effective integration of medical and behavioral care, totaling \$37.6 billion to \$67.8 billion across the United States as of 2017.³

As one example, “Collaborative Care” (a particular model with specific reimbursement codes), which integrates behavioral health care into primary care settings, has shown efficacy in improving clinical outcomes and reducing total healthcare costs.⁴ This approach has been studied in more than 70 randomized controlled trials, which have “shown collaborative care for common mental health disorders such as depression to be more effective and cost-effective than usual care.”⁴ One major study found that Collaborative Care “yielded net savings in every category of health care costs examined, including pharmacy, inpatient and outpatient medical, and mental health specialty.”⁴

###

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FIGURE: DISEASE EPIDEMIOLOGY AND VACCINE EFFECTIVENESS FOR SELECT VACCINATIONS AGAINST PREVENTABLE VIRAL INFECTIONS

VACCINE RECOMMENDATION	VIRUS MODE OF TRANSMISSION	BASIC REPRODUCTION NUMBER	VACCINE EFFECTIVENESS	HERD IMMUNITY THRESHOLD *	POPULATION COVERAGE	DURATION OF COVERAGE
Influenza, annually starting at 6 months of age ¹⁴	Respiratory droplets ¹⁵	1.2-1.4 ¹⁶	40% (16-75%) ¹⁷	42-71% (22-100%)	51.8% ⁸	1 year ¹⁴
Measles (Me), mumps (Mu), rubella (R), two doses at 12-15 months and 4-6 years; one or two doses after age 19 without evidence of immunity ⁹	Me: aerosol ¹⁸	Me: 12-18 ^{21, 22, 23}	Me: 93-97% ^{18, 24}	Me: 95-100%	91.5% ²⁵	Me: life-long ¹⁸
	Mu & R: respiratory droplets ^{19, 20}	Mu: 4-7 ²¹	Mu: 78-88% ^{19, 24}	Mu: 85-100%		Mu: >10 years ¹⁹
		R: 6-7 ²¹	R: 97% ^{20, 24}	R: 86-88%		R: >15-20 years ²⁰
SARS-CoV-2, TBD	respiratory droplets; probably aerosol ²⁶	2-4 ^{27, 28}	TBD	50-75%	TBD; 75%? ⁶	TBD

TBD = to be determined. Basic reproduction number = expected number of cases directly generated by one case in a population where all individuals are susceptible to infection. Herd immunity threshold = indirect protection from infectious disease that occurs when a large percentage of a population has become immune to an infection, whether through vaccination or previous infections, thereby providing a measure of protection for individuals who are not immune.

* Calculated here as (1 - 1 / basic reproduction number) / vaccine effectiveness, when available.

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