

THE Actuary

VOLUME 15 ISSUE 6

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CONTENTS

FEATURES

12 NOT YOUR GRANDMOTHER'S RISK ADJUSTMENT

The pioneering realm of the ACA methodology
By Gregory G. Fann

20 WHEN LIFE AFFECTS HEALTH Connecting the dots between social determinants and health care utilization

By Ksenia Whittal

30 COSTLY TRENDS Measuring claim cost movement in volatile markets

By Dave Dillon and Josh Hammerquist

36 PARTNERING TO SHARE THE RISK

The emergence of risk-sharing contracts for
pharmaceuticals, the role of actuaries and experience
from an interdisciplinary learning laboratory

By Gregory Warren, Wanmei Ou and Karl J. Gregor

42 BREAKING FREE

Working to overcome the legislative and funding
challenges to getting wheeled mobility equipment
By Deborah Snow

46 PUTTING A PRICE TAG ON HEALTH Value in health care is more than finding cost reductions

By Stoddard Davenport

52 A HELPING HAND Q&A with Ashlee Mouton Borcan, FSA, MAAA, principal and consulting actuary at Milliman



CONTENTS

DEPARTMENTS

- 6 **FROM THE PRESIDENT**
Advancing Opportunities for the Profession
- 8 **EDITORIAL**
Health Care Complexities
- 10 **NEW + NOTEWORTHY**
Your Source for International Happenings,
Industry Briefings and SOA News
- 54 **INCLUSIVE IDEAS**
Increasing Student Awareness
- 56 **EDUCATION**
CAA: A Global Vision to Strengthen Financial
Security Systems
- 58 **RESEARCH**
Mortality Improvement: Q&A with R. Dale Hall and
Patrick Nolan
- 60 **DISCOVER**
Off the Beaten Path
- 62 **TIMELESS**
The Past, Present and Future of the SOA

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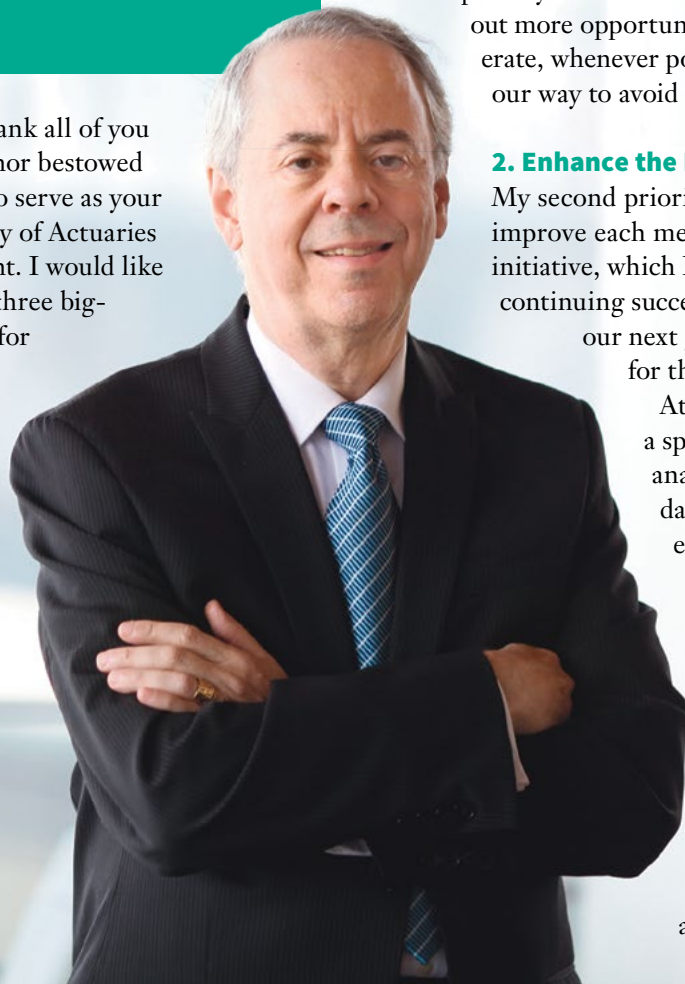
Following is an excerpt from James M. Glickman's presidential luncheon speech at the 2018 SOA Annual Meeting & Exhibit. Read or view more online.

bit.ly/Glickman-Text

bit.ly/Glickman-Video

I want to thank all of you for the honor bestowed upon me to serve as your 70th Society of Actuaries (SOA) president. I would like to discuss my three biggest priorities for this coming year.

JAMES M. GLICKMAN, FSA, MAAA, CLU, is president of the Society of Actuaries. He can be reached at jglickman@soa.org.



1. Improve Relationships

My first and most important priority is continuing and expanding the progress the SOA has achieved in improving our relationships with other actuarial organizations, especially those in North America. We must seek out more opportunities to collaborate and cooperate, whenever possible, and always go out of our way to avoid conflicts.

2. Enhance the Member Experience

My second priority is to look for new ways to improve each member's experience. One new initiative, which I believe will be crucial to the continuing success of the SOA, is preparing our next generation of actuarial leaders for the challenges ahead.

At our June Board meeting, a special task force, formed to analyze and make recommendations regarding the SOA's engagement with our newest FSAs, presented its report. This report revealed that the millennial generation is now the SOA's largest generational segment, at more than 45 percent of total membership. Yet, they participate at a much lower rate than our other FSAs, both in our sections and other volunteer activities.

The SOA recognizes the need to build cutting-edge tools that specifically appeal to millennials' style of interacting, not only with their peers, but also when networking with other FSAs and while participating in continuing education. I am pleased that the SOA Board voted to add this goal as a strategic initiative for the upcoming year.

Another opportunity to enhance our members' marketability and career advancement opportunities is to find ways to deliver communication training, a skill set actuaries have perennially endured a reputation for lacking. If we are successful at routinely adding communication skills to the other well-recognized skill sets of our FSAs, we will expand employment opportunities for all actuaries, especially into the nonactuarial management roles. Someday, perhaps, we may even eliminate the stereotype that actuaries are great technically but not particularly effective at communicating their conclusions beyond their actuarial communities.

Volunteering has always been at the heart of the actuarial profession. For that reason, I would like to see every effort expended to make volunteering more accessible, more rewarding and, most important, fun for our members.

One initiative I propose is the development of programs that would offer small incentives to retiring actuaries to stay involved with the SOA in a volunteer capacity. Perhaps pairing up retirees, as mentors, with newer FSAs would be just the type of activity that both retirees and millennials would enjoy. The professional interest sections could logically help set up this matching program, by organizing it and providing small incentives to participate.

Another opportunity would be serving as experts to the media. This is where the

SOA can be particularly helpful, by continuing to match up section experts with the SOA's media contacts. By increasing our relationships between the actuarial experts who can explain complex issues and the reporters who can then educate the public, not only will society benefit, but the recognition and reputation of the actuarial profession will be significantly enhanced.

A final idea is to expand our efforts to sponsor and encourage international continuing education programs that are locally developed and presented in that location's native language.

3. Expand Employment Opportunities

My third priority is focused around the SOA's strategic goal of expanding employment opportunities for actuaries. The most obvious places to achieve this are in two areas where we now only occasionally see actuaries employed. The first, and the one with the most potential, is with new industries that would logically benefit from the skills actuaries possess.

The second area, and one where actuaries are heavily employed in actuarial roles today, is the nonactuarial management roles at traditional actuarial employers. The real key in making progress in developing more of these opportunities is through changing the stereotypes that currently inhibit employers from seeking out actuaries to fill these roles.

Diversity and inclusion is one of the SOA's strategic goals. Through expansion of our support of The Actuarial Foundation, particularly its efforts to provide math-oriented educational materials in disadvantaged communities, the SOA can dramatically increase its impact to foster more diversity in the future by raising awareness among these students and families about the opportunities offered by our profession. The Casualty Actuarial Society (CAS) and SOA Joint Committee on Career Encouragement and Actuarial Diversity (JCCEAD) are working on ways to accomplish just that, and I encourage them to expand that effort.

Before closing, I want to encourage each of you to volunteer with the SOA. Volunteering is essential to foster new ideas, collaborate with colleagues and expand our reach.

Thank you for this opportunity to serve as your president. I look forward to working with you to advance the profession. ■

As actuaries, our primary tasks are usually predicting costs and mitigating risks. But there is also the opportunity to consider what “success” looks like beyond isolated financial benchmarks.

Health Care Complexities

BY ABIGAIL CALDWELL

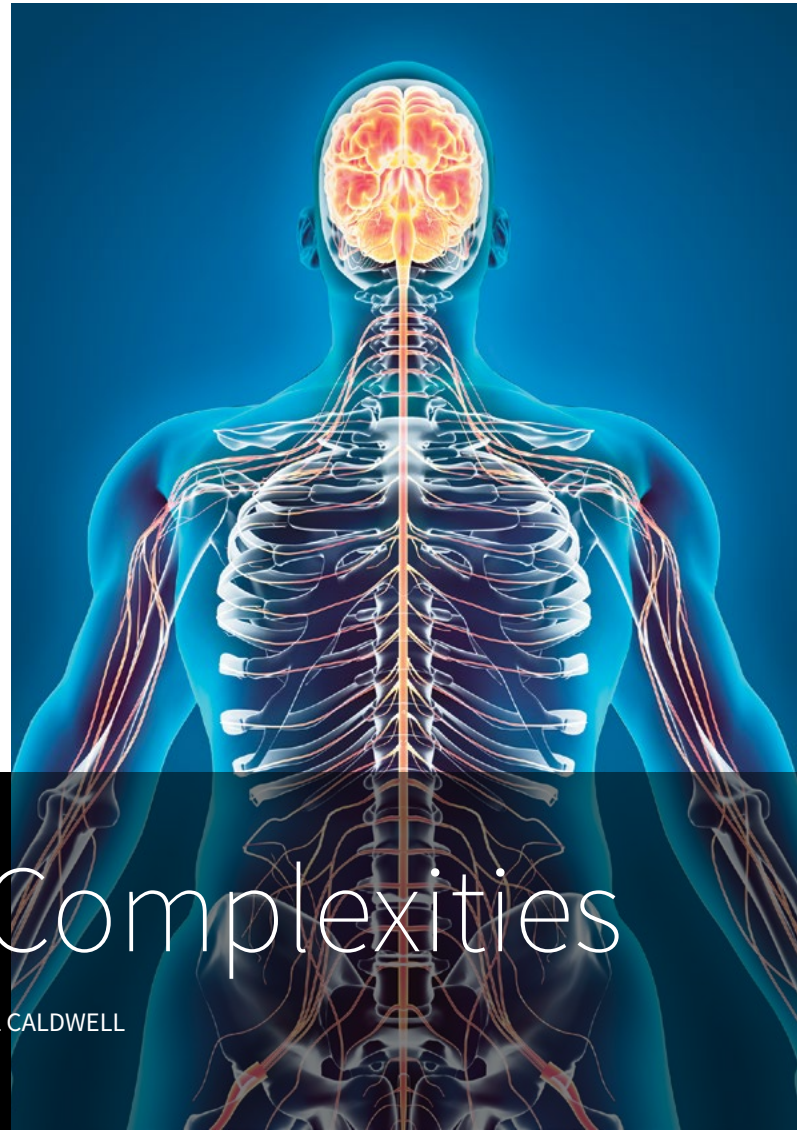
WHO KNEW HEALTH CARE COULD BE SO COMPLICATED? It is safe to assume the question is more of a rhetorical musing (and clearly there is some underlying sarcasm implied as well). While actuaries aren't generally known for their sense of humor, they are commended for their analytical skills and industry expertise. And as those of us working in health care can attest, it absolutely is

complicated (and keeps us employed)!

Taking a step back, the general public's understanding of health care—which includes insurance and benefit plans, cost-sharing, networks and more—can be complicated and confusing due to the multifaceted nature of a health care system and the numerous parties involved. Even if you work in the industry, after reviewing a detailed bill from your health care

provider, you can likely relate to the feeling that you have more questions about your bill than you did during the visit or procedure itself. Case in point: A friend recently called me and said: “I know this isn't exactly your job [to explain my insurance benefits], but you're an actuary, and you work in health care. Do you know why my insurance company keeps denying my claim for this prescription?” (Honestly,

I was just relieved someone who knows I'm an actuary was asking me something besides when they are going to die.) As we talked, to the best that we could decipher, she needed a preauthorization. Nothing terribly difficult to obtain (in theory), but crucial for the coverage of the service. And yet it wasn't something her providers and insurance company were communicating clearly to her—or to each other.



For health care actuaries in particular, we know how complex health care is because it is our job. Managing costs and risk associated with health care is a challenge whether you're working for payers or providers, in the commercial or government space, or in traditional or nontraditional roles. The past decade has been a continuous stream of changes and transitions regarding how many Americans receive, utilize and gain access to health care. In the past two years alone, the current administration has proposed many alternatives to the Affordable Care Act (ACA)—nine proposals were drafted in 2017 alone.¹ Beyond the United States, health care reform is happening in developed nations all over the world. It wouldn't be an understatement to say that understanding what drives and influences health care is like shooting at a moving target.

This issue of *The Actuary* will explore many facets of the health care space in which actuaries are working today. Topics include:

» **Medical trends.** They are an integral part of actuarial work. National Health Expenditure data has consistently demonstrated significant growth in health expenditures as a percentage of gross domestic

product (GDP), increasing to more than 18 percent in recent years.² There are many different components both directly and indirectly driving medical trends, and making the most accurate predictions requires the consideration of utilization and cost patterns with regard to market changes.

» **Risk adjustment mechanisms.** Even the definition of the term within different contexts is evolving. Although the development of the commercial risk adjuster employed in the individual and small-group markets as part of the implementation of the ACA is only one example, we can glean lessons to apply to other areas of the industry.

» **Value-based insurance designs (VBIDs).** Both in the medical and pharmacy space, VBIDs provide yet another opportunity to share risk and evaluate and tie in the value of care with cost. Outcomes-based risk-sharing agreements (OBRsAs), part of the article on page 36, demonstrate how health care payers and pharmaceutical manufacturers can manage risk together.

» **Social determinants of health.** Societal impacts on health haven't always been at the forefront of predicting

costs for actuaries, in part because they have not been tangible or easily measured. However, as more research is done in the area and data becomes available, and as more key players in the health care industry are paying attention to social determinants of health, they will become another factor to incorporate into our understanding of both historical experience and projections.

» **Reconciling and redefining how we value health (care).** In other words, how do we evaluate health care and health outcomes? There's always a financial aspect; after all, it costs money to deliver care, and it's important to understand what drives costs and what can be done to manage them. As actuaries, our primary tasks are usually predicting costs and mitigating risks. But there is also the opportunity to consider what "success" looks like beyond isolated financial benchmarks.

Ultimately, what's going on in health care has downstream effects for actuaries—and for those who work with actuaries—employed in life, disability, retirement and many other disciplines. I hope you enjoy reading this issue of *The Actuary* that focuses on "all things health care!" ■

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SOA in Rio de Janeiro

The Society of Actuaries (SOA) Latin America Committee (LAC) visited Rio de Janeiro, Brazil, in September 2018. During the weeklong visit, the committee held the first-ever SOA seminar in South America, hosted a networking reception, participated in the Brasileiro de Atuaria (IBA) Congress, met with stakeholders and held its annual committee meeting.

The “Introduction to Universal Life Seminar: The Basics and Beyond” was held on September 4 and attracted more than 70 attendees. Specialists from a variety of countries presented and discussed the characteristics of universal life insurance, which is under development in Brazil.

Jim Toole, FSA, CERA, FCA, MAAA, president of the SOA LAC, explained that the idea was to share the experience of the United States with a product that is practically unexplored in the Brazilian market. “The best way to manage risk is to learn [from] the mistakes made by others,” Toole said. “We are here to learn with you about the mistakes and successes of the United States and avoid those same mistakes in the Brazilian market.”

According to Leticia Doherty, manager at IRB-Brazil Re and director of the IBA, the main hurdle to the development of a universal life insurance product in the domestic environment is the tax issue. “The rules do not really address what matters, which is taxation,” she noted. “Who will take the first step and put the product on the market without this definition? It is absurd that this product exists in the world for more than 40 years and not in Brazil.”

Ronald Poon-Affat, FSA, FIA, MAAA, CEO of RGA and member of the SOA LAC, also presented at the seminar. He addressed key product features that vary from country to country along with transparency and flexibility. In his opinion, while it is attractive to the consumer, universal life insurance brings significant pricing risk to insurers. However, Poon-Affat noted that actuaries have been developing important solutions to mitigate these risks.



PHOTOS: FEDERICO TASSARA, ASA

Guests at the SOA networking reception in Rio de Janeiro listened to an overview of UL's development from the Brazilian insurance market's perspective.

Patrick T. Leary, corporate vice president of LIMRA, who has dealt with the sale and distribution of the product in the American market, noted that universal life insurance is quite controversial. In his presentation, he listed the types of products currently marketed and what should be the approach of the agents responsible for the sale of the policies.

To close the event, Federico Tassara, portfolio manager of MetLife Chile, addressed the main lessons learned so far in four different markets: Mexico, Argentina, Chile and the United States.

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Not Your Grandmother's Risk Adjustment

The pioneering realm of the ACA methodology

BY GREGORY G. FANN

T

he largest casino in California, just a few miles from my residence, held its annual fireworks extravaganza on the Saturday after the Independence Day holiday. Having lost any desire we may have once possessed for getting mixed up in large crowds, my wife and I stepped out our front door into the darkness, walked up a hill to an empty field and quietly watched the flashes of light from a distance.

Returning down the hill in the calm aftermath, it occurred to me that the real fireworks of the holiday weekend—emanating from an organization responsible for optimizing risk models—had actually occurred the night before. *The Wall Street Journal* broke the story: The Centers for Medicare & Medicaid Services (CMS) was expected to suspend Affordable Care Act (ACA) risk-adjustment collections and payments because of a February federal court ruling in New Mexico. The article¹ offered some belated clues to health actuaries who were inquisitive about the unexplained rationale of annual risk-adjustment results not being released as expected on June 30, 2018.

Follow-up stories on Saturday² and Sunday³ largely focused on the negative implications for insurers due to the suspension of a program being administered in a budget-neutral fashion. It was briefly noted that the precipice for all of this activity was that several small insurers had filed lawsuits challenging the program methodology and that some insurers would also naturally benefit from such a suspension. Two industry groups—America’s Health Insurance Plans and the Blue Cross Blue Shield Association—immediately released statements^{4,5} critical of the legal maneuvering and suggested that significant 2019 rate increases were imminent without quick action and program reinstatement. The immediate public discourse that followed focused on contemplations of alternative legal strategies at CMS’ disposal and an imagined dispute over the efficacy of risk adjustment rather than the substantive discussion

of improving the ACA risk-adjustment methodology, which was at the heart of the legal debate and the larger industry discussion over the past three years.

The lawsuit in New Mexico, and others across the country, did not question the general appropriateness of risk adjustment. The plaintiffs alleged that unpredictability and inequities resulting from the ACA methodology were harming some insurers and the market in general—topics that are still being debated today inside and outside of the courtroom. This article explores the history of risk adjustment in the ACA markets. As you will discover, the mechanics are quite unlike other risk-adjustment programs.

Risk-adjustment Basics

As it relates to health care, risk adjustment is a mechanism to normalize the relative health costs of different populations with different risk profiles. Risk adjustment is often used to adjust capitation payments to payers at risk for health care costs, to adjust payments to providers based on different risk levels of their patient panels, to develop appropriate benchmarks for risk-sharing arrangements and to normalize provider quality measurements. It is well-understood that individuals have unique risk characteristics, and appropriate compensation for provision of care or payment responsibility should vary at an individual level. There is not always consensus regarding the specific mechanics required to produce equity and a market that functions well.

In response to the need for risk adjustment, the private marketplace has responded with a multitude of proprietary models that seek to accurately predict costs based on known risk factors. Similarly, the federal government has developed its own models to be used in federally regulated markets.

While largely untested as a premium adjustment mechanism in the commercial insurance markets prior to the ACA, such risk-adjustment models have been

well-established in Medicare Advantage and various state Medicaid programs. To the extent that premiums are not aligned with expected costs, these models attempt to adjust premiums to appropriately compensate health plans for the actuarial risk of their respective enrollees. A goal of any risk-adjustment program is to neutralize competition based on favorable selection and to encourage insurers to compete based on the efficiency and value of their plans. Specifically, the ACA aimed to “create market conditions in which insurers’ prices reflect the underlying value and efficiency of their products rather than the composition of their risk pools.”⁶ Well-constructed risk-adjustment programs foster market stability and predictable results.

While the technical details are rigorous, the general approach is straightforward. Individuals within a fixed population have different risk characteristics. If a government entity is going to pay various insurers to insure a portion of that population with quantifiable risk differences, it is equitable to vary those payments based on the risk of the population that each insurer enrolls.

This exercise becomes more complicated in the commercial markets, where the enrolling population is largely unknown and each insurer independently develops different premium rates. The ACA model is further constrained by the budget-neutral methodology CMS implemented. As no funds are disbursed from the government, any risk-adjustment payments must come from other insurers. This necessitates the development of a complex formula to achieve funding balance.⁷

The varying levels of ACA net premiums in the individual market, constructed from high gross premiums minus a government subsidy derived from a market benchmark premium and personal income, result in enrollment incentives for some and disincentives for others.⁸ This creates greater unpredictability in assessing the average expected risk in the marketplace, something of major importance in a budget-neutral framework.

ACA Risk-adjustment Methodology: Rationale, Requirements and Challenges

The ACA disallows enrollee selection and limits rating variables that can be used in the individual and small-group markets. As insurers are not able to select enrollees or appropriately rate for the risks they accept, a risk-adjustment mechanism is intended to appropriately compensate insurers for the risk they enroll. The methodology CMS developed can be thought of as a two-step process. First, each enrollee in the marketplaces is assigned a risk score based on demographics, benefit plan

and any identified high-cost health conditions. Second, to account for risk characteristics that cannot be differentiated by premium rates under the market rules, a “transfer payment” methodology is developed to transfer money from insurers that enroll lower-risk enrollees to insurers that enroll higher-risk enrollees.

As insurers are not able to select risks or set prices based on the risks received, they must rely on the CMS methodology for an appropriate and adequate financial accommodation. It is therefore imperative that the operational methodology is precise and impartial, as CMS has assumed accountability for equity among market participants.⁹ The risk-adjustment process should accurately assess risk based on health status and related predicted claim costs and not be influenced by other factors. A risk assessment model requires both appropriate data and appropriate methodology to function properly. Even with a perfect model of risk assessment, a biased transfer payment formula will have equity problems. The U.S. Department of Health and Human Services’ Notice of Benefit and Payment Parameters (NBPP) for 2019 notes the transfer payment formula intention: “The risk-adjustment transfer formula generally calculates the difference between the revenues required by a plan, based on the health risk of the plan’s enrollees and the revenues that a plan can generate for those enrollees.”¹⁰

Developing an equitable risk-adjustment model in the ACA realm is a challenging endeavor, as is projecting a relative risk score for a participating health plan. This is primarily due to the dynamic population, the multitude of factors in the transfer formula and the budget neutrality requirement that necessitates the average risk being determined prospectively by the enrolling population.

The individual market is more fragile due to the underlying incentives for prospective enrollees that are present in the net premium calculations. The market is sensitive to regulatory changes that impact enrollment dynamics. As a recent example, enrollment of individuals with income levels between 200 and 400 percent of the federal poverty level was expected to increase in 2018 due to additional premium subsidies.¹¹

ACA Risk-adjustment Concerns

Many new and small insurers were caught by surprise when CMS informed them of their first annual risk-adjustment charges in 2015 (for 2014). A few were insolvent immediately. Others quickly tried to determine salvage plans. The Consumers for Health Options, Insurance Coverage in Exchanges in States (CHOICES) coalition was formed with “the primary objective of



The risk-adjustment process should accurately assess risk based on health status and related predicted claim costs and not be influenced by other factors. A risk-assessment model requires both appropriate data and appropriate methodology to properly function.

supporting health care consumers by advocating for improvements in the current risk-adjustment program.”¹² Made up of mostly new consumer operated and oriented plans (co-ops) from different states, the group began discussing common challenges they were experiencing. The coalition engaged Richard Foster,¹³ who served as chief actuary of CMS from 1995 through 2012, as a consultant to understand some of the technical issues. CHOICES petitioned CMS to implement “immediate solutions to help alleviate the dramatic consequences these flaws are having on health insurers, including:

- » Exempting new and fast-growing plans from risk adjustment for the first three to five years.
- » Applying a credibility-based approach to participation in risk adjustment.
- » Placing an upper bound on the amount of a plan’s risk-adjustment transfer charge.”¹⁴

In response to this and solvency concerns, Maryland’s insurance commissioner endorsed capping risk-adjustment payments at 2 percent of premiums for certain plans and noted that the “[National Association of Insurance Commissioners (NAIC)] has urged CMS to review the formula and work with carriers and state regulators to make adjustments for 2015 and 2016 to ensure it is providing appropriate protection for all carriers, and not wait until 2017 or 2018 to enact reforms.”¹⁵

Foster later stated that “the current HHS-HCC risk-adjustment model established by CMS is known to understate risk scores for relatively healthy individuals and to overstate them for those with significant health conditions,”¹⁶ and highlighted that “there is a fairly easy way to address this bias in the [risk-adjustment] model that could be used on a practical basis.”¹⁷ CMS elected not to address

this concern immediately, but acknowledged it in the 2018 NBPP:

“We will not implement any of these approaches for 2018, but will consider changes in future years ... we are still evaluating the tradeoffs that would need to be made in model predictive power among subgroups of enrollees. We continue to focus on encouraging plans to attract high-risk enrollees through the risk-adjustment model, but agree with commenters that we should further evaluate solutions prior to making any adjustments to the model.”¹⁸

While the equity concerns were largely voiced by small, growing plans, some established health plans also noted the inequities. Anthem’s chief financial officer stated that the risk-adjustment methodology “overcharges for healthy (members) and over-reimburses for certain moderately unhealthy disease states.”¹⁹ Compounding the risk assessment inequities, transfer payments are often magnified as the nature of the statewide average premium formula “severely exaggerates risk transfers for efficient insurers by mandating an inflated transfer amount relative to their cost structure.”²⁰

The expressed concerns and solvency challenges ultimately led three of the health plans affiliated with CHOICES to file separate lawsuits in U.S. district courts challenging the ACA risk-adjustment methodology. They allege the formula includes several items not associated with actuarial risk and resulted in inequitable advantages for established and more expensive plans. A key argument was that the transfer formula is based on the state’s average premium, effectively calculating higher-than-appropriate payments from lower-cost, lower-premium plans.

The case in New Mexico is the only one of the three that has received a verdict partially favorable to the

plaintiff. The 2018 ruling effectively suspended the risk-adjustment collections and payments for effective years 2017 and 2018.²¹ While the case remains outstanding (with CMS asking that the ruling be reconsidered), additional federal regulations already have been issued. A final rule was issued for 2017 (which allowed payments to be reinstated), and a proposed rule was issued for 2018. Both rules seek to clarify the language regarding the rationale of CMS in selecting the statewide average premium methodology, which was found to be “arbitrary and capricious.”²² The 2017 rule was challenged for not allowing public comments.²³ Comments on the 2018 proposed rule have been submitted, and a final rule has not been issued as of November 2018.

The New Mexico plaintiff's attorney views the original ruling as an opportunity for productive discussion. He said: “This gives a real opening to CMS and the industry to really come up with a better solution and a better path going forward that will help consumers and the ACA. That's our end game. We want to make the ACA work better and want a risk-adjustment formula that works right.”²⁴

CMS Response

The concerns expressed with the risk-adjustment methodology did not go unnoticed. In March 2016, CMS released a discussion paper²⁵ and facilitated an industry conference to discuss the ongoing concerns. Many of the specific items were addressed in the 2018 NBPP,²⁶ resulting in improvements in the risk-adjustment methodology.²⁷ Other concerns were not immediately addressed and continue to be discussed.

The 2019 NBPP, the first authored by the Trump administration, largely continued implementation of the risk-adjustment enhancements in the 2018 rule. A new notable allowance for states is an opportunity to request up to a 50 percent reduction in risk-adjustment transfer payments.

Industry Perspectives

In April 2016, the American Academy of Actuaries' (the Academy's) Risk Sharing Subcommittee reviewed the first year (2014) performance of the risk-adjustment methodology in the individual market.²⁸ The summary finding was that the risk-adjustment methodology operated in a directionally correct way as it “compressed the loss ratio differences among insurers.”²⁹ An unavoidable data deficiency of this loss ratio analysis is the reliance on premiums in the loss ratio equation. Premium levels were sporadic and generally inadequate in the ACA marketplace's initial year. Industry studies have demonstrated that premium inadequacy continued in 2015 and 2016.³⁰

A similar analysis using 2017 experience will have the same inherent limitation, but it should reflect more accurate pricing and not have the complication of the presence of federal reinsurance.

In 2015, the Health Section Council of the Society of Actuaries (SOA) launched a new committee to identify areas worthy of focused research to supplement the education of health actuaries. One of the first two initiatives was a focused study on the ACA markets. The group of volunteers completed a series of papers late in 2016. Interestingly, a variety of current complications with the ACA were documented³¹ in actuarial literature at that time, but the volunteer group elected to focus its series of papers exclusively on ACA risk adjustment and not report the other concerns, highlighting the overwhelming impact and associated prominence that risk adjustment has on market results.³²

The authors of this series were intentionally selected to represent different types of organizations and provide unique experiences with the ACA: co-ops, Blue Cross Blue Shield organizations, consulting firms, smaller health plans and large national payers. Notably, their themes were very similar and mirrored actuarial comments related to the 2018 proposed NBPP regulation,³³ focusing on the statewide average premium methodology, HCC scoring inequities, volatility concerns and disadvantages for low-cost insurers that effectively manage care.

Mitigation

State regulators also struggled with comprehension of risk-adjustment results as solvency concerns arose with little warning. In 2016, the state of New York released emergency regulation to “stabilize” the impact of the ACA risk-adjustment methodology in the small-group marketplace. The superintendent of insurance “expressed concern that the CMS risk-adjustment program has created inappropriately disparate impacts and unintended consequences among health insurers in New York.”³⁴ The regulation allowed the superintendent to reduce a percentage of the payments in the risk-adjustment formula. Along the same lines, CMS proposed allowing states to request to reduce risk adjustments by 50 percent in the 2019 NBPP. These “dilution” methods remove some of the shock of risk-adjustment payments, but they are regarded as crude adjustments by some actuaries who believe “it is unlikely that the application of a flat percentage reduction to the transfer amounts would produce equitable outcomes for all the issuers in a state.”³⁵

Other states (e.g., Maryland) have explored mechanisms of capping risk adjustment at a fixed percentage

of an insurer's premium. This adds some predictability to the "risk-adjustment charge" in the pricing process, but it requires a balancing adjustment if the intent is to preserve a budget-neutral methodology; detractors argue insurers may be incented to avoid high-risk enrollees if they believe their risk-adjustment liability is limited. This capping mechanism can be structured in many ways, and actuarial models have been developed to analyze the opportunities and risks of this approach.

Some model enhancements have been suggested to align the risk-adjustment methodology with the program intent. As one author notes in the SOA's series of papers: "The risk-adjustment transfer formula does not account for plans that have more advanced approaches to care management or more progressive value-based contracting methods that help drive premiums lower in a market. The transfer formula penalizes plans with lower premiums and rewards those with higher premiums in relation to the statewide average premium."³⁶ A proposed solution is a formula enhancement that "will remove the health plan's perverse incentive and will motivate more issuers to improve their [care management effectiveness] performance and reduce the related cost of health care."³⁷

As more ACA market experience becomes available, actuaries will utilize this data to validate the effectiveness of these and other mitigation efforts. More important, robust data can be used to inform continued improvements to the ACA risk-adjustment methodology.

Conclusion

The nature of the ACA market is challenging in many respects. Risk adjustment is no exception. CMS developed an intricate model to maintain budget neutrality and sought to transfer payments from insurers that enrolled low-risk individuals to insurers that enrolled high-risk individuals in an actuarially fair manner.

While initial analyses indicate some positive directional changes, stakeholders have raised concerns about the equity and predictability of the results disseminated from the current model. Some improvements have been implemented, but some of the most troubling elements of the methodology (as expressed by some market segments) remain intact. Arguably, this is a barrier to new entrants in ACA markets, many of which suffer from limited competition.

Successful risk-adjustment models foster predictability and eliminate incentives for enrollee selection based on specific health conditions. They equitably adjust premium levels to reflect the health status or actuarial risk of an enrolled population. They provide impartial treatment for all health plans and do not offer advantages based on size,

Interestingly, a variety of current complications with the ACA were documented in actuarial literature at that time, but the volunteer group elected to focus its series of papers exclusively on ACA risk adjustment and not report on the other concerns, highlighting the overwhelming impact and associated prominence that risk adjustment has on market results.

growth patterns, breadth of network, efficiencies, medical management or cost structure. Many stakeholders believe the current risk-adjustment model results in imbalanced assessments that penalize the types of insurers and enrollees the ACA seeks to attract. Improvements are being made, and actuarial analysis of emerging experience data likely will facilitate further improvements.

In today's high-cost environment, it is imperative that programs such as risk adjustment foster an environment where insurers that offer efficient, quality coverage can participate without unnecessary volatility or the risk of being disadvantaged. Admittedly, that's not easy to do. If we can make it happen, it will be a story worth telling our grandchildren. ■

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When Life Affects Health



BY KSENIA WHITTAL

Connecting the dots between social determinants and health care utilization



The health care financing sector is finally looking at something public health has known for decades: Funding upstream efforts to reduce the prevalence of chronic diseases is a way to reduce future health care spending. Growing recognition that social determinants are significant drivers of health and health care utilization patterns has increased the desire to better understand and identify these issues, as well as to develop actionable steps at both the population and member levels.¹



There has been a growing focus on developing the ability to identify the presence of social vulnerabilities among population health entities, Medicaid state agencies, risk-taking provider organizations such as accountable care organizations (ACOs), and any entity with a vested interest in the reduction of health care spending. Therefore, it is not unusual for health actuaries to get involved in this discussion. You may ask, why actuaries? The first reason is that actuaries are experts in quantifying risks related to health care, costs and utilization patterns. If another set of factors or characteristics affects these risks, then actuaries should (at the very least) understand these factors and be involved in evaluating the impact of efforts aimed at addressing them.²

Second, health actuaries play a supporting role in a system where the primary function is to produce health (or at least treat disease). Because actuarial training is rooted in the financial aspects of health care funding, provider reimbursement arrangements and resource use, actuaries typically pay less attention to the root causes of disease and health care utilization. Let us step back from our typical day-to-day thinking and take a look at what is currently happening in the industry with regard to social determinants of health and how actuaries can play a greater role.

Social Determinants of Health

Social determinants of health are the conditions in which people are born, grow up, live and work that shape health outcomes.³ These conditions include a wide spectrum of life factors—income, housing, education, food access, transportation, social support and stress, just to name a few. Social determinants come to life in the stories of patients unable to take their prescribed medications due to lack of food, as taking these medications without food results in nausea. Similarly, patients with diabetes who are not able to keep their insulin sufficiently cold due to

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housing or income instability and patients who cannot get to their appointments due to lack of transportation provide additional examples of intersections between social determinants and health care. Simply stated, life affects health. Systems such as education historically have incorporated social elements into their processes such as addressing food insecurity through reduced and free lunch programs. The notion has been around for years in the public health and population health domains, and it has finally become a focus for the financial side of the health care system.

Research⁴ indicates social determinant factors can be linked to each of the top 10 causes of premature mortality in the United States, which include diseases such as heart and cardiovascular diseases, cancer, respiratory diseases, diabetes, kidney disease, injuries and suicide. These researchers used mortality as a proxy for morbidity and made the case that addressing these social determinants is key for improving health outcomes and reducing disparities in health. There are two reasons this is important:

- 1 | The conversation around social determinants frequently involves these figures. While it is not unreasonable to use mortality as the ultimate health outcome, most health care utilization (and thus cost) occurs before this outcome takes place. More research is needed to

understand the association among social determinants and the prevalence of chronic conditions (although there is some evidence already^{5,6}), health care service utilization and clinical outcomes.

- 2 | When it comes to implementing programs aimed at addressing social determinants, the costs are immediate and the benefits (e.g., reduced mortality) are deferred, sometimes decades into the future. This notion alone should temper expectations for a return from these programs in the short term. Just as one does not expect to see a reduction in next year’s medical claim costs for a member who quit smoking this year, this does not mean society should stop investing in smoking cessation programs. Research argues: “The cost-effectiveness of various interventions to improve population health is less clear. In a vexing example of double standards, public investments in health promotion seem to require evidence that future savings in health and other social costs will offset the investments in prevention. Medical treatments do not need to measure up to this standard; all that is required here is evidence of safety and effectiveness. The cost-effectiveness challenge often is made tougher by a sense that the benefits need to accrue directly and in the short term to the payer making the investments. Neither of these two conditions applies in many interventions for health promotion.”⁷

A Look at Data

While individual-level data on social determinants of health is currently sparse and difficult to collect,⁸ the availability of detailed codes within the *International Classification of Diseases, 10th Revision (ICD-10)* is a place to start. Although still not frequently used, the subset of codes that most closely aligns with the relevant social determinants can be the best source of this information, particularly if providers make a consistent effort to use these codes in the years to come. Armed with a database of 2016 medical claims experience containing ICD-10 diagnosis coding, we set out to test some of the existing hypotheses and discover new ones about health care utilization among claimants who experience such vulnerabilities.

The ICD-10 codes that represent social determinants are those starting with “Z,” referenced as Z-codes. In particular, we focused on nine categories of codes in the current classification:

- » **Z55XXX.** Educational problems.
- » **Z56XXX.** Employment problems.
- » **Z57XXX.** Occupational hazard exposure.

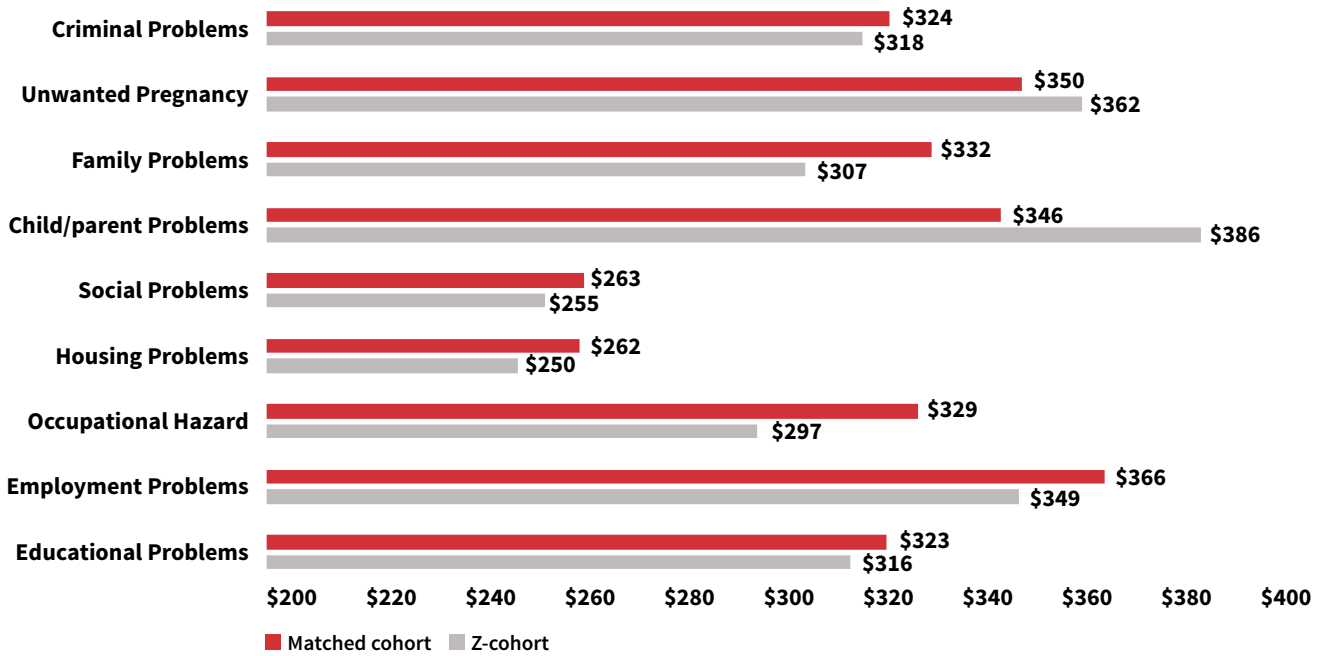
- » **Z59XXX.** Housing problems.
- » **Z60XXX.** Various social problems.
- » **Z62XXX.** Child/parent problems.
- » **Z63XXX.** Family problems.
- » **Z64XXX.** Unwanted pregnancy.
- » **Z65XXX.** Criminal problems.

We posed one main question we were hoping to answer with this analysis: After controlling for differences in morbidity and demographics, are there significant differences in cost and utilization among members affected by these social circumstances? If there are differences, are they statistically valid (and not just random)?

We conducted a matched cohort analysis where we drew a matched sample of claimants without a claim with a Z-code for each group of claimants in the nine Z-cohort categories. The matched samples of members were similarly distributed by age, gender, type of coverage⁹ and morbidity represented by a risk score¹⁰ range. We then compared risk-adjusted¹¹ costs and utilization metrics for various medical services between the Z-cohorts and the matched cohorts. The source database is Milliman’s proprietary research database containing 49 million lives with experience nationwide.

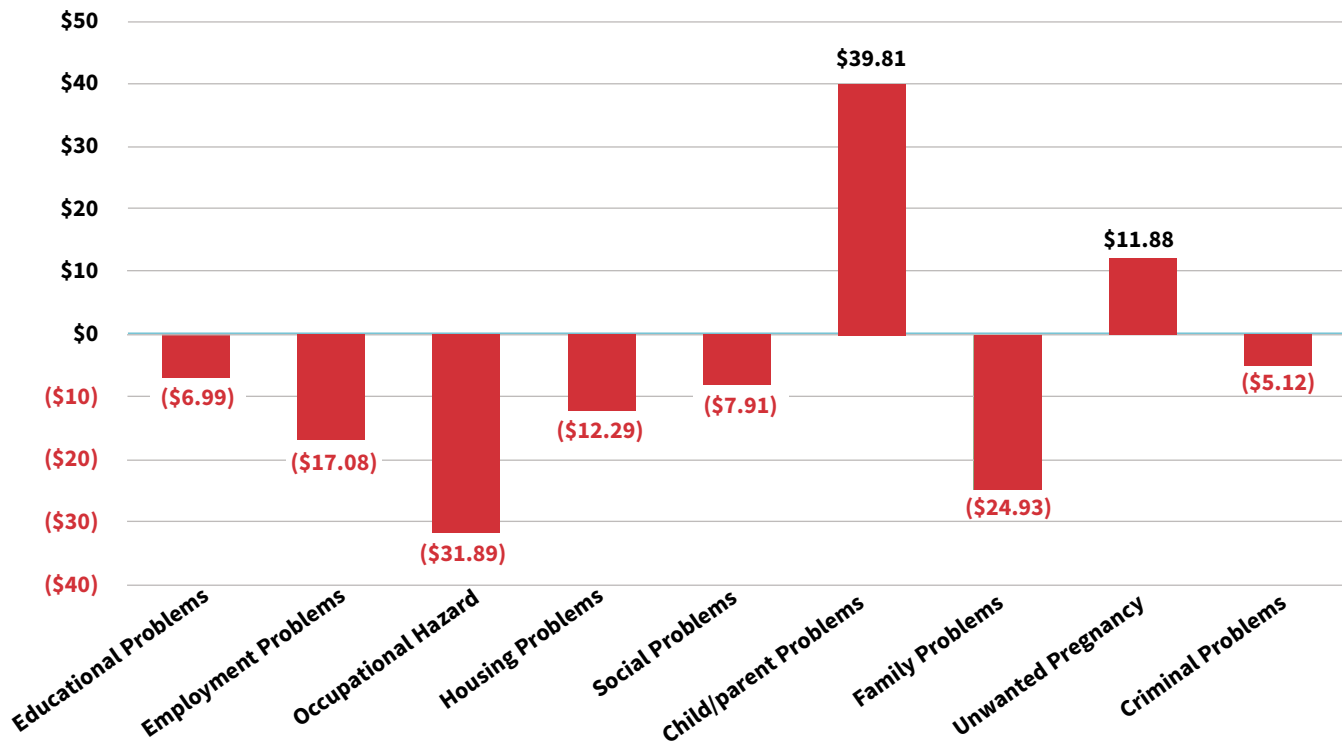
Our findings include a mix of expected and unexpected results. The total risk-adjusted health care costs¹² per member per month (PMPM) between Z-cohorts and the matched cohorts were similar, on average within \$8 PMPM (or 2.4 percent) of each other (ranging from -\$32 PMPM to +\$40 PMPM), as shown in Figures 1 and 2. The Z-cohort categories with the greatest disparity in total costs were cohorts dealing with child/parent problems, occupational hazard and family problems. Assuming that the utilization of medical care by the matched cohorts is appropriate, the observed differences in costs among these groups of patients imply either underutilization or overutilization of services for a given level of morbidity, and neither is ideal. Chronic underutilization of needed medical care typically leads to unnecessary complications or worsening of potentially treatable conditions, resulting in deferred higher-cost treatment. Medication nonadherence alone was estimated to cost the U.S. health care system between \$100 billion and \$289 billion annually.¹³ On the other hand, overutilization of health care services may be indicative of a significantly higher prevalence of medical conditions treated with these services, inefficiencies, or lack of integration and coordination of services among providers, or delivering unnecessary or duplicate services. According to a report by the Institute of Medicine, the estimated value

Figure 1 Comparison of Total Risk-adjusted Cost PMPM, by Z-cohort



Source: Milliman Proprietary Research Claim Database, CY2016. Analysis conducted by Whittal, K., Milliman. September 2018.

Figure 2 Comparison of Differences in Total Risk-adjusted Cost PMPM, by Z-cohort



Source: Milliman Proprietary Research Claim Database, CY2016. Analysis conducted by Whittal, K., Milliman. September 2018.

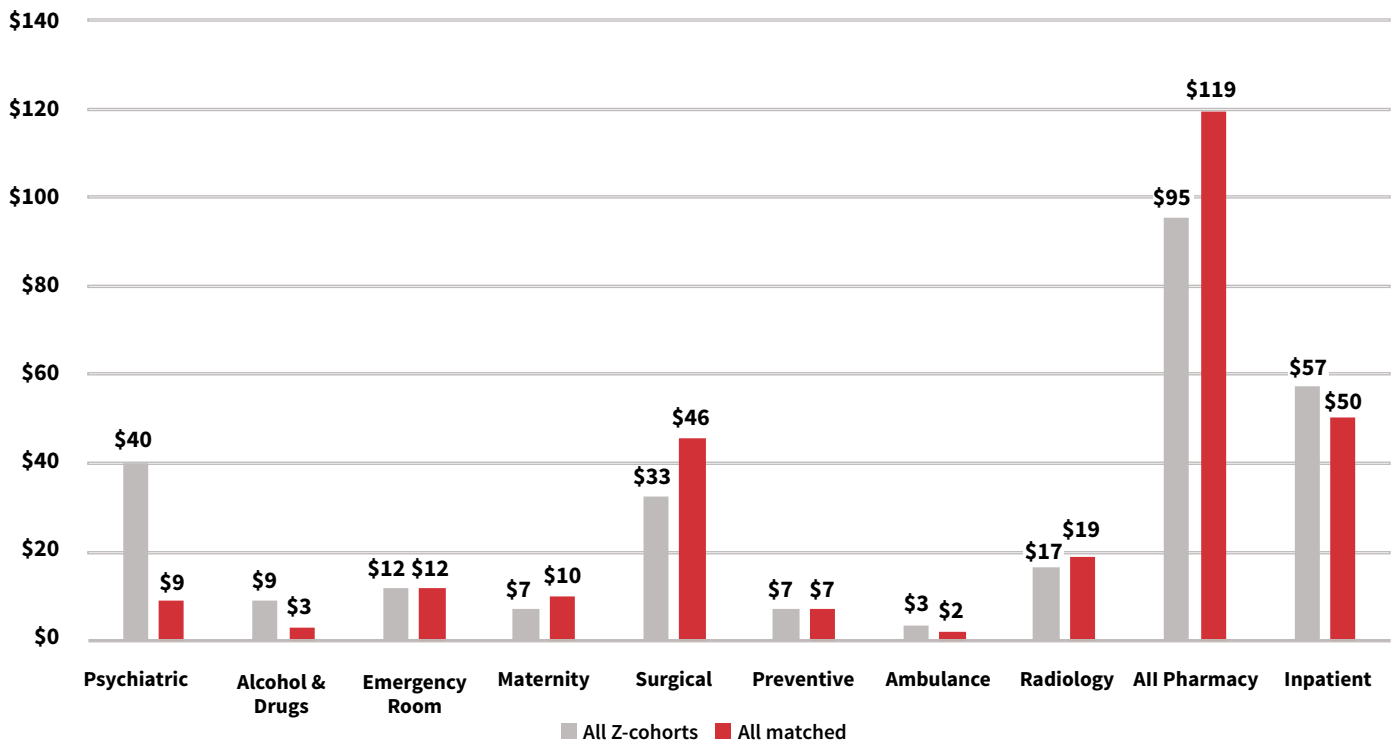
of unnecessary health care services was as large as \$210 billion in 2010.¹⁴

The results of the analysis also show that patients with social vulnerabilities and their matched counterparts utilize health care services differently. After breaking down the total cost of care into its component services, we saw a number of noteworthy differences (see Figure 3). While emergency room (ER) visits and inpatient hospital visits typically get most of the attention when it comes to cost containment through addressing social determinants of health, the data show that the greatest disparity in costs arise from utilization (and hence prevalence) of psychiatric mental health (MH) and substance abuse (SA) services. Cost differences on a PMPM basis for these services are more than four and three times greater, respectively.

Additionally, we saw significant potential overutilization of inpatient hospital, ambulance and emergency services across the majority of Z-cohorts, as shown in Figure 4. (Figure 6 on page 28 compares these costs on a percentage basis.) The most notable difference is \$97 PMPM in psychiatric services for members with child/parent problems. If we compare these costs on a percentage basis, differences for MH/SA services range from 91 percent to 734 percent higher for patients with social vulnerabilities

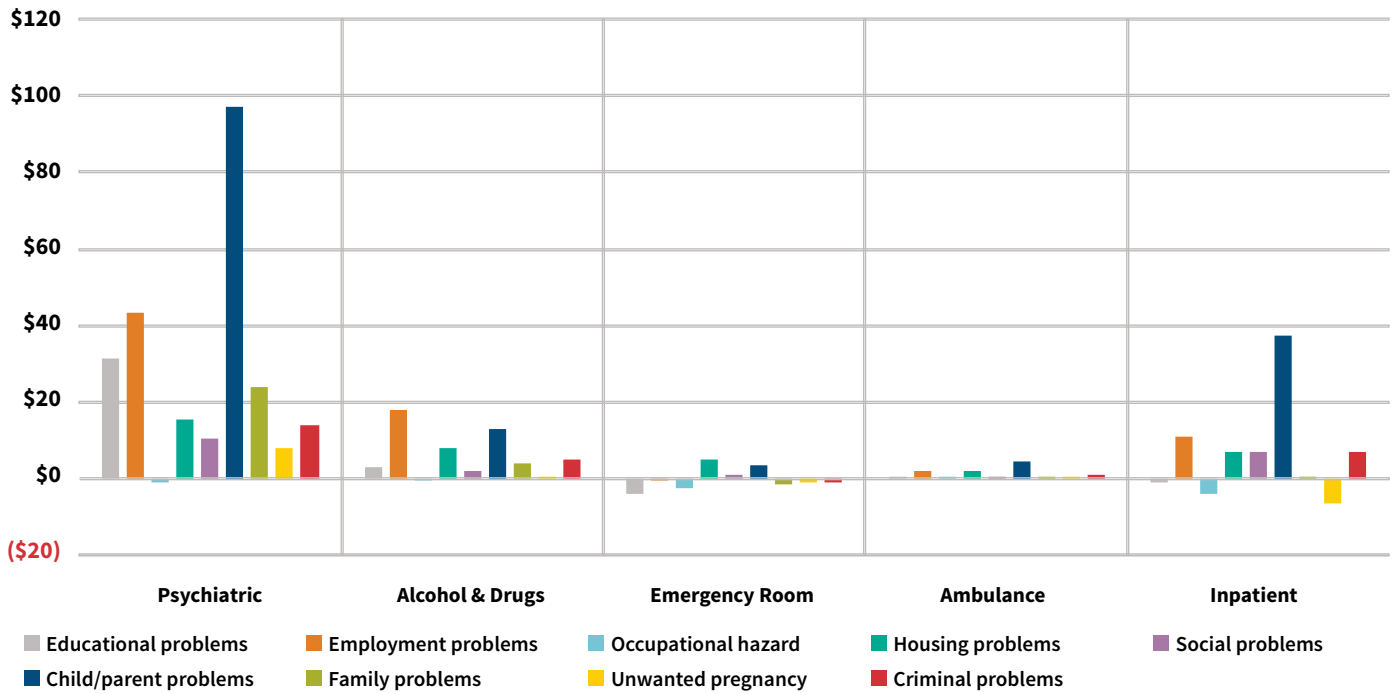


Figure 3 Comparison of Risk-adjusted Cost PMPM Between Z-cohorts and Matched Cohorts, for Selected Services



Source: Milliman Proprietary Research Claim Database, CY2016. Analysis conducted by Whittall, K., Milliman. September 2018.

Figure 4 Differences in Risk-adjusted Cost PMPM Between Z-cohorts and Matched Cohorts, for Potentially Overutilized Services



Source: Milliman Proprietary Research Claim Database, CY2016. Analysis conducted by Whittall, K., Milliman. September 2018.

as compared to their matched counterparts for all cohorts, with the exception of the unwanted pregnancy and occupational hazard cohorts. This finding is consistent with existing research on this topic, which has found positive associations between food insecurity and MH problems in children and adults.^{15,16,17,18,19,20} Certainly, we are not aiming to imply causality between these events in either direction (i.e., does prevalence of MH/SA develop or increase because of life difficulties, or is it the other way around?).

We also noted a significant potential underutilization of surgical services, pharmacy, maternity and radiology, as displayed in Figure 5 on page 26. Interestingly, there were no consistent disparities in the preventive services category, as we originally hypothesized could be the case for populations with social vulnerabilities. The reduction in pharmacy cost was expected—it is probable that individuals dealing with stressful life circumstances would be less able to adhere to their treatment plans, keep up with refills of maintenance medications and so on.

One unexpected finding was the reduction in surgical services. Upon further investigation of the types of surgical services that were reduced, the most common less-utilized procedures were elective (non-acute) procedures such as biopsies, and laparoscopic procedures such

as appendectomy, colonoscopies, esophagogastroduodenoscopy, angioplasty/stent placement, cataract removal, knee arthroscopy, tissue debridement and others.

As a final test of the validity of the observed differences, we performed a regression analysis in which we modeled cost of the four service categories with the greatest differences (MH/SA, maternity, surgical and pharmacy) using age, gender, risk score, type of coverage and presence of Z-code (one indicator for each type of Z category) as independent predictors. The resulting p-values for the presence of Z-code binary indicator variables, with the exception of a few cases, are statistically significant at the 1 percent level.

Limitations to Consider

There is a bias inherent in this type of analysis. In this approach, a member can be identified with a particular social issue only if he or she has health coverage, has a health issue and seeks medical care from a health care provider, who in turn becomes aware of and codes the social issues using the ICD-10 coding methodology and files a health insurance claim. Many things need to “go right” for the social determinants data to make its way into an administrative claim database. This by itself significantly limits the population of interest, as any individual facing

the same social determinant issues who does not meet any one of these criteria will not be identified using these codes. In addition, this analysis considered a 12-month snapshot of experience in time, rather than tracking these members longitudinally over several years. Hence, it is less clear how the presence of such codes on a medical claim relates to the actual timing of the underlying event or circumstances identified with the code during the 2016 calendar year. Certainly, some life events have effects long into the future, or take a longer time to manifest in a medical issue. Because we are looking at a pooled group of members with different coverage types, there are inherent differences in the data quality and coding levels that could materially affect risk scores. Finally, there is a lack of data on potentially important confounders not present in the administrative claim data such as income, educational attainment, family composition and other demographic variables, including ethnicity. While we recognize these limitations of the study, we believe there is still knowledge to be gained from analysis on these emerging data.

In conclusion, what do all these findings suggest and what is the takeaway for a reader? Actuaries tend to root their decision making in data-driven evidence. This analytical exploration of the connection between social determinants and the cost of health care, even in this admittedly limited capacity, does reveal an undeniable

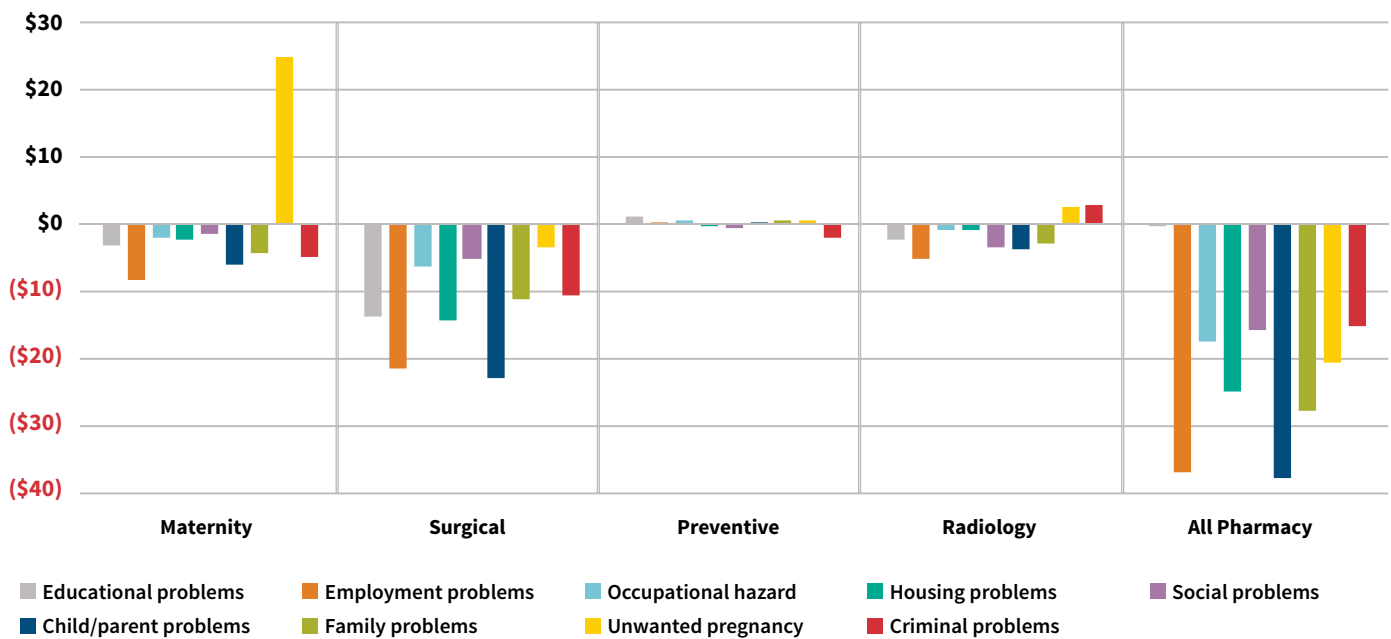
variation in utilization of health care services by individuals facing social vulnerabilities. There is much motivational discourse and evidence around the importance of addressing these complex social issues. Still, very little gets done on a large scale beyond local pilot projects, as it is difficult for any single stakeholder to take complete ownership and coordinate efforts of multiple entities that need to be involved. The systemic multisector policy changes to education, the food industry and the health sector, along with redesigned financial incentives for all parties that would be required to achieve a desired level of population wellness—including social, mental and physical well-being—can seem too far out of reach. Actuaries are in a unique position to bring together perspectives on both cost and health outcomes, and ground the motivation to recognize the impact of the social determinants (or life conditions) in solid actuarial analysis and data-driven evidence. ■

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Continued on page 28

Figure 5 Differences in Risk-adjusted Cost PMPM Between Z-cohorts and Matched Cohorts, for Potentially Underutilized Services



Source: Milliman Proprietary Research Claim Database, CY2016. Analysis conducted by Whittall, K., Milliman. September 2018.

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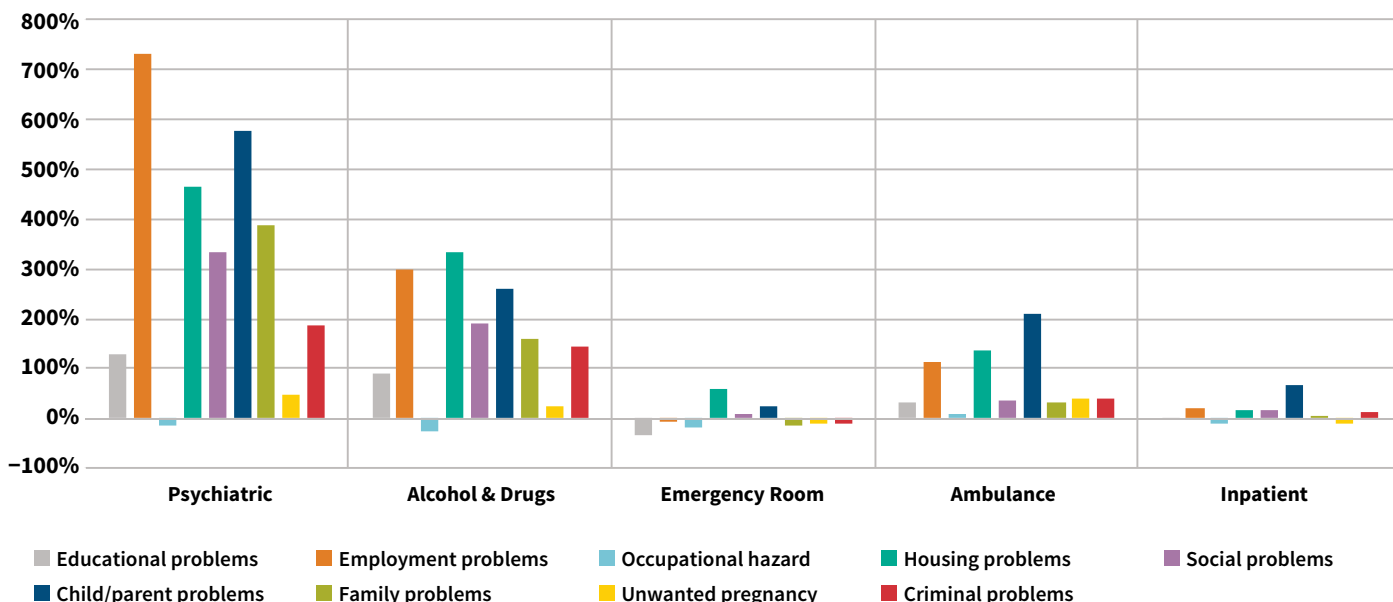
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Figure 6 Differences in Risk-adjusted Cost (as a Percentage) Between Z-cohorts and Matched Cohorts, for Potentially Overutilized Services



Source: Milliman Proprietary Research Claim Database, CY2016. Analysis conducted by Whittal, K., Milliman. September 2018.

Continued from page 26

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⁷ Supra note 4.

⁸ While there are a number of screening tools designed specifically to screen for social determinants of health, the actual implementation of such screenings is time-consuming, potentially expensive and not always fruitful.

⁹ The types of insurance coverage present in our population of interest included employer-sponsored (large and small groups), individual Patient Protection and Affordable Care Act (ACA) policies, Medicaid, Medicare Advantage, Medicare Supplement and some unknown. The type of coverage affects provider reimbursement levels and allowed costs, so it is important to ensure there are no large differences in distribution of claimants by the source of coverage that are distorting the cost comparison.

¹⁰ A risk score is a common measure of morbidity for an individual, developed using medical diagnoses and assigned coefficients. Risk scores are calibrated such that in a population with average demographics and morbidity level, the average risk score is 1.00. In this analysis, we relied on the Milliman Advanced Risk Adjusters (MARA), commercial CxAdjuster concurrent model for all populations.

¹¹ Risk adjustment refers to a process of normalizing a metric of interest (most commonly cost or utilization) between two populations for inherent differences in morbidity and demographic profile to make them comparable. Mechanically, this is done at a population level by dividing the average metric of interest by the population's average risk score. Although we were already working with matched samples, we still risk-adjusted our costs and utilization metrics in order to ensure any observed differences were not driven by differences in morbidity and demographic profile.

¹² The total cost represents allowed claim cost levels of medical and pharmacy benefits.

¹³ Viswanathan, M., C.E. Golin, C.D. Jones, M. Ashok, S.J. Blalock, R.C. Wines, et al. 2012. Interventions to Improve Adherence to Self-administered Medications for Chronic Diseases in the United States. *Annals of Internal Medicine* 157, no. 11:785–795.

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Costly Trends

Measuring claim cost movement
in volatile markets

BY DAVE DILLON AND JOSH HAMMERQUIST

T

he measurement of health care cost growth is a crucial element in pricing health insurance products. Trend rates are used to project a company's claims experience into future time periods. While projecting trends was never an easy exercise, the implementation of the Affordable Care Act (ACA) resulted in material changes to the health insurance market that made analyzing trend even tougher. The Office of the Assistant Secretary for Planning and Evaluation (ASPE) estimated that premiums for individual market coverage increased 105 percent from 2013 to 2017 after the passage of the ACA.¹

These substantial increases result from a wide range of underlying factors, including ACA provisions and recent federal administrative actions. For example, new regulations and laws regarding association health plans,² short-term medical plans³ and the nonenforcement of the individual mandate penalty⁴ will likely cause individual market premiums to increase further and make it more difficult to isolate trend from other market changes when reviewing historical experience.

The increase of medical costs historically has been the single most important factor that causes health insurance rates to rise. Three major components comprise medical trend:

- ❶ Increases in the cost of a given medical service or procedure
- ❷ Increases in the use of medical services and procedures
- ❸ The intensity or mix of services provided

While prospective insights on the impact of the changes in the individual market are important in developing actuarial projections, the medical trend estimate based on historical data is still considered the most important

component. Considerable analysis must be performed on a retrospective basis to validate prior projections and to assess emerging results.

Traditional Trend Methods

Trend analysis requires much thought and is not just a number-crunching exercise. Medical trend estimation is a complicated process, and a variety of methods can be used to analyze claims trends. Whatever methods are selected, it is important that an actuary fully understand the methods used, including their strengths and their weaknesses. Failure to analyze the trend study properly could result in trends that are less predictive.

Figure 1 Historical Claims and Membership

Month	Members	Allowed Costs	Allowed PMPM	Month	Members	Allowed Costs	Allowed PMPM
1/1/14	37,641	\$10,464,115	\$278.00	1/1/16	172,671	\$66,478,435	\$385.00
2/1/14	37,528	\$10,840,522	\$288.87	2/1/16	172,326	\$59,571,585	\$345.69
3/1/14	37,453	\$10,953,444	\$292.46	3/1/16	172,154	\$62,161,654	\$361.08
4/1/14	37,340	\$11,668,617	\$312.49	4/1/16	171,809	\$66,478,435	\$386.93
5/1/14	37,228	\$10,464,115	\$281.08	5/1/16	171,637	\$64,233,709	\$374.24
6/1/14	37,154	\$10,388,833	\$279.62	6/1/16	171,123	\$61,816,311	\$361.24
7/1/14	37,042	\$11,819,180	\$319.07	7/1/16	170,609	\$65,097,065	\$381.56
8/1/14	37,005	\$11,104,007	\$300.06	8/1/16	170,097	\$65,615,079	\$385.75
9/1/14	36,894	\$10,539,396	\$285.66	9/1/16	169,757	\$60,434,941	\$356.01
10/1/14	36,784	\$12,195,587	\$331.55	10/1/16	169,587	\$60,952,955	\$359.42
11/1/14	36,710	\$11,292,210	\$307.60	11/1/16	169,248	\$59,571,585	\$351.98
12/1/14	36,637	\$11,367,491	\$310.28	12/1/16	168,740	\$60,952,955	\$361.22
1/1/15	41,823	\$14,052,528	\$336.00	1/1/17	177,486	\$72,946,795	\$411.00
2/1/15	41,739	\$15,307,218	\$366.73	2/1/17	177,309	\$74,544,170	\$420.42
3/1/15	41,698	\$13,676,121	\$327.98	3/1/17	176,954	\$72,236,851	\$408.22
4/1/15	41,573	\$15,432,687	\$371.22	4/1/17	176,777	\$66,912,267	\$378.51
5/1/15	41,448	\$15,474,510	\$373.35	5/1/17	176,247	\$73,124,281	\$414.90
6/1/15	41,406	\$14,428,935	\$348.47	6/1/17	176,070	\$74,366,684	\$422.37
7/1/15	41,324	\$13,968,882	\$338.04	7/1/17	175,718	\$68,687,128	\$390.89
8/1/15	41,200	\$15,599,979	\$378.64	8/1/17	175,543	\$70,107,017	\$399.37
9/1/15	41,117	\$13,717,944	\$333.63	9/1/17	175,367	\$72,236,851	\$411.92
10/1/15	41,035	\$13,968,882	\$340.41	10/1/17	175,016	\$74,189,198	\$423.90
11/1/15	40,912	\$15,390,864	\$376.20	11/1/17	174,666	\$73,301,768	\$419.67
12/1/15	40,871	\$14,303,466	\$349.97	12/1/17	174,142	\$74,721,657	\$429.08

Figure 1 on page 31 shows the data used for our analysis. The 48 months of data are representative of data from a carrier that sells qualified health plans (QHPs) in the ACA individual market. A company that has a large, statistically credible block of business may analyze trend at the component level—for instance, unit cost and utilization or trends by service category. For simplicity, we analyzed the trends at the aggregate level.

Calendar year data from 2014–2016 was used as the experience period to project trend through the end of 2017. The actual 2017 data was used to analyze the results of the methods used.

The trend analysis is focused on allowed costs.⁵ This approach removes the impact of consumer cost-sharing. Increases in claim costs can be severely leveraged when deductibles do not increase with trend each year.

Determining Which Method to Use

Linear regression is a well-known method that is used in prediction and forecasting. In linear regression, it is assumed there is a linear relationship between the observed and estimated values.

Another common method is exponential regression. This method assumes the linear relationship exists between the transformed response and explanatory variables (instead of the original variables). Exponential regression is often preferable in medical trend analysis, as it assumes the increasing rate over the interval is a constant.

When the data is stable and the trend factor is small to moderate in magnitude (e.g., 10 to 20 percent), estimation by linear regression and exponential regression often produce similar results over a short period, with linear regression producing lower trends than exponential regression.

Besides determining the method, another decision that needs to be made is how much of the historical data should be used. Our analysis includes methods that use both 24 months and 36 months of historical data.

Seasonality is a common phenomenon in monthly health insurance data. Many actuaries prefer using a rolling 12-month method to address seasonality. Therefore, we also used a rolling 12-month method over a 24-month period to address any underlying seasonality patterns.

Adjusting for Demographics and Benefit Changes

Actuaries understand that a block’s underlying population can shift from year to year. Before the ACA, actuaries primarily adjusted the underlying data for lurking variables such as geographic mix and the age-gender (AG) distribution. However, the ACA

Figure 2 Age-Gender and Induced Utilization

Year	Age-Gender	Induced Utilization
2014	1.504	1.071
2015	1.521	1.072
2016	1.477	1.032
2017	1.498	1.035

has created markets that are often more volatile year over year.

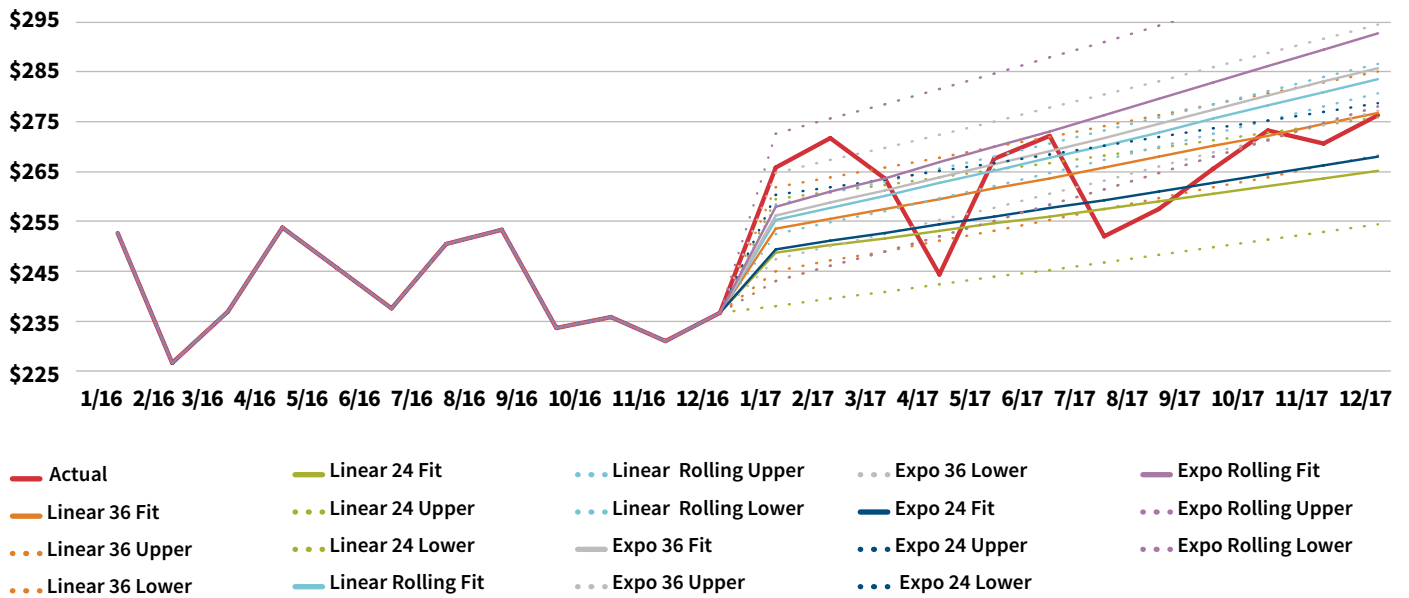
To account for demographic differences by calendar year, the data was normalized by the average AG factor each month. By analyzing allowed claims, the impact of varying cost-sharing is mitigated. However, it is still important to normalize for changes in induced utilization⁶ if the benefit levels have changed during the experience period. Figure 2 summarizes the AG and induced utilization factors used. For each month, the actual allowed claims were divided by monthly AG and induced utilization factors.⁷

Figure 3 compares the results of the base projection methods for projecting allowed costs into 2017. The solid lines are the predicted best estimates while the dotted lines are the 95 percent confidence interval for a given method. For display purposes, only the 2016 experience period is illustrated.

One observation is that the 24-month regression produces significantly lower per-member per-month (PMPM) costs than the 36-month methods. The projected differences resulting from the different time periods used obviously are a consideration when selecting a final trend estimate.

Figure 4 illustrates the trend estimates based on each of the base regression methods used. Each trend estimate is based on dividing the projected 12-month rolling PMPM cost ending Dec. 31, 2017, by the 12-month rolling PMPM cost ending Dec. 31, 2016. Not surprisingly, the rolling PMPM methods have the lowest error measures since they are based on smoothed and aggregated data. The 24-month exponential and linear methods have different trend estimates even though they have similar error measures. This highlights that the “best fit” is not always the easy answer, and there are a lot of considerations in trend estimation.

Figure 3 Linear and Exponential Regression—Projected PMPM Costs



Adjusting for Morbidity

In Figure 3, some of the base methods appeared to produce reasonable trend estimates. However, as mentioned previously, there was a dramatic increase in membership from 2015 to 2016 that should be analyzed for any significant morbidity shifts. Therefore, the next step in the analysis was to account for any underlying morbidity differences by calendar year. This was accomplished by normalizing the data by the plan level risk score (PLRS). The ACA-defined PLRS accounts for age, so the previously used AG factors were replaced in this step.

Before the PLRS can be used to normalize the historical claims, an adjustment needs to be made to account for morbidity changes in the underlying risk adjustment model that calculated the PLRS values. Since the creation of the risk-adjustment program, the Centers for Medicare & Medicaid Services (CMS) has annually enhanced the underlying models. These enhancements were undertaken to use updated data and information to better predict the risk scores of the covered populations.

This is one adjustment to the data set that may not have been intuitively considered from the beginning; however, it could have a substantive impact on projecting future trends for a carrier. If the methods used to calculate PLRS have been modified during the experience period, then the historical PLRSs must be adjusted to create better projection models.

Figure 4 Regression Results—AG and Induced Utilization Adjusted

Method	Trend Estimate	PMPM RMSE
Linear regression, 24 months	7.2%	\$12.14
Exponential regression, 24 months	8.1%	\$12.19
Linear regression, 36 months	10.1%	\$11.99
Exponential regression, 36 months	12.7%	\$14.63
Linear regression, 12-month rolling	12.2%	\$3.34
Exponential regression, 12-month rolling	14.9%	\$3.82
Adjusted actual	9.9% ⁸	

ROOT MEAN SQUARE ERROR (RMSE)

The root mean square error (RMSE) can be used to evaluate the models tested. A lower RMSE means the model is a better fit. However, caution should be used when comparing results across different time periods (e.g., 24 months versus 36 months of data). For example, if the data from month 25 to month 36 is more volatile from month to month, this will increase the RMSE, but it does not necessarily mean that the methods using 36 months of data are less predictive.



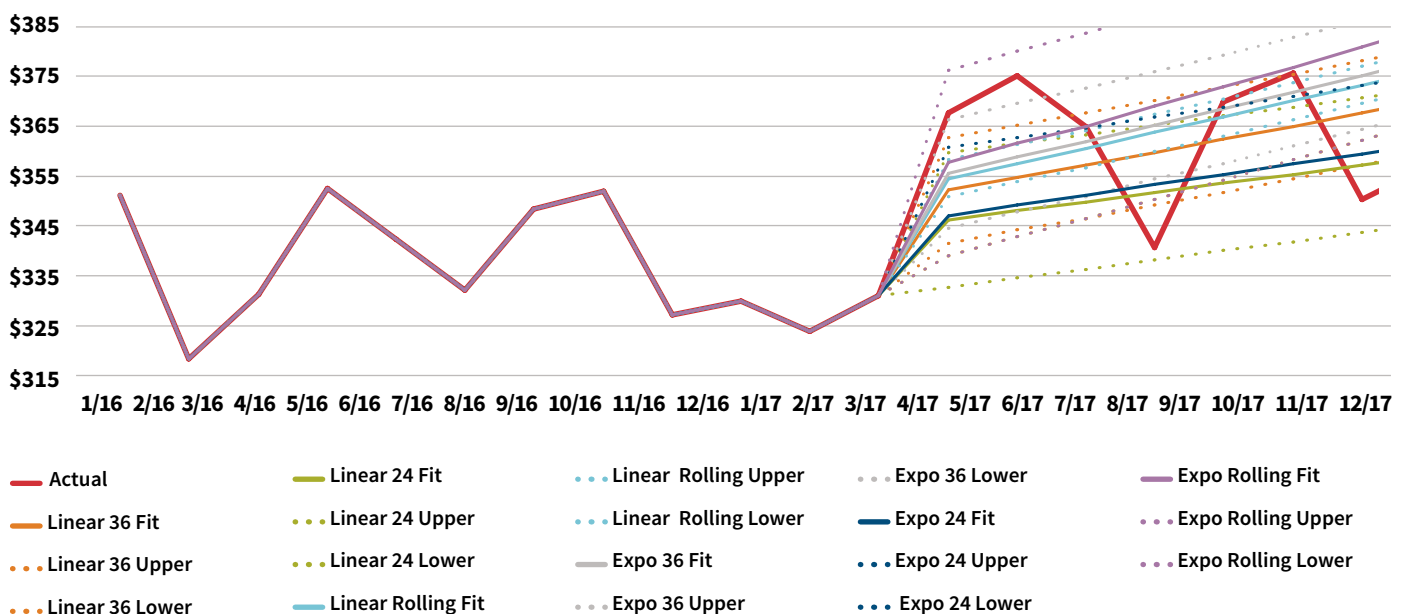
Trend analysis is not just a number-crunching exercise. Medical trend estimation is a complicated process, and a variety of methods can be used to analyze claims trends.

Figure 5 Adjusted PLRS

Year	PLRS
2014	0.941
2015	0.993
2016	1.052
2017	1.125

Figure 5 illustrates the PLRS factors used to further normalize the allowed costs. For each month, the actual allowed claims were divided by the adjusted PLRS. This adjusts the claims so that each exposure period can be compared without concern for morbidity changes in the population.

Figure 6 PLRS Adjusted Regression—Projected PMPM Costs





between the methods that use 24 and 36 months of data. This variation between the historical periods should be considered in light of the material membership jump from 2015 to 2016. Alternatively, an actuary could analyze the 24 months of data from 2014 to 2015 to remove the impact of the jump in membership. ■

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Figure 6 graphically compares the results of the base regression methods after normalizing the data for population morbidity, while Figure 7 illustrates the resulting trend estimates based on the projected PMPM costs in Figure 6.

After this round of normalization, the range of results have narrowed and the most significant variation is

Figure 7 Trend Analysis—PLRS Adjusted

Method	Trend Estimate	PMPM RMSE
Linear regression, 24 months	1.3%	\$15.10
Exponential regression, 24 months	1.3%	\$15.10
Linear regression, 36 months	5.7%	\$17.03
Exponential regression, 36 months	6.4%	\$17.26
Linear regression, 12-month rolling	5.9%	\$4.83
Exponential regression, 12-month rolling	6.5%	\$5.03
Adjusted actual	4.2% ⁹	

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- ⁴ United States Congress. Public Law 115–97: Individual Tax Reform and Alternative Minimum Tax. December 22, 2017, <https://www.congress.gov/115/plaws/publ97/PLAW-115publ97.pdf> (accessed September 10, 2018).
- ⁵ Allowed costs are the maximum amount on which payment is based for covered health care services. These are the costs before consumer cost-sharing is applied.
- ⁶ Induced utilization is defined as the additional demand for services created by an increased level of coverage regardless of health status.
- ⁷ Additional normalization factors may be necessary depending on the underlying data. Examples include network, geography and changes to company programs.
- ⁸ The actual PMPM changes from 2016 to 2017 include changes in demographics, benefits levels and morbidity. The actual results for 2017 are adjusted using the same methods as the historical experience.
- ⁹ Ibid.

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PARTNERING TO SHARE THE RISK

The emergence of risk-sharing contracts for pharmaceuticals, the role of actuaries and experience from an interdisciplinary learning laboratory

BY GREGORY WARREN, WANMEI OU AND KARL J. GREGOR



Health care actuaries pay attention to large costs and areas of rapidly changing costs. In the past several years, growing drug budgets have been associated with pharmaceutical innovations that have transformed the treatment of many challenging diseases. While these advances have greatly benefited patients, health plans often struggle to predict and manage the impacts of these therapies on their budgets. As a result, actuaries are paying much closer attention to the financial risk associated with pharmaceuticals.

With new pharmaceuticals coming onto the market and the overall health system's move away from a fee-for-service environment, there is an increasing focus on value-based payments in which reimbursement for pharmaceuticals is linked to treatment outcomes via benefit design.¹ These so-called risk-sharing agreements (RSAs) may also be referred to as performance-based risk-sharing arrangements (PBRsAs), managed entry agreements, patient access schemes, coverage with evidence development (CED) and outcomes-based risk-sharing agreements (OBRsAs).

The Emergence of OBRsAs

OBRsAs are one approach that health care payers and pharmaceutical manufacturers can use to manage risks. This article explores the emerging use of OBRsAs for pharmaceutical contracting; the role of actuaries; and a multiyear learning initiative designed to develop, test and refine solutions and new types of models for RSA development. Through our collaboration, we discovered similarities and differences related to culture, language, method and value drivers between health actuaries and health economic outcomes researchers, who are often the ones responsible for quantifying the economic value of pharmaceuticals.

Traditional financial-based schemes focus on the financial arrangements between the pharmaceutical manufacturer and the purchaser/payer (e.g., health plan).

These agreements are not typically associated with specific performance metrics, but rather rely on traditional terms such as rebates, discounts, price-volume agreements and/or quantity limits. In contrast, outcomes-based schemes are tied to specific performance metrics such as biomarkers, clinical outcomes and/or medical resource utilization (e.g., hospitalizations), and often include coverage with evidence development and guarantees.

Currently, treatment costs and clinical outcomes are not necessarily aligned, leaving uncertainty in the correlation between the two. Through OBRSA agreements, patients, payers and pharmaceutical manufacturers have an opportunity to clarify the relationships among treatment costs, clinical outcomes and possibly related financial outcomes. As such, OBRsAs for pharmaceuticals are becoming an increasingly popular topic of discussion in the United States, especially as the broader health system moves from a fee-for-service model toward a pay-for-performance model. Despite the growing interest, a recent study found only 12 percent of global risk-sharing agreements have been executed in the United States.²

Historically, significant barriers have hindered the development of OBRsAs, such as defining relevant performance metrics, adequate data infrastructure, lack of operational and adjudication capacity, policy and regulatory barriers and their implications, an often fragmented multi-payer health care system, uncertainty about the real-world performance of the pharmaceuticals, and ambiguous contractual terms and conditions. These barriers require creative and novel approaches to OBRSA development and execution.³ Despite these challenges, OBRsAs present opportunities for both payers and pharmaceutical manufacturers. See the sidebar on page 38 for details.

A Unique Learning Opportunity

Over the past two years, two leading organizations in the U.S. health



system—one a pharmaceutical manufacturer and the other an information and technology-enabled health services business—collaboratively conducted an iterative, exploratory and data-driven initiative meant to inform the methodology behind, and design of, OBRSA. The overarching purpose was to inform the development and execution of OBRSA over the next three to five years. Structured as a “learning laboratory,” the initiative focused on immediate learning rather than immediate success or failure in designing and testing innovative OBRSA models. The learning laboratory is the first phase of a potential multiyear plan to develop and execute OBRSA. The next phases could focus on prospective OBRSA piloting and then broader pilot implementation based on key learnings.

In the learning laboratory, real-world data⁴ was used to develop and test predictive outcomes-based and financial models in order to better understand the types of variables, populations and clinical characteristics that are most predictive of clinical and financial outcomes. The data was also used to explore new models and modeling methods, define stakeholders for whom such agreements may be most promising and develop OBRSA contracting archetypes. We also identified prevailing and evolving regulatory challenges that should be considered in the development and prospective testing of OBRSA. Contributors to the learning laboratory included not only actuaries, but also experts in health economics, health policy and health care data, along with the health plan, pharmacy benefits management (PBM), and medical and pharmacy leaders.

There is a lot to be gained from OBRSA for payers, pharmaceutical companies, patients and ultimately the health system at large. Exploring these innovative models requires a commitment of time and resources, but we are all encouraged by the progress we’ve made so far.

OBRSA OPPORTUNITIES

Outcomes-based risk-sharing agreements (OBRSA) are not as common as other risk-sharing agreements because there are significant barriers that must be overcome in order to properly develop and execute them. However, despite these challenges, OBRSA offer a number of opportunities to both payers and pharmaceutical manufacturers.

Potential payer benefits include:

- » Optimized resource utilization and patient outcomes
- » Competitive product offerings
- » Member retention and growth
- » Financial sustainability
- » Positive public relations

Potential pharmaceutical manufacturer benefits include:

- » Maintained or improved formulary access
- » Competitive differentiation, market share growth
- » Financial sustainability
- » The generation of real-world evidence of value

Areas of Scope

The learning laboratory focused on two therapeutic areas, each of which included several work streams (e.g., actuarial, health economics and outcomes, contracting strategy and policy). The therapeutic areas included a chronic condition predominately managed in an outpatient setting and a more acute condition that can be treated in either inpatient or outpatient settings. A governance committee included senior leaders from both organizations to align on key strategic and technical topics and oversee the project teams. A series of modeling and retrospective analyses were then conducted to inform an OBRSA simulation model, which was developed to estimate potential payer and pharmaceutical manufacturer financial value under

specific guarantee, formulary and contracting conditions.

Concurrently, an extensive forward-facing analysis (consisting of literature review, conference presentations⁵ and interviews) was conducted to ascertain how health care culture, policies and regulations shape the OBRSA environment. Example topics included federal and state pricing reform initiatives, government best price regulations, potential changes in the federal 340B drug pricing program, the impacts of alternative payment models (APMs) and value-based insurance design (V-BID), HIPAA and related privacy and security rules pertaining to personal health information, applicable statutory authority for risk-sharing, and biosimilar and orphan drug regulation.

The View of “the Payer”

While a variety of OBRSA opportunities and challenges have been documented in the public domain, the learning lab distinctively focused on the perspective of “the payer,” including risk-bearing entities and other influencing stakeholders. Health care actuaries describe and measure financial risk. The aggregate size and probability of the risks are important in determining if and how specific risks are managed. The actuarial analytics quantifying the size and probability of the risk are critical in establishing the level of uncertainty, and thus whether and how risks should be mitigated or leveraged. Actuarial analytics were specifically included in the learning laboratory to complement the health economics approaches that are more familiar to pharmaceutical manufacturers. Ultimately, the role of the actuarial analytics was to estimate payer financial risks and opportunities with methods and language that are familiar to payer-community stakeholders.

Return-on-investment (ROI) modeling is one way that actuaries, and the organizations they represent, prioritize risks—to determine which risks might be worth engaging with nontraditional approaches.

ROI models developed for health care payers estimate the potential incremental financial “investment” (costs) relative to the “return” (cost-offsets/savings) for specific cohorts of health plan members. ROI models incorporate net-cost, utilization management and medical-cost offset scenarios, leveraging “proxy client data” from claims databases, with sensitivity testing of various population and assumption scenarios. This initiative used two types of analyses to inform the ROI estimation: payer addressable burden analyses (PAB) for the “return,” and formulary design modeling (FDM) for the “investment.” The data source for these analyses was a large proprietary claims database, which included access to commercial and Medicare Advantage Part D claims for approximately 27 million members.

The FDMs provide insights into key levers that payers may use to leverage or mitigate financial risks. These actuarial models were designed to replicate the analytic modeling payers use when determining pharmaceutical formulary placement, medical drug benefits, and clinical program and utilization management policies. The models estimate health plan per-member-per-month (PMPM) costs potentially associated with the OBRSA, incorporating key utilization and net-cost levers that health plans may use to exploit or mitigate financial risks. Specific payer perspectives include:

- » Understanding the current pharmacy PMPM cost for the therapeutic class
- » Estimating the net financial impact of changing coverage and clinical program decisions for the therapeutic class
- » Estimating the risk that could be attracted based on the OBRSA design, terms and conditions

PAB analyses describe the total cost of care curve, its trends over time and the primary drivers of those trends. PAB analyses are ultimately used to identify



Return-on-investment modeling is one way that actuaries, and the organizations they represent, prioritize risks—to determine which risks might be worth engaging with nontraditional approaches.

opportunities to address those costs and trends, should the expected clinical benefit of a pharmaceutical and the hypothesized benefits of an OBRSA materialize. For this initiative, disease episode grouper technology [Symmetry Episode Treatment Groups (ETGs)] was used to bundle claims into episodes of care for the diseases being evaluated plus comorbidities, for three sequential yearly cuts of the medical and pharmacy claims data. ETGs provide a condition classification methodology that combines related services into medically relevant and distinct units describing complete episodes of care and costs. Each episode can be composed of multiple claims clusters. Each cluster has only one anchor record and may have multiple claims. Each claim line can be assigned to one, and only one, episode of care. The ETG software aggregates costs into five cost categories for care management (services, surgery, facility, ancillary and pharmacy), which are then added together to produce a total cost for a specific episode of care.



We've made major headway in establishing mutual understanding between the actuarial and health economics disciplines. This opened up the necessary dialogue to help us figure out a productive approach to these very complex financial models.

Key Learnings

Throughout the course of the OBRSA learning laboratory, team members paid close attention to similarities and differences in culture, language, methods and value drivers traditionally used within the health care payer and pharmaceutical industries. The goal was to build a mutual understanding beyond the terms and conditions of OBRSA. Through our work together, we identified several common foundations shared by the actuarial and health economic outcomes research disciplines, including calculus-based statistical theory, skills in measuring results, focus on health economic impact and ability to deal with uncertainty. However, there were also divergent approaches and applications. Whereas actuaries leverage the law of large numbers to minimize statistical variation, the pharmaceutical industry approach is to use characteristic-matched

or controlled samples. Additionally, actuaries tend to focus on lines of business (e.g., Medicare, Medicaid, commercial large group, small group and individual), whereas the pharmaceutical industry has more of a disease-based focus. We also found that actuaries tend to use models with shorter-term time horizons, as they are more relevant to the business decisions they are addressing, whereas the pharmaceutical industry typically uses models with longer-term time horizons such as spending for a specific disease area or capturing the full value of a medicine over a lifetime.

We've made major headway in establishing mutual understanding between the actuarial and health economics disciplines. This opened up the necessary dialogue to help us figure out a productive approach to these very complex financial models.

A Novel Opportunity

Health insurance is a promise to pay for certain health care expenses incurred over a specified period of time in the future. Both the number and frequency of claims are moving targets, with regular changes including but not limited to charges for services and products, the frequency with which products and services are utilized, and the emergence of new products and services. Accurately predicting the uptake and cost of new products is among the most important issues facing health care payers, or "risk-bearing" entities, which work to meet the needs of their members in a constantly evolving environment.

The pharmaceutical industry continues to develop new medicines, often delivering on the great clinical promise associated with substantial pharmaceutical development efforts. The associated costs and frequency with which these innovations are occurring has brought increased scrutiny and financial risk to the provision of pharmacy benefits.

OBRSA offer a novel opportunity to manage and mitigate risks, or leverage

them as appropriate. In their role measuring clinical outcomes and managing financial risks, health care actuaries may wish to further explore this emerging area of risk modeling as the U.S. health care system increasingly moves toward value-based payment models and new therapies continue to come on the market. ■

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Breaking Free

Working to overcome the legislative and funding challenges to getting wheeled mobility equipment

BY DEBORAH SNOW



R

ose is a 50-year-old woman with chronic obstructive pulmonary disease (COPD). She has shortness of breath and relies on supplemental oxygen to breathe. While she moves around her apartment with the assistance of a walker, she cannot walk down the block due to her condition and requires a wheelchair to leave her home. However, because her Medicare insurance will not fund it, she must pay privately for a wheelchair.

Harry is a 70-year-old man with brain damage due to a seizure disorder. He is unable to sit upright without support, and his posture will likely worsen without the appropriate equipment to provide the positioning support he needs. Like Rose, Harry has Medicare as his medical insurance, and Medicare will not fund the equipment he needs.

While many individuals successfully obtain wheelchairs through Medicare funding, Rose and Harry are two examples of patients who cannot afford necessary equipment due to Medicare's funding regulations. Medicare, state Medicaid programs and the Veterans Administration (VA) fund the majority of wheelchairs in the United States, and Medicare is often used as the model on which other insurance companies base their policies.¹ This article will highlight some obstacles patients and clinicians face in attempting to secure medically necessary wheelchairs through Medicare funding.

Determining Wheelchair Necessity

Occupational and physical therapists work with patients to determine their wheelchair needs. They also work with the equipment vendors that supply the specialized equipment, including wheelchairs that range from standard to complex. Standard wheelchairs differ from complex wheelchairs in that they are typically for short-term use, have minimal adjustability² and are easily obtained because any doctor can prescribe one. In contrast, complex wheelchairs are for individuals with permanent or chronic disabilities, are

customizable to individuals' unique needs³ and are obtained following a thorough evaluation by a trained clinician.⁴ When making recommendations, therapists balance the medical needs of patients with what their insurance deems medically necessary. If insurance will not fund recommended equipment, patients are faced with the decision to pay for it privately or forgo the equipment altogether.

There is additional complexity in federally qualified health centers (FQHCs), whose mission is to serve all patients regardless of their ability to pay. Any patient in need will receive services necessary to secure a new wheelchair. Since the equipment is supplied by a third party, however, it is not subject to the mission of the FQHC and must be fully funded. Frustration often results. Patients ask, "What was the point of that evaluation?" when they learn that Medicare will not fund recommended equipment that can cost hundreds or thousands of dollars.

Necessity Nuances

Indeed, many in the profession do not understand some of Medicare's coverage guidelines. While therapists try to recommend equipment that Medicare covers, there are situations when they cannot—the cases of Rose and Harry are prime examples. In Rose's case, Medicare will not fund a wheelchair for community use because Medicare only covers mobility equipment for use in the home.^{5,6} This rule can render individuals homebound and can result in patients using inappropriate equipment. Equipment meant for in-home use—on indoor, level surfaces—may be inappropriate or not durable enough for use outside. But it might be used outdoors anyway, resulting in more frequent breaking, costly repairs and significant amounts of time where patients are without their equipment.⁷

Editor's note: The names of the individuals in this article have been changed to protect their privacy.

PENDING LEGISLATION REGARDING WHEELCHAIR FUNDING

Medicare acknowledges that differences exist between the two wheelchair categories, as standard wheelchair frames are funded through the competitive bid process, while complex power wheelchair frames are not.¹ Aside from this distinction, standard and complex wheelchairs are part of the same benefit category for funding purposes.² Moreover, Medicare has applied competitive bid pricing to complex manual wheelchair accessories.³ The result is decreased access to complex specialized equipment for patients in need, as this system is not financially sustainable.⁴

Therefore, the following legislation is pending in Congress:

- » **H.R. 3730.** Its aim is to stop the application of competitive bid pricing to complex manual wheelchair frames and accessories.⁵
- » **H.R. 750.** Its purpose is to create a separate benefit category for complex wheelchairs to ensure continued access to this equipment.⁶

If passed, this legislation will increase funding and consequently access to complex wheelchairs.

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Harry cannot receive the specialized supports he needs because of Medicare's diagnostic-based coverage policy for several wheelchair accessories, including specialized cushions. This means that Medicare has a list of diagnoses that qualify individuals for these cushions, regardless of their symptoms.⁸ Harry's inability to sit upright necessitates a specialized back cushion; however, his seizure diagnosis does not qualify him. His posture will therefore continue to worsen unless he pays for the equipment himself.

Equipment Challenges and Implications

Medicare's approach to funding wheelchairs can also limit patients' access to equipment. In many areas of the United States, Medicare funds standard wheelchairs through a competitive bid process: Suppliers submit bids for standard wheelchairs and Medicare awards contracts to those with the lowest bids that also meet applicable standards.⁹ A temporary gap in the competitive bid program will begin Jan. 1, 2019, and is expected to last through Dec. 31, 2020, so the Centers for Medicare and Medicaid Services (CMS) can determine if changes to the program are necessary.¹⁰

Suppliers of standard wheelchairs typically are able to provide equipment to patients quickly because, as the primary Medicare suppliers of standard wheelchairs, they carry these items in bulk. In my experience, however, one consequence of the low reimbursement rates for standard wheelchairs is that suppliers often lack sufficient resources to provide the highest quality equipment and services. Additionally, suppliers are often unable to provide prescribed specialized accessories due to high cost or infrequency of need. For example, a supplier providing a standard wheelchair to one of my patients had to return to the clinic with the wheelchair five times before bringing the correct chair. The supplier did not carry the recommended equipment and independently swapped the prescribed accessories for inappropriate ones. The competitive bidding program can increase the likelihood of such mistakes since suppliers likely feel compelled to sell extremely large quantities of equipment as quickly as possible in order to be financially sustainable.

The functional and financial implications of receiving inappropriate equipment are significant for both patients and the larger health care system. Without necessary wheelchairs, patients cannot leave their homes to work or run errands. Homebound individuals have high rates of disease and higher mortality rates than nonhomebound individuals,¹¹ and individuals are more likely to develop secondary medical conditions when using inappropriate equipment,¹² further increasing their medical costs.



According to Cornell University’s 2016 *Disability Status Report: United States*, non-institutionalized working age adults (ages 21–64) in the United States with ambulatory disabilities—defined as “serious difficulty walking or climbing stairs”—had an employment rate of 24.9 percent in 2016.¹³ Comparable adults without disability had an employment rate of 78.9 percent.¹⁴ The question is glaring: Would this statistic, the face of health care and the socioeconomic status of people with disabilities change if all patients received the equipment they need? The answer is simple: Likely, yes. ■

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Putting a Price Tag on Health

Value in health care is more than finding cost reductions

BY STODDARD DAVENPORT

For health actuaries, questions about the costs and financing of health care are a daily concern. Much of the pressure to understand cost drivers and control costs has fallen upon the health insurance industry, which in turn places much of the burden squarely on the shoulders of health actuaries. As we work to respond to this situation, it's important to remember that the cost for any good or service, health care included, is only one part of the equation. The other critical component is what you get for your money.

Roles and Responsibilities

What do we hope to attain when we spend money on health care? The answer may seem obvious, but it is worth reflecting on. Health, as defined by the World Health Organization, is “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.”¹ Health promotion, then, is not merely about healing wounds, eradicating disease or extending life spans, but is instead concerned with improving overall well-being. Patients are well within their rights to expect that the health care goods and services they purchase promote their health.

Patients have their own individual goals and definitions of health, but helping patients achieve those goals is the ultimate purpose of the health care industry, a purpose that unites all stakeholders in the

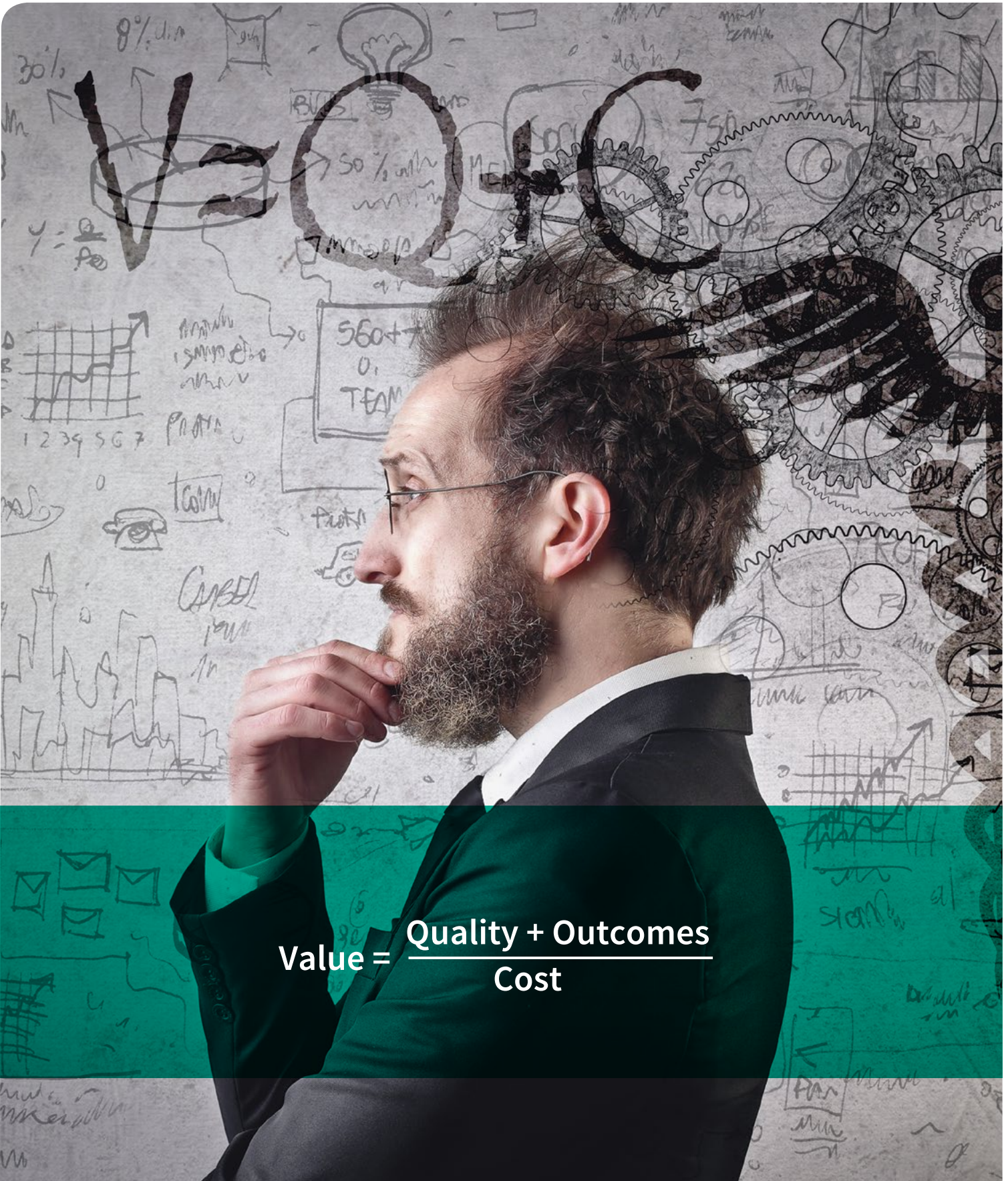
system. At the end of the day, “health service organizations are social enterprises with an economic dimension rather than an economic enterprise with a social dimension.”²

While the purpose of the health care industry is to produce health, the purpose of the insurance industry is to produce financial security (a significant contributor to overall well-being). This gives insurance a unique role in this system, but one that should ultimately serve the same end. The distinctions between the roles of the insurance industry and the health care industry are blurring by the day as providers increasingly take on some of the financial risks of health care delivery, and as insurers continue to be involved in determining what will and will not be paid for through benefit design, network design, utilization review, medical necessity criteria and other processes and criteria.

Defining Value

Value has become somewhat of a buzzword in health care as of late, though its emergence as a prominent consideration is not without merit. One popular definition posits that value is the measure of “health outcomes achieved per dollar spent,” and this definition is frequently expanded to encompass quality of care as well.^{3,4} In this framework, the quality of care and health outcomes are the numerator, and cost the denominator. We can think of achieving value in health care not necessarily as a cost reduction exercise, but as an optimization problem, where neither cost nor outcomes should be considered in isolation. In this sense, the real conundrum is not just how much we're spending, but what we get for what we're spending.

Indeed, if infant mortality, cancer and heart disease were eradicated, perhaps many of us would be willing to pay much more for such fine results. And yet, as spending on health care in the United States has pulled away



$$\text{Value} = \frac{\text{Quality} + \text{Outcomes}}{\text{Cost}}$$

from other Organisation for Economic Co-operation and Development (OECD) countries since the 1980s, its outcomes have not. The United States spends a higher proportion of its gross domestic product (GDP) on health care than any other country, but our life expectancy ranks 27 out of 35 countries in the OECD. Compared to other OECD countries, we also have the fourth-highest infant mortality rate and the ninth-highest likelihood of premature death from a variety of causes, such as heart disease and cancer.⁵

**Cost and Quality:
Not a Zero Sum Game**

In a value-based framework, what criteria should be used to evaluate new health care interventions? In the actuarial world (as in other domains with an economic dimension), a common measuring stick is return on investment (ROI). If a particular intervention is expected to result in cost avoidances that exceed the costs of implementation, spending on that intervention may be justified on the expectation of positive financial outcomes. On the other hand, health care providers often focus more on quality, safety and effectiveness. If a particular intervention can be proven to be necessary, safe and effective, provision of that intervention may be justified on the expectation of improved quality of care and positive health outcomes. Health economists commonly use cost-effectiveness analyses, which measure the cost of an intervention per quality-adjusted life-year (QALY), as a way to relate outcomes to costs, but this method has not gained widespread adoption in actuarial circles (with some exceptions). When an intervention is evaluated only for cost impacts or only for health outcomes, it's possible to wind up investing scarce resources in interventions that have low overall value.

Additionally, focusing on costs alone can result in systematic underinvestment in improvements to delivery systems and public health interventions that are often

complex, difficult to evaluate and have longer time horizons for their intended effects.⁶ One study found the majority of cost impact analyses that are published relate to new technologies or drugs, and only 10 percent of such studies evaluated delivery improvements or public health interventions, with many of the studies in that 10 percent focusing on clinical prevention⁷ (see Figure 1). These types of interventions do not lend themselves well to experimental study designs, have externalities that are difficult to measure and often co-occur with other interventions, making it difficult to directly measure effects and attribute them to particular interventions. The relatively low volume of evidence for ROI for these types of investments may speak more to the overall complexity of measuring them than to their actual value.

If one were to consider cost and health outcomes as bookends of a financial-clinical continuum, one would quickly dismiss this as a nonviable framework. A health care system could focus exclusively on the cost of care at the expense of clinical outcomes (after all, isn't the cheapest care no care at all?) or it could focus exclusively on clinical care with no regard to costs (using all the latest technologies in every circumstance). It is doubtful that many believe we should operate at either extreme, but there are many situations where we might not think to explicitly consider both sides and may inadvertently promote interventions that are not well-balanced to provide value.

Finding Balance

One approach to evaluating health care interventions that could serve to unify interests in both cost and health outcomes is the STEEPE criteria, an analytical framework outlined in 2001 by the Institute of Medicine (now called the Health and Medicine Division) and widely adopted by health care providers since then. The STEEPE criteria suggest that health care should be:⁸



Focusing on costs alone can result in systematic underinvestment in improvements to delivery systems and public health interventions that are often complex, difficult to evaluate and have longer time horizons for their intended effects.

- » **Safe.** Avoid injuries to patients from the care that is intended to help them.
- » **Timely.** Reduce waits and sometimes harmful delays for both those who receive and those who give care.
- » **Effective.** Provide services based on scientific knowledge to all who could benefit and refrain from providing services to those not likely to benefit.
- » **Efficient.** Avoid waste, including waste of equipment, supplies, ideas and energy.
- » **Patient-centered.** Provide care that is respectful of and responsive to individual patient preferences, needs and values, and ensure that patient values guide all clinical decisions.
- » **Equitable.** Provide care that does not vary in quality because of personal characteristics such as gender, ethnicity, geographic location and socioeconomic status.

In this framework, efficiency clearly makes room for consideration of the cost of care, and the other five aims are helpful guideposts as we make determinations about how to allocate scarce health care resources. Interventions that don't fit into this framework may prove to be of low value, even if they produce cost savings, while interventions that achieve these aims may prove to be of high value even if they do not produce cost savings.

In more recent years, the Institute for Healthcare Improvement developed and popularized the notion of the Triple Aim—the idea that health system performance can be optimized by focusing on interventions that improve the patient experience of care, improve the health of

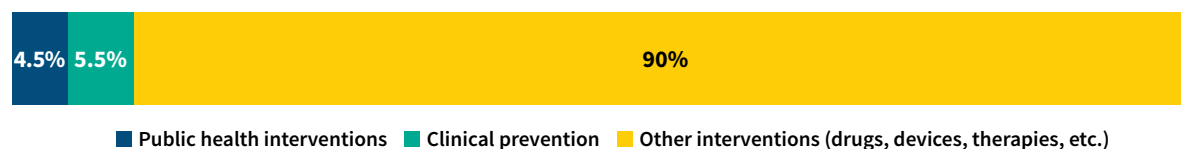
Health service organizations are social enterprises with an economic dimension rather than an economic enterprise with a social dimension.

—Kurt Darr, J.D., MHA, DsC, leading health care ethicist

populations and reduce the per capita cost of health care.⁹ This framework places a greater emphasis on population-level outcomes while still connecting the importance of balancing cost management with the importance of health care quality and outcomes.

Preventive care provides a good case study for considering this balance. It's widely believed that preventive care pays for itself—that by preventing the occurrence of new problems, or by preventing the worsening of current problems, we avoid unnecessary emergency room visits, hospitalizations and long-term complications (and thus, costs). However, a major study by the Robert Wood Johnson Foundation published in 2009 looked at more than 500 studies of preventive care published in peer-reviewed journals and found this conventional wisdom to be false. The researchers found that outcomes for preventive care were good at reducing prevalence of disease and increasing longevity, but few studies showed strong evidence of cost savings.¹⁰ The researchers note that many preventive care interventions are cost-effective, even if not cost-saving. To quote Aaron Carroll, M.D., a prominent health researcher,

Figure 1 Types of Interventions in Published Health Care Cost Impact Studies



Source: Adapted from Brousselle, Astrid, Tarik Benmarhnia, and Lynda Benhadj. 2016. What Are the Benefits and Risks of Using Return on Investment to Defend Public Health Programs? *Preventive Medicine Reports*, 3:135–138. <https://www.sciencedirect.com/journal/preventive-medicine-reports/vol/3>.



But money doesn't have to be saved to make something worthwhile.

—Aaron Carroll, M.D., influential health services researcher

medical professor and columnist for *The New York Times*: “But money doesn’t have to be saved to make something worthwhile. Prevention improves outcomes. It makes people healthier. It improves quality of life. It often does so for a very reasonable price. ... Sometimes good things cost money.”¹¹

Doing Our Part

Health care providers have been focused on providing quality care for their patients. However, in an environment with limited resources and the need to efficiently allocate health care dollars, providers have increasingly needed to consider costs. The Institute for Healthcare Improvement’s Triple Aim framework, which highlights the need to simultaneously improve the patient experience, the health of populations and reduce the per capita cost of health care,

has become highly influential.¹² The transition from fee-for-service payment models to value-based payment models is well underway, including accountable care organizations (ACOs) that are taking on financial responsibility for the outcomes they produce for Medicare beneficiaries.¹³ Initiatives such as the Choosing Wisely campaign, a joint effort of leading medical societies spearheaded by the American Board of Internal Medicine, have developed widely respected guidelines for avoiding unnecessary health care services and procedures.¹⁴ Leading health research organizations such as The Dartmouth Institute are studying unwarranted variation in how health care resources are used.¹⁵

Perhaps as expectations grow for health care providers to consider the costs of care, it would be wise for actuaries and other leaders in the health insurance industry to join them by giving greater

consideration to improving health outcomes. All parties make unique contributions that keep the entire health care apparatus humming along. But as the lines between roles continue to become less clear, we would do well to ensure we're all working on the same equation to achieve value for patients. ■

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A Helping Hand

**Q&A with Ashlee Mouton Borcan,
FSA, MAAA, principal and consulting
actuary at Milliman**

As an actuary, why did you choose to stay in the niche field of supplemental health?

Supplemental health appealed to me because of how much it helps consumers. Unlike typical major medical coverage, which pays benefits to the hospital when you incur expenses, supplemental policies pay benefits directly to policyholders for certain medical events. This money isn't required to be paid to the hospital. Insureds can use it for anything they need, so if they're not working as a result of their illness, they may want to use the money to pay their mortgage, or even to buy groceries. That money may also allow a loved one to take time off work to care for the insured during the illness. So much of the current talk about health care focuses on medical expenses and misses all the other nonmedical costs associated with being very sick. As medical plan deductibles have increased over the years, supplemental health has become even more valuable to consumers, and our work has gotten much more important.

What is the most interesting and/or rewarding part of your job?

The most rewarding part of my job is helping people focus on getting well, rather than being distracted by financial concerns. Sometimes we get lost in the details of our work, and when you're working with the data, it can be easy to forget about the people

behind it. I love when I hear stories from my clients who have gotten thank-you notes or agents who have gotten hugs because the benefits paid saved someone's home or allowed that person's mother to fly in to provide care. I know the products we develop really help people, and that's what makes our work so important.

Are there places in the health care space where actuaries aren't currently involved but you think they should be?

I'd love to see more actuaries in senior leadership roles. To make this happen, I think we need to work on broadening our image beyond our current stereotypes. I also wish that I could see more actuaries involved in public policy. A lot of the big events in the news these days are closely related to actuarial work: health care, Medicare, Medicaid and Social Security. I hear the actuarial community's thoughts on these items through my actuarial network, but I don't see enough of that making its way to mainstream media.

What about your job inspires you?

Without a doubt, it's the people—the people with whom I work, the clients I serve and the people we help. I have some of the best coworkers out there, and I can't imagine working without them. When I have difficult days, I think about the people I'm helping and it makes it all worth it. ■



READ MORE ONLINE!

Learn why Ashlee sees value in volunteering, her advice for future actuaries and more. Read the full Q&A at TheActuaryMagazine.org/A-Helping-Hand.

Ashlee Mouton Borcan can be reached at ashlee.borcan@milliman.com.



Increasing Student Awareness

Since its inception in 2015, the Inclusion and Diversity Committee (IDC) has worked to uphold the Society of Actuaries (SOA) Diversity and Inclusion Statement:

The SOA best fulfills its mission when it is diverse and inclusive of all individuals. Openness to and acceptance of diverse perspectives, cultures and backgrounds helps to attract the best talent and ensures the overall inclusivity of the actuarial profession.

The SOA welcomes the membership and participation of all individuals, regardless of race, ethnicity, religion, age, gender, sexual orientation, gender identity or expression, disability, or national origin.

In 2017, the SOA, the Casualty Actuarial Society (CAS) and the International Association of Black Actuaries (IABA) collaborated on a joint research project. Findings emphasized the importance of promoting early awareness of the actuarial profession among minority high school students, parents and teachers.

Key research findings indicate:

- » Lack of awareness and late awareness about the actuarial pathway are the largest barriers for underrepresented students, including African-Americans and Latinos.
- » Minority students and their major networks, including family and teachers, lack contact with actuaries.
- » Inadequate academic preparation can leave minority candidates less prepared for exams.

With those findings at the forefront, the IDC has identified two major strategic initiatives for 2019 and beyond:

- 1 Improve awareness of the actuarial profession and financial support, especially in the 12-to-20-year-old age group.
- 2 Increase awareness of the availability of exam reimbursement, scholarship,

academic and network support to underrepresented students, parents and teachers.

To achieve these initiatives, the IDC and other groups will oversee an awareness campaign about the actuarial profession for U.S. students, their parents, teachers, counselors and other educational influencers. Expansion of the CAS/SOA-sponsored High School Actuarial Day is also on the docket, as is continued marketing and support of The Actuarial Foundation's Math Motivators tutoring program. The IDC is also charged with the responsibility to lead an interorganizational working group to assess a financial support system for students who qualify.

The SOA will report on the progress of these initiatives in upcoming publications and on *SOA.org*. For more information and to stay up-to-date, visit bit.ly/SOADiversity. ■

RELATED LINKS

Exploring Ways to Support Inclusion and Diversity

bit.ly/DI-Research

Math Motivators Program

mathmotivators.org



SAVE THE DATE

Life and Annuity Symposium

May 20–21, 2019 • Tampa, FL

Health Meeting

June 24–26, 2019 • Phoenix, AZ

Valuation Actuary Symposium

Aug. 26–27, 2019 • Denver, CO

SOA Annual Meeting & Exhibit

Oct. 27–30, 2019 • Toronto



Learn more at SOA.org/Calendar

CAA: A Global Vision to Strengthen Financial Security Systems

BY KEN GUTHRIE

In October 2016, the Institute and Faculty of Actuaries (IFoA) and the Society of Actuaries (SOA) announced an agreement to establish a nonprofit, public interest joint venture organization, named CAA Global.

This organization was established to oversee, deliver and promote the certified actuarial analyst (CAA) qualification. The CAA is designed to give those working in actuarial support roles and the broader financial services sector a path to acquire sound technical skills, and also to bring them into a professional framework to increase the public's confidence in the work they do. The CAA also facilitates the growth of the actuarial profession in emerging markets where it is just starting to develop.

To earn the CAA qualification, a student must:

- » Pass the five examination modules, which include coverage of topics such as statistics, financial mathematics, and short- and long-term actuarial models.
- » Provide evidence of one year of relevant work experience.
- » Pass the Online Professional Awareness Test (OPAT).
- » Join an accredited association such as the IFoA or the SOA Center for Certified Actuarial Analysts.

Since the time of the original announcement, a full governance structure has been implemented, including the CAA Global Board, which receives input from

its Education and Marketing Committees. Each component of the governance structure has membership drawn from both founding organizations (the SOA and the IFoA). Strong efforts have been made to introduce the qualification to a wide variety of audiences through events such as meetings of the International Actuarial Association (IAA); IFoA and SOA member events in Asia, Europe and the United States; and the Asian and Indian Actuarial Conferences. Direct outreach to employers and university faculty is also occurring. Beyond the United Kingdom and United States, interest is strong from India, Indonesia, South Africa and Kenya.

There are currently around 1,000 candidates actively studying to obtain the CAA qualification—a significant uptick since the establishment of this SoA/IFoA joint venture. The typical CAA candidate is between 20 and 35 years old. The current geographical spread of candidates is principally within Sub-Saharan Africa, United Kingdom and Ireland, other European countries and Southeast Asia. There is a small and growing number of candidates in North America. (See Figure 1 for a breakdown of candidates by region.)

Recently joining the SOA and IFoA as an accredited association of CAA Global is the Actuarial Society of South Africa.

This expansion broadens the global network and scope of the qualification. It also further promotes the worldwide development of actuarial science while providing support with necessary technical skills to those industries that rely on actuarial skills.

The qualification also has complemented the U.K. government’s recent focus on apprenticeship programs. In the United Kingdom, the actuarial technician apprenticeship is an entry-level role. Apprentices study while working as part of a team, supporting qualified actuaries. Apprenticeships can last for two to three years, taking into account previous experience as well as study and exam progress. The CAA qualification forms the basis of the educational element of this apprenticeship scheme.

Another significant milestone for the program came when the Georgian

Actuarial Association chose CAA as the educational vehicle for building actuarial capacity in the country. Recent positive economic growth for this country, which straddles western Asia and eastern Europe, has driven a need for enhanced financial security services. The local association approached CAA Global with an interest in building competency in basic actuarial skills for its regulatory body using the curriculum and examinations of the CAA qualification. Applying the CAA qualification in this manner fits exactly into the original vision for its potential impact and prolonged value. CAA Global is hopeful that its work in Georgia will become a model for other jurisdictions to consider and adapt the CAA to their specific marketplace. Other national actuarial associations have already starting discussions, which is a good sign. ■

RELATED LINKS

U.K. Apprenticeship Program

bit.ly/UK-Apprentice

CAA Global

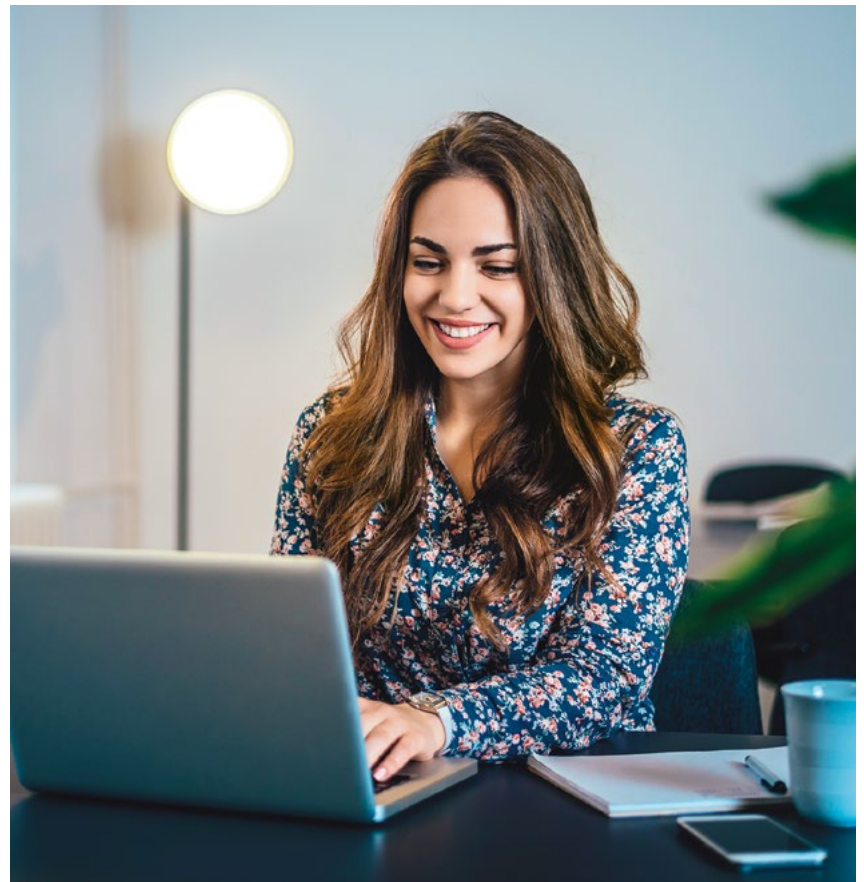
caa-global.org

ABOUT THE WRITER

KEN GUTHRIE is managing director of Education at the Society of Actuaries. He is also a member of the Board of Directors of CAA Global. Guthrie can be reached at kguthrie@soa.org.

Figure 1 Breakdown of Candidates Registered for CAA Exams

Region	Mix
United Kingdom	35%
Africa	31%
Europe	9%
South Asia	7%
North America	7%
Other Asia	4%
Southeast Asia	4%
Middle East	2%
East Asia	2%
Oceania	1%
South America	0%



Mortality Improvement

Q&A With R. Dale Hall and Patrick Nolan

Managing director of research at the Society of Actuaries (SOA), R. Dale Hall, and experience studies actuary Patrick Nolan discuss findings from the mortality improvement scale.

Can you tell us about the latest mortality improvement scale?

Nolan: This past October, we released the annually updated mortality improvement scale for pension plans, MP-2018. This experience study report projects lower future rates of mortality improvement and lower pension plan obligations compared to the previous scale, MP-2017. Scale MP-2018 is the fourth annual update to Scale MP-2014 developed by the Retirement Plans Experience Committee (RPEC).

What are the key changes in the scale and why?

Nolan: Our preliminary estimates suggest updating from Scale MP-2017 to Scale MP-2018 could reduce a plan's pension obligations by 0.2–0.4 percent for females and 0.3–0.6 percent for males. Those estimates are determined using a 4 percent discount rate.

Hall: We are seeing a reduction of overall U.S. mortality improvement trends that began in 2010. It's important to note that because there is varied mortality improvement across the different age groups, it's imperative for industry professionals to perform their own calculations. That means experts need to use the

corresponding demographics of their pension population to determine the impact of implementing the updated mortality improvement scale for their individual plan.

Nolan: As part of this experience study work, we conducted an assessment of the overall effectiveness of alternative approaches for the projection of future U.S. mortality rates. This study considers three characteristics: stability, forecast accuracy and fit. One particular alternative model is introduced in the Scale MP-2018 report that improves year-over-year stability in pension obligation estimates, but with weaker historical fit.

What other projects on mortality studies are in development?

Hall: As part of the SOA's strategic research, we are working on longevity research projects to examine the factors that impact models and mortality predictions. Stay tuned for future updates.

Earlier this year, RPEC released an exposure draft of the Pub-2010 Public Retirement Plans Mortality Tables. The primary focus of this study was a comprehensive review of recent mortality experience of public retirement plans in the United States. We're currently reviewing comments provided on the exposure draft and will be making final updates.

We are also hosting the Living to 100 Symposium in January 2020. This triennial event brings together actuaries, academics, demographers and other experts to discuss mortality and longevity. ■

RELATED LINKS

Mortality Improvement Scale MP-2018

bit.ly/MP-2018

Mortality Tables RP-2014

bit.ly/SOA-RP-2014

Living to 100 Symposium

Livingto100.SOA.org

Strategic Research

bit.ly/SOA-Strategic-Research

ABOUT THE WRITERS

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PATRICK NOLAN, FSA, MAAA, is experience studies actuary at the SOA. He can be reached at pnolan@soa.org.

Visit [SOA.org/Research](https://www.soa.org/Research) for the latest updates on new research opportunities, data requests, experience studies and completed research projects.



RESEARCH READS

Assumptions on Policyholder Behavior in the Tail

The Joint Risk Management Section, in collaboration with the Casualty Actuarial Society (CAS), the Canadian Institute of Actuaries (CIA) and the SOA, released a report on policyholder behavior in the tail (PBITT). The report gathers assumptions used to price, reserve and manage risks of universal life and its secondary guarantees.

bit.ly/2018-PBITT

Exploring Auto Loss Cost Trends

The CAS, SOA and Property Casualty Insurers Association of America (PCI) jointly released reports on the causes of automotive insurance loss trends, using publicly available data from the Federal Highway Administration, the U.S. Bureau of Labor Statistics and the Census Bureau. These reports focus on two key cost areas: liability and property damage in terms of frequency and severity.

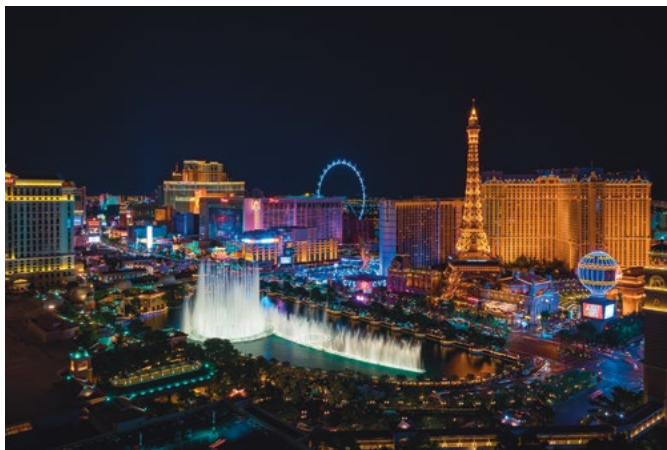
bit.ly/Auto-Loss-Cost

Analyzing Research on Aging and Retirement

A new series of SOA reports examines financial challenges and perspectives on retirement planning across the millennial, Generation X, late baby boomer, early baby boomer and silent generations. The studies look at financial priorities and difficulties in gaining financial security.

bit.ly/Age-Retire

OFF THE BEATEN PATH



Meeting

ReFocus Conference

March 10–13, Las Vegas

Join your colleagues for the 13th annual global conference for senior-level life insurance and reinsurance executives, jointly sponsored by the American Council of Life Insurers and the Society of Actuaries (SOA). For more information and to register, visit bit.ly/ReFocus2018.

Article

From Filmmaking to Predictive Analytics

As a film major in college with a dream to shoot movies, actuary Michael Xiao, FSA, CERA, MAAA, had an untraditional start to his actuarial career. Today, he uses predictive analytics to solve problems in the health care industry. Learn more at bit.ly/SOA-MXiao.

Reports

Retirement Across the Generations

This SOA report looks at how different generations manage their finances and retirement. Financial perspectives of five generations are the focus: millennials, Generation X, late boomers, early boomers, and the silent generation. Read the report at bit.ly/Age-Retire.

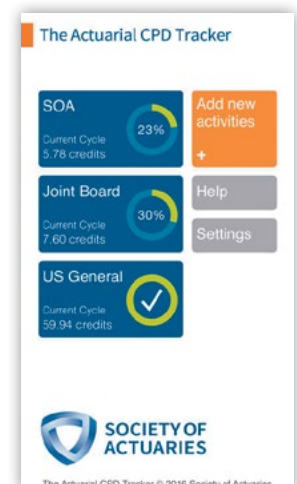
Mortality Improvement Scale

Download the SOA's mortality improvement scale for pension plans, MP-2018. The SOA's preliminary estimates suggest that compared to Scale MP-2017, implementing the MP-2018 improvement scale could reduce a plan's pension obligations by 0.2–0.4 percent for females and 0.3–0.6 percent for males, when calculated using a 4 percent discount rate. Download the report at bit.ly/MP-2018.

Resource

Track Your Progress

Keep track of your continuing professional development (CPD) by downloading the free SOA CPD Tracker tool. It is available for iOS and Android, and it also can be accessed on your desktop using a web browser. Check it out at bit.ly/CPDTracker.





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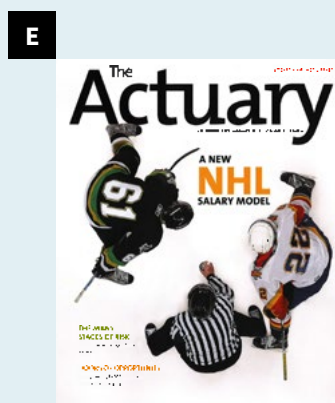
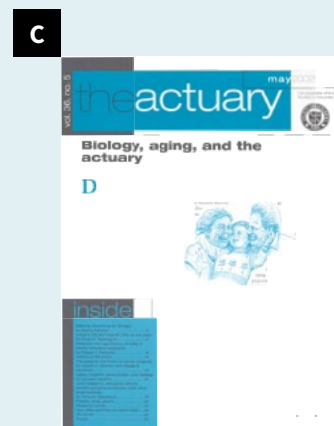
1967 The first issue of *The Actuary* was published in March 1967 as a newsletter. The publication was issued monthly and focused on education and research, ethics and standards, pension reform, the application of new mathematical concepts and more. The newsletter format changed twice with updated designs and a cleaner column format (see images A, B and C).

The Actuary magazine was introduced in October 2004 with Volume 1, Issue 1 (image D). Since then, it has grown in stature and content (images E and F), covering topics such as predictive analytics, health, member interviews, artificial intelligence, technology,

leadership and a host of other current information. Eleven volunteers serve as contributing editors; one volunteer is an education consultant for the magazine. See page 4 for the list of individuals who produce *The Actuary*.

Today, themed issues are published six times a year. *The Actuary* has also garnered several awards for design and content, the latest of which is a 2018 Folio Ozzie Award for Overall Design Excellence.

The magazine is complemented by an interactive website, which debuted with the December 2015/January 2016 issue. Thousands of new and repeat visitors from around the world visit TheActuaryMagazine.org weekly.



VISIT US ONLINE!
Check out our digital edition at TheActuaryMagazine.org.

Send information about SOA historical artifacts that highlight our organization's past and serve as a springboard for future growth. Write to theactuary@soa.org and share.

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