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Health Watch

"For Professional Recognition of the Health Actuary"

Medicare Prescription Drug and Medicare Advantage Programs Look Hot, Hot, Hot!

by Patrick J. Dunks

The Medicare Prescription Drug Improvement and Modernization Act of 2003 (MMA) contains the most significant changes to the Medicare program since its inception in 1965. MMA created Health Savings Accounts, changed the Medicare Advantage (formerly the Medicare+Choice) program, and added a prescription drug benefit, through subsidized private coverage, for Medicare beneficiaries. Recent Medicare Advantage (MA) and Part D information released by CMS confirms industry response to the Medicare changes has been robust and the Medicare insurance market—MA plans, Medicare supplement plans, new stand-alone Prescription Drug plans (PDPs), and administrators of self-insured employer retiree plans—should be very interesting in 2006. In this article, I'll focus on the industry response to the MA and stand-alone PDP programs, review the drivers of the new activity, and, finally, raise several issues related to the future of these programs.

Industry Response is Robust

For the Medicare Advantage program, statistics illustrating the robust industry response include:

- MA plans are available in all states except Alaska,
- 143 new MA plans were approved in 2005, including 41 plans completely new to the Medicare program, 66 new local PPOs,
- 90 MA organizations expanded their service areas in 2005,
- By September 2005, 428 plans were available across the nation, far more available than ever before,
- Over 200 Special Needs Plans (SNPs) will be available Jan. 1, 2006, most for dual eligible beneficiaries, but a small handful for beneficiaries with specific diseases,
- Nearly 95 percent of Medicare beneficiaries will have access to a Medicare Advantage plan in 2006,
- Regional PPOs will be available in 21 of 26 regions including 37 states plus the District of Columbia,

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SOCIETY OF ACTUARIES

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Chairperson's Corner

by Lori A. Weyuker

As I write to you today, the front page of the *Wall Street Journal* alludes to how the big issue for the 2006 and 2008 elections could likely be the cost of healthcare. As healthcare actuaries, we are uniquely positioned to be a significant part of this dialogue. In the upcoming weeks, the Health Section leadership will convene to define our focus for the 2005/2006 year. Don't be surprised if this is located somewhere in the dialogue.

The Health Section has recently undergone some dramatic changes in roles and responsibilities. These changes were designed, in part, to make us more responsive to and reflective of the interests of you, our members.

In the past year we have accomplished much under the leadership of Karl Volkmar and with the work of the (all-volunteer) Health Section Council. The Council is supported by the Health Section Activity Teams (Communications and Publications, Continuing Education, Research and Professional Community), the Health Section Professional Perspective Advisors, the "Friends" of the Council, and the ever-present SOA staff. Your contributions are recognized and appreciated for helping us achieve many of our goals.

First, I wish to thank all Health Section members, the Council, and the SOA for the confidence and support they have given me in allowing me to serve as Health Section Chair for the coming year. I look forward to serving our entire community.

Also, let us give kudos to the three new Health Section Council members. Jodie Hansen, John Stark and Jim Toole officially began their three-year terms at the 2005 Annual Meeting in New York City.

As voting members of the Health Section, you have shown them your support by electing them. They will need continued support from you, in the form of input to efficiently represent your interests to the SOA. There is hard work in store for them, and they will need your help!

And for the same reason, please contact any of the nine Health Section Council members—we can only serve you effectively if we are in communication with you and know your needs.

In the near future, you will be further able to communicate with us and familiarize yourselves with the Health Section Council, on a more user-friendly, redesigned Health Section Web site. Among other things, we will include photos and

personalized bios so that when you see us, you will recognize us. Please feel free to approach any of us. We want to know you, and we want you to know us.

The Health Section Council has taken on the additional responsibilities formerly assumed by the Health Practice Area, including strategy.

One of the main reasons for this change in structure is so that the SOA can be more in touch with its members through the grassroots organization that is the Health Section Council. Our responsibility is to be responsive to you, our members. We act as a conduit between the SOA and Health Section members.

In the upcoming year, we will increase our focus on promoting the actuarial profession. Our strategy includes demonstrating to the business community and to academia that actuaries, with inherent talent and specific training, are efficaciously and uniquely suited to solve the majority of problems in health care today.

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- The vast majority of Medicare beneficiaries in rural areas will have access to a Medicare private fee-for-service (PFFS) plan, and
- Medicare Advantage enrollment is growing at nearly 50,000 members per month in 2005.

Equally as impressive is the response of stand-alone Prescription Drug Plans:

- Each region within the contiguous 48 states will have between 16 and 23 organizations offering stand-alone prescription drug coverage in 2006,
- In Alaska and Hawaii, 11 and 12 organizations, respectively, will offer coverage,
- Average 2006 enrollee Part D monthly premiums range from $25 to $37, about $5 less than previous CMS projections,
- Every region except Alaska has at least one organization offering coverage for less than $20 per month, and
- In most U.S. territories, at least one organization will offer coverage.

The Special Needs Plan option allows a Medicare Advantage organization to offer benefit plans targeted to "special needs" populations and to limit enrollment in those plans to only the special needs populations.

Many PDPs will be offered by familiar organizations, yet many others will be offered by organizations relatively new to the Medicare insurance market. I expect CMS, the Bush administration and Congress are very pleased with the 2006 industry response. Further, many organizations are considering entry and/or expansion for 2007.

All in all, the intense new activity, coupled with existing players, indicates a fierce battle for insured Medicare lives exists and will continue.

Market Activity Drivers

The current Medicare population size, anticipated future growth, and continually growing familiarity with HMO, PPO and other insurance products, make it potentially attractive to almost every health insurer. That said, the current increase in market activity is directly related to the expected increase in profits by MA and PDP insurers.

Medicare Advantage Growth Drivers

Five key Medicare Advantage program changes required by the MMA, plus one decision by the present administration, led to explosive growth in the number of organizations and number of benefit plans available, now and in the near future, to Medicare beneficiaries:

1. *Higher payment levels.* Every county's published payment rate is at least as high as projected traditional Medicare costs in the county. While in many areas this caused little or no change in payment rates, other areas realized increases of up to 20 percent.

2. *Higher payment trends.* Annual payment rate increases must now be at least as great as traditional Medicare cost trends. Prior to MMA, payment rate increases often lagged behind cost trends that left MA plans with little choice but to cut benefits and/or increase member premiums. MMA creates a more sustainable business environment where revenues and costs are more likely to trend similarly (outside of other policy changes or interpretations).

3. *Regional PPO option.* MMA created a regional PPO benefit design in which organizations must offer PPO-style benefits across an entire region for the same member premium.

4. *Moratorium on new or expansions of local PPOs in 2006 and 2007.* While the local PPO moratorium was designed to aid regional PPO development, the deadline appears to have spurred a large number of organizations to offer a Medicare Advantage local PPO at or just prior to the deadline for mid-year 2005 applications.

5. *New Special Needs Plan option.* The Special Needs Plan option allows a Medicare Advantage organization to offer benefit plans targeted to "special needs" populations and to limit enrollment in those plans to only the special needs populations. Many existing Medicare Advantage organizations and Medicaid health plans have entered or are entering the market targeting dual (Medicare and Medicaid) eligible beneficiaries. Additionally, several organizations are targeting Medicare populations with special needs defined by the presence of particular chronic diseases.

Beyond these changes, the CMS interpreted budget neutrality related to risk-adjusted payments such that the total Medicare Advantage industry would receive the same payment level, in aggregate, from risk-adjusted payments as from demographic payments. In 2005, this interpretation added just over 8 percent, on average, to Medicare Advantage payment levels. Although the administration announced this past spring they would phase out this adjustment, in the short term, the higher plan payment level simply added to the financial improvements noted above.

Not surprisingly, the improved financial picture, new market opportunities, urgency with respect to local PPOs, and the pre-MMA momentum from several organizations adding private fee-for-service plans in a large and fast-growing segment of the health care system, created a near frenzy of Medicare Advantage activity.

Stand-Alone Prescription Drug Plan Growth Drivers

Beyond the sheer size of the Medicare population, nearly all Medicare beneficiaries indicate they would like prescription drug coverage. Except for those Medicare beneficiaries covered by Medicaid, former employers, selected Medicare Advantage plans, or individually purchased Medicare Supplement policies, Medicare beneficiaries' prescription drugs are usually paid out-of-pocket. Moreover, most Medicare Advantage and Medicare Supplement prescription drug coverage is limited. Although this situation is not new, MMA attracted insurers to a market, individually sold prescription drug coverage for the Medicare population that was previously unacceptable to them.

MMA includes six main enhancements to the previous market situation:

1. *Premium subsidies.* Prescription drug coverage is highly subsidized, on average about $50 to $60 per member per month, by the federal government. Additional subsidies for low income beneficiaries are also available.

2. *Risk-adjusted revenue.* CMS payments to PDPs will be 100 percent risk-adjusted, which should limit selection risk significantly.

3. *Premium penalties for delayed enrollment.* If a Medicare beneficiary decides to delay purchasing prescription drug coverage when they don't otherwise have coverage as least as rich, on average, as standard Part D coverage, they face a 1 percent per month delay penalty when they do enroll.

4. *Benefits with significant universal appeal.* Since Part D coverage can have no more than a $250 deductible, most Medicare beneficiaries will see some benefit from coverage. Due to the premium subsidies mentioned above, most Medicare beneficiaries who spend more than $800 on prescription drugs will benefit financially from coverage in 2006.

5. *Catastrophic reinsurance.* CMS assumes 80 percent of the risk for drug spending in excess of a $3,600 annual member out-of-pocket.

6. *Risk-sharing.* CMS shares in the risk of drug spend experience more than 2.5 percent different than the PDP's expected drug spend in 2006 and 2007 (5 percent for years 2008 to 2011).

Items 1 through 4 above eliminate most insurers' previous concerns about selection risk while items 5 and 6 provide individual and aggregate stop-loss coverage to the insurer. The combined impact of the above factors, together with previous industry experience that demonstrates drug spend is quite predictable once a base of experience is available, reduces the relative risk of providing PDP coverage in comparison to many other new health insurance products.

For a PDP with a typical enrollment mix, the average cost of the Part D benefit will likely range from about $100 to $134 per member per month (PMPM) with $20 to $34 PMPM reimbursed

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through Part D's federal reinsurance provision. Please note the above figures are for 2006 and most will be indexed (e.g., benefit thresholds) or move with expected drug spend trends as we move to 2007 and beyond.

In addition to the above considerations, insurers have some flexibility in creating drug benefits. The required coverage is:

- Standard Part D coverage,
- An equivalent cost sharing plan where member cost sharing in the initial coverage period (i.e., between $250 and $2,250 in annual drug spend) may vary by drug tier but, on average, is equivalent to Standard Part D cost sharing, or
- A basic alternative plan where an alternate plan design can be offered under the initial coverage limit ($2,250 in 2006) that provides equivalent value to Standard Part D coverage (e.g., deductible may be eliminated and cost sharing increased).

Once an insurer offers one of the above required coverages in a given region, they can offer an enhanced alternative plan design where the value of the benefit above Standard Part D is paid for by additional beneficiary premiums.

Beyond the potential for profit, insurers entered the PDP market to gain and/or protect market share. As the market evolves, market share gains or losses are realized, and profits or losses are experienced, we should expect consolidation, new entries and product refinements just as we do in any health insurance market.

Additional MMA Influences on Medicare Advantage

In addition to the MMA changes noted above, a number of other related changes added analytical and operational opportunities and challenges for MA plans. The highlights include:

- A bid process for traditional Part A/B benefits and Part D rather than the Adjusted Community Rate Proposal process,
- The addition of Medicare's 2006 Part D prescription drug coverage,
- The savings reduction to A/B revenue combined with the addition of Part D revenue,
- The continued transition toward fully risk-adjusted payments for A/B benefits, and
- MA enrollment lock-in that creates potential sales staff issues.

Bidding Replaces Adjusted Community Rate Proposals

For 2006, a bidding process replaced the Adjusted Community Rate Proposal filings required in 2005 and prior years. For Part A and B benefits, MA plans bid on traditional Medicare benefits including traditional Medicare cost sharing levels. Their projected costs for benefits, administration and profit based on their anticipated enrollment mix forms their bid. Their bid is compared to benchmark revenue that is defined as CMS's published rates adjusted to the projected population. The benchmark revenue less the bid, assuming that difference is positive, equals savings. Seventy-five percent of the savings, or rebates, must be spent on supplemental benefits including Part D premium buy downs. CMS keeps the other 25 percent of savings. Prior to 2006, MA plans could effectively use 100 percent of savings to fund supplemental benefits. Because supplemental medical benefits not funded by the rebates generate required member premiums, most MA plans bid below benchmark and created savings in order to have a competitive benefit package. CMS's retained savings had the effect of offsetting at least a portion of the additional revenue a MA plan would receive due to Part D.

For Part D, the competitive bidding process is based on bids compared on a national profile population basis. If a plan bids higher than the national average bid, its member premium for Part D is increased by the difference. Similarly, if a plan bids lower than the national average bid, it will have a lower Part D member premium.

Another change is that the bidding process and forms were designed and reviewed by actuaries. The actuaries responsible for the new bidding process and reviews generally focused on material

issues so the process and reviews were more sensible than with the prior ACRPs. Except for the unfamiliarity of some reviewers with the MA market and tight turnaround times, the review process seemed to proceed reasonably well.

When I first read the law, CMS's ability to negotiate bids, in particular, concerned me. CMS kept referencing the Federal Employees Program as an example, yet many health plans experienced difficulties (best rate, audits, etc.) with the way the Federal Government operates that program. For 2006 bids, CMS's approach to the negotiation process was reasonable. We'll see if the process remains reasonable in future years and applies to bid audits as well.

Prescription Drug Coverage Added to Medicare Advantage with Part D
In each service area, a Medicare Advantage organization with non-SNP benefit plans must offer at least one non-SNP benefit plan with the required prescription coverage. All SNPs must offer required prescription drug coverage (standard, equivalent cost sharing or basic alternative) or an enhanced alternative plan design where the value of the benefit above Standard Part D is paid for with A/B rebate dollars (described below). Moreover, MA plans cannot offer any prescription drug coverage that does not meet the Part D coverage minimums.

Savings Reduction to A/B Revenue and Addition of Part D Revenue
Besides the requirements on MA plans, the introduction of Medicare Part D created issues related to revenue, cost and competition. MA plans will receive Part D premium subsidies from CMS. In some cases, the additional revenue helps pay for drug coverage that was previously funded with Part A/B revenues. The additional revenue may offset the 25 percent of Part A/B savings (described above) that CMS will retain in 2006. At the other extreme, the revenue may only cover a portion of the cost of a new benefit.

Many MA organizations are offering 2006 benefit plans with and without drugs with the same underlying Part A/B benefits. However, in zero premium markets with very rich benefits (e.g., New York City and southern Florida), MA-PD plans sometimes couldn't find enough additional Part A/B benefits for a plan without drugs unless they paid part of Medicare beneficiary Part B premiums.

Risk Adjustment's Role Continues to Grow
Risk adjustment, although it's not new to MA, will continue to have a greater impact on Part A/B revenue. Part D revenue from CMS will be fully risk adjusted. Capturing appropriate diagnosis information will be particularly important to MA plans because of its impact on risk adjustment scores and, in turn, revenue. The industry is working vigorously to gather more complete diagnosis data.

Enrollment Lock-in Creates Sales Challenges
Enrollment will be concentrated around Jan. 1 each year, except for newly and dual eligible Medicare beneficiaries. This requirement will create sales and sales staffing challenges for MA plans. Some MA plans are considering using brokers as a way to avoid a full-time sales staff with six to nine months of down time per year.

Besides the requirements on MA plans, the introduction of Medicare Part D created issues related to revenue, cost and competition.

Future Considerations

The issues described above focus on 2006. In reality, most strategic and actuarial work with respect to 2006 was completed quite some time ago. Organizations are now planning for 2007 and beyond.

Expect Relative Stability for the 2007 PDP Market
Stand-alone prescription drug plans will have limited new information as they plan for 2007. In addition to information previously available, plans will know:

- Their competitive position with respect to 2006 benefits, formularies and member premiums,
- How that competitive position impacts their ability to enroll Medicare beneficiaries,
- Who the 2006 competition is, and
- Which regions were qualified for low-income beneficiary auto-enrollment.

Naturally, PDPs will look for ways to improve or maintain their competitive positions. Additionally, as the June 5, 2005 due date approaches for 2007 bids, PDPs may:

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- Improve administrative cost estimates,
- Review their initial drug spend experience (three to four months), and
- Capture the average beneficiary health status attracted to their plan.

If CMS relaxes their limit of three benefit plans per service area, some PDPs may expand their number of benefit options. Organizations that have not yet entered the PDP market may revisit their decision or partner with a PDP they can market that won't be looking to move their other Medicare business. In summary, I expect moderate stability in the 2007 PDP market with adjustments typical to new markets.

2007 MA Organizations Face Significant Revenue Issues

While stand-alone PDPs should expect relative stability in 2007, Medicare Advantage organizations face a significant revenue issue. Based on current CMS plans, the phase-out of budget neutrality for risk adjustment may eliminate the otherwise expected 2007 increase in Part A/B revenue. While the phase-out will be an issue for several more years beyond 2007, its incremental impact should be less severe after 2007.

Based on past experience in the Medicare program, I expect 2007 MA plans will lower benefits, raise member premiums, reduce profit objectives somewhat, and attempt, with limited success, to hold the line on increases in provider reimbursement. MA organization management will know their 2006 competitive position and will try to anticipate how their competition will deal with the same revenue problem while developing their once-a-year benefit/premium strategies. Despite the revenue issue, many organizations are still considering MA entry or expansion for 2007, particularly as Special Needs Plans.

Appropriate Capture of Medical Diagnoses is Critical to MA Organizations' Future

MA organizations continue to work diligently on capturing medical diagnoses critical to improving their risk-adjusted A/B and D payments. Organizations that can't effectively capture medical diagnoses will struggle to remain competitive.

MA Organization Risk Recruitment Strategies May Change

As I look forward, the desired risk mix of MA plan members may change significantly. Full risk-adjustment turns the usual risk selection strategies on their head. In the past, MA organizations profited if the enrollee mix they attracted was healthier than average. With fully risk-adjusted revenue, the most profitable beneficiaries (and thus, most desirable) may well be those beneficiaries with high revenue (i.e., those with diseases expected to cost a lot in the next year as measured by the CMS-HCC risk adjuster) and diseases where there is significant potential to reduce costs through interventions (i.e., where improved medical care can delay progress and cost of diseases significantly). As more SNPs enter the market, SNPs may target the most desirable MA beneficiaries and leave the mainstream MA plans with fewer of these enrollees and hence, less desirable enrollee mixes. MA plans will increasingly consider their own SNPs or at least disease programs within their existing MA plans that allow them to effectively compete for the most desirable Medicare beneficiaries.

The introduction of Part D in 2006 puts nearly every Medicare beneficiary in play in late 2005 or early 2006. Every Medicare eligible must decide whether to enroll in Part D, remain with employer-provided retiree drug coverage if they have such coverage, or decline enrollment in Part D. While Medicare beneficiaries are making that decision, many are likely to entertain potential changes in their Part A/B coverage. Medicare Supplement enrollees may take a hard look at MA enrollment, and MA enrollees who selected MA coverage largely for the drug benefits in the past may opt for stand-alone PDP coverage and possibly Medicare Supplement coverage. With all the 2006 Medicare Advantage, Part D and Medicare Supplement plan changes and the market adjustments in subsequent years, the competition for Medicare lives should be very interesting.

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Actuaries Play Important Role in Part D Retiree Drug Subsidy (RDS)

by Stephen J. Kaczmarek

On Dec. 8, 2003, President Bush signed the Medicare Prescription Drug, Modernization and Improvement Act into law. The most significant part of the Act is the addition of prescription drug coverage to Medicare. This new prescription drug program, initially known as Medicare Part D, is now being promoted under the title "Medicare Rx" to the nation's Medicare eligible population.

When Congress drafted this legislation, it knew that the high cost associated with expanding Medicare in this way could delay or prevent its passage. The Retiree Drug Subsidy (RDS) was one of numerous solutions that they crafted to help reduce the cost of the program. The RDS encourages plan sponsors of existing qualified retiree pharmacy benefit programs to continue to offer retirees the benefits that are currently in place by paying them a federal tax-free subsidy. Since approximately 10 million of the total projected 42 million 2006 Medicare beneficiaries currently receive a retiree pharmacy benefit, the cost savings attributable to not folding them into the federal program is substantial.

In order to entice plan sponsors to maintain their benefits, the Retiree Drug Subsidy pays a federal tax-free benefit that the Centers for Medicare and Medicaid Services (CMS) estimates to be worth $668 per retiree in 2006. This amount is determined by multiplying 28 percent by the gross discounted cost of pharmacy claims (but net of rebates) between $250 and $5,000 per qualified retiree. This payout could total more than $6 billion if most plan sponsors currently providing retiree pharmacy benefits seek the subsidy. That amount does represent a savings to the government, however, from the approximate cost of $11 billion that would be incurred if all of the current employer beneficiaries enrolled in Part D.

The general requirement for qualifying a plan for the RDS is to test the plan for actuarial equivalence to the standard Part D benefit. If a plan is at least as rich as the standard Medicare Rx benefit, it is eligible for the RDS. However, the subsidy may not be collected for individuals that enroll in a Part D prescription drug plan (PDP).

Actuaries are playing several vital roles in the RDS process.

- First, actuaries that work for CMS have been integral in interpreting the legislation and developing guidance on the testing that must occur. This includes evaluating congressional intent and ensuring that the guidance and testing standards strictly adhere to the legislation.
- Second, an American Academy of Actuaries task force has worked for over a year to provide input and guidance to CMS on the issues that impact the implementation of the Part D program and the RDS.
- Third, actuaries are directly involved in performing the testing and analysis required to determine if the retiree pharmacy plans offered by employers qualify as being at least actuarially equivalent to the standard Part D benefit. They are also responsible for providing the attestations that the legislation requires in order for employers to qualify for the federal funds.

The regulations that have been developed to support Part D provide a great deal of detail on how the actuarial equivalence testing must be conducted. In general, this takes the form of a two-step process:

- The gross value of the plan must be at least equal to the gross value of the standard Part D benefit. The standard Part D benefit for 2006 has a $250 deductible, a 75 percent benefit for covered prescription drug spending below the

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"initial coverage limit" of $2,250, a "coverage gap" where no benefits are payable and catastrophic coverage once the beneficiary has paid $3,600 in true out-of-pocket costs. All of these figures are indexed to pharmacy inflation in subsequent years.

- The net value of the benefit (after accounting for the retiree contribution) of the plan must be at least as great as the net value of the standard Part D benefit.

On the surface, these two tests appear to be fairly easy calculations for the attesting actuary to perform. However, a number of issues must be considered when performing the analysis. Several common ones are listed below.

Issues related to the Gross Value Test

The standard Part D plan includes coverage for a specific set of pharmacy benefits. Included in this list are items such as prescription drugs to assist with smoking cessation programs and drugs to treat erectile dysfunction. Many employer plans do not cover drugs used to treat these conditions. The actuary must account for any differences in the drugs covered between the standard Part D benefit and the coverage provided by the plan being tested.

In addition, actuaries regularly encounter plan design provisions such as annual or lifetime benefit maximums that require complex modeling. These provisions must be analyzed and their impact quantified. Any plans that have integrated medical and pharmacy cost sharing provisions (e.g., deductibles and out-of-pocket maximums) must be assessed so that the value of the pharmacy benefit can be isolated and compared to the standard Part D plan.

Issues related to the Net Value Test

Many retiree medical benefits require a monthly contribution that covers both the medical and pharmacy components of the benefit. In order to assess the value of the pharmacy benefit on a stand-alone basis, the actuary must determine how much of the monthly contribution covers the medical benefit and how much of the contribution covers the pharmacy benefit. The regulations states that the "… attestation must allocate a portion of the premium/contribution to the prescription drug coverage under the sponsor's plan, under any method determined by the sponsor or its actuary." Guidance from CMS allows the actuary to allocate as much as the full cost of the medical benefit as being attributed to the retiree contribution and the remaining amount to the pharmacy benefit. An example follows:

(A) Total Combined Premium	(B) Medical Premium	(C) Pharmacy Premium	(D) Retiree Combined Contribution	Net Pharmacy Contribution Max ((D-B),0)
$500	$250	$250	$300	$50

A fair amount of discussion has occurred regarding the guidance for allocating combined contributions. It is intended to not penalize a plan sponsor that provides both retiree medical and pharmacy coverage, relative to one that only provides pharmacy coverage, by allowing the attesting actuary to assume that the medical coverage is a retiree-pay-all benefit. This analysis must be done on a retiree by retiree basis, since using an average for the entire group could result in a negative premium or premium credit for a particular beneficiary with a contribution that is less than the retiree medical cost.

Some retiree plans are considered by their plan sponsors as retiree-pay-all even though there may be an inherent subsidization if a blended active/retiree cost is used to determine the retiree-pay-all contribution. In circumstances where this occurs, the actuary must often use actual claims experience in order to determine the true cost of the medical benefit which can then be subtracted

from the actual retiree contribution to determine the net pharmacy contribution.

Plans that have complex or detailed contribution strategies (e.g., based on years of service) require special attention in order to determine if the entire group or some subset of the groups qualifies for the subsidy. Actuaries may group benefit options (defined as a unique combination of plan design and contribution amount) and test those groupings to see if they pass the net test. In practice, this can result in a plan sponsor receiving subsidy dollars for a beneficiary that has pharmacy coverage with minimal net value. On average, the beneficiaries in the group must have a pharmacy benefit with a net value equal to or greater than the standard Part D benefit. This provision prevents windfalls for plan sponsors, one of the key Congressional intents to which CMS actuaries adhered when crafting the regulations and their guidance.

Another complex provision allows the actuary to consider a reduction in the value of the standard Part D benefit when a retiree plan is secondary to Part D. Because the catastrophic coverage afforded by Part D is triggered by true out-of-pocket spending, the net value of the Part D plan is reduced when a Part D beneficiary also receives coverage from a retiree pharmacy benefit. This reduced benefit becomes the new benchmark for comparison when the Medicare Supplemental Value (as the provision is called) is invoked. It can be used in the analysis when a particular plan has provisions that allow it to be secondary to Medicare Part D if a retiree is enrolled in both plans. This is confusing to many people since the plan sponsor is no longer eligible for the subsidy when a retiree enrolls in Part D, but it has a logical foundation since the plan being assessed is benchmarked against its alternative (i.e., the Part D benefit that would pay less and therefore has less financial value).

RDS Impact on Plan Sponsors

As of this writing, nearly 10,000 plan sponsors have initiated their application for the RDS. It may be some time before we know the total number of plans seeking the subsidy or how many of the approximate 10 million retirees are covered by those groups. It will take even longer to determine whether or not plan sponsors will continue with the RDS in the future or pursue one of their other options.

Plan sponsors are beginning to realize that they have other options besides the RDS to reduce their retiree benefit cost and the associated liability. The RDS application requires an annual submission and plan sponsors are not "locked in" to the RDS even though they may pursue it in 2006. We can expect them to use next year to compare the financial outcome from the RDS, becoming a PDP sponsor through the waiver approach and the wrap-around approach. Once again, actuaries will be called upon to help quantify the alternatives and provide guidance to plan sponsors.

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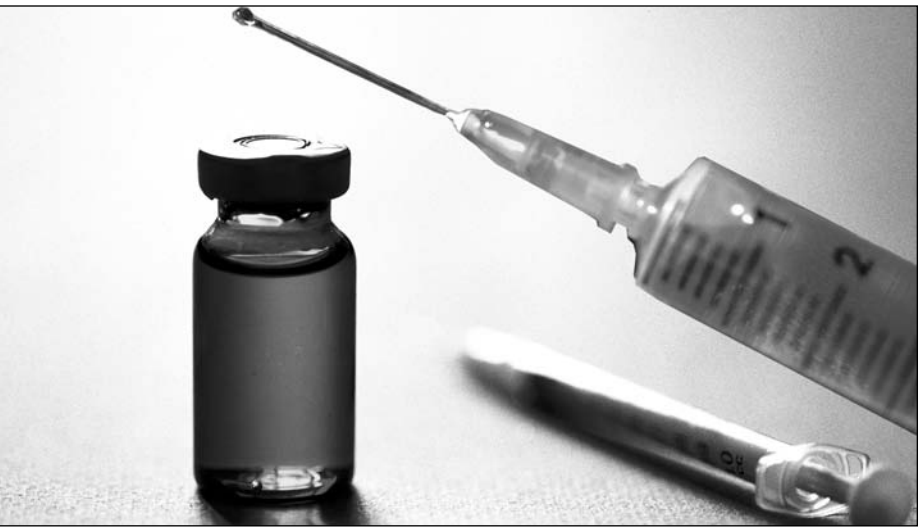
The 2006 SOA Health Spring Meeting

June 20-22, 2006 • Westin Diplomat, Hollywood, Florida

Please mark your calendars for the 2006 SOA Health Spring Meeting, which will be held at the Westin Diplomat, in Hollywood, Florida. More information will be forthcoming soon!!

Risk Adjustment under the Medicare Modernization Act

by John M. Bertko and Kendra L. Fox



The Medicare Modernization Act (MMA), enacted into law in December 2003, will introduce far-reaching changes into the Medicare program. The greatest impact will likely be the introduction of a voluntary prescription drug benefit program for seniors, but other important changes involve new Medicare Advantage ("MedAdvantage") PPO options. Risk adjustment is used by CMS to adjust the premiums paid to MedAdvantage contractors and stand-alone Prescription Drug Plans (PDPs) to reflect the health status of the enrolled population. For those readers not familiar with the changes to risk adjustment made by the MMA, this article is meant to provide a short summary of how the new risk adjustment methodology works.

A Short History

Since Jan. 1, 2000, the Centers for Medicare and Medicaid Services (CMS) has used some version of risk adjustment to fine-tune payments to health plans that are contractors for what is now called Medicare Advantage. From the 2000 through 2003 contract years, CMS used a risk adjustment method based solely on inpatient diagnoses (the Principal Inpatient Diagnostic Cost Groups, or PIP-DCGs) to modify payments according to the health status of seniors enrolled in Medicare Advantage plans (then known as Medicare + Choice plans).

On Jan. 1, 2004, the agency switched to the CMS Hierarchical Condition Categories (CMS-HCC) model, a broader method of risk adjustment using 70 disease groups, with records based on both inpatient and outpatient encounters. For the last two years, MedAdvantage plans have had their payments modified using data submitted by health plans using the CMS-HCC method, along with other technical modifications, such as the budget neutrality adjustor. In addition, risk adjustment has been gradually phased in, starting with 10 percent of payments adjusted by PIP-DCGs from 2000 to 2003 to 50 percent of payments under the CMS-HCC risk adjustment model in 2005. For the most part, Medicare risk adjustment prior to 2006 has been a factor only for the limited 13 percent of the senior population that has been enrolled in MedAdvantage plans.

New for 2006

In 2006, risk adjustment will affect payments to private payers for Medicare enrollees to a greater degree. Risk adjustment for the hospital and professional benefits provided by MedAdvantage plans (also known as Part C benefits) will be phased in at 75 percent for 2006, increasing to 100 percent in 2007. New Medicare products such as the Regional PPO will extend the offering of MedAdvantage products over a larger service area. For 2006, all seniors enrolling in the new Part D prescription drug benefit will be affected by risk adjustment for Part D.

The Part D risk adjustment system (RXHCC) was developed using the same basic disease classifications as the CMS-HCC model. Since outpatient prescription drugs were not covered by Medicare prior to 2006, the RXHCC model was calibrated using pharmacy data for retirees in the Federal Employee Health Benefit plan. Adjustments were made to the RXHCC disease groupings to more accurately predict pharmacy expenditures. Additional payments are provided for long-term institutional enrollees and for those eligible for the Part D low income subsidy payments. And, in contrast to the phase-in of the Part A and B risk adjustor, the Part D RXHCC risk adjustor will immediately start at 100 percent in 2006.

Implications for Actuaries

One major effect is that all PDP bidders and all MedAdvantage plans offering Part D benefits (MA-PD plans) must bid on a "national average" senior (i.e., a senior who has exactly the average drug usage of all 65+ seniors and other Medicare-eligible

beneficiaries, whether enrolled or not). This means that bidders must take existing data for, say, Medigap members with drug coverage, MedAdvantage members with drug coverage, Medicaid members or retirees with drug coverage and "convert" their usage to that "national average" senior. Thus, simply bidding based on current experience would be inappropriate and actuaries must have good working knowledge of how Part D risk adjustment will affect payment and bids.

Next, actuaries must recognize that, for at least a few years, the Part D risk adjustor must be based on diagnoses reported from Part A (inpatient hospital claims) and Part B (outpatient and professional service claims) data—obviously, no prescription drug data is available for those lacking pharmacy coverage and aggregating data from other groups would be an impossible task. This new Part D risk adjustor makes use of approximately 84 disease groups that are relevant to predicting high-cost drug usage. In addition, there are separate factors for low-income seniors and those residing in long-term care facilities.

A further issue is that the new "Defined Standard Part D Prescription Drug Benefit" does not provide a continuously increasing payment. Everyone is aware that there is a "coverage gap" in this benefit, from $2250 of spending to $5100 in spending in 2006 (these and other coverage limits will change each year). Thus, the risk adjustor may work better for some segments of seniors than for others. In other words, high-cost seniors may have very good predictions from the risk adjustor, but seniors with spending in the "coverage gap" may not have their costs predicted as well.

Yet another issue is predicting the spending of those seniors either in long-term care facilities or those eligible for both Medicare and Medicaid. New factors have been developed by CMS staff to adjust payments for these categories of individuals.

To provide a more complete, but terse, picture of the Part D risk adjustor, think of the payment adjustments as part of a "Chinese restaurant menu." Pick an adjustor from each category that applies:

- Age/gender—for all
- Diagnosis—for those with the listed chronic conditions
- Medicare and Medicaid status—add payment, if appropriate
- Long-term care residence—add another payment if resident is in an LTC facility

Future Developments for PDP Risk Adjustor

With emerging experience over the next few years, much more actual experience data on the use of prescription drugs by seniors will become available. Most of this data should be directly accessible by CMS through the "data aggregator" vendor that CMS will be employing to provide coordination of benefits and coverage determinations. Daily exchanges of prescription drug "events" are required from all PDPs and MA-PD plans.

The obvious candidate for a future change would be to move from using Part A and B diagnostic data to using actual Part D data to predict future Part D costs. Not only is prescription drug data quickly available (e.g., run-off time is measured in weeks, not months), but many researchers have shown that actual prescription drug spending is by far the best predictor of future prescription drug expense.

Other important issues will be determining how well the low income and long-term care factors predict actual costs. Finally, CMS can also determine whether a geographical factor is appropriate for risk adjustment purposes.

Summary

The worthwhile goal of matching payment for Part D to the healthcare needs of individual seniors is even more complicated than prior risk adjustors. Actuaries practicing in the Medicare Part D world will need to not only be good at pricing prescription drug benefits and following the rapidly changing trends in prices and new drugs, they will also need to be intimately familiar with how CMS develops and applies risk adjustors for the Part D benefit.

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Enterprise Risk Management

by Kara L. Clark

Editor's Note: This article is the second in a series of two. The first article appeared in the August 2005 edition of the Health Section News.

In the first article in this series, we defined ERM and discussed the three major aspects to an ERM framework: risk identification, risk measurement, and finally, risk management. In this article, we're going to take a closer look at the first of these three, and then focus in more specifically on what it means in the context of a health insurance or health plan organization.

Risk Categories

In ERM literature, risk categories are defined in different ways. In my last article, I noted that some common categories include:

- Market risk—External factors that affect the entire economy and/or specific industries;
- Credit and underwriting risk—Selection and monitoring of counterparties; and
- Operational risk—Process quality and control.

In my work with the SOA's health risk management group, upon which these articles are based, we have chosen to define the risks that face health organizations a bit differently, although our categories can be shown to align to those above (as indicated in parenthesis, below). The six broad categories we've included in our risk mapping document include:

Environmental risk (market risk);
Financial risk (credit and underwriting risk);
Pricing risk (credit and underwriting risk);
Operational risk (operational risk);
Reputational risk (operational risk); and
Strategic risk (operational risk).

Let's look at each of these six categories in turn.

Environmental Risk

Environmental risk is a major category of issue for health insurers. It includes:

- Changes in the state of the buyer environment—The risk that the target market changes and that the buyers of insurance products will experience a positive or negative impact that strengthens or lessens their position relative to the private insurance industry. Examples might include the formation of purchasing groups or associations.
- Competition—The risk that a competitor (such as another health plan) will enter or leave the market, that a competitor will have a significant change in market position (perhaps due to a merger), or that substitutes to health insurance (such as self-funding) will become more or less attractive (could be due to legislative changes). Additional impacts of competition include price wars or less market share to cover fixed expenses.
- The economy—The risk that the condition of the economy has an adverse effect on the financial results of the insurer. For example, for LTD, claims could go up in an economic downturn (due to unemployment risk) or in an upturn (due to stress claims). A poor economic outlook could also put pressure on the financial conditions of the insurer's customers, resulting in an issue of affordability (customers may then elect to not purchase insurance and take on the risk themselves). If a positive economic outlook increases the number of people with insurance, there may be problems of provider access if the network is overburdened due to unmanaged growth.
- External fraud—One example is provider fraud or the risk that the providers are billing fraudulently. Another example is where customers are working the system to get services that they should not.
- Legal issues—The risk that decisions of the legal system will negatively impact the

financial results of the insurer. Establishment of precedents being set that an insurer should be aware of.

- Regulatory/legislative issues—The risk that regulators or legislatures will pass rules or laws that inhibit a firm's ability to operate according to sound insurance principles. Examples include community rating, premium increase limitations, further "commoditizing" the market (i.e., Any Willing Provider laws, mandated benefits), make the purchase of insurance more affordable/attractive (changes in rules regarding portability, tax credits or premium subsidies that could result in unmanaged growth) or even eliminate the current private market (national healthcare).
- Changes in the state of the supplier environment—The risk that suppliers to the insurance market will experience a positive or negative operational impact that strengthens or lessens their position relative to the private insurance industry. Examples might include cost-shifting from insufficient Medicare/Medicaid payments, "walk-outs" due to rising medical malpractice increases, the formation of provider alliances (increasing their bargaining power), or the exit or entry of a large provider from or into a market.

A new state-mandated benefit might be an example of a regulatory risk. A "change in the state of the supplier environment" might be something like a hospital merger or acquisition, or a hospital closing. If you are a health plan in that area, what kind of impact might you see in your provider contracting provisions due to these changes?

Financial Risk

Financial risk is a major category for banking and life insurance. It's less often discussed relative to health plans, but that doesn't mean it can be ignored. Aspects of financial risk include:

- Asset default—An asset loses all or part of its value if the company that issued the security is unable to make payments or investors lose confidence.
- Data—Insufficient data or insufficient time to assess a given risk. This can result from bad or incomplete data. There is a materiality issue here; some risks are small enough that very little data and analysis are required to measure them.
- Financial viability—A company can no longer fulfill its financial obligation to assume risk. Risk that you cannot pay your current obligation. Definitions can vary depending on whether we are considering a GAAP or SAP setting.
- Interest rate—Change in level of interest rates affects costs of healthcare services (e.g., provider costs, business venture, utilization), as well as valuation of the assets.

Financial risk is a major category for banking and life insurance. It's less often discussed relative to health plans.

- Liquidity—Risk that an asset is unable to be converted to cash at fair market value when required.
- Model risk—A model does not reflect the process being analyzed (wrong model or inappropriate parameters) to an acceptable degree of precision. Materiality is important here. Also includes interpretation risk—the risk that the model will be interpreted or used inappropriately even though it appropriately models the issue at hand. For example, using a "directional" model as absolute.
- Reinvestment risk—Risk that rates will fall causing cash flows from investment income (dividends or interest), upon reinvestment, to earn less than assumed. Includes the risk of selling assets at a loss.
- Reserve adequacy—The risk that the level of reserves held is inadequate (a low probability that reserves can support the underlying liabilities) or excessive (overly conservative reserves have negative pricing, tax and reputation implications).

Of these, data and reserve adequacy are probably the most familiar to actuaries that work with health plans. Liquidity is important as well, especially as states pass laws or providers negotiate contracts with timely payment provisions. We also have to think about how the environment is changing and how these risks may look in the future. For example, how might financial risk change for health plans if/as the market moves away from one-year type funding arrangements?

Pricing Risk

Pricing risk is another significant category of risk for health insurers, probably more so than for the banking or life insurance industries. Trend is a bellwether for health insurer risks. The various dimensions of pricing risk include:

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- Anti-selection—The risk that a company's pricing or benefit structure is misaligned with the market and attracts or keeps poorer risks, or repels better risks, than anticipated in the pricing.
- Authority—The risk that the premium rate charged to the group insured deviates from pricing policies (which may or may not include discounting policies implemented due to competitive pressures).
- Competition—The risk that an insurer will: 1) lower its rates in the face of competition to the point that the premium generated by the rates is inadequate to cover expected claims, expenses, taxes and profit; or 2) face a loss in new business with consequences for the sales division. This may have the unintended result of one line of business subsidizing another. The risk that the company's sub-optimal performance, or benefit design, is driving the pricing structure.

Health actuaries are likely to be very familiar with a number of examples in this category. The financial viability of a capital provider represents another example of pricing risk.

- Data—The risk that data used to price the insurance product is inadequate, incomplete or inappropriate. The risk of misunderstanding the context of the data.
- Financial viability of capitated providers—Risk that a capitated provider or provider group is unable or unwilling to meet their obligations; e.g., insolvency (from capitation levels paid by any source) or breaks negotiated contracts. Should also reflect situations where contracts come up for negotiation mid-year and those negotiations break down.
- Model risk—The risk that the model used to price the insurance product fails to reflect the dimensions of pricing risk inherent in the product reasonably and adequately.
- Mortality—For disability and LTC, the risk that actual mortality falls short of that assumed in pricing or significantly exceeds that assumed in pricing (resulting in higher premium rates than may have been necessary and in lost sales opportunities).
- Regulatory/legislative—The risk that the insurer will be prevented or delayed from; a) charging an adequate rate, b) using the rate structure that most closely follows sound actuarial principles, or c) revising rates when prudent and to the degree necessary.
- Reinsurance—The risk of adverse financial outcomes associated with the availability of reinsurance, the cost of reinsurance, the extent or form of reinsurance selected, and the reliability and timeliness of reimbursement for reinsured claims.
- Trend: Inflation—The risk that the price of insured goods and services significantly differs from the rate assumed in pricing.
- Trend: Intensity/Severity and the risk that the mix of service of an insurer's incurred claims significantly differs from the service mix assumed in pricing or reserving.
- Trend: Technology—The risk that pricing fails to anticipate the effect on claim costs of technologies that: 1) are developed and made available in the future, 2) will be covered by the insurer and 3) will be used by the insured.
- Trend: Utilization—The risk that the frequency of an insurer's services or claims significantly differs from the frequency assumed in pricing or reserving.
- Underwriting—The risk that an insurer's underwriting policy fails to prevent the acceptance of a risk into an underwriting classification when that risk: 1) would make the pool of risks in that underwriting classification heterogeneous and 2) would increase the average expected claim cost of risks in that underwriting classification.

Health actuaries are likely to be very familiar with a number of examples in this category. Relative to anti-selection, for example, you might be concerned whether your competitors are considering some factors in their underwriting that you are not. Are you offering a benefit that other plans aren't? Both situations might potentially represent an anti-selection risk to your organization. The financial viability of a capitated provider represents another example of pricing risk. Will one of your plan's capitated provider groups become insolvent? If so, will your health plan end up paying again for the same services that you paid that provider to supply?

Remember that the existence of risk does not necessarily represent a problem or something to avoid. Rather, we need to be aware of the risk, its magnitude, how it relates to other risks facing our organization and what processes our organization has in place to manage it.

Operational Risk

Operational risk is a risk category in which health actuaries have some experience in thinking outside the silo. Health actuaries will be familiar with the premise that having half of the claims processing department out sick for two weeks will impact the incurred, but not paid, claim estimates as of the end of the month. A similar situation occurs if a major provider has problems in its billing area. We're aware that changes in claim processing operations (for example, moving to electronic submission) can affect IBNR estimates or that the sales force can affect renewal rates. Medicare Part D is a current example of operational risk. In this case, carriers must modify existing processes quickly to meet deadlines in the law.

Another operational risk example for some health insurers is the capability to pay claims in a way not currently considered in provider contracting. That is, if the health plan has been capitating providers, and for whatever reason is no longer able to do that, does the health plan have the systems required to pay claims in a more "traditional" way? Or have providers whose area capitated for some services found a way to "translate" those services into fee-for-service charges? An example outside the health plan industry can be found in the experience of hospitals relative to benefit buy downs or high-deductible plans—will these providers be exposed to more bad debt now that patients are paying for a greater percentage of costs out-of-pocket? Hurricane Katrina unfortunately provided another example of operational risk relative to the destruction of medical and other types of key identification records.

The risks represented by the operational category include:

- Billing and collections—The risk that expected cash inflows fail to materialize or are received late as a result of lax billing collection practices. For example, cash flow problems with customers (A/R), external forces (postage strike).
- Claims processing—The risk that cash outflows will be processed incorrectly or unnecessarily quickly; includes disputes or lawsuits related to claims management, claims adjudication or case management. Could lead to billing problems with provider or network (e.g., double billing).

- Contract wording—The risk that contract wording is unclear or incomplete, leading to lawsuits for interpretation and/or claims payment in excess of that intended.
- Data technology and management—The risk that information technology (IT) systems fail, lack adequate security or privacy, or are inadequate.[1]
- Internal fraud—The risk of adverse financial consequences (directly or indirectly) owing to internal fraudulent conduct. Also includes the risk that internal controls to detect and combat fraud are inadequately developed or enforced.
- Human resources—The risk that the firm cannot or does not hire or contract with persons adequately skilled or experienced to perform the jobs necessary to carry out the insurer's operations. Includes delays in hiring.
- Network management—The risk that network providers give poor service, are inadequately monitored or cannot be contracted under terms acceptable to the insurer.
- Reinsurance—The risk that reinsurance cannot be obtained at the level desired, or that the reliability and timing of cash flows to and from the reinsurer are disadvantageous to the ceding company.
- Sales force—The risk that the sales force will be ineffective or use improper sales techniques or representations to achieve sales results. Includes selection bias in the broker/independent agent market as well as omitting required disclosures. Also involves the

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[1] Financial Condition Assessment, J. P. Ryan, et. al., *British Actuarial Journal*, Vol. 7, Part IV, No. 33, October 2001, p. 563.

concern over the suitability of the product to the client needs.
- Training—The risk that the firm's employees will be inadequately trained to perform their jobs or avoid making mistakes that result in adverse financial or legal consequences for the insurer.
- Vendor relations—The risk of not selecting the right vendor or TPA, i.e., vendor not meeting the company standards.

In a recent Towers Perrin survey ... respondents indicated that they were less than satisfied with their organizational resources relative to managing operational risk.

Because health actuaries have some experience in thinking about operational risk, this category seems to present some market opportunities for us. In a recent Towers Perrin survey on ERM practices, survey respondents indicated that they were less than satisfied with their organizational resources relative to managing operational risk.[2] We can also draw on the experience and knowledge of actuaries in our sister organization, the Casualty Actuarial Society, to strengthen our understanding and skill set in this area.

Reputational Risk

Reputational risk has two dimensions—one external and one internal. The external dimension includes:

- Disgruntled policyholders—The risk that company resources are expended due to a policyholder bringing attention to a corporate decision that goes against the policyholder's (un)justified expectations, and in doing so, creates negative publicity/bias against the company. The risk is difficult to gauge until the issue is raised.
- Rating agencies—The risk that certain industry and/or company actions result in a negative change in the company's rating.
- Stock analysts—The risk that industry analysts misinterpret corporate information or are impatient on the results of mid/long-term corporate strategies, resulting in excessive stock price volatility.

The internal dimension includes:

- Claims adjudication—The risk that claims are adjudicated in a manner that negatively affects the expectations of policyholders or providers.
- Corporate governance—The risk that the corporate leaders/Board are viewed negatively by the public.
- Distribution—The risk that misleading or overly forceful sales tactics destroy or change the future policyholder, regulatory or legislative relations.
- Fraud—The risk that internal control measures are insufficient in preventing ongoing or severe fraud and as a result, places the company in a situation where its credibility comes into question.

Reputational risk has several attributes that make it particularly dangerous. First, it can hit with little or no warning. Second, each episode is unique due to circumstances, corporate culture and response so there are few, if any, data points to use as references. Finally, recovery time can be inordinately long compared to other risks.

This category is, again, one that health actuaries will be very familiar with. Think managed care backlash, the negative publicity generated if health plan-provider negotiations break down, or closer to home, the Morris Report.

Strategic Risk

Finally, there is the category of strategic risk. Strategic risk encompasses the following dimensions:

- Capital management—The risk that the structure of a company's assets impedes the ability of the company to conduct its normal business. The inability to get capital to support the corporate strategy.
- Growth—The risk that growth, whether intentional or not, is mismanaged such that the resources required to sustain the growth are depleted.

[2] Tillinghast Towers Perrin, 2004 Benchmarking Survey Report. Retrieved from *http://www.towersperrin.com/tillinghast/publications/reports/2005_ERM_Survey/ERM_Survey.pdf, October 2005*.

- Incentives—The risk that incentives are misaligned with the corporate strategy.
- Management failure—The risk that incompetence or an unsuccessful management strategy places the corporation's future at risk.
- Mergers and acquisitions—Under the example of an expansion strategy, the risk that acceptable candidates are unavailable, or that insufficient due diligence was performed to uncover problems that could hinder a strategic fit.
- Network management—The risk that a company is unable to contract with providers to support the corporate strategy. This could be as a result of the insufficiency of providers available, or the inability to attract them due to the fee schedule or contract terms.
- Reinsurance—The risk that coverage is not available at an acceptable cost.

Growth represents an interesting risk. Generally it sounds like a positive situation, but if a company grows too quickly and doesn't have the resources to meet its demands, it can represent a risk. I've heard of companies that have managed both low and high growth with their sales force; that is, sales personnel had the authority to sell between X and Y products. They weren't able to "oversell" without communicating and getting the go-ahead from management. In that way, the company was able to understand the level of service or product its customers were demanding and could plan accordingly to be able to meet the demand and satisfy customer expectations.

Ideas for Getting Started

So what does all of this mean? How can your organization start to implement an ERM framework?

First, you'll need to define and commit to ERM as an organization. What will ERM mean for you? Is everyone defining it the same way? Has senior management bought into the concept and the definition? Their support will be critical for success. Have both the hard and soft costs of implementing the program been recognized?

The corporate culture is a factor that is critical in setting up an ERM program. A company needs to have open communication to discuss difficult issues for an ERM program to be successful. Also, turf battles can occur and these will be easier to solve in an open environment.

Next, your organization will need to determine its risk preferences, in terms of both culture and appetite. Is your company culture to be a first mover (more of a risk taker)? Or does it reflect a more conservative nature—to sit back and wait until the market "shakes out"? Then, within that culture, how much risk is the organization comfortable taking?

Next, you'll want to identify the universe of risks facing your organization (we hope that the risk mapping document we've described here can help with such an exercise). Remember, that risk identification is only the first step in an ERM framework—risk measurement and risk management follow. But this first step is key. We've all heard that you "can't manage what you can't measure." You also can't measure what you can't define.

Then you'll move into risk measurement by determining metrics. These metrics don't have to be quantitative or complex. Some risks (reputational risk, for example) may not lend themselves well to quantitative measurement—but it's important that you don't ignore the risk simply because you aren't sure how to precisely quantify it. You may start with something as basic as "low-med-high." Conduct some stress-testing in your measurements—model a few things happening together. Do several independent "low" likelihood or severity risks combine to form the perfect storm? In this step, trying to set "precise" metrics for the more qualitative risks can result in a false sense of security and can cause an organization to lose sight of the basic concepts of ERM.

Finally, use information from this step to develop risk management approaches that will help reduce uncertainty and allow for better business decisions. If you can reduce the impact of some uncertainty of an outcome and then communicate that to senior management, you can allow for the freeing up of organizational resources that can then be applied elsewhere to produce additional owner value.

I realize this description oversimplifies an approach to ERM. The purpose of these two articles is to raise your awareness and pique your interest in this relevant and evolving discipline. I encourage you to continue with your personal professional development in this area and invite you to share your experiences with the health actuarial community at large.

I would like to recognize and thank Rajeev Dutt, Trevor Pollitt, John Stark and Sudha Shenoy for their work in the development of the health risk mapping document described in this article. I also would like to thank John Stark, Trevor Pollitt and Geoff Sandler for providing peer review.

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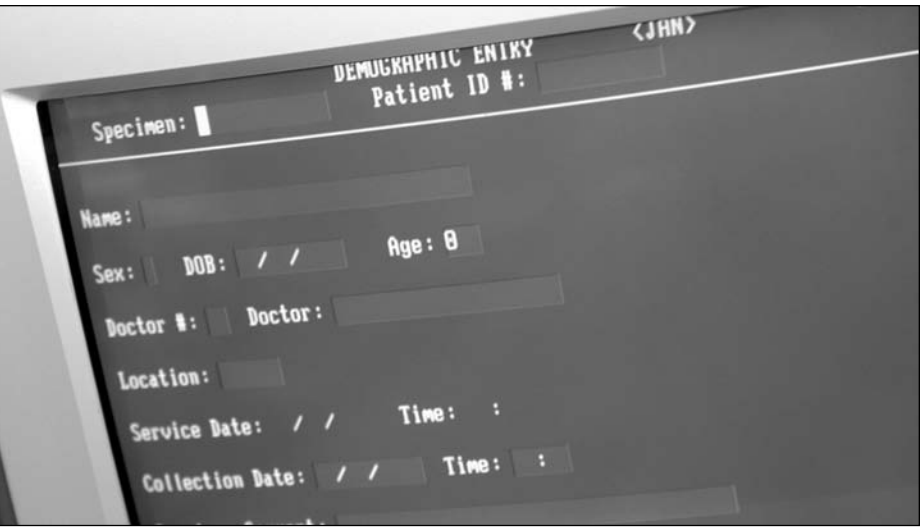
Useful Sources of Healthcare Data, Health Services Research and Health Policy Information for Actuaries

A Report from the Professional Community Team

by Ian G. Duncan and Henry Dove



In the course of consulting engagements, actuaries almost always find they need one or more of the following resources:

- Healthcare data, which may be at the individual member level or on a particular population—for general healthcare costs or services, or for a specific health condition.
- Health services research studies that describe, summarize or predict patients' use of health resources. Often, these studies are of different types of programs or interventions that are aimed at trying to alter utilization. Assessment of whether a program has affected utilization is one of the most difficult problems in healthcare.
- Health policy information, which describes public or private actions that affect the access, cost and quality of medical care.

The Health Section Council identified "Data—what's needed and how to get value from it" as one of the four major initiatives for the section in 2005. Initial responsibility for responding to this initiative was accepted by the Professional Community Team, one of several teams that report to the Health Section Council in the new SOA section structure.

The Professional Community Team is responsible for increasing interactions and exchanges with non-actuarial healthcare professionals such as clinicians, academic researchers, health associations and similar organizations. Henry Dove, Ph.D., a health researcher affiliated with Yale University and Solucia Inc. and a long-time friend of the Health Section, prepared this note, which has been reviewed by members of the Professional Community team and the Health Section Council.

This document describes the ever-changing health data resources and specifies where they may be obtained. Hopefully the structure we have created will facilitate updating and supplementing these data resources periodically. Interested actuaries may also want to consult Dr. Dove's presentation on health research, given jointly with Margie Rosenberg of University of Wisconsin-Madison at session 55TS of the 2005 Spring Meeting in New Orleans. Entitled, "An introduction to research methods for actuaries," it includes a discussion about accessing online journals and other resources using PubMed. Handouts for this session are available on the SOA Web site and an article summarizing this session can be found on page 37 of this newsletter. The session will be repeated at next year's Spring Meeting in Hollywood, Fla.

Some of the resources are free, most are available for a fee or on a subscription basis. We assume all actuaries have high-speed access to the Internet, which is how all three types of resources are obtained.

The Professional Community Team proposes to update the information in the resource center on a regular basis. If you have any suggestions for other useful data sets (or questions about where to obtain certain information), e-mail Ian Duncan, chair of the professional community team at *iduncan@soluciaconsulting.com*, Kara Clark of the SOA at *kclark@soa.org*, or any member of the health section council.

Other activities of the Professional Community Team have included the co-sponsorship along with the Health Section of a joint health actuary/healthcare professional seminar in conjunction with the Annual Meeting in New York. A number of academics were invited to attend the session, which covers the topic: "Healthcare Affordability."

The session focused on a paper completed recently under the direction of Professor Marjorie Rosenberg, FSA, Ph.D., of the University of Wisconsin-Madison and submitted to the *North American Actuarial Journal*.

The Professional Community Team has also embarked on an update to Harry Sutton's well-known textbook, *Actuarial Issues in the Fee-for-Service/Prepaid Medical Group*. Several members of the team have contributed to a new edition of those chapters that form part of the Part 8 syllabus. Additional chapters will be updated and new material added over the coming year.

Any actuaries interested in research, furthering relationships with non-actuaries or otherwise contributing to the external relations effort through the Professional Community Team are invited to contact Ian Duncan or Kara Clark.

Healthcare Data

Healthcare actuaries presumably have access to their client's data, which usually involves medical claims and eligibility files. But for comparative studies, enhancing forecasts, devising strategies to reduce medical expenses or evaluating attempts to change patient or provider behavior, additional data are required.

The table below lists the type of patient data, the organization that collects and/or disseminates the data and the relevant Web site.

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PATIENT-LEVEL DATA

data/patient type	source of data/name of data	description/notes	Web site
hospital inpatient; all payers.	hospitals report information on each discharge; states compile data on a quarterly or annual basis, which may be purchased from an organization in the state.	27 states collect data from hospitals on every hospital admission; variables include pt diagnoses, procedure(s), length of stay, age, sex, charges and DRG.	www.nahdo.org
large sample of hospitalized patients.	Agency for Health Research and Quality.	HCUP = Health Care Cost and Utilization Project, which is a federal-state-industry partnership. HCUP databases include the National Inpatient Sample--inpatient data from a national sample of ~1,000 hospitals; a nationwide sample of pediatric inpatient discharges; State Ambulatory Surgery Databases; and State Emergency Dept Detabases for ER visits that do not result in hospitalizations.	www.ahrq.gov
Medicaid-inpatient and outpatient claims.	Centers for Medicaid and Medicare Services.	Medicaid Analytic Extract = MAX contain patient-level data files on Medicaid eligibility, utilization and payments.	www.cms.hhs.gov
Medicare patients-inpatient admissions.	MedPAR = Medicare Provider Analysis and Review file.	data from hospitals on every Medicare beneficiary who use hospital inpatient services; variables include diagnoses, procedure(s), length of stay, disposition, age, sex, charges and DRG.	http://www.cms.hhs.gov/researchers/
Medicare patients--all sites of service.	Medicare 5 percent Standard Analytic File.	links all claims (for which all adjustments have been resolved) for a 5% sample of Medicare beneficiaries; patients are followed over multiple years.	http://www.cms.hhs.gov/researchers/
Medicare patients--single site of service.	Medicare 100 percent Standard Analytic File.	Each separate file contains information on beneficiary specific use of durable medical equipment, home health, hospice, inpatient, outpatient, physician and skilled nursing facility.	http://www.cms.hhs.gov/researchers/
medical claims for all federal employees.	Federal Employees Health Benefits Program.	medical claims submitted by ~8M federal employees and dependents.	†
patients enrolled in health plans (HMO, PPO or POS).	claims data, submitted by hospitals, physicians, PBM, labs, other ancillary providers.	Insured patients' claims are adjudicated by claims processors; eligibility files often need "cleaning."	MedStat, Ingenix, Solucient
SUMMARY STATISTICAL DATA/ OTHER USEFUL INFORMATION		†	†
productivity of physicians in group practices.	Medical Group Management Association.	date on number of visits in group practices, by specialty.	www.mgma.org
costs of medical group practices.	Medical Group Management Association.	annual costs of group practices.	www.mgma.org
Health care providers--hospitals, SNFs and home health agencies.	Centers for Medicare and Medicaid Services.	Medicare Cost Reports, submitted by providers to CMS, usually on an annual basis. Auditing the cost reports usually causes 1- _to 2-year time lag.	http://www.cms.hhs.gov/researchers/
hospital statistics.	American Hospital Association.	lists the name, address, phone number, teaching programs, financial status, services offered, number of admissions and outpatient visits.	www.AHAData.com
prescriptions written by physicians in a two-week period.	IMS Health.	data is summarized for different categories of pharmaceutical agents and disease/medical condition.	www.imshealth.com
Medical Device Decisions.	Centers for Medicare and Medicaid Services.	lists whether Medicare will cover (pay for) a certain medical device or procedure.	www.cms.hhs.gov/coverage/
International Classification of Diseases (ICD-9-CM).	public-use software distributed by Centers for Medicare and Medicaid Services (and others).	codes for all diseases--used by all hospitals for inpatient and outpatient care.	http://www.cms.hhs.gov/researchers/
Current Procedure Terminology (CPT4)	American Medical Association.	codes for all procedures performed by physicians.	www.ama.org

Health Services Research Studies and Statistics

This list includes only those journals containing the most important research studies on cost, utilization and quality. This list is by design not comprehensive.

American Journal of Public Health
Health Services Research Inquiry
Journal of Ambulatory Care Management
Medical Care

The following medical journals often publish the most important research studies, but most of their articles are for physicians or medical researchers:

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American Heart Journal
American Journal of Cardiology
American Journal of Medicine
Annals of Internal Medicine
Archives of Family Medicine
Archives of Internal Medicine
British Medical Journal
Journal of the American Medical Association (JAMA)
Journal of Canadian Medical Association
Journal of Clinical Epidemiology
Journal of General Internal Medicine
Lancet
New England Journal of Medicine (NEJM)

The following journals often provide useful statistical data, though not on a scheduled basis:

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Health Care Financial Management
Health Care Financing Review
Health Journal of Health Care Finance
Health and Hospital Networks
Health Care Management Review
Health Care Management Science
Journal of Medical Systems
Modern Healthcare
Business & Health
American Journal of Managed Care
Managed Care Quarterly

If an actuary wishes to perform a literature search, PubMed[1] is recommended as it provides access to the abstract and the citation of all health services research projects. Another useful resource is Google Scholar.[2]

Health Policy Information

Healthcare consulting done by actuaries is most frequently performed for private insurers. However, the healthcare system of the United States is greatly influenced by health policy created by the U.S. Congress and state legislatures and implemented in various federal and federal agencies.

The following journals provide detailed accounts of policy formulation and execution:

Health Affairs
Journal of Health, Politics, and Law
Milbank Memorial Fund
Health Care Financing Review

A more thorough review of a specific policy is best found using PubMed or a news tracking service such as Lexis-Nexis.[3]

The following Web site provides information regarding Medicare coverage decisions involving medical devices and new procedures that are recorded in the Medicare Coverage Database: *http://www.cms.hhs.gov/mcd/search.asp*

The Blue Cross/Blue Shield Technical Evaluation Center is another organization that performs independent assessments of new technologies. Information on their coverage decisions is available at: *www.bcbs.com/tec*

Other managed care organizations such as Aetna, United Healthcare, Cigna, Kaiser Permanente and Anthem Blue Cross have their own staff of physicians and health economists who make coverage decisions. Their decision-making processes are often confidential.

[1] www.pubmed.org
[2] www.scholar.google.com
[3] www.lexisnexis.com

When...Not If
The Impact of a Catastrophe on Private Health Insurers

by Daniel L. Wolak

Editor's Note: This article is reprinted with the permission of Risk Management Matters*, December 2005.*

Two events have occurred in the United States in the early part of the 21st century that resulted in unprecedented catastrophic insurance losses. The terrorist attack of September 11th raised our awareness and concern about concentrations of risks. The losses on the Gulf coast, specifically in New Orleans, due to Hurricane Katrina raised our awareness and concern about future natural catastrophes. In both cases, the losses to the property and casualty insurance industry were staggering. Comparatively, by all accounts, the losses to the private health insurance industry were small.

The question to explore is: are there other events that when, not if, they occur will challenge the solvency of the health insurance industry? This article discusses several observations from Hurricane Katrina and provides insights as to the impact on the private health insurance market, which includes commercial insurance carriers, Blue Cross, HMOs and also self-funded employers, given other types of catastrophic scenarios.

Hurricane Katrina

Hurricane Katrina impacted a three-state area of the Gulf coast. The effects on health insurers and providers in that area offer insights into what could happen in the future when catastrophes impact metropolitan areas. The following are some notable lessons.

Healthcare Services Disrupted: Damage from Hurricane Katrina resulted in a complete disruption to healthcare services. A *Wall Street Journal* article of Sept. 9, 2005 stated "Hurricane Katrina left health care in the Gulf region in a state of complete disarray, with thousands of patients unable to connect with their doctors or medical records. Cancer and dialysis patients had critical therapies interrupted and are looking for places to resume treatment, and Walgreen Co. has become a de facto emergency health provider, filling many prescriptions for free. New Orleans' 10 hospitals were evacuated."

Initial Claim Volume Down: Blue Cross & Blue Shield of Mississippi said its overall claims volume was down during the first week after the hurricane. "People were in a recovery mode at that time; hospitals were damaged, providers' offices were completely gone, and people were spending the first few days recovering and coming to grips with what had happened," a spokesman for the company was quoted as saying.

Healthcare Plans Aid Displaced Insureds: Healthcare companies responded by providing deferred payment options to customers and individuals, by treating all area hospitals and providers as participating network providers under existing emergency benefit provisions, and by assisting in replacing lost or destroyed prescriptions.

Insurance Department Responds: All rate increases were deferred for 90 days (until Jan. 1, 2006). Insurers could not non-renew any business as long as the state of emergency existed. Health insurance programs were required to pay out-of-network claims at in-network benefit levels during the state of emergency. State insurance departments as well as the federal government developed bulletins to make sure that insureds were treated fairly during the state of emergency period.

Presence of Relief: The large presence of relief agencies such as American Red Cross and government agencies such as FEMA reduced costs that

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would otherwise be borne by private insurance plans. At this point, it is too early to quantify the full impact of these activities.

Healthcare Workers Courted: Displaced healthcare workers from New Orleans and the Gulf Coast were being lured with signing bonuses, relocation assistance and other perks by hospitals, doctor offices and clinics nationwide. (*USA Today*, Sept. 16, 2005) This phenomenon will lead to a longer-term shortage of providers in the impacted area.

A dirty bomb would likely cause a relatively small number of deaths ... a dirty bomb would display some similarities to what was experienced in New Orleans after Hurricane Katrina.

New Questions: Several questions have arisen for health carriers. With businesses interrupted in the area, would small and medium-size employers be able to continue to pay premiums? Would a significant number of workers decide to move to another part of the country? Would the number of insureds in the Gulf Coast area decline by a double-digit figure, possibly leading to anti-selection arising from the decline in enrollment?

Conclusion on Costs: As of mid-October, health insurance plans have not identified measurable claim losses due to Hurricane Katrina. A short-term reduction in service providers and in those receiving healthcare covered under insurance plans reduced claims during the initial portion of the emergency period.

Nuclear – Dirty Bomb in a Metropolitan City

A dirty bomb would likely cause a relatively small number of deaths, but could result in a large number of people suffering from radiation poisoning. A potentially large surrounding area of property would be contaminated with radioactive material and the cleanup would be time consuming and very expensive.

A dirty bomb would display some similarities to what was experienced in New Orleans after Hurricane Katrina. Similarities would be:

- An evacuation of a city/area.
- Unusable health facilities.
- Displaced policyholders.
- An expensive rebuilding process.

The following would likely be different in the scenario for a dirty bomb:

- No forewarning of the event would occur. No pre-event evacuation would occur.
- The primary health concern would be long-term health problems after a dirty bomb, rather than the short-term health issues that arose due to flooding from Hurricane Katrina.
- Given an event during work hours, a significant number of health claims would be covered by workers compensation.
- A much slower repopulation of the impacted area would occur.

Conclusion on Costs for Private Insurance Plans: Private health claims would arise from those injured that were not at work. Workers compensation would cover claims arising from those at work at the time of the attack. The impact on short-term health insurance costs (first 30 days) would likely not be significant. Burn claims for those in the immediate area of the attack could be costly, but claims from those less seriously injured and those with other health conditions would likely be offset by free health care offered by emergency agencies and the displacement of normal health services in the impacted area. Longer-term health concerns, and questions of insurability, would arise for those exposed to radiation. A government program could be expected to arise to finance future healthcare for those suffering from radiation.

Nuclear – A One-Kiloton Bomb in a Metropolitan City

When researching this type of catastrophe last year, I spoke with an expert in this area. Following are some comments that were shared:

- At the one-kiloton bomb level, there is limited ability for the healthcare system to provide care to all patients. (System would likely be overwhelmed.)
- Triage identification will be challenged due to the need to test the radiation level of each patient. Efforts will be stymied by the large number of patients, the shortage of medical testing materials and the time required (48 hours) to receive test results.
- "No city can handle 1,000 acute trauma patients at the same time." Response teams are likely to run out of IV packets.

- "Every hospital is already full." Hospital administrators are charged with maintaining nearly full capacity at all times.
- Healthcare workers are generally scared when radiation is involved and could be slow to assist radiated victims.
- There will be lots of "walking wounded" and it will be very difficult to provide care due to transportation issues. In the first 24 hours there will be a major evacuation process in an impacted city, which will limit the ability of responders to bring in resources.
- It would take 24 to 72 hours for rescue workers and supplies to arrive (much like what occurred in New Orleans.)

The major differences I see compared to a dirty bomb would be:

- A one-kiloton event would result in a greater number of, and more serious injuries.
- A large number of deaths would occur. Most people within a half-mile radius of the event would perish. In addition, most buildings in that radius would be significantly damaged or totally destroyed.

Conclusion on Costs for Private Health Insurance Plans: Naturally, we hope that we never have to find out what will happen. That said, the short-term private health insurance claims from the catastrophic event would have some upper limit related to available private healthcare resources in the impacted area. As for a dirty bomb, longer-term health concerns and insurability issues would arise for those exposed to the radiation. A government program could be expected to finance future healthcare for those suffering from the radiation.

Pandemic

In the September/October 2005 issue of *Contingencies*, Howell Pugh presented an article on the risk of pandemic. A *Forbes* Jan. 31, 2005 article on pandemics was titled, "The Next Big Killer." The *USA Today* cover story on Oct. 11, 2005 focused on a report being read by world leaders, including George Bush, which discussed a virus epidemic that could result in 50 million worldwide deaths, including 1.9 million in the United States. The potential for a pandemic has become an increasingly popular topic, and concern, for those involved with public health and safety.

In his article, Howell Pugh provided a chart developed by the CDC that modeled a pandemic influenza. This study generated two different impact scenarios. The chart listed the impact based on two levels of modeled pandemics:

	Low Impact	**High Impact**
Total infected	43 million	100 million
Outpatient	18 million	42 million
Hospitalized	314,000	733,000
Deaths	89,000	207,000

The above indicates that 33 percent to 100 percent of all hospital beds would be needed for the epidemic over a six- to 10-week period. Since the claims would not be work-related, private health insurance would bear the cost rather than being supplemented by workers compensation coverage. A pandemic could disproportionately impact those under the age of 65. If so, medical resources would be shifted from caring for the aged to tending to the pre-65 population, with the subsequent claims being financed more by private insurers and less by public plans.

In 1918, an estimated 700,000 people died in the United States from the flu pandemic. At that time, the U.S. population was 100 million. Today, we are approaching 300 million. In such a case, 700,000 deaths in 2006+ would represent a pandemic only 33 percent as severe as in 1918.

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A 2004 report prepared by Risk Management Solutions (RMS) modeled the losses that would be incurred for a pandemic that resulted in 200,000 deaths and $30.6 billion of health insurance losses. Extrapolating that projection to 700,000 U.S. deaths, losses to the life and health insurance industry are estimated at:

Life Insurance:	$32 Billion
Health Insurance:	Range of $30 Billion to $106 Billion

The private health insurance loss would be impacted by:

- The length of time that a flu virus impacted health. If the infectious period was relatively short, the limits to healthcare resources would hold down costs,
- The number of seriously ill patients requiring extended hospital care,
- The impact of the virus on working population versus the elderly and the uninsured, and
- The impact of the virus on reducing the number of available healthcare workers.

Some of the characteristics of a pandemic would be:

- An evacuation would not occur. It's likely that just the opposite would happen. Many people would remain at home, some quarantined. The quarantine could last for an extended period of time, disrupting normal business.
- Damage to property would be nonexistent, unlike other types of catastrophes.
- Most or all of the country would be impacted.
- Red Cross or other volunteers would be providing less of the care as compared to other catastrophes. Only those healthcare workers who receive a dose from a relatively limited supply of vaccinations could assist others.

Conclusion on Costs for Private Insurance Plans: A pandemic would strain or drain, depending on size and the resources of health insurers. Regional health programs and HMOs that have a greater market share in an area particularly hard hit by a pandemic could incur solvency problems. The federal government would be less likely to step in to provide the services normally paid for by private insurers since the event would not be a one-time, one-location, dramatic event.

Conclusion

Health insurance carriers have been insulated from incurring significant losses from recent catastrophes due to limited non-occupational health risk exposure to the under-age-65 population covered by private plans. When compared to other types of insurance, health insurance is a "just in time" benefit, where supply is matched to expected demand. A spike in demand in one area as a result of a catastrophe may go unmet by additional capacity or may be met by special government agencies. This seems to be true in the case of man-made or natural disasters.

Health insurance carriers would, however, appear to have significant claim risk from a large-scale pandemic. In such a case, the spike in demand could occur across the United States rather than being localized in one city or state. To prepare for such an event, Pugh suggested in his article that the American Academy of Actuaries and the Society of Actuaries could work to develop a way to stress-test a company's strength. My suggestion is that, at a company level, such risk should be considered, and quantified, as decisions are made relative to market share and concentration.

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An Overview of Aging Curves for Retiree Health Care

by Jeffrey P. Petertil

The July 2005 issue of the *North American Actuarial Journal* published my paper entitled "Aging Curves for Health Care Costs in Retirement." The paper was based on peer-reviewed research sponsored by the Health Section. Many actuaries involved with retiree health actuarial models will look to the article for numerical factors to reflect morbidity increases as retirees grow older. Such factors combine to form an aging curve and have become an essential part of long-term retiree health cost and utilization projections. Although health actuaries at larger benefits consulting firms have access to some substantial databases and may have analyzed those to develop their own aging factors, many other actuaries have been relying on anecdotal sources. Aging curves have gained a new significance with the Governmental Accounting Standards Board's accounting rules and with the actuarial equivalence provisions of the Medicare prescription drug law.

As the author of the paper, I want to offer a few precautionary principles, as well as relieve some of you the burden of reading through the entire paper. While the goal of the paper is reflected in its title, the length of the paper reflects my conclusion that a number of complicated issues need discussion. Most of those issues had not been subject to published discussion recently, if ever. The paper was an opportunity to explore and document sources. It had become clear to me, in the research leading up to the paper, that the aging curve is quite dynamic. Actuaries will need to continue researching these issues. An immediate answer to the question became less important than structuring the framework of the question.

Although I suggested an "answer" in the paper, I also emphasized the variety of circumstances under which a different aging curve answer might be more appropriate. On page 40 of the *NAAJ* July issue is an aging curve, with a single age-to-age factor set out for each of the five-year age bands from age 50 to age 90. Flatter than a single geometric curve, this "representative" curve is made up of small geometric curves for each five-year band. The highest band is 4.2 percent from age to age; the lowest is 0.5 percent age to age at the oldest age band. This curve was derived from and representative of a 2002 survey of actuaries who work in the area of retiree health benefits. The basis of the curve is explained, but it is noted that, "a close fit to the survey answers does not make the curve a good fit for any one particular situation. Indeed, it may not be a good fit to any situation." Notwithstanding that last cautionary comment, I do believe the representative curve is an appropriate fit for many of the retiree health valuations of the next several years and maybe many years beyond. The actuary who uses that or any curve, however, is encouraged to read carefully the caveats in the paper and consider the circumstances in their use of any curve.

Some historical and personal background may help flesh out my concerns. When, 20-plus years ago, I was first asked to value a retiree health benefit plan, I was given no guidelines. The consulting firm where I worked had many pension specialists among its actuaries, all of whom were quite busy in the years after the passage of ERISA, whereas I was a health insurance actuary who seemed to have time on his hands. An actuary who understood the pension valuation system (I did not) would project the participant census over the lifetime of all those eligible. I was to determine an annual per capita cost that would be the starting point for an increasing annuity inflated over the retirees' lives, as well as review valuation results and write a report.

I knew enough, however, to know that the "inflation" would understate the increase in costs if it did not take into account the likelihood that these retirees, as they got older, would use more health care goods and services. Simply increasing the

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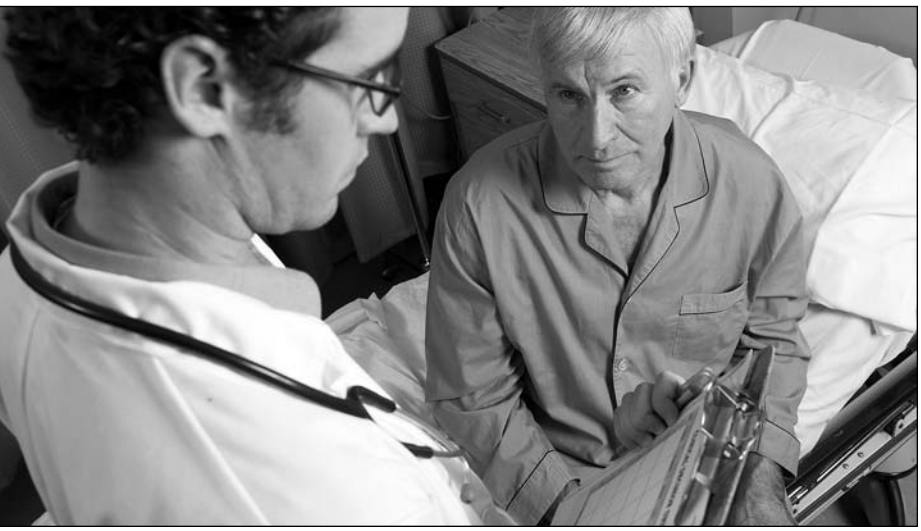
medical inflation factor by some amount for aging was suggested. That would not accurately model what was likely to happen, however, because the older participants were also more likely to die in any given year than the younger retirees. The valuation actuary understood my point and programmed features for the valuation system that included an "aging factor" to model the increase in morbidity with age. The only factors published, however, were for ages of active workers. The factor we used, 4 percent for each additional year of age, was used over the entire life span of the retirees.

Retiree health care valuations became my bread and butter over the next few years and I talked with many more actuaries who were wrestling with the same problems. There was much anecdotal talk about what the correct "aging factors" were. Occasional internal studies were undertaken, leading to adjustments of the original factors, but nobody ever published anything. When the Health Section announced a few years back that it would like to invest in research and asked for proposals, I suggested aging factors as a suitable topic. The Health Section agreed to some funding for my research. Results were first discussed at an SOA meeting in 2002 and published to the Web site in late 2003. The full paper was published in July 2005 in the *NAAJ*.

What is in the paper besides the representative aging curve referred to above? It validates the use of age factors and concludes that differences in age factor by medical service can be significant. Nursing home care seems most affected by age differences, dental and vision least. The answer to one of the questions that prompted me to take up the study was, "Yes"—aging factors for most retiree health services seem to decrease with advancing age. For many categories of health care service, age factors begin to decline after age 70 and become insignificant by age 90. Beyond noting such findings, much of the paper reviews sources and offers shortcuts and considerations for those deciding which aging curves to use in their valuation work.



The paper moves from an introductory piece on aging factors and their use in retiree health valuations to a review of Medicare data, followed by a relatively lengthy look at the significance of the factors from a theoretical standpoint. This last section was included not only for the few people who still doubt the significance of aging on measurement of retiree health benefits, but also to outline ways that the significance might be quantified. This is important because the actuary needs to know what is significant in choosing between two or more possible sets of aging factors. One point not made in the paper is that all aging curves are theoretic, in the same way that all mortality curves formed from smoothed data found in raw mortality tables are theoretic. The actuary has a choice to make, a choice informed by professional judgment.

It turns out that there are many ways to measure significance. I wanted to acknowledge the different ways of measurement while advocating the most meaningful measure of significance. For a single life, I concluded that the best comparative measure was a multi-year accumulation taking into account a mortality assumption, but not assumptions for trend or discounting. Illustrations in the paper used the female UP 94 mortality table throughout and three different age ranges, starting at ages 50, 65 and 80, with each range continuing to the end of life. Using that measure and that mortality table, the impact of using the representative aging curve was significant when the range began at the younger of the ages. At age 50, the increase was 82 percent above the accumulation that did not recognize aging and at age 65 it was 29 percent. Only when the impact over the range starting at age 80, the oldest age, was measured did the comparative use of the representative aging curve become relatively insignificant: a 4 percent increase. Using a different mortality table would have given different results, although it would be unlikely to change the basic significance.

I identified as variables certain characteristics in a population that will magnify or mitigate the importance of correct aging factors. The paper addresses at some length those variables—for the current retiree population, the average age and age

distribution; for the plan, the potential range of eligible ages. Regarding the age distribution within a set of retirees, there is discussion of how two different sets of retirees with the same average age and average cost would, under the same aging curve, have a different set of initial claim rates simply because they had different age distributions. Although counterintuitive for most of us, this is theoretically true. There is an exception for the rare aging curve that would be strictly linear. But actuaries using the more usual geometric curves that are better matches for claims experience (of Medicare, etc.), are cautioned against the use of only average cost and average age when applying the aging curve.

The paper also discusses the "warping" error related to the shortcut of placing a geometric aging curve such that it runs through a single age/cost point that is derived from averaging costs or rates over a range of ages. Most health actuaries know an error will result, but the paper's discussion may bring it to the attention of others and indicate when the error might or might not be significant.

For actuaries who are unsure of their aging factors, the research provides some guidance as to particular numbers and areas for further attention. For instance, sections 3 and 6 of the paper cover comparison techniques that can be helpful for an actuary trying to decide whether to change curves. The difference between using one curve and another can be estimated without running a valuation several times. Actuaries with a solid basis for their current aging factors will find the paper to be a reminder that there are other opinions, there are important variances by medical services and there are dynamics driving changes in the relative values between ages. It might also encourage them to share their own findings through publication. For instance, there are now many actuaries interested in the aging curve for primary and secondary prescription drug coverage. Is this an appropriate area for practice section research?

In the larger world there are also implications. In the United States and other developed countries, the population is gradually, but inevitably, becoming older. A health cost aging curve such as those discussed in the paper implies that, due to the older average population, spending for medical goods and services will increase as a portion of national expenditure, crowding out other needs. This seems to have been the case in at least the last 30 years. While productivity gains in the economy have taken care of some needs, there is a significant portion of the population for whom medical care has become a substantial economic problem. Much of this is due to demand and supply variables that may be separate from the aging effect. Nonetheless, it is worth considering that if the aging curve is not static, but sufficiently dynamic, then there is a greater chance that the efforts at healthcare cost control that many of us have been involved with will be successful.

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SOA Health Section Webcast

The SOA Health Section is sponsoring a webcast based on Jeff Petertil's research on retiree healthcare. The webcast is scheduled February 15, 2006. For complete details, go to *http://www.soa.org/ccm/content/?categoryID =335004*.

Sixth Annual Intercompany LTCI Conference

Please mark your calendars for the Sixth Annual Intercompany LTCI Conference, co-sponsored by the LTCI Section for the Society of Actuaries. For more information, visit *http://www.secure.lenos.com/lenos/soa/ LTCI2006/*.

Assessing Predictive Modeling Tools for Pricing and Underwriting

by Ruth Ann Woodley and Marilyn Schlein Kramer

In today's world of soaring medical costs, margins for HMOs and insurers are being squeezed more tightly than ever. The present point in the underwriting cycle requires underwriters to focus on increasing membership *and* margins. Passing along "standard" price increases to "low risk" accounts will not be sustainable in the coming years. Thus, actuaries and underwriters are looking for tools that can improve pricing accuracy and lead to higher earnings. Predictive modeling, a tool many companies are familiar with from its uses in disease management, intuitively seems promising.

Risk selection represents another area where the application of predictive models seems promising. Carriers have always struggled to understand how the morbidity of their enrollment from a "slice" case compares to that of the other plan offerings, and how membership within a given market compares to the population in total. The introduction of consumer-driven plans and the possibility that these plans attract only the healthiest employees makes this an even more pressing issue today.

Traditional underwriting uses a risk model based on age, sex and prior cost, with some additional features on occasion, such as geographic region and industry. Predictive modeling comes from health services research and adds the additional predictive factor of diagnoses. Predictive models use information included in medical and pharmacy claims (diagnoses, procedures, drug type/dosage, etc.) to estimate future costs at the individual member level. While the terminology and approach of predictive modeling may be different from pricing models underwriters have traditionally used, underwriters should not dismiss adapting predictive models for use in pricing.

Generally speaking, groups under 250 lives are too small to have a fully credible experience base under traditional models. Past claim costs can be an unreliable starting point for pricing these groups because of the phenomenon of "regression to the mean."[1] Research has shown that as many as 75 percent of members with very high or low costs in one year will move back toward average costs in the subsequent year. This is part of the rationale for the common sales pushback that the health event driving the prior year's claims is over and will not recur. Without knowing the reason for the cost, it is difficult for underwriting to refute this pushback. As a result, underwriters turn to medical underwriting, which can be costly and inconsistent. Predictive models can be used instead to separate those members whose high costs are driven by chronic conditions, and therefore likely to continue, from those driven by random or one-time events.

Predictive models offer underwriters a low-cost means of setting cost estimates based on illness burden and prior treatments. They can predict instances of "regression to the mean" and conversely situations when a member might become higher cost in the future. Increasingly, employers and benefits consultants are using them to evaluate health plan performance and set pricing levels. Finally, the results of predictive models are more intuitive than some other common rating factors like SIC codes.

But much of the large body of existing literature on the validity of predictive models can be frustrating to actuaries and underwriters. Until recently there was no research making a case for the underwriting value of predictive models. This

[1] For a discussion of regression to the mean and its implications for health actuaries, see: Henry Dove and Ian Duncan: "Actuarial Issues in Care Management Interventions." Paper 2 of a series *An Introduction to Care Management Interventions and Their Implications for Actuaries,* sponsored by the SOA Health Section and available at: *http://www.soa.org/ccm/content/areas-of-practice/health/research/part-1-introduction/*

has begun to change, with articles from the Society of Actuaries' *Health Section News* in August 2003[2] and August 2005.[3] While these articles are a huge step toward building the case that predictive models can improve underwriting accuracy, a comparative analysis is still needed of the tools available that considers both technical and practical features.

Most predictive modeling research has assessed how well the tools do in targeting patients for disease management or risk adjusting payments among large employers and health plans. It has not asked or answered the right questions for underwriting applications, so companies may need to do additional analysis and thinking in order to choose the best model to use in their underwriting.

Technical Analysis

Most research on predictive models, and the 2002 SOA Study,[4] performs analysis at the wrong level for underwriting applications. Generally speaking, the research has evaluated whether the models identify those few individuals who will have the highest future cost, and whose costs can be most effectively reduced, so that their care can be better managed and those risks avoided.

In contrast, pricing tools are more concerned with costs at the employer group (or block of business) level, than at the member level. Commonly used evaluation metrics like R-squared, which measures what percentage of the variation in results is explained by a given model, usually have very low values at the individual level. So readers conclude that these tools only explain 10 percent to 20 percent of the variation in results. That sounds like a poor result to actuaries and underwriters who are used to thinking about entire accounts or blocks of business—but traditional age/sex factors or a prior year's claims experience don't explain much of the variation in a single individual's results either!

What is needed is additional analysis that compares predictive ability across tools for groups of 20, 50, 100 and more lives to see how results vary at various case sizes. Statisticians use the Grouped R-squared to measure the ability of the models to explain variation in expenses at the group level (account, employer, provider, etc.). It should be no surprise to actuaries and underwriters that predictive models do better at the group level as opposed to the individual member level. For example, in one typical study of the power of predictive models to identify individuals for disease management, individual R-squared results for age/sex, experience and diagnosis models were 2 percent, 6 percent and 9 percent respectively, compared to Grouped R-squared results (using 2-percentile cost groups) of 17 percent, 50 percent and 82 percent respectively.[5] Additional research is still needed on how these results would compare for real employer groups rather than groups of people designed to have similar costs.

Most predictive modeling research has assessed how well the tools do in targeting patients for disease management or risk adjusting payments among large employers and health plans.

Many studies truncate very high dollar claims above a threshold of $25,000 or $50,000. One reason this is done is to prevent a small percentage error in the predicted claim value from having a disproportionate impact on the R-squared calculation. For example, if the model predicts $750,000 of claims for a member whose actual costs turn out to be $850,000, that model still has done a good job of identifying that member as high risk. However, that $100,000 of error may be very significant in pricing, especially for a relatively small group, if the costs are recurring. Truncating also removes the impact of large random claim events from future projections, but predictive models may be better able to distinguish these from large claims that are

(continued on page 32)

[2] Ellis, Randall J.; Kramer, Marilyn Schlein; Romano, Joseph F.; Yi, Rong. 2003. Applying Diagnosis-Based Predictive Models to Group Underwriting. Health Section News: August, 1, 4-7.

[3] Winkelman, Ross. 2005. Optimal Small Group Renewal Methods. Health Section News: August, 12-15.

[4] Cumming, Robert B.; Knutson, David; Cameron, Brian A.; Derrick, Brian. 2002. A Comparative Analysis of Claims-based Methods of Health Risk Assessment for Commercial Populations. Conducted by Milliman USA and Park Nicollet Institute Health Research Center. Sponsored by the Society of Actuaries.

[5] Ash, Arlene S., and Byrne-Logan, Susan. 1998. How Well do Models Work? Predicting Health Care Costs. Proceedings of the Section in Statistics and Epidemiology, American Statistical Association: 42-49.

to some extent ongoing. Finally, the highest-cost claims are the most important for pricing some products, like employer stop loss.

It is also common in the published research to focus on groups of members with similar claim costs (for example, the highest 10 percent) when choosing the best tool to predict who the future highest-cost members will likely be. This approach does address the problem of focusing on member-level rather than group-level results, but does not use the kind of heterogeneous groups that exist when pricing real customers.

Finally, an analysis of whether predictive models can improve pricing accuracy needs to be put into the correct business context. The predictive power of these models must be compared to current business tools like age/sex factors, SIC loads and pricing from prior experience. These different techniques should also be tested in combinations, not just independently. This kind of work will help users define the optimal underwriting process for different business segments. And researchers should continue to move to understand statistics like R-squared and attempt to analyze the impact of changes to quoted rates on business results like profit margins and close ratios.

Practical Analysis for Underwriters

Research on the power of predictive models in identifying members most likely to benefit from case management also deviates from pricing and underwriting needs for reasons driven by its practical applications. Case management is focused primarily on the small percentage of members who will have the highest costs rather than the overall population. While this may be helpful in underwriting, it does not address the equally important issue of identifying members and groups who will have the lowest future costs to ensure these are not over-priced and thus lost.

Some tools may focus on correctly predicting costs for patients having those conditions where disease management interventions are available and most effective, and as a result could sacrifice predictive power across all members. The output format of a tool is an important quality as well. The model may only produce a binary indicator of whether a patient is a good case management candidate, but underwriters need some sort of relative risk score in order to derive an expected future cost or cost distribution.

Many academic studies indicate that models should be built not to reflect cost differences among different treatment choices, since these could influence physician behavior when their compensation is tied to the results of a risk model. However, these variations in treatment patterns may lead to real cost differences that should be captured by the tools when they are used for underwriting.

Some practical questions are the same whether you are considering a tool for case management or for underwriting. Is the data required available easily and on a timely basis? Does the model's design make sense from your underwriting experience? Can you see "inside" the model or is it a "black box?" Can the model be used across varying lines of business?

But some important questions for the actuary or underwriter are not usually asked for case management uses. How will use of the tool impact the underwriting work flow? Will it reduce variation in performance among underwriters? Can it reduce administrative costs, and if so, by how much? Can I explain to brokers and customers how the predictive model impacted their rates? How do I apply regulatory restrictions to the output, and is the prediction still valuable once those are taken into account? And, how do I reflect varying benefit designs and provider contracts?

All of these technical and practical issues have to be factored into any decision of whether, and which, predictive model to use for underwriting. As a result, you may need to do additional analysis beyond that available in the literature today. Choosing a predictive model for pricing and underwriting is a very different decision than choosing one for case management, and some of these perspectives may lead you to different conclusions.

Checklist for Reviewing Predictive Models for Underwriting

Technical

- Are R-squared results presented at different employer group sizes?
- Are R-squared results compared to other underwriting methods?
- Are large claims truncated in the analysis? If so, at what level and with what impact on the model's predictive power? And how are the excess claims allocated back to the overall pricing?
- Are the groups being presented in the analysis similar to real customers?
- Can you evaluate the impact on business metrics (close ratio, profit margin, etc.)?
- How, if at all, does the model use credibility?
- How, if at all, does the model incorporate traditional rating factors without "double-counting" these?
- How does the model handle new members or members with no prior claim history?
- How does the model account for incomplete incurred claims?
- How does the model take into account the lag between the experience claim period used and the underwriting year for which costs are projected?

Practical

- Does the model predict well for low- and high-cost members *and* low- and high-cost/risk groups?
- Does the product generate a credible risk score that can be inexpensively applied?
- Does the model reflect real cost differences from area contracting and treatment patterns?
- Does the model integrate into your underwriting process? For example, is the data required by the model available in time for your renewal processes and is the output in a usable format?
- Will the model reduce administrative costs? By how much?
- Can you explain the model's design and rate impact, especially rate increases, to others—sales, marketing, employee benefits managers, consultants, brokers?
- How will you adjust results for regulatory limits?
- Can you use the model across products and benefit designs?

Software Design/Implementation

- Can you buy the models and link them into your current systems, or do you need to purchase an entire reporting system?
- Is the software compatible with your IT environment? For example, if you use Excel, does the software produce results that can be easily exported to Excel?
- What is the model's implementation time, including needed customization?

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Value of Wellness

by John Have

Louis Bernatchez, FSA, FCIA, brought together two excellent speakers to explore the value of wellness at a Health session during the June 2005 Annual Meeting of the Canadian Institute of Actuaries in St. John's, Newfoundland, Canada.

Our first speaker was ***Tom Brogan***, an economist and president of Brogan, Inc., who is an innovator in health economics and pharmaceutical market research. Tom pioneered drug analysis in Canada by bringing together both public and private drug data in order to analyze utilization behavior.

Tom explored our perception of wellness. It varies by a person's:

- Current state of health—the ill need treatment and the healthy want prevention.
- Age—a young person has higher expectation than an older person.
- Economic status—the wealthy expect better health.
- Location—varies significantly by geography and perhaps access to healthcare.

Wellness measures are really a shift away from quantity to quality of healthcare. That is, moving beyond the basic healthcare needs of survival and freedom from disease to the ability to perform normal daily activities plus enjoying some level of quality of life.

Healthcare costs are highly concentrated with 56 percent of claims coming from just 10 percent[1] of all claimants. Hence, working on the worst 10 percent to 20 percent is very cost effective at the same time as preventing new high claimers. There have been some significant success stories as follows:

- HIV/AIDS drug therapy plus education has reduced the number of related deaths in Canada significantly.[2]
- Hospital utilization for asthma has dropped by 48 percent by number of admittance and 61 percent by length of stay from 1990 to 2000. This was accomplished through better medicines and preventive programs.[3]
- Deaths from cardiovascular disease decreased from 650 per 100,000 to 300 per 100,000 from 1969 to 1997 as a result of new drugs, new medical technology, and education and lifestyle changes, such as less smoking and lower weight.[4]

Illness adds significant costs to employees, their families, employers and society as a whole. Indirect costs are frequently larger than the direct medical costs and include the loss of productivity to the employer, the employee's family and to society.

Most government plans and employer insurance plans focus on current cost containment rather than longer-term wellness outcomes. A person's family physician can play a crucial role here by

[1] Brogan Inc.—Private Drug Plans Database

[2] Brogan Inc.—Ontario Drug Plan

[3] Innovation Crossroads—The Health and Economic Value of New Medicines GSK

[4] The Changing Face of Heart Disease and Stroke in Canada 2000—Stats Canada

detecting early signs of problems and responding with aggressive treatments and patient education.

The focus can change from cost containment to wellness by attaching economic value to outcome. This is a difficult transition since it may involve more cost up front with a big payback later in more productive employees and society as a whole.

Insurers should promote aggressive treatment and provide incentives for healthy living, prevention, early detection and reporting, compliance in treatment and more education.

Promoting wellness within an organization requires a culture change to encourage aggressive early intervention and to prevent more serious problems later. This requires innovation in incentive programs while still protecting an employee's right to privacy.

Tom's presentation served as a good introduction to Nico Pronk's ideas.

Nico Pronk, who holds a Ph.D. in Exercise Physiology with Postdoctoral studies in Behavioral Medicine and is a Vice President of the Center for Health Promotion, HealthPartners in Minneapolis. Nico is responsible for HealthPartners' client programs in health promotion, disease prevention and disease self management.

Nico reminded us that 20 percent of people generate 80 percent of health claims. Hence, 80 percent generate only 20 percent of the claims. Our goal should be to prevent any of the 80 percent from moving to the 20 percent.

In effect, you want to *improve* the health and well being of members (employees, patients) so that function is improved…
…and quality of life improves
…and healthcare cost and utilization reduces
…and disability is controlled
…and productivity is enhanced.

Then you want to maintain the health and well being of currently healthy members so that quality of life stays high…
…and healthcare cost and utilization stay low
…and disability is prevented
…and productivity stays high
…and excess costs are avoided.

There are many modifiable health risk factors. Such factors are frequently precursors to a large number of diseases and disorders and even premature death. Improving these factors will lead to lower healthcare costs and increased productivity. Workplace-sponsored health promotion and disease prevention programs can reduce healthcare expenditures by companies and society and produce positive ROIs. Many actual case studies were cited, including: Johnson & Johnson 2002, Citibank 1999 to 2000, Procter and Gamble 1998, Chevron 1998, California Public Retirement System 1994, Bank of America 1993, Dupont Pronk, et. al., JAMA 1999; 282 2235-2239, and Goetzel RZ, et. al., Journal of Occupational and Environmental Medicine 40 (10) (1998): 843–854.

Physical activity alone has a significant effect on medical cost, especially with adults over age 55.

Aside from direct healthcare costs, indirect productivity and work performance is significantly affected by these same modifiable risk factors. For example, the impact by obesity alone can have the same effect as adding 20 years to an employee's age. Obese workers are twice as likely (6.9 percent versus 3.0 percent) to have workplace limitations because of physical or emotional problems.[5]

Productivity at work is also important. In fact, a really poor performance at work related to health problems can have a very negative effect. If one develops a workplace performance scale of +100 to -100, with total absence valued at 0 and an optimal performance valued at +100, then a job done poorly may be scored a -100. In effect, one has to hire another person just to cancel out the negative person![6]

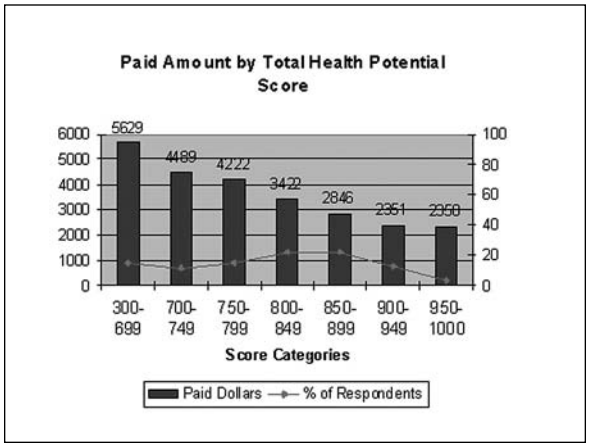
When modifiable risk factors are improved, health costs and productivity (using short-term disability costs as proxy) are both improved. One study shows a 43 percent combined improvement in just over a one- or two-year period when someone goes from high- to low-risk.[7]

(continued on page 36)

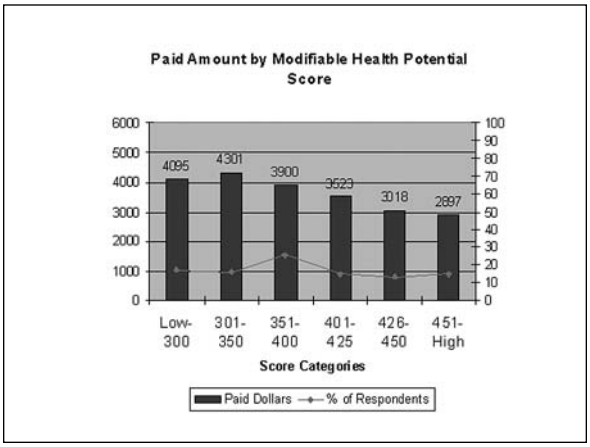
[5] Hertz, et. al., JOEM 2004; 46:1196-1203

[6] Pronk, NP. ACSM's Health & Fitness Journal 2003;7(3):31-33

[7] Edington and Musich. HPM 2004;3(1):12-15.



If one looks at only the modifiable components, the results are shown above.



If one assumes that the potential low claims point for all score categories is $2,897, then the extra claims in total amount to about 25 percent.

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Physical activity alone has a significant effect on medical cost, especially with adults over age 55. A study showed that an increase in physical activity from 0 to three-plus days per week decreased claims cost by around $2,000 per year. Such results should easily justify investment in physical activity programs.[8]

A study by Steven Aldana, Ph.D.,[9] in the *American Journal of Health Promotion* (May/June 2001) followed 32 health promotion programs (over 3.25 years average period) and showed positive results in 28 with an impressive 3.48 to 1.00 ROI from seven of the studies.

Having a group of employees complete health assessments (or health risk appraisals) is one useful tool to help identify the opportunities. It measures both modifiable and non-modifiable risk factors. From a health assessment, a total health potential score is developed from 0 (worst) to 1,000 (best). For men, 520 points reflect modifiable risks and for women 507 points reflect modifiable risks.

In one study,[10] about 51 percent of employees (83 percent female and 17 percent male) responded and as might be expected, they had on average lower claims and were younger. The tables above show the claims paid by score category (both modifiable and non-modifiable) for the respondents.

Since health assessments appear useful, one needs to generate as high a participation as possible in order to develop the right programs. Incentives and telephone follow-ups have been used with some success.

[8] Martinson, et. al., Preventive Medicine 2003;37:319-326

[9] Aldana. American Journal of Health Promotion, May/June, 2001, 15:5.

[10] Based on HealthPartners diagnosed disease registry, 2004 data

Introduction to Research Methods for Actuaries

by Kara L. Clark

Where would you expect to find more than 90 actuaries at 8:00 in the morning last spring in New Orleans? Enjoying coffee and beignets at Café Du Monde? Believe it or not, on June 16, you would have found them in the "Introduction to Research Methods for Actuaries" session at the Health/Pension Spring Meeting. Margie Rosenberg, Ph.D., FSA, of the University of Wisconsin-Madison and Henry Dove, Ph.D. of Yale University, served as the session panelists. Ian Duncan, FSA, FIA, organized the session and served as the moderator.

This session covered a range of relevant issues, both of interpreting and conducting research, for practicing actuaries. Research provides an opportunity to expand actuarial thought and application as well as to enhance the visibility of the profession with other disciplines. Other disciplines such as medicine and law have a much more robust tradition of practitioner research. Granted, the actuarial profession is smaller, but we would all benefit from increasing our research output. Therefore, the presenters at this session strongly encouraged practitioners to take a more active role in original research (the health practice area in particular seems woefully underrepresented in the actuarial literature), but the lessons here also benefit those who are primarily interested in increasing their awareness and interpretation of the latest research in order to incorporate it into their daily work.

The Research Article

The most important aspect of the research is that its focus must be well-defined and manageable. We can't solve world hunger in a single paper. It must also clearly define the contribution it makes to the professional literature that already exists on the topic. What about it is unique?

The research article itself is typically comprised of the components described below. To illustrate the research process, the panelists referred to an article that appeared in *Medical Care*, April, 1990, "Explaining Variability of Cost Using a Severity-of-Illness Measure for ICU Patients" by Rapoport, Geres, Lemeshow, Avrunin and Haber.

You can refer to any number of research journals to "follow along" with other articles, including *Health Affairs, Health Care Financing Review, Health Services Research, Journal of Managed Care*, etc. You don't need to fully understand the specifics of this illustrative article; what's important is that you get a sense of how the authors addressed each of the following components in the write-up.

Abstract

The abstract is a high level overview of the topic of the research and methodology as well as a summary of the findings. The form and length of the abstract may vary depending on the specifications of the publishing journal.

Introduction/Background

The introduction provides the purpose of the paper, (that is, a definition of the problem that is being studied), background on the subject, a literature review and a sense of what is coming in the paper. For example, in the Medical Care article, the authors' underlying question was whether the use of Diagnosis Related Groups (DRGs) may have led to inequities in Intensive Care Unit (ICU) reimbursement. (DRGs were implemented in 1983 as a system for hospital payment for Medicare patients. There are approximately 500 DRGs, each with a relative weight).

The literature review demonstrates that the author has researched the existing literature related to the topic at hand, and articulates how the new research fills in one or more of the gaps that might be present or extends previous research. For completeness and context, the literature search should also investigate research in disciplines outside those of the authors.

There are a few publicly available resources to support conducting a literature review, including *www.ncbi.nlm.nih.gov/entrez* and *www.scholargoogle.com*. Another option is to Google PubMed. As with many Internet searches, using a variety of search terms can help, including MESH-subject headings, journals, articles, exact words, etc. These can also be combined to help focus the results of the search.

Data

In this section of the article, the researchers should explain what data was used, how it was "scrubbed," etc. Data summaries should be explained in words in addition to any tables or figures (that is, the authors should not rely on the tables to get their points across).

In the illustrative *Medical Care* article, the data used in the study was described as those patients admitted to the General Medical/Surgical ICU of Baystate Medical Center in Springfield, Mass. from Feb. 1, 1983 to Jan. 20, 1985. The data was scrubbed to exclude burn patients, cardiac surgery patients, coronary care units and patients under the age of 14.

Methods

This part of the article describes what methodology was employed and why. What is the methodology (describe it)? Why did the researcher choose to use this particular model versus others that were available? What other studies or resources can the reader refer to for more information on the methods and models?

In the *Medical Care* article, the main independent variables included:

- DRG
- Length of stay in the ICU
- Length of stay in the hospital
- Vital status at discharge
- Vital status at discharge in hospital
- Age
- Service at admission
- Previous ICU in the last six months (Y/N)
- Therapeutic Intervention Scoring System (TISS) score; and
- Mortality Prediction Model (MMPM) probability

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(Note: TISS and MMPM are mortality assessment systems.)

The researchers focused in on four specific DRGs: DRG 1, 5, 75 and 110, and described the diagnoses related to these codes.

The main dependent variable in the study was a cost "surrogate" equal to weighted hospital days, where:

- Non-ICU day = one unit
- Surgical patient day one = four units
- Surgical ICU day two plus = three units
- Medical ICU day one = three units and
- Medical ICU day two plus = two units

Table 1: Descriptive Statistics for Study DRGs (an excerpt)

DRG	% of All Hospital Admissions in this DRG that Spent Time in ICU	Mean (Standard Deviation)
1	78.5	32.7 (24.4)
5	72.5	17.0 (11.6)
110	72.4	31.7 (38.7)

Table 2: Comparison of High ICU Users with Rest of Users (excerpt)

ICU Length of Stay	Top 10% of Patients Based on ICU Length of Stay	Other 90% of Patients	P Value
ICU Length of Stay – Mean	16.9	3.8	< 0.01
Age – Mean	61.0	58.8	0.082

The researchers investigated the ability of MPM to improve the use of DRG classifications as a predictor of resource use. They used three analyses:

- Method A: dummy variables for the four DRGs, relative weights of each DRG and geometric mean LOS for the DRG for that year;
- Method B: Method A + MPM + MPM2
- Method C: Method B, but eliminated one outlier case

Results

What were the outcomes of the study? Again, summaries should be explained in words and not only tables or figures.

There are a few key statistics that often show up in the results section. If you're an actuary who remembers that exam fondly but faintly, a quick review may be helpful.

First, means and standard deviations. You probably remember how to calculate them (or know how to get Excel to calculate them!). One of the keys here is how large the standard deviation is relative to the mean. That will provide you a sense of how much variability there was in the data for that particular set.

For example, the *Medical Care* article includes Table 1.

In the far right column of that table, you can see that the standard deviations (in parentheses) are quite large relative to the mean weighted hospital days for each of these DRGs. That result implies that there was significant variability in the weighted hospital days for those patients with each of these DRGs. The weighted hospital days across all patients within that DRG were quite disperse.

Another statistic that you will see quite often in peer-reviewed literature is the P-value. The P-value indicates whether or not two means differ "significantly" from one another. In many fields, including health services research, P-values equal to or less than .05 suggest "significant" differences.

Again, the *Medical Care* article includes Table 2.

In this case, the top 10 percent of patients based on ICU length of stay had a mean ICU length of stay of 16.9 days, versus 3.8 days for the other 90 percent of patients. Is this a "significant" difference? This case seems a bit obvious, but in other situations some context might be required. The P-value provides that context. Here, a P-value of <.001 suggests that indeed, these means between these two groups are "significantly" different.

However, in the case of mean age, the P-value is greater than .05 (a cut-off value generally determined by discipline), which suggests that the difference in age between these two groups is not significant.

The results of this particular study suggested that the long stay ICU patients, when compared to the non-long stay patients:

- Had higher weighted hospital days
- Had higher TISS scores
- Had higher MPM (on average and by quantile);
- Were older and
- Were more likely to have had previous ICU care in the last six months.

All of these findings, with the exception of the age difference, were found to be statistically significant.

Some of the additional findings included that DRGs explained 5 percent to 6 percent of the variation in weighted hospital days. Adding the MPM doubled the R-squared. Some of the variation in weighted hospital days within the DRGs could be explained by severity of illness as measured by the MPM.

Conclusion/Discussion

In the discussion section, the authors should comment on what the results and outcomes of the study mean. What are the implications? How can the results be used? These are essentially the "so what?" questions that follow from the results.

Following along with our example, the authors of the *Medical Care* article concluded that the use of "weighted days" is appropriate. They also summarized their key findings relative to the most costly ICU patients and the relationship of resource use and severity.

In a business sense, their findings suggested that if a hospital has "sicker" patients that require more intensive use of medical resources, that hospital could be disadvantaged under a DRG payment system.

In addition, the article will describe the limitations of this particular approach to the research. All approaches will have some limitations; these do not suggest that the approach was flawed or otherwise inappropriate. Discussing the limitations provides the reader with some assurance that the thought process regarding the research was thorough and robust.

The limitations outlined for the *Medical Care* article noted that the study did not address cost issues between ICU and non-ICU patients; that the conclusions were based on only four DRGs during a two-year time period soon after the payment system was introduced; that the MPM system is not appropriate for use with all conditions, and that the use of MPM requires additional data collection which could be cumbersome.

Finally, the discussion section will describe what follow-up research is suggested by the results of the study. For practitioners interested in conducting original research, reviewing this section of previously published articles can provide good fodder for new research topics.

The authors of the *Medical Care* article suggested that beneficial future research might improve the misclassification rates of developed models and include the development of predictive models.

References

As important as the paper itself, is the list of prior research that was consulted in the development of the study. Any article listed in the reference list should be cited in the paper, and likewise, any facts stated in the paper should be cited in the references.

Getting Published

If you are an actuary who has an interest in original research and its publication, it's important to "start with the end in mind." Knowing your target journal and its audience will influence how you write your article and perhaps how you organize the research. Each journal outlines instructions to potential authors, including the target length of the abstract and/or paper, the structure of the article and the formatting of the bibliography. It's important to read a number of articles published by your target journal to determine its style; this approach can help you tailor your paper appropriately.

The process of publication can be arduous. There are peer-reviewed and non peer-reviewed journals. Those that are peer-reviewed are the most prestigious and can have low acceptance rates. Once you submit an article, it can take weeks to several months for a response. Peer reviewers will provide comments; you as the author will respond to those comments, and in the end, it is the decision of the editor as to whether the article will be put to print.

But as noted earlier, there are a number of benefits to conducting research and pursuing publication—it can enhance your personal reputation and is a great opportunity to collaborate and network with other disciplines, either within or outside of the actuarial profession. It can keep your work dynamic and interesting, and what's more, you may actually learn something in the process! Finally, as you have success, please let us here at the SOA know about it. We can help provide current and potential members as well as other disciplines with some visibility into your contributions, which helps enhance the profession's overall image.

I hope this introduction has piqued your interest and curiosity both in research and in publishing. If you want to further explore the idea, Margie Rosenberg at the University of Wisconsin would be happy to serve as a resource for you; you can find her contact information in the SOA directory. Happy researching!

* * *

This article is a summary of the Session "Introduction to Research Methods for Actuaries," presented at the SOA Health/Pension Spring Meeting in New Orleans in June 2005, and is based on the PowerPoint material from that session, which is publicly available on *www.soa.org*.

Kara L. Clark, FSA, MAAA, is a staff actuary with the Society of Actuaries in Schaumburg, Ill. She can reached at (847) 706-3576 or *kclark@soa.org*.

Editorial Correction

In an article in the August 2005 *Health Section News* newsletter, Ira Slotnick's affiliation was inadvertently listed as Converium instead of GMAC RE Corporation. We regret any confusion that may have caused.

Sound Bites from the Academy's Health Practice Council

2005 Events and Projects

The Academy continued its policy activities on Capitol Hill and at the NAIC.

The Annual health Capitol Hill visits took place in February 2005.

Capitol Hill Briefing, *Medicare and Social Security: Weighing Solvency*
Status: Completed April 1, 2005

Capitol Hill Briefing, *Wading through the Basics on Health Care Risk Pools*
Status: Completed July 22, 2005

Capitol Hill Briefing on rising health care costs.
Status: Expected November 2005

The Academy worked closely with the NAIC on a number of projects. Projects included:

- Risk-based Capital Treatment for Medicare Part D Coverage;
- Principles-based Valuation;
- LTC Minimum Reserve Standards; and
- Individual Medical Rate Regulation.

2005 Issue briefs

In 2005, the Academy published a number of timely issue briefs including:

Medicare: Next Steps
Status: Completed February 2005

Medicare's Financial Condition: Beyond Actuarial Balance
Status: Completed March 2005. Will be updated upon release of 2006 Medicare Trustees' Report.

Medical Reinsurance: Considerations for Designing a Government-Sponsored Program
Status: Completed January 2005

FAQs on AHPs
Status: Completed March 2005

Disease Management Programs: What's the Cost?
Status: Completed April 2005

Pay For Performance: Rewarding Improvements in the Quality of Health Care
Status: Expected Fall 2005

Expected in the next several months are issue briefs on issues related to the uninsured, consumer-driven health plans and risk pooling in health insurance.

Practice Notes

The Academy is just completing a project to review and update all of its health Practice Notes. The approved Practice Notes can be found on the Academy Web site: *www.Actuary.org*

The current status of new Practice Notes are:

Actuarial Certification of Rates for Medicaid Managed Care Programs
Status: Completed August 2005

Attestation of Actuarial Equivalence for Plan Sponsors Accepting a Federal Subsidy under the Medicare Drug Program
Status: Exposure draft open for comment until Nov. 15, 2005. Final expected late 2005 or early 2006.

Actuarial Equivalence for Prescription Drug Plans and Medicare Advantage Prescription Drug Plans under the Medicare Drug Program
Status: Exposure draft expected in November 2005. Final expected in February 2006.

Disease Management
Status: Exposure draft expected in early 2006.

Contingencies Health-Related Articles

If you missed these 2005 health articles in 2005, you may want to go back and read them.

Cori Uccello penned the commentary, "Don't Forget About Medicare," in the March/April 2005 issue of *Contingencies*.

Dale Yamamoto wrote the article, "Attesting to the Value of Employer Plans," in the July/August 2005 issue of *Contingencies*.

2006 Academy of Actuaries Planned Activities

The Academy is starting to look at its 2006 schedule. In addition to its Spring Meeting (May 15th & 16th) and the Annual Meeting, the Academy will continue its activities on Capitol Hill and at the NAIC. If you want to participate in any of these activities contact Holly Kwiatkowski at *Kwiatkowski@actuary.org* or Geralyn Trujillo at *Trujillo@actuary.org*.

There will be three to four possible Capitol Hill Briefings expected in 2006 on issues related to Medicare, the uninsured or other pertinent health issues. The Annual Health Capitol Hill visits are expected again in February 2006.

An article by Ed Hustead is expected to be published in *Contingencies* early in 2006 that looks at the findings of the Medicare Technical Panel.

In 2006, potential issue brief topics include Medicare's financial condition and early lessons learned from Part D. We are currently reviewing our activities related to the uninsured, but activity on that issue is expected in 2006. Other issues that we continue to monitor include LTC, retiree health, health insurance issues, etc. It is planned to write a practice note on bidding/pricing process under Part D and Medicare Advantage in 2006.

Projects will include:
The Medicaid Workgroup plans to do a projection and analysis (i.e., development of an actuarial model) of Medicaid enrollment and costs over the long term (e.g., 25 to 30 years).

The Stop-Loss Workgroup continues efforts to update its previous report on risk-based capital to the NAIC.

Contributed by Donna Novak, ASA, MAAA, FCA