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SOCIETY OF ACTUARIES Entrepreneurial Actuaries Section

THE INDEPENDENT CONSULTANT

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On Counting, Modeling, & Beans

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Honorable Mention Essay for the Society of Actuaries' Entrepreneurial Actuaries Section 2010 Papers Competition

Executive Summary

This paper discusses issues relating to measurement of data in healthcare. Typically data is summarized in deterministic models that produce point estimates for analysis and decision making. The process is resource intensive, fraught with issues relating to unavailable or poor quality data, and can produce inconsistent results. The vision presented in the paper is that of a central repository of actuarially modeled distributions that can either be used as benchmarks or adapted to an organization's experience. In this manner credible, consistent, and comparable information can be made available to the benefit of all, especially in view of the critical performance challenges that lie ahead with healthcare reform.

Caveat Lector: What follows is a *light hearted & tongue-in-cheek* take on how healthcare is typically measured, and an entrepreneurial vision for a better world. No offense is intended to practice and the practitioner, and no beans were harmed in the writing of this paper (only ingested).

The Issue

What is an example of the simplest and most straightforward healthcare analytical question you can ask?

How much does X cost in this area? X could be a procedure code, a particular DRG-based admission, or any basic claim-based measure.

Beans
by Syed M. Mehmud

Do You Attend Non-SOA Meetings?

Easy-it costs $750.92 on average.

Or $754.34, or $761.12, or ... insert as many unique, precise, and precisely unique estimates as the number of analysts you ask.

The reason for this diversity of answers to the same question is that while one analyst might count the beans from one data base, another might count them from a different one, or a different subset of the same one, or reference the beans that someone else counted and spilled ... err, published.

You cannot manage what you cannot measure—and actuaries are advertised experts at both with regard to risk. How can we get the experts to measure consistently? Yes, the axiomatic addition, multiplication, and weighted averaging are all wonderful, consistent things—but that is not what I mean.

I mean that we have gotten away from actuarial modeling of data. We live in the *Data Age*. The ready access to data and the power to process it have rendered modeling of it obsolete. Why sample or model something when I can run PROC SUMMARIES on the entire thing! I'm not trading my power tools in for a chisel! Well, there may be reasons why one should.

Summarizing data does not confer understanding. The process of abstracting key elements of complex transactional data to build a model that resembles reality allows one to discover and focus on important relationships. A clear narrative emerges from the development and use of models in lieu of rough and messy empirical evidence—a clarity that leads to better decisions.

An empirical approach rests on the belief that what happened in the past can be adjusted for factors (multiplicative nonetheless, leading to a multiplicative increase in error terms—but that is another thought for another day!) such as inflation and trend to exactly predict the future. Even if we suspend disbelief at the precision of such point estimates, they convey little regarding the underlying uncertainty or a degree of belief in the estimate. One cannot easily and seamlessly factor in the effects of changing important quantities such as cost sharing, results from combining risks, or quantifying the riskiness of an estimate (e.g., tail risks). If I had a bean for every time someone said, "if only we could find a benchmark for this ..."—I could have them stacked in a giant stalk.

The vision presented in this article would constitute a *mega* change in how health care is measured, understood, and managed—in the United States and internationally. The ideas take on increased significance in a dramatically changing environment of health reform.

I know what you are thinking—do actuaries not learn all this on exams? Are we not already creating and running actuarial models? Is every spreadsheet with an input and output not an actuarial model? What's for lunch?

Typical healthcare actuarial analyses are based on spreadsheets containing summaries of data by various breakdowns. There is an exuberant optimism in which it is hoped that if we only deconstruct data to manipulate it at deeper detail—we will end up with a well understood and accurate model. Complexity does not beget accuracy, and such empiricism does not identify cause, effect, or interactions thereof. Think of the last time you calculated trends, measured utilization management savings, created cost projections, a rating model, a benefit model, an underwriting model, etc. Did the model calculate point estimates based on summarized data? Was the data credible at the detailed level? Did actuarial judgment elbow out credibility theory when it was not? How certain were the estimates, and were there readily available benchmarks to compare to? Did you think the analysis passed the 'sniff test'? Did it 'feel reasonable', 'look right', or 'sound good'? Is it not time to get less touchy feely about empirical estimation and think more in terms of distribution based modeling?

Measurement of data has a tremendous impact in healthcare decision making, and will play a critical role in healthcare reform. Proper measurement of data will result in actuarially sound rates for services, appropriate allocation of resources, incentivize better care not selection, and directly impact profitability and solvency of plans through mechanisms of risk adjustment and quality improvement. While the issue of measuring and benchmarking data may not look a big deal—it underscores everything in healthcare. Investment in IT is near the top of the healthcare agenda—but collected information will only be as good as its use. Are point estimates reached deterministically the best we can do?

The Solution

In college we used to have a manual of integrals published by some chemical company. The thick book full of the most difficult results of integration was an invaluable reference when studying mathematical physics. It saved us a lot of time to give the results we needed to focus on the important, big-picture questions at hand.

What if we had a similar reference for all important benchmark distributions in healthcare? "The set of all possible distribution functions is too large to comprehend"—but it would be great to have all fitted distributions available to practitioners in some sort of a giant reference book.

This leads into the entrepreneurial solution and vision that I would like to present in this paper. Imagine a reference that has a menu of parametric distributions and a table of parameters to tailor them to specific situations. The family of probability density functions is identified using multiple sources of claim data, and parameters are informed by the same sources. As research turns up more evidence for variance in costs by conditions, procedures, geography, etc.—the parameters are adjusted to the extent that the new information is credible relative to that already incorporated.

You want to know the distribution of charges for an appendectomy in a particular state? This reference would provide the appropriate distribution function and parameters specific for this purpose. It is less work than it sounds. The family of distribution that models claims is unlikely to change much, while the associated table of parameters will adjust it for appendectomy, geography, and any benefit or reimbursement levels.

You want to calibrate the set of distributions to your data? There exists mathematics that will do just that. All you would need to do is run a programmatic code against your data, and it will adjust the global table of parameters to your data to the extent that it is credible. Once you have made this adjustment, you can model the impact of benefit changes, calculate expected values along with associated confidence levels, and discover important relationships.

No more spending hours researching disparate sources of information only to find contradictions, spending days creating models to understand cost levels and benefit impacts, spending months populating such models with data, and updating/massaging/kneading/tenderizing data to prepare that perfect morsel of information—only to have it not make sense and be replaced by actuarial judgment.

The goodness of an idea is not necessarily commensurate with monetary investment. Such an idea will require mostly an investment of time and talent. The resulting set of distributions and parametric tables could be uploaded to a website for the use of fellow professionals. Even better, this effort could be collaborative in nature where the parameters are informed not just by publicly available sources of data, but by professionals in industry running scripts against in-house data to share fairly non-proprietary information for the benefit of the actuarial community. There could be a modest monetization too via a subscription fee etc.—but at the end of the day I think that being an entrepreneur is really about putting a dent in the universe, and less about money. One would rather try to advance the actuarial skill set and be paid in beans, than to leave it as found.

Note: The opinions expressed in this article are solely those of the

author.

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[1] Diagnosis Related Group

[2] Spicy bean curd...

[3] Stuart A. Klugman et al. *Loss Models: From Data to Decisions*, Second Edition

[4] This is of course, an exaggeration.

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