
SOCIETY OF ACTUARIES

Article from:

# Health Section News

January 2002 – Issue 42

## *NAIC Health Update*

*continued from page 9*

appear to be seriously contemplating such a move.

For further details on Academy RBC proposals, see *http://www.actuary.org/naic.htm*, which contains an archive of all recent Academy reports to NAIC groups on RBC and many other issues.

### Blanks Task Force

The regulators on the Blanks Task Force approve changes to the annual and quarterly statement reporting forms and instructions. In their annual meeting each October, they consider changes not for the next year but for the subsequent year, i.e. the October 2001 meeting dealt with changes to the 2003 blanks. Proposals for blanks changes are typically referred to the Blanks Task Force from other NAIC groups, such as those discussed above.

A major initiative that was just passed by this task force in October is what I will call the "Health blank migration" proposal. This idea originally came from the RBC Task Force, who observed that there are many companies that anyone would think of as being "health insurers" but that, for historical reasons, file the Life blank or the P&C blank. Since risk-based capital is tied to the statement blank, such companies are subject to Life RBC or P&C RBC rather than to Health RBC. The RBC Task Force felt that it would make more sense for all "health insurers" to be regulated by the Health RBC formula, and it concluded that the most practical way to accomplish this would be to get all health insurers filing the Health statement blank.

What the migration proposal does is create a framework by which certain Life and P&C filers will move over to the Health blank, assuming no objection from their domiciliary regulator. To be eligible for migration, health insurance products must represent (on a net-of-reinsurance basis) at least 95% of a company's premiums, and at least 95% of its reserves, for two consecutive years. Companies that are 100% health under this measurement are always eligible to migrate; companies that are between 95% and 100% health are only eligible if they pass some geographic concentration tests. It is very important to note that, in this context, "health insurance" excludes long-term care and disability coverages.

*Rowen B. Bell, FSA, MAAA, is an Associate Actuary at Blue Cross/Blue Shield Association in Chicago and a member of the Health Section Council. He can be reached at* rowen.bell@bcbsa.com.

# From Art to Science - Using Clinical Insight Modeling to Strengthen Actuarial Prediction

**by Harry Poteat**

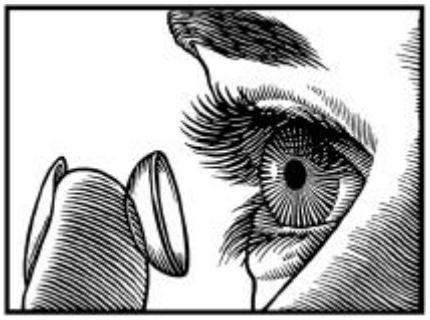
***(Summary of Dr. Poteat's talk at the Society of Actuaries Annual Meeting, October 21-24, 2001, Section # 58 – "Applying Clinical Insight to Price Catastrophic Risk.")***

During my talk I explained the concept of clinical insight modeling. He discussed two different models: the Markov State Transition (MST) and the Rational Artificial Intelligence (RAI) model. The MST model is designed to function in data-poor environments utilizing a benchmark database developed through a process of triangulation. The RAI model is designed for use in data-rich environments where data mining and analysis can identify whether the data forms patterns that facilitate the prediction of future costs of individual patients (claimants).

Clinical insight modeling consists of three fundamental elements: 1) the incorporation of reproducible, objective processes into predictive models; 2) the use of all available predictive data, particularly epidemiology; and 3) validation of the models. In catastrophic risk prediction, standard statistical models often do not apply. Technology moves forward so rapidly that what made patients expensive five years ago may not make them expensive today, and even if the types of expense remain similar, the case rates and severity for cases in these areas is constantly in flux.

### Leverage Technology

One way to achieve repeatable, definable and objective processes—a core element of clinical insight modeling, is



by developing predictive modeling software technologies. Medical Scientists Inc., a Boston-based healthcare software and services firm, has developed a portfolio of predictive modeling technologies to address both data-poor and data-rich environments. MediSave ™ is a disease-specific decision-support software suite that predicts

the future outcomes, event rates and direct and indirect costs of disease for a population (even without specific claims experience). The software can also predict the financial impact that potential intervention (e.g., case management) will have upon a population. Hybrid AI™ leverages rational artificial intelligence, which evaluates multiple artificial intelligence modeling methods to find the best model, validates the model for accuracy and then allows the user to implement this custom made model. The output of the system is a custom made model derived from the managed care plans data and experience. Hybrid AI™ enables identification of potentially catastrophic cases in less time with greater accuracy.

### Knowledge is Power

The second key element in clinical insight modeling is to utilize all available predictive modeling information. One way to accomplish this is to involve medical personnel in renewal underwriting and case management to obtain some clinical insight which can then be combined with the actuaries' understanding of the mathematical patterns inherent in the population and experiences gleaned with other similar populations, as well as some ideas about industry trends and cost over time. A major shortcoming of this approach is that it provides minimal information about case rates. Using epidemiological data to predict future case rates provides a means to compensate for the difficulty of obtaining rare claims experience data so as to determine case rates for a population.

Epidemiological risk factors for a disease can be translated into an overall case rate for the disease and knowledge of disease progression can provide insight about case mix severity. In a data-poor environment, demographics combined with the epidemiology of disease can be leveraged to reach estimates of case rates (prevalence and incidence) and severity (progression). Using MST models, it is also possible to relate catastrophic risk to levels of medical management. MST models can adjust for changes in treatment and technology. For example, the probability of a diabetic developing kidney failure when not taking a specific medication is 4.9% per year and when taking the medication it is 2.9% per year.

### The Litmus Test

The final key element in clinical insight modeling is the concept of validation. By necessity, most modelers use the past as a focus of validation for their models, which is subject to inaccuracy given how rapidly technology and treatments change. Imagine validating a prediction for the use of mechanical hearts in 2005 based on year 2000 data. Instead of the traditional approach, the Medisave MST model incorporates a process of combing or "triangulating" claims experience, expert opinion and medical literature (to contain epidemiological and product information) in an effort to model the future. Validation is performed against historical data to supplement the process.

***"Using epidemiological data to predict future case rates provides a means to compensate for the difficulty of obtaining rare claims experience data so as to determine case rates for a population."***

### The RAI Advantage

A data-rich environment, when available, is optimal for the use of RAI, the second generation of data-mining technologies. The first generation of artificial intelligence products in health care relied nearly exclusively on the use of a predictive technology called neural nets that attempted to duplicate the way the brain thinks about problems. The premise behind rational artificial intelligence is that it is not necessary to use neural net technology to solve every problem. RAI models access many different artificial intelligence learns to find the best predictive model from data presented to it.

For example, the risk of developing catastrophic complications from diabetes is often proportionate to the number of years a person has been a diabetic, a linear problem. Age and risk for prostate cancer in men is linear over certain broad ranges. Using a rational artificial intelligence approach, simple models should be used to attack such simple problems and complicated models used to solve more difficult problems, such as the relationship of median income to catastrophic neonatal risk.

### Summary

Clinical insight modeling represents an evolution in medical actuarial prediction that provides an alternative to experience-only pricing. The models allow explicit adjustment for changes in treatment and technology to help meet the challenge of predicting catastrophic risk. My talk emphasized the need to use all available data (e.g., not just pricing) and the need for predictive processes to be both validatable and reproducible.

*Harry Poteat, MD, ScD is the Vice Chairman and CIO of Medical Scientists, Inc. He can be reached at* Hpoteat@medicalscientists.com. *Dr. Poteat was a speaker at the Society of Actuaries Annual Meeting on October 21–24, 2001 in New Orleans, LA.*