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# Pricing Aggregate Stop-Loss Coverage

by Chuck Fuhrer

## Overview

The January, 2002 issue of the *Health Section News* included Robert G. Mallison's article titled "A Brief Note about Pricing Aggregate Stop-Loss Coverage." Mr. Mallison has written an excellent article that covered a number of important points on this subject. I wish to briefly build on his material in a few ways.

## The Extra Risk

Mr. Mallison presented these aggregate stop-loss rates (125% attachment point) as a percentage of expected claims.

Rates	Rich	Lean
200	1.222%	1.699%
500	0.382%	0.573%
1500	0.038%	0.073%

The columns refer to a rich and a lean underlying plan of benefits which he defined in his article.

The total expected claims for the underlying plan can also be calculated:

Exp. Claims	Rich	Lean
200	\$416,614	\$369,327
500	\$1,134,060	\$1,012,380
1500	\$3,495,300	\$3,129,315

These lead to the following set of net aggregate annual premiums

Agg. Prem.	Rich	Lean
200	\$5,091	\$6,275
500	\$4,332	\$5,801
1500	\$1,328	\$2,284

These premiums appear to be considerably inadequate. They are certainly well under what the market is currently charging. Furthermore, the premiums are such a small part of the underlying program costs that it is hard to believe they are at a high enough level.

When our models don't seem reasonable we have to go back and check to see if there isn't some process going on in the real world that isn't allowed for in our model. I wrestled with this problem during the 1980s and found a solution. Similar problems have been dealt with by casualty actuaries, who call it "parameter uncertainty." See for example, "Parameter Uncertainty in the Collective Risk Model" by Meyers, G. and Schenker, N. *Proceedings, Casualty Actuarial Society*, LXX (1983), 111.

See my article "A Method for the Calculation of Aggregate Stop-Loss Premiums," *Actuarial Research Clearing House*, 1988.3, page 1. In this article, I pointed out that models such as Mr. Mallison's do not allow for the fluctuation in claims costs that are not related in

variation in the number or sizes of claims. These include an unexpected trend (both national and local) and fluctuations in the true expected claims for the group from what is calculated by the experience rating process. These fluctuations will generally not affect the members of the group independently.

My article goes on to explain how this extra risk can be modeled and presents one scheme for calculating the resulting aggregate claims costs. I have been using this method, with some further improvements, since then and obtain reasonable results.

## Calculation Methods

There are three methods of calculating aggregate stop-loss premiums within a model. The first one, which Mr. Mallison presents, is called the Monte Carlo method and involves using pseudo random numbers. There are two problems with this method: (1) It is difficult to perform enough trials to be sure that a correct answer is achieved, and (2) most pseudo random number generators have some bad properties such as non-zero correlations between successive values. As a test, I calculated the aggregate premiums using Mr. Mallison's assumptions with 250,000 trials. Here are my results:

	Rich	Lean
200	1.228%	1.669%
500	0.396%	0.587%

Note that the values are not the same.

The second method is to fit a curve to the group's claim distribution. This should give reasonably accurate results if a good fit is obtained. The third method is the recursive method as presented in the textbook *Actuarial Mathematics*. This is probably the best, as the answers are exact, but the size of claim table has to have equal size brackets.

## Key Variables in the Calculation

Obviously, as Mr. Mallison correctly points out, the three most important are group size, attachment point and specific stop-loss level. He points out the importance of taking into account the underlying benefit richness. This is related to another important variable, the size of the expected claims, per person. This can vary considerably by the group particularly when they are in different areas. Once again, the larger the expected claims per person, the smaller the aggregate stop-loss premiums as a percent of claims.

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## Health Costs Rise—Implications for Student Health

by Paul A. Cronin

*Insurers, consultants, government agencies and academics are all capturing the same headline: "Health Care Costs are Rising Dramatically."*

Surprising to some, student health plans are feeling much the same cost pressure as employer-sponsored plans. Student health presents a healthier risk profile because of the relative youthfulness of its insured population. Student health also provides a more rational delivery system because of the primary care role each school's Student Health Services (SHS) provides to its students on campus. But the utilization mix under student health plans falls disproportionately on prescription drugs, behavioral health and outpatient surgery, the three areas with the highest rate of inflation, thus offsetting student health's inherent economies.

To understand current trends in health costs, it is necessary to look back over the past decade. During that period across the country, inpatient hospital capacity and utilization were reduced significantly, eliminating virtually all of the excess capacity in that part of the health care delivery system. In taking out this excess inpatient capacity, three things occurred. First, costs came out of the system, off-setting increases in other areas and slowing the rate of increase in health care premiums. Second, as personnel were eliminated or redeployed, wages were held in check throughout the sector and the entry of new manpower, particularly in nursing, dermatology and radiology was reduced. Third, as hospitals sought to replace lost inpatient revenues and utilize facilities

with fixed capital costs, they developed significant outpatient programs, particularly outpatient surgery.

With no more capacity to squeeze out, and with hospitals and physicians raising fees, the cost rebound has not been subtle. Add to this several other important cost-driving features of the last five to 10 years. First, direct-to-consumer advertising of prescription drugs has been wildly successful. Further, the explosion in the use of certain newer drugs such as SSRIs (the #1 drug by therapeutic class for the student population) has added net new costs. The result: drug costs have grown substantially faster than total national health expenditures since 1993 and are projected to continue to do so in the future. Public policy regarding mental health parity has also driven up costs by causing expanded coverage and increased payments to behavioral health practitioners. And finally, underpayment by Medicare, and particularly many state Medicaid programs, have shifted costs to private payers.

While all of this has been going on, the media, consumers and politicians have villainized managed care, resulting in more open choice, expanded networks and in so doing, added costs. Rarely have we seen this kind of alignment of cost drivers in the health arena.

The insurance industry typically tries to anticipate trend by guessing (in a highly

sophisticated way) how price inflation, technology, utilization and cost-shifting will play out in the year(s) ahead. Because the basis for these methodologies is historical, significant shifts are often under-anticipated. As an industry, health insurance premiums, including larger employer-sponsored self-funded plans, lagged the increases in underlying health costs for three or four years at the end of the '90s. This is often referred to as the turning point of the underwriting cycle.

For the past four renewal years, health insurance increases (including self-funded plans) have at least doubled CPI. For last year (2001 over 2000), large employers' health insurance costs per active employee increased 12.1%. This year it is expected to rise between 13% and 20%. "Employees also can expect to pay on average 18% more in premiums next year, and it's not a temporary problem. We're going to be looking at a period of about four years of double-digit inflation."

If that is the larger picture, what about student health insurance inflation? To some degree, "the rising tide raises all ships". Cost increases are typically calculated separately for several sectors of the health care economy. Milliman, the noted actuarial firm, reports cost increases in four areas: outpatient, inpatient, prescription drugs and physician. Data through March 2001 reflecting changes from the previous year show outpatient up 11.2%, inpatient up 2.8%, prescription drugs up 14.5% and physician services up 4.8%.

Translating this to the percentage of each dollar of increase, outpatient contributed 37%, inpatient 10%, prescription drugs 27% and physician services 25%.

Because of the demographics of students and the

