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## Session 58PD

### Catastrophic Health Care Events: Implications for Pricing

**Track:** Health

**Moderator:** TIMOTHY K. ROBINSON

**Panelists:** CHUCK BECKER†  
MICHAEL R. MCLEAN  
DR. HARRY POTEAT‡

*Summary: Panelists discuss three key factors related to catastrophic health care events:*

- *Trends in health care delivery and medical technology that are likely to impact catastrophic care costs*
- *Methods of cost and risk control through early identification and specialized medical management*
- *Modeling the cost of catastrophic events on health insurance programs*

**MR. TIMOTHY K. ROBINSON:** I'm Tim Robinson. I'm a consulting actuary at NiiS/APEX out of Princeton, N.J., and one of my special interests over the last several years has been in the catastrophic-care kind of risk management, disease management, and pricing, so I'm glad to get a chance to put together a session on that topic. We've got some great speakers to talk about some different aspects of this today.

First, we're going to have Dr. Harry Poteat from Medical Scientists in Boston. Harry is vice chairman and chief information officer at Medical Scientists. They develop software for predictive modeling of health care costs. Among several degrees, Harry is a medical doctor—a pathologist by training, and he's spoken at several Society of Actuaries meetings on topics similar to this and related to predictive modeling of health care costs.

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†Mr. Chuck Becker, not a member of the sponsoring organizations, is president and CEO of Alliance Care in Columbus, OH.

‡Dr. Harry Poteat, not a member of the sponsoring organizations, is vice chairman and CIO of Medical Scientists in Boston, MA.

**Note:** The chart(s) referred to in the text can be found at the end of the manuscript.

Chuck Becker is from Alliance Care. He's the president and CEO of Alliance Care, which is a medical cost and risk-management company serving employer groups, stop-loss insurers, managing general underwriters (MGUs), and benefit administrators, helping them to manage employee benefit programs. He's going to talk about early identification of cases and medical management approaches.

Mike McLean is the president of Medical Risk Managers, which is an MGU specializing in specific and aggregate stop loss. He's presented numerous times at different Society meetings on various topics related to stop-loss insurance pricing.

Some unique challenges for pricing are presented by catastrophic health care claims and this is particularly true for stop-loss insurance. But there are some predictive tools to better understand what the risks are and also some operational approaches to managing and reducing the risk.

**DR. HARRY POTEAT:** I'm going to see if I can add some clinical insight to this wonderful field of actuarial analysis. This is how I view catastrophic risk. Remember, I'm a pathologist. I'd like to define catastrophic risk as an interaction of a disease state with the medical treatment environment to include the market as well, which is expected to exceed a specific level of resource utilization. So resource utilization might be trips to the emergency room, days in a neonatal intensive care unit, etc. Disease state can also include things like pregnancy, so maybe it's better to call it a health state. Research utilization correlates reasonably well with catastrophic risk as long as there's some degree of stability in pricing and major medical services.

In the reinsurance environment, we have a disease process colliding with the treatment environment, so this might be cancer. Some cancer treatment is going to be essentially noncatastrophic, or below the attachment point, and other cancer treatment is going to be catastrophic, or above our attachment point. Obviously, depending on your perspective, that has different implications for how you would write a policy.

### **Data-poor Environment Modeling**

What's different about this way of doing things? I was privileged to be in Dave Wilson's talk yesterday (session 7PD), and he was talking about using Monte Carlo analysis to simulate claims distribution. In that situation you randomly assign a claim level to an individual. We're doing similar things, but in our data-poor environment modeling, I'm randomly assigning a disease to people. In this particular set of examples, about 23 different health states, or diseases, get randomly assigned. Then as a doctor, I hope that we have an idea about how that disease is going to progress, what complications will develop, and what percentage of people will develop complications that put us above a specific attachment point. So we're simulating the world based on disease and health states, and Dave is simulating it based on claim levels and claim distributions.

I would view these as different approaches to similar problems, although I must say, without being sycophantic, that I was truly impressed with what Dave was doing yesterday.

### **Looking for Results**

So what do we get when we're in a data-poor environment? I haven't been in reinsurance nearly as long as many of you, or in first-dollar insurance, but what I've experienced from the reinsurers is that if they asked for data from a third-party administrator (TPA), if they asked for data from an MGU, or if they ask for data from a health plan, they probably can get it, but come renewal time, they might want to go with somebody who is a little less nosy.

Now, I've also experienced with my colleagues that once that person reaches half of the attachment point or the whole attachment point, they're more than happy to hand over all the information and ask you to pay for it. No surprise there.

We essentially don't know a lot about 99 percent of the populations. What we like to do is use what we know about disease prevalence—which would be case rates, actuarially speaking—and disease progression—which would be severity, or how sick these people are going to get—and we like to leverage what we know about how these diseases differ in different parts of the country. So we're here in Louisiana, and it's a medical fact that African-Americans and Hispanics have higher prevalence rates of diabetes than Caucasian people and that people from Eastern regions of the world—Asian regions—have very low levels of diabetes. So we can tell something about the southeastern United States even before we look at the eligibility file, which is about as much information as we're going to get.

What we're trying to do is use age, sex, race, and economic status to figure out what the prevalence of the disease is and what the disease progression or severity will be. It does walk a little bit of a fine line, in that many actuaries are specifically forbidden from considering race. As a physician I justify that by saying that if I'm also working with medical management companies, and I have to help them target underserved populations or people that aren't getting appropriate care, I really have to be able to talk about at least socioeconomic level, if not race.

What we're trying to do is ask is, if it's a data-poor environment, where do I get my data? Dave Wilson was getting his data from a known claim distribution. We're trying to pull together three different pieces of information. One of them is a standard claims database.

Another one would be literature review. For example, for a diabetic to progress to end stage renal disease—that would be kidney failure—you're looking at either a transplant or 33 months of dialysis. If you're a reinsurer, that is \$40,000 a year in many markets. The idea is that the literature can give you a very good probability estimate once somebody has developed a specific level of complications in diabetes, what their chances are of ending up with kidney failure. In year one, I know how

many individuals are at that relatively progressed stage of diabetes. I can make a really defined estimate of where they're going to be next year, so that's where the literature helps us.

Then we have expert review. I've talked to many of our clients about preauthorization of ciprofloxacin scripts, and I don't know if I've had any success with that, but the idea here is that if we're trying to use year 2000 claims to estimate utilization of an antibiotic like ciprofloxacin—it's used to treat anthrax—and if we're trying to estimate that utilization based on year 2000 claims, we're certainly going to miss the boat.

We'd like to have a model in which we have a line item for antibiotics and in which we can proactively change what the utilization rate of those antibiotics is based on current knowledge and not prior claims. A similar thing might include things like split liver transplants. Would that increase the rate of liver transplant? We've seen the first sort of successful artificial heart. What's that going to look like in 2005?

Basically, I think another part of clinical insight modeling is trying to gain some degree of credibility for it. In keeping with the antitrust disclaimer, this is all the data (Table 1). I'm not going to tell you what region of the country it's from. I will tell you it's from a commercial HMO, and since it's older data and we don't know where it comes from, it would be very foolish to do any pricing.

The idea here is to split the population using a continuous table that Kevin Gabriel, who is a Fellow in the Society of Actuaries, helped me produce—split the group into 29 different disease states. Then by looking at each disease state and what we know about the disease and how it progresses, we come up with price points and estimates for how many catastrophic cases we're going to have. So here transplants, neonatal, heart disease, diabetes, and cancer account for a sizable number of cases; but then we also have other cases from other diseases.

Table 1

**Define (using aggregation of DCG's)  
"MCC's" 23 specific categories (Client X)**

Condition	Total Spend Catastrophic (>20k)(pm/pm)	Avg. spend/case >20K	# of Cases
<b>Transplant</b>	<b>\$0.40</b>	<b>\$3972</b>	<b>6</b>
<b>Neonatal</b>	<b>\$0.52</b>	<b>\$1699</b>	<b>18</b>
<b>Heart Disease</b>	<b>\$4.06</b>	<b>\$2060</b>	<b>117</b>
<b>Diabetes</b>	<b>\$0.41</b>	<b>\$4042</b>	<b>6</b>
N....N <sub>29</sub>			
<b>Total pm/pm</b>	<b>\$26.33</b>		<b>705</b>

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I'm going to say that, obviously, the more you know, the more you can use this as a manual rating system (Table 2). Or you can use this as an experience or partial experience by adding what you know about price points (Table 3). For this client, we've added what we know about price points, but we don't really have case rates from them, we don't know about individual patients, we just know what the market pricing is.

Table 2

<b>Validation Manual Rate (Client X)</b>
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Condition	Actual Pm/pm	Predicted Pm/pm	% Difference
Transplant	\$0.63	\$0.63	0.00%
Neonatal	\$8.21	\$6.29	+23.39%
Heart Disease	\$8.75	\$8.94	-2.17%
Diabetes	\$1.09	\$1.39	-27.52%
N...N <sub>29</sub>			
<b>Total pm/pm</b>	<b>\$118.75</b>	<b>\$108.49</b>	<b>+8.6%</b>

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Table 3

<b>Validation Partial Experience (Client Z)</b>
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Condition	Actual Pm/pm	Predicted Pm/pm	% Difference
Transplant	\$0.72	\$0.71	+1.39%
Neonatal	\$8.41	\$8.65	-2.85%
Heart Disease	\$9.63	\$10.17	-2.17%
Diabetes	\$1.82	\$1.25	+31.32%
N...N <sub>29</sub>			
<b>Total pm/pm</b>	<b>\$130.40</b>	<b>\$130.90</b>	<b>0.00%</b>

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For some of these diseases looked at retrospectively, we have a pretty good validation result, and for others it is not so good. Our total per month per member (PMPM) number is reasonably good.

We've had a lot of experience working with the data-poor model in the first-dollar setting and working on disease specific trend. We're working hard to collaborate with actuaries to bring this into the actuarial community for purposes of pricing.

### Data-rich Environment

I'm going to switch gears and talk about the data-rich environment and say that a problem that has come forth with a lot of our HMO clients is that essentially, they've begun to realize that many of the people that are high cost this year were not high cost last year. Essentially many people at an HMO will manage individuals who already have achieved half the attachment point or the entire attachment point. They'll get a case manager, but in some ways, from a medical perspective, the cat is already out of the bag, or the costs have already been incurred.

If you could predict who was going to go from low cost to high cost quickly and then manage those individuals aggressively, medical management could have a major financial impact on PMPM cost levels.

If you focus your attention on the individuals that cost \$150 to \$800 in 1998, and then you look on the far side of the table, they've accounted for a significant percentage of the high-cost patients in 1999 (Table 4).

Table 4

### Association of Prior Years Claims with Future Years Claims in Dependents

1998		1999			
Range (\$)/Year	Cases	Median	Cases > \$10K	% Cases > \$10K	% of Group
<\$1.50	3,422	\$195	76	2.22%	22%
\$1.50 - \$800	9,031	\$138	80	0.89%	23%
\$801 - \$12,000	354	\$778	132	3.73%	38%
>\$12,000	215	\$2,749	61	28.37%	17%
<b>Total</b>	<b>13,022</b>		<b>349</b>		<b>100%</b>

The issue is, what can we do to better predict who's going to go from being low cost to being high cost? I think the startling thing is, when we looked at this problem at Medical Scientists a couple of years ago, we found out that the people who market beer know more about whether you're going to buy a six-pack of beer on Saturday than we as doctors know about whether you're going to be high cost next year. The direct marketing companies know more about data mining, more about figuring out who's going to buy their product, than we as physicians do about who's going to get sick. We said, "That's unacceptable, and we're going to have to fix that."

I guess we're still not done with the fix, but we adopted some technology from the direct marketing industry, and what it allows you to combine multiple models or hybridize them (Table 5). A logistic regression uses very little computing time, but it doesn't handle nonlinear problems well, so it's a good tool to use when you know it's a linear problem.

Table 5

### Theory:

➤ Be willing to hybridize together all data and all available models to come up with ModelH(RAI)

Model Type:	Computing Time:	Non-Linear:	Complexity:
Logistic regression	Low	Poor	Moderate
Neural Net	High	Good	High
Decision Tree	Moderate	Fair	Low
The N <sup>th</sup> Model	N'	N''	N'''

**RESULTS:** ModelH (RAI) uses less computing time to produce better model performance and lower rule complexity

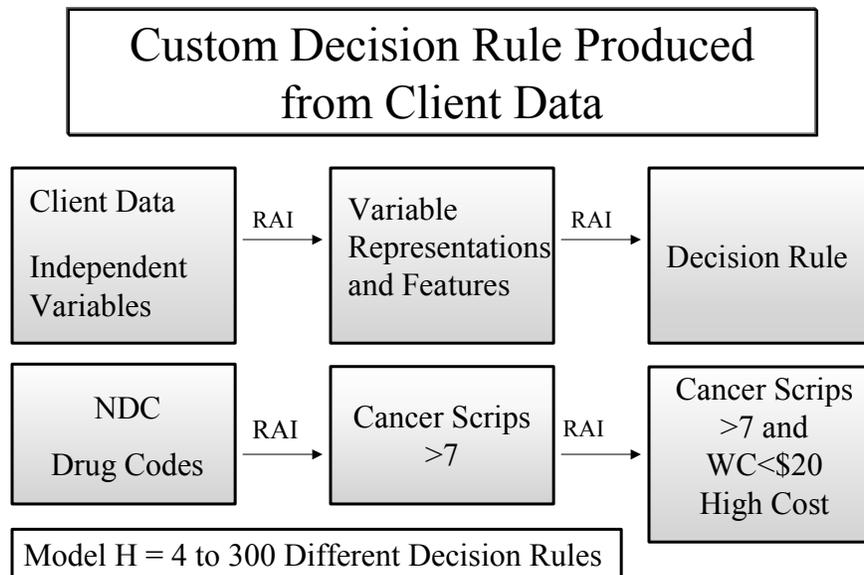
Neural Net is very good at dealing with nonlinearity—the relationship between median income and neonatal catastrophic risk. Relatively poor people have high rates of catastrophic neonates; very wealthy people have high rates of catastrophic neonates. They're taking Clomid. They're waiting until they're 40 years old to have babies. They have multiple births, and those multiple births end up in the neonatal intensive care unit (NICU). But the middle class has very low levels of catastrophic neonates, so this is a nonlinear function, and it's well dealt with by Neural Net.

The problem is that with Neural Net, it can take you three to four months to figure out what's going on, and pregnancy is nine months, so that creates a bit of a problem. We try to hybridize those together to get to the nth model, which is the hybrid of all different modeling technologies. That's the theory behind all of this.

**Applying the Theory**

What happens when we apply theory to reality? This is an example. You take the client data; here I've used national drug codes (NDC) as an example (Table 7). Then you have a variable representation created by the rational artificial intelligence, and you get to less than seven cancer scripts as a variable representation.

Table 7



Then you take those variable representations and combine them with multiple factors, and you're looking at a decision rule that is fewer than seven cancer scripts, fewer than 20 worker's comp claims, and that correlates with low cost. Ten you combine those decision rules—four to 300 different decision rules—and you end up with a means of making a final decision.

We can see some things that can become high cost, and we have cancer on the bottom of that column (Chart 1). What we've shown in chart 2 is number of cancer drug prescriptions in 1998. That's on the X-axis, and the cost per case in 1999 (that's a year later) is on the Y-axis. If you translate that line, it happens to be through those two data points. It really should be on the right side of them.

You can see that the majority of the catastrophic cancer cases in 1999 were arising from people that have had only a few courses of chemotherapy or a few cancer prescriptions. As a physician, I never would have figured that out. But once the artificial intelligence told me about it, it made a lot of intuitive sense. If you've had more than seven courses of chemotherapy, sadly, you're either pretty much on the way out, so you're not going to be expensive next year, or you're probably cured. You had some adjuvant chemotherapy as part of the treatment for your disease, and you may be cured.

That now makes sense intuitively, but I wouldn't have found that without a heavy-duty data-mining tool.

How good is artificial intelligence? We come back to this issue of validation and trying to always validate our model. What we basically come down to is that this artificial intelligence system can help us enrich a population.

We've gone from about 29,000 active lives that are shown in the left column (Chart 3) and we showed their claims distribution over a relative level of costs in the subsequent year down to a population of 600 people, and we showed their claims distribution in the subsequent year. As you can see, there are still a large number of low-cost players in this group that we've identified; but what's neat is, we've really enriched the population of people that are going to go from being relatively low cost to high cost.

If we're working in this data-rich environment where we can mine as much data as we possibly can get our hands on, we can use five-digit zip codes, we can use eligibility files, we can use claims and pharmacy data, and we can predict things about individuals. How does that then turn into a pricing model or a rating model or something that an actuary can use? These are the kinds of questions that I struggle with every day.

With the help of some very good underwriters and some very good actuaries, we were able to come up with an application of this in renewal underwriting. Has anybody here done any small group renewal underwriting? When you renew these, you don't have sufficient experience or credibility to give a rate, so what you sometimes have to do is look at individual patients.

These small group numbers have no correlation to anything, and you can't trace them back to anything, and the number of members in each group is given in the next column. Then the prediction of how many members fall into each of those cost categories, based on the rational artificial intelligence system, is shown in the middle four columns.

Based on the number of people in the group and the number of high-risk people, they get a risk score; in the far right column is the statistical probability that a randomly distributed group would give you that same set of potentially catastrophic

or high-cost individuals. Having assigned each of these individuals a risk in which we take the top three risk scores and look at this retrospective validation again, we look at their PMPM price change. It turns out that we did—at least in retrospective validation, not in prospective validation—pretty well in predicting which groups were going to have increases in their PMPM costing.

Clinical insight models, I think, represent a complement to experience-only pricing. The models allow explicit adjustment for changes in treatment and technology, so if you know that something is going to happen to the way cancer patients or diabetic patients are treated, you can explicitly model that instead of empirically model it.

We are trying to gain credibility in the actuarial community by working with actuaries and underwriters and also by making our results public about how our models do. It isn't always pretty, it's not a lot of fun, but we're doing it. Then we hope that, given a movement toward risk adjustment in the Medicare + Choice environment, by tying our clinical categories to the diagnostic cost groups (DCGs), a system that the government has already endorsed for Medicare + Choice, that we can gain acceptance and that this becomes a useful tool.

**MR. CHUCK BECKER:** We found is that there is an unmet need in this industry for the reinsurers and managing general underwriters to really effectively control their escalating medical costs. Early notification of a catastrophic case is the key in gaining control of that risk.

Almost every self-insured plan has a utilization management vendor that it employs to manage the care and make sure that it's necessary and appropriate. But that information actually doesn't get to the risk-taker until it's way too late—the program has been administered, the course of treatment has been rendered, and you just find out at the end. That's the dilemma in this whole program today.

The patient gets admitted to the hospital and he or she is contacting the utilization review (UR) company. Now the UR company in turn notifies the TPA at one point or another, but the TPA virtually does nothing with that information once it receives it. It adjudicates the claim. It files for a reimbursement with the MGU, and the reinsurer finds out about it and gets hit with this large loss all of a sudden.

### **Critical: Early Intervention**

You need to do is establish an early intervention-program in which you're identifying the case earlier as a reinsurer. What we've said is, if you get into this information, you can't rely upon those 50 percent notices any more. It's getting at retrospective claims data. You need to get into this and set something up so you're getting it directly from the UR vendors.

That's exactly what we've done. We've set up an early warning system. You develop an early warning system that's basically a seamless electronic connection between you and the UR vendor, in which you receive data on your insureds; when

it comes in, they call, they certify. It transfers into a system and you don't have to rely upon the TPA or UR vendor to manage the risk.

Once you develop the early warning system, you can identify those potential claims through the ICD-9 codes, common procedural technology (CPT) codes, and frequency—there are all types of ways to identify these potential catastrophic claims. That gives you an opportunity to step in and actually manage your risk once you've identified it.

The early warning system basically has two things that it can help you do. You possess the data to manage the case yourself. You also have a format of data and more of a comprehensive database to analyze, review, and take a look at.

The conditions that we can identify very easily from that initial precertification are pregnancy, the neonates, the spinal cord injury, etc. (Table 8). These are all conditions that you can actually have an early intervention with and do something different than what the traditional UR vendors have been doing.

Table 8

## Complex Clinical Conditions

- **HIGH RISK PREGNANCY**
- **COMPLICATED NEONATES**
- **SPINAL CORD INJURY**
- **MULTIPLE TRAUMA**
- **ACQUIRED BRAIN INJURY**
- **SEVERE BURNS**
- **TRANSPLANTS**
- **ONCOLOGY**
- **NEUROLOGICAL DISORDERS**
- **AUTO IMMUNE DISORDERS**
- **CARDIOVASCULAR CONDITIONS**

When thinking about the claim, if you're reinsuring your group of 500,000 lives, how many catastrophics can you expect? Of these that we've listed you can expect about 25 each. The average first-year cost on one of those is about \$200,000, whereas in the first year, you're going to spend almost \$15 million. And it obviously gets worse over a five-year period. This is the kind of thing that we're trying to prevent and assist in controlling a little bit better.

The frequency and cost summary—catastrophic claims equal about one percent of the total claims that come in. However, the dollars paid out equal about 20 percent, so that's the impact that they can have. Again, that early warning gives you a chance to manage the money that's being paid out and actually put some programs in place.

### **Early Intervention Opportunities**

There are several opportunities to do this. One is to identify the potential high-dollar catastrophic confinements (Table 9).

Table 9

## Early Intervention Opportunities

- Identify potential extended, high dollar or catastrophic hospital confinements
- Cap the claims cost with global or all inclusive event rate
- Steerage into centers of excellence
- Identify out of network providers and obtain discounts
- Through case management assure care is provided in the most appropriate setting
- Negotiate prospectively

Another is steerage into centers of excellence. Also, establish that case management is in place and that managed care discounts exist. If they don't, you certainly have the opportunity then to negotiate prospectively.

One of the things that we try to think of is, nurses sometimes are case managers and will try to negotiate with the facilities and with the providers. We think that's probably a better job for the reinsurer. You have someone who could do a better job negotiating with the hospital. If you're aware of the discounts that the hospital takes, you'll know what they'll accept. There are all sorts of opportunities there.

### **Benefits of Early Warning**

On a transplant without an event program, you're talking about \$219,000 a year—that's an average, and this is data from 1998, so it's probably gone up a little bit. With an event program, you can probably save a little bit of money and get it down

to about \$178,000. One of the things we're looking at is the savings of \$40,000. If you base this on that same 500,000 covered lives, your total savings could be just more than \$2.6 million.

Early warning is not just receiving data from the UR vendors. The pharmacy benefit managers (PBMs), also are people that you can notify earlier so that you can identify individuals who are being treated as an outpatient. That's information that's very easily obtainable.

PBMs are required to provide that data electronically and report that to the government—I believe it's monthly. You can receive that data very simply by asking and they will be more than happy to provide it to you if you are their client. That gives you an opportunity to identify people that have an outpatient condition. It can help you eliminate some underwriting exposure if you know what's out there, even though they're not being admitted, they're not hitting 50 percent. It may be coming, and you could actually identify that through the types of drugs or combinations of drugs that they're taking.

### **Disease Management Programs**

When you do identify someone through something like that, you need a disease management program to target those high-risk conditions; prevent and delay the progression of the disease and optimize the patient's health status. A lot of that is education—making sure that they're doing what they're supposed to be doing—taking their medications, keeping their blood pressure under control and they don't wind up in the hospital.

The five major components of a successful disease management program are:

1. Identification of potential candidates.
2. General and clinical assessment.
3. Stratification for appropriate intervention.
4. Intervention in managing care
5. Evaluation and outcomes, which is the reporting side that identifies your successes. It's very important that you have that information.

### **Management Continuum**

To understand all the needs for programs like these, you will look at what is called the medical management continuum (Chart 4). You have the first one, which is the high-frequency, low-dollar claims, which fall into that disease-of-demand management program. The trend in the market is to intervene and intensively manage these cases, and that's the asthma, the diabetes, things like that.

The second part of this is the medium frequency, medium costs, and it's usually the hospital inpatient confinements and surgeries. This is where utilization review and case management play a very important role in the existing medical management program. They have historically shown success in impacting the costs here.

The third is the low-frequency episodes of care. They account for the highest costs per episode. These are by nature the catastrophics—the severe burns, the neonates. They're rare, and they require specialized treatments. You never know when they're going to hit you and how much they're going to cost. They're probably the hardest of all the claims to manage.

When you identify the claims early you have an opportunity to step in and do something different—and you don't have to depend on someone else. I'm sure many of you are aware of this, and you find out, and it's done. But this gives you an opportunity to step in and make an impact. It's your money that you're backing them with, so you can see a savings basically through the implementation of these types of programs.

### **Event Rates**

A word to explain event rates: We have a global event rate that you can look at that's an all-inclusive event rate, maybe for a year of treatment on a kidney transplant. You can see a savings of 19 percent if you're able to identify those transplants, neonates, and severe burns and establish these event rates. In direct negotiations out of network, you can see a 21 percent reduction of what we've been able to show through our efforts.

**MR. MICHAEL R. MCLEAN:** The topics that I'd like to cover are the importance of networks when pricing catastrophic claims; the impact on them; and something that's a little esoteric—cost-led pricing versus price-led costing; and something that's also a little different, network remediation.

We've evaluated several hundred networks across the country, and I can tell you from what we've seen, the stop-loss liabilities can vary by a factor of 10, depending on the network that's used. So we think networks are pretty important. In fact, just like real estate is location, location, location, we think that stop-loss liability is networks, networks, networks.

### **Price-led Costing**

I'm going to switch gears a little bit. The traditional actuarial approach is to build the price based on the costs that were given, which I call cost-led pricing. The proposed approach that we're doing is price-led costing, which will sound insane at first. But it's "Price to the market and try to force your cost to follow."

The first time I ever heard this was from Andy Grove. At the time he was the CEO at Intel, and he said the way they do their pricing is, they price to the market and then they try to force their cost to follow. Now, as an actuary, I was thinking of saying, "Andy, this is sacrilege, how can you be doing this? We all know that's not the right way to do the pricing!" In our field, we do pricing by taking our claims, trending them forward for inflation, adding on expenses, then contending with competition. That's Actuarial Studies 101—take your costs and price for them.

I thought, well, at least at the time, they were pretty successful. Now it's not maybe a good time to talk about Intel, but this was about six years ago, so they had a good run, let's put it that way. As Andy said, they price to the market and try to force their cost to follow.

It was working for computer chips. There must be something different about computer chips. They've got to spend billions of dollars building these fabrication plants and billions on R&D and all that. They've got a high initial investment, then they have a very low marginal cost, and they can literally make it up in volume. So it works for computer chips, but it could never work in health care, I thought.

Then I had that little light bulb go off when I was thinking, "What do the HMOs do to the indemnity players?" Indemnity players are pricing at \$100. I was on the wrong side there, I was on the indemnity side.

The HMOs shadow-priced us. We all know that. They came along, they priced to the market, they priced it at \$95, and then they took the important step. They said, "I've got \$25 for expenses, I'm going to capitate my physicians." In some instances, they capitated their hospitals. So they literally priced to the market, and then they forced their costs to follow. Again, they had a high initial cost in building the network, but they had a lower marginal cost, so again it sounds like sacrilege, but it worked for the HMOs.

There's a great article in the September 1995 issue of *Harvard Business Review*. It's a little seven-page article in which Peter Drucker describes the things that executives really need to know. He states one of the things is that knowing the cost of your operations is not enough. So it's not enough to know how much my own pencils cost and of the dollar of premiums that we're looking at— I could look at \$0.30 of that. The rest of it is claims, the \$0.70. It's not enough to know the cost of sellers using commissions.

Drucker says, "Companies are beginning to shift from costing only what goes on inside their own organization to costing the entire economic process." So I would equate that to looking out and saying, "OK, we're going to look at the different claims. And some PPOs are different from others.

This is something that the company has to work on with other members of the chain to manage costs, so it's not enough to just be reacting to what lands in your lap. You've got to go out and impact your costs.

A book that Drucker wrote recently explains that all the great companies won basically because they had lower cost structure. When Sony did their price structure, they could come out and say, "I could sell a lot of Walkmen if the price is \$50." So they would go to all of their parts suppliers and say, "The price is \$50. We need to make sure that with the components together, we can sell this and make a profit for \$50." We would equate that to saying that we need to go to our parts

suppliers, which are the hospitals and the PPOs and potentially even the doctors—to anyone who's costing us money.

One of the other things he says is that these companies that do price-led costing are still rare exceptions. Most businesspeople still consider it a theoretical abstraction. And if I were sitting out there, I'd probably at this time still consider it a theoretical abstraction, too.

However, managing the economic cost chain will become a necessity. Once a few people do it, the others have to do it if they're going to survive. So again, how do we do our current stop-loss pricing? I don't know—I take the claims just like fully insured trends for inflation, add expenses, then contend with the competition.

What we're proposing is a paradigm shift. Instead of just being reactive—when a case lands in your lap, putting on that case, based upon whatever network good, bad, or ugly that you've evaluated—I think you should become proactive, actually going out and impacting the stop-loss liability in certain networks. And then through pricing or higher commissions or whatever you choose to do, strongly encourage the use of these networks.

### **Applying the Theory**

How do we apply price-led costing to specific stop loss? First, I think we have to realize that we want to concentrate on lowering the inpatient hospital bills of very large claims.

Dave Wilson is in the front row. I think you threw out a figure once that for claims over \$200,000, hospital inpatient was 91 percent of the total claims, and that's consistent with some other data we've seen. We're also concentrating on the tertiary-care hospitals, the community hospitals. They don't really tend to rack up the large claims. It tends to be fairly safe to concentrate on the tertiary care hospitals, and we've got about \$100 billion of shock claim data just on hospital inpatient, so we think we know where the large claims are coming from.

What we're saying is, we deal with a select number of PPOs, and we help them to remediate or fix their networks to make them what we call more stop-loss friendly, which means they give us much better discounts on large claims.

Look at the percentage of liability that is hospital inpatient at various deductibles. First-dollar hospital inpatient is not like it was 15 years ago. Now it's really only 26 percent of the total claims. It's not that big a deal. But by the time you get up to that \$200,000 deductible, it's about close to 90 percent of your liability. If you go to a \$300,000 deductible—not that we sell a lot up there, but if you do go up there—hospital inpatient is 94 percent.

If you can control the hospital inpatient cost, you can pretty much eliminate your shock claims. At least that's the theory.

For most of the PPOs—and we've looked at several hundred networks over the last 10 years—what we notice is that with the vast majority of these networks, we obtain big percentage discounts on small claims and small percentage discounts on big claims.

In a typical California network, we might see a 65 percent reduction from billed charges. The reimbursement is 35 percent of billed charges for the small claims less than \$30,000, and yet it might only be a 25 percent reduction on claims more than \$30,000. So this is not what I would call very stop-loss friendly. You're giving huge discounts on little claims, but not very big discounts on big claims. In fact, from the stop-loss carrier's perspective, this is kind of ridiculous. We're getting poor discounts, so it doesn't make any sense.

### **Outlier Provisions**

The real problem is the outlier provisions. In fact, the outliers destroy discounts for large claims. I would contend that unless we confront the outlier issue head-on, we cannot overcome the fact that we are reimbursing the hospitals far too much for large claims.

How did the situation arise that we're getting big discounts on little claims and little discounts on big claims?

We looked at \$1 billion of CIGNA claims because we had access to their networks at the time. Let's say I'm making up numbers, but the average cost per day of a stay was \$1,250. Someone had a great idea: Let's form a PPO; let's get a 20 percent discount. Let's do a \$1,000 per diem.

That made a lot of sense 15 years ago. The problem is, over time, it has not gone down. But that per diem really hasn't gone up much, either, unless you're very good.

This is inflating, in the years we looked at, about 2 percent. In other words, you're per diem with \$1,000. It might have stayed at \$1,000 the next year, it might have gone up to \$1,050. But it wasn't inflating much.

Billed charges, on the other hand, for the years we looked at were inflating at 10.2 percent per year.

Does everyone understand what an outlier provision is? It's this little asterisk that says, "These rates apply unless billed charges exceed some threshold (\$30,000)," in which case, "Reimbursement will be billed charges, less 20 percent."

What's happening is, for big claims, we're essentially paying 80 percent of billed charges, so when people say billed charges don't matter, I would disagree. In fact, they're the only thing that matters for shock claims, because the vast majority of these contracts have outlier provisions.

It's like a Mickey Mouse balloon. Somebody has been squeezing in on the head for a long time, on the per diems, putting pressure on them. There's no inflation there. The ears have gotten really big, and the ears represent the shock claims. What we get are really big discounts on small claims and relatively small discounts on big claims, and it gets more and more perverse each year as the billed charges are going through the roof and the per diems are staying flat.

In fact, if you actually compound this problem that we just talked about for the last 15 years, that's how you can get 65 percent to 70 percent discounts on the small claims and yet a relatively small discount on the large claims. That is the "Evil of Outliers."

The hospital has to get inflation back somewhere. It has to get a raise. They haven't had a raise on appendectomies in 15 years, so what they artificially inflate their billed charge. The only thing that matters for the billed charges is the large claims that are paying 80 percent of billed charges. So the large claims are inflated dramatically, resulting in what I would call inefficient dollar swapping between the employer and a stop loss carrier.

For self-funded cases, the only risk transfer going on for the most part is specific stop loss. If, by squeezing in on the head of the Mickey Mouse balloon, we've got these ears really big, the problem is for the claims toward specific and aggregate—if a claim is towards aggregate, the employer pays \$1. There are not expenses there.

If we force claims on the specific side, the employer has to pay about a \$1.50 for stop loss, because we're dollar swapping. The whole reason minimum premium existed in the first place was to avoid dollar swapping. The reason stop loss exists is to avoid your giving me a \$1 of claims, and then I add my \$0.50 of expenses and give it back to you. It's inefficient. So again, the outlier provisions are not good for the employer,.

There's also inappropriate allocation of hospital resources. Hospitals are actually losing money. When you look at all claims under \$30,000, they're actually losing money. We go to hospitals and they laugh. And we say, "Why are you laughing?" They say, "Well, because I know I lost \$7 million under the outlier last year." They know they're losing on the small claims—that are the vast majority of claims that they do.

Everybody wants to do liver transplants. Why? Because that's over the threshold. I can make a huge profit margin on that. So I think it's an inefficient, inappropriate allocation of hospital resources and this causes difficulty for the hospital budgeting. It kills the stop-loss carriers, because we get hit with all the inflation.

### **Examples**

We looked at \$100 billion in shock claims from the hospital discharge databases around the country—just looking at claims where billed charges go over \$35,000.

These are shock claims in which the average cost per day was \$6,000; this is pretty expensive.

What ends up happening is that four-day stays might rack up \$24,000. It's pretty bizarre, but when you actually look at it, if you had a \$1,000 per diem, that \$24,000 claim would be repriced to \$4,000. We've really squeezed in on the head of the Mickey Mouse balloon here. We've really taken down the appendectomies of the world. However, once you hit that \$24,999, then one extra dollar, and it's 80 percent of \$25,000, or for the \$30,000 claim, it's \$24,000.

Literally that \$1 of extra billed charges costs the employer an extra \$16,000. You go from \$4,000 up to \$20,000. It would be like the IRS telling you, "You made a dollar more in income last year, now you owe \$15,000 extra in taxes." It doesn't make any sense. (That's my story and I'm sticking to it.)

**An Interesting PPO Case.** Here's some actual hospital data for one of the networks we're doing this with. We'll call it "PPO XYZ". It had a great per diem.

The hospital we looked at is the hospital in the country that has the greatest number of shock claims that go over \$35,000. They actually have 4,533 claims in a year over \$35,000, so they're a very big hospital. The per diem is great—\$1,025.

PPO XYZ doesn't want to open their contract with the hospital when they want a \$1,025 per diem. So the PPOs are saying that they don't want to go back to the hospital and renegotiate. The hospital doesn't want to renegotiate the outliers because it can bill what it wants for large claims, and get paid 80 percent of it.

The outlier in this instance with PPO XYZ and the hospital was \$25,000, and typically we got a 20 percent discount once we hit the outlier. The interesting thing, though, was when we looked at total reimbursement from this network to the hospital, it was \$4,711 per day. I was asking, "How can this be? I know I've got \$1,025 reimbursement on the little claims. How can my average of little and big be \$4,711? I must be doing something really bad for the big claims."

So we went back and looked at the hospital database— again, it was all discharges from this hospital. These were commercial claims, not Medicare or Medicaid. We looked at 4,533 claims. Again, the billed charges were more than \$35,000, and this represented about \$450 million on these claims. I think it's about \$100,000 for each claim on average, and that was 47,000 bed days, so this is an incredible amount of data we're looking at it.

The interesting thing is, if you take the \$450 million, divide by the 47,000 of bed days, you get \$9,573 a day for billed charges—and this hospital is not really that unusual. It's just a little bigger.

For claims that don't hit the \$30,000, I'm paying \$1,025—about \$1,000 a day. For large claims, billed charges are about \$10,000 a day, with a 20 percent discount.

So, with a \$1,000 per diem on small claims and an \$8,000 per diem on large claims, it's averaging \$4,700 dollars. But what really counts for the stop loss carrier is that it's basically \$10,000 a day with a 20 percent discount. We're paying \$8,000 a day.

When people say it's going to be difficult for me to renegotiate, I would be hard-pressed to not beat \$8,000 a day. It's pretty easy to do that. So what is the solution? We partner with a couple of select PPOs and eliminate the outlier provisions within these networks. To be fair to the hospital, though, you've got to raise their per diem to make it revenue neutral for the hospital, and then we, through whatever mechanism, steer employees toward these PPOs.

We've actually done this and gotten agreement from 200 hospitals. We've targeted 500 hospitals around the country and 200 have agreed. Some people say, "I'll wait until you get the 500." They're missing the point. If I get Hartford Hospital done and Yale in Bridgeport, I own Connecticut, because I've eliminated virtually all my liability.

**Will the Strategy Work?** Will the strategy of pricing to the market work? Well, I think in the stop loss industry, we've all shown that we're capable of pricing to the market. The industry lost about \$1 billion a year collectively for I don't know how many years in a row—there were at least three—and there were about five bad years altogether.

Can we force the cost to follow? What's interesting is that on a lot of HMOs, I always wondered why HMO reinsurance at \$50,000 was much less than that of typical stop-loss carriers. I thought maybe they really were doing a much better job managing claims. Maybe they got the younger, healthier population.

**A Connecticut PPO.** I've looked at a lot of PPOs and HMOs. I looked at one PPO with 27 hospitals; and in the 27 contracts, 22 of the 27 had outliers on the PPO side. On the HMO side, four of the 27 had outliers.

The HMOs don't tend to have outliers as often, so what ends up happening is that the sales rep is sending in the data, and he's quoting on the PPO side, and he's saying, "How come you're getting such a big difference? It's the same network." No, it's not the same network at all. It's a vastly different network, and the liability was three- or fourfold different between the PPO side and HMO side, even though it was really the same name out there. So the loss ratio on our business for HMOs has been much better.

We've had a couple very large ex-clients that we pitched the idea to years ago. They got rid of the outliers. We're talking \$100 million, plus blocks of business; for

one of them, the loss ratio went down to 29 percent; for the other one, the loss ratio declined from 60 percent to 35 percent. So this is not just theory on whether it works or not; it's been done.

This is over the same time period in which, a lot of industry loss ratios were more like 129 percent, not 29 percent.

We've also done this with one Blue Cross. This particular Blue Cross is about as good as it gets, because their network, from what I understand, is essentially global per diems without any outliers at 96 percent of the hospitals in the state. So you'd have to be really hard-pressed to underprice them .

There was one entity they were pricing—giving 50 percent PPO discounts and discounting their manual 50 percent and running a 30 percent loss ratio after all that. But they tried the same thing outside of the Blue Cross network, and let's just say it didn't work as well.

Network remediation is not a theoretical abstraction. How much can remediation reduce your specific stop-loss liability? We went to a very large carrier and told it, "If you eliminate your outlier provisions, what we have determined was at a \$50,000 deductible, if all you do is get rid of your outliers, \$1 a stop loss turns into about \$0.20, so it's a five-fold reduction."

This is not quite there, but this is getting rid of the outlier and not raising the per diem to make it revenue neutral. If all you do is get rid of the outlier at \$50,000, \$1 turns into \$0.20. At a \$100,000 deductible, the leveraging is more, and the claims are more intense; their getting them back down to the per diem is even better. At \$100,000—\$1 turned into \$.08 of liability. This is older data that's even more dramatic now.

The actuary said he couldn't believe that it was this good. So he went out and duplicated the study and came to the conclusion that if you got rid of —, the outlier provision, \$1 of stop-loss liability turned into about \$0.15 cents. So it works. And this was at an average deductible of about \$75,000 on 100 actual claims from this very, very large carrier with tens of millions of lives!

So the actuary went to his contracting people and said, "Hey, we've got this great idea. Get rid of the outlier provision." The contracting people said, "Hospitals would never go for that." So the idea didn't get implemented.

In the meantime, we built up a \$3 million block with one of their future subsidiaries, and we were having to reinsure it back to them because it was so profitable. They were the 900-pound gorilla in their market. We had 14 cases the first year, \$1 million dollars of gross premium, \$567 in claims, which is a good loss ratio.

They didn't have any outlier provisions, so billions of dollars were spent buying this network. Then they went to them saying, "We have this great idea: Why don't you get rid of your outlier provisions?" The HMO said, "Why would you have outlier provisions?" That's when this carrier realized, "Oh, this is not just theoretical." So they got rid of the outlier provisions, and their loss ratios declined precipitously across the country.

**Reverse Leveraging.** The first thing you have to realize, is to reduce your stop-loss liability, you don't need to reduce your claim that much, because we all know what leveraging is. Well, it works in reverse too; there's reverse leveraging. The other thing going on is, large claims very often exceed \$10,000 a day, so getting down to a \$2,000 per diem, that 80 percent reduction leverages quite nicely.

I want to talk about reverse leveraging. A 30-day stay at \$5,000 a day of actual reimbursement, a \$150,000 claim, with a \$50,000 deductible—leaves \$100,000 of stop-loss liability. If you get down to \$2,000 a day, which is only a 60 percent reduction in the claim from \$5,000 a day to \$2,000, there is a 90 percent reduction in your stop-loss liability, so that's the leveraging we're talking about.

One actual recent large claim came through at billed charges of \$1.7 million and a length of stay of 106 days. It was actually a Blue Cross claim in which we'd stripped off the stop loss because they do a pretty good job of discounting. They got almost a 50 percent discount down to \$855,000.

Now you'd look at this claim and you'd probably say, "Well, this is an unusual claim. It's \$16,000 a day. That is unusual."

Then we went back and looked at the hospital discharge database. And you're right, it is an unusual claim. We got a break. The average billed charge at this hospital, on 774 claims from the hospital discharge database, was \$17,500 a day. If you go and look at some of your large claims you've probably been hit by the same high level of costs per day.

The interesting thing, though, is that there were per diems on this case—a \$900 per diem and a \$300 one for skilled nursing facility days. So had the per diems been allowed to apply, this would have been a \$93,000 claim.

I would rather pay double the per diems. Charge me \$1800. Anything you can do to get the hospital to not bill you a percentage of retail or to not be able to just bill whatever they want is good.

**Closer Look at Another Hospital.** One of the hospitals we were talking to actually had all of their claims in a spreadsheet. They had three things in the claims that were very interesting.

The first thing they know for every inpatient claim is what the billed charges were; all hospitals know that. They also all know what the reimbursement was. But this particular gentleman also had his total cost allocated back to each claim. And according to his assessment— with everything rounded to the hundreds—billed charges were \$2,700 a day. The hospital's reimbursement was about \$1,000 a day—again, a 63 percent discount.

The interesting thing was that his costs, once he totaled them all up, were \$1,100 a day. He came to the conclusion that on the vast majority of all the claims that they were doing, they were losing \$100 a day. Why would they do that? Well, because they can build wings when they get to the next column.

On the 504 claims in the database with billed charges greater than \$30,000, their costs were a little higher at \$2,000 a day. The interesting thing is that their billed charges were \$4,500 a day.

The data we had from the hospital discharge database said \$7,800 a day, so they did give a discount. This represents a 40 percent discount down to \$4,500. However, they're making \$2,500 a day on those 504 claims, and the average length of stay on these claims here is about 10 days. They're making about \$15 million on the large claims and losing a few million on the small claims. It doesn't make a lot of sense to us as a stop-loss carrier, though. The actual reimbursement has no relation to the hospital's expenses.

### **Why Eliminate Outliers?**

Why would a hospital eliminate the outlier provision? Well, it's revenue-neutral to them. It actually makes more sense than the existing reimbursement system, in which they lose money on the vast majority of claims with the hope of making it up on a few claims. And, in fact, it's more stable profit.

At that hospital, he showed me one claim on which the billed charges were \$1 million with reimbursement at \$700,000. His expenses were \$200,000. They made \$500,000 on one claim, and yet, collectively, they lost millions of dollars on the thousands of small claims. It doesn't make any sense. It's not very budgetable.

The revenue-neutral aspect is a win-win for the hospital with the extra patients and budgetable profits on common procedures. For the stop-loss carriers and reinsurers a very low liability means competitive rates, higher commission, or whatever you chose to do.

For employers, I think it actually makes more sense, because they can still fund a larger portion of their total claims. And in doing so, they don't have to dollar swap and add expenses on those claims; so ultimately, they'll be better off.

**MR. DANIEL L. WOLAK:** Dr. Poteat made many interesting comments, but there was one in particular—that for doctors it's very difficult to predict who is going to have large claims in the coming year.

Our stop-loss underwriters normally do their underwriting two or three months in advance of the renewal. They have, let's say, a limited amount of data; they have claims paid in the past year. They probably have notification of claims, which might be less than 50 percent of the deductible or certain other conditions, information based on claims at certain ICD-9 codes. I guess I'd like to ask the panel for their thoughts on how well a stop-loss underwriter can predict in a normal environment what groups are going to have larger claims in the coming year.

**DR. POTEAT:** I think there are a couple of issues. One, I think, is reproducibility. I think reproducibility is best achieved if you have a machine-built set of rules. If you can come in and use a data-mining system to look at the history—what people at that specific insurer in that specific market for that specific product have ended up being high cost in the future—and build a set of decision rules that leverages that experience and that specific market. Then you have a reproducible process for identifying individuals that are going to be high cost next year.

When you do this data mining, you're essentially trading intuition for some degree of reproducibility. Dave can do 500,000 simulations of a claims distribution; by the same token, our rational artificial intelligence process can look at 10 million different combinations of variables in a couple of days, so you get to a reproducible process. And that's important for underwriting. You can do it within the time that you're allotted to do it because this rational, artificial intelligence allocates computing time better.

The other way to make your underwriters more effective is to rely on the machine to do some prescreening. We've had a number of clients, when their small group business was 20,000 lives, that could hire one or two nurses and they could handle that book of business. Now their small group business is growing very quickly, they're up to 80,000-100,000 lives, and they can't look at every case, so you build a custom set of rules for that market and that product that tells them, "OK, look at these 2,000 or 3,000 cases, and use your intuition."

The other thing that this does is it helps to create reproducibility, because now you can probably use the same underwriter so you're not getting inadequacies in underwriting. So if I can use the same underwriter that I've used for the past two years to underwrite 2,000 cases that the machine spits out, my level of reproducibility is much better than if I'm using seven different, say, nurses that I've hired in the past six months, and I have no idea what their track record is. That's a much different situation.

**MR. WOLAK:** I guess from what you said, you're strongly suggesting a quantitative response or a method for determining renewal rating for stop loss. Of course, in your world, you're probably dealing with underwriters who are using a lot of intuition. I'm wondering, can someone with the intuition and a limited amount of data make that process work? How well does that work? You are suggesting that it would probably be very hit-and-miss and to just use intuition rather than a strong data model.

**MR. MCLEAN:** I think if your question is, how well can underwriters predict shock claims based upon the current tools, based on current loss ratios? I'd say they weren't as good as they thought they were. Obviously, I believe you want to take the intuition out of it and do any kind of quantitative analysis you can. The concern, though, was if any of the shock claims for next year weren't shock claims this year. That's what insurance is for.

**MR. WOLAK:** To add to that very briefly, Mr. Becker had a nice chart on which he showed the continuum over 50,000 (Chart 4), and he talked about fragmented procedures, generalist approach, and reactive management. To get a single physician to make a living doing nothing but underwriting high-cost claims, you really have to have scalability; and I think there are a few physicians out there that are willing to do that. But to have a person who's got a patient load of 1,000 patients, and you call him up once a month and ask him, "How much is this case going to cost?" it's not surprising that you don't get higher quality to me.

**MR. ROBINSON:** Dan, I think that the underwriters are going to have to look beyond just underwriting models. I think they need to go to risk assessments, deal with physicians and nurses who can assess that individual and look at the individuals in the sense that they look at the conditions that they've had and try to establish what the cost will be for this individual over a year.

**MR. MICHAEL L. KELLEN:** Dr. Poteat, I have a question for you regarding your model. As I understand it, the model creates a risk score and uses that risk score to predict next year's claims on a given group, or maybe even on a given individual, and then puts the individuals together. Have you compared that with more traditional models? In the past, loss ratio and past experience oftentimes have been used as a proxy for what's going to happen in the future. More recently there's been another model, which is to have a person sit down and actually look at not just the loss ratio, but the drug claims and other claims and try to make a judgment as to whether this case is going to be high cost next year. So compared to those two models, how does this model compare?

**DR. POTEAT:** I think to be direct and not to dodge your question, in the very specific comparison that you're suggesting the answer would be no. There have been several comparisons. We typically will compare these predictive models to logistic regression. Logistic regression is very fast, very cheap, and if the model doesn't do significantly better than logistic regression, we don't ship it to our client.

We've been approached by the actuarial community to deal with cases in which people go from being very low cost to being very high cost rapidly. They'll tell us, "I passed my load factor onto the small groups where I have three or four cases that are exceeding \$20,000 a year. What I need to know is of these 5,000 groups I have for which I haven't passed on any load factors, and I don't have any expensive players, can you tell me which of those 5,000 groups I should be concerned about and perhaps proactively pass on a load factor?" There, I would say that there's such a big need. In those inexpensive groups the loss ratio would be favorable to the payer and therefore the comparison would be not as relevant or in need of actuarial help.

**FROM THE FLOOR:** A couple of things on the last two comments: First, there is a study being done by the Society of Actuaries research department on predicting claims in which they have three models. I believe one uses drugs only to predict claims and the others use combinations. John Bertko is head of that research project. There are some people at Milliman USA who are working on that one.

Going back to the previous question, my company, INTEL Rx, is a company that deals with drugs in terms of the underwriting process. We bring drugs to underwriters from PBM databases to use in new business underwriting and have been investigating the whole problem of the predictability of drugs. There are some very large insurance companies right now that are using drugs purely for the renewal underwriting of small group. That's the only input that's going into their processing in terms of predicting claims, and I think part of that is because of the small group limitations for health.

I've also seen studies done using drugs on predicting large claims for reinsurers and they've gone to HMOs and have actually been using drugs only. I think the biggest problem we have in the stop-loss area is data itself. The one piece of data that I think is good is drugs. You can get it off the databases that are independent of the PPA itself, and if people would take a look at drugs themselves, there are a lot of predictive models that we are working with in terms of being able to predict large claims, small claims, all those kind of things.

**MR. MCLEAN:** It's not my field, but I think drugs are a good early predictor. Certainly they occur a lot before a hospital stay as an indication of a problem.

We're dealing with people who are going to be using pathology and lab reports from hospitals. I think in those two things, combined with drugs, we may have something where we can ignore the claims that are being paid by TPAs and set stop-loss rates, both aggregate and specific based on those factors. That may be the solution to the whole problem.

**DR. POTEAT:** I both agree and disagree. Let me handle the disagree part first.

I think that again going back to my beer commercial, a beer company will take everything they know about you: what kind of car you drive, what block you live on, how old you are, how many kids you have, what your median income is. They can tell us more by mining through all that data, about who's likely to buy their product than we can tell about whether they're insurable or not or what rate we should insure them at.

My focus is, if we are lucky enough to be in a data-rich environment, we as the medical industry and the actuarial industry ought to be using every available piece of information and very high-powered technology, because the technology is out there. That's the disagree part.

The agree part is, yes, reinsurers often work in data-poor environments, and we have seen that it's very client dependent when we use our data-mining system. There are some clients with which you have a particularly good PBM. You also have bad claims databases in which the machine's opinion is that the Rx data, the drug data, is highly predictive. But that's not always the case.

You have other situations where other pieces of data are predictive, and I think we're both saying the same thing in that being locked into a situation where you can only use the drug data or you can only use the CPT-4 and the ICD-9 codes, that's not a place where I think we want to be. We want to have a high degree of flexibility about what data we can use in what circumstances, especially with the government coming in and telling us what data is going to be fair game for making these projections. We want to have flexibility. I think it's very important.

It gets down to, the size of the carrier, how much money they're willing to spend in the data mining. It's a lot of work to take a company's database, go through it, get information, and say it's reliable. You know when somebody used a drug and that's substantial value. In most cases, the stop-loss carrier doesn't know if anything happened for the last five months, but it does know drugs; they know what happened yesterday, and I think that adds a lot more value.

**MR. HARRY L. SUTTON JR.:** I see a problem with the business. What do you do with a carrier that sells stop loss and has 100 TPAs? It's very interesting when Dr. Poteat talked about HMOs, but HMOs process 100 percent of the claims. They can catch those disease items sooner.

As a carrier in the stop-loss business, we don't get any of the claims below the break points. We get notified in advance and how would you, if you don't have a concentration of business in a given metropolitan area where you have a lot of lives, ever come up with the data that you're talking about getting?

**MR. MCLEAN:** That's always one of the biggest issues with that type of coverage.

We were talking about the fact that there's so much variability. Sometimes you're lucky if you can get something that's adequate. I think that's part of what Chuck was talking about, what they're trying to draft in terms of looking for the source of the data and looking at the UR vendor, especially when you're talking about the catastrophic claims and trying to find any way they can to take any piece of data that the UR vendor, say, or TPA can provide and try to build a database from that. That might be a database that brings together data from different employer groups, different TPAs, anything that contains enough data elements to put together something that's predictive. It is difficult.

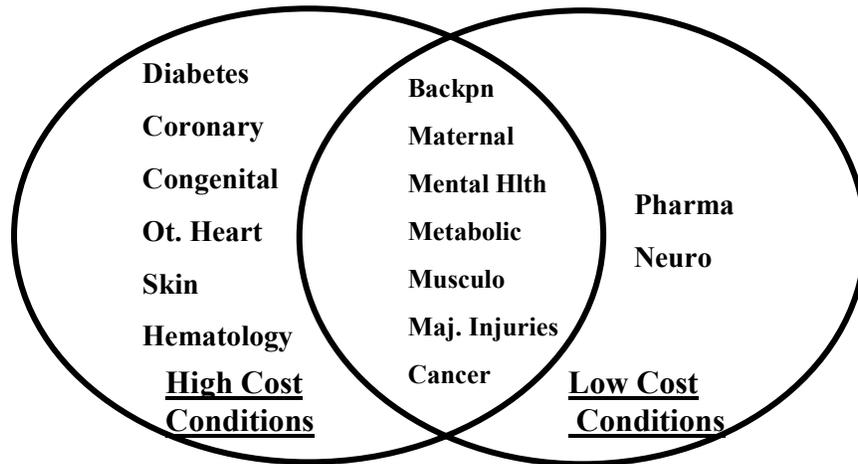
**MR. POTEAT:** We try to have a data-poor model that recognizes that many times, you're going to be essentially in a manual-underwriting mode.

The data-poor model is called MST, and the idea is to really heavily leverage epidemiology, so if I know what the eligibility for your group or set of groups looks like, I then build up from knowledge about disease prevalence—who is likely to be there, what diseases they're likely to have from a purely epidemiological perspective.

I then leverage that with benchmark claims data that I get from a benchmark claims supplier, and then I try to ask experts about what they think the coming trends are that are going to put people over the attachment points. I agree with Tim, it's not fun; it's a lot of work, and I think Tim's team has a different take on how to do this. I think they're both creative and innovative and have a lot of potential, but it's no fun right now.

Chart 1

**Model H(RAI): MCC's which are Consistently or Conditionally Associated with High Cost Cases at Client Y**

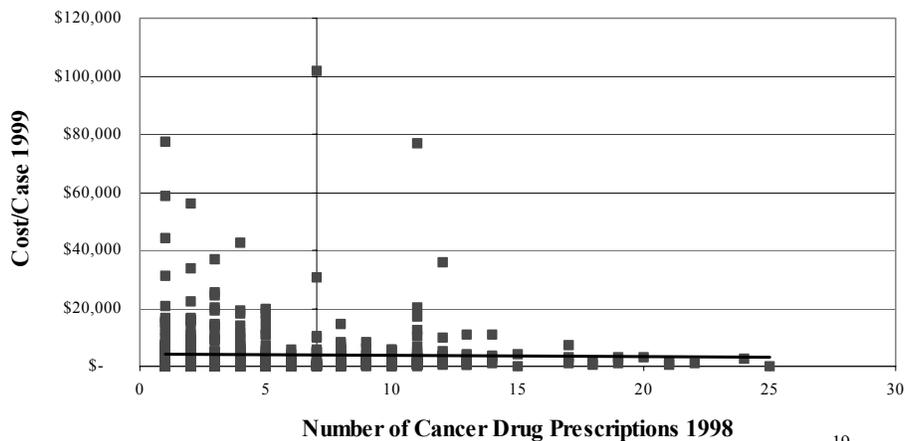


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Chart 2

**Cost per Case 1999 by Cancer Drug Prescriptions 1998**

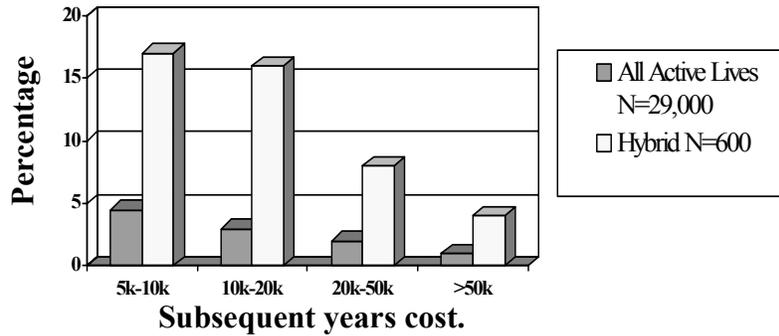
Number of Cancer Drug Prescriptions in 1998 and Amount Paid 1999



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Chart 3

Distribution of Individuals within Client Y population and within the population identified by the Model H(RAI) rule set as high cost. (\*>\$10,000).



**LEGEND:** The percentage of individuals who fall into a specific cost category is depicted. The population on the left is all insured, numbering approximately 29,000. The population on the right is a cohort of approximately 600 people predicted to be high cost in 1999 using 1998 data.

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Chart 4

## The Medical Management Continuum

