

# RECORD OF SOCIETY OF ACTUARIES 1994 VOL. 20 NO. 1

## WHERE YOUR SOA RESEARCH DOLLAR GOES

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JAMES C. HICKMAN  
Recorder: MARK C. ROWLEY

- SOA research structure
- Update on projects and experience studies

MR. AARON TENENBEIN: First, I'd like to introduce the panel. I'm a professor of statistics in actuarial science at New York University, Stern School of Business. Our first speaker will be Jim Hickman. I knew Jim when I was an actuarial student, and I have read much of his work. He has had a distinguished career in teaching and research. He was professor of actuarial science at the University of Wisconsin until 1985, and from 1985 to 1990, he was dean of the School of Business. Jim will give you an overview of the whole research process, what the purposes of research have been, the various processes for funding, and the different kinds of research.

Our next speaker will be Warren Adams, who also comes from an academic background. He taught at Drake University and was head of its actuarial program for 20 years. Warren was the first director of education at the Society of Actuaries; currently, he's director of actuarial education and research for The Principal Financial Group. He is head of the Committee on Research Coordination (CORC). He'll be talking about his experiences on the CORC and the general process of getting funding.

Our third speaker is Kyle Grazier from Cornell University. She'll be talking about the process of securing grants from the Society of Actuaries and also the kind of research she has been doing. Kyle has been developing a database on catastrophic claims.

MR. JAMES C. HICKMAN: I grew up in mathematics and in mathematical discussions; it was ingrained in me that you always start with a set of postulates, or axioms. I would like to start with three axioms: the Society of Actuaries is a scientific and professional organization. The support for this postulate, or axiom, is those words are basically lifted from the SOA constitution. The second is perhaps not a true postulate or axiom, but it is a comment on the "passing parade:" the rate of innovation in the mathematical sciences and economics is very high. The reason for picking those out, of course, is the eclectic foundations of our applied science are in those two more basic sciences. If we are to keep up to date, we have to watch what's happening in our foundations. The third is not an axiom in the same sense that Euclid might have it, but it is another comment on the "passing parade"—the institutions served by actuaries are changing very rapidly. This is influenced by the shift away from defined-benefit-pension plans, the different nature of the risk being

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\*Ms. Grazier, not a member of the sponsoring organizations, is Associate Professor and Director with Cornell University in Ithaca, New York.

assumed by life insurance companies, and the massive health care reorganization in which the nation is currently engaged.

There are, of course, certain implications of these postulates, and one implication is that new ideas are needed. They are needed because if you are to keep up with your foundations, you're going to have to bring some of these new ideas from the mathematical sciences and economics into our profession. New ideas are needed to serve both the old and the new institutions. For some time, the Society has been talking about the importance of expanding employment opportunities for actuaries by serving new institutions. Entry into new fields requires new research. Other areas, such as finance, government guaranteed programs, individual financial counseling, or environmental hazard management are not unoccupied. We need new and better ideas if we are to expand those actuarial opportunities. My presentation will be based on these postulates (not of the same order of Euclid). Some of them are simply observations on the "passing parade." I believe the rest of the program will proceed from these foundations.

Clearly, the idea of Society of Actuaries research is not new. The *Transactions of the Society of Actuaries (TSA)* has contained reports on mortality and morbidity since the Society was organized in 1949. One can go back before that and find other organizations (the Actuarial Society of America and the American Institute of Actuaries) that also conducted similar studies. Impairment studies that aid insurance classification were very early research endeavors by professional actuaries in the United States. These examples are not meant to be exhaustive, but suggestive of what had happened in the past. In response to special purpose stimuli, the Society has engaged in other special research projects. For example, in the 1970s, when GAAP accounting came upon actuaries in their financial reporting responsibilities, and the question arose about the quantification of the experience at deltas permitted in the release from reserve system, the Society sponsored a monograph headed by John Woody called, "Adverse Deviations, a Research Response to a Particular Stimulus." Over the years, the Society has also attempted to bring new tools into the profession, largely through books and monographs. The first three are books and monographs dating back no more than two years ago: options, fuzzy sets, and risk theory (*Insurance Risk Models*). Actually, these were published in recent months, but these aren't the first. Those of us of the older generation can remember, for example, monographs by Robert Henderson on graduation and others of an earlier series. These join old traditions of trying to bring new tools into actuarial science.

In the last decade, there has been a big expansion in these research efforts, motivated by what I referred to as axioms. We have people who were present at the creation, such as Mark Doherty and Warren Luckner. If there has been a big expansion of the Society's research efforts, what am I talking about? Currently, there are roughly 53 projects either being carried out or developed. Warren Adams will speak to you about some of the process. There are roughly 400,000 research dollars to be allocated this year. There is a little over \$1 million involved in projects, some of it being funded by the sections. This has increased enormously in recent years. Among the oldest research projects are the experience studies that date back many years. Traditionally, they were funded by companies using a complicated allocation formula. Out of those studies, of course, have come not only valuation mortality tables, but standards by which companies could gauge the success of their own

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classification. The work also helped provide the basis for mortality improvement studies. More recently, as the scope of actuaries expanded, these studies have expanded into credit risk events. At this meeting, Mark reported to the entire assembly on the results of a credit risk study involving commercial mortgages and private placement bonds using experience from the late 1980s. Even here, you can see the aspects of expanding the role of actuaries, using research as entry into new opportunities. Although these expenses have largely been allocated back to companies, we have probably underreported the enormous contribution of volunteer time in these studies. Your Society is now engaged in an effort to try to more adequately account for the magnitude of that volunteer contribution. These studies themselves generate dollars. By selling books and data, these studies have generated a little over \$100,000 in revenue. One of the objectives for the future is to find a way for these research projects to not only be a sink for revenue, but also to generate revenue. Ideas are power, ideas have value; perhaps we can do a better job of creating and selling ideas.

Warren Adams will tell you more about the process. The process is under development; as I said before, you are almost present at the creation. We have seen a big increase in the complexity and the size of these research operations. We are in the age of total quality management (TQM), or continuous process improvement. We are improving this process, but clearly, it has to start with elicitation of ideas; everything starts with ideas. Not all ideas are amenable to research. If you jump out of a building, you may be able to confirm Galileo on the way down, but there's not much you could do to change the outcome. We have to develop systems to help our members understand what good researchable ideas are and develop systems to elicit those research ideas. Ideas are usually flaky when first suggested. They have to be developed (in the sense of being more precise), stating the goals of the research and some of the methods. We believe in competition in the Society, in part, because we are disciples of Adam Smith and, in part, because we do believe we are stewards of your money. Competition is a way to ensure the best possible people do the work. After competition, of course, you ultimately have to come to a decision point. You have to make a commitment of money and time. Then, it's important we monitor the research to make sure the plan is being followed. We should always think about how we're going to disseminate it. Part of that may be revenue generating, but research that stays on the library shelf (or on the disk) is not fulfilling its purpose. Will this be disseminated by monograph, by computer disk, by TV, by videotape, by a learned article, or by press release? As we develop a process, we need to think of all these elements.

A program requires an organization. Warren will tell you more about that organization later. We have such an organization. Shortly, Harry Panjer will become our director of research; Mark Doherty has held that position for some years. Warren Luckner is also on our research staff. We have a very able Society of Actuaries staff which holds all this together. A year ago, the Society structured itself into different areas. These areas are: general extension of knowledge, finance and investments, health, life, and retirement. Most of the Society's structure falls into these categories. Each of these areas has a research committee. Warren Adams is the chair of the Committee on Research Coordination which holds these wild horses together. The new element is the Society of Actuaries Foundation. You are, in truth, present at its creation. The Board has not yet met officially, but the bylaws have been approved.

Clearly, the goal is partly fund raising; more importantly, perhaps, is the goal of continuity—to create a foundation with leaders from the profession and related industries to help guide this research program and to seek funding from many different sources in order to carry it out. Bob Berin, our president-elect, is the first chairman of the Foundation Board.

These five areas reflect the way we're organized now. Each of these five categories correspond to assignments of Society vice presidents. There are many entries, and I have selected one from each area to discuss. From the Committee on Knowledge Extension Research (CKERs), there is a project on operations research methods—a vast area of intellectual activity that we would like to bring more into actuarial science. Pat Brockett, who is a professor in the Finance Department at the University of Texas in Austin, is carrying out that project. Under the finance and investment group, there is the fair-value accounting project. The reason it is there is it is not simply a life or health or pension issue. Kyle will talk to you about a project carried out under the health area on catastrophic health claims. Recently, Bob Johansen talked about some massive plans the life group has for a two-step project for collecting econometric models of life insurance and building them into company models. Our retirement section, or practice area, has been working on research projects on two of the principal inputs—turnover and retirement rates. Those issues are particularly important from the labor market viewpoint, as we've had an increase in turnover and a shift from defined benefit to defined contribution. What's that doing to the retirement system in the United States?

In brief order, that is some of the background and organization of your Society's research endeavors. We hope we are being good stewards, and I believe the next speakers will give you an even better idea of what we're doing.

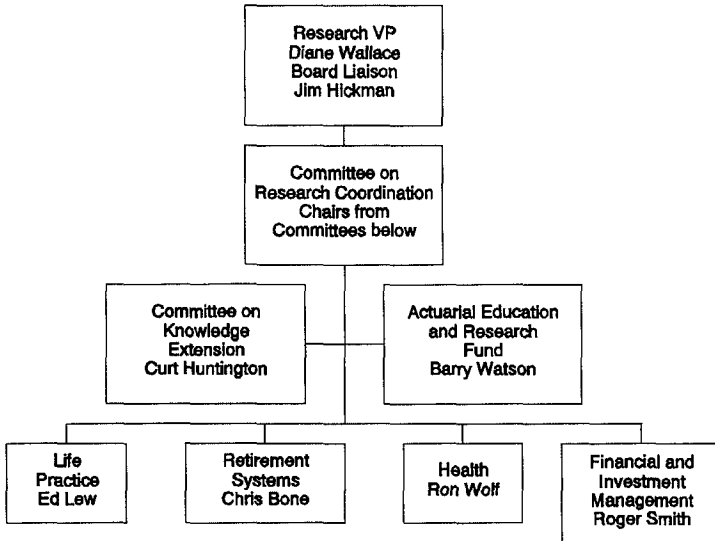
**MR. WARREN R. ADAMS:** The process of reorganizing the Society of Actuaries' research effort has gone on for several years, but it is beginning to take shape now, somewhat along the lines of this structure. We have, as we have had for a number of years, a vice president of the Society (currently, Diane Wallace) who is responsible for the research area. Jim Hickman, along with William Hsaio and John Harding, serve as liaisons to the research effort. In order to coordinate everything, the Society developed a Committee on Research Coordination, which completed its first year of operation in 1993 under the leadership of Harry Panjer. I think it served as Harry's training to become director of research. We are organized along the lines you see on Chart 1. These are the wild horses Jim was talking about.

The reason we organized along these lines was to provide a sharper focus on the main practice areas in which actuaries are currently interested. Twenty-five years ago, we probably would have seen life and health as the primary areas of focus (perhaps retirement systems, as well), but in recent years, we have added the financial and investment area as one of the principal practice areas. This is taking on more and more importance, as you will see from the list of projects the Research Coordination Committee is currently working on. Also, as part of our group, we have the Committee on Knowledge Extension which is headed up by Curtis Huntington. It is looking at areas that are less in the mainstream of actuarial practice than the other areas at the bottom of Chart 1. We also have a liaison in Barry Watson, who is currently heading up the Actuarial Education and Research Fund. Barry is primarily

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there for coordination purposes but, of course, provides a significant amount of knowledge and background through input to this committee process. To coordinate with the casualty area, Mike Miller represents the Casualty Actuarial Society. This is to keep the CAS abreast of what's happening in our organization, as well as to keep us on top of what the CAS is doing.

CHART 1  
SOA RESEARCH ORGANIZATION



Jim mentioned the outstanding research staff at the Society of Actuaries office. Harry Panjer has yet to come on board. Harry attended a meeting of the Committee on Research Coordination we held recently. Warren Luckner has been an invaluable resource. If you are ever asked to chair an SOA committee, you must ask for staff support from Warren Luckner. He is so good and gives us so much expertise and hard work. We also have Judy Yore, who is the Research Management Coordinator. This gives you a good idea of the work the people on this committee and in the practice areas are involved in in order to get these projects underway. We also have Jack Luff, who heads up the experience studies area, and Research Assistants Pam Leonard, Kathie Allison, and Ann (Magine) Berg. We get great help from these people.

When I was with the Society 15 years ago, the size of the entire Society staff was as big as the research department. It's not only an indication of how the Society has grown as an association but also of the importance now being placed on research in the Society. Each of the practice areas has a vice president from the various areas working with them: Shane Chalke in the Financial and Investment Management; Sam Gutterman in the Health Benefit Systems area; Arnold Dicke in the Life Insurance area; and Harry Garber for Retirement Systems. We are currently looking for an

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actuary who will specialize in the Health area to provide some additional assistance for this group.

As the title of the committee would suggest, our purpose is to coordinate the research effort. This consists of a number of different activities. The committee will probably meet every other month (so far, we've met every month). Our meetings consist of discussion of the projects currently in progress and current priorities for these projects. We also coordinate the budgeting for these projects; this often involves trading funds. From time to time, each of the practice areas may have projects that are put on the shelf or on the back burner. Funds may become available that can be traded from one year to the next to help fund projects that are not quite as well-funded as needed for the current year.

We're also in the process of developing the project management policy. Jim actually gave you a good outline of the policy, so I won't talk much more about it. This is a project we expect to finish sometime this year. This is an evolving project. When we discussed this subject at our last meeting, Warren Luckner mentioned this subject had come up every year since the committee was organized. We are constantly working on the development of the research policy; it's always evolving.

We normally have a teleconference every other month or so to get updates on the projects in progress. The staff will report to us on the status of the requests for proposals (RFPs), and we will discuss other issues. At our last meeting, we dealt with the research budget requests for 1994-95 (the 1995 fiscal year budget) and looked at the research management guidelines. I'm going to tell you a little bit about the current budget requests for research. There are three RFPs for the dynamic solvency project since there are three different aspects to the project. One reason we do this is because it's such a major project, the funds exceed one year's budget, so we break it into pieces in order to fund it in the current fiscal year.

This year, the committee requested from the Board of Governors a budget in the neighborhood of \$400,000, which is a slight increase (if you consider 17% slight) from our previous budget. We're not sure all of it will be funded, but among the projects we consider high priority are a high-yield bond (also known as a junk bond) study, a pension plan termination study in Ontario (which is very important in that part of the actuarial world), and a continuation of a modeling techniques project (which includes things like chaos theory and neural networks).

I will indicate to you some of the budget amounts for these projects. The high-yield bond study is coming in at around \$25,000 (that's our estimate of what that project will cost). I think I should comment a little bit about this. It has been our experience that some of the estimates of what these projects will cost have not been confirmed by the request for proposal. For example, we had a project go out recently for which we had expected a cost of about \$10,000. When the proposals came back, the actual amounts ranged from a low of \$35,000 to approximately \$130,000. With the small budget we have, one of the issues we're trying to deal with is how we approach this kind of problem. Do we tell the project bidders ahead of time what our budget is and ask them to quote on the project within the confines of the budget? Do we ask them to tell us how much of the project they can do for the amount allocated to the project? Do we do a second round, after we get the proposals back,

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and do the same sort of thing? We have a project on risk adjustment, which has to do with the community rating under health care reform and how those risks are shared. This is a very expensive project, coming in at well over \$100,000 (approaching \$200,000). We expect some of it will be funded from outside sources. *Perhaps another actuarial organization will participate in its funding, but we have it in our own budget for about \$100,000.*

We have a project on fair-value accounting that is market value of assets and some market value (or something comparable) of liabilities. We will be requesting a proposal on it soon. There is also a project on retirement rates, actuarial modeling, and insolvencies of health carriers (I believe it is a continuation project) which comes in with a total budget of \$73,000. We have a lower priority project on mental/nervous disorder and substance abuse data. We are trying to get a more detailed analysis of the causes of claims in this area. Another one is on postretirement health, economic assumptions, and guidance; its budget is \$10,000. Walter Rugland brought one back from Russia a few weeks ago on the relationship between parental agent at death and mortality of their children. You can see from this list of projects that we get to deal with some creative ideas.

We're all getting our feet wet during this coordination process. It's fun and interesting to see the new ideas coming to our committee (many of them are in the economic area). I see one of the old researchers, Jack Bragg, who did a wonderful research project on economic assumptions and their relationship to investment defaults. This venture into new areas of research is in good shape. We have a sound policy which is evolving and getting better. We have a good committee structure to carry out those responsibilities, and have an especially able and hard-working staff. Our funding management issues are being addressed. I don't know that we'll ever have enough money to do all the wonderful research people suggest, but please do not hesitate to talk to the committee, to me, to members of the coordination committee, or to the staff about the ideas you have.

We need good ideas, no matter how unusual they might seem to you; remember fuzzy logic is now taking on a greater importance in the work actuaries do. In my own company, for example, we're using fuzzy logic to help us deal with possible *fraudulent health claims*. *When I saw the word fuzzy, I didn't believe I would ever want to have anything to do with this area, and now I find it's really quite useful.* We will now hear from a researcher who is doing some of the wonderful research we all want to try to find.

MR. TENENBEIN: Kyle Grazier will be talking specifically about a particular project that was funded by the Society.

MS. KYLE L. GRAZIER: The project I'm going to report on, which was funded by the Society, is a group medical insurance large claims database collection and analysis. This was an RFP that went out about a year ago. The goals of this particular project were to collect data from several different carriers (or insurers), standardize them, and then analyze them. Very simple. So why is it taking so long? Aaron also asked me to discuss, or at least present, some pieces of the process. An RFP went out (a typical part of your process). We placed a bid on the RFP and were selected as a finalist. Mark Doherty was the Society of Actuaries' director of research at the time

and called and asked if this was our best and final offer. At that point, I contributed my time and charged only the programmer's time to the project. We revised our bid and were selected. From that point on, I worked primarily with Mark Doherty at the Society. More recently, I've worked with a project oversight group. This is a group of volunteer actuaries from around the country who has taken on this particular project and agreed to work with us in both defining the new goals of the project and in finalizing the report to make sure what we're presenting is something you can use. When the project started, John Bertko from Coopers & Lybrand was the head of the project oversight group and worked with us until recently. Then, Tony Houghton became the head of the project oversight group. I've been working with Tony, Jim Mange, Ned Crocker and several others in the project oversight group to define the final stages of the work.

I will now break the project into four phases to try and describe the process itself. Prior to our being selected as the contractor (researchers) on this, Mark Doherty and the group of researchers at the Society defined the data to be collected from the insurers who would participate in the large claim studies. They also solicited participation from the carriers. At this point in time, we were notified of being selected and received copies of the information that went out to all the carriers asking for their participation.

Around the middle of last summer, we began to receive data tapes from the carriers who had agreed to participate. Mark sent us tapes that had been copied by the Society. We began reading those tapes, trying to translate what had been received. I'm calling this Phase I, although it's really ongoing.

We promised the Society a working database that could be utilized without a mainframe (this was in Phase II). So, we began reading the tapes, clarifying them, editing them, and getting them into some kind of standardized microcomputer form. What we have now is a microcomputer-based database. Our thoughts were if this were microcomputer-based, it would be much more useful for actuaries working in the field, and they wouldn't have to transfer data from large tapes through a mainframe.

The analysis phase (Phase III) involved standardizing databases from 25 actual participants and then looking at these claims in different ways. This is the phase we are in right now. It has taken about eight months just to get the database in working order, including getting it edited.

We're looking at two years of data (1991-92) for 25 participants by individual carrier and then across carriers. We can look at the data by plan type (standard indemnity, PPO, HMO, point-of-service-type plans), age of claimant, sex of claimant and status (employees or dependents). We can look by ZIP code—we have five-digit ZIP codes, but some of our initial work is just on two of those digits (for obvious reasons). We also have International Classification of Diseases-9th Revision (ICD-9) diagnosis codes. We also have some information from each participant on exposure data. This is the stickiest part. At one point, I thought the claims might be the most difficult part, but trying to get accurate, useful exposure data is somewhat difficult for large carriers. We also did an analysis by deductible level. The deductible levels we've been asked to look at are \$25,000, \$50,000, \$100,000, \$150,000, and \$250,000. Most of



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the analyses we're involved in right now include those analyses that have been defined by the project oversight group. The fourth phase of this will be file transfer to the Society and the research group and preparing the report. Once again, this is in very close contact and consultation with the project oversight group.

There's a little bit of risk in giving a preview at this stage. We do have 25 participating carriers. We're just looking at claimants with \$25,000 of claims in any one year. In 1991, we have 75,789 claimants from the 25 participants; in 1992, we have 95,447 claimants. These claimants resulted in almost \$4.5 billion in large medical claims in 1991 and over \$5.5 billion in 1992. The average claim amount in 1991 was \$58,413; in 1992, it was \$58,794. What we have now is a standardized, clean claims database to work with; I just wanted to highlight some of its pieces.

MR. ADAMS: We were surprised the average claim grew so little from year to year.

MS. GRAZIER: What I'm going to present to you now are charts for 1991-92 on several of the key variables. As you saw in the average claim amount, there wasn't much difference between 1991 and 1992. This is true across every variable we've looked at so far. There are two bars in Chart 2: the top bar is total charges and the bottom bar is in excess of the \$25,000 deductible. Where I present an excess, I'm just dealing with the \$25,000 deductible, although the final report and the additional analyses will be by the other deductible levels I referred to earlier. This chart shows the total charges and excess charges by status. This is employee/dependent and sex (or gender). What you have here (if you're looking just at total charges) is the majority of the total charges (almost \$1.5 billion) are by male employees; the second most number of charges is by female dependents. Third is from female employees, and fourth is from male dependents. We see the same relative relationships in the 1992 data in Chart 3.

CHART 2  
TOTAL AND EXCESS CHARGES BY STATUS AND SEX—1991

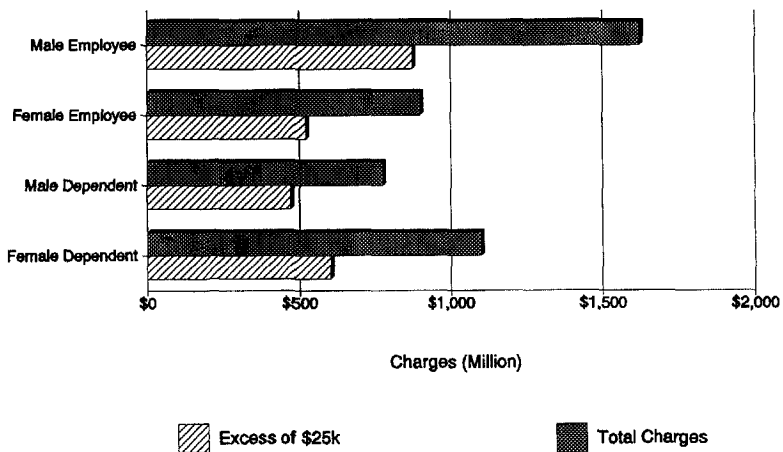
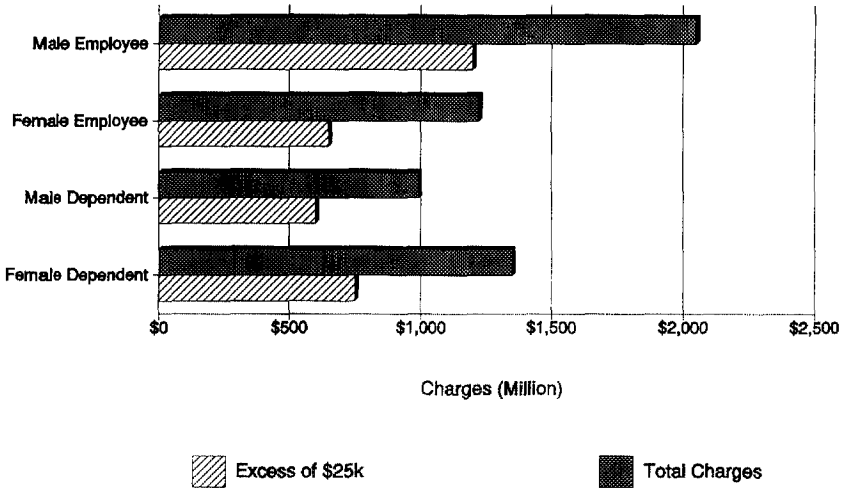


CHART 3  
TOTAL AND EXCESS CHARGES BY STATUS AND SEX—1992



Remember, a male employee is showing us the largest total, but obviously the total is a function of the number of claims, as well as the average size of the claims. If you look at average charges by status and sex, the relationship changes again so that our excess here is average charges in thousands (Chart 4). On an average charge basis, our male dependents are coming in at a little over \$60,000 (about \$64,000 for an average claim). The second most common is male employees, the third is female dependents, and the fourth is female employees. Looking at 1992 data, you see essentially the same relative relationships (Chart 5).

Chart 6 shows the excess charge more than \$25,000 as a percentage of total by status and sex; it's essentially excess charges over total charges by relationship and sex, again with male dependents coming in slightly more than 60% over the deductible. The year 1992 is showing the same kinds of relative relationships (Chart 7). As I said, the project oversight group has been very helpful in defining what they believe to be the most interesting kinds of analyses for you, and the deductibles have turned out to be quite interesting.

MR. ADAMS: If I looked at ICD-9 codes to find out why the male dependents are high, what would it tell me?

MS. GRAZIER: We haven't gotten to that level of detail. I'm going to show you some diagnosis data in just a second, but it's only diagnostic groups at this phase. Charts 8 and 9 show the total charges by age. Along the Y axis are age ranges where each of the numbers represents the minimum of that age range. The first (or lowest) bar graph is essentially the 0-1 age group; next is the 1-2 age group; the bottom two are just 0-2 age-group bars. The black bar is total charge, and the gray bar is in excess of the \$25,000 deductible. If you're just looking at total charges by age, the middle age ranges have the largest amount of charges by age.

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CHART 4  
AVERAGE CHARGES BY STATUS AND SEX—1991

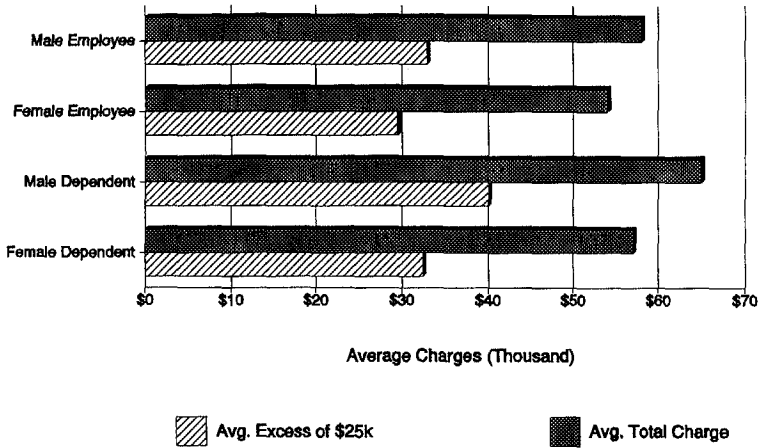


CHART 5  
AVERAGE CHARGES BY STATUS AND SEX—1992

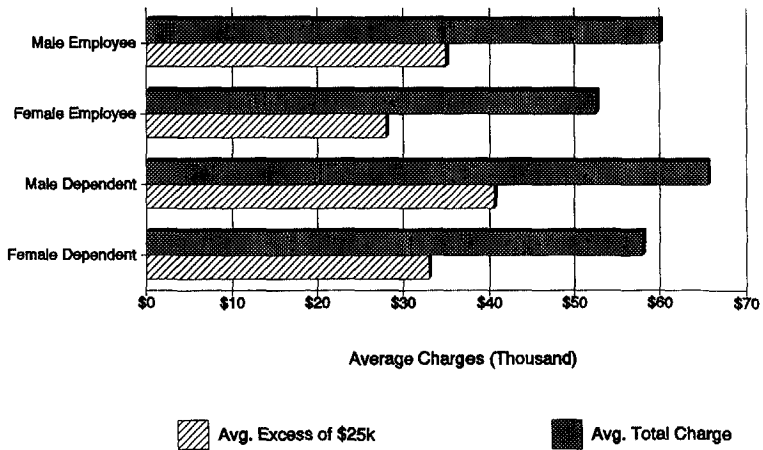


CHART 6  
EXCESS AS A PERCENTAGE OF TOTAL BY STATUS AND SEX—1991

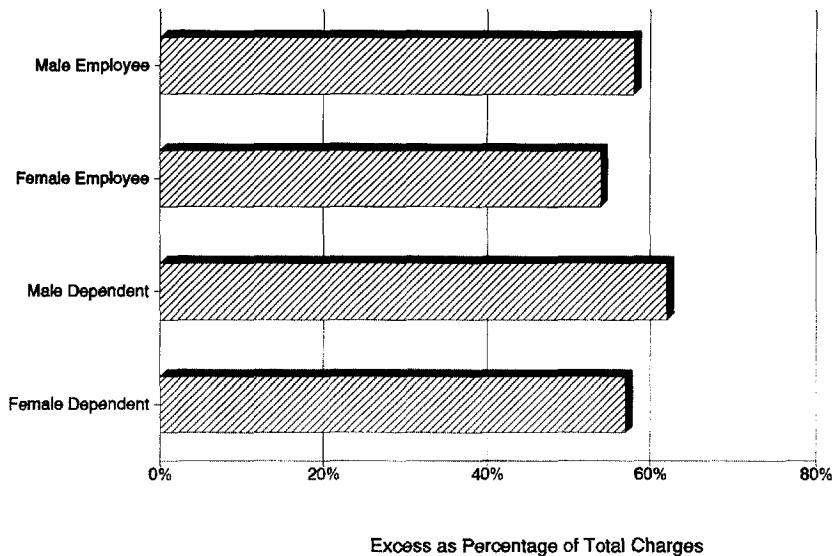
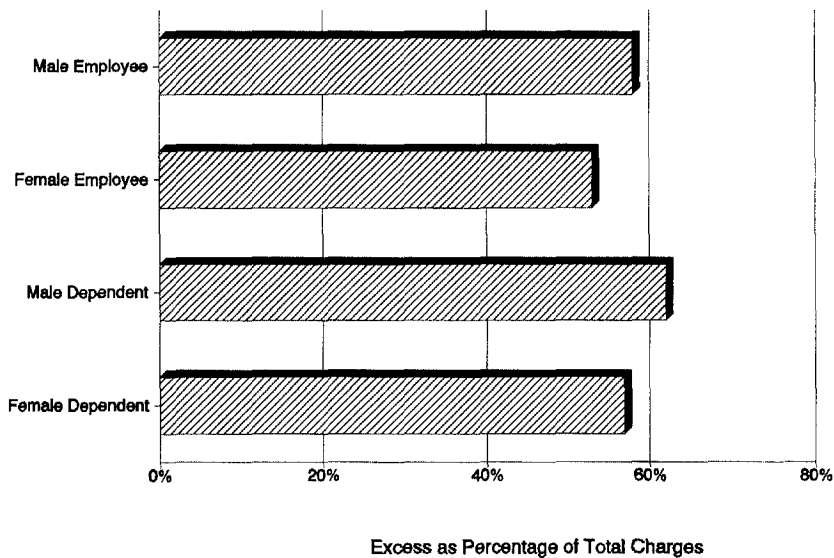


CHART 7  
EXCESS AS A PERCENTAGE OF TOTAL BY STATUS AND SEX—1992



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CHART 8  
TOTAL AND EXCESS CHARGES BY AGE—1991

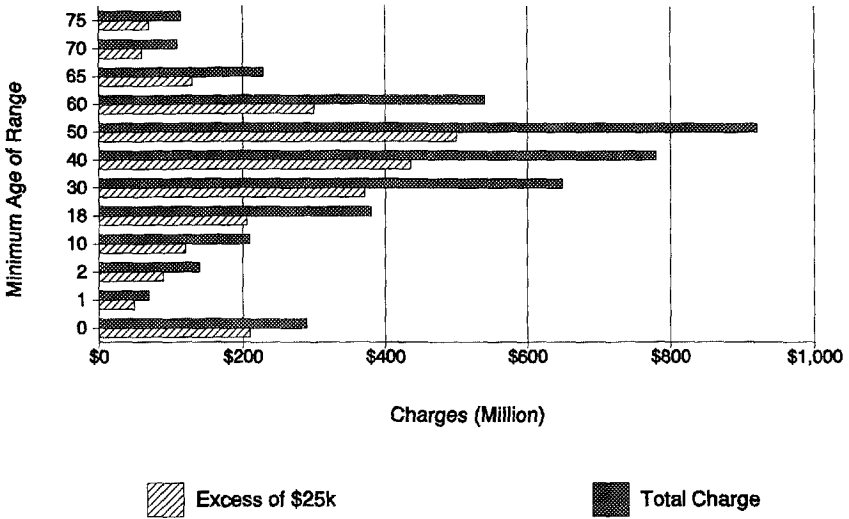
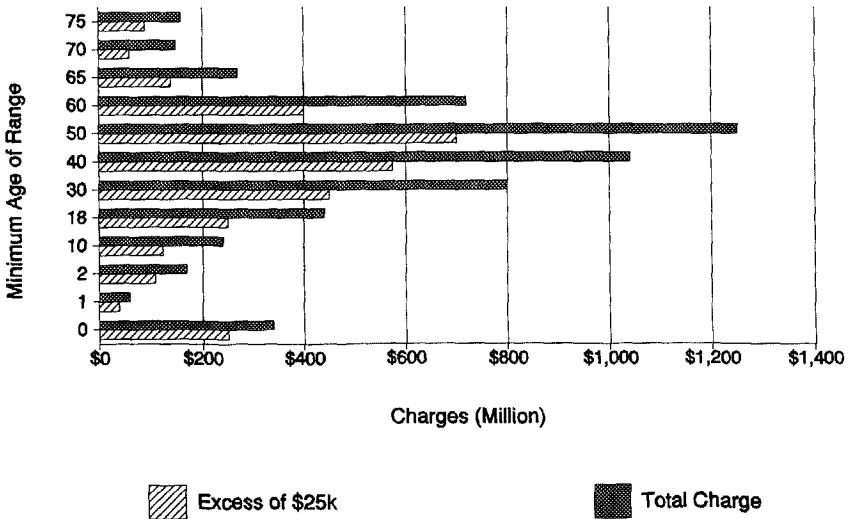
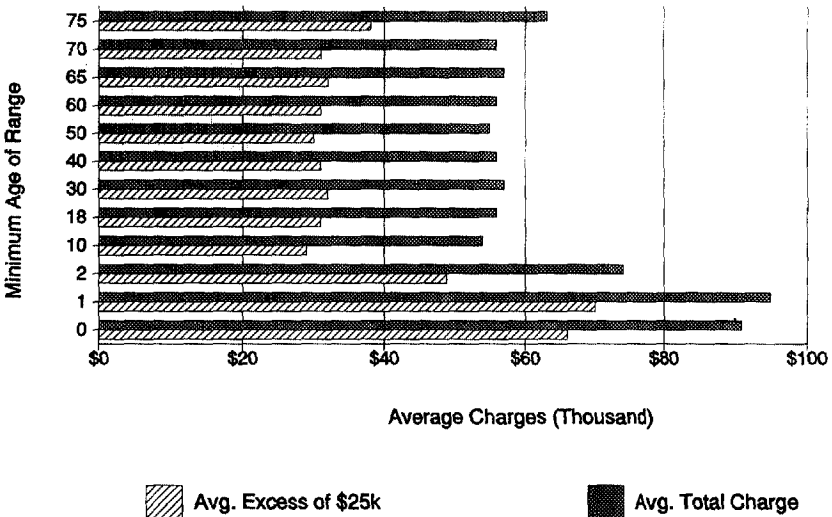


CHART 9  
TOTAL AND EXCESS CHARGES BY AGE—1992



If you look at the average charge instead of the total charge, you see a different relationship (Charts 10 and 11). Once again, the top bar is the average charge (or average total charge), and the bottom bar is the average excess over the \$25,000 deductible. Although the total dollar amount in the under-age-two range was quite small in Charts 8 and 9, if you look at the average claim amount by age, you see the premature baby and very young child have the highest average claim; it's a little bit higher than the over-75 age range. This is for 1991; 1992 looks very similar, with even larger amounts in the 0-1 and over-75 age ranges. Chart 12 is excess over the \$25,000 deductible as a percent of the total claims; we're able to present both years. The top bar is 1992, the bottom bar is 1991. There isn't much change from year to year again, but the X-axis is the percent of total charge in excess of \$25,000. You're still seeing the larger averages under age two.

CHART 10  
AVERAGE TOTAL AND EXCESS CHARGE BY AGE—1991



Let me show you a little data on diagnosis. We're using ICD-9 primary diagnoses on all claims and are still working with them. The project oversight group has grouped the ICD-9 codes into several categories it thought would be most meaningful to you. Charts 13 and 14 show the categories provided for us; we have groupings of ICD codes within these categories. These two charts show the total and excess charges (like the first charts) by several diagnosis groups. If you look at total charges, you see more total charges under circulatory system and tumors (malignancies and other cancers), with injury and poisoning, and preemies and congenital conditions being the two other high groups. Two other groups which are quite high (at least relative to the others) are skeletal and muscle systems. These are total charges or total dollars we saw within the database in 1991; there were similar relationships in 1992. We're dealing with over \$1 billion in circulatory system disorders and tumors and cancers.

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CHART 11  
AVERAGE TOTAL AND EXCESS CHARGE BY AGE—1992

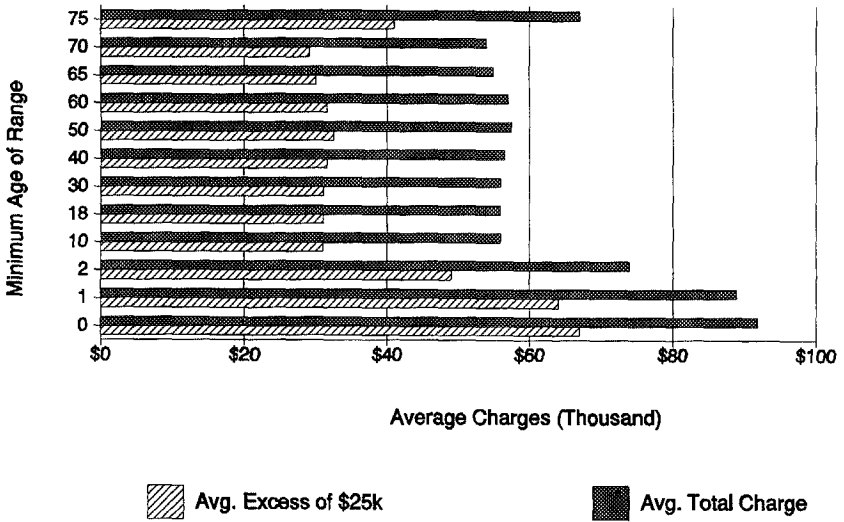
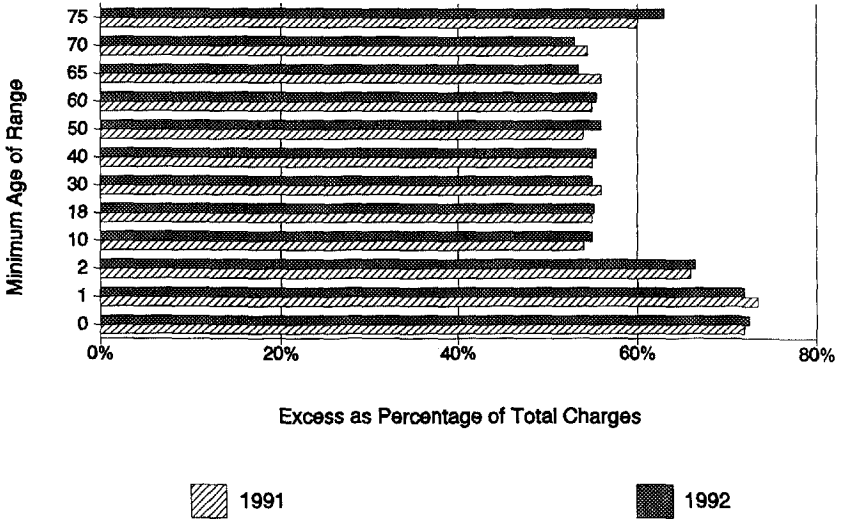
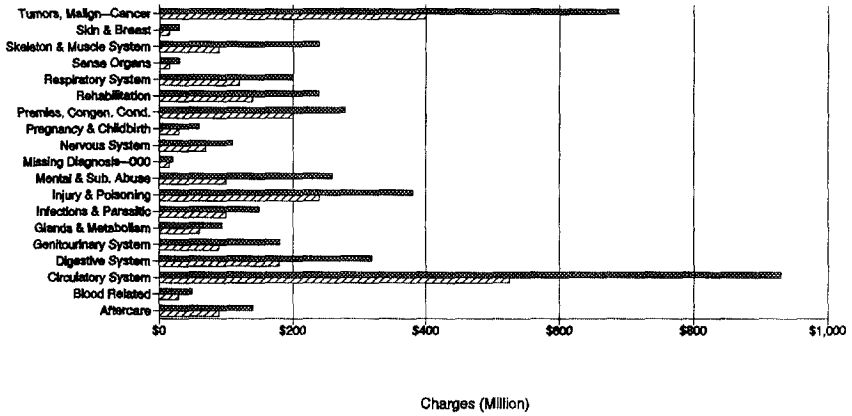



CHART 12  
EXCESS AS A PERCENTAGE OF TOTAL, BY AGE  
BOTH YEARS



RECORD, VOLUME 20

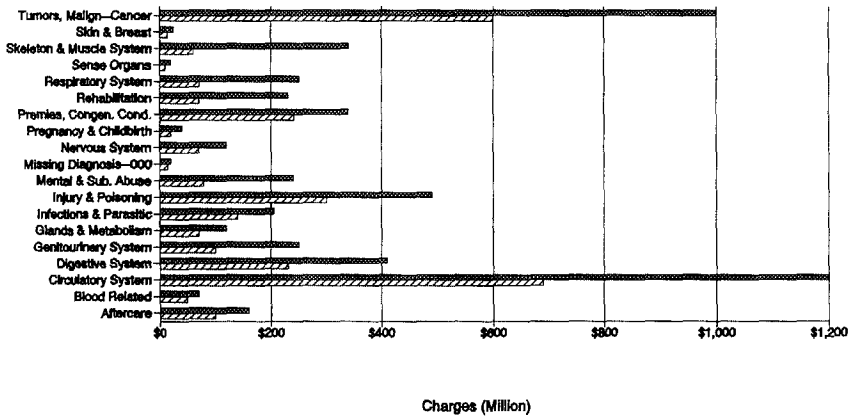
CHART 13  
TOTAL AND EXCESS CHARGES—1991



 Excess of \$25k

 Total Charges

CHART 14  
TOTAL AND EXCESS CHARGES—1992



 Excess of \$25k

 Total Charges

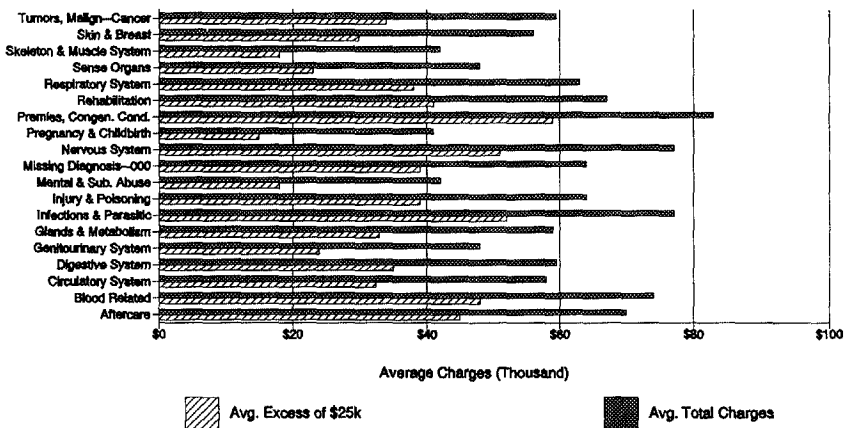


## WHERE YOUR SOA RESEARCH DOLLAR GOES

Keep circulatory system disorders and tumors and cancers in mind when we look at average charges.

We have many circulatory claims, but if you look at the diagnostic groups (total charges are all charges, including hospital and other), on an average-charge basis, you see higher numbers for preemies (which would be consistent with the age data you saw earlier), congenital conditions, blood-related disorders, infections and parasitic diseases, skin and breast disorders, and cancers. The 1992 data was quite similar. (See Charts 15 and 16.)

**CHART 15**  
**AVERAGE TOTAL AND EXCESS CHARGES—1991**



Charts 17 and 18 are total charges by diagnosis and sex. For the 1991 data, the black bar is male and the gray bar is female by diagnosis (total charges again). The circulatory system, particularly in males has twice as many charges as females.

In tumors and cancers, there are slightly more total charges by females in the group than by males. The same is true with mental and substance abuse and injury and poisonings. There are similar relationships across both genders and by diagnosis groups in 1992.

If you look at average charge by gender in Charts 19 and 20 (even though we have more total claims, or total dollars by males in the circulatory system), it is greater for females (a little over \$60,000) than for males (a little over \$50,000); there are roughly the same relationships in 1992.

Charts 21 and 22 show the excess charges by diagnosis and sex in 1991 and 1992, which was very similar to our total charges.

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CHART 16  
AVERAGE TOTAL AND EXCESS CHARGES—1992

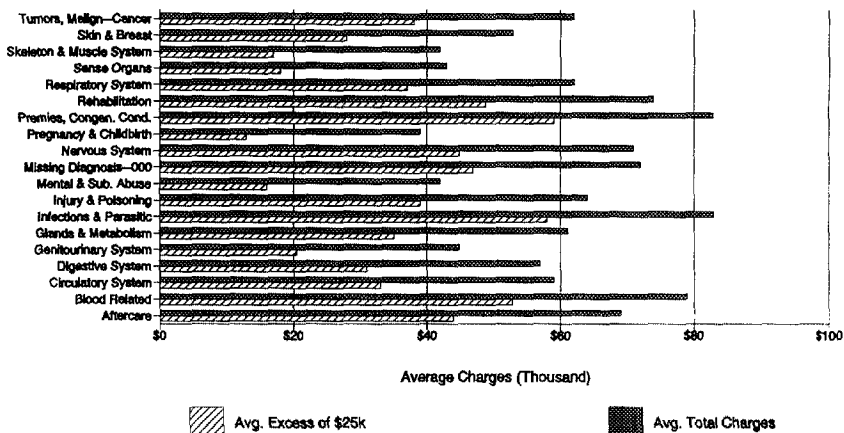
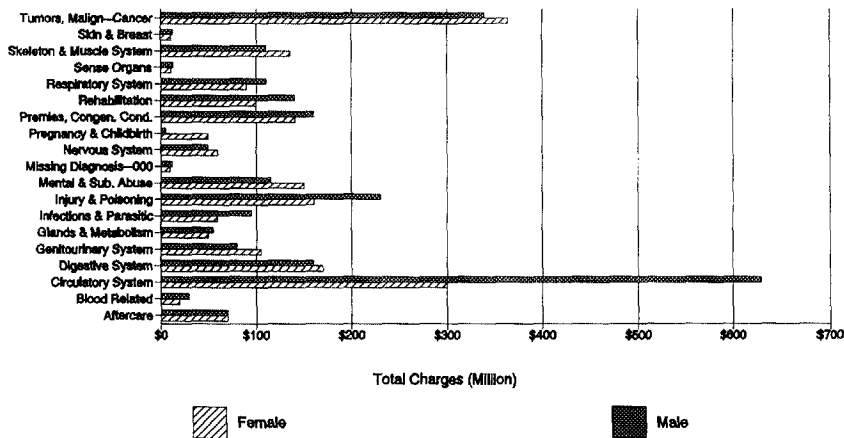


CHART 17  
TOTAL CHARGES BY DIAGNOSIS AND SEX—1991



WHERE YOUR SOA RESEARCH DOLLAR GOES

CHART 18  
TOTAL CHARGES BY DIAGNOSIS AND SEX—1992

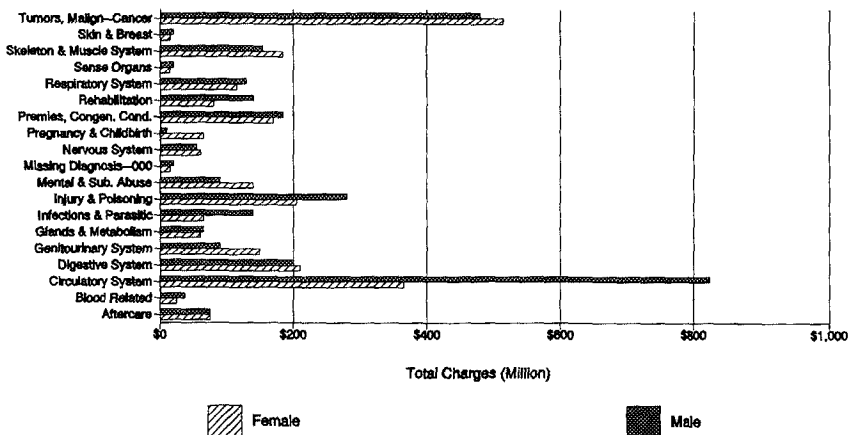
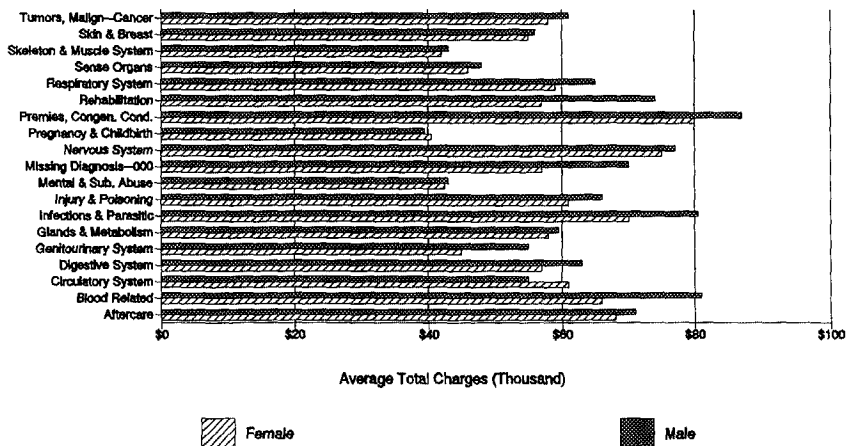


CHART 19  
AVERAGE TOTAL BY DIAGNOSIS AND SEX—1991



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CHART 20  
AVERAGE TOTAL BY DIAGNOSIS AND SEX—1992

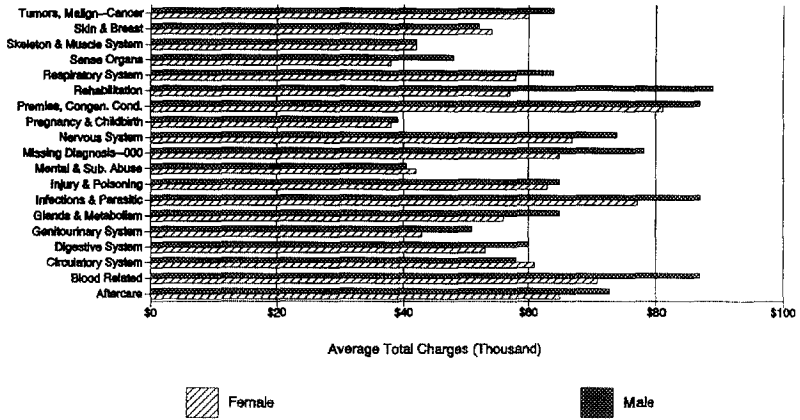
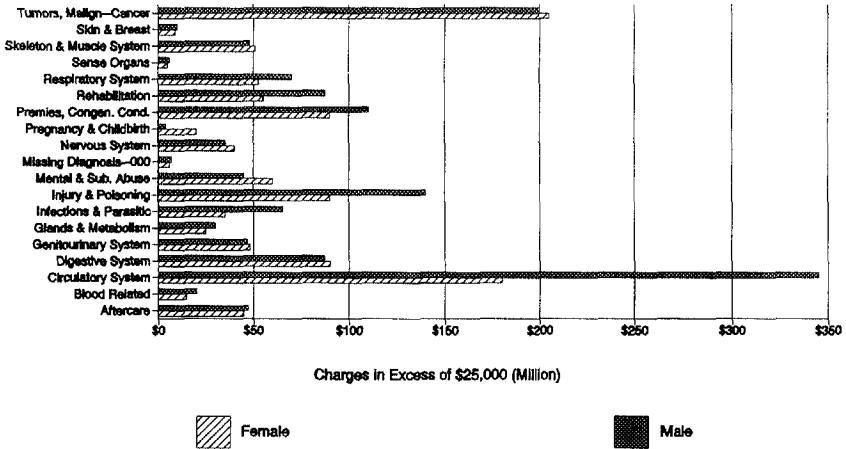
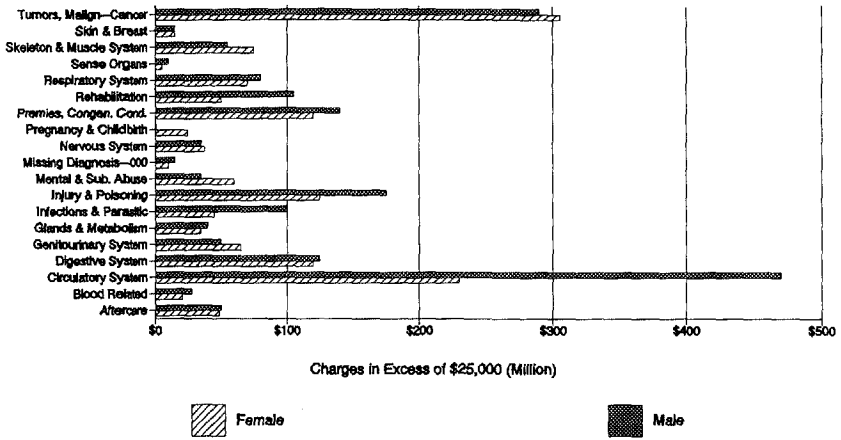


CHART 21  
EXCESS CHARGES BY DIAGNOSIS AND SEX—1991



WHERE YOUR SOA RESEARCH DOLLAR GOES

CHART 22  
EXCESS CHARGES BY DIAGNOSIS AND SEX—1992



As I said, this is a preview of things to come. The project will be completed in the next two months. The fun has just begun. It took a long time to get the database in order and to get the fields standardized across 25 different carriers so we could get the different tape formats into one database. Now, the actual working database can be captured on a diskette and utilized by members of the Society, in ways the Society sees fit.

I think there is a great deal of information in the database and much useful data on these variables across many different carriers; it can be aggregated in many different ways. The project oversight group has guided us in aggregating different carriers for different reasons (such as plan type and the proportion of total charges associated with hospitals). They've also given us many good ideas on how to present it. We've had much fun doing this particular project, and I think the Society will gain much from it.

MR. TENENBEIN: With respect to university research going on in various departments and with respect to doctoral students who are doing research in statistics or operations research which are allied with actuarial science, what sort of process do they have to go through?

MR. ADAMS: Clearly, this is an important source of ideas for the committees to tap into. I don't know quite how we make the connection there. In fact, I don't know if this occurred to us in our development of the management process or not, but this is a source we would like to access; ideas can come from there as easily as they come from the actuarial community. We would very much like to have the information, and they are probably wondering if their ideas are thought to be worthy by the practice areas or CKERS. They would certainly be candidates for submitting a request for proposal.

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MR. HICKMAN: There is a special program for grants to Ph.D. students in areas directly related to actuarial science and insurance. The genesis of that program was somewhat different than the research effort we've talked about. Clearly, the ultimate goals are the same. When Don Sondergeld was president of the Society (actually before that), he was very interested in improving relationships between the Society and universities. A program of grants in support of Ph.D. research was part of a comprehensive program developed by a committee Don headed. I think Warren Luckner staffs both of these groups. Warren, you probably know more about the numbers than I do.

MR. WARREN R. LUCKNER: There is a Ph.D. grants program. We're currently in the process of reviewing the applications for the 1994-95 academic year. We've received about 12 applications for new grants and three applications for renewal of grants. This is an important complement to the research effort because one of the objectives of strengthening relations with the academic community is to generate cross-fertilization of ideas on research. The other thing I would mention with regard to linking with an academic community for research ideas is we do, of course, try to advertise through various means the RFPs available; hopefully, our members in the academic community will forward them to academic researchers as appropriate.

MR. ADAMS: I think Kyle's presentation gives us a beautiful illustration of how this new research process can work. In her capacity as a university faculty member, she has an opportunity to do some research that actuaries often don't find the time to do. We haven't had the time to do this kind of research on large claims, but it has been an area of concern to health actuaries for as long as I've been around. This kind of research, if done properly, can serve as a basis for ongoing studies that can be taken over by the Society of Actuaries. In the future, this kind of information will be a real godsend to the health actuarial field. Do you have sufficient detail with the ICD-9 codes so you can break down some of the really broad categories you've illustrated for us? I think it's also very important to have this information.

MS. GRAZIER: We have at least three-digit ICD codes on everyone. In some cases, we have five-digit codes. It's still attached to every claim, although what I presented were the aggregates.

MR. LUCKNER: There seemed to be a great increase in the number of claims (from about 76,000 to about 95,000) from 1991 to 1992, unless there are different companies involved each year. It's over 25% in one year. This seemed like many claims. Maybe there's that kind of variability from year to year in the health area.

MS. GRAZIER: The same companies are involved in both years, except that one participant gave us only 1992 data, but this was barely 900 claims, so it's not the reason.

MR. LUCKNER: Do you have ideas on what the reasons might be? Does that happen?

MS. GRAZIER: I don't have any good hypotheses.

## WHERE YOUR SOA RESEARCH DOLLAR GOES

MR. MARK G. DOHERTY\*: One of the things I found out from talking to companies is their own data systems are improving. In fact, they're better able to understand a large claim. I've talked to companies who are looking at large claims now only because of the Society of Actuaries' study. In one case, the company thanked us for doing it because it forced them to do the study; in fact, they aren't getting the discounts on these large cases they thought they were getting. It has triggered many things for companies, as well as for the Society of Actuaries. I do think much of it was claims, and I was astounded at how bad they are.

MR. TENENBEIN: I have another question for Kyle. Basically, what I noticed is that the average size of your claims was approximately \$60,000-70,000. It was higher for women than for men. Do you have any feeling, and perhaps this is something you can look at later, about what percentage of these claims were over very large levels (such as \$1 million). Many insurance companies have a lifetime maximum of \$1 million. It would be interesting to know what percentage were super catastrophic.

MS. GRAZIER: We certainly have the capacity to look at that. I can't recall the data to respond.

MR. DOHERTY: The ranges were astounding, from \$25,000 to \$6 million.

MS. GRAZIER: That's right.

MR. DOHERTY: We're talking about something big.

MR. JOHN M. BRAGG: My comments relate to the overall process we were talking about earlier. Incidentally, Warren referred to my book, *Protecting Against Inflation and Maximizing Yield* [Atlanta, GA.: Georgia State University, 1986]. It has to do with an attempt to create an actuarial system of the economics investment world, which I hope will be of some future help to some of these projects. The comments I had, in general, were like this. There's obviously a need for more funding. It is very desirable for the Society group to keep track of other research being done elsewhere, certainly in the academic community. There is other actuarial research going on. Our firm's niche is experience studies, and we're very anxious to cooperate with the Society. I meet with Jack Paddon's committee to try to coordinate our efforts and keep track of what's going on elsewhere. You should make sure the funding exists when you send out one of these RFPs. I believe it would be a good idea to quote a maximum. There are several reasons for that. If the bidders know what the funding is, they could quite easily decide to donate their professional time. They may be interested in trying to get their computer cost paid. There are people like that. I feel I'm that way with everything I do. I don't personally make any money out of it. I just try to get my costs paid. So, I think it would be helpful. You should make sure the funding is there before you ask for a bid. I was involved in a continuing care retirement community (CCRC) bid. I don't believe it ever took place because I don't believe it was ever funded.

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\*Mr. Doherty, not a member of the sponsoring organizations, is Executive Director of the Actuarial Education and Research Fund in Inverness, Illinois.

My question is, how do we intend to disseminate the results of research? Will they be in the green *TSA Reports*?

MR. HICKMAN: A great deal depends on the nature of the project. Some of these projects will come out as monographs. You've already seen that in the fuzzy logic and the risk theory monographs. Some of them will come out in *TSA Reports* and some of them will come out, as it may happen on Kyle's project, as a disk or other computer-compatible tabulation. I think we're still learning about this. As, I mentioned before, we made about \$100,000 by selling some of the results of our research. We want to build on this, whether projects will appear as a monograph or a paper. Also, think of the kinds of revenue that could be generated from them. Outside of saying we're learning, I'm not sure I could give you a definitive plan with respect to each of the projects we plan to do in the future. Warren, did you want to make a comment on dissemination?

MR. ADAMS: There are a variety of ways in which you can publish research. Videotape is another possibility. It's our intention to provide all research in some form or another. In some cases, it may be sold.

MR. BRAGG: I'm entirely in favor of selling. I think it's the normal thing to do.

MR. ADAMS: In the past, much of the research wound up in the *TSA Reports*. Another comment is if we send out a request for proposal, the funds are available up to the amount the committee has budgeted for that project. If the proposals come back and exceed the budgeted amount, we try to reallocate resources among the practice areas in order to carry out the project if we feel it is important. Without exception, if we send out a request for proposal, the money is there to fund it, it's budgeted already. Warren, do you want to answer the question on continuing care?

MR. LUCKNER: Because the CCRC-data-collection project was a very large project (it was estimated to be several hundred thousand dollars), and the initial funding wasn't there for a variety of reasons, we ended up not awarding it. However, there has been some additional activity on it. It looks like we're pretty close to being able to do it. This is an example of some of the significant problems we have with funding. One problem is the SOA funding is not necessarily the full funding we can access for the project. In fact, one idea is we should be able to leverage SOA funding and get other funding from sections or from outside entities. It's a little difficult to judge whether you should always mention that the amendment is going to be the maximum amount available. You may be able to say, "This is the maximum available from SOA funds, but we anticipate we can get additional funds." The second thing I wanted to mention is about the dissemination of research. I think we are trying to get to a more formalized process, where we would try to identify as far in advance as possible the ways we're going to disseminate the research. There are really two types of dissemination—the immediate dissemination and the permanent-record dissemination. We think they're both very important. For example, we are going to probably have a permanent home for the credit risk study in one of the actuarial publications, probably the *TSA Reports*. (I mention this since we have had a book for sale and sold a number of copies.)



## WHERE YOUR SOA RESEARCH DOLLAR GOES

MR. ADAMS: I suppose it's possible, Jack, we will have some research that won't be worth disseminating, although we haven't had to cross that bridge yet.

MS. KELLEY MCKEATING: Jim, you mentioned the newly-formed, or about-to-be formed, Society of Actuaries Foundation. I know there's already a group called the Actuarial Education and Research Fund (AERF). Could you explain how these two groups differ?

MR. HICKMAN: That's a very difficult question. I'm not going to give a good answer. AERF came about 15 years ago in an attempt to bring together six principal actuarial organizations in North America to sponsor research. Unfortunately, AERF never received a large and stable funding base. It carried out several superb projects. The *Loss Distribution* textbook was ramrodded by Charlie Hewitt. Charlie had the idea, he raised the money, he helped recruit the two authors (Stuart Klugman and Bob Hugg), and it was a good project. Nesbitt did the same thing with respect to the Social Security monograph. AERF has carried out some superb projects, but it was unable to get a continuous flow of money and to make commitments to long-term projects. The difficulty was felt by the officers of the Society, and they felt with the Society's larger membership and constituency perhaps the foundation would be a way to get this kind of continuity. I guess I would have to say that the relationship (basically it's the same people) has been friendly. You're quite right that the ultimate goals of the two organizations are very similar.

MR. JOHN E. HEWITT: I have a quick question on disability. We have two disability tables—a Commissioner's Individual Disability Table A (CIDA) and a Commissioner's Group Disability table (CGDT), both of which are almost obsolete. I haven't heard anything mentioned about the future study of the termination rates. A couple years ago, the Society said that they were going to reinstitute the reports on disability, but nothing has happened. In the last five years, the termination rates have changed drastically, but we don't have an ongoing study to develop some new tables. The actuaries I talked to admit these tables have to be modified drastically in order to be used.

MR. HICKMAN: I do not know the answer. I do not know the status of the disability tables. Warren, do you have any comments on that?

MR. LUCKNER: I don't really have any comments at this point. Jack Luff, who is our Experience Studies actuary, would be the person to talk to about that. I know there are committees doing the experience studies. I don't know the latest status of the ones on disability.

MR. ADAMS: The existing studies, or ongoing studies, are not on our plate. We're looking for new research, which may become ongoing studies. Jack Luff is probably the guy you need to talk to.

