RECORD OF SOCIETY OF ACTUARIES
1989 VOL. 15 NO. 3B

HIGH COST CLAIMANTS IN MEDICAL BENEFIT PLANS

Moderator: KENNETH S. AVNER
Panelists: LESLIE M. ALEXANDRE*
JOHN P. COOKSON
MARY G. HENDERSON**
Recorder: STEVEN C. SIEGEL

- What are the characteristics of these claimants?
  - Types of cases
  - Demographics of claimants
- What can be done to manage or control these cases?
- What are the selection effects of these claimants in a multiple choice environment?

MR. KENNETH S. AVNER: When actuaries analyze the experience of medical benefits plans, we often start by stratifying it and looking at the different types of benefits and the plan's population. Often, we find that there are relatively few people who account for an overwhelming portion of the cost of the plan. This session will explore the details of what we know about these high cost claimants. Most of this research, which looks at issues of health status, management of high cost claimants, and the effect on multi-choice environments and stop loss reinsurance, is quite recent. We are lucky to have a very knowledgeable panel to discuss these issues.

Our first speaker is Leslie Alexandre who is an independent consultant in Los Angeles and works with private payors of health care services and the management of medical benefits expenditures and utilization. She is a graduate of the University of California at Davis and received a Ph.D. from the School of Public Health at the University of California at Los Angeles. Her thesis explored the issue of who are these high cost claimants.

DR. LESLIE M. ALEXANDRE: I want to explain my research objective and describe the population upon which my study was based. Then I will briefly profile each of the two key groups I studied: the high cost claimants and the very high cost claimants, and share some of the highlights from the longitudinal analyses I conducted on each group. I'll conclude with what I think are the implications of my findings for managing the experience of high cost patients.

I undertook this study to answer the question: Who are the high cost patients in an employer-sponsored fee-for-service medical plan and what is the nature of their expenses, utilization and leading health problems, within a single year and over a period of years? Although there had been numerous studies of catastrophic illness prior to my research, they provided almost no information that employers and other payors might use to design programs to prevent or ameliorate future high or very high cost cases.

Data for my research were provided by Bank of America and its claims administrator -- Blue Shield of California. During the years under investigation -- 1981-1984 -- the vast majority of the firm's 80,000 employees resided in California. About 75% of the employees were female and the average age was 36 years. More than 30,000 of these employees belonged to the company's self-insured medical plan; the remainder were in HMOs or did not have coverage.

From 1981-1983 the Bank of America Medical Plan provided basic medical benefits with supplemental major medical coverage. Inpatient hospital and surgery were covered at 100% and 80%, respectively, without a deductible. Outpatient services were covered at 80% after meeting

* Dr. Alexandre, not a member of the Society, is a Health Care Consultant at DrPH in Los Angeles, California.

** Dr. Henderson, not a member of the Society, is a Senior Researcher with the Bigel Institute of Health Policy Resource connected with Brandeis University in Waltham, Massachusetts.

the deductible of $100 for individuals and $250 for families. In 1984 the plan was transformed to provide comprehensive major medical benefits. All services were covered at 80% after meeting a deductible of $150 for individuals and $375 for families. To be included in the study group for a given year, an employee had to be a full-time, active worker under the age of 65, residing in California and a member of the Bank of America Medical Plan for the entire 12 months. Also comprising the study group were the covered spouses and children of these employees.

The dependent variable for the study -- annual medical expenditures -- was operationalized as annual adjusted allowable charges for individual claimants. Allowable charges included all expenses covered by the plan, irrespective of who paid them. To eliminate the influence of inflation on the annual incidence of high cost patients in the plan, pre-1984 charges were adjusted to 1984 values using the medical care component of the CPI. Claimants whose annual expenses were $5,000-25,000 were categorized as "high cost;" claimants whose annual expenses were $25,000 or more were "very high cost;" and claimants whose expenses were below $5,000 were "low cost."

Each year 6% of claimants incurred expenses of $5,000 or more and were responsible for over half of total plan expenses. High cost claimants represented just over 5% of all claimants and with a mean annual expense of about $9,000, they were responsible for over one-third of total plan expenses. Very high cost claimants represented just .50 of 1% of total claimants, but with an average annual expense in the neighborhood of $50,000, they accounted for about 20% of total plan expenditures.

Year-to-year stability persisted even when claimants and expenses were distributed among more narrowly defined expense levels. In all four years, claimants whose expenses were less than $3,000 accounted for 90% of total claimants but only one-third of total expenses. At the opposite end of the distribution, the 2% of claimants with the highest expenses were responsible for more than one-third of total expenses.

High cost claimants were, on the average, 39 years of age -- more than seven years older than the low cost claimants. These claimants were very overrepresented by older individuals (50-64 years) and females of childbearing years (20-39). After adjusting for age differences between the genders, female claimants were 50% more likely than male claimants to be high cost patients. And, female claimants ages 20 through 39 were more than twice as likely as males in the same age range to have annual expenses of $5,000-25,000.

On average, high cost patients experienced 1.2 admissions during their high cost year, with an average length of stay of 5.4 days and an average charge per admission of about $6,000. Over 70% of all high cost patients experienced just a single admission that year. Claimants with expenditures ranging from $5,000-25,000 utilized 37-50 times more patient days than claimants whose expenses were below $5,000. With respect to outpatient utilization, high cost patients averaged almost 14 professional visits, three-quarters of which were with a physician, and about 10 prescription drugs. This was slightly more than double the outpatient utilization rates of low cost claimants.

Pregnancy-related conditions accounted for the largest share of total expenses among the high cost claimants. In 1984, 16% of total plan spending was for pregnancy, which was the leading cause of hospitalization in three out of four years.

In 1983 and 1984 pregnancy accounted for one in every five hospitalizations for the high cost claimants. Pregnancy and genitourinary disorders together were responsible for one in every three admissions. Neoplasms and diseases of the digestive system together accounted for another 20% of hospitalizations.

Very high cost claimants were only slightly older than the high cost claimants, with an average age of 41 years. Unlike the high cost claimant population, which seemed to be dominated by pregnant females, older males and infants were extremely overrepresented among the very high cost claimants. Controlling for age differences between males and females, male claimants were 80% more likely to be very high cost claimants than females; males 50-64 years of age were two to three times as likely as females in the same age range to have annual expenses of $25,000 or more.

Very high cost patients experienced about twice as many admissions as high cost patients, with lengths of stay two to three times longer. On average, each of the very high cost claimants

experienced almost three hospitalizations, with an average length of stay of 11.5 days. While about two-thirds of the very high cost patients had at least two hospitalizations, almost 10% of these patients had no hospitalization at all. Very high cost patients also used about twice as many outpatient services as high cost patients. They averaged 26 professional visits, more than 80% of which were with a physician, and they used about 18 prescription drugs.

Unlike high cost patients whose leading health problems tended to be acute in nature, very high cost patients tended to suffer from more chronic types of ailments. For example, diseases of the circulatory system were responsible for 20-30% of total expenses of the very high cost patients each year. Neoplasms and circulatory diseases together accounted for 40-50% of admissions and inpatient expenses. Perinatal admissions also stand out in this group, not because of their frequency, but because of their enormous expense. The average charge among very high cost patients for a single perinatal admission during the study period ranged from $30,000 to $187,000.

All of the information reported so far relates to individual years of data. An important aspect of my research was to examine several consecutive years of data to better understand longitudinal trends in expenses and utilization for high and very high cost claimants. I investigated per capita expenses and use rates in the three years subsequent to being categorized as high or very high cost, the three years prior to this event, and the one year before and one year after. For each of these analyses, to be included in the study population a person had to have been a claimant in the base year and a member of the plan for all years being investigated. Claimants were assigned to a cohort, i.e., low cost, high cost or very high cost, according to their total expenses in the base year.

Per capita total expenses declined substantially from 1981 to 1982 for both the high cost and the very high cost claimants, while they increased about 60% for the low cost claimants. Despite this pronounced regression toward the mean by each of the claimant cohorts, in 1984 -- 3 years after being categorized as such -- the average expenses of the high cost claimant cohort was more than double that for all claimants, and the per capita expense of the very high cost claimants was more than five times the average for all claimants.

The temporal patterns exhibited in mean inpatient expenses of the three claimant cohorts were quite similar to those exhibited in mean total expense. Per capita outpatient expenses, however, declined much less rapidly for the high cost and very high cost claimant cohorts from 1981 to 1984 than per capita inpatient expenses.

Claimants that were categorized as very high cost in 1984 had a mean total expense three years earlier that was more than five times the average for all claimants. Even the claimants that had expenses of $5,000-25,000 in 1984 had a mean total expense in 1981 that was almost three times greater than that of all claimants. Per capita expenses grew steadily from 1981 through 1983 for both high and very high cost patients, with sharp rises occurring for both groups between 1983 and 1984. Per capita expenses for high and very high cost claimants in the first year after being categorized as such were slightly higher than per capita expenses in the first year immediately preceding this categorization.

Mean inpatient expenses for the high and very high cost claimants in the first subsequent year closely approximated mean inpatient expenses in the first prior year. This is because the admission rate of the high cost cohort in the first subsequent year was virtually identical to what it was in the first prior year. For the very high cost cohort, however, the admission rate in the first subsequent year was 40% greater than it was in the first prior year.

In the year immediately following the base year, the mean outpatient expense of the very high cost claimants was not only much higher than it was in the year immediately preceding the base, but also it was even larger than in the base year. Among the high cost cohort, although the mean outpatient expense in the first subsequent year was much lower than in the base year, it was still 30% greater than in the year prior to the base.

What are the implications of these findings for employers attempting to reduce their health care cost burden by focusing on the high cost claimants in their medical plans? First and foremost, there appears to be good rationale for investment in health promotion and disease prevention programs. Diseases of the circulatory system and cancer were the two leading health problems of the very high cost patients, accounting for 22-30% of their expenses and 40-52% of their hospital admissions. These diseases -- many of which are eminently preventable through attention to

lifestyle and reduction of risk factors such as high blood pressure, smoking, elevated cholesterol, excess weight and lack of regular exercise -- also figured prominently among the leading health problems of the high cost patients.

Employers can help reduce the incidence of heart disease, stroke and cancer among employees and their families in at least three ways: 1) offering a comprehensive health promotion program to employees and their families; 2) offering periodic examinations at the worksite, whose content and frequency are dictated by employee age, gender, medical history and health risk characteristics; and 3) adding coverage for a carefully defined set of preventive services to their benefit plans.

A particularly important area of preventive medicine is prenatal care. Babies born to mothers who receive no prenatal care are three times more likely to be low birth weight than babies born to mothers who did receive such care.

Each year of my study there were 30 to 40 high and very high cost infants in the Bank of America Medical Plan. These infants represented just 2-3% of all claimants with expenses of at least $5,000, but they accounted for up to 9% of expenses in that group. In 1984, 38 infants accumulated plan expenses of almost $2 million. Although most plans, including that of Bank of America, do cover prenatal care, there are good reasons for creating benefit plan incentives to encourage early and continuous use of these services. Some employers have gone so far as to offer prenatal services at the workplace.

Obviously, it is far preferable from both a financial and a human suffering perspective to prevent high cost cases before they occur. For those cases that are not prevented, however, the findings from my study suggest that there are new opportunities for earlier intervention by case managers -- opportunities that should be fully explored and, if feasible, exploited.

Mary Henderson is going to spend much of her time discussing case management programs and what is known about their effectiveness to date, and I want to avoid duplicating her remarks. To be certain that everyone is clear as to what I'm talking about when I say "case management," however, I am referring to programs whereby a case manager (usually a registered nurse -- RN) is assigned to work with a patient who has suffered a serious medical problem, as well as the patient's family, physician and any other providers, to assure that the appropriate care is rendered in a coordinated manner, according to an established and agreed upon treatment plan.

It is commonly recognized that the earlier patients are identified as being potentially high cost cases, the greater the opportunities for case managers to become involved with a case in one of two ways. Either a utilization review (UR) nurse contacts the case manager upon reviewing an admission for a diagnosis that is on a predetermined list of potentially high cost diagnoses, or a claims processor communicates with a case manager when total claims for one patient exceed a specific dollar threshold, e.g., $25,000.

Notification by the UR nurse is preferred over advisement by the claims processor since it begins the case management process much earlier. This approach, however, suffers from the basic premise that all high cost patients experience hospitalization. As shown by my study, this is not the case. Each year, 5-7% of patients with expenses of $5,000-25,000 and 8% of those whose annual expenses exceeded that level did not have a hospital admission. On the other hand, case management services that are initiated through claims processing are inherently flawed in that they are triggered by a level of expenditures that is already so high there may be little the case manager can do to alter the course of treatment or the patient's outcome.

Multiple methods of identifying high cost and potentially high cost patients are probably necessary for case management services to achieve their full potential. For an acute trauma case, such as an injury sustained in a car accident or severe burns, initiation of case management through the UR process is very appropriate since it will involve the case manager at the earliest possible moment. For those individuals who have chronic health problems and use many outpatient services over a prolonged period, however, the two approaches to case management presented so far are extremely reactive in nature and far from optimal.

Based on findings from my longitudinal analyses, there is good reason to suspect that a more proactive case management approach could be designed. Rather than waiting for patients to exceed a certain level of claims expense or to be admitted to a hospital, it might be possible to use

claims data -- such as diagnostic and demographic information -- to identify patients with a strong likelihood of becoming very high cost and then intervene as necessary (and appropriate) to prevent that occurrence.

I reached this conclusion from two key observations in the longitudinal data. First, in the year immediately following their base year, patients whose annual expenses were between $5,000 and $25,000 had a hospital admission rate that was virtually identical to their admission rate in the first year prior to the base. This suggested that the majority of illnesses and conditions for which the high cost patients were hospitalized were acute events, a perception that was supported to a certain extent by the diagnostic data.

Without additional information, one might suspect that over time the high cost patients typically are low cost patients (or non-users) who simply experience a one-time high cost event and then return to their original low levels of utilization. However, the second important finding was that three years after being categorized as high cost, this group of patients had a mean expense that was two to three times the mean expense of patients who were categorized as low cost. This demonstrated that the high cost patients as a group were distinct from the low cost patients. Individually, many of the high cost patients -- such as those having babies -- were probably low cost patients or non-users in the years prior and subsequent to their high cost year. At the same time, however, there had to have been a number of patients in the high cost cohort whose levels of utilization and expense were sufficiently high over a period of years to result in levels of use and expense for the entire year that were substantially above those for the low cost claimants.

It is this latter group of claimants that would be worth studying further to identify health problems and longitudinal utilization patterns. As a group, these patients either maintained a steady high level of expenses over a several year period, or many of them became very high cost in one year or more. By eliminating from the high cost cohort those patients who were pregnant or had other clearly identifiable one-time acute events, such as a hysterectomy or appendectomy, the remaining patients might be excellent candidates for early intervention efforts through case management.

MR. AVNER: Mary Henderson is a Senior Researcher with the Bigel Institute of Health Policy Resource which is connected with Brandeis University. She has a Ph.D. in social policy and most of her research focuses on managed care for high cost and vulnerable populations.

DR. MARY G. HENDERSON: I am very pleased to be here to discuss strategies to manage the expenditures of high cost claimants. In the brief period of time we have available, I will not be able to do justice to all the innovative techniques and programs both currently used and those under development by insurers, health management firms, and employers which focus on the types of high cost patients that Dr. Alexandre just described.

In my discussion I will go into a bit more detail about the types of management strategies that Dr. Alexandre just talked about -- secondary prevention of high cost illness and case management for high cost illness.

Secondary prevention is the approach used to eliminate or reduce the complications and exacerbations of already existing health conditions. It is used to manage health care delivery for patients with a clearly defined serious illness or injury. As one can imagine, the line between the secondary prevention program and high cost management is beginning to blur.

A major aim of case management programs is to prevent complications in patients with a high cost illness through better and more comprehensive care. An example would be the prevention of ulcers or bedsores in spinal cord injury patients through the provision of a well-coordinated skin care program. Also case management programs are moving into the identification and management of patients at risk of high cost illness. My remarks will have particular relevance for the management of risk in health insurance programs offered through employer-based indemnity plans, the primary source of health insurance in the U.S. today.

Most of my presentation will concern high cost case management since I have been conducting studies in this area for the past four years for private industry, the Health Care Finance Administration (HCFA), and state Medicaid programs. I will also touch briefly on future trends in both prevention and high cost case management.

Recently, secondary or targeted prevention programs have been developed to reduce the incidence of many types of high cost illness. Innovative approaches have been used with high risk pregnancy or perinatal care and cardiovascular conditions. Approaches for AIDS are in the planning stage. In the initiatives that I will briefly describe, individuals at clear risk of developing the condition are identified and are encouraged to become involved in the prevention program.

Given the high cost in both human and economic terms of premature babies, many companies are beginning to offer services to prevent perinatal complications in pregnant employees and dependents. Prenatal programs are currently offered by 1st National Bank of Chicago, the Marriott Corporation, Oster Sunbeam and many other corporations. Typically, employers offer prenatal education which stresses identification and reduction of behavioral risk factors to identify those of particularly high risk and second opinions regarding certain procedures such as Caesarean sections are also used. Usually, incentives are offered for participation in the prevention program with either a reduction in copays or sometimes cash. Some programs are mandatory for employees, but most are not.

For the prevention of cardiovascular illness, the most frequent type of high cost condition, Southern California Edison offers a program called good health rebate. In this program employees are tested on several objective modifiable health risks related to heart disease such as total cholesterol, body weight, and smoking which is measured by blood carbon monoxide levels. Those identified at risk are given financial incentives to enroll in risk reduction programs.

As we are all well aware, the current medical thinking regarding optimal AIDS treatment and management approaches continues to evolve. AIDS is now regarded as a chronic disease with periodic exacerbations alternating with intervals of relatively good health and high functioning. Based on the findings of very recent clinical trials, it is now believed that prevention of opportunistic infections -- the lethal factor for people with AIDS -- may be accomplished through aggressive monitoring and drug therapies. Many companies are now considering whether to encourage HIV positive employees to seek aggressive care. Obviously, social, political, and legal issues are germane here as companies decide whether or not to stress testing and treatment over primary prevention strategies such as education.

The analysis of the effectiveness of any targeted prevention strategy must be demonstrated by comparing the cost and benefits. For the most part, however, these programs are too new to have undergone rigorous analysis and evaluation.

Two major categories of cost must be included in the cost benefit calculation. First is the cost of incentives, if any, offered to employees to participate. The Marriott Corporation, for example, offers $100 to each employee who participates in its prenatal program. Given 2,000 eligible employees for the program in 1989, incentive costs of $200,000 could result. Second, the program itself will cost money. Few companies have calculated the cost of the intervention itself, but Marriott expects to pay an ob-gyn provider $20,000-25,000 for one year of the program. The benefits for prenatal care appear obvious since one high cost birth can cost in the short term more than $300,000 and well over $1 million in long-term cost if the child is disabled, ventilator dependent, or experiences multiple hospitalizations.

Productivity is increased if the mother and child have fewer medical problems allowing mother or caretaker to return to work earlier. Long-term productivity of the U.S. work force is improved through the prevention of disabling conditions in children. The problem, of course, is in attributing improved outcomes to the program since the incidence of these events is usually so low in any one company that small chance variations can make a program look very good or very bad. Employers clearly state, however, that cost avoidance is not the primary motivation in offering these programs. It is improved access and quality of care.

Future trends in prevention include programs that focus on a wider array of modifiable risk factors such as seatbelt use, and drug and alcohol use. More sophisticated testing and screening techniques used to determine risk including testing for genetic markers for certain diseases and better targeting of those at risk will help make these programs more efficient.

Most of the remainder of this presentation will focus on high cost case management. Since there is a great deal of confusion about what high cost case management is, I will begin with a discussion of its origins and then proceed to a definition. I will then briefly describe the process of high cost

case management and give highlights of a national survey we conducted that studied the variations in the process. Finally, I will present results from our evaluation of the cost effectiveness of one major insurer's program.

The term *case management* has been used to describe a number of diverse approaches to planning, coordinating, providing, and financing health care. One of the earliest uses of the term came from the rehabilitation field. Employers began to pay particular attention to the efficacy of rehabilitation after the passage of worker's compensation laws. These legislative acts motivated employers to help get injured workers back on the job, thus reducing employer liability. Numerous private vendors and companies began to offer case management to coordinate these workers' care. The emphasis was on early intervention and return to work.

Case management in the social services has a somewhat different connotation. Coming into vogue during the "Great Society" programs of the 1960s and early 1970s, case management was used as a strategy to increase the access of vulnerable populations to social service programs and entitlements such as public housing and Medicaid. The late 1970s saw the explosion of human services costs, particularly in health care expenditures.

Case management began to be used as a way to control access to expensive services like specialty and emergency room care. Physicians and others were to serve as gatekeepers to the health care system supposedly to improve the efficiency of care delivery. High cost case management or medical case management, as it is also called, originated in the early 1980s, but only began to be widely used after 1985. The approach was fueled by the continuing rise in health care cost and the realization that only a small percentage of covered individuals accounted for a large proportion of the total claims dollars.

Currently more than 65% of large corporations offer high cost case management and that proportion is growing rapidly. High cost case management has several distinctive characteristics and Dr. Alexandre mentioned some of them. High cost or potential high cost cases are identified through a number of triggers including specific diagnosis, cancer, AIDS, high risk infant, head injury, and mental illness. Cost and utilization criteria such as annual claims over $25,000, multiple hospital admissions in a given time period, and certain procedures such as transplants, are also used as commonly employed identifiers.

High cost case management is distinguished from routine utilization review due to the development of individualized treatment plans that address the unique needs of each patient and family. The sequencing of specific services is tailored to individual needs through these treatment plans. Frequently, the treatment plan calls for the delivery of services that are not covered under the patient's health plan such as transportation, certain kinds of equipment, and intensive home care. The high cost case management program arranges for payment of these uncovered services through the health plan by making benefit exceptions in the individual case.

A controversy in high cost case management, as well as in other forms of case management, concerns who should be the case managers and what should be their training. Virtually all high cost case management programs for private employers use highly qualified RNs. Programs differ, however, as to whether the RNs are specialty matched to the cases they manage.

Finally, all high cost case management companies claim to be saving money while they improve quality. They contend that they are increasing efficiency and are providing better outputs for the same or lower level of inputs. Although much anecdotal evidence exists on this point, rigorous evaluation of the service has yet to be performed. Our study represented a small first step in that direction.

There are five steps in the high cost case management process: first, case identification and referrals using the triggers I just described; second, screening and assessment of the patient's condition and current care; third, the development of a plan of care, including the recommended benefit exceptions based on the assessment results; fourth, plan implementation and monitoring by a case manager or other individual; and finally, case closure. The trend that we have found is to shorten the whole process between case identification and closure to around three to six months.

We conducted a national survey of 25 high cost case management programs, including both insurance based programs and those provided by independent case management vendors, to discover some of the variations in the case management process itself.

We found there is quite a bit of variation in the use of on-site visits for assessment or monitoring. There has always been great controversy in the field whether face-to-face assessment, by the case manager or health care worker who is contracted by the case manager, is really necessary to develop a high quality, cost-effective plan of care. To be honest, I think the jury is still out on that. The cost-effectiveness evaluation that we performed showed that on-site assessment did not appear to be related to cost-effectiveness even when we controlled for diagnosis and severity of illness. However, over half (55%) of large employers responding to our national Washington Business Group on Health Survey reported that they used on-site case management.

Insurance based firms are more likely to recommend benefit exceptions than independent case management vendors because it is administratively easier for insurance based programs to do this. This may be important since some of our research suggests that some types of benefit exceptions are positively related to cost effectiveness. The Washington Business Group on Health Survey reported that 50% of large employers had case management through insurers, 35% through case management vendors, and 17% performed in-house case management.

Case management services charge for their program in a variety of ways as well. These include hourly fees, which can range as high as $125 per hour; yearly retainer fees; a percentage of total paid claims, or a fixed per capita monthly fee. Some insurers offer high cost case management at no extra charge although these costs are included in overhead and premiums. Estimates are that employers should pay approximately $2.00 per employee per month or 1.2% of paid claims for the full range of case management services.

Some high cost case management programs report using quality review and quality assessment mechanisms. Our work indicated, however, that there are significant differences in the actual application of quality controls. The increased auditing activity that we have noticed by employers should lead to more uniform standards and procedures.

I would like to briefly discuss the results of the cost effectiveness component of our study of one major insurer's program that we completed last year and was funded by the Robert Wood Johnson Foundation. This was a retrospective study of 245 managed cases which fell under four diagnostic groups: high risk infant, spinal cord injury, head injury, and cancer and AIDS patients which we grouped together. To get into the black box of case management by trying to determine what the case managers were actually doing, we painstakingly classified all billable hours of the more than 20 different case managers who worked on over 100 of these cases. We did not classify all 245. Finally, we developed definitions of outcome measures; for example, we operationalized what cost avoidance or short-term savings mean in a case.

Our results on how case managers spend their time usually surprised employers but not case managers. We found that the largest chunk of hours billed to employers -- this service charged an hourly fee -- was spent on documentation activities, writing case reports, letters, etc. The second greatest amount of time was spent on monitoring patients which included calling providers, patients or family members to see how things were going. Over 10% of the time was spent informing claimants about the benefit plan. Less than 10% of total time was spent actually arranging and coordinating the care called for in the treatment plan.

Obviously, our judgment played a role in how activities were classified. But two independent researchers rated each case manager activity with a degree of interrated reliability over .90, which means 90% agreement. However, another caveat is these cases were managed in the 1986-1987 period, and case management companies will be quick to inform you now that documentation has become more streamlined since then.

We then reviewed the entire 245 cases to determine if the high cost case management intervention actually resulted in savings. We were particularly interested in short-term savings; that is, those which resulted within six months of the beginning of the case management process. We developed three categories of short-term savings: high cost case management which was responsible for shortening the acute hospital stay; high cost case management which affected a transfer to a less expensive facility on the basis of the price discount at the current facility; and high cost case

management which reduced the expense of the home care program through intensivity reductions or price negotiations. To be considered a short-term savings case, at least one of these activities had to be coordinated by a high cost case management program.

We found that one-third of the cases fit our definition of short-term savings for a total of 82 out of 245 cases. For these 82 cases we judged that high cost case management was responsible for averting over $1.8 million in claims dollars. In total, however, employers were billed over $1.5 million in case management fees for these 245 cases. The return on investment for all cases was only 1.2. The case management fees for the 82 cases with short-term savings amounted to almost $500,000. Thus, the return on investment for the 82 cases was 3.90 since all of the savings, as we defined them, were generated by just those cases.

These results suggest that if case management programs could improve their targeting and spend less time and money on the non-savings cases, the return on investment would be significantly improved.

We also looked at the results of the study by diagnosis. Cancer and AIDS had the highest proportion of short-term savings cases, but the return on investment was small and not much money was saved per case. This is because of the terminal nature of the disease. The return on investment was greatest for head injury and spinal cord injury because costs are so high due to the lengthy nature of the treatment and the high per diem cost. Thus, an alternative form of care can significantly lower costs and make a difference.

Recent trends in high cost case management include improved targeting mechanisms such as the approaches that Dr. Alexandre was talking about and more research to really find out what does predict high cost. Also, in the future there will be less duplication with other cost containment programs. In our work we find that utilization review programs sometimes are already doing much of what case management does. Other improvements include more administrative efficiency to cut down on the length of time spent in documentation activities; better management information system (MIS) to really keep track of what case managers are doing with cases; more protocols and standardization of case management plans and care; and improved provider arrangements so negotiations can be performed quickly and smoothly.

MR. AVNER: John Cookson is a consulting actuary with the Philadelphia office of Milliman and Robertson. He has worked in the areas of trend analysis, stop loss reinsurance, and attempts to apply measures of health care status and health care financing.

MR. JOHN P. COOKSON: I am going to talk more from the standpoint of an insurer who is trying to price and underwrite the high cost claimant risk. Based on our most recent claim probability distribution estimates for a typical comprehensive major medical (CMM) plan, we estimate the 1% highest claimants as a percentage of all enrollees represent about 35% of total claim dollars; the 2% highest claimants about 50% of claim dollars; and the top 50% of claimants about two-thirds of total claim dollars.

The percentage of non-claimants in this group would run somewhere between 35% and 60% depending on whether there is direct submission of claims by providers, whether this is mechanized, and what the submission pattern is for people with low-level reimbursable claims.

What is more important and provides a different perspective is the percentage of variance in the claims distribution that is attributable to these catastrophic claimants. In other words, if high cost claims represent such a large proportion of our total claim costs, you need to try to predict the impact of those claims and minimize the effects in the rating and underwriting processes. If you look at the contribution of these claims and the total variance of the individual claim distribution, you see that these claims really do represent the bulk of the variance in the claim distribution. Again, the top 1% represent nearly 90% of the total variance about the mean and the top 5% represent about 97% of the total variance in the individual claim distribution.

You might think that one way to control this is through pooling of the large claims or through stop loss, which could significantly reduce the variance involved. For example, if we put a stop loss cap at the minimum attachment amount for the top 1%, the variance would be reduced by about 76%. But this means pooling approximately 20% of the total claims, which results in some fairly high pooling charges.

How do we predict these claims? Much of this involves using a group approach; that is, we look at last year's claims, apply some credibility and trend them forward. If we look at the individual claimants, the correlation of individual claim levels from one year to the next is only about 20%. Estimates in the neighborhood of 15-25% are what I have seen -- about 20% was found in the Rand Study health insurance experiment. From that perspective last year's claim levels are not a strong indicator of what next year's claim levels are likely to be.

In terms of the explainable variance, there are demographic variables or other rate book approaches to developing cost estimates. What was found in the Medicare analysis of this experience was that demographics explain only about 1% of the total variance of the individual claim distribution. Medicare found that when trying to look at some history of prior use to project and anticipate what the claims levels might be, the explainable variance was increased to maybe somewhere in the 5-10% level. Still, a very small percentage of total variance is explained, but a significant improvement relative to demographics.

Estimates have been made in connection with the Medicare program that the maximum variance that might be explainable using absolute state of the art techniques and levels of data that might not generally be available is only about 20%. The balance of the variance is random or, at this point in time, is not easily explainable.

Another issue that Dr. Alexandre mentioned is the issue of regression to the mean. This compares how high cost claimants or low cost claimants relate in the present year to what their future experience might be. Below is a chart representing some statistics on the Medicare program; again, the source was a paper on Medicare reimbursement and regression to the mean by James Beebe. It shows a distribution of claimants cohort which is followed from the period 1974 to 1980. They were ranked in the 1974 period by size of claim. The 2% highest of all eligibles, which includes not just claimants but also those with no claims, had average claim reimbursement of over 15 times the average for the whole cohort. The lowest 52% at that point had no claims at all.

ILLUSTRATION OF REGRESSION TO THE MEAN

Reimbursement Ratio

% of Claimants	1974	1975	1976	1977	1978	1979	1980
52%	.00	.54	.65	.73	.74	.75	.76
19	.10	.98	.97	.99	1.01	1.03	1.04
11	.48	1.44	1.36	1.23	1.37	1.32	1.34
4	1.32	1.64	1.46	1.31	1.53	1.47	1.52
3	2.05	1.48	1.34	1.33	1.43	1.24	1.37
5	3.47	1.70	1.68	1.67	1.38	1.45	1.56
4	6.79	2.53	2.39	2.09	1.99	1.84	1.63
2	15.79	3.30	2.83	2.75	1.89	2.40	2.10

SOURCE: Medicare Reimbursement & Regression to the Mean

Over time, the highest claimants had their relative cost come down dramatically. In subsequent years the relative cost was down to three times the average and by 1980 down to two times the average, but still significantly above the average claim levels for the cohort as a whole. At the other extreme, the zero claimants of 1974 increased to about half the average in subsequent years and ultimately to about three-quarters of the average by the end of the period.

What do these things mean, particularly in the case of small groups? In the case of small groups, there is either one or two large claims or there is none at all, and that makes the difference between success or failure in the financial results of a given small group. For groups of 25 employees, we would estimate that probably about 75% of the groups would be expected to have one or more claims over $25,000. This can make a big difference in the overall financial results for a particular group. In fact, perhaps even 10% of the groups can be expected to have two claims for $25,000 or more.

On the large group side, you think that the law of large numbers would have an effect and diminish the impact of the large claim. It does to some extent. But when you look at the large

claims, you still have a very small number to deal with, and you could have substantial fluctuations relative to those large claims and also to the claim size. For example, for groups of 500 employees we might anticipate that 50% of the groups would have five or less claims over $25,000 while as many as 10% of the group might have eight to ten claims over $25,000. This can contribute to the overall fluctuation even in large size groups.

I think an important issue is, as was pointed out earlier, that these large claims are not homogeneous. There are some that appear to be one time actual occurrences and others that may be more long-term or chronic and may not occur every year. However, they may occur every third or fourth year and are likely to contribute to high costs again in the future.

In order to improve predictability and pricing, it becomes necessary to try to identify those claimants who are likely to be continuing and chronic such as cancer and heart patients as opposed to those who have short, one-time illnesses like appendectomies.

I would like to talk about Medicare's ratebook and the analysis Medicare had done in conjunction with its program for risk-basis HMOs on a capitated or prepaid basis reflecting demographics, geographic locations, and separate rates for disabled, institutionalized persons and people on welfare. As I mentioned before, only about 1% of the variance in the individual claim distribution is explained by the adjusting average per capita cost (AAPCC).

Medicare's concern was that in using risk-basis HMOs it might get biased selection. Biased selection could occur either from a marketing program where the HMOs are targeting healthier individuals or it could occur from self-selection. This is because people who are sick may be less willing to switch doctors in order to join an HMO than healthy people. Medicare was also concerned that the HMOs did not get selected against because it is looking at this as a way to help control future costs. If the HMOs have negative selection, it would not bode well for the long-term success of the program.

To identify biased selection, a number of studies were done linking prior hospital usage and prior physician usage to subsequent claims experience using samples of Medicare data. It was found that the predictability of the AAPCC rate books could be improved significantly, but generally less than 10% of the variance could be explained by any of the techniques that were being used.

What can be done to best improve the results with the least amount of effort and not provide perverse incentives that shift people into high cost reimbursement categories? It seems at this point the most successful or the most promising program is the DCG (diagnostic cost grouping) program which is based on classifications of patients by prior hospital usage ICD-9 codes. ICD-9 codes were studied by clinical and statistical methods which were chosen to improve future predictability of claims. In other words, certain ICD-9 codes were found to be indicative of future ongoing high costs while other ICD-9 codes were not found to be indicative of future ongoing high costs. It's almost like an acute versus a chronic type distinction between the various types of admission diagnoses.

The DCGs represented eight different rating cells plus there was a separate cell for renal disease which is not covered under the risk basis HMO reimbursement contracts. The admission classifications were adjusted in order to avoid the perverse incentives that I mentioned earlier that HMOs might have. Admissions which were subject to overstays, and those that had ambiguous diagnoses were reduced to the lowest reimbursement level to avoid those kinds of disincentives.

The findings under this approach were that the R^2 predictability of the individual claims was significantly increased. Even groups of intentionally biased subgroups had the predictability of their claims significantly improved relative to a typical rate book. For example, when all females with cancer were chosen as a subgroup, this reimbursement mechanism improved the overall estimate of claim cost for that subgroup relative to a rate book estimate.

What are the applications to private health insurance? In regard to the criteria used for DCGs, I think, Medicare's objectives differ somewhat from a typical indemnity employer because of the HMO reimbursement issues. Particularly, with respect to the discretionary and short length of stays, if you are not in a managed care system and under a typical indemnity approach, these stays may appear year after year. The Medicare criteria looked at only one year, and therefore each year you would have to be placed into a new diagnostic category.

I think the data indicated that the effects of these categories lasts for a number of years. I felt it may be worthwhile to consider longer term placement in these categories such as three years or five years or possibly longer. However, I think some of the clinical evaluations may need to be revisited because of the differences between the under 65 and over 65 admission and treatment patterns. Obviously, the distribution of admissions by ICD-9 will differ significantly, but I suspect that the predictability, for the most part, will be consistent between the two populations.

What about the availability of information? Since this approach keys off of ICD-9 inpatient diagnosis, I think that this type of information could be easily blended into some kind of rating scheme -- either in a manual rated process or an experience rated process.

What are the potentials for using this information? One significant potential is the identification of antiselection. For example, if you could develop a standard DCG mix representative of the overall insured population, you could then begin to do hypothesis testing. You could look at anti-selection within a given pool, within a group, or within options taken in a given group. This type of information might also be used to study the select and ultimate effects of selection in terms of small group rating and underwriting.

The second area is physician risk sharing. For example, in an open practice association (OPA) situation physicians are often reimbursed on a capitation basis which is either level or adjusted for some kind of demographics. Often, you'll hear a single physician or a small group of physicians claim that they are attracting the sicker patients and there should be an adjustment to their capitation. A standard could be developed and then used to measure whether, in fact, they have been selected against or have received a sicker population. This would justify whether an adjustment in their compensation should be made.

In small group rating and underwriting, antiselection can, as I mentioned, be identified in terms of the overall pool or within a given group. I believe it could be used in developing rating techniques for substandard risk pools resulting in maybe more competitive and profitable rates for these pools. Much of the subjective experience rating that is done on small group pools right now could be objectified by using these types of techniques. This might satisfy some of the concerns that insurance departments have been raising about the subjective techniques that are currently being used.

In the large group market I believe this kind of information could be fed into the experience rating formula and can be used in conjunction with the credibility type adjustments in future experience.

If you are in a multiple option, or managed care dual choice arrangement, antiselection can be determined from whether individuals choosing one option or the other are those representing the higher risk as measured by the DCGs.

It also can be used to improve the stop loss pricing. For example, if you look at these categories, the leverage on stop loss is tremendous. If you can separate the acute care individuals, who will not likely have a repetitive claim from those who are likely to have continuing ongoing chronic claims, this could have a significant impact on the overall catastrophic cost related to stop loss.

MR. MARK ALAN CHESNER: I have problems in adapting Leslie's results to the insured population as a whole. You seem to have taken the people of California, the state which I would say is the most extreme for showing patterns of utilization and cost above the nationwide average, and coupled that with the banking industry which probably has the lowest industry factor of any industry that I have examined -- way below the 1.00 standard. This would lead to a lot of interplay between who is providing the high costs and how they arrived at them.

For instance, I suspect that for a group like the banking industry, if you are really sick you are going to run up those large claims, but if you are not all that sick, your smaller claims will amount to a lot fewer than the typical industry. Therefore, your ratio of high claims to small claims would be higher than what I would expect to see as the nationwide average. I recognize that your work is not applicable to what we're doing, but there is a serious amount of manipulation we would have to do before we could use it.

MR. THOMAS F. WILDSMITH: I have a question for Leslie and Mary. Preventive wellness and lifestyle programs are problematic for carriers because they involve a current expenditure to reap future savings. Because groups can and often do change carriers freely, those savings, in the future, are likely to be reaped by another carrier. Do we have any knowledge of the time lag involved between when the money is put into these programs and when the savings are realized?

DR. ALEXANDRE: I think that is something that has been pointed out repeatedly as an argument for not investing in health promotion and disease prevention. Most of the companies that I have worked with over the last several years have been large self-insured employers. Many of them have very stable work forces.

For example, Southern California Edison is, I think, one of the first in the country that gives an actual rebate on the premium contribution to their employees if they test negative on the five modifiable risk factors. Or the rebate goes to employees who test positive and begin a company approved treatment program. However, this is a company that has incredible stability. It has about a 3% turnover rate per year, and it is also a third and fourth generation company. Basically, Edison is covering its employees from cradle to grave.

There is a ten-year time lag between quitting smoking and reducing the risk of heart disease and certain cancers, and this would be okay for an employer like Edison. It could be a lot more difficult on the insurer's side when you are talking about fully insured groups that change frequently. I think there is hope that ultimately, if everybody does this, then you may pay for a certain group which does turn over, but you then get another group that someone else has paid for.

I think we are in trouble unless we start moving as a society toward that type of perspective. In other words, we have to start preventing these things instead of paying for them after the fact.

MS. JOAN P. OGDEN*: A question for Dr. Alexandre. In your before and after comparisons, when you have a span of time, clearly a premature newborn could not have fit your criteria for being covered under the program for the entire spectrum of time. How did you treat these newborns, and if they were excluded from your analysis for the before or after, what would their inclusion have done in terms of changing the results?

DR. ALEXANDRE: That is a good question. I don't think there was an exclusion of those cases so it could have skewed the findings. It was three years ago that I did the actual analysis of the data. I think it is an excellent point and this is something to be looked at.

MR. JOHN D. BOHON: A question for John Cookson. Regarding the study on the Medicare reimbursement which I think was finally published in *Health Care Financing Review* this last issue, didn't it show that the best predictor of all of the ones that they looked at was prior use -- Part B prior use -- not the diagnostic cost groups.

MR. COOKSON: I think that may be true, but it is also very difficult to get that kind of information in the easy levels of detail.

MR. BOHON: But isn't that the basis of experience rating for group insurance? There was no detail, as I recall, just Part B claims. You either had them or you didn't.

MR. COOKSON: Was this just published? I worked with this almost two years ago. I recall that prior Part B use was a significant variable, but it was rejected for a number of reasons as impractical, at least in terms of the approach Medicare was using.

MR. BOHON: For the approach Medicare was using, but not necessarily for our purposes.

MR. COOKSON: Not necessarily, no.

MR. DAVID NUSSBAUM: It was mentioned that the targeting of medical cost management was important. You mentioned some statistics about spinal cord and head injury being cost effective

* Ms. Ogden, not a member of the Society, is a Consulting Actuary at Wilcox & Company, Inc. in Salt Lake City, Utah.

whereas cancer was not. Could you comment on premature births and maybe some other illnesses or injuries as well?

DR. HENDERSON: We were not able to study in detail anything beyond the four diagnostic categories that I mentioned. Our data, as I recall, on the premature births were somewhere in the middle of the spinal cord and head injury, and the cancer and AIDS.

What tended to happen with the premature births was that either the child was born small and needed some kind of alternative treatment plan to leave the hospital or the child was severely disabled. The first group of children gained weight and became fine, and had no really long-term cost implications or adverse health problems. The other group of children in the same diagnostic category went on to incur very large claims.

The problem is that the group is very diverse. I think we have all said that there is a lot of variation among these high cost patients, and even within the ICD-9 code level, there is a lot of variation as well. I think that is why this group fell in the middle of our research.

DR. ALEXANDRE: Anecdotally, when you talk to employers about these types of programs, they overwhelmingly feel that these are positive programs which are saving them tremendous amounts of money whether they have quantified that or not.

The technology has improved greatly in dealing with some of the premature infants. It is going to be interesting to see if the savings ratio increases because in the last two or three years, the options for taking premature infants home and teaching the parents how to care for those infants have expanded greatly. Although this isn't scientific evidence, when you look in the trade journals or at reports from different employers, parents are much happier having their infants at home. They do seem to feel that they're saving quite a bit of money by doing this.

MR. AVNER: Mary, if I were an employer and I was considering putting in a management program for high cost claimants, what would you recommend?

DR. HENDERSON: I would recommend a several things. First of all, it is clear that you have a very diverse group of high cost claimants or claimants that are generating the large expenditures. I would strongly recommend that employers analyze their data. They need to go back as many years as they possibly can, given the resource constraints, to really try to find out what their problems are.

Many of the employers that we have worked with are very surprised when they look at their claims experience. For example, they might think they have a problem with perinatal cases, when in fact, it turns out to be cardiovascular cases or maybe just injuries. In certain states, the high cost patients are those multiple injury type patients who do not really fit into any of the kind of categories that we have talked about. This would include motorcycle accident victims resulting from a lack of helmet laws. Employers should look at the claims data and try to separate the acute cases from cases that are chronic. They could then design the programs around what their experience actually is.

I would also recommend that the employer carefully audit the vendors that are providing case management services. Case management services are tremendously different. If employers are proactive and really get the kind of reports that they require to find out what these case managers are doing and how they are spending their time, it would be well worthwhile. Finally, after the case management program has been in operation for a year or so, they should re-evaluate the program to see what the impact really is, how many cases fall through the cracks, and how many cases seem to be managed in a cost effective manner.