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THE ROLE OF EDP IN THE PLANNING AND MANAGEMENT OF PUBLIC HEALTH CARE SERVICES

USE OF COMPUTERIZED INFORMATION FOR LOCAL AND NATIONAL HEALTH CARE PLANNING PURPOSES

(CASE STUDY)

by

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SUMMARY

Health care planning has two primary objectives:

--First, to estimate the need for health care in the future.

--Second, to plan the implementation of actions sufficient for satisfying as much of that estimated need as efficiently as possible within the approved amount of resources.

As principal analyst for the United States General Accounting Office's study of the well-being of older people, I developed and demonstrated the use of a computerized information system for planning the provision of services. The information system developed during that study is being used for planning the local provision of services in a large industrial city (Cleveland, Ohio) and is being evaluated by the United States Department of Health and Human Services for planning the national provision of services. For your purposes, I am limiting this paper to a description of only the data elements and their use for estimating and planning health care although the information system design can accommodate the economic and social aspects of a person as well.

The described information system can not be used to obtain current and future estimates of (1) what is being provided and achieved by an existing health care system, (2) unsatisfied health care needs, (3) the likely costs for additional health care to satisfy those needs and (4) the likely reductions in illnesses and increases in personal capabilities over time if those needs were satisfied.

Use of Computerized Information for Local and National Health Care Planning Purposes

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INTRODUCTION

The United States spends billions of dollars annually to care for people 65 years old or older. The United States Congress, consisting of the legislators who authorize these expenditures, looks to my employer, the United States General Accounting Office, for information and independent judgments about how well those billions are being spent, about whether all the needs of older people are being met, and about the changes in the lives of older people that can be attributed to those expenditures.

In the United States, considerable effort was spent on studying information obtained and recorded by the various Federal, State, City, County, and private agencies providing care for older people. The information resulting from such studies did not satisfy the information needs of legislators. My role, as a principal analyst, was to evolve a computerized information system useful to the Congress, researchers, planners, and service providers. In this paper, I will describe this information system. However, I am limiting my description to only the data elements and their use for estimating and planning health care although the information system design can accommodate the economic and social aspects of a person as well.

We accepted the view expressed by Dr. Eric Pfeiffer, a reknowned Gerontologist in the United States, that "if you design

a health care system which is adequate for the aging population, it will be superb for the rest of the population." I believe and hope to convince you that the information system which was evolved for identifying all the needs of older people for help can be easily adapted for identifying the health care needs of any population in countries other than the United States.

DATA ELEMENTS FOR IDENTIFYING NEED FOR HEALTH CARE

The basic data elements in our information system were established at the Duke University Center for the Study of Aging and Human Development. Dr. George Maddox and his colleagues at that center successfully designed a questionnaire which was sufficiently meaningful to older people to enable them to communicate their needs and helps received and was sufficiently meaningful to agencies to enable them to communicate the services provided to those people.

The essential features of the information in that questionnaire are:

- --descriptions of the extent that persons can perform activities essential for living outside of an institution (Example A below).
- --a list of the illnesses that such persons are likely to have and the extent that those illnesses interfere with personal activities (Example B below).
- --a list of common medicines that such persons are taking (Example C below).
- --the kinds of help or services which persons are receiving and whether the provider was family or friend or a public agency (Examples D and E below).

Examples of the format used to obtain that information are:

Example A

--Can you eat...

Code	Statement
2	without help (able to feed yourself completely),
1	with some help (need help with cutting, etc.),
0	or are you completely unable to feed yourself?

Example B

--Do you have any of the following illnesses? If YES, how much does it interfere with your activities?

ARTHRITIS OR REHUMATISM...

0	No
1	Yes and it interferes with my activities a little or less.
2	Yes and it interferes with my activities a great deal.

Example C

--Do you take...

ARTHRITIS MEDICATION?

1	Yes
0	No

Example D

--Does someone help you with your personal care; for example, help you bathe or dress, feed you, or help you with toilet care?

1	Yes
0	No

Example E

--Who helped you in this way?

1	Unpaid family members or friends.
2	Someone hired to help you in this why or someone from an agency.
3	Both.

LIMITING THE NUMBER OF DATA ELEMENTS

In general, the number of the kind of data elements just mentioned for identifying the need for health care can be limited to those which are directly relevant to the goals or objectives established for your health care efforts. In our study, in the health care area alone, we used information about 13 activities of daily living, about 28 illnesses (covering both physical and mental illnesses), about 18 medicines (including both prescription and non-prescription drugs), and about 11 services (those services provided in the home to compensate for a lack of some capability).

BASIC IDEAS FOR USING DATA ELEMENTS

The following ideas were instrumental in using data elements for producing information about health care needs:

--CONDITION refers to the relative capability or feelings of a person. For example, a person in the best condition could perform all the activities of daily living without help.

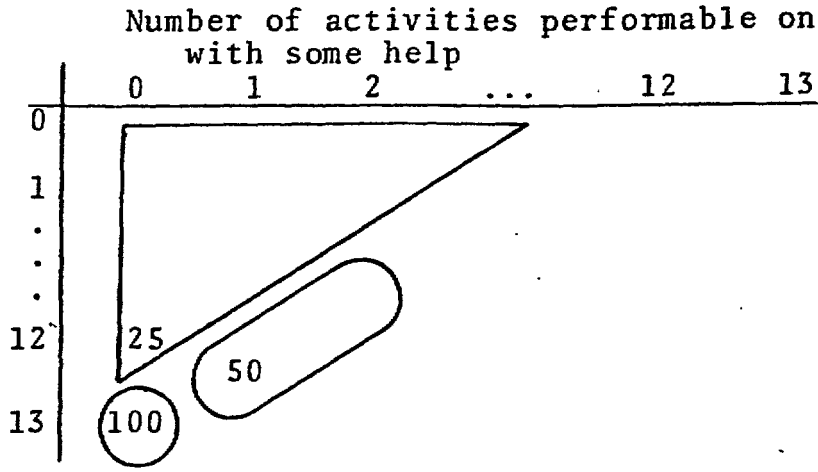
--PROBLEM refers to the alleged or diagnosed explanations for a person not in the best condition. For example, an illness like arthritis could be a diagnosed explanation for a person not being able to dial a telephone.

--HELP refers to the resources and services provided to a person to remove or reduce the effects of an identified problem. For example, arthritis medication is a help for arthritis. If only considering health care, help for an illness is also called a TREATMENT and help in the form of performing an activity for a person who cannot perform that activity is also called a COMPENSATORY SERVICE.

USING DATA ELEMENTS TO IDENTIFY THE CONDITIONS OF PEOPLE

We computerized the questionnaire information obtained from some 1600 persons at two time periods approximately one year apart.

For each time, we created two data elements from each person's record; one created data element was the number of activities of daily living which a person could do without help; another created data element was the number of those activities which a person could do only with some help. Then, the following cross tabulation enabled us to see how many persons had which combinations of 13 capabilities at one time.



In the above table,

--100 persons are shown to be capable of performing all 13 activities of daily living without help.

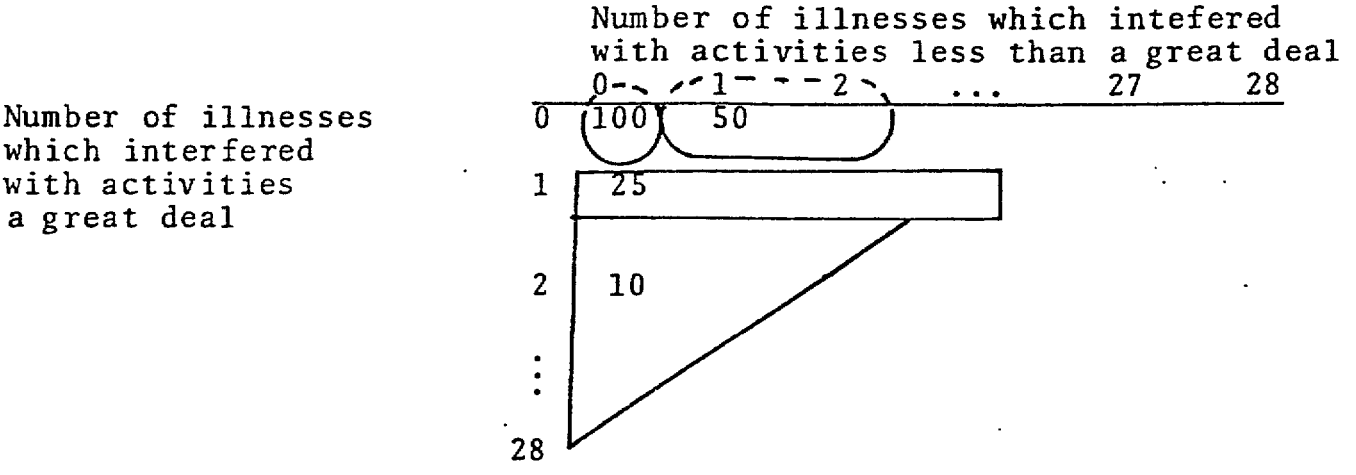
--50 persons are shown to be capable of performing 12 activities without help and of performing 1 activity only with some help.

--25 persons are shown to be capable of performing 12 activities without help, no activities with some help, and to be incapable of performing one activity even with help.

The number of persons in the circled position are the persons in the BEST CONDITION. The number of persons in the oval positions are the persons in the NEXT BEST CONDITION. The number of persons in the triangular positions are the persons in the POOREST CONDITION. We found few persons in the triangular positions because those persons tend to become institutionalized or they lose all basic capabilities by dying.

USING DATA ELEMENTS TO IDENTIFY THE PROBLEMS OF PERSONS NOT IN THE BEST CONDITION

For each of our two time periods, we created another two data elements from each person's record. One created data element was the number of illnesses that interfered with a person's activities a great deal. Another created data element was the number of illnesses that interfered with a person's activities less than a great deal. Then, the following cross tabulation enabled us to see how many persons had which combinations of 28 illnesses at one time.



In the above table,

--100 persons had no illnesses.

--50 persons had one illness which interfered with activities less than a great deal.

--25 persons had one illness which interfered with activities a great deal.

--10 persons had two illnesses which interfered with activities a great deal.

The number of persons in the circled position are the persons with NO ILLNESSES. The number of persons in the oval positions are the persons with NO ILLNESSES WHICH INTERFERE WITH ACTIVITIES A GREAT DEAL.

The number of persons in the triangular positions are the persons with TWO OR MORE ILLNESSES WHICH INTERFERED WITH ACTIVITIES A GREAT DEAL.

To see the extent that reported illnesses reduce the capabilities of persons to perform activities of daily living, we produced the following cross tabulation at one time.

CONDITION OF PERSONS	Number of illnesses which interfered with activities a great deal		
	NONE	ONE	TWO OR MORE
BEST	150		
NEXT BEST		25	
POOREST			10

In the above table, we can see that as the number of illnesses increases from NONE to TWO OR MORE, the capabilities of persons decreases from Best to Poorest. The computerized information can be used to find out which capabilities were reduced for the 25 persons who have ONE illness which interfered with activities a great deal.

While on the subject of illnesses or problems, another useful cross tabulation is the following.

TIME ONE		TIME TWO Number of those illnesses which interfered with activities a great deal		
		NONE	ONE	TWO OR MORE
Number of illnesses which interfered with activities less than a great deal.	NONE	100		
	ONE		50	
	TWO OR MORE			

In the above table, we can see that 50 persons experienced ONE illness increasing its effects on persons from TIME ONE to TIME TWO.

A special table can easily be prepared to identify which illnesses those are. For health care planning purposes, such tables can be used to let you know the rate of debilitation of persons over time because of those illnesses. Of course the interval of time between TIME ONE and TIME TWO can be established by choosing how often you will obtain information about persons.

USING DATA ELEMENTS TO SEE THE EXTENT THAT ILLNESSES ARE TREATED

Because treatment is provided on the basis of what has socially or professionally been identified and accepted as appropriate for a person's identified illnesses, treatments are associated with each of the considered illnesses. For each of our two times, we created another two data elements from each person's record. One created data element was the number of illnesses which interfered with a person's activities a great deal and medication treatment was being taken for that illness. Another created data element was the number of illnesses that interfered with a person's activities a great deal and no medication or treatment was being taken.

Then, the following cross tabulation enables us to see how many persons had which combinations of 28 illnesses, which interfered with activities a great deal, being treated and not treated at one time:

Number of illnesses being treated	Number of illness not being treated				
	0	1	2	...	28
0	100	10			
1	50	25			
⋮					
28					

In the above table, we can see that

--100 persons had no illnesses which interfered with activities a great deal.

--50 persons had one such illness and it was being treated.

--10 persons had one such illness and it was not being treated.

--25 persons had two such illnesses and one of those was being treated and one was not being treated.

The table also indicates PERCENT NEEDS SATISFIED. For example, all persons in the first column have all illnesses treated and therefore are 100 PERCENT NEEDS SATISFIED. All persons in the first row, excluding the persons in the first column (who are persons without such an illness), have no illness treated and therefore are ZERO PERCENT NEEDS SATISFIED. The 25 persons in the table are 50 PERCENT NEEDS SATISFIED.

For health care planning purposes, you can use the computer to identify all persons having one such illness not being treated and identify which illnesses those are and thereby recognize which treatments are being inadequately provided.

While on the subject of the treatment of illnesses, another useful cross tabulation is the following.

		TIME TWO	
		Percent of illnesses treated	
TIME ONE		100	Less than 100
Percent of illnesses treated	100	BEST	POORLY
	Less than 100	NEXT BEST	POOREST

In the above table, persons identified as BEST treated are those who either have no illness which interferes with activities a great

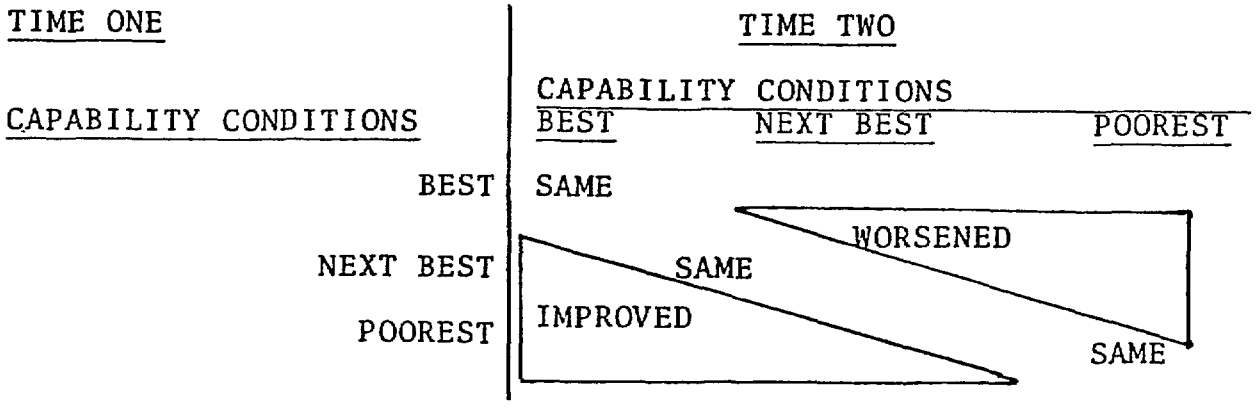
deal or have all such illnesses being treated at both observed times. Persons NEXT BEST treated are those who had at least one such illness not being treated at TIME ONE and either no longer have that illness at TIME TWO or were taking treatment for all illnesses at TIME TWO. Persons POORLY treated are those who either stopped taking treatment for an illness between TIME ONE and TIME TWO or gained another illness for which treatment was not yet being received. Finally, persons POOREST treated are those who had at least one such illness not being treated at TIME ONE and at TIME TWO.

USING DATA ELEMENTS TO SEE THE EXTENT THAT PERSONS LACKING CAPABILITY ARE SERVED

Because persons who cannot feed themselves will die unless someone feeds them, relevant compensatory services must be provided for persons unable to perform essential activities. You can use the computer to produce tables covering a lack of capabilities or disabilities and compensatory services just like the tables covering illnesses and treatments. I will show examples of such tables during the discussion period if requested.

USING DATA ELEMENTS TO SEE CHANGES IN CONDITIONS OVER TIME

To see the decline in the capabilities of persons over time, the following cross tabulation can be produced.



Persons who could perform all activities of daily living at TIME ONE and TIME TWO are in the BEST CONDITION at both times. Persons who lose some capability from TIME ONE to TIME TWO have worsened. Persons who gain some capability from TIME ONE to TIME TWO have improved.

Knowing that illnesses are the cause of a loss in capability, you next want to see the extent that gains and losses in illnesses explain or account for the worsenings and improvements in conditions. This can be seen by using the computer to produce the above table for each of the following groups of persons:

--Persons who reported the same number of illnesses interfering with activities a great deal at TIME ONE and TIME TWO.

--Persons who reported a greater number of such illnesses at TIME TWO than at TIME ONE.

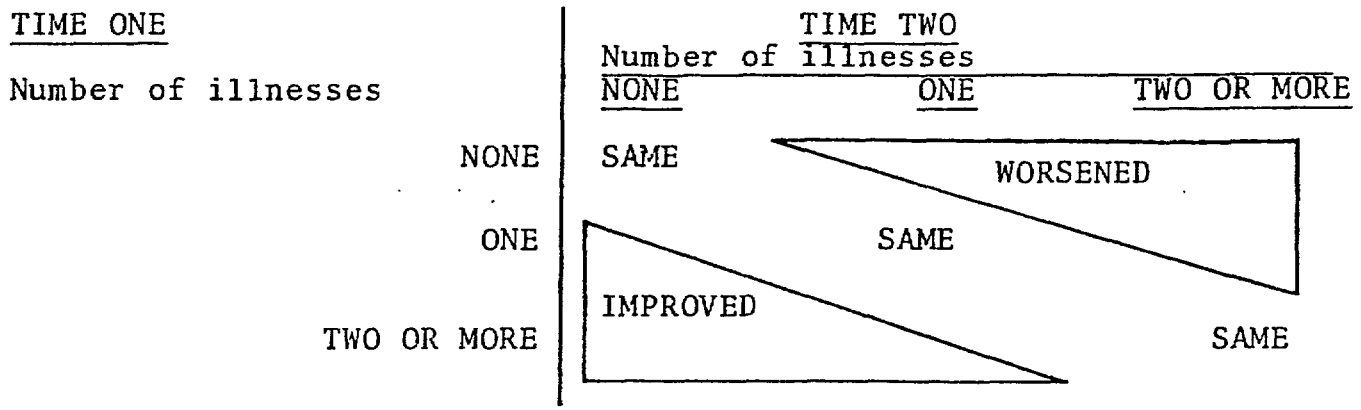
--Persons who reported a smaller number of such illnesses at TIME TWO than at TIME ONE.

In our study, we found that persons were more likely to lose capability as they gained illnesses, were more likely to not change capability as their number of illnesses stayed the same, and were more likely to gain capability as they lost illnesses. The relationship of capabilities and illnesses is probabilistic for at least two reasons: one, because after an illness is gone a person may need time to build enough strength to re-acquire a capability; and two, because a person may have as yet an undiagnosed illness which still restricts capabilities. For health care planning purposes, information about the extent that persons lack some capabilities and yet have no identified illnesses can be used to focus research effort and practices to reduce such occurrences.

Before covering the next subject, I must point out that when you obtain information from the same persons at more than one point in time, some of those persons may die or may otherwise not be available. Information about those persons can be readily examined for interesting purposes like estimating the rate of institutionalization of persons.

USING DATA ELEMENTS TO SEE CHANGES IN PROBLEMS OVER TIME

To see the changes in the problems (illnesses) of persons over time, the following cross tabulation can be produced.



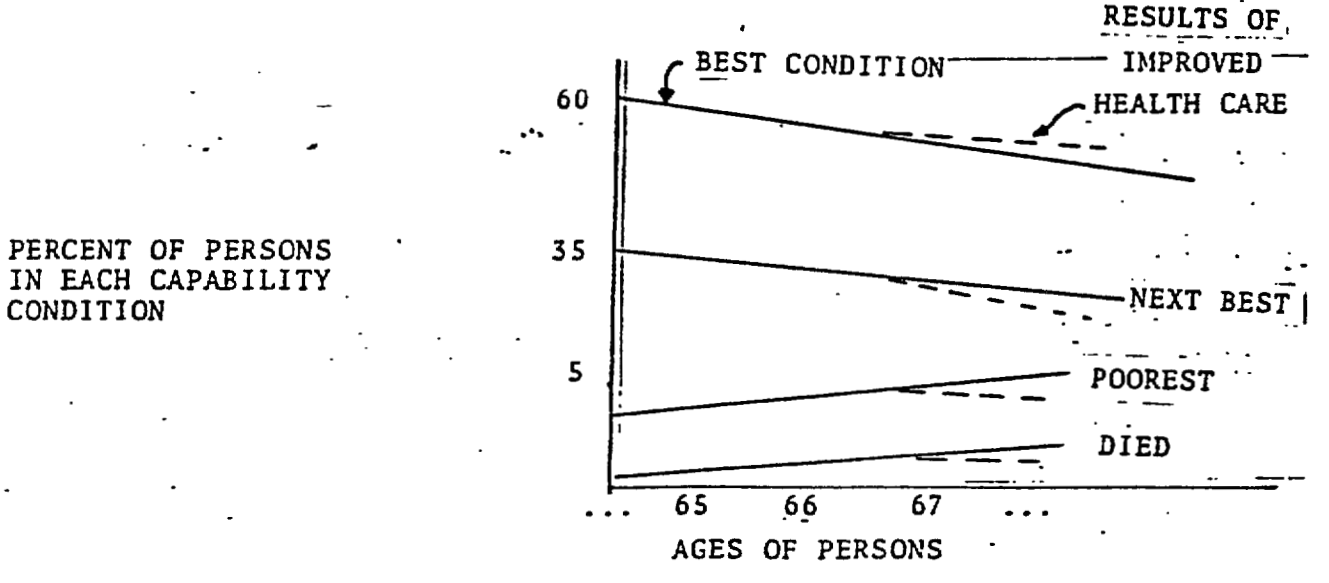
Knowing that treatments are to eliminate or reduce the effects of illnesses, you next want to see the extent that gains and losses in illnesses can be explained or accounted for by treatments. This can be seen by using the computer to produce the above table for each of the groups of persons identified in the table on page 9; namely, persons in the BEST treated group, persons in the NEXT BEST treated group, persons in the POORLY treated group, and persons in the POOREST treated group.

In our study, we found that persons were more likely to lose illnesses if they were in the BEST treated group and, given that they had illnesses, were more likely to lose illnesses if they were in the NEXT BEST treated group, and were more likely to gain illnesses

if they were in either the POORLY or the POOREST treated group. The relationship of illnesses and treatments is probabilistic for several reasons: one, because an illness may increase although a person is receiving appropriate treatment which is as yet relatively ineffective, for example - some cancers; two, an illness may remain suppressed only as long as treatment continues, for example - high blood pressure; and three, because some illness may disappear without treatment. For health care planning purposes, information about the extent that persons have illnesses, which persist in spite of appropriate treatment, can be used to focus research effort on developing more effective treatments.

BASIC IDEAS FOR INTERPRETING CHANGES IN PERSONS OVER TIME

The following graph represents the change in the percent of persons in each capability condition over time.



The above graph shows that the capability of persons declines as they age. As capability declines because of increasing or persisting illnesses, treatments increase or persist as do associated costs.

In our study, we found that the costs of health care per person is the least for persons in the BEST CONDITION and is the largest for persons in the POOREST CONDITION. To the extent that more effective treatments are developed and provided and to the extent that all illnesses are treated, more persons remain in or attain a better condition group. Thus, an improved health care system can eventually reduce total health care costs and enable more persons to lead a fuller and more thriving life until death.

In our study, we also learned that to the extent that more persons remain in or attain a better condition through the treatment of all illnesses, the less need there is for compensatory services, and thus there is a resulting reduction in their total costs.

USING DATA ELEMENTS ABOUT SOURCE OF HELP

Because our data was about so few people, we only produced information about the kind of help and its cost received from family or friend and from public agencies. However, you could theoretically obtain information about (1) enough people, (2) the sources of their help, (3) the associated provider costs, and (4) the providers' locations relative to the person helped. Then, you could compare the performance of providers in terms of the TIME ONE and TIME TWO treatment tables and problem tables shown on pages 9 and 12 respectively. I will discuss such use if requested.

ESTIMATING NEED FOR AND PLANNING FUTURE HEALTH CARE

Health care needs and plans to satisfy them must be future oriented because it generally takes years and large costs to build hospitals and educate professionals like doctors. You want to avoid

the costs of providing unneeded health care while assuring that needed health care is provided.

In our study, at the local level of a city, we found that the condition changes over a year for persons aged 65 through 69 could be used to artificially age them four additional years and obtain a good statistical match with the conditions of persons who were 70 through 74 years old in our sample at TIME ONE. This result is the basis for the remainder of this paper which covers health care planning at a level of detail which I have not yet had a chance to try.

I believe that health care planning can cover at least three different kinds of needs:

--community care, that provided to persons not in a hospital or an institution;

--hospital care, that provided to persons for a short period of time, in a fixed location, and using costly facilities; and

--institutional care, that provided to persons who reside in an institution for an indefinite period of time.

For each of these kinds of care, the computerized information system can be used to estimate how much it should cost to accomplish specific satisfactions of need and to estimate the satisfactions of need if money were spent according to a specific plan. To estimate how much it would cost, you could produce estimates of:

--the cost per PERCENT SATISFACTION OF NEED over time; and

--the need for a kind of health care (for example, community care) in the year of interest (say 1985) for each of a representative number of smaller governmental planning areas (like a city).

Then, you can produce planning area estimates of total cost by multiplying the need by the cost per selected PERCENT SATISFACTION of need. By adding the cost for each planning area, a national cost estimate can be obtained. To the extent that reasons for persons not being treated are other than the availability of that service, other data elements descriptive of those reasons could be used at the person level. Such reasons could be dissatisfaction with the manner services are provided or a stigma attached to the service like mental health services.

For either hospitals or institutional care, a governmental planning area needs enough beds to keep the time to wait for an admission less than an unacceptable amount. Because admissions can be elective as well as non-elective, the following table can be helpful, whereby each governmental planning area could be appropriately located therein:

		Number of elective admissions delayed		
		0-50	51-100	ETC
Number of non-elective admissions delayed	0-50			
	51-100		10	
	ETC			

For example, in the above table, 10 governmental planning areas are shown as having 51 to 100 delayed non-elective and elective admissions during a period of time. Data about the health consequences of delayed admissions could be obtained and used to judge which combinations of delayed admissions are acceptable given the restricted amount of monies available for obtaining more such facilities.

CONCLUSIONS

I have briefly described the kinds of data elements and some of the information which can be produced from a computerized information system for health care planning purposes. Please feel free to ask questions. Perhaps with further discussion I can demonstrate to you that this system and concepts can be readily adapted for your purposes because the system excludes value judgments which can and must be applied by the planners of the country in which it is used.

Reports based on our study can be obtained from William F. Laurie, United States General Accounting Office, Room 2933, 1240 East Ninth Street, Cleveland, Ohio, 44199 (telephone number 216-522-4892). The report titles are as follows:

--Well-being of Older People in Cleveland, Ohio (HRD-77-70, April 19, 1977)

--Comparison of People 75 Years Old and Older With 65-74 Years Old - Federal Council on Aging (B-165430, September 30, 1977)

--Home Health--The Need for a National Policy to Better Provide for the Elderly (HRD-78-19, December 30, 1977)

--Conditions of Older People: National Information System Needed (HRD-79-95, September 20, 1979)

--The Potential Need for and Cost of Congregate Housing for Older People (HRD-80-8, October 15, 1979)

--Conditions and Needs of People 75 Years Old and Older (HRD-80-7, October 15, 1979)

--Comparison of the Well-Being of Older People in Rural and Urban Locations (HRD-80-41, February 8, 1980)

--Comparison of Demographic Data on Older People in Rural and Urban Locations - Federal Council on Aging (HRD-80-83, May 23, 1980)

--A Unique Methodology for Determining the Needs of Older People, Video Tape, Number 999864