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# HEALTH-CARE DISTRICT MANAGEMENT INFORMATION SYSTEM PLAN

Review of Operations Analysis Activities During Calendar Year 1975 and Plan for Continued Research and Analysis Activities

by

George J. Nielson and William G. Stevenson

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The Charles Stark Draper Laboratory, Inc.
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16. Abstract

This is a report on operations research activities that were developed in order to identify the information required to manage both the efficiency and effectiveness of the Veterans Administration (VA) health services as these services relate to individual patient care. The clinical concerns and management functions that determine this information requirement are discussed conceptually. Investigations of existing VA data for useful management information are recorded, and a diagnostic index is provided. The age-specific characteristic of diseases and lengths of stay are explored. Recommendations for future analysis activities are articulated. The effect of the introduction of new technology to health care is discussed.

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# PREFACE

In January 1975, some of us set out to explore the dynamics of patient care in the Veterans Administration (VA) system toward the 5-year goal of articulating the VA requirement for a management information system. Our premise was that the Management Information System (MIS), and the patient-care system that it supports, should address the provision of effective individual patient care, not simply the efficient production of goods and services within autonomous cost centers.

Toward this goal, we have established a program philosophy (Chapter 1). We have also explored the characteristics of a few key variables, already captured by the existing information system, and assessed their utility in resource management (Chapter 2, Appendices A and B). We have developed ideas for continuing operations analysis activities during 1976 (Chapter 3). And we have suggested an approach to the introduction of new technology in health-care delivery (Chapter 4).

At the outset, we felt strongly that the utility of this research activity lay in the interaction between members of the research community and the line management of the VA health-care system. Through this mechanism, the knowledge base arising from the research may be used and tested in the course of day-by-day problem solving in the VA system. During this first year, regular contact was maintained with Veterans Administration Central Office (VACO) personnel. In the forthcoming year, we hope to establish more formal seminar and working group activities involving VA personnel from both the central office and hospital stations.

This forthcoming year will represent the first chance the research team has had to address the development of this program within a unified organizational setting (The Center for Health Care Management: Boston VA Hospital). In this setting, we anticipate a more rapid rate of program development, and considerable broadening of the program scope. Research topics will develop, not only in data-base analysis, but also in MIS development and evaluation, and in health-care-management problem definition. Of special import, we feel, are the analyses of experimental data sets to be prospectively captured in the ambulatory-care environment. These studies will represent the first steps toward the development of predictive models of resource needs in the outpatient environment.

Those who have followed our progress closely during the past year may wish to turn directly to Chapters 3 and 4 and Appendix A. Those who are not familiar with the underlying philosophy of health systems management should begin with Chapter 1.

The authors wish to express special thanks for the encouragement and assistance of the VACO staff and representatives of NASA, Johnson Space Center during the past year. We also wish to extend special thanks to Frank M. Holden, MD, Edward B. Roberts, John F. Rockart, and David D. Rutstein, MD, for their excellent advice and assistance in developing this program concept.

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# CHAPTER 1

# SOME CONSIDERATIONS OF HEALTH-SYSTEMS MANAGEMENT

## 1.1 Introduction

The principal function of the health-care-delivery system is the medical management of the individual patient. The physician holds the primary responsibility for assuring that the health and well-being of a patient are maintained or improved by his encounter with the system. The manager of the system is responsible for assuring the provision of resources needed to support the physician-patient encounter. The physician rarely has need to examine the entire care-delivery system. He considers only those segments of the system that will directly support the care of his patients, one at a time. The manager has no direct involvement in patient care and, historically, has gathered little information about physician-patient interaction and associated patterns of resource use. This is true even though the operations of the system are basically an aggregate of the physician-patient encounters and the activities that they generate.

Present methodology for managing health-care-delivery institutions has evolved largely from traditional concepts of managing cost centers. According to these concepts, a hospital is frequently viewed by management as 20 or 30 independently organized revenue centers, all housed under one roof, each of which sends customers to the others. The important management issue of efficiency in the production of goods or services is addressed by conventional cost-center control, where output may be maximized for a given dollar resource available to an autonomous cost center. But, the effectiveness and efficiency of the application of those goods and services to the individual user—the patient—has not usually been addressed.

The principal motivation of our research is to understand the dynamic operation of the system in order to identify the information that management needs for determining the efficiency and effectiveness of the system in relation to individual patients. In order to identify this information, several basic characteristics of the system must be articulated. First, it is necessary to identify the principal functions of the physician in order to understand the types of information he seeks. The following section discusses these concerns. Second, it is necessary to define the basic functions that the manager must fulfill. For each of these functions we postulated questions that he must ask to make the concomitant decisions. The information required to answer these analysis questions provides the basic subject matter for analyzing the system. A discussion of these management functions and a summary comprise the remainder of this chapter.

## 1.2 Some Aspects of Clinical Care

This document does not attempt a comprehensive description of the clinical-care process which deserves and has received volumes of attention. This is a brief discussion designed to identify certain fundamental aspects of the complex subject of clinical care that management must consider. Clinicians initiate the largest amount of resource use in the system, and the entire system exists to support the clinical-care process. The researcher and manager must understand the basic motivations of the clinician and become familiar with the clinical-care process if they are to recognize and effectively control the patterns of activity that grow from it.

The clinician's motivation is always to identify and treat the patient's problem. Holden has articulated this motivation in the following way. "One could consider the physician as having five major categories of questions which he is attempting to answer. These categories could be represented by the following global questions.

What is wrong?

What is causing the problem?

What can I do about it?

Am I improving the situation?

When should I next review the situation?"[(1)]*

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* Superscript numerals refer to similarly numbered references in the List of References.

The physician begins to answer these questions by examining certain characteristics of the patient; by measuring certain variables that are related to the patient's health. These variables are derived from the patient's history, physical exam, or laboratory findings. Each measurement is designed to help the physician answer one or more of the five questions. Measurements may be either quantitative or qualitative, and variables will have varying degrees of specificity to a given medical problem. The medical profession assigns standards to the values of these variables so that measurements will indicate normality, abnormality, or danger. These standards are developed both implicitly, by observation of a large volume of patients, and explicitly, by statement of expert knowledge on the part of academic medicine.

During this process of patient examination and measurement, the system begins to apply its resources to the patient. If the physician were able to identify variables which completely represent all possible patient states, and to assign uniform requirements for diagnostic tests and therapy for each patient state, then standard specifications for care of the population could be articulated. All patient care could be practiced by algorithm. However, such a patient-care model is not possible. The number of variables which may be relevant to an individual patient's state is vast. Many variables contribute to answering more than one of the physician's analysis questions. The individual patient may suffer from multiple conditions of different severities, thus, the sequence of asking questions and seeking answers may vary. Furthermore, the physician's mode of articulating both problems and findings is not uniform throughout the system. Still, patterns observed in the information generated during the clinical-care process can identify trends in resource use. The manager, therefore, should begin to investigate the presently available elements of clinical information for use in helping him determine the resource requirement of his institution.

Consider one of the most important pieces of clinical information, the diagnosis. The diagnosis is the clinician's articulation of the patient's disease or condition. It is partially designed to answer the question, "What is wrong?" in that it is the identification of the patient's problem. Historically, in the practice of medicine, establishing a diagnosis has held first priority for the physician before initiation of the full treatment plan. While the considerations in making a diagnosis are numerous, the physician will generally be concerned with establishing the presence of a disease for which effective treatment is available, rather than merely seeking to establish the most probable diagnosis.

It will be essential for the manager to understand the character of the diagnosis as a piece of information if the manager is to find a realistic use for this clinical input. Diagnoses are not one-dimensional identifications. They are intended to communicate a whole set of characteristics. Again Holden, "For example, the diagnostic statement 'adult onset diabetes mellitus', transmits much of the medical science information concerning the disease, family history, cause, future possible problems, and current options for therapy."(1) For all the communication power of the diagnosis, however, it rarely, if ever, contains an information base that is sufficient for treating the patient. The clinician must have other measurements of the variables that reflect his patient's health—ranging from the basic consideration of his age, height, and weight, to very subtle determinations of various chemical concentrations in the blood.

It is important to realize that the type and degree of information varies considerably from diagnosis to diagnosis. "Diabetes mellitis, late onset" implies something about family history, cause, prognosis, and a fairly specific range of therapy options, while "cardiomyopathy" implies nothing specific in any of those areas. The term "cardiomyopathy" locates the problem at the heart, implies that the nature of the problem is muscular and eliminates atherosclerosis as a principal cause. However, there are many different scenarios that could be implied by the term—a rather wide range of metabolic disease or other dysfunction. In some cases the cause will remain obscure or unknown, and prognosis may vary tremendously from patient to patient. We assume that a diagnostic statement is designed to communicate information on the etiology, morphology, topography, dysfunction, prognosis, and therapy options associated with a problem. Certain medical nomenclatures (i.e., SNOP and SNOMED) are designed to describe activities in each of these information fields. When these descriptions are linked together, they can act as a diagnostic statement. However, few diagnoses (of the more than 4,000 coded by the International Classification of Disease (ICDA)) will imply information in all of these areas. There are many diagnoses that yield little patient-specific information in any field. These are gathered in the ICDA under the phrase "other and unspecified" and coded usually under .9.

The manager and researcher can use the diagnosis to identify patterns of resource use. Patients with the same diagnosis tend to require similar resources. Of course certain diseases will display greater uniformity of resource use associated with their diagnosis and therapy than others. The length of time that two patients of the same age will stay in the hospital with a similar right inguinal hernia handled with similar procedures will not vary a great deal. On the other hand, two patients with paranoid schizophrenia could differ tremendously in their length of stay. Within any given diagnostic category, resource use will vary, and it will be important to examine subsets whose delineation is based on other patient characteristics, such as age or the presence of secondary diseases. The diagnosis can provide the manager with resource-use patterns which will help him identify his resource requirement. But the utility of this predictor will be lost if its varying import as a packet of clinical information is not considered.

Diagnoses are tools for articulating and communicating answers to the questions "What is wrong? What is causing the problem? What can I do about it?" But whether or not the diagnosis is stated, the clinician is always asking these questions. Sometimes the clinician will spend a great deal of time and resources on a patient before he is willing to make his diagnosis and initiate treatment. Sometimes he will initiate treatment without recording a diagnosis. This situation is most frequently observed in outpatient services when patients' symptoms are not severe and are frequently self-limiting. Considering the vagaries of diagnoses themselves, and the amount of resource use that occurs without a diagnosis with which to correlate it, the researcher and manager will clearly have to become more familiar with the clinical information process in order to find other variables by which resources can be aggregated. Problem descriptors such as SNOMED can be partially applied at the first stages of almost all care processes. If a problem cannot be diagnosed immediately its topography and major symptoms usually can be recorded. Resources aggregated by these descriptors might reveal helpful patterns. In the extreme, all resources used could be correlated with all clinical measurements. Even in the presence of the sophisticated techniques now available for analysis of variance among multiple variables, the vast number of measurements that can be taken make it basically impossible to produce one all-encompassing model of clinical methodology. Also, seeking correlations between such detailed information elements may ignore some basic patterns of human disease that clinical care has learned to identify.

The clinician will always be seeking patterns of measurements in the individual patient which predict the presence of treatable conditions. The manager will need to seek resource aggregations and patterns that are repeatedly observed (predictable) in large populations of patients receiving health care. The manager's success at accomplishing his goal will depend greatly on how well he observes the physician persue his.

## 1.3 Management Functions

In order to identify the management information needs, it is first necessary to identify management functions. We have identified the following four functions as basic to managing health services.

(1) Planning for resource production.

(2) Controlling the efficiency of the system.

(3) Controlling the effectiveness of the system with respect to individual patient's outcome.

(4) Predicting the effects of change within the system or change in the population that it serves.

To perform each function, the manager will need to ask and answer a variety of analysis questions. The data that is gathered and structured to answer these questions will form the management information base.

We should remember that whether or not these management functions have been explicitly addressed in the past, the health-care system does work. Inherent in its day-to-day operation there occurs the production of goods and services, the evaluation of efficiency and effectiveness, and the assessment of the implications of change. Thus, there is already considerable information flowing through the system intended to support these functions. Most of it, however, reflects the cost-center orientation of present health-service management. Since we are not setting out to design a new health-care system, but rather to implement a management system that will perform specified functions for the existing system, we need to consider two issues:

(1) How does the present system work with respect to these management functions?

(2) What are the limitations of the present management knowledge base and the present operational environment of the system that impede the management of these functions?

## 1.4 Planning for Patient-Care-Resource Production

There is no function more fundamental to the health-care manager than the provision of resources to the medical providers. Here we define a patient-care resource as a product or service which is used or consumed by an individual patient, either to provide for his normal needs while he is residing in the health-care system, or to effect his diagnosis or treatment. There are several questions that management must ask while preparing to provide patient-care resources.

(1) What resources are needed?

(2) Where are the resources needed?

(3) When are the resources needed?

(4) What is acceptable quality?

(5) What is acceptable cost?

Answering these questions implies establishing standards of some form—articulating minimum requirements for each resource. The accuracy with which these standards need to be met will vary from question to question and resource to resource. In many cases, these questions can be satisfactorily answered by observing the present operation of the health-care-delivery system. For example, such observation can answer the first question. Barring some change in the needs of the population served, the clinical knowledge base, or the technology available in support of clinical care, the patient-care resources required tomorrow would be about the same as those produced today. Yearly, seasonally, monthly, weekly, or daily variations in productions quantity should be identified, however, in order to establish the most efficient production capacity and inventory policy.

The question "Where are resources needed?" can also be answered by observation. In the inpatient environment, resources tend to go to patients, while in ambulatory care, patients tend to go to resources.

This is an important distinction in planning for the logistics of care, and requires the identification of patient areas and the identification of the nature and number of patient-care resources required by each area.

The timely provision of patient-care resources is essential in a clinical environment, especially in the case of life-threatening acute illness. In the past, little attention has been paid to this aspect of resource-production planning. Again, one can determine by observation of the system when resources need to be delivered. How long the delivery of a patient-care resource takes is also an important aspect of planning, and requires the development of a measurement not presently used, which we may call "resource-delivery-response time." This measurement should represent the time that elapses between a provider's order for a resource and the moment when the patient actually receives that resource. The time required to produce a resource from a given cost center (e.g., the time it takes to make a serum sodium determination in the laboratory) is only part of the response time. After all, it is the time from order to actual delivery that is important to the individual patient's health and well-being. Resource-delivery-response time can be measured by observation of present system activity with each patient-care resource. This measurement will be facilitated if the communication of orders and results is performed by an automated system because computers generally contain clocks.

Establishing quality standards for resources will require the participation of clinicians. While quality control appropriately abounds in many health-care-delivery activities (the laboratory, radiology, etc.) there should be some explicit statement of an appropriate quality description for each of the patient-care resources provided. Obviously, it will differ in nature from resource to resource, including as appropriate such factors as absolute accuracy of measurement, repeatability, cleanliness, reliability, etc. Observation of the system by clinical physicians who are aware of how quality descriptors relate to individual patient need can document this aspect of present operations.

Many methods are available for establishing and defining the cost of resources. Present accounting methods tend to focus on the cost center. Different cost centers may employ different methods of aggregating direct or indirect costs. If the manager is to determine the cost of providing a resource to a patient, he will have to aggregate the activities of several different cost centers. For example, a patient who has his leg X-rayed and then a cast applied will use two cost centers. Even a single procedure such as a blood test can involve three cost centers: the nursing service to draw blood, the dispatch service to transport the sample and test result, and the laboratory to analyze the sample. Therefore, a uniform system of definitions for accounting patient-care resources is needed. We identify three cost elements for accounting patient-care resources.

(1) Direct Cost—This is the dollar cost of personnel, supplies and material, and equipment (amortization) which is required to produce a unit resource.

(2) Resource-Use-Dependent Overhead—This is the cost of maintaining the capability to produce a resource (or more of a resource) when production is not required at full capacity or all the time.

(3) Institutional Overhead—This is the cost of maintaining the health-care-delivery-system environment (plant, grounds, etc.) and maintaining and accounting the provider work force (payroll office, personnel office, etc.).

### 1.4.1 Functional Accounting

In the previous section we discussed the basic questions that the manager will need to answer in order to understand what resources are needed, and the characteristics of each resource that are essential to their use in clinical care. If he is to plan for the demands of a patient population, or evaluate the effectiveness of a mix of resources on one patient, the manager will need to account these resources by patient groups, not simply by cost center. We refer to this process as a functional accounting. Functional accounting keys the cost and disposition of all patient-care resources by individual patient identification. It is not sufficient to know the volume of resources used and the total patients handled. The cost of each resource should be identified in terms of its constituent components, and a user identified. The objective is to provide, for each value of the variable called "patient-care resources", descriptors which identify:

(1) The care areas where the resource is used and the frequency of occurrence of its use.

(2) The response time of the system with respect to providing a resource to an individual patient.

(3) Appropriate definitions of its quality.

(4) Its direct cost, and both the resource-use-dependent and institutional overhead.

(5) Its disposition by patient.

This data set should arise from actual measurement of the system activity. It should not be derived from averages or other disaggregations of cost-center data. However, such measurements may be made on a sample basis rather than continuously. Attention should first be focused on implementing functional accounting in those areas which produce resources for the volume health-care activities, the more significant cost components of the system.

Many of these measurements are already made in the health-care-delivery system. Some are even available in the present data stream that flows between functional areas of the system. Implementing this methodology thus requires attention not just to the definitions of new variables, but to the capture and communication of information already in the system.

## 1.5 Controlling Efficiency

The second management function, controlling efficiency, is concerned with minimizing the unit cost of the system output while assuring acceptable quality of all goods and services produced. To evaluate system efficiency, the manager will need the data set that results from functional accounting.

The concept of efficiency is basically related to change. Will some change in the system result in greater or less efficiency? For a given resource, a proposed change may increase or decrease the utility of the resource (its quality or availability) and/or increase or decrease its dollar cost. Thus, efficiency and inefficiency are defined by Table 1-1; those situations of change which may affect the utility of the resource when used by an individual patient are indicated by (I). In those cases, the manager's decision to effect change must be based on medical opinion about the possible effect on the individual patients who will be served.

Table 1-1. Efficiency as a quality/cost relationship.

| Resource Quality | Resource Dollars Cost | | |
|---|---|---|---|
| | Increase | Remain Same | Decrease |
| "Better" | I | X | X |
| Remain Same | 0 | No change | X |
| "Worse" | 0 | 0 | I |

X = efficiency

0 = inefficiency

I = question of effect on patient

Health-care delivery must be considered as a system, a structured set of interrelated activities producing goods and services. Questions of efficiency must address the entire system, not a single resource-production center. A change in one resource (such as a diagnostic X-ray procedure) may affect the production of other resources (such as other procedures requiring the same machine). For example, a change in the laboratory communication system may speed laboratory operations at the expense of ward operations which must now accommodate two modes of ordering services, one for the laboratory and one for everyone else.

The first analysis question concerning management's evaluation of efficiency is: Is the volume/quality/time/cost trade-off optimum for each resource?

In order to assess the impact of change on the system, rather than an individual cost center or production center, it is necessary to provide a certain level of detail. For every patient-care resource, management should identify the contribution to its production made by each organizational component (cost center) of the system. In the case of laboratory test time, for example, one may readily identify the components of: communication time, sample collection time, sample transport time, test time, and result communication time. These components may all arise in different organizational settings of the care-delivery system, and changes in one may affect the dynamic operation of the others.

If this level of detail is measured, and if the cost trade-offs with respect to production volume, quality, and resource-delivery time are identified, it is possible to anticipate the result of management decisions at the system level, that is, to predict the effects of change at this level.

The separation of resource-use-dependent overhead from direct-cost and institutional overhead helps to identify the cost of less-than-full utilization of production capacity, or less-than-optimum resource load/resource mix. Again, for a given resource, the component of use-dependent overhead arising from each cost center involved in its production should be identified. This enables system-level analysis of the impact due to changes in resource load/mix production. Overall efficiency therefore, relates to:

(1) Minimum direct cost for resources of acceptable quality.

(2) Minimum institutional overhead.

(3) Optimum resource-use-dependent overhead, concomitant with the provision of an adequate inventory of goods and services to meet the nature and volume of resources required to serve the needs of a prescribed population.

The second question related to efficiency evaluation is: Is institutional efficiency maximum?

This question addresses the conventional cost-center management functions for maintenance of the institutional environment and the provider work force. The fact that these management methods are not outlined here in further detail does not mean that they are not important. They are simply much better understood and in more general use than the concepts of management with respect to individual patient care.

The management model which addresses the question of cost efficiency must identify the result of interactions between cost centers in the production and utilization of health-care resources. Thus, the development of an initial model of institutional efficiency must be based on a system of functional dollar accounting which identifies the organizational cost components of patient-care resources, while linking the utilization of these resources to individual patients.

## 1.6 Effectiveness Control

The ultimate responsibility for controlling the effectiveness of medical care lies with the physician. He has the knowledge base for evaluating the quality of care, and only he can implement changes in that care. For the evaluation and control of effectiveness to occur regularly and system-wide, management and the medical providers will need to cooperate and integrate their information requirements.

Evaluation will focus on two basic areas. First, physicians will wish to review individual cases, evaluating almost all aspects of care associated with that one case. Second, they will wish to evaluate medical and surgical procedures, looking at all cases in which they occur, in order to determine which one yields the best prognosis for the patient. In the first situation, physicians will need to articulate the criteria for selecting cases to be reviewed, as it would be impossible to review all patients in the system at all stages of their care. The manager will then need to develop systematic mechanisms for identifying those patients. In the second case, the information elements that should be collected on a given procedure must be specified by the physician. Information collected on a procedure may not be as all-inclusive as the information needed to evaluate a single case. But the manager will have to make sure that this information is captured for every patient who uses a given procedure. The highly experienced clinical specialist can provide valuable knowledge about certain procedures. Sometimes, however, only the observation of large populations—larger than a single clinician is likely to encounter—can yield the information necessary to evaluate the effectiveness of a procedure.

The evaluation of individual cases should be performed by physicians who have not been attending the patient. The evaluating physician tries to recreate the medical context in which the diagnosis was made and treatment prescribed. He asks again the same basic questions suggested by Holden (see Section 1.2), comparing his answers with the events that have occurred. He requires certain basic information about the patient. As a minimum this would probably include:

(1) The elements of the patient's history deemed relevant by the attending physician.

(2) The chronology of findings of physical examination.

(3) The chronology of therapy.

(4) The discharge and followup plan.

Having used this information to review the case, the evaluating physician will need to judge the effectiveness of the case. Some of the basic concerns related to that judgment are represented by the following questions.

(1) Was everything done that should have been done?

(2) Was anything done that should not have been done?

(3) Were goods and services ordered and provided in a timely fashion?

(4) Did preventable iatrogenic disease occur?

(5) Was the dollar cost of the individual encounter minimized (assuming satisfactory answers to questions (1) through (4), and efficient production of goods and services by the system)?

These are often difficult questions to answer. As we noted in Section 1.2, different diagnoses yield widely varying degrees of specificity to the history and prognosis of a problem. The clinical knowledge base is not uniformly developed for all diseases and conditions. Cure through the direct manipulation of an individual's biochemistry or biophysics is not always possible. The individual patient's response to a specific therapy may range over a broad spectrum. These facts of clinical life make it very difficult to define outcomes that uniformly reflect effective medical care for large numbers of cases. As previously noted, the clinical-care process, in its full range of concerns, cannot be easily reduced to algorithms. Thus, the evaluation of effectiveness must, in most instances, be performed for single cases reviewed one at a time.

Effectiveness control may concentrate on individual cases but the selection of cases to be reviewed will require the identification of large patient populations and their information bases. Cases can be selected randomly, of course, and in some contexts, random selection may be as useful as any other means of identification. In general, however, there are definite reasons for identifying specific populations, and definite advantages to selecting cases from them.

Patient populations are identified by a shared characteristic or characteristics. From these classes of patients, the evaluator identifies exceptions that he thinks may represent unsatisfactory outcome. Let us consider the most widely applied mechanism for evaluating care presently in use: concurrent review. Patients with similar or identical diagnoses are grouped together. Classes within these groups are established by considering other factors such as the patient's age, whether he had one diagnosis or several, and whether or not he was operated on. For each class of patients, an average length of stay (LOS) has been determined by the Commission of Professional and Hospital Activities. The average LOS was determined from data collected from over 1500 hospitals over the course of 1 year. At the time of admission each patient receives a projected LOS based on his provisional diagnosis when he enters the hospital, and this is revised as more diagnostic information is generated. When the patient exceeds his projected LOS by a given margin, he is identified for review. The suggestion is that for certain patients with certain diagnoses, an abnormally long LOS will have a high probability of reflecting ineffective medical care. One cannot, however, assume a priori that unusually long LOSs indicate poor health care, or that only these exceptions require evaluation. Even for conditions where LOS selection is no more likely than random selection to flag unsatisfactory medical outcome, minimizing LOS still serves to save the patient money and save the system resources. If medicine is unable to cure a patient, he need not remain in the system so long as his condition is stable and his prognosis does not suggest relapse. In this category, attention should be given to placement of the patient in proper special facilities or nursing homes in order to minimize cost. For this category of patients, a short course of inpatient stay should be encouraged.

For the process of concurrent review to function smoothly, the manager must collect the necessary information for each patient so that his projected LOS can be established and subsequently revised. The manager can also examine the statistical character of LOS, since average LOS will not reflect reality uniformly. One average LOS of 10 days may reflect a wide spread from 2 to 20 days and another LOS of 10 days might reflect a very high density of patients staying between 8 and 12 days.

Present methods of concurrent review are very helpful for controlling costs but may be little more effective than random selection for pointing towards ineffective medical care. Clinical medicine will be able to evaluate care most effectively when it is looking at conditions it understands well and can control. For patients with these conditions, outcome measurements can be developed, and patients who are not progressing adequately can be more easily identified on a regular basis. During the course of 1975, an HEW committee, chaired by David D. Rutstein, MD, has been developing a list of conditions identified by ICDA code number that, with the present clincial knowledge base and available resources, represent situations that could be reasonably expected to be prevented, arrested, or cured.(2) One would not expect some of the preventable diseases on the list to appear at all in our present society (i.e., malnutrition), and others one would expect to encounter very rarely. But it is important to flag cases representing these conditions as soon as they appear. Such identification may not help to evaluate the quality of care in a single institution, but it will be important for evaluating large health-care-delivery systems and the state of public health in general.

Numerous possibilities exist for using populations of patients with the curable or arrestable conditions to evaluate the effectiveness of care. For each of these conditions (or class of such conditions) physicians can identify certain descriptive patient measurements to be noted, and determine the range of values of those measurements that would be considered acceptable at a point in time. These measurements could vary from subtle laboratory determination, to multiple X-ray readings, to very simple but important qualities such as the patient's ability to stand up or breathe freely. If the course of a disease under specific therapy is well-established (little variation from patient to patient), then age-specific LOS would be a helpful indicator of outcome. Whatever measurements are relevant for each of these conditions (or class of conditions), they can be articulated. Patients whose measurements are distinctly out of range from the articulated standard can be identified as exceptional cases and reviewed. Unfortunately, this list of conditions only accounts for a fraction of the number of problems that could arise. In a few cases, however, they will represent significant volume of activity. In all cases they can be used to evaluate the effectiveness of health care.

One set of cases that any evaluation of effectiveness should review is those that end in death. These cases are not a priori more likely than others to identify instances of poor care. A patient's death is usually unavoidable. However, death is undeniably the least acceptable outcome and the one that effective health care devotes all possible effort to avoiding.

Any means of evaluating effectiveness will require that management systematically collect and relate certain information on all patients. Of course the information requirements will vary from method to method, but certain medical settings will simply not generate the information that is needed to make evaluations by the methods we have discussed. This is particularly true in most outpatient areas. Here different information will have to be developed and collected for the same purposes. This will be discussed more thoroughly in later sections on outpatient services.

In all cases, the patient's full medical record must be easily available as any of the information in it might be required for proper review. Whenever possible, subsets of the record that incorporate the important relevant information for reviewing a patient should be identified and separated. This separation can facilitate and hasten the review, clarify the basic considerations, and make it possible for more patients to be evaluated more frequently.

## 1.7 Predicting the Effects of Change on Functional System Performance

The ultimate objective of management planning with respect to providing effective individual patient care is to be able to predict the effects of changes in either the characteristics of the population or the technology and methods used in the clinical process. This function of management will require the information base associated with the previous three management functions. Resources will have to be identified, uniformly costed, and accounted functionally for each patient using them. Articulated information on patient outcome that measures the effectiveness of the system will be needed. As methods of measuring effectiveness are not highly developed, it is not now possible to devise a model of system operations which will address this management function. Measurements are also lacking that will be required to determine the change in system effectiveness which may be anticipated as a result of changes in the population served. These measurements must describe the population served in terms of patient attributes which are related to the incidence, prevalence, nature, and severity of health problems.

Conceptually, if one knows how to predict the nature of individual outcome as a function of process performance, and how to predict the nature and number of process resources required on the basis of measurable population attributes, then it is possible to simulate the operation of the system for the purpose of assessing the effects of potential changes. Such a simulation does not practice medicine. Rather, it is intended to define the upper and lower limits of the nature and number of resources required to effect good medical care for a specified population.

## 1.8 Summary

We repeat, the principal motivation of this research is to identify the information that management needs in order to determine the efficiency and effectiveness of the system in relation to individual patients. This chapter has been designed to give a basic conceptual framework to that motivation, and to articulate the full scope of concerns that our research must eventually touch. We have discussed the basic motivations of the clinician and the basic functions of the manager. We have suggested kinds of information they require and some means of structuring that information. Were all necessary measurements of system-resource activity presently available, were all resources linked to patients that used them, and were all the relevant patient characteristics measured, we could easily develop an integrated data base that could serve as a model of the health-care-delivery system. This model could predict resource use, and predict the effects of change on both efficiency and effectiveness. For our recommendations of prospective studies we always have in mind the development of the data base needed to build the model. But the first analyses of the system (Chapter 2, etc.) must be performed with available data. The studies we have performed with the available data have been designed to identify tools for predicting system activity. The first consideration was to define that activity in terms of descriptors which could link resource use to patient characteristics and thus eventually incorporate it into the management model.

# CHAPTER 2

# MANAGEMENT STUDIES OF THE SYSTEM'S PRESENT OPERATIONAL CHARACTERISTICS

## 2.1 Introduction to Inpatient Analyses

Concomitant with the management philosophy outlined in Chapter 1, the first analyses of VA patient-care activities used data that has been traditionally collected by the present VA data systems. Most of this data, which is related to individual patients, resides in the patient treatment file (PTF). A 1-year file of selected PTF data, covering all inpatient admissions in calendar year 1973, was abstracted from PTF for installation on a rapid access-retrieval data-base management system. The findings of the initial analyses are presented briefly in this chapter. Details of the analysis procedures and the actual information output resulting from the studies are contained in Appendices A and B.

### 2.1.1 The Diagnostic Index

The diagnostic index of a health-care system is a tabulation of the frequency of occurrence, in the presenting population, of all diseases and conditions which are observed in the system during a specified period of time. Since we know that diagnostic and theraputic resource requirements are related to the diagnosis, the management utility of this index lies in predicting the case load-case mix, and its dynamics, which may later be related to the nature and number of patient-care resources that will be required. The confidence limits of long-range predictions, of course, depend on the stability of the disease-prevalence rates over a period of time.

Dividing the frequency of occurrence of a particular disease by the total number of patients observed yields the prevalence rate of that condition in the presenting population. Prevalence rate can be converted to incidence rate only when the onset of illness can be established. Prevalence rates in the population at large can be developed only with survey data from the population that does not present for health care, or from a predictive model which relates the health characteristics of those who present to the characteristics of those who do not.

In the short term, the diagnostic index is useful for defining the number of care categories which must be considered if the bulk of system activity is to be described. Some 600 conditions, identified by ICDA (8th revision) nomenclature, each with a population of 200 or more patients, were found to describe more than 90 percent of the total VA inpatient activity in calendar year 1973 (Appendix B).

Consider the $i^{th}$ diagnostic category ($Dx_i$). Over the course of a year, episodes in this category will include those who are presenting for the first time with the disease, and those who return for continuing or followup treatment. It is important to separate these two groups, since:

(1) Resource for followup care (largely therapeutic) may differ from the resource requirements at initial presentation (largely diagnostic).

(2) It would be useful to predict future resource requirements for those who are already captured by the system.

(3) Separating the occurrence of "new" and "old" patients in the system will allow us to study the dynamics of new admissions—toward the goal of predicting the nature and number of new cases that should be anticipated.

Two distinct populations of episodes were therefore identified in a 1-year PTF sample: those episodes representing the first admission for a patient with a particular diagnosis during the year (the nonrepeating population); and all episodes of all patients during the year. While a 1-year time span is not sufficient to establish long-term hospital admission requirements for any specific disease, the ratio of occurrence of nonrepeating episodes to total episodes was provided as a rough index of chronic resource reuse within a disease category.

The plan for development of this index as a predictor of case load-case mix (Chapter 3), must therefore address two issues.

(1) Separation of initial disease occurrence in the presenting populations from the chronic resource reuse within each disease category.

(2) Observation of the dynamics (time-varying trends) of both initial admission and readmission by disease category.

### 2.1.2 Age-Specific Prevalence of Disease

Consider the statement: Some diseases or conditions are specific to youth, and many chronic conditions require more care with advancing age. While, as a qualitative statement, this concept is true, it is not a very accurate predictor of the age-specific characteristic of disease. In order to obtain a better indication of the relationships between age and disease, an analysis of the PTF data was conducted (Appendix A) which identified, for selected disease categories, a measurement of the age-specific disease prevalence in the population who presented for VA care during 1973.

The establishment of a quantitative relationship between disease prevalence and age is an important step in predicting case load-case mix for two reasons. First, if the observed age characteristics of a particular diagnosis is very predictable (that is, if all observed age-specific prevalence rates follow a distinct pattern, and if this pattern is repeatably observed from year to year), then it will be a good predictor of the age distribution of any total number of cases. This will be especially useful if age is to be used as a descriptor of resource use. For example, age may be useful in predicting direct-care (hotel function) resource needs on the basis of age-specific LOS.

Second, if a distinct set of age-specific characteristics hold for a set of diagnostic categories which describe the bulk of individual patient cases, then we have a model which will allow us to predict the effect on case load-case mix that results from aging of the population. Where aging effects are significant, this model will be especially helpful in identifying the component of change which is due to effects other than population aging.

The eventual goal, of course, is to identify patterns of patient health which are specific to patterns of health-care-resource consumption. With this in mind, we should explore the stability of age-specific disease-prevalence patterns, not only with respect to principal diagnoses, but also with respect to:

(1) Whether or not a patient underwent surgery.

(2) Whether or not the principal diagnosis was the only problem (sole diagnosis).

The VA delivers health care over a wide geographic area. Thus, we should also explore the stability of this index over a variety of regional and institutional settings. If we observe reproducible patterns of variation from district to district, it will suggest differences in either the environmental or socioeconomic conditions of the populations, or the available health-care resources. Results of our early analysis (Appendix A) have been almost encouraging. Distinct patterns of age-specific disease prevalence are observed. Distinct changes in this characteristic are found as a result of differentiating between those patients with a sole diagnosis, and those with multiple diagnoses. Similar patterns were observed for some diagnoses at the national, regional, and institutional levels.

The continuation of these studies (Chapter 3) therefore is aimed at developing the VA system index of age-specific disease prevalence, identifying the effect of the aging population, and identifying regional variation within disease categories.

### 2.1.3 Diagnostic Clusters—Multiple Disease Observed in an Individual Patient

While we know that the utilization of diagnostic and therapeutic resources tends to aggregate by diagnosis, we observe that some diagnoses also tend to occur together in individual patients. This suggests that both the nature and number of diagnoses may be significant factors in identifying categories of patients whose resource needs may be accurately predicted.

Identification of diagnostic code pairs and triplets in the presenting 1973 input population (Appendix A), indicates that, in fact, significant numbers of these events do occur. Subdividing the disease-specific prevalence by associated diagnoses may provide a level of detail which will ehnance the confidence limits of predictive models of resource needs. It is suggested, however, that the introduction of this "fine structure" to problem-category nomenclature should await the description of resource-use patterns which are associated with sole and principal diagnosis. If, in many or most cases, this fine structure of problem category is not required for accurate prediction of resource needs, then it will be prudent to avoid this complication. It is suggested that this mechanism of providing fine structure to problem categories be reconsidered after completion of the initial studies correlating patient attributes and process resource—in those cases where confidence limits on the model are marginal.

### 2.1.4 Length-of-Stay (LOS) Analyses

The elapsed time between inpatient admission and discharge may be a powerful tool for predicting resource requirements associated with normal life needs of the patient. These resource needs, largely independent of problem category, include food, maintenance of living quarters and the like. LOS has been shown to exhibit different age-specific characteristics for different diagnoses. Its characteristics are also observed to depend on the number of associated diagnoses, and the use of surgical procedures. It appears likely that the nature of associate diagnoses—the presence of a specific diagnostic cluster—may also influence the age/LOS characteristic for a given principal diagnosis. Initial studies (reported in Appendix A) considered age/LOS characteristics for specific disease groups subdivided by the presence of a sole or a multiple diagnosis. For those conditions studied, mean LOS generally fell in the 20-to-30 day range. The mode—most frequently occurring LOS—tended to fall in the vicinity of, or earlier than the mean. But, for any given condition and year of age, there was considerable variation in numbers of cases discharged versus LOS. It is axiomatic that a patient should be discharged as soon as his prognosis, with convalescence in his home, is at least as good as if he remained longer in the hospital. This implies an organizational system of care that maintains a discharge plan for each patient, and a plan for ambulatory-care followup as appropriate in the individual case. Within the VA health-care system, it is fair to hypothesize a significant number of cases where a longer than "normal" LOS may be anticipated. These situations will arise when convalescence at home is impractical, or suggests a poor prognosis, because of family economics or lack of available family to assist with the post-hospital care. If LOS is to be used as an accurate predictor of direct-care resource needs in the individual case, we must find additional descriptors which can be used with LOS to define the individual case more specifically. Thus, we recommend both analyses to improve the predictability of LOS (Chapter 3), and the development of a systematic method for discharge planning.

### 2.1.5 The Assurance of Quality Care

During the course of 1975, a committee chartered by the Department of Health, Education and Welfare has been defining a systematized nomenclature for those diseases and conditions which are either preventable or treatable to the extent that unnecessary disease, disability, and untimely death can be clearly identified on the basis of individual patient outcome. This index, which includes some 200 of the 4500 odd diseases and conditions of ICDA-8, represents a starting point for the development of individual patient outcome indicators. A preliminary tabulation of frequency of occurrence and prevalence of these diseases and conditions is provided in Appendix A. Towards an operational VA system to monitor this index, the initial information base of such a monitoring system is explored in Chapter 3.

## 2.2 The Outpatient Sector

The diagnostic index, the age-specific prevalence studies, cluster studies, and LOS studies were designed to identify patterns of activity that could be linked to resource use and so help the manager predict his resource requirement. None of the data that was gathered from PTF and used to create these studies is available in the outpatient sector. The data that is available system-wide is the number of outpatient visits broken down by these categories:

(1) Compensation or pension.

(2) Determine need for hospital care.

(3) Outpatient treatment—service connected.

(4) Insurance.

(5) Aid and attendance.

(6) Prebed care.

(7) Outpatient treatment (nonservice connected).

(8) Nonbed care.

(9) Other.

Aggregations of visits by these categories may be useful in the analysis of the veteran population demand for care, but they offer little possibility for developing predictive relationships between required resources and the presenting population, based on individual patient-problem characteristics.

There is one useful data element in PTF that does not even apply to the outpatient sector: LOS. There is another important data element that cannot always be captured for outpatient visits: the diagnosis (see Section 1.2). Much of the outpatient activity occurs in the early stages of medical problems, and may require several visits for accurate diagnosis. Some of the acute problems of mild severity will heal themselves before diagnosis. Some drop-in patients do not take advantage of followup care and will not receive a diagnosis. More complex problems in specialized clinics may require multiple visits before a diagnosis is rendered.

Whatever analyses can be performed in the outpatient sector, they must rely on data that will be gathered prospectively. In some areas (e.g., problem descriptors like diagnoses), initial studies will be required to identify useful data elements. All studies will require the identification of patients, and not merely visits, if they are to help build a model which will predict both new-patient needs and continuing resource use by those already captured in the system.

# CHAPTER 3

# RECOMMENDATIONS FOR MANAGEMENT RESEARCH AND OPERATIONS ANALYSIS

## 3.1 Introduction

The purpose of management research is to identify and gather data from the health-care system which, through analysis, can become a sufficient information base to support both policy decisions and decisions regarding the appropriateness of management policy.

Traditionally, the management model of health-care delivery has been based on the assumption that, for a given set of clinical physicians, services performed should be of a quality acceptable to those physicians, and institutional operating cost per unit time should be minimized. This assumption is consistent with the social attitude that patients seek medical care on their own initiative, and receive the care that they can individually afford. During the past decade, the social attitude has begun to shift toward the concept of health care as a right, not a privilege which is constrained by the individual's economic status. The government, now in the role of informed consumer, since it has become a large third-party payer, and the Veterans Administration in the more complex role of both provider and payer, must develop health-care-delivery-management methods which will meet the challenge of modifying the health-care-delivery system to assure care of high quality at minimum cost to the individual patient. Evolution of this system can only occur concomitant with evolution of the management knowledge base. This new conceptual framework of thought (model) of health-care delivery as a system responding to patients (as users) implies the ability to:

(1) Aggregate component process resources so as to relate them to an individual patient.

(2) Relate resource-utilization patterns to individual patient attributes.

(3) Establish relationships between patterns of resource use in the individual case, and outcome measurements of the individual patient.

Concomitant with the development of this management knowledge base, we must consider the evolution of the information system—the mechanism for accomplishing data collection, storage, communications, processing, and retrieval within the health-care environment. As the nature and number of data elements required by management has been changing, the hardware and software associated with information-system technology have undergone vast improvement in recent years.

A principal assumption underlying operations analysis activities, not only at the VA, but also within the Professional Standards Review Organization (PSRO) structure and other federal and private sector health-care systems, is that the diagnostic statement may be used to describe the clinically relevant features of a patient, as well as to suggest a pattern of resource use that is specific to his care. Our previous studies have established the possibility of using disease discriptors to characterize the presenting population and successfully predict case load-case mix; it is appropriate to complete this model and establish its stability over time.

## 3.2 Age-Specific Characteristics of Disease Occurrence

Let $X_{ij}$ equal the number of observed cases of diagnosis (i) at age (j). We define the age-specific prevalence rate as

$$R_{ij'} = \frac{X_{ij}}{\sum_j X_{ij}}$$

Using the observed nonrepeating (NR) record population of calandar year 1973, the values of $R_{ij}$ will be arrayed for the 200 most frequently occurring diagnoses over the age range 20 to 90 years. This array is a model of age-specific disease prevalence. Given a set of values for the number of patients presenting by their year of age ($X_j = \sum_i X_{ij}$), $X_{ij}$ may be calculated. The diagnostic index of the NR record population may then be constructed as

$$\sum_j X_{ij} = X_i$$

Where $F_i$ is the average frequency of return for a particular diagnosis during the 1-year period, the all-episode diagnostic index can be constructed as

$$X_i \times F_i$$

Our model of $R_{ij}$ may be considered as a set of 200 one-dimensional arrays. In order to explore the possibility of describing this 200-dimensional space with fewer dimensions, a factor analysis will be performed. If diseases are observed to group together by age-specific prevalence characteristic, the diagnoses in each group may be identified.

This age-specific disease-prevalence model will be used to predict a 1975 case load-case mix for both NR and all-episode populations. The input to the model may be either actual 1975 data on the cases that presented by year of age, or an estimate derived from 1973 observations and trends. A projected 1983 age-specific case load will also be constructed and used as an input to the model. The results of these studies—the predicted case load-case mixes for 1975 and 1983—will be reviewed with VA management to assess the value of such predictive tools in planning long-range resource allocation to programmatic health-care activities of the VA system.

We anticipate that this initial model will not be a very accurate predictive tool. With only 1 year of abstracted PTF data now available, we are unable to separate patients who were previously captured by the system from those who are appearing at the hospital door for the first time. Some of the less frequently occurring diagnoses will contain only about 200 cases for analysis. Also, we are unable to establish the presence or absence of year-by-year trends in the prevalence rates. Refinement of this model is, however, straightforward.

In order to distinguish between newcomers and those previously captured by the system, an abstract of IDDS information may be prepared covering the period fiscal years 1961 to 1969. The abstracted record format for all male inpatient admissions would include:

(1) Patient identifier.

  (a) Principal discharge diagnosis.

  (b) Admission date (YYMM).

From this information, the population presenting in 1970 and thereafter may be separated into those patients who represent:

(1) First observed admission to the system since 1961.

(2) First admission with a specified principal discharge diagnosis (but with previous admissions with other principal diagnoses).

(3) Readmissions.

The frequency of return characteristic of cohorts (2) and (3) above may be determined over the period 1961 to 1975. By diagnostic category, we may explore the specificity of this variable to both "age at first episode" and "age at time of encounter". From this information, a frequency-of-return model will be constructed for the previously identified 200 diagnoses.

Cohorts (1) and (2) above are analogous to the NR population defined for calendar year 1973 records. They may be used to develop a model of age-specific disease prevalence similar to that described for analysis of the calendar year 1973 record population. Observed trends in this model, during the period 1970 to 1975, will be identified and used to enhance the predictive capabilities of the model.

These two models, the age-specific disease prevalence and the disease-specific frequency of return, may then be compared with their counterparts developed from calendar year 1973 data. They will also be used to predict a diagnostic index for fiscal years 1976, 1978, 1981, 1983, and 1985. By the time this model is completed, actual fiscal year 1976 data will be available for comparison.

## 3.3 Inpatient Resource-Utilization Study

We have already been able to identify relationships between inpatient characteristics and discharge diagnoses that offer some potential for prediction of system-wide case load-case mix. If such models are to enjoy utility as predictors of resource requirements, we must establish the presence of patterns of resource use associated with diagnoses.

In order to begin this activity, an abstract of the Washington VA Hospital (WVAH) patient-care data base is being prepared during calendar year 1976. The abstract will include, for each WVAH patient discharge, the following data elements.

(1) Patient identification and age.

(2) Date of admission and discharge.

(3) Discharge diagnosis.

(4) Procedures and the dates they were performed.

(5) Radiology and laboratory orders, and the dates of these orders and of the availability of results.

The file layout of this tape is indicated in Figure 3-1. The initial analysis of this data will include consideration of the following relationships by diagnostic category:

(1) Frequency of use of X-ray and laboratory resources and surgical procedures.

(2) Frequency of reuse of these resources during the course of an episode.

(3) The relationships between resource use or reuse and LOS.

(4) The relationship between patient age at time of episode and resource use or reuse.

(5) The resource utilization patterns occuring as a function of time from the outset of the encounter.

Also, it may be possible to identify patterns of resource utilization associated with several diagnoses, or with a specific cluster of diagnoses.

The utility of this analysis lies in establishing whether or not, for a significant fraction of volume activity of the health-care system, resource use can be predicted in the individual patient case. If it can, then a "specification of care" may be developed for a disease or group of diseases, which will be useful in the management planning for individual care and in the assessment of whether or not the system is working properly (quality control). It will be important to distinguish between the diagnostic and therapeutic use of resources, since, a priori, therapeutic resource use should be rather specific to diagnosis.

This analysis seeks to define specifications of care within an institution. Thus, it forms the basis for comparative definition of different patient management techniques. For example, if three process methodologies were identified for a specific condition, and if outcome measurements were established for that condition, the relative utility of the three clinical methods could be compared. Confidence in the result of such a study is obviously related to the number of observed cases. But, in the VA system, for frequently observed conditions, such studies might be routinely conducted in a short period of time (i.e., 1 or 2 years).

| HEADER RECORD | DISCHARGED RECORD NO. 1 (FIRST RECORD IN QUARTER) | DISCHARGED RECORD NO. 2 | DISCHARGED RECORD NO. 3 | DISCHARGED RECORD NO. N (LAST RECORD IN QUARTER) | TRAILER RECORD |
|---|---|---|---|---|---|
| 80 BYTES | VARIABLE LENGTH | VARIABLE LENGTH | VARIABLE LENGTH | VARIABLE LENGTH | 80 BYTES |

HEADER/TRAILER RECORD

| RECORD LENGTH | BLANKS | NOT USED | IDENT. HEADER / TRAILR | BLANKS |
|---|---|---|---|---|
| 2B | 2C | 2B | 6C | 68C |

←80 BYTES→

DISCHARGED RECORD

| RECORD LENGTH 1 | BLANKS | NOT USED | SOCIAL SECURITY NUMBER (SSN) | DATE OF ADMISSION | DATE OF BIRTH | DATE OF DIS-CHARGE | DISPO-SITION 8 | NO. OF Dx CODES 9 | ICDA CODE 1 | ICDA CODES 2-8 | NO. OF PROCE-DURE CODES | ICDA CODE 1 | ICDA CODES 2-5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2B | 2C | 2B | 5PS | 3PU | 3PU | 3PU | 1C | 1PU | 7C | 49C | 1PU | 5C | 20C |

MIN BYTES 1 / MAX BYTES 57 (NO. OF Dx CODES through ICDA CODES 2-8)

MIN BYTES 1 / MAX BYTES 26 (NO. OF PROCEDURE CODES through ICDA CODES 2-5)

←FIXED PORTION - 21 BYTES→ ←VARIABLE PORTION→

| NO. OF SURG-ICAL DATES | NO. OF SURG. CODES THIS DATE | DATE OF SURG-ERY | ICDA CODE 1 | ICDA CODES 2-5 | SURGICAL DATES 2-10 | NO. OF X-RAY STUD-IES | X-RAY STUDY 1 | DATE/ TIME X-RAY STUDY 1 ORDER-ED | DATE/ TIME X-RAY STUDY 1 COM-PLETED | X-RAY STUDY 2-N 25 | NO. OF LAB TESTS 25 | LAB TEST 1 | DATE/ TIME LAB TEST ORDER-ED | DATE/ TIME LAB TEST COM-PLETED | LAB TESTS 2-N 30 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SURGICAL DATE 1 | | | | | | | | | | | | | |
| 1PU | 1PU | 3PU | 5C | 20C | 261 BYTES | 2PU | 2PU | 4PU | 4PU | VAR-IABLE | 3PU | 2PU | 4PU | 4PU | VAR-IABLE |

MIN BYTES 1 / MAX BYTES 291 (NO. OF SURGICAL DATES through SURGICAL DATES 2-10)

MIN BYTES 2 / MAX BYTES N (NO. OF X-RAY STUDIES through X-RAY STUDY 2-N)

MIN BYTES 3 / MAX BYTES N (NO. OF LAB TESTS through LAB TESTS 2-N)

←VARIABLE PORTION→

(a) Inpatient discharged file layout (tape).

Figure 3-1. File layout of Washington VA Hospital resource-use data tape (sheet 1 of 2).

| HEADER RECORD | LABORATORY TESTS-WEEKLY/DISCHARGED PATIENTS RECORD NO. 1 (1ST RECORD IN QUARTER) | LABORATORY TESTS-WEEKLY/DISCHARGED PATIENTS RECORD NO. 2 | LABORATORY TESTS-WEEKLY DISCHARGED PATIENTS RECORD NO. 3 | LABORATORY TESTS-WEEKLY/DISCHARGED PATIENTS RECORD NO. N (LAST RECORD IN QUARTER) | TRAILER RECORD |
|---|---|---|---|---|---|
| 80 BYTES | VARIABLE | VARIABLE | VARIABLE | VARIABLE | 80 BYTES |

<u>HEADER/TRAILER RECORD - SEE INPATIENT DISCHARGED FILE LAYOUT</u>

LABORATORY TESTS RECORD

MIN BYTES 13
MAX BYTES N

| RECORD LENGTH | BLANKS | NOT USED | SOCIAL SECURITY NUMBER (SSN) | DATE OF ADMISSION | DATE OF BIRTH | DATE OF DIS-CHARGE | DISPO-SITION | NO. OF LAB TESTS | LAB TEST 1 | DATE/TIME LAB TEST ORDER-ED | DATE/TIME LAB TEST COM-PLETED | LAB TESTS 2-N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | 8 | 26 | | | | 30 |
| 2B | 2C | 2B | 5PS | 3PU | 3PU | 3PU | 1C | 3PU | 2PU | 4PU | 4PU | VARIABLE |

|← FIXED PORTION - 21 BYTES →|← VARIABLE PORTION →|

TAPES - 9 TRACK, 800 BPI

Notes:

B - Binary representation
C - Character representation
PS - Packed signed decimal representation of arithmetic and nonarithmetic data (odd number of digits).
PU - Packed unsigned decimal representation of arithmetic and nonarithmetic data (even number of digits).

(b) Laboratory tests—weekly/discharged patients file layout (tape).

Figure 3-1. File layout of Washington VA Hospital resource-use data tape (sheet 2 of 2).

## 3.4 Functional Accounting

We have previously articulated the rationale of functional accounting—the ability to associate dollar cost accurately with unit goods and services supplied to individual patients. We have also defined the basic cost categories.

(1) Direct cost.

(2) Utilization-dependent overhead—overhead associated with the production of specific resources.

(3) Institutional overhead.

Traditionally, the VA has not billed patients, and budgeting and reimbursement has been based at cost centers or cost-control points. Hence, little impetus for aggregating individual patient costs has been present in the system. The implementation of functional accounting was addressed by the automated system that accomplished distribution of cost-control-point accounts to the VA 14-4 program summary accounting format. However, true functional accounting will require attention to:

(1) Developing a uniform treatment of utilization-dependent overhead for all cost-control points.

(2) Providing appropriate linkage between accountable items and the individual patient who is served.

Functional accounting does not require basic information that does not exist. Instead, it requires careful attention to making the right measurements in the system (some of which are not now captured by the existing information system), and providing a structure for them in the data base that will facilitate unit-cost analysis and audit of resource consumption by individual patients. The only way to determine the feasibility of functional accounting—and identify the barriers to its implementation in the VA system—is to attempt a pilot implementation. Because of its proximity to the VA Health Care Management Center, the Boston VA Hospital is suggested as the initial vehicle for functional accounting studies. While we cannot, before the fact, address organizational complexity of implementing such an accounting methodology, we can delineate the basic costing rules which must be observed.

Consider each health-care resource which may be used or consumed by an individual patient to be an assemblage of basic components such as provider time, use of equipment, or certain amounts of raw supplies and materials. The direct element of cost associated with a given resource is the sum of all basic components which are consumed in the production and delivery of one of the unit resources. For example, in the utilization of one serum sodium determination, one would find (as elements of direct cost) specified quantities of certain reagents, a test time involving both equipment and personnel, a variety of disposable (consumed) items related to drawing the sample, and some cost associated with sample and result transport whether or not these functions are automated. The sum total of all such basic components consumed in the delivery of one serum sodium are the direct cost of that test. In order to establish which (or if all) of the components should be monitored on an individual test basis, one must first look at the variations in individual cost components associated with the production of a unit test. If the variation is small, then the cost element need not be measured for every output resource. If the variation of the sum of all basic components to direct cost is small, when observed in the production of many output resource units, then the entire direct cost need not be measured for each output resource. One must continuously monitor only those component costs which represent significant variation in the total cost. Other component costs may be established as fixed for a given resource, and their stability checked on a weekly, monthly, or quarterly basis as appropriate. Some observations of the system operation must be made to determine what is appropriate in each case.

In addition to the direct cost of a resource there will be some cost associated with the dynamics of producing that resource. Consider for example, the serum sodium determination. The cost-center (laboratory) that produces serum sodium determination also manufacturers other tests; some of the equipment and many of the personnel may come in to play not only in the production of serum sodium determinations, but in the production of other test results. The cost associated with maintaining such shared-cost components in the presence of a given volume and mix of output items is the utilization-dependent overhead component. In our example of the serum sodium determination, if a flame photometer is used, we may find that it is also used in other electrolyte determinations. But its cost, when not in use, should be distributed (as utilization-dependent overhead) to all the test types which require it. Similarly, laboratory equipment must be calibrated and standardized whether or not a large volume of tests are accomplished in the period between calibrations. Again, this is utilization-dependent overhead.

Observation of the present system will be required in order to establish the nature and dynamics of this overhead component. Further, since manufacturing methods differ from institution to institution, it will be necessary to explore this cost component in several settings before system-wide standards can be established.

The third cost component is independent of any unit resource production or consumption—the cost of maintaining the facility and the provider work force. It is commonly called institutional overhead and is characteristically independent of the functional activity in the institution over short periods of time (weeks, months).

The present plan is to conduct a 3-month study of budget accounting in the Boston VA Hospital, toward the identification of how to begin data collection, and estimate the cost associated with implementation of a pilot program of functional accounting.

3.5 <u>Toward a Quality-Control System</u>

Earlier we identified a set of diseases and conditions which is being promulgated by HEW as a list of diagnoses suggestive of unnecessary disease, disability, and intimely death.[2] The list is organized into three parts.

(1) Conditions suggested for immediate use as a quality-surveillance index, with an indication for each as to whether the occurrence of the disease is preventable and whether unnecessary disability or untimely death is associated with prevention or with treatment.

(2) Conditions where prevention or clinical management is highly effective but more than one case (or a single death) should be required to initiate immediate inquiry.

(3) Conditions requiring improved definition and special study.

We have previously reported a snapshot look at the prevalence of these conditions in the VA case load for calendar year 1973 (Appendix A). But we should establish the occurrence trends of these conditions in the VA system and develop the associated information about death rates. This can be done easily with the PTF data base defined later in this chapter. The result of this analysis will establish:

(1) The magnitude of the case-review job that we may associate with implementation of this quality-surveillance index.

(2) The conditions on which the VA clinical system should concentrate—those which we observed to occur in the population that presents for VA care.

Thus, it is recommended that occurrence, occurrence rates, and death rates for these conditions be tabulated for the years 1970 to 1975.

Prospectively, it is suggested that cases falling within the first list (conditions suggested for immediate use as a quality-surveillance index) be reported by exception within an institution at that time of their occurrence, and reviewed at the institutional and/or district level. Two appealing features of district-level review arise.

(1) It will tend to more clearly separate the review body from the attending provider work force.

(2) It will provide uniform review procedures for a more diverse population of patients than are encountered within a single hospital.

It is recommended that the second list of conditions be similarly handled—but with review on a district or national level (rather than institutional level). Thus, larger case aggregations will be available for determination of occurrence rates. The third HEW list of quality-surveillance conditions includes some conditions which represent a large volume of the VA patient-care activities—especially alcohol-related conditions. In this area, the VA should take the lead in studies to identify criteria related to the effectiveness of care. One such study is outlined below.

If one heeds the anecdotal observations of health-care providers, a question quickly comes to focus. Namely, do those who use detoxification and rehabilitation facilities actually manage to emerge with a comfortable and productive life? Perhaps, instead, they simply move about in the treatment system—their movement punctuated by periods of acute ethanol intoxication.

It is difficult to define a set of measurements of the individual patient that can be used, together with some criteria of "good" and "bad", to identify a successful outcome for the alcoholic. Thus, retrospective studies are hard-pressed to address the question of effectiveness of care in the individual case. The measurement called "time outside the treatment system", however, may be useful in assessing health-care-process effectiveness in three ways. First, by differentiating between patterns of resource use which tend to result in reuse of resources and those which do not. Second, by identifying those programs which tend to promote long periods of departure from the health-care system. Third, by identifying variation, within each treatment method, in the nature of continuing use or reuse of the health-care facilities.

It seems likely that analysis of the existing care-delivery system can address these issues—so long as all institutional facilities available to the individual patient are identified. Such analyses will not solve the problem of defining "good" or "bad" patient outcome measurements. Nor will they relate individual attributes of the patient to his potential for rehabilitation in one treatment program or another. They will, however, size up the operating characteristics of the present treatment system in terms of identifying:

(1) The patterns of facility use and reuse which represent high-volume system activity.

(2) The relative dollar cost of alternative patterns of resource use by individuals.

(3) The effectiveness of alternative treatment methodologies with respect to the length of time patients spend outside the health-care system.

We contend that such a knowledge base is prerequisite to the design of prospective studies of either the effectiveness or dollar efficiency of treatment.

In order to perform such analyses, it is first necessary to define a data set which will describe:

(1) The range of available treatment plans—classifying each, for example, as medical/surgical, simple detoxification, halfway house, outpatient, or voluntary social-service program.

(2) The average cost of each treatment plan in each institution per patient per unit time.

(3) The geographic model of the location of each institutional facility for patient care.

(4) The population of individuals who have used the system, and their individual age at encounter, LOS (inpatient), or length of participation in the program, and geographic location of home.

In this light, the data set for a specific patient might take the form of records, repeating by patient identifier, with the following format.

| Field Number | No. of Characters | Name of Data Element |
|---|---|---|
| 1 | 9 | SSN |
| 2 | 4 | Institution |
| 3 | 3 | Treatment plan |
| 4 | 6 | Admission date YYMMDD |
| 5 | 4 | Date of birth YYMMDD |
| 6 | 6 | Discharge (departure) date YYMMDD |
| 7 | 5 | Home location (zip code) |
| 8 | 5 | Principal diagnosis (if inpatient) |
| 9 | 15 | Associated diagnosis (maximum 3) (if inpatient) |

After the cohort data set was obtained, and the system model of institutional operation defined, two analyses would be performed. One would track the use and reuse of resources by individual patients in time and geographic location. Another would identify the variation in patient time spent outside the health-care system as a function of institution and of treatment plan. Both activities should include cost and cost-variation analysis.

The goals, of course, are to identify the nature of volume activity in the system, and the variation in cost and apparent utility with respect to permanent rehabilitation. This information should point one in the direction of prospective studies with the maximum likelihood for early payoff in terms of improving efficiency or effectiveness, or suggest that few improvements were possible with the existing clinical knowledge base. The problem is that considerable interagency cooperation is essential for such activities. It may be relatively easy to define a patient cohort, but it is less simple to enlist the cooperation of all possible facilities to which a member of a cohort may have access.

Returning to the HEW list of conditions associated with health-care quality surveillance, let us consider some implications of implementing such an index. Two questions are immediately raised. First, should this system be expanded to include the case review of conditions which are perceived to be intimately related to quality control? Second, can the expansion of this activity form the basis for a system of concurrent review?

With respect to the first question, one may note that a systemized nomenclature of such conditions is not well-developed. For example, in the present operational data stream it would be difficult to capture, at the time of onset, such conditions as:

(1) Post-operative hemmorrahage.

(2) Decubitus ulcers.

(3) Contractures, and contractures with stroke.

(4) Gram-negative pneumonia and septicemia.

(5) Post-operative wound dehiscence.

(6) Anaphylaxis, and renal failure caused by antibiotics.

(7) Mortality associated with certain procedures such as cardiac catheterization.

The first step in defining such a list of quality-control flags is to establish their presence or absence in the system. This may be explored using the PTF data base defined in this chapter and an interactive file management system. For example, conditional case sorting such as the selection of cases of death, under age 65, associated with operated inguinal hernia as a sole diagnosis may be rapidly accomplished. Based on the incidence of such untoward health events in the observed population, an initial set of quality-control indicators could be delineated. The problem, then, would be to implement a reliable mechanism for detecting and flagging these situations during the course of patient care. The alternative methods are:

(1) To assure their capture, after the fact, by record abstract.

(2) Attempt their source capture at the time of occurrence (difficult to implement without supplementing the provider team with someone directly responsible for the quality-control function).

The degree of difficulty associated with source-data capture is dependent on the organizational structure. Thus, the ability to implement this approach may vary in difficulty from institution to institution. Since source-data capture is always more appealing than record abstracting, this possibility should be explored in a few institutional environments prior to a recommendation for such system-wide data collection.

The second suggested expansion of quality surveillance and control, concurrent review, should be aimed at the review of both process effectiveness and efficiency—assuring an acceptable quality of care for a minimum dollar cost, in support of the best possible patient outcome. We have already pointed out the complexity of the judgments involved; individual outcome is sufficiently complex to warrant care review by clinical committees. We recommend that a three-level (institution, district, and national) care-review system be established. Toward the development of such a system, we recommend the continued analysis of inpatient LOS. Initial studies in this arena may be performed using the PTF data base defined later in this chapter. They should address the quantitative definitions of:

(1) Number of cases by year of age for specific values of LOS associated with unique conditions or groups of conditions.

(2) Number of cases by LOS for specific values of age associated with unique conditions or groups of conditions.

(3) Items (1) and (2) above as a function of the use of surgical procedures, the presence of associated diagnoses, and the length of time a patient has been treated for a specific condition in the VA system.

These analyses are required in order to better define the role of LOS as a flag which is useful in discharge planning and resource utilization review. Mean LOS analyses will have much greater significance when the distribution of cases around the mean is better understood (when reproducible observations of this variation have been identified).

## 3.6 The Data Base for Inpatient Analyses

The analyses suggested in previous sections of this chapter may be accomplished with a PTF data set containing all records of male inpatient admissions to VA general medical and psychiatric institutions during the period 1970 to 1975. The record layout should be as indicated below.

| Field Number | No. of Characters | Name of Data Element |
|---|---|---|
| 1 | 9 | Patient identifyer |
| 2 | 4 | Date of birth (YYMM) |
| 3 | 5 | Principal discharge diagnosis (this episode) |
| 4 | 6 | Admission date (YYMMDD) |
| 5 | 6 | Discharge date (YYMMDD) |
| 6 | 2 | Number of discharge diagnoses |
| 8-11 | 20 | Associated diagnoses (0-4) |
| 12 | 1 | Number of procedures (9 maximum) |
| 13-16 | 20 | Procedures (0-4) |
| 17 | 3 | Station number |
| 18 | 1 | Disposition (life-death-autopsy) |
| 19 | 3 | Blank |
| TOTAL | 80 | |

3.7 Outpatient Analysis Activities

As we noted in Chapter 2, no data that could be aggregated by patient (as opposed to visit) has been regularly collected on ambulatory care above the institutional level in the VA. In February of this year, such a data base was initiated. It will provide by abstract from the Clinic Routing Slip (VA form 10-2875) a data set for 10 percent of the visits in VA institutions. Initial analyses suggested for this data base will require the following data elements:

(1) Social Security Number (SSN)

(2) Zip Code

(3) Birth year

(4) Location of visit

(5) Disposition

(6) Clinics visited

(7) Date of visit

(8) Facility (station code)

(9) Diagnosis (beginning in fiscal year 1977)

At some point it is suggested that the data collected for the 10-percent sample be compared to data found on the same form but not included in the sample. Such a comparison may reveal something about the utility of the sample data for making predictions. For example, the sample data will always contain a diagnosis (once diagnosis is included in the sample in fiscal year 1977), but that need not be recorded outside the sample. If it is rarely found outside the sample, the accuracy of diagnosis as a resource predictor may be small, and other means of characterizing the population must be sought. Certain data elements, such as clinics visited, will be found on most all forms both in and out of the sample and can serve to accurately define volume activity.

### 3.7.1 Defining System Volume Activity

In lieu of a diagnostic statement, the initial characterization of system activity must be made on the basis of clinics visited. The format indicated in Figure 3-2 is suggested. By definition, a patient

| CLINIC | NEW PATIENTS | | REVISITS | | TOTAL VISITS | |
|---|---|---|---|---|---|---|
| | NUMBER | PERCENT TOTAL | SAME CLINIC | DIFFERENT CLINICS | NUMBER | PERCENT |
| CLINIC 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| ⋮ | | | | | | |
| n | | | | | | |

Note: Clinics ordered by descending number of new patients.

Figure 3-2. Suggested format for clinic index.

presenting for ambulatory care at the onset of data collection (February 1976) is a new patient. Thereafter he will represent a revisit upon his return to the same, or a different, clinic. The local institutions have established their own clinic nomenclature. However, a complete list of possible clinic stops at all institutions will soon be available.

The later collection of the variable diagnosis offers several possibilities for investigating patterns of activity. In the ambulatory-care environment, especially during the initial (diagnostic) phase of a new patient's encounter with the system, the diagnostic statement will not be well-developed. On the other hand, when a course of therapy for chronic disease is established, one might reasonably expect both the diagnosis and clinic stop to repeat from visit to visit. Although clinic nomenclature has been locally developed, the idea of a clinic is to organize the provider work force of specialists. Hence, clinics tend to address problems of specific biological systems. ICDA diagnoses are also organized by human system. Thus, one might expect that many diagnoses would appear in only one or two clinics.

If we are to explore the specification of total patient care (linking inpatient and outpatient episodes) and, if we are to seek patterns of resource use by diagnosis, then it is important to establish the characteristics of the variable diagnoses in the clinic environment as soon as possible. A suggested variation of the clinic index, including the variable diagnosis, is indicated in Figure 3-3. The index will show us the characteristic distribution of diagnoses across clinics, and give us disease-occurrence information which may be compared with the results of previous inpatient analysis.

### 3.7.2 Developing a Characterization of Clinic Operations

In addition to actively defining the volume of the present clinic setting, and later defining the case load-case mix based on diagnoses, there are two analyses that may be performed with this initial data set. First, it will be useful to establish the difference in resource reuse that occurs, by clinic (and later diagnoses), as a function of patient age. Second, it is essential to seek ways of separating clinic use due to chronic treatment from clinic use for other purposes. Initially, it is suggested that, for each clinic, the age-characteristic return rates

| | NEW PATIENTS | | REVISITS | | TOTAL VISITS | |
|---|---|---|---|---|---|---|
| | NUMBER | PERCENT TOTAL | SAME CLINIC | DIFFERENT CLINIC | NUMBER | PERCENT |
| CLINIC I | | | | | | |
| $Dx_1$ | | | | | | |
| ⋮ | | | | | | |
| $Dx_n$ | | | | | | |
| CLINIC II | | | | | | |
| $Dx_1$ | | | | | | |
| ⋮ | | | | | | |
| $Dx_n$ | | | | | | |
| CLINIC M | | | | | | |
| $Dx_1$ | | | | | | |
| ⋮ | | | | | | |
| $Dx_n$ | | | | | | |
| TOTAL | | | | | | |

Figure 3-3. Format for a diagnostic index of clinic operations.

to the same clinic, and to different clinics be calculated. The output format of such an analysis is indicated in Figure 3-4. If distinct reproducible patterns are observed, then this may become a useful predictive tool.

We may also explore the movement of patients among clinics through a cross-tabulation of clinics. For patients visiting a given clinic we can see what other clinics they most frequently visit. The output format of such an analysis is indicated in Figure 3-5.

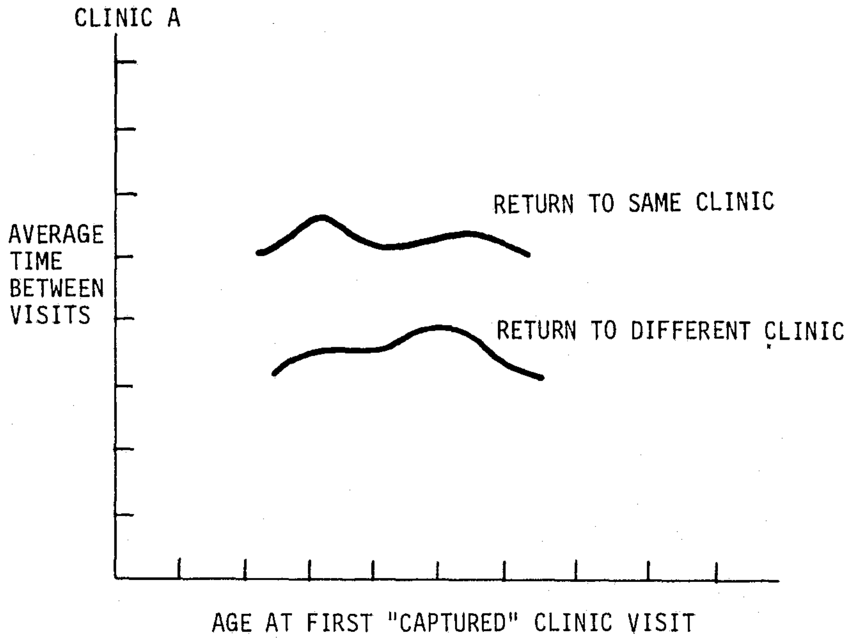



Figure 3-4. Suggested output format for analysis of age-specific clinic reuse.

| | SECOND VISIT | | | | | |
|---|---|---|---|---|---|---|
| FIRST VISIT | CLINIC | | | | | |
| | A | B | C | D | ..................... | N |
| CLINIC A | | | | | | |
| B | | | | | | |
| C | | | | | | |
| D | | | | | | |
| ⋮ | | | | | | |
| N | | | | | | |

Figure 3-5. Output format of multiple-clinic-use analysis.

With these basic indices as guides to the presence, or absence, of reproducible patterns in the outpatient activity, we may explore variation observed to occur in the several data elements of this initial data set. Such analyses are best performed on an interactive data retrieval and analysis system since, before the fact, it is impossible to tell which analyses will present distinct patterns of potential use in predicting patient activity.

With the advent of diagnosis in the data base, several analysis questions are suggested.

(1) What is the relationship between the age-specific disease-prevalence characteristic observed for inpatients and that observed in ambulatory care.

(2) What is the age-specific pattern of frequency of return (or time between visits) by diagnosis.

(3) What are the characteristics of visit disposition by diagnosis.

(4) What are the geographic variations in these indices.

(5) In an inpatient/outpatient-linked data set, what is the diagnosis-specific relationship between inpatient LOS or time between admissions and frequency of outpatient visits.

### 3.7.3 Outpatient Resources

After initial analysis of the outpatient activity, a prospective study must be designed to permit resource-use analysis similar to that now being initiated with Washington VA Hospital inpatient data. Resource use in the ambulatory-care environment may be less complex than in the inpatient setting. But, we will not have a quantitative model of this effect until orders for patient-care resources and provider time are accounted by individual patient. A pilot study of how to capture outpatient-resource utilization data should be performed during 1976, in order that data collection may proceed after the initial analysis of clinic-activity characteristics. It is logical to combine this study activity with the pilot study in functional resource accounting which has been suggested for implementation at the Boston VA Hospital Center for Health and Care Management.

3.7.4 Overall Quality Control and the Outpatient Sector

It is important to remember that the care of an individual patient is a continuum of activities. Many patients' care requires both inpatient and outpatient treatment for the same problem. The kind of care delivered in each area may be extremely different, even for that one patient. The quality of the care in each area may be evaluated separately. But these separate encounters must be related if the overall quality of care in the system is to be determined.

Dr. R. H. Egdahl, in a recent editorial in the New England Journal of Medicine[3] has pointed out the necessity of extending quality-of-care evaluation through the inpatient sector into ambulatory care. Several significant points are discussed. Dr. Egdahl concludes, "First of all it will be impossible without post-discharge ambulatory-care audit to assess the 'quality' impact of constricted lengths of stay or seemingly cost-effective diagnostic or therapeutic regimens. It will also be impossible to justify the creative use of screening procedures unless long-term evaluations, involving both inpatient and ambulatory dimensions of care, are undertaken." The appropriateness of given LOS for patients with given diagnoses will be much affected if those patients are found to be progressing very slowly in their outpatient followup. The frequency of return variable that can be derived from the 10-percent sample might be linked to LOS to help the providers determine the most appropriate course of inpatient treatment and outpatient followup. The evaluation of diagnostic and therapeutic procedures (see Section 1.6) will also require that the entire course of a patient's treatment be considered. As with LOS, what seems appropriate from evaluating hospital care may belie the facts which the patient's ambulatory care reveals. Again the frequency-of-return variable may be useful.

3.7.5 Quality Control within the Outpatient Sector

The difficulties associated with evaluating care (see Section 1.6) in general, are multiplied in the outpatient sector. One significant reason for this fact is that the ambulatory-care patient is not "captured". Whatever problems are associated with defining a satisfactory outcome in general, they will be greater for a patient who does not return to be checked. It will be difficult to review concurrently, for even if some criteria for selecting cases are developed, the patient may not be there when he is chosen to be reviewed. And, as we have noted, an ambulatory patient, by definition, cannot have an LOS. Obviously, the large bulk of review will be retrospective.

There is one other problem which is unrelated to the patient's mobility. As of now, there is no large information base that contains data on patients and their medical problems in ambulatory-care settings. Without any observations of the presenting population it is impossible to develop implicit standards for care. Therefore, the first methods of evaluation must depend upon explicit standards. The list of conditions that the HEW Committee (see Section 2.1.5) has deemed able to be cured or arrested can serve this purpose. All cases representing these conditions can be flagged and the records reviewed retrospectively. The number of cases that can be reviewed this way will be relatively small so that further mechanisms for evaluation will need to be developed.

The 10-percent sample might provide an opportunity for developing other evaluation mechanisms. When a diagnostic index is developed and the age characteristic is explored, potentially useful patient groups can be identified. For the outpatient sector, a patient's frequency of return might be used in a way that is similar to the way in which LOS is used in the inpatient sector. If a given patient returns significantly more often or significantly less often than the norm of patients his age with his diagnosis, his case could be identified for review. A positive aspect of this process would be that the review need not be retrospective. Identified as requiring review after his last visit, the patient can be reviewed concurrently on the next visit. It will be important to examine the statistical character of frequency of return before using it for review identification. If the variation in that measurement is normally distributed it will be of little value. If diagnosis is not available for most outpatient visits, then alternate problem descriptors could be explored with several prospective studies. The presenting complaint might be used if it were structured so as to limit the number of possible values. SNOMED might provide a useful structure for describing problems since the values are limited and the division of the nomenclature into fields allows the problem descriptor to grow as diagnosis and treatment progress.

The utility of flagging cases by frequency of return (or LOS) for evaluating effectiveness will depend entirely on how those cases are reviewed. If outcome is not distinctly evaluated, the value of this mechanism for identifying cases that have a high probability of representing poor outcomes can never be determined. If this is so, the measurement of frequency of return may only be useful for resource management. Since standards for outcome, either explicit or implicit, are scarce, mechanisms for developing them should be explored. One method might involve seeking articulations from the physician concerning his expectations for treating a particular patient. These articulations could take the form of goal statements. Consider the following examples: "I want to have a bacterial culture with phage type and antibiotic sensitivity for this patient"; or, "I want to reduce this patient's fever"; or, "I want to eliminate this patient's β streptococcus infection." These goals represent different types of medical care but each could be the proper imperative depending on the circumstances. In general, goals tend to be specific to the diagnostic process or to treatment. Though establishing a diagnosis is always a prime concern of the physician, sometimes treatment must be started before diagnosis is complete. Thus, a physician may wish to reduce a patient's fever before waiting for the nature of his disease to be identified. Or, in the case of trauma, a physician's goal might be to stabilize a patient's fluid balance before determining the full nature of the trauma. One might ask again Holden's five questions (see Section 1.2) and categorize goals accordingly. These questions will generally be addressed in a certain order, but, as with diagnosis and treatment, the order will not apply to all cases.

Sets of goal statements could be developed either explicitly or implicitly. The first method would involve having a group of physicians decide on a list of goals considered appropriate for a variety of medical care. Classes of goals could be established and requirements concerning the kind of information considered appropriate in each class could be set. The second method would require that each physician record what he considered to be the principal goal for that episode. These goal statements could be reviewed for similarities, seeking ways of limiting the number of possible different statements, or grouping these statements into a small number of classes. Most probably, a series of iterations using both methods would yield the best understanding of both the possibilities and limitations of creating goal statements that repeatably convey useful descriptive information.

The real value of goal statements would be their ability to act as interim outcome measurements. Whether or not a goal is achieved could potentially reflect the quality of care delivered. However, this need not always be the case. The achievement of a goal will not reflect a good outcome if the goal was not appropriate in the first place, and the failure to achieve a goal will not reflect poor care if the subtleties and complexities of a case prove that goal to be unrealistic or inappropriate. However, no system for evaluating the quality of medical care can possibly develop concrete and universal standards. The utility of goal statements for evaluating care will be determined almost entirely during the process of developing those statements. Goal statements will need to:

(1) Be clear articulations of accepted medical activities.

(2) Be applied in specified contexts in which they are deemed appropriate (e.g., some goals would not be considered appropriately applied if certain diagnostic work had not preceded them, or if certain patient characteristics were normal at the outset).

(3) Represent activities that are agreed upon as potentially able to positively affect the patient's outcome (in a specific context).

The realistic possibilities of using goal statements for evaluating the quality of care can only be soundly determined when a group of practicing physicians representing experience in a variety of medical specialties and organizational settings, and a management representative familiar with the problems of gathering information, convene and systematically address the issue. The principal benefit of goal statements to the outpatient sector is that they would provide some measurement related to the quality of care for almost every patient visit. And only one measurement (or at least a small number of measurements) would be required for each patient. Even if evaluating all outpatient care is impossible, the number of cases that it would be possible to evaluate would be high. The goal statement method would not depend upon the establishment of a diagnosis and could be more suited to the variety of ongoing care found in the outpatient sector.

There is a great diversity in the nature of different kinds of ambulatory care, and different classes of care require different considerations for developing outcome measures. There will be some outpatient visits that do not require an extended course of diagnosis and treatment. These will include such categories of care as physical examination on patient request, preventive medicine visits, educational visits, and administrative visits. It is difficult to attach a figure of merit to physical exams on patient demand, as no study has shown definitively how routine physicals improve the health of the patient. To develop a thoroughly applicable outcome measure for preventive medicine, one must establish the nature of the risk to the patient, and then follow him for an appropriate period of time, which may be a significant part of his lifetime. The success of educational visits cannot really be measured without tracing the patient's future actions to see if he has absorbed his new knowledge. There is no relevant medical evaluation of an administrative visit. Perhaps the only relevant outcome measure at the encounter level for these categories of care would be the answers to the questions: "Is the patient satisfied?" or "Is the physician satisfied?" or "Did the form get filled out?" These categories of visits will not represent a large percentage of ambulatory care, but still, identifying them can be quite important. These visits can be handled with a degree of routine that is impossible when dealing with disease states. Because the volume of visits in the outpatient sector is so high, the efficient handling of care in these categories could free more time for clinicians to deal with the treatment and evaluation of the diseases that demand the most from their professional expertise.

### 3.8 Management Information System (MIS) Development

A decision-making approach to the question of MIS centralization versus decentralization has been reported(4) in application to the health-care delivery environment. During the next year, this methodology will be applied to VA institutions in VA district 1, in order to illuminate the potential cost effectiveness of alternative MIS configurations in application to the VA health-care system.

At the same time, it may be possible to explore the operational problems of data capture, communication, and data-base management in one or more VA institutions. The mechanism for accomplishing this study will include the experimental installation of a data capture and data-base management system in the Boston VA Hospital. From the standpoint of implementing prospective management research protocols, the availability of such a data system is essential. Consider the following qualities of the proposed GIM II system:

(1) The ability to use data elements from the data base maintained for operational (hospital) applications in a separately structured research data base.

(2) The ability to add information to the research data-base off-line to hospital operations.

(3) The ability to restructure the research data base, without programming support, independent of the operational (hospital) data base.

(4) The ability to manage the research data base to select record populations on the basis of Boolean criteria, create variables derived from previously captured data elements, count events and total or average, and tape output files for subsequent statistical analyses.

Consider, for example, the utility of these qualities of the proposed MIS to three studies of ambulatory-care dynamics.

(1) <u>Developing a predictive model of problem occurrence in ambulatory care</u>.—Medical problems are well-defined and these definitions are uniformly accepted in inpatient care, such as the ICDA list of diagnoses. For various reasons, such nomenclature is not as well-developed in such wide use in ambulatory care. Developing such a structured nomenclature begins by considering numerous candidate variables (e.g., complaint, category of visit, diagnosis (conventional), clinic, etc.). In order to identify relationships that will predict volume activity in ambulatory care, such variables must be related to patient attributes (e.g., age, race, sex, geographic location, etc.).

Without a data-entry/data-management system in the institution where the research is to be conducted, all data would have to be abstracted for the research by hand. In an applications-oriented fixed data-base system (such as AHIS) the development of a research data base or its modification in either content or structure, would require programming support. In the proposed MIS environment, data elements which are used operationally in the hospital may be linked to the research data base, the research data-base structure may be modified without programming support, and data may be added to the research files off-line from institutional operations.

This reduces (probably by a factor of two to four) the costs associated with research-data acquisition and eliminates the need for programming support in maintenance of the research data base.

(2) Developing a predictive model of resource use in ambulatory care.—This exercise requires linking health-care resources which are ordered by providers to the individual patients who consume them, and subsequently identifying patterns that occur by problem category (item (1) above) or patient attribute. In the nonautomated data-processing environment, of course, all data capture for research would be by abstract. In the partially automated environment, research-data capture would require reentry of data, and attention to the structure and currency of the automated data-base segments providing the data (such as the laboratory information system). In the proposed MIS environment, with a link between the laboratory data base and the information system, the capture of research data may be accomplished without reentry or reformatting the data in many cases.

(3) Studying resource reuse.—At the time of data entry for the operational purposes of patient and resource scheduling, date/time information associated with both the return of patients and their continued reuse of multiple resources may be derived (from the MIS clock) and provided directly to the research data base. This eliminates preprocessing of research files before they are entered into an interactive data-analysis environment and, of course, manual collection or transcription of such data.

In scenarios such as the three operations analysis activities described above, the researcher is constantly faced with a need to:

(1) Explore new relationships between captured variables.

(2) Create or derive new variables.

(3) Structurally change his file system (invert on different key variables).

Such analysis activities must proceed with very limited scope when manual data abstracting and file maintenance is required. The conduct of such research is almost totally dependent on automated-data capture and file maintenance. Recognizing this fact, we have thus far worked only with existing data bases (PTF, AHIS, etc.)—and even in these cases we have no ability to modify captured data or derived variables outside the data-processing/analysis environment of the research computer. A GIM II type of system will significantly speed management analysis activities—especially in the outpatient sector where even a basic operational data set is, at best, poorly defined.

# CHAPTER 4

## THE IMPACT OF NEW TECHNOLOGY ON THE DELIVERY OF HEALTH SERVICES

Rapid technical advances in the aerospace and defense sectors of our economy during the 1960's have created a sizable reservior of technology and technical expertise which has not yet enjoyed application to health-care delivery. There is considerable effort devoted to identifying specific clinical problems which may be solved, wholly or in part, by existing technology. While improvement in our society occasionally arises from the identification of a problem that fits a specific solution, this is the exception rather than the rule. If the objective of technological innovation is, in fact, to better man's lot, then perceived problems of social systems should be clearly articulated—and the priority or perceived value of solving the problem clearly identified—before engineering development activities are initiated.

Now what about priorities, specifically in the health-care sector? What are the yardsticks which may be applied to determine the relative utility of solving one problem or another? Two types of values must be considered.

First, there is the value of health and well-being to the individual. On the value scale of individual patient health, death is the least desirable outcome of medical care. When the physician must choose between a new innovation and conventional care, he will act conservatively; thus, the probability of inducing disability with new therapeutic methods is always carefully weighed against the probability of a poor prognosis with conventional care. Since the probability of inducing disability must be determined from observation of those who are treated, it may take a very long time to acquire clinical evidence in support of health-care innovations. This has the effect of lengthening the time between development effort and marketplace for a new product—frequently 5 to 10 years—which is long enough to make most manufacturers wonder about the return on their investment. After all, in our society, many advanced technology products have become technically obsolete in 5 to 10 years.

Even if the new product is acceptable to clinical medicine—let us say it is foolproof in clinical application—there is the question of how much it will help the patient. What is the value of saving a life? For 1 year? For 10 years? Is one life worth more than another? This value scale is not very refined in our society. And what if the new product provides only temporary or incomplete rehabilitation for the patient? Should its production in volume be encouraged, or should the problem-solving activity press on until an ultimate solution is achieved?

In order to address these questions, one must consider not only the value of health and well-being to the individual, but also the value of an individual's health and well-being to the society. The resources which can be turned to saving or prolonging life are finite. Can we afford the overproduction of health-related goods and services associated with ensuring that everyone, regardless of where they are and when they are there, has access to all of the clinical technology that we can muster? The timeworn example of a situation where there are more people with clear-cut clinical need for a respirator than there are respirators is taking some new twists. We have apparently progressed. Ten years ago we were deciding that "equal care for all" did not imply that if there weren't enough respirators to go around, then no one should have access to any of them. Today we are beginning to see ethical guidelines for clinical care that are quite specific about these issues. The published recommendations of an ad hoc conference on "ethical issues in newborn intensive care"[1] includes, among its conclusions:

> "If an infant is judged beyond medical intervention, and if it is judged that its continued brief life will be marked by pain or discomfort, it is permissible to hasten death..."

In other settings this has been called euthanasia. And:

> "If it is necessary to discriminate between several infants [because of lack of space in a newborn intensive care unit] it is ethical to recommend that theraputic care for an infant with poor prognosis be terminated in order to provide care for an infant with better prognosis."

Perhaps this is a corollary to the old axiom "survival of the fittest".

In any event, it is neither our intention to establish ethical guidelines for the utilization of scarce clinical resources, nor to approve them. What we seek to do, is to identify the nature and magnitude of resource need toward the goal of providing measurements and information to the profession on the basis of which they can rationalize clear-cut decisions about clinical-care policy.

We recommend that the VA consider establishing a working group, from within their community of clinical providers and the most prestigious level of the profession, to consider the potential of scientific research, clinical research, technological innovation and technology development—and the reality of marketplace dynamics—for each of the top 200 most frequently occurring conditions treated in VA facilities today. The findings of this group, perhaps revised yearly, should take the form of clear-cut problem identification and the establishment of VA clinical research priorities for evolving better patient care.

But there are needs and opportunities for technological innovation in health-care delivery outside the arena of individual patient care.

We have suggested (at some length in this text) that the health-care system may be considered as a structured set of patient-care resource production activities. We have hypothesized that the production cost of output goods and services from the system may vary—independent of the quality of those resources. And we have discussed the nature of the information system—that portion of the structure through which data and information moves. As we begin to characterize the system structure—to identify the interactions between production centers in terms of the dynamics of patient-care-resource cost—we will begin to identify clear-cut issues of system efficiency. The available technology of process automation and information processing may be helpful in both increasing the output of goods and services, and in reducing unit cost.

There are some significant costs associated with operation of the present system independent of the individual patient. They are necessary costs, but perhaps new technology can help us to reduce them. For example the data base of individual inpatient care (PTF) is acquired by abstract from from discharge records at each VA institution.

If an average of two FTE employees were required at each of 180 stations (at an average cost of $7,000 per year per employee) to accomplish this record abstract, then the annual cost would be $2,520,000. Suppose that, quite apart from any consideration of this PTF maintenance function, we rationalize a data capture, storage, and retrieval system that improves the efficiency of managing patient care. If such a system automatically provides PTF abstract data, from single-point-source data capture without additional record abstracting, then we have saved some or all of the PTF abstracting cost. One can buy a lot of sophisticated analysis capability—or a lot of data entry devices—for $2,000,000 a year.

But it takes time to clearly identify how the health-care system works and what barriers to improved efficiency presently exist. We argue that it is prudent to take that time and develop system improvements only after the requirement for change has been clearly articulated.

The objective always should be to seek the most efficient and effective way of operating the system day by day, not the quickest way to use the most exotic technology which is available. In the process of doing this, it will be necessary to exercise a certain amount of technological overkill. In research and pilot demonstration development, we will need to explore a range of solutions to identified problems in order to determine what works the best. The key to identifying "what works best" will be a well-defined evaluation protocol for all development and demonstration activities.

We believe that, through continuation of the EDP cost analysis of Rockart et al. (MIT, Sloan), evaluation criteria for a VA data system will emerge during the forthcoming year. This effort, concomitant with research and development related to the core-computer concept, should give rise, in a 2- to 4-year time frame, to a clearly defined EDP requirement for the VA system.

We believe that the information systems area will be the first to demonstrate increased system efficiency through the use of new technology.

APPENDIX A

# ANALYSIS OF SOME VARIABLES CONTAINED IN THE CALENDAR YEAR 1973 PATIENT TREATMENT FILE

## A.1 The Data Base

A nine-track 1600-BPI, magnetic data tape was prepared at the Austin, Texas VA data-processing center by abstract from the 1972, 1973, and 1974 patient treatment file (PTF). For each episode with 1 or more days of inpatient stay in a VA-operated general medical and surgical (GM&S) or psychiatric hospital during calendar year 1973, the record layout shown in Figure A-1 was included. Subsequent processing of this tape yielded patient age in 1973 (from date of birth), and length of stay (LOS) using the dates of admission and discharge.

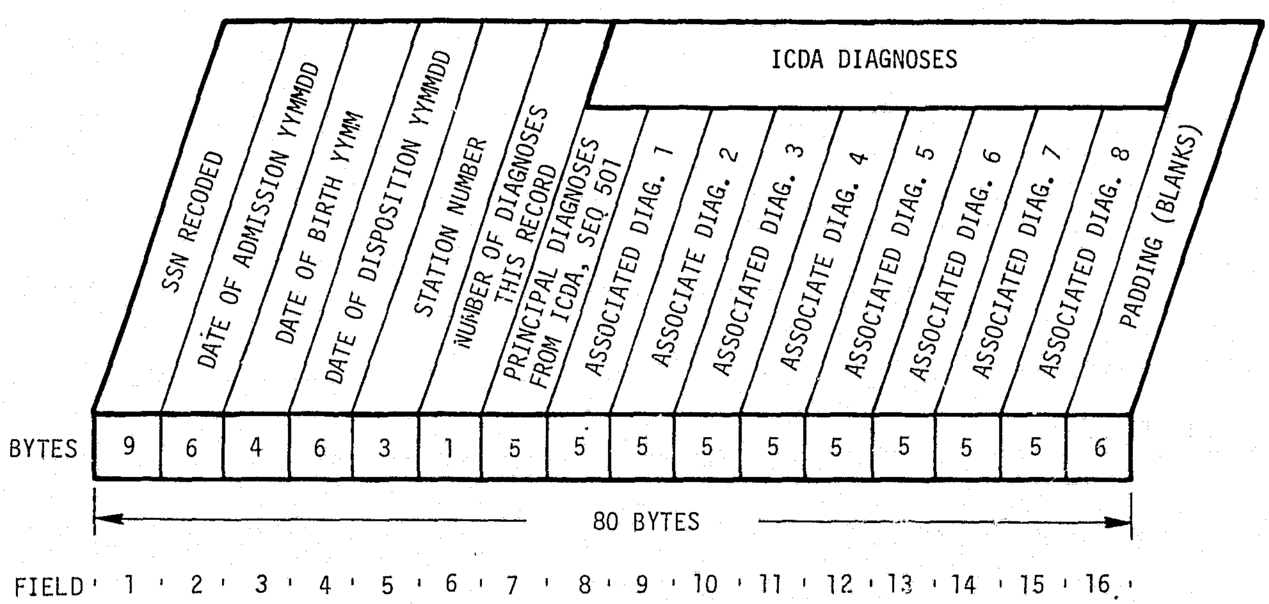



Figure A-1. Record layout of PTF abstract data tape.

When more than one episode involving time during calendar year 1973 occurred for an individual patient, the file was organized by repeating records within a social security number (SSN) recode.

## A.2 The Record Population

Two populations of records were identified.

(1) All episodes included in the data base.

(2) Nonrepeating (NR) episodes. This population of records includes, for each observed ICDA-8 diagnostic code, the first record for each unique SSN recode with that ICDA code as a principal diagnosis. That is, one record per patient was selected after inverting the file on principal diagnosis.

In the VA system, the principal diagnosis is defined as the diagnostic code associated with the principal reason for the LOS of the inpatient episode. Associated diagnoses are defined as other conditions for which treatment was provided during the course of the episode.

The data base was found to contain 1,013,269 episodes, involving 621,973 unique SSN recodes (patients). The NR population numbered 801,817 records.

## A.3 The Diagnostic Index

A diagnostic index (Appendix B) was prepared using the logical flowchart shown in Figure A-2 and the Fortran program that is listed in Figure A-3. For each unique value of ICDA-8 code on the data tape, the frequency of occurrence as a principal diagnosis (PDx), and as an associated diagnosis (ADx), was tabulated. This tabulation was performed for both record populations: all episodes, and NR episodes. Also for each record population, the number of times a particular ICDA code occurred by itself (as a sole diagnosis) or with one, two, three, or four other diagnoses, was tabulated.

A second tabulation, Figure A-4, was simultaneously prepared. It tabulated:

(1) The number of patients (discrete values of SSN recode) as a function of the number of inpatient episodes which occurred for any given patient during the course of calendar year 1973.

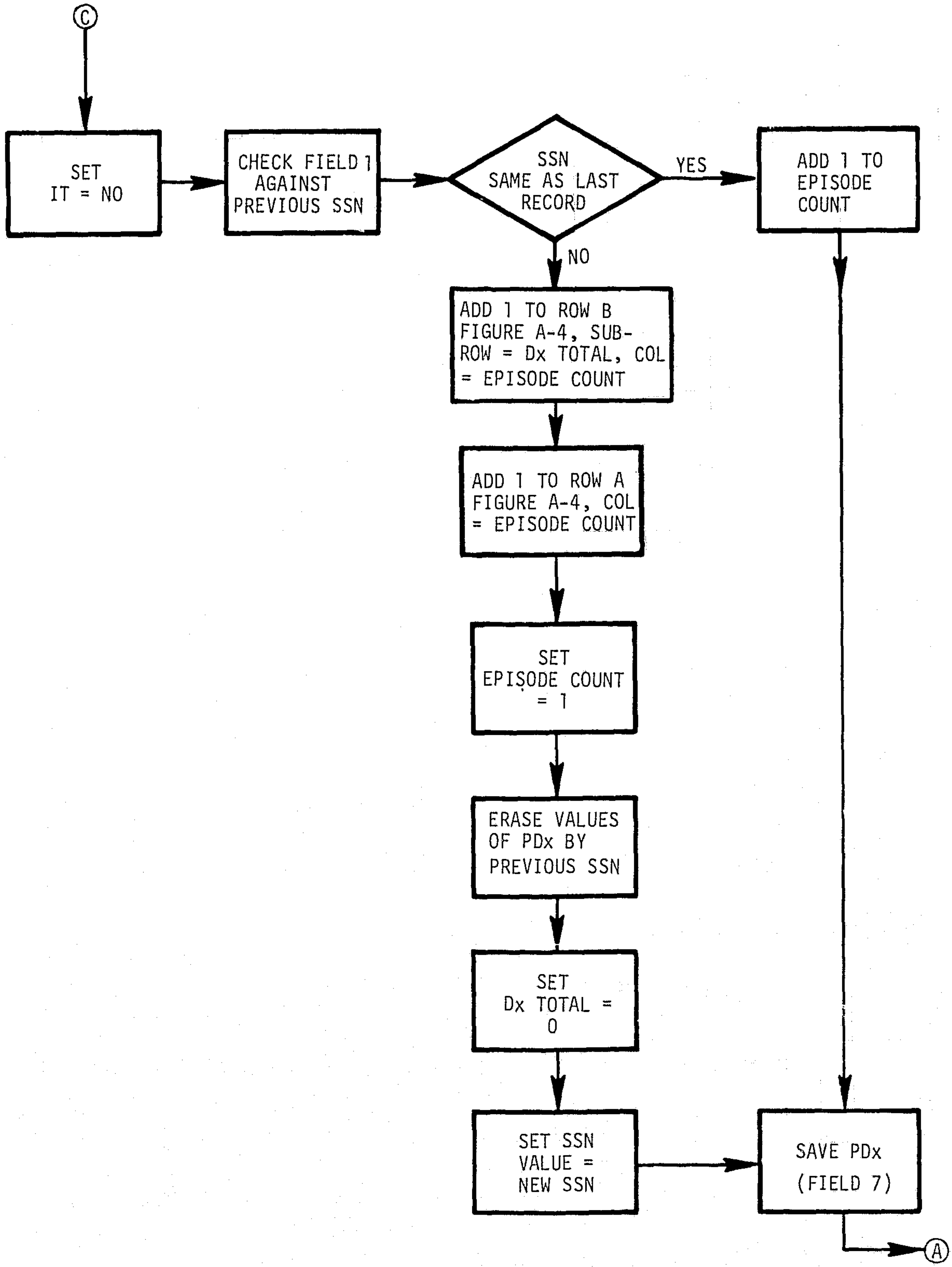



Figure A-2. Flowchart for preparation of the diagnostic index (sheet 1 of 3).

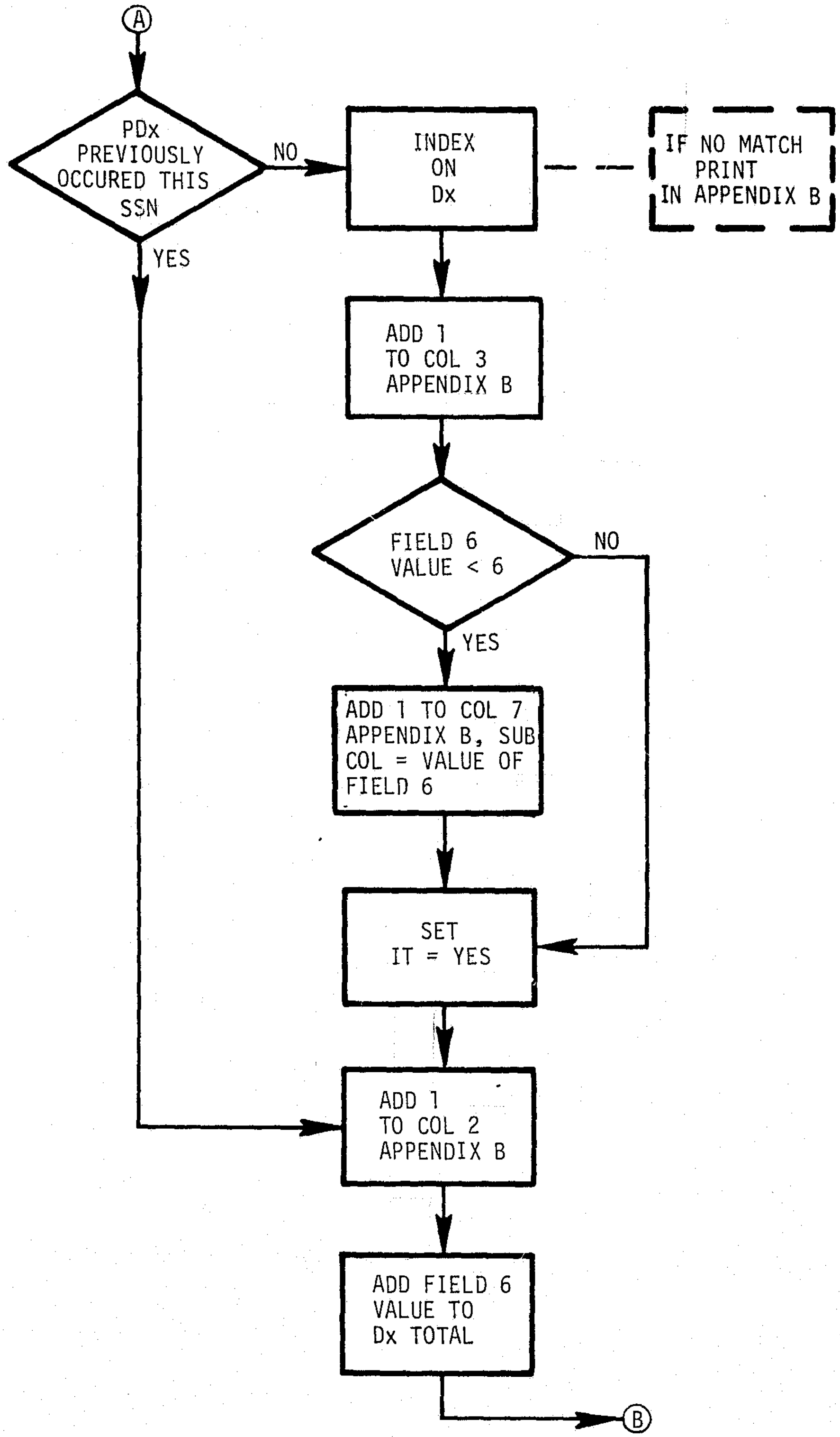



Figure A-2. Flowchart for preparation of the diagnostic index (sheet 2 of 3).

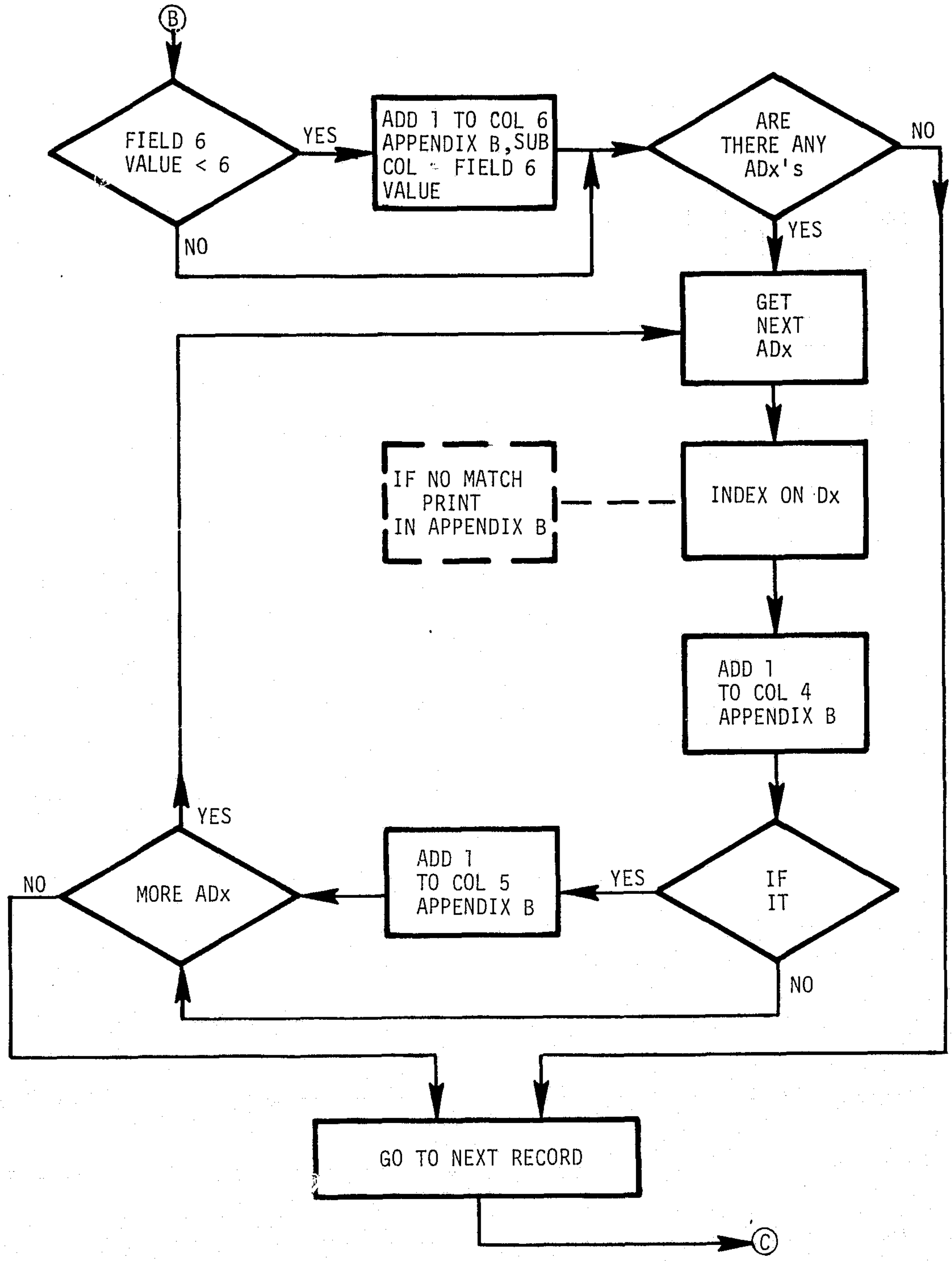



Figure A-2. Flowchart for preparation of the diagnostic index (sheet 3 of 3).

```
FILE: REPORT1   FORTRAN   A1

      INTEGER I1(14),ICDA(5),I2(14)
      COMMON COUNT
      WRITE(3,10)
10    FORMAT(1H1)
      CALL HEAD
      DO 15 I=1,14
      I2(I)=0
15    CONTINUE
17    READ(2,20,END=900)(ICDA(J),J=1,5),(I1(I),I=1,14)
      IF(COUNT.GT.50) CALL HEAD
      COUNT=COUNT+2
20    FORMAT(5A1,14I6)
      WRITE(3,30)(ICDA(J),J=1,5),(I1(I),I=1,14)
30    FORMAT(1H0,1X,5A1,14(1X,I7))
      DO 100 I=1,14
      I2(I)=I2(I)+I1(I)
100   CONTINUE
      GO TO 17
900   CALL HEAD
      WRITE(3,200)(I2(I),I=1,14)
200   FORMAT(1H0,' TOTAL ',14(1X,I7))
      STOP
      END
```

```
FILE: HEAD      FORTRAN   A1

      SUBROUTINE HEAD
      COMMON COUNT
      WRITE(3,10)
10    FORMAT(1H1,///,8X,'OCCURANCE   PDX   OCCURANCE ADX     NO.',
     *' DXS KEYED ON PRIMARY DX',12X,'NO.  DXS KEYED ON PRIMARY DX')
      WRITE(3,20)
20    FORMAT('  ICDA      ALL       NR        ALL       NR              ALL',
     *'     EPISODES',22X,'NON-REPEAT EPISODES')
      WRITE(3,30)
30    FORMAT(41X,' -1-      -2-       -3-      -4-      -5-       -1-',
     *'      -2-      -3-      -4-       -5-')
      COUNT = 7
      RETURN
      END
```

Figure A-3. Fortran program for diagnostic index preparation.

| | # EPISODES | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | >4 <25 | >24 | TOTAL |
| PATIENTS | 439411 | 116449 | 39448 | 14277 | 11151 | 1237 | 621973 |
| DIAGNOSIS | | | | | | | |
| 1 | 149199 | 0 | 0 | 0 | 0 | 0 | 149199 |
| 2 | 107585 | 18887 | 0 | 0 | 0 | 0 | 126472 |
| 3 | 74360 | 18417 | 3641 | 0 | 0 | 0 | 96418 |
| 4 | 48158 | 18552 | 3836 | 843 | 0 | 0 | 71389 |
| 5 | 30222 | 15474 | 4515 | 1002 | 261 | 0 | 51474 |
| 6 | 13249 | 12946 | 4550 | 1150 | 393 | 0 | 32288 |
| 7 | 7921 | 9606 | 4266 | 1302 | 519 | 0 | 23614 |
| 8 | 4170 | 7322 | 3759 | 1345 | 572 | 0 | 17168 |
| 9 | 4547 | 5119 | 3298 | 1272 | 657 | 0 | 14893 |
| 10 | 0 | 3576 | 2703 | 1176 | 714 | 0 | 8169 |
| 11 | 0 | 2358 | 2175 | 1042 | 715 | 0 | 6290 |
| 12 | 0 | 1706 | 1641 | 944 | 766 | 0 | 5057 |
| 13 | 0 | 993 | 1381 | 759 | 666 | 0 | 3799 |
| 14 | 0 | 641 | 997 | 613 | 661 | 0 | 2912 |
| 15 | 0 | 356 | 776 | 581 | 582 | 0 | 2295 |
| 16 | 0 | 228 | 541 | 466 | 552 | 0 | 1787 |
| 17 | 0 | 139 | 393 | 397 | 490 | 0 | 1419 |
| 18 | 0 | 129 | 304 | 336 | 447 | 0 | 1216 |
| 19 | 0 | 0 | 198 | 248 | 419 | 0 | 865 |
| 20 | 0 | 0 | 374 | 650 | 2390 | 1237 | 4651 |

Figure A-4. Occurrence of patients and diagnoses as a function of number of episodes (NR population).

(2) The number of patients by the total number of diagnoses (up to 20) acquired by an individual patient and the number of episodes he experienced during calendar year 1973.

In the diagnostic index (Appendix B), ICDA diagnostic codes are ranked by decreasing frequency of occurrence of the codes in the NR population. The cumulative percentage of the total NR record population, as a function of the rank-order number of ICDA codes, is shown in Figure A-5.

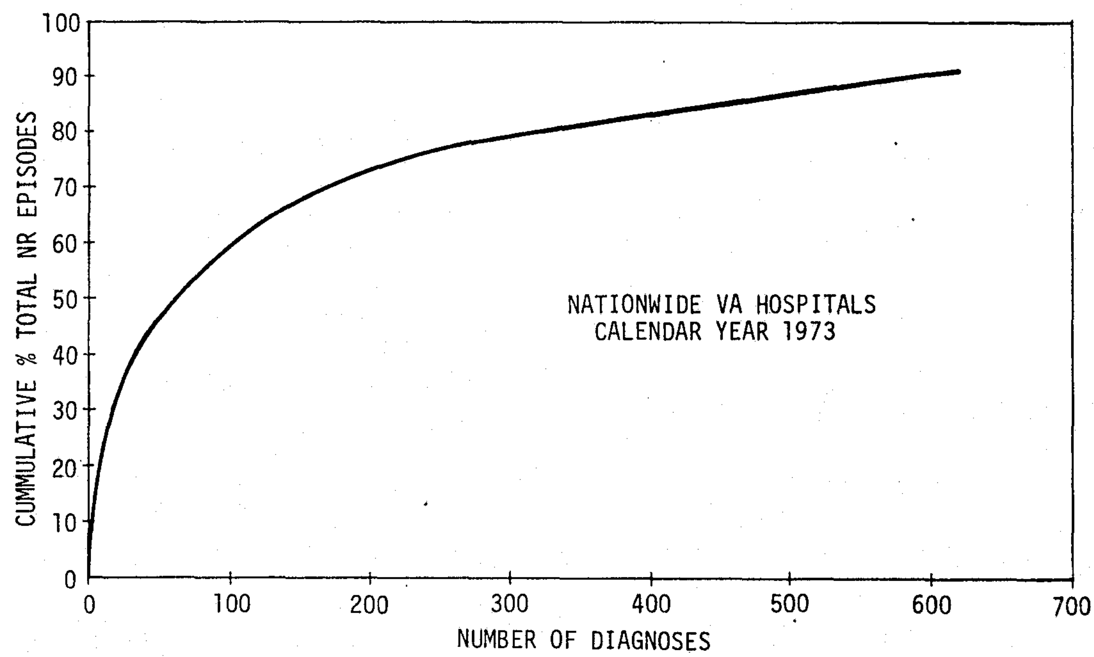



Figure A-5. Percentage of total episodes versus number of diagnoses.

## A.4 The Age-Specific Prevalence of Disease

The objective of this analysis was to explore the nature of, and variation in, observed disease prevalence as a function of principal diagnosis and year of age. The age-specific disease-prevalence characteristic, $\gamma$, was defined as the percentage of observed cases (of a specific PDx) above or below the case load that would be expected if the disease prevalence were equal at all ages. In other words, let $X_{ij}$ equal the number of cases with diagnosis (i) and age (j).

$$\sum_i X_{ij} = A_j$$

$$= \text{the number of cases of age (j) with all diagnoses}$$

$$\sum_j X_{ij} = D_i$$

$$= \text{the number of cases with diagnoses (i) including all ages}$$

$$\sum_{ij} X_{ij} = T$$

$$= \text{total number of cases in the NR population}$$

then

$$\frac{A_j}{T} = \alpha_j$$

$$= \text{proportion of cases of age (j)}$$

hence,

$$\sum_j \frac{A_j}{T} = 1$$

If the prevalence of a diagnosis were equal at each age in the population, the expected number of cases at age (j) with diagnosis (i) would be $\alpha_j D_i$. Thus, the difference between the number of observed cases ($X_{ij}$) and the expected number of cases ($\alpha_j D_i$) is

$$\delta_{ij} = X_{ij} - \alpha_j D_i$$

$$\sum_i \delta_{ij} = A_i - \alpha_j \qquad T = 0$$

$$\sum_j \delta_{ij} = 0$$

Although $\delta_{ij}$ may be computed and observed directly, it exhibits considerable variation among diagnoses. For the convenience of scale in the plotted output of this analysis, this difference ($\alpha_{ij}$) was divided by the expected age and diagnosis-specific case load ($\alpha_j D_i$), and expressed as a percentage above or below that case load. Hence

$$\gamma = \frac{\delta_{ij}}{\alpha_j D_i} \times 100$$

The initial analysis considered the NR record population of the following diagnostic categories (ICDA-8):

303.2 Alcoholic Addiction

571.0 Alcoholic Cirrhosis

162.1 Neoplasm of the Bronchus and Lung

492 Emphysema

412 Chronic Ischemic Heart Disease

550 Inguinal Hernia

304.0 Opiate Addiction

295.3 Paranoid Schizophrenia

295.9 Unspecified Schizophrenia

This age-specific disease-prevalence characteristic, $\gamma$, showed remarkably distinct patterns. The plotted output of these analyses are presented in Figure A-6. Asterisks (*) were used to represent populations of 50 cases or more at a given year of age. Zeros (0) represent less than 50 cases. The total number of cases represented by these ICDA-8 codes is summarized in Table A-1.

Let us explore some attributes of the output information which arose from these analyses. Consider the population with a principal diagnosis of chronic ischemic heart disease. Over the range of 37 years to 89 years, a span of 52 years, it may be approximated by the straight line

$$\gamma = 4.29a - 223$$

where (a) is the year of age.

In the case just described

$$r^2 = 0.97$$

Table A-1. Number of NR episodes for selected diagnoses—National VA Hospitals, 1973.

| ICDA-8 | Diagnosis | Number NR Cases |
|---|---|---|
| 303.2 | Alcoholic Addiction | 42,707 |
| 571.0 | Alcoholic Cirrhosis | 9,134 |
| 162.1 | Neoplasm of the Bronchus and Lung | 10,723 |
| 492 | Emphysema | 10,407 |
| 412 | Chronic Ischemic Heart Disease | 35,488 |
| 550 | Inguinal Hernia | 12,982 |
| 304.0 | Opiate Addiction | 8,474 |
| 295.3 | Paranoid Schizophrenia | 20,056 |
| 295.9 | Unspecified Schizophrenia | 20,786 |

For the same data over the age range of 37 years to 59 years (a span of 22 years), the straight-line model

$$\gamma = 5.22a - 274$$

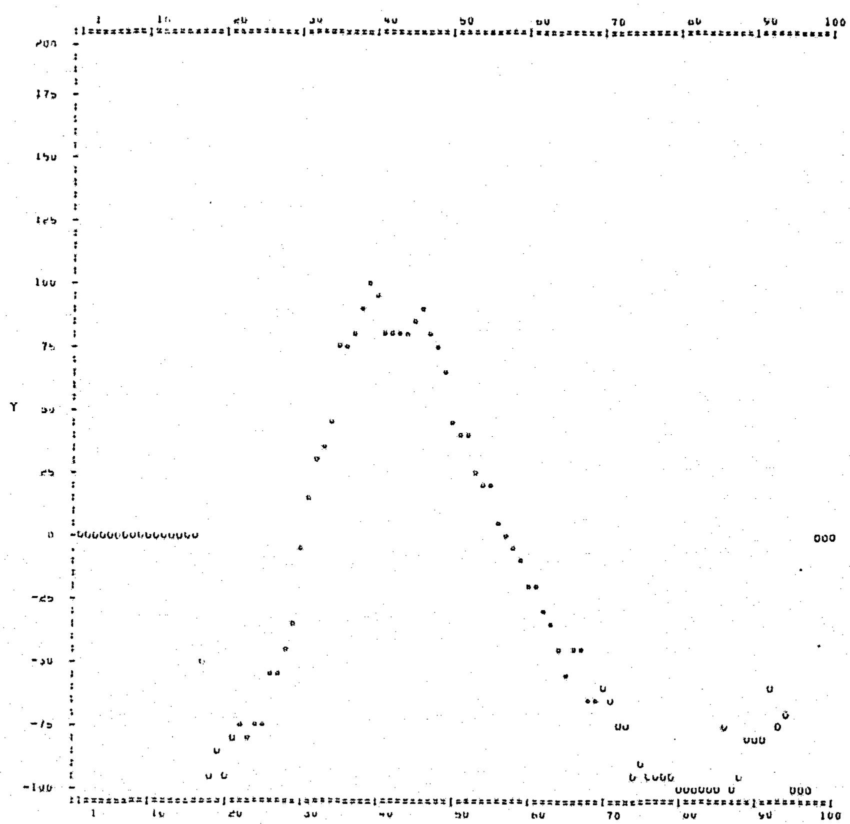
is found to yield

$$r^2 = 0.99$$

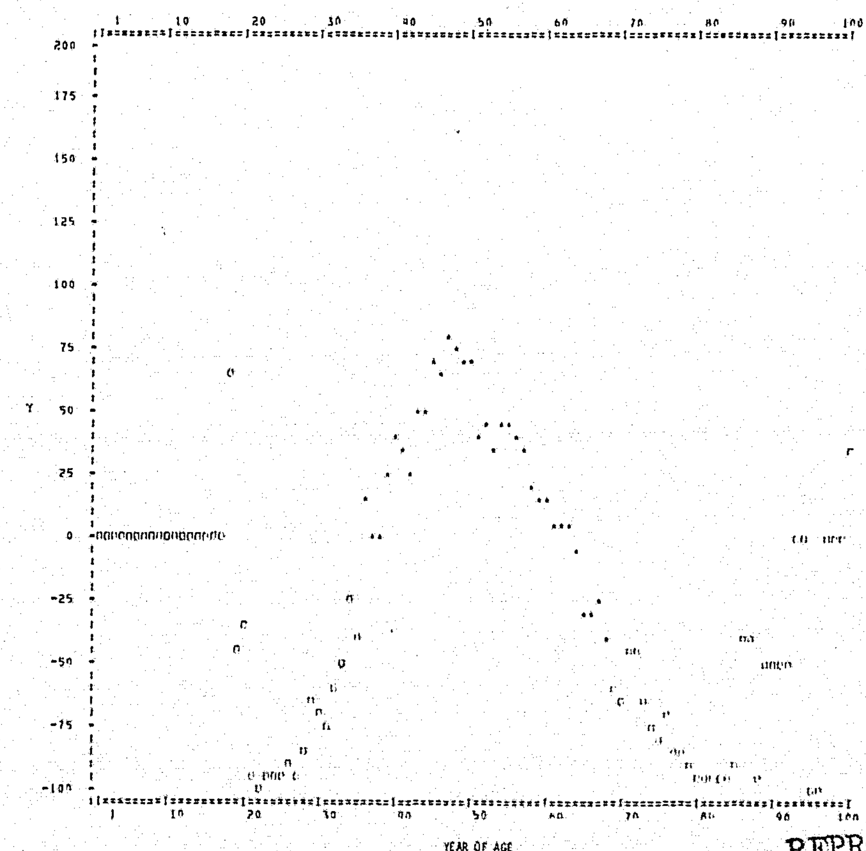
It is obvious by inspection of Figure A-6 that curved-line models could be constructed which would more accurately approximate the observed data than a simple straight line. These simple straight-line models are used here only to characterize basic attributes of the observed data. Linear-model coefficients, and values of ($r^2$), are tabulated in Table A-2 for several of the diagnostic codes that were examined.

While these simple models characterize most of the observed $\gamma$ characteristics, some effects which are clearly distinct from the mainstream may be observed. For example, a significant number of

Dx 303.2 ALCOHOLIC ADDICTION NATIONAL VA 1973 ALL NR CASES



Dx 571.0 ALCOHOLIC CIRRHOSIS NATIONAL VA 1973 ALL NR CASES



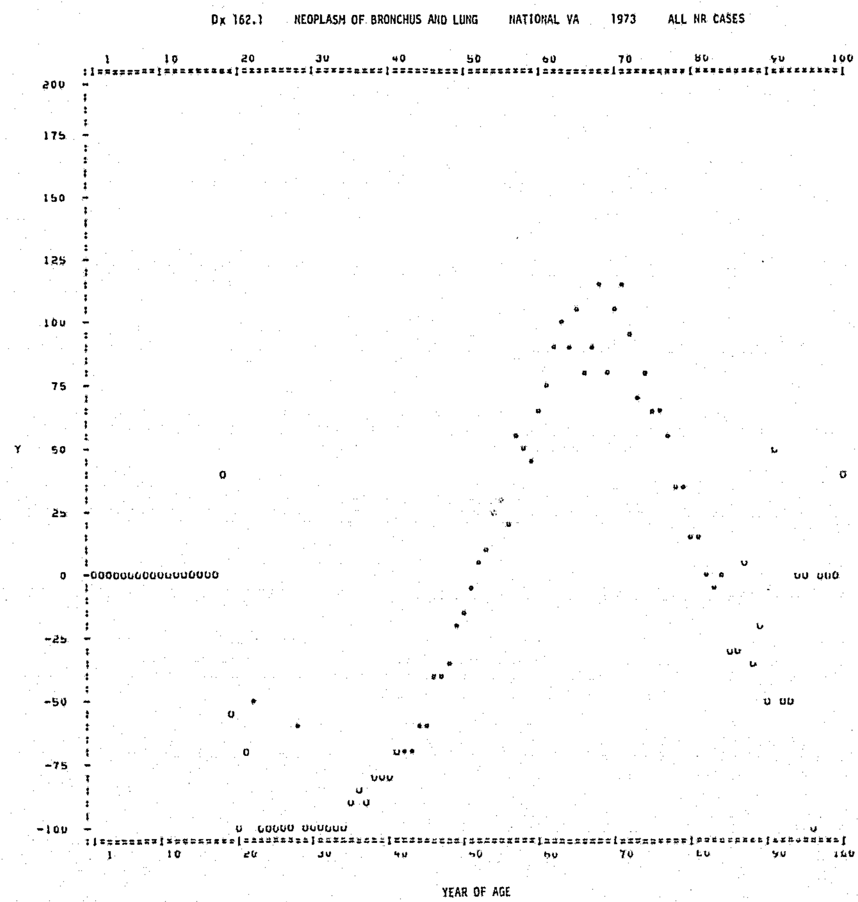
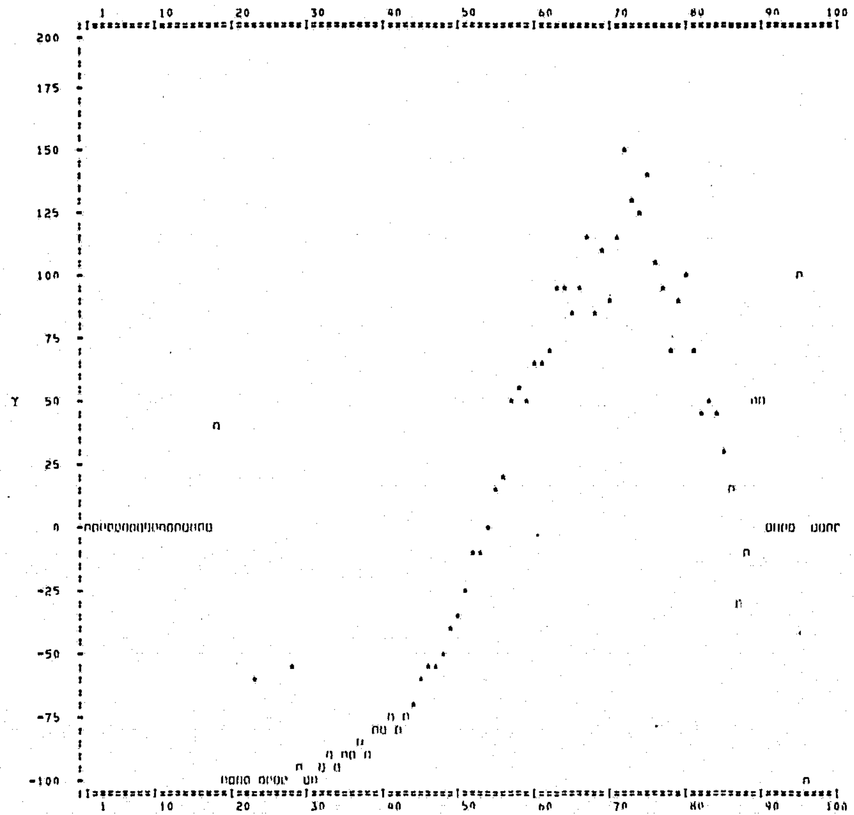
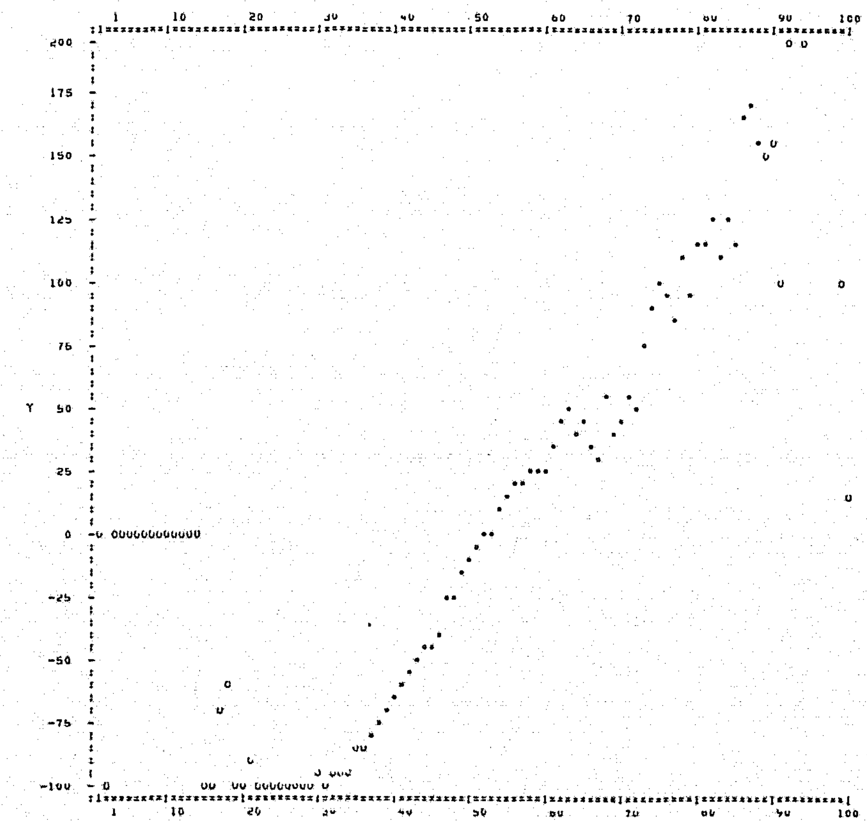



Figure A-6. Age-specific disease prevalence of selected ICDA conditions—all NR cases in VA hospitals, 1973 (1 of 3).

Dx 492 EMPHYSEMA NATIONAL VA 1973 ALL NR CASES




Dx 412 CHRONIC ISCHEMIC HEART DISEASE NATIONAL VA 1973 ALL NR CASES



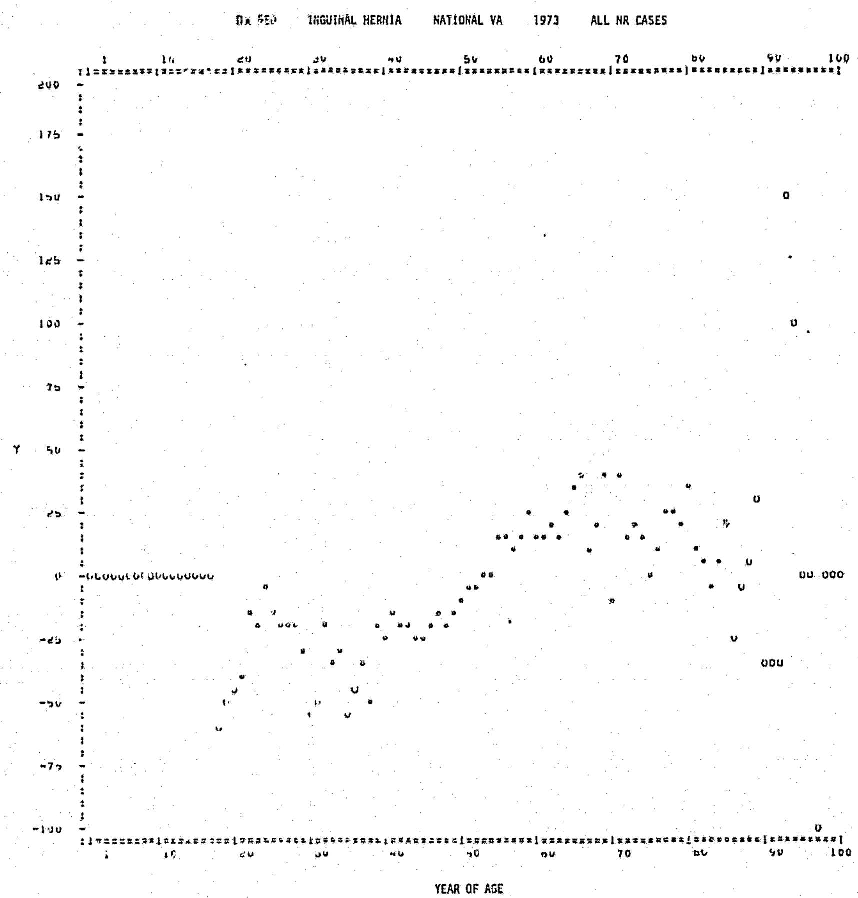
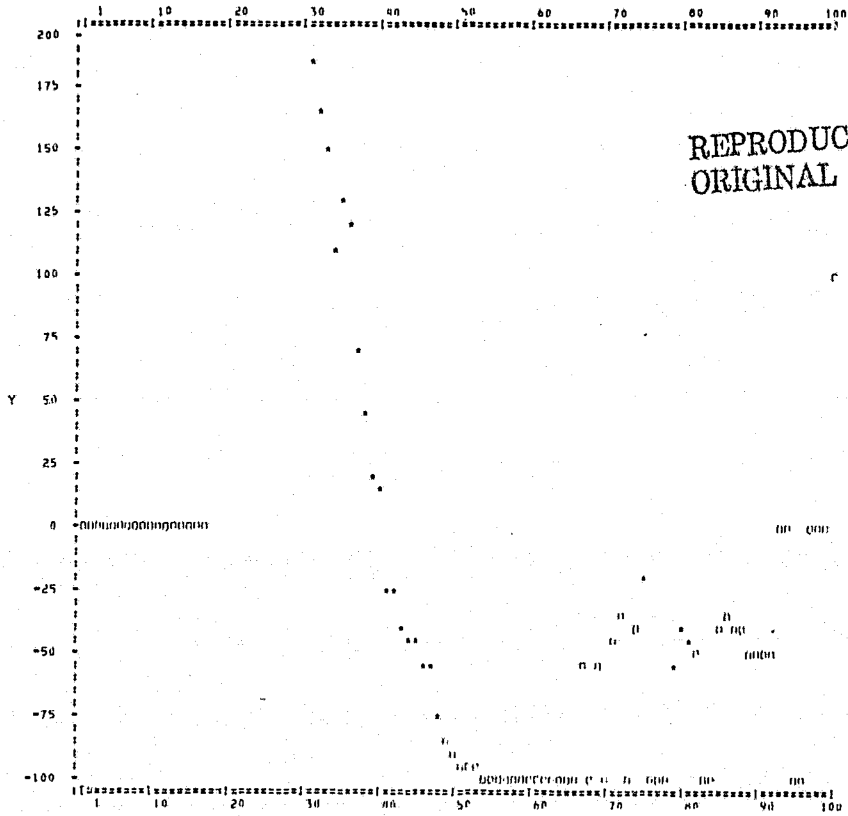


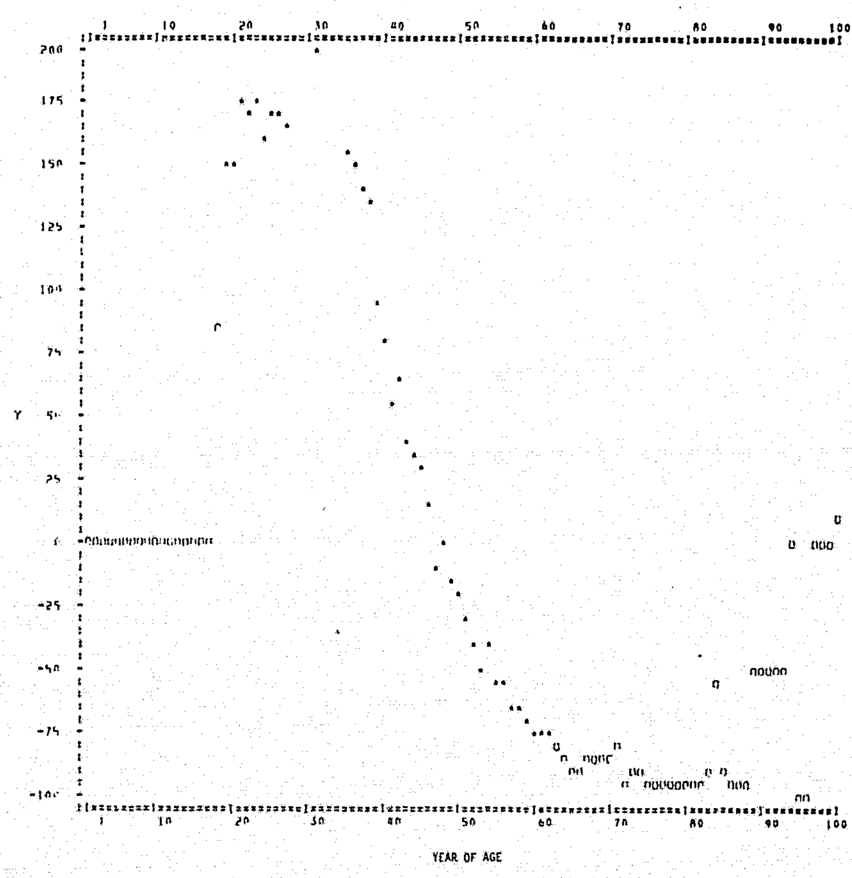

Figure A-6. Age-specific disease prevalence of selected ICDA conditions—all NR cases in VA hospitals, 1973 (2 of 3).

Dx 304.0 OPIATE ADDICTION NATIONAL VA 1973 ALL NR CASES






Dx 295.3 PARANOID SCHIZOPHRENIA NATIONAL VA 1973 ALL NR CASES



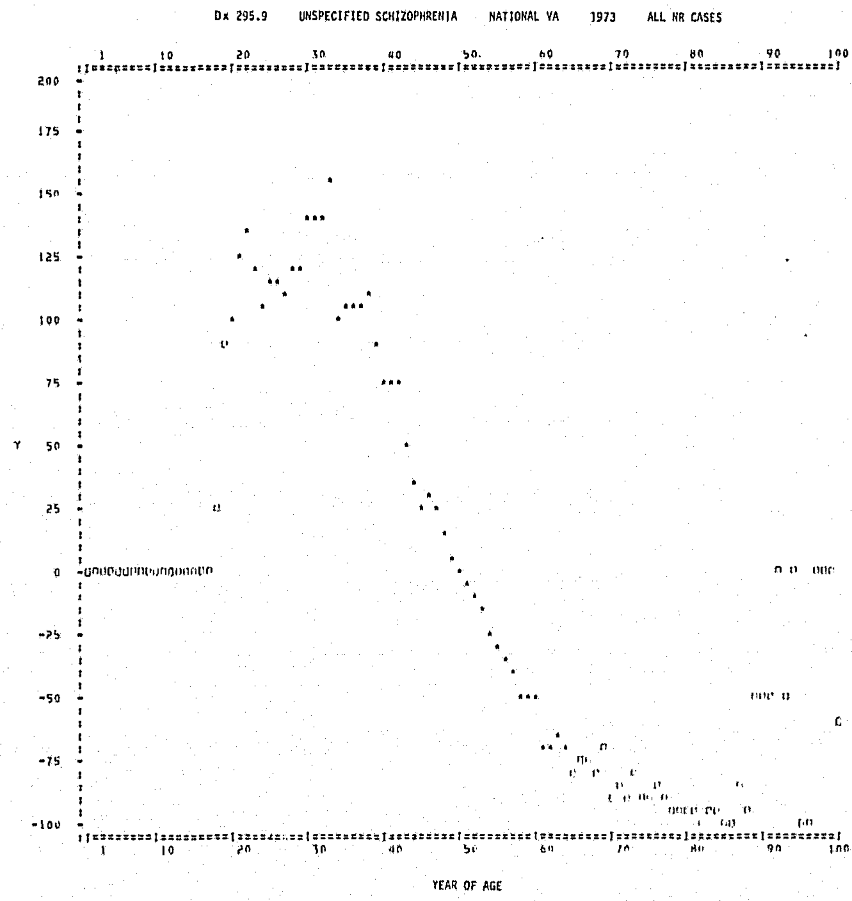



Figure A-6. Age-specific disease prevalence of selected ICDA conditions—all NR cases in VA hospitals, 1973 (3 of 3).

Table A-2. Linear-model parameters associated with observed age-specific disease prevalence.

| ICDA | Condition | Year of Age | | Age Range (years) | Coefficients | | |
|---|---|---|---|---|---|---|---|
| | | Lower | Upper | | m | b | $r^2$ |
| 412 | Chronic Ischemic Heart Disease | 37 | 88 | 52 | 4.29 | -232.8 | 0.97 |
| 162.1 | Neoplasm of Bronchus and Lung | 42<br>70 | 65<br>85 | 24<br>15 | 7.9<br>-8.7 | -410.6<br>719.3 | 0.99<br>0.96 |
| 303.2 | Alcoholic Addiction | 23<br>46 | 39<br>69 | 17<br>24 | 12.6<br>-6.62 | -383.5<br>383.1 | 0.98<br>0.98 |
| 304.0 | Opiate Addiction | 31 | 48 | 18 | -15.97 | 666.7 | 0.95 |
| 295.3 | Paranoid Schizophrenia | 35<br>44 | 60<br>72 | 26<br>29 | -9.40<br>7.44 | 462.1<br>-396.7 | 0.94<br>0.96 |
| 492 | Emphysema | 72 | 85 | 13 | -8.74 | 774.7 | 0.9 |

patients is observed to constitute a cluster of opiate addicts in the 70- to 80-year age range. One may ask of the clinical research community: Where are these people coming from? More generally, are the secondary (or even the mainstream) effects a characteristic of the disease, or a characteristic of the aging population? Before progressing to the dynamics of these effects, however, we may consider a few more attributes of the 1-year observations.

If one is surprised by the specificity of the patterns observed in Figure A-6, perhaps it is because of the innumerable variables not accounted for in the observed population. One might anticipate, for example, that the presence or absence of hypertension would significantly effect the $\gamma$ characteristic associated with ischemic heart disease. Or that the presence of multiple and related disease, in general, might have a significant effect on this population characteristic.

Thus, the population of alcoholic addiction cases was separated into categories of sole and multiple diagnoses, and the difference in the $\gamma$ characteristic examined (Figure A-7). A higher peak value of $\gamma$

is observed in the case of sole diagnosis, and although the slopes of both ascending and descending linear models are larger than in the case of multiple diagnoses, the age spread at $\gamma = 0$ is slightly larger (31.6 versus 29.9 years). Onset of $\gamma > 0$ occurs earlier for sole diagnosis cases (age 28.3 versus age 32).

For another condition, neoplasm of the bronchus and lung, the results of separating sole and multiple diagnoses is shown in Figure A-8. Here, a higher peak value of $\gamma$ is observed for multiple diagnoses, the slopes of the linear models are slightly larger in the case of multiple diagnoses, and the age spread at $\gamma = 0$ is larger for multiple diagnoses (30.7 versus 26 years). Onset of $\gamma > 0$ occurs earlier for multiple diagnoses (age 52.1 versus age 53.5).

A table summarizing some parameters of the sole- and multiple-diagnoses models of alcoholism and lung cancer is provided in Table A-3.

We noted earlier that a group of opiate addicts, around age 75, were observed to be clearly separated from the mainstream case-load effect. We noted (from Figure A-7) that a similar effect is observed between ages 80 and 90 with alcoholism as a sole diagnosis, and less pronounced (lower values of $\gamma$) with alcoholism as a multiple diagnosis. A more spectacular observation, in neoplastic disease of the lung (Figure A-8), is the distinct cluster of cases—apart from the mainstream feature—at ages 20 to 30 years. And that the occurrence of these cases is most frequently associated with a sole diagnosis.

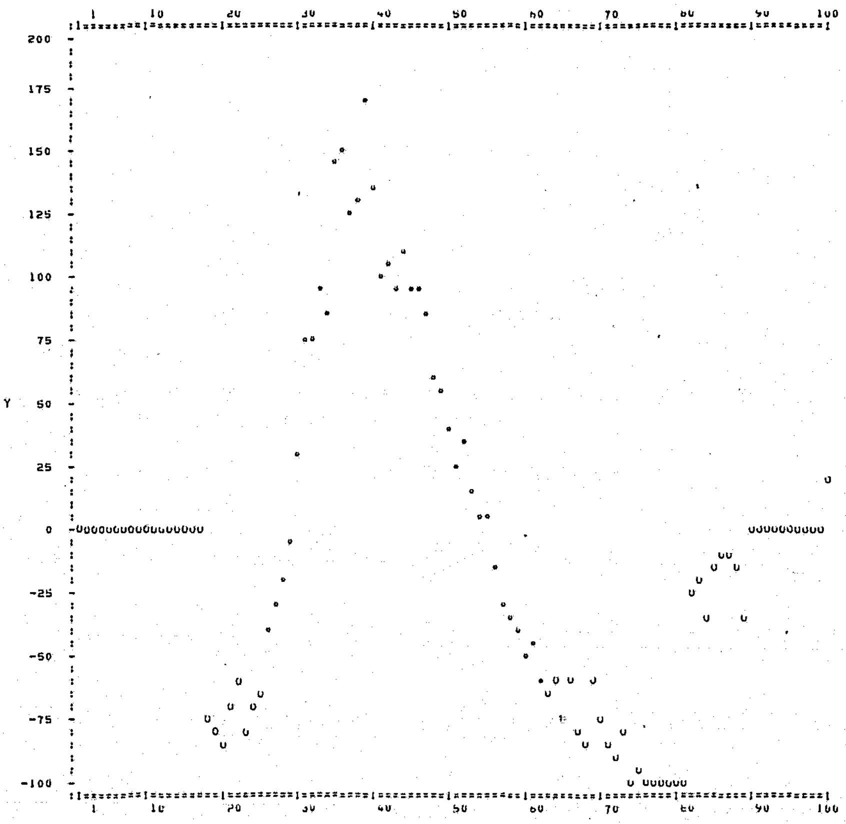
Have these people been at high-environmental risk (in the asbestos mines or downwind from petrochemical plants)? Have they been smoking tobacco for only a few years and acquired the disease—or found something to smoke with a more carcinogenic effect than tobacco? These are, of course, questions to be answered by the clinical research community.

Another diagnosis, chronic ischemic heart disease (CIHD), was analyzed to observe:

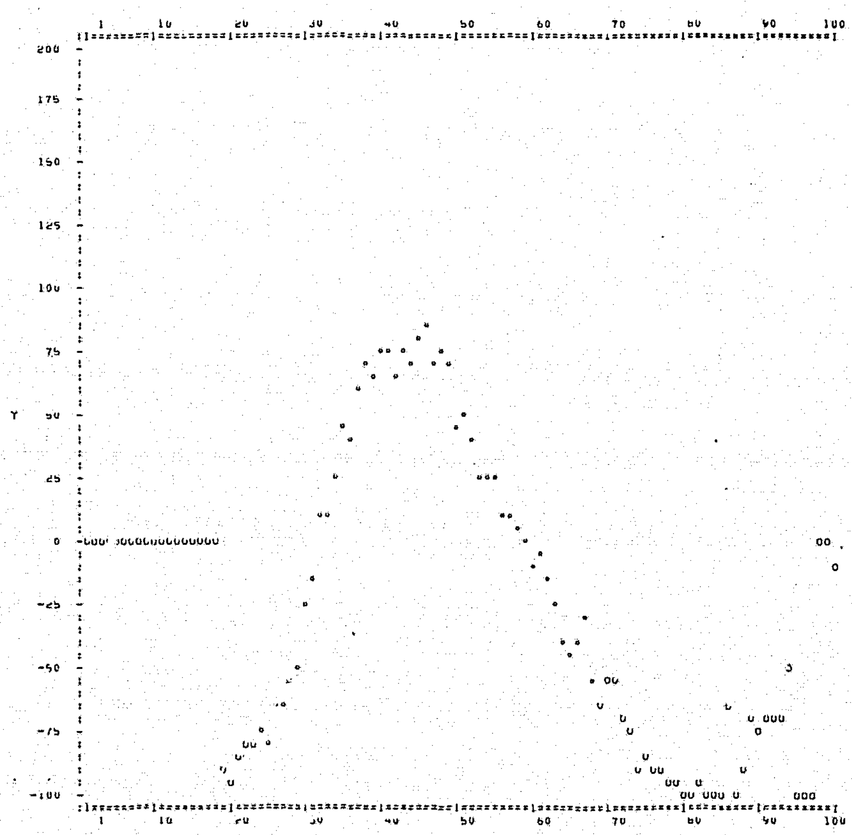
(1) The change in $\gamma$ characteristic related to the presence or absence of an associated disease entity (hypertension).

(2) The effect, in each case, of considering sole versus multiple diagnoses.

Dx 303.2 ALCOHOLIC ADDICTION NATIONAL VA 1973 SOLE DIAGNOSIS




Dx 303.2 ALCOHOLIC ADDICTION NATIONAL VA 1973 MULTIPLE DIAGNOSES



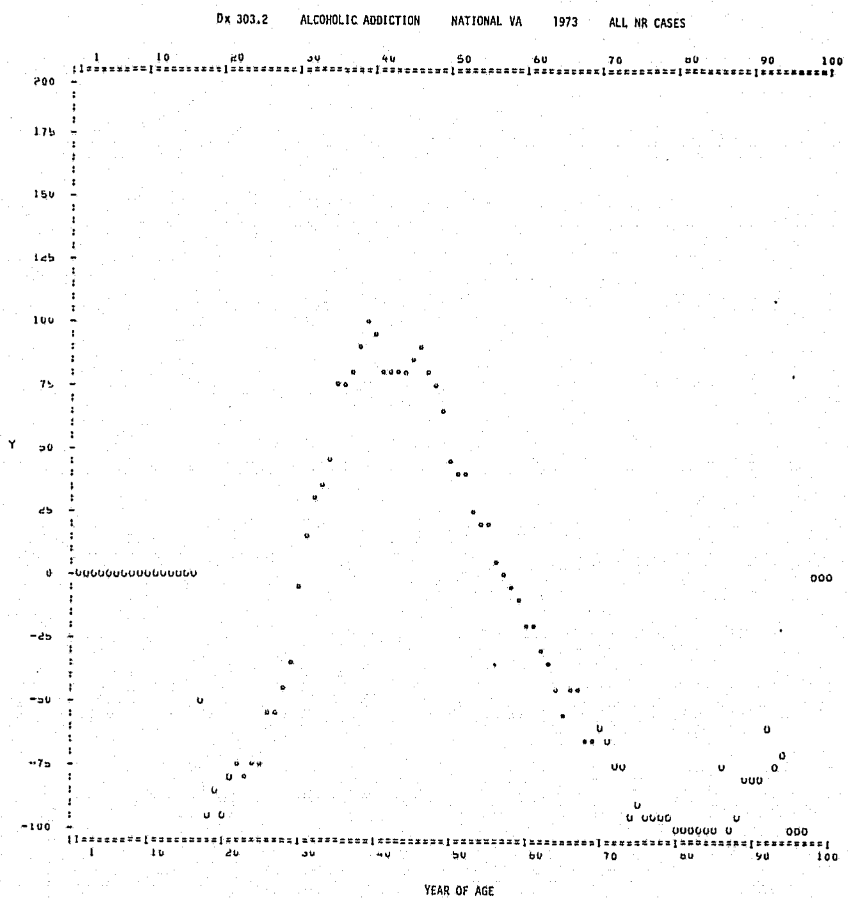
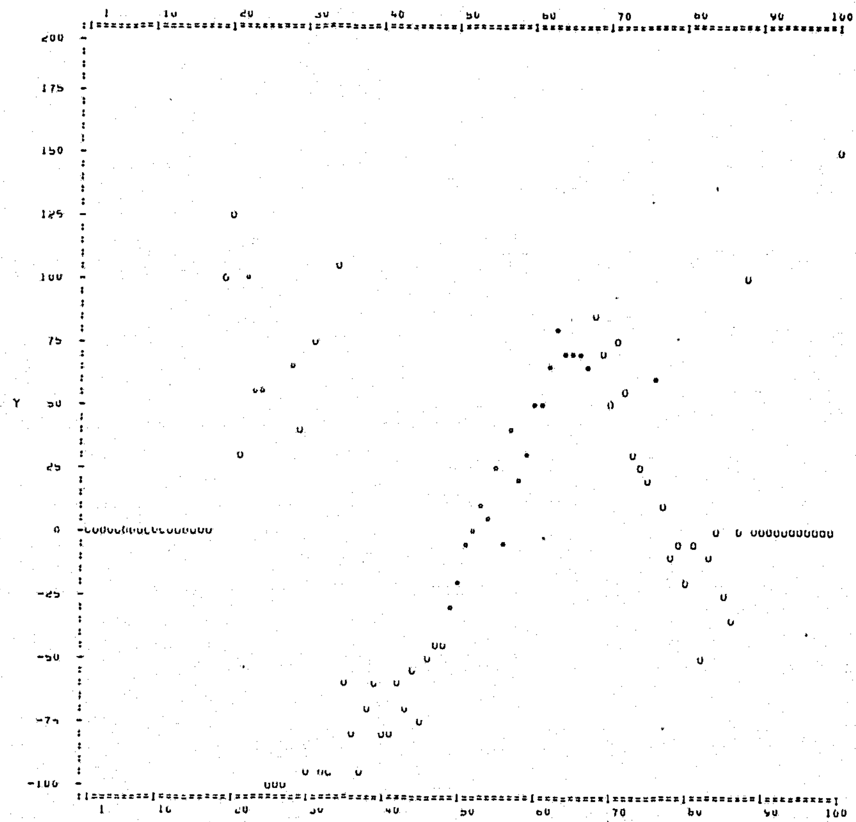
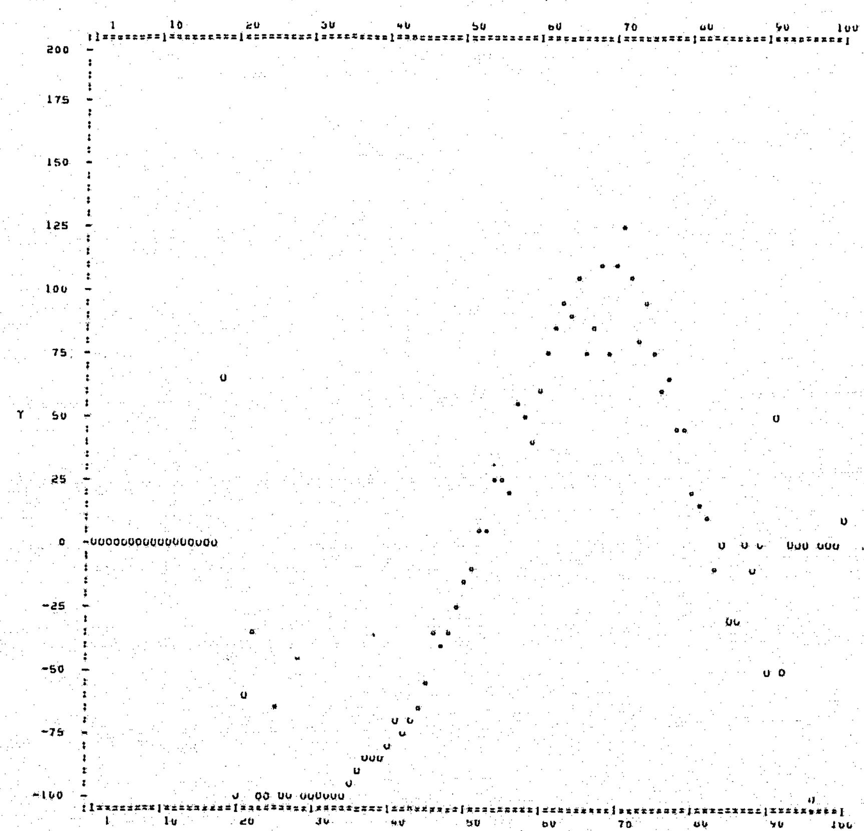



Figure A-7. γ characteristics for alcoholic addiction—sole versus multiple versus total.

Dx 162.1 NEOPLASM OF THE BRONCHUS AND LUNG NATIONAL VA 1973 SOLE DIAGNOSIS



Dx 162.1 NEOPLASM OF THE BRONCHUS AND LUNG NATIONAL VA 1973 MULTIPLE DIAGNOSES



YEAR OF AGE

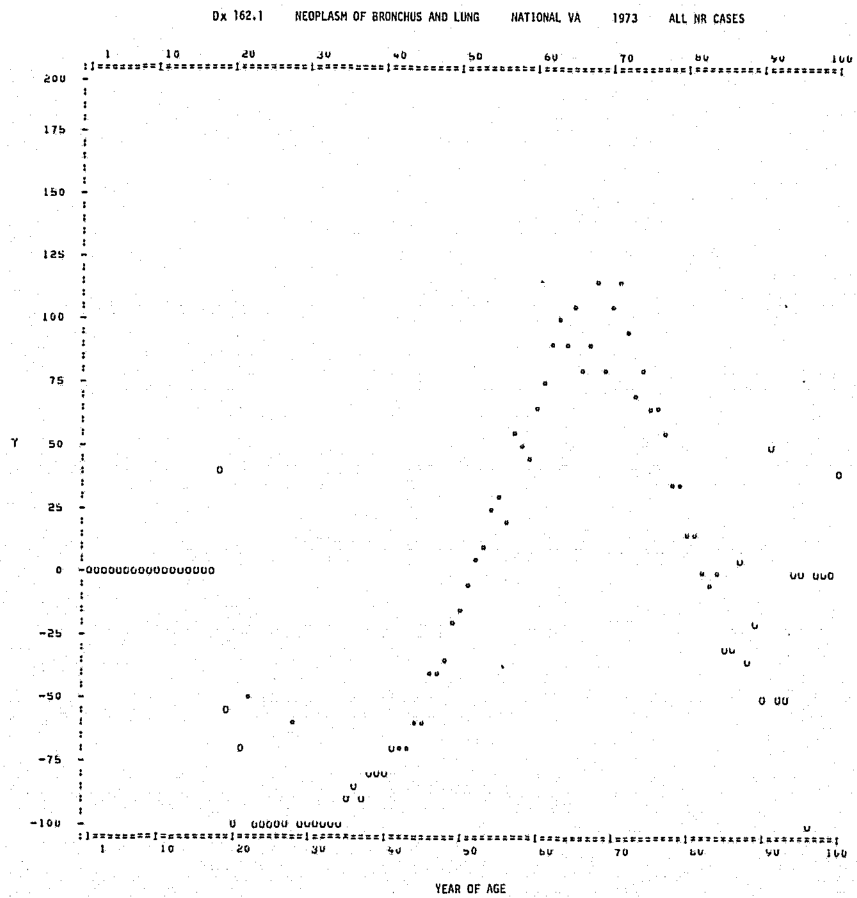



Figure A-8. γ characteristics for neoplasm of bronchus and lung—sole versus multiple versus total.

Table A-3. Linear-model parameters associated with the specified conditions.

| | | Sole Dx | Multiple Dx | S→M Trend |
|---|---|---|---|---|
| Alcoholic Addiction | Ascending m | 16.5 | 10.7 | ↓ |
| | b | -467.6 | -343.3 | ↑ |
| | $r^2$ | 0.96 | 0.97 | ↑ |
| | Age at $\gamma_0$ | 28.3 | 32 | ↑ |
| | Descending m | -9.2 | -6.1 | ↑ |
| | b | 501.7 | 357.4 | ↓ |
| | $r^2$ | 0.97 | 0.97 | — |
| | Age at $\gamma_0$ | 54.9 | 58.9 | ↑ |
| | Age Spread at $\gamma_0$ | 31.6 | 29.9 | ↓ |
| Neoplasm of Bronchus and Lung | Ascending m | 6.1 | 6.9 | ↑ |
| | b | -323.9 | -358.7 | ↓ |
| | $r^2$ | 0.94 | 0.95 | ↑ |
| | Age at $\gamma_0$ | 53.5 | 52.1 | ↓ |
| | Descending m | -6.1 | -9.5 | ↓ |
| | b | 486.6 | 793.7 | ↑ |
| | $r^2$ | 0.71 | 0.97 | ↑ |
| | Age at $\gamma_0$ | 79.5 | 82.8 | ↑ |
| | Age Spread at $\gamma_0$ | 26 | 30.7 | ↑ |

Figure A-9 shows the $\gamma$ characteristics of these CIHD populations. Table A-4 summarizes the parameters associated with straight-line models of these characteristics. A poor fit of the linear model to the data is observed in the case of CIHD occurring, without hypertension, as a sole diagnosis. This is also the smallest population of CIHD cases.

Table A-4. Linear-model parameters for observed age-specific prevalence of chronic ischemic heart disease (CIHD).

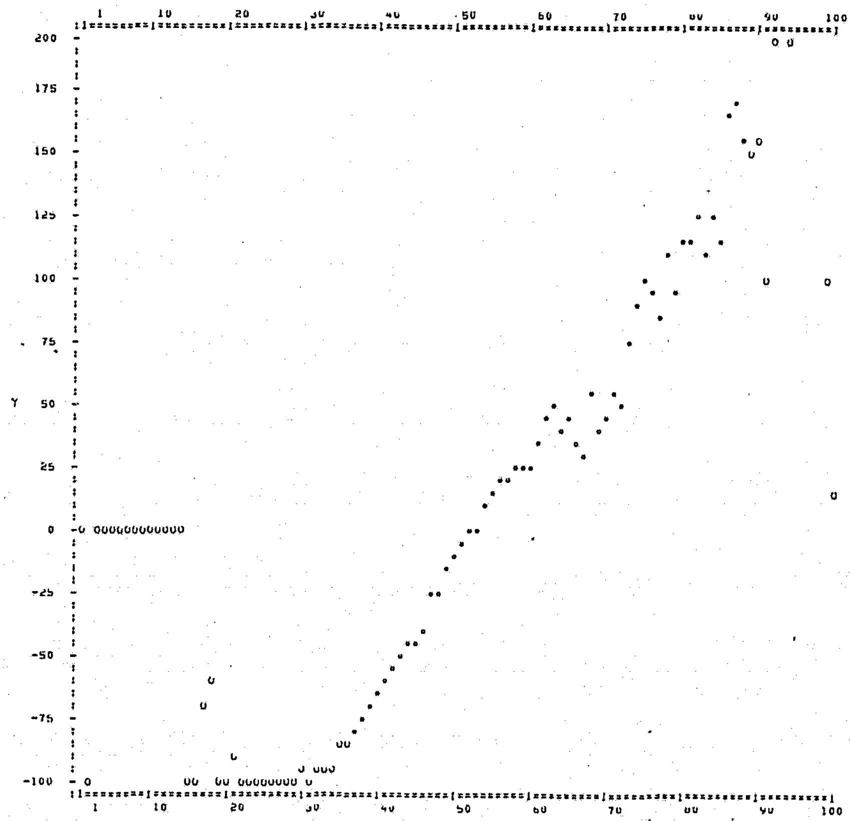
| | Dx 412 with Hypertension | | | Dx 412.9 without Hypertension | | |
|---|---|---|---|---|---|---|
| | Total | Sole Dx | Principal | Total | Sole Dx | Principal |
| Ascending m | 5.22 | 3.37 | 5.32 | 4.65 | 5.74 | 5.38 |
| b | -267.3 | -184.7 | -275.2 | -253.3 | -264.3 | -295.5 |
| $r^2$ | 0.97 | 0.71 | 0.97 | 0.97 | 0.92 | 0.97 |
| Age at $\gamma_0$ | 51.2 | 54.8 | 51.48 | 54.4 | 46.1 | 54.9 |
| Age range | 35-65 | 36-60 | 35-65 | 35-85 | 30-55 | 39-85 |
| Descending m | -0.22 | -1.98 | -0.27 | | -0.90 | |
| b | 63 | 121.7 | 71.9 | | 67.9 | |
| $r^2$ | 0.004 | 0.39 | 0.005 | | 0.12 | |
| Age at $\gamma_0$ | 289 | 61.6 | 266 | | 75 | |
| Age range | 66-85 | 61-85 | 66-85 | | 56-85 | |

A poor fit is observed uniformly after age 65 in CIHD without hypertension. In this regime, the $\gamma$ characteristic tends to level, and to acquire a high-frequency component of greater amplitude than is observed in earlier years. A similar phenomenon is observed in CIHD with hypertension as a sole diagnosis. Probably, the paucity of cases in which CIHD occurs as a sole diagnosis (with or without hypertension) accounts for the increased high-frequency component (i.e., noise) after age 65. The fact that CIHD has a less grave prognosis when hypertension is not present (or is controlled) probably accounts for the leveling-off in the $\gamma$ characteristic of that population. Again, it is obvious by the inspection of Table A-4 that a straight-line model is not the equation of choice for a close fit to the observed data. A two-term exponential of the form

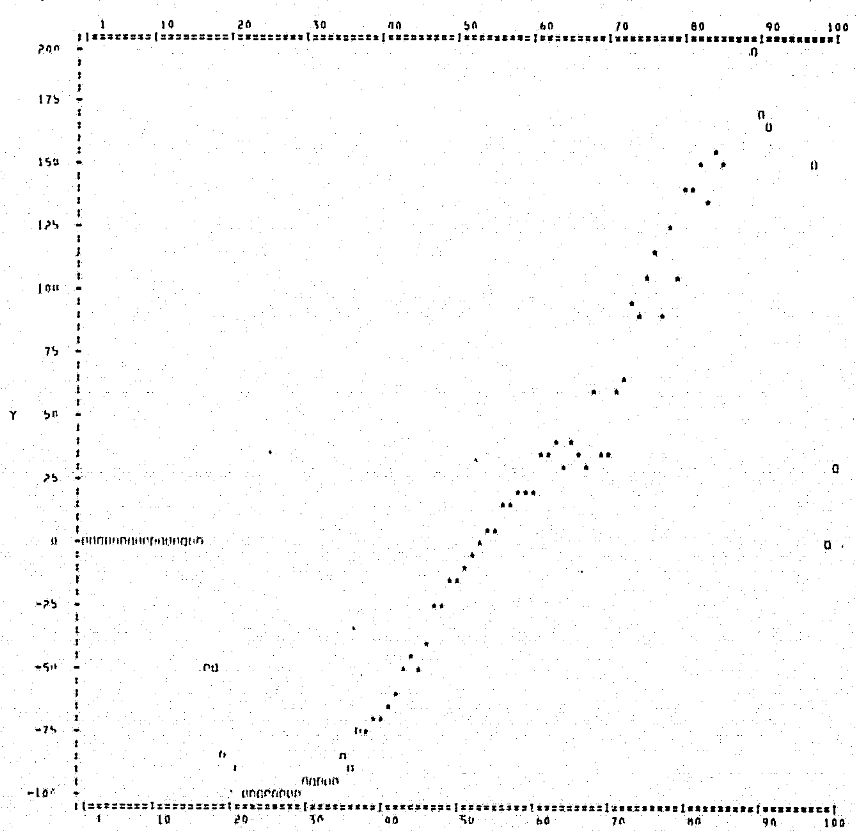
$$\gamma = b_1 e^{-b_2(a-b_3)^2} + b_4 e^{-b_5(a-b_6)^2}$$

plus a periodic noise component, perhaps dampened as a function of

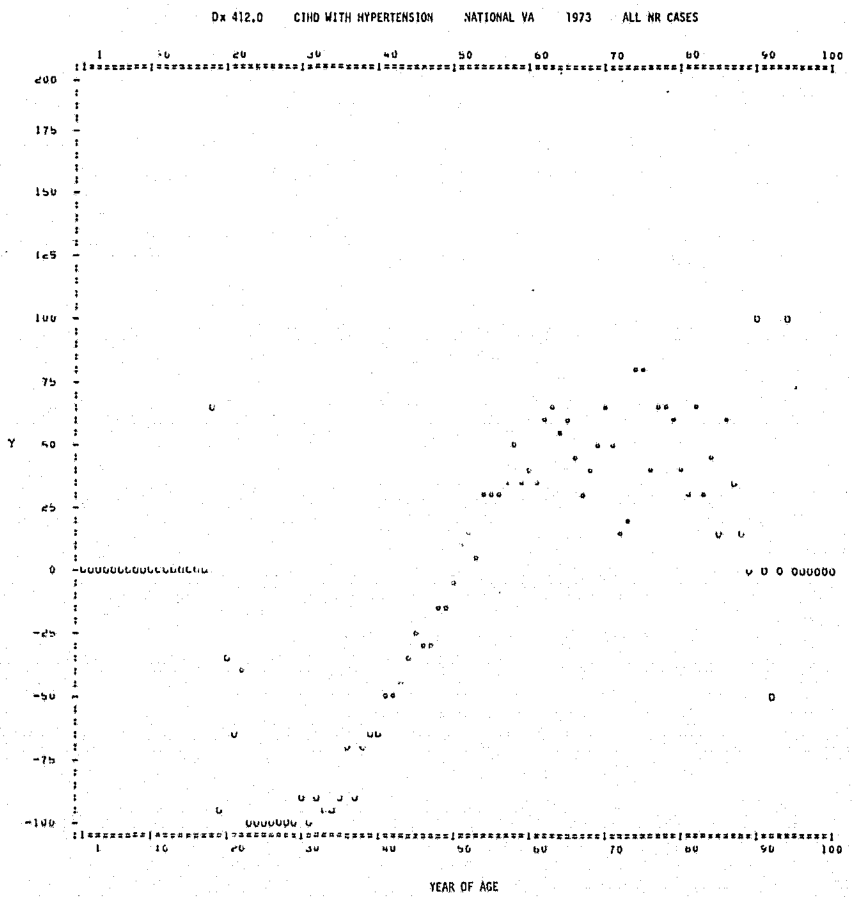
Dx 412    CHRONIC ISCHEMIC HEART DISEASE    NATIONAL VA    1973    ALL NR CASES



Dx 412.9    CIHD WITHOUT HYPERTENSION    NATIONAL VA    1973    ALL NR CASES



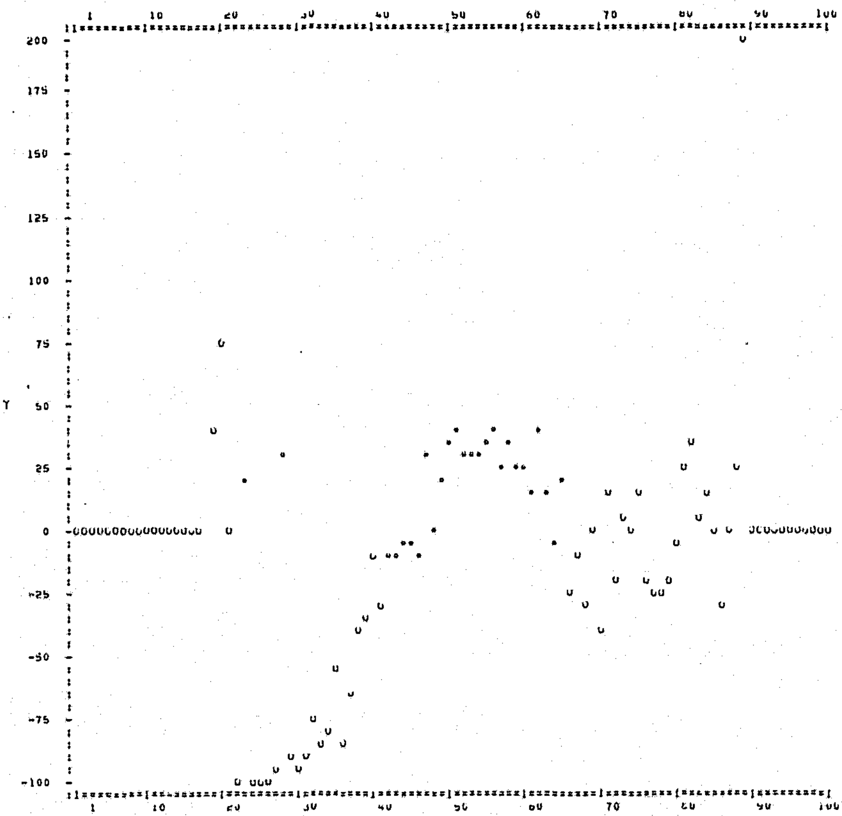
YEAR OF AGE



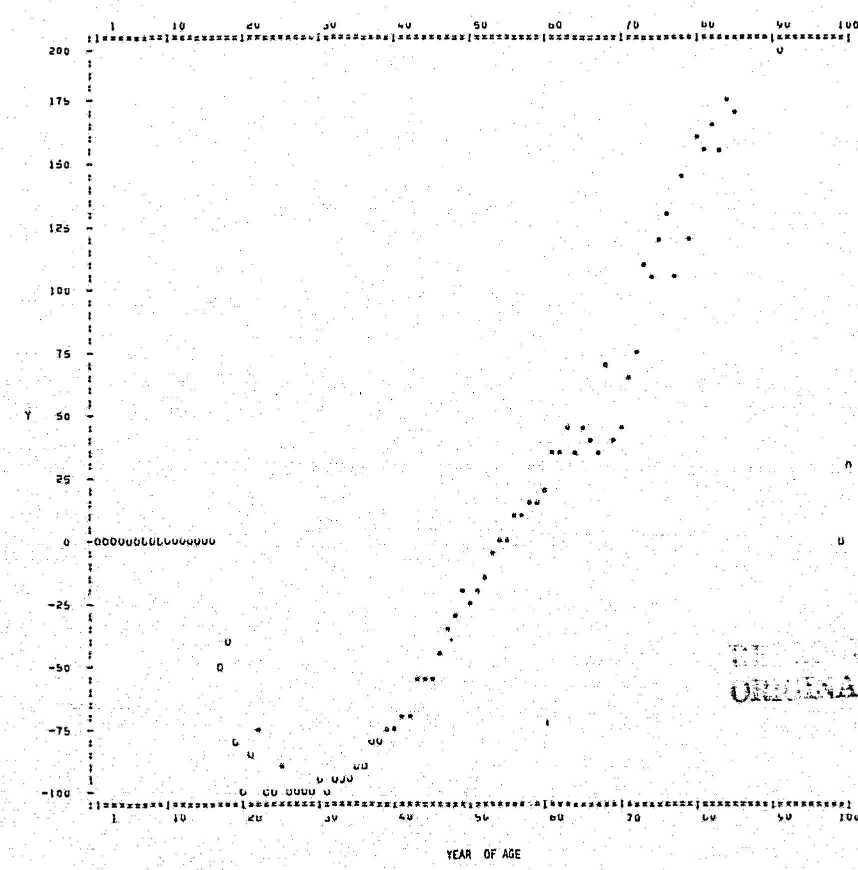

(a) CIHD versus CIHD without hypertension versus CIHD with hypertension.

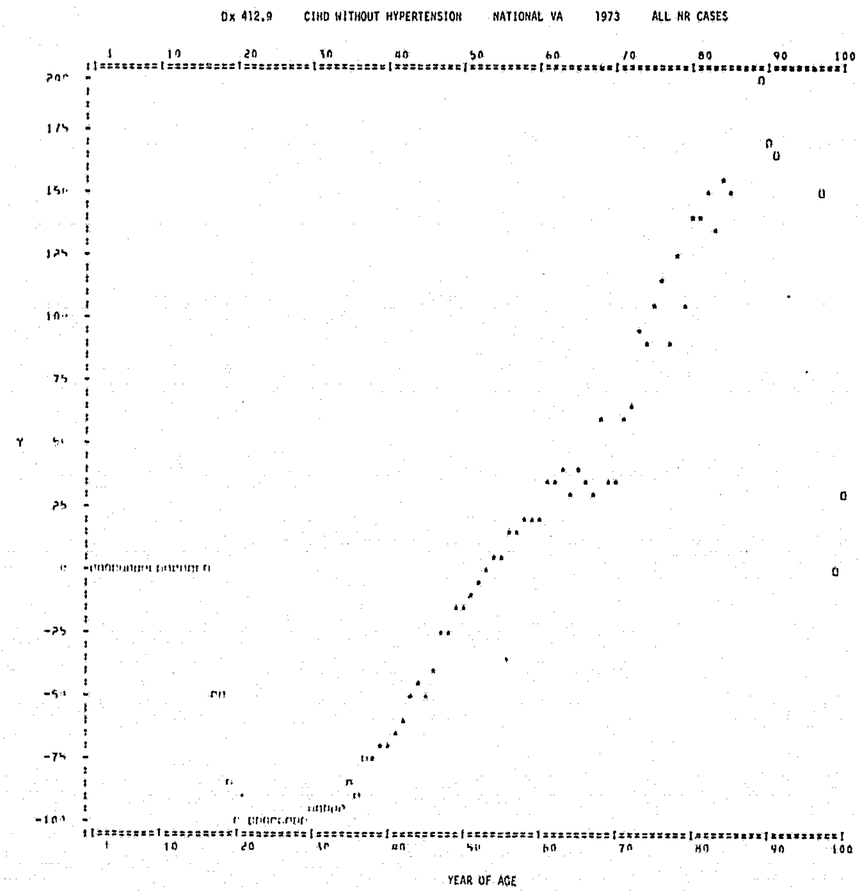
Figure A-9. γ characteristics of chronic ischemic heart disease (CIHD) (1 of 3).

Dx 412.9 CIHD WITHOUT HYPERTENSION NATIONAL VA 1973 SOLE DIAGNOSIS




Dx 412.9 CIHD WITHOUT HYPERTENSION NATIONAL VA 1973 MULTIPLE DIAGNOSES

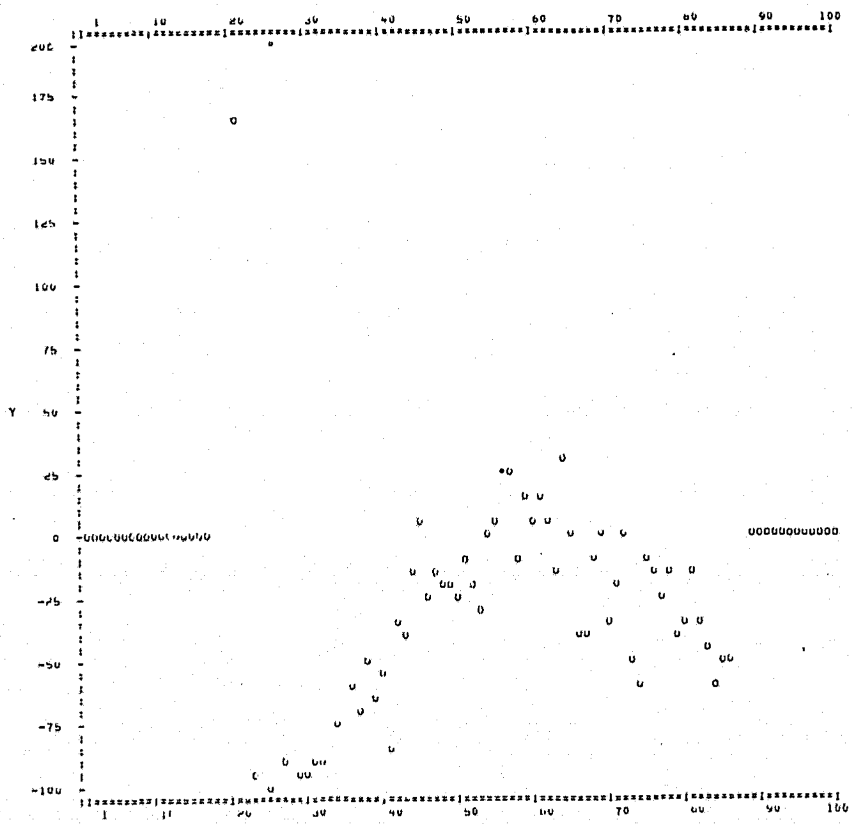




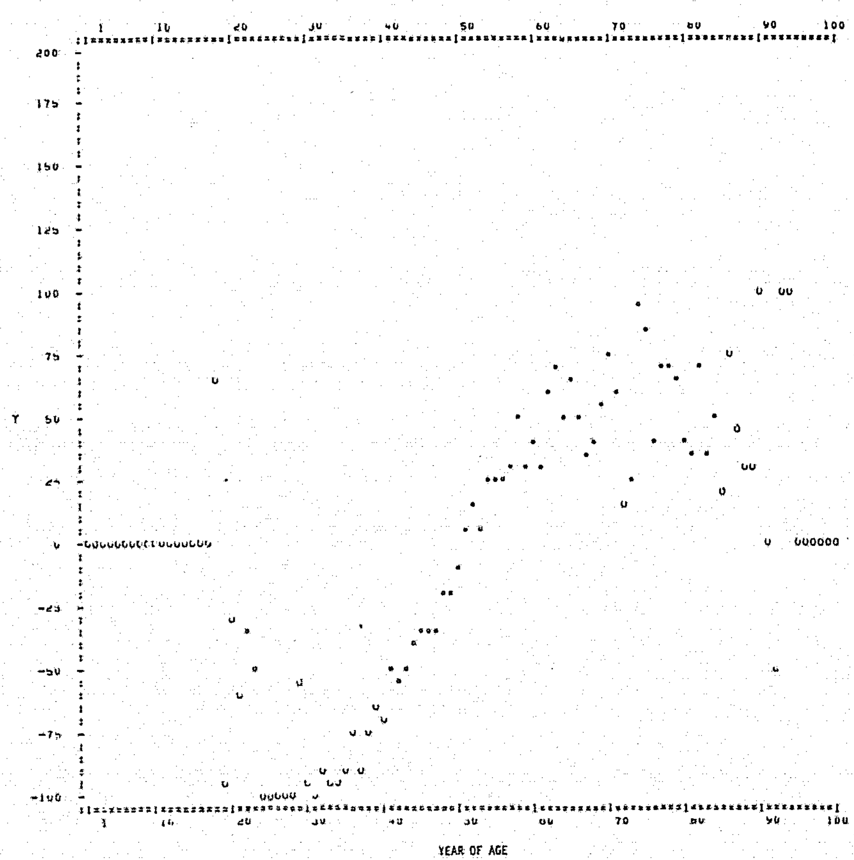

(b) CIHD without hypertension—sole versus multiple versus total.

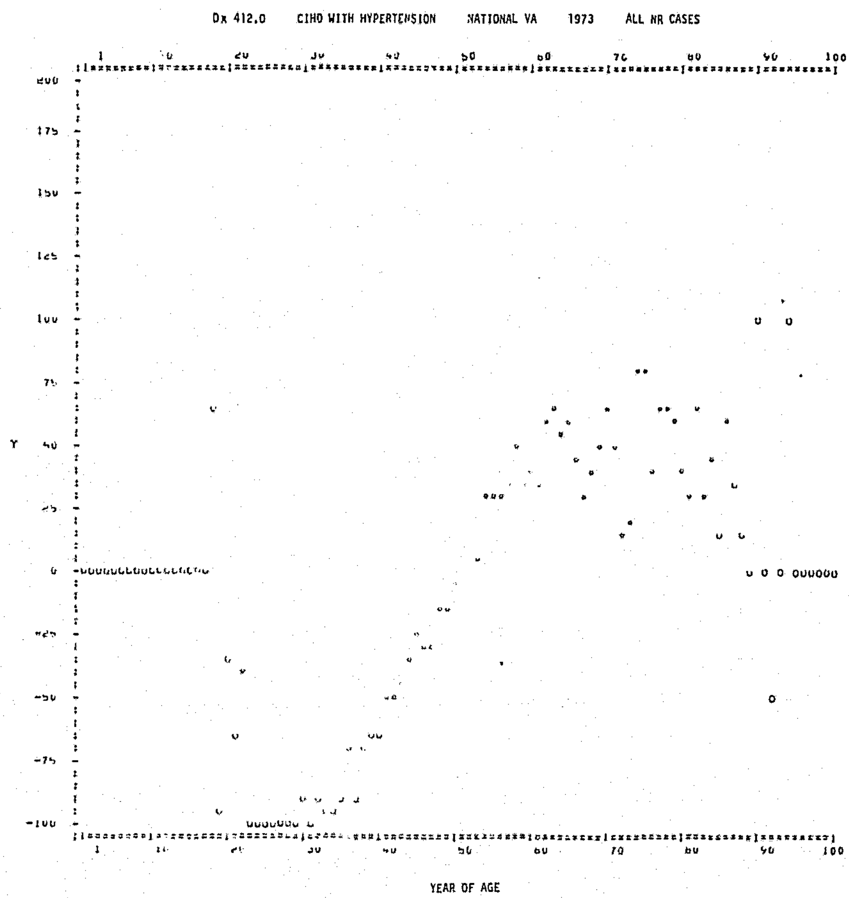
Figure A-9. γ characteristics of chronic ischemic heart disease (CIHD) (2 of 3).

Dx 412.0 CIHD WITH HYPERTENSION NATIONAL VA 1973 SOLE DIAGNOSIS



Dx 412.0 CIHD WITH HYPERTENSION NATIONAL VA 1973 MULTIPLE DIAGNOSES






(c) CIHD with hypertension—sole versus multiple versus total.

Figure A-9. γ characteristics of chronic ischemic heart disease (CIHD) (3 of 3).

C-2

number of cases by year of age, comes immediately to mind. The fact remains that even without mathematical subtleties, which might yield improved correlation coefficients, specific and readily discernable patterns are observed in this data.

Another attribute of the $\gamma$ characteristic which was explored is the change, for cases representing a particular disease entity, which occurs as one progresses from the nationwide VA inpatient episode data, to the level of a VA health-care district, and finally to a single institution. Such a progression is shown in Figures A-10 and A-11 for alcoholic addiction and the CIHD-with-hypertension populations, respectively. The linear-model coefficients for this data are summarized in Table A-5. At least in these two cases, $r^2$ decreases from the national population through the district level to the institutional population. This is probably the effect of the decreasing number of cases

Table A-5. Parameters of regional disease-prevalence models.

| | National | District I | BVAH |
|---|---|---|---|
| Dx 303.2 Alcoholic Addiction | | | |
| Ascending m | 12.6 | 8.54 | 6.05 |
| b | -383.5 | -276.1 | -191.3 |
| $r^2$ | 0.98 | 0.71 | 0.25 |
| Age at $\gamma_0$ | 30.4 | 32.3 | 31.6 |
| Descending m | -6.62 | -6.30 | -4.63 |
| b | 383.1 | 367.3 | 246.8 |
| $r^2$ | 0.98 | 0.90 | 0.64 |
| Age at $\gamma_0$ | 57.9 | 58.3 | 53.3 |
| Dx 412.9 Chronic Ischemic Heart Disease without Hypertension | | | |
| m | 4.65 | 4.21 | 3.50 |
| b | -253.3 | -234.0 | -196.5 |
| $r^2$ | 0.97 | 0.75 | 0.48 |
| Age at $\gamma_0$ | 54.4 | 55.6 | 56.1 |

available for consideration. Although the slope of the linear model varies considerably with this geographical dimension, the age corresponding to $\gamma = 0$ remains rather constant. A model more accurately replicating the observed data would improve the confidence in such statements.

To summarize the findings of this study:

(1) Distinct patterns of the age-specific disease-prevalence characteristic, $\gamma$, are observed in the nationwide VA population of cases.

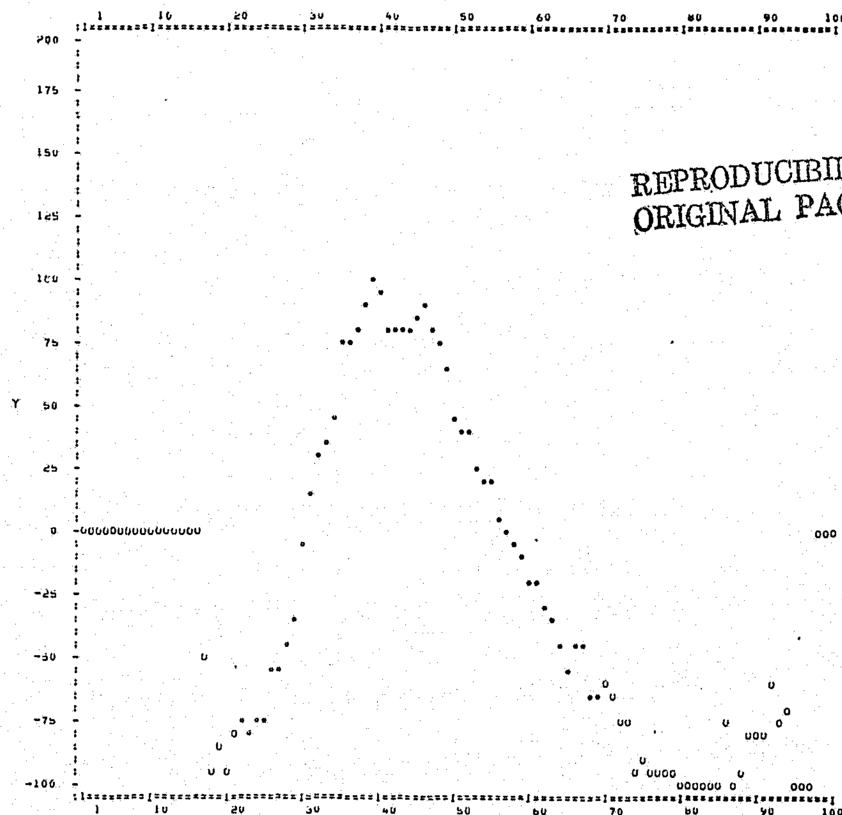
(2) For a given disease or condition, multiple patterns in the $\gamma$ characteristic may be discernable in a population.

(3) Similar disease-specific characteristics may be observed at the national, district, and institutional levels.

## A.5 The Age-Specific Length of Stay (LOS)

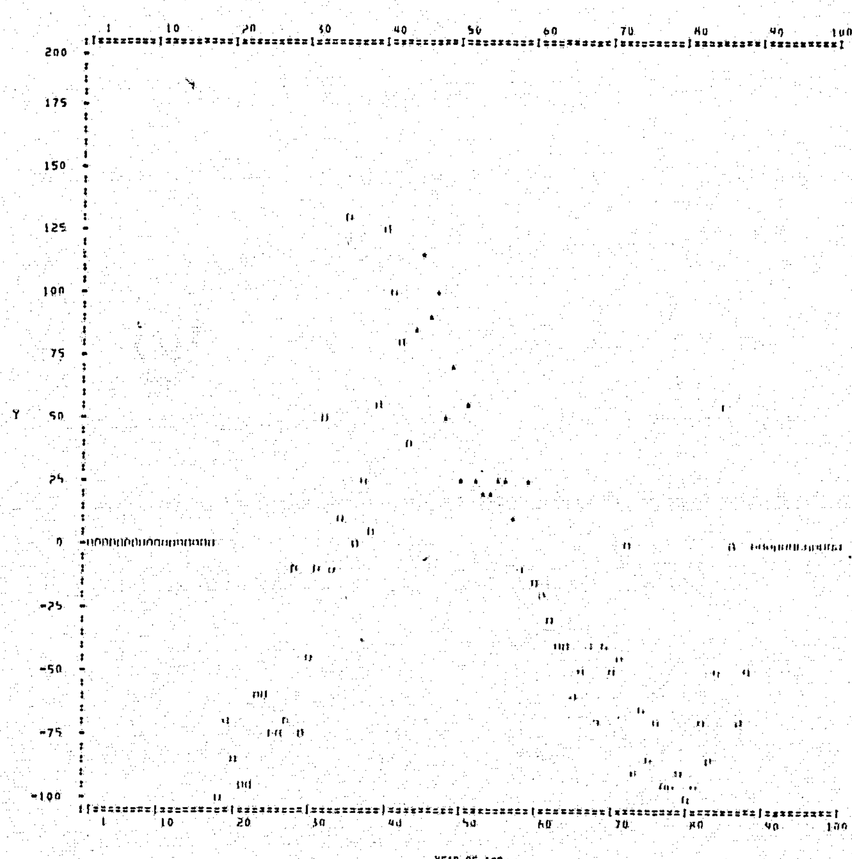
The same record populations used for analysis of disease prevalence were analyzed with respect to LOS. The results of these analyses (mean LOS by year of age for each condition) are provided in Figure A-12. The zero (0) character was used to indicate the mean LOS, and the (+) character was used to indicate the mode (most frequently occuring values of LOS). Since the LOS value 101 (days) represents all cases with LOS > 100 days, it is frequently larger than the actual mode of the distribution—especially when the distribution is fairly flat. Future analyses of this type should have a more extended LOS scale, or should recognize modes as occuring under 100 days. The true modes do lie generally below the mean. This indicates that the LOS distribution of all cases for a given year of age is skewed toward a longer stay than would be anticipated from a normal distribution around the mean. In many cases, increasing year-to-year fluctuation in mean LOS is found after about age 70. Shorter stays at advanced ages may be associated with death in the institution—a question that could not be resolved since the data base did not include life-death outcome by case. The parameters of linear models of the mean LOS observations are tabulated in Table A-6. Since the slope of these models is near zero, the coefficient $r^2$ is not a very useful indication of goodness of fit. The standard deviation(s) is therefore included.

Dx 303.2 ALCOHOLIC ADDICTION NATIONAL VA 1973 ALL NR CASES






Dx 303.2 ALCOHOLIC ADDICTION DISTRICT 1 VA 1973 ALL NR CASES



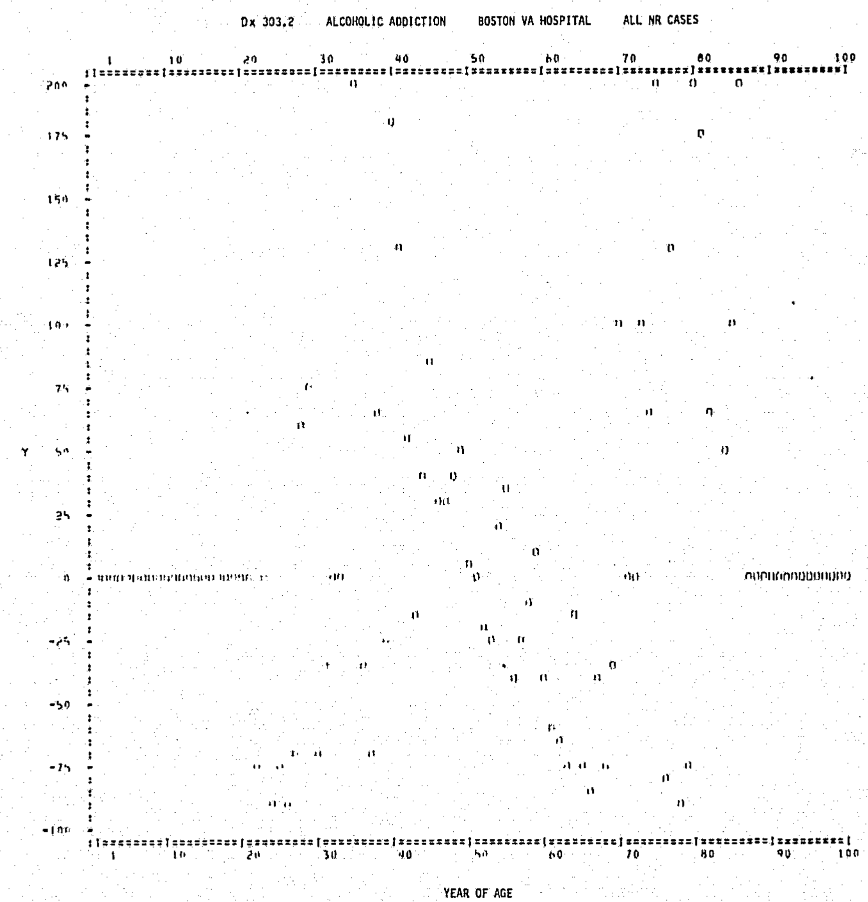
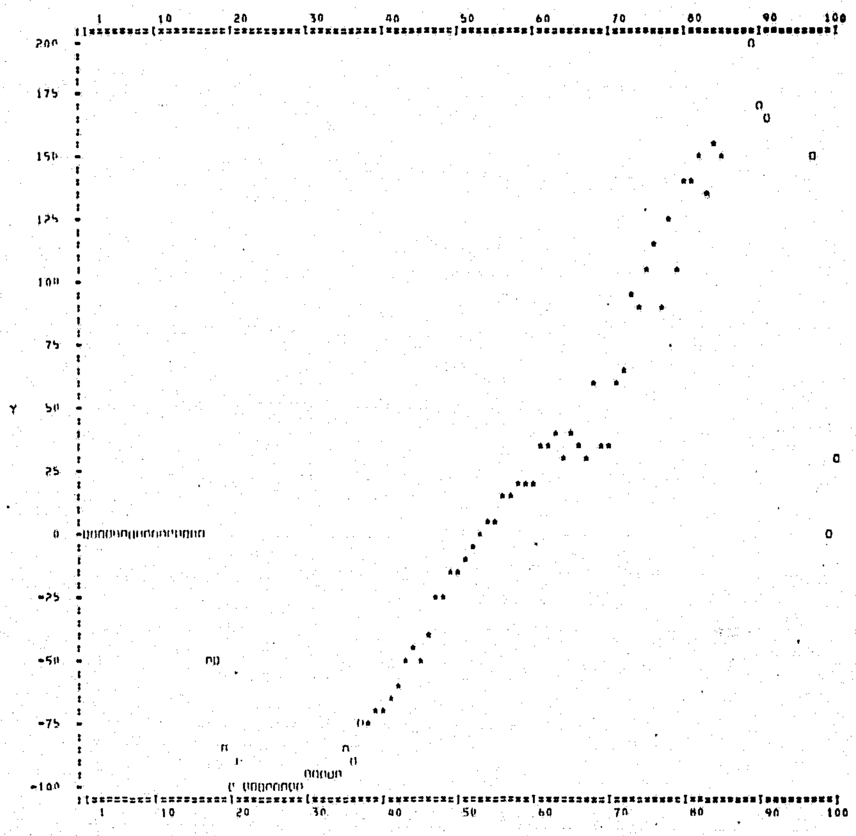
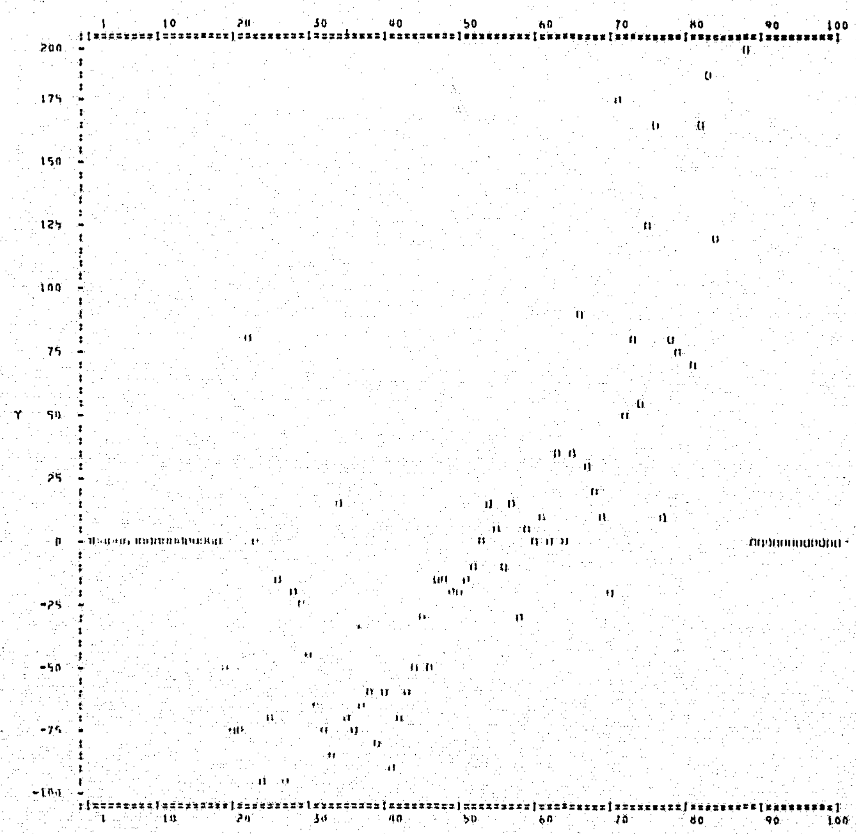



Figure A-10. γ characteristics of alcoholic addiction—national versus district versus institution.

Dx 412.9 CIHD WITHOUT HYPERTENSION NATIONAL VA 1973 ALL NR CASES



Dx 412.9 CIHD WITHOUT HYPERTENSION DISTRICT 1 1973 ALL NR CASES



YEAR OF AGE

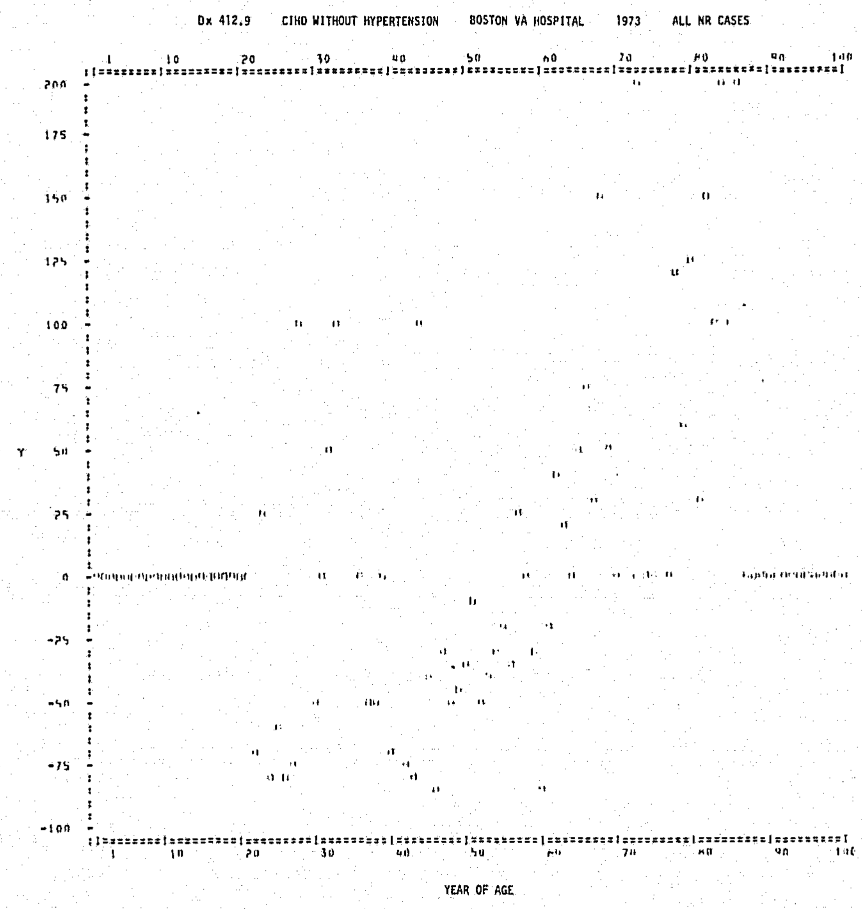
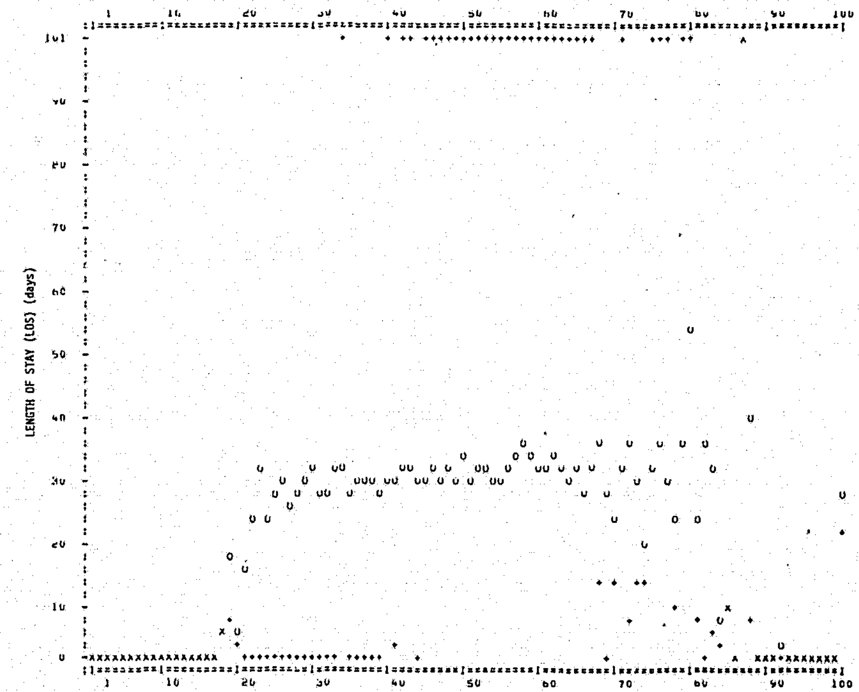
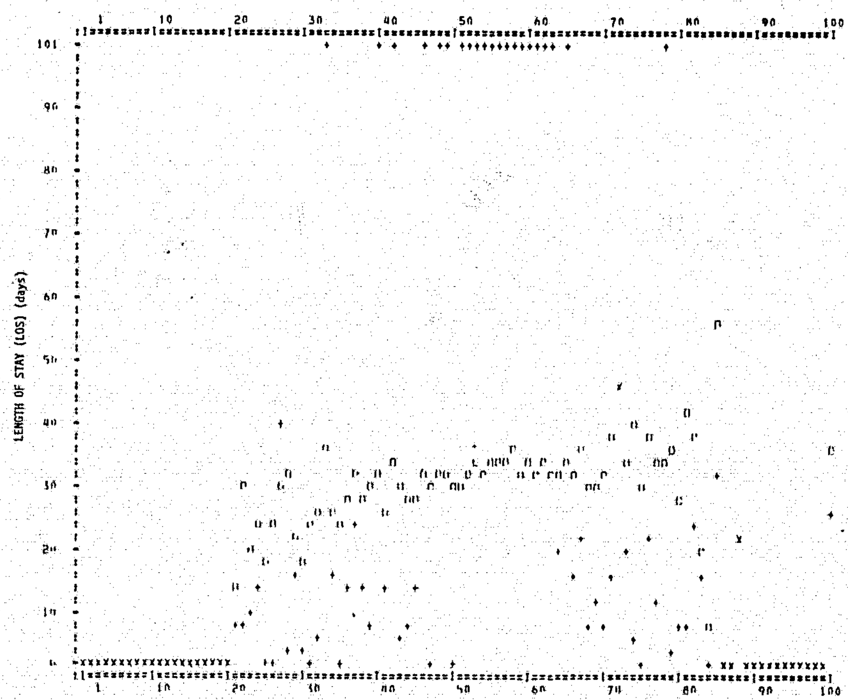



Figure A-11. γ characteristics of chronic ischemic heart disease (CIHD) without hypertension—national versus district versus institution.

Dx 303.2 ALCOHOLIC ADDICTION NATIONAL VA 1973 ALL NR CASES




Dx 571.0 ALCOHOLIC CIRRHOSIS NATIONAL VA 1973 ALL NR CASES



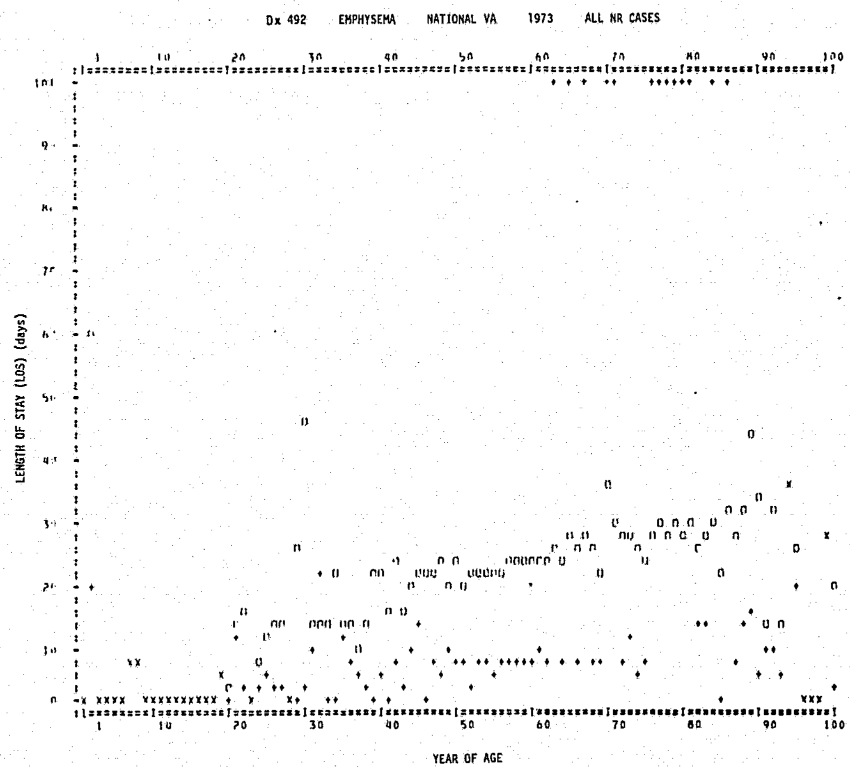
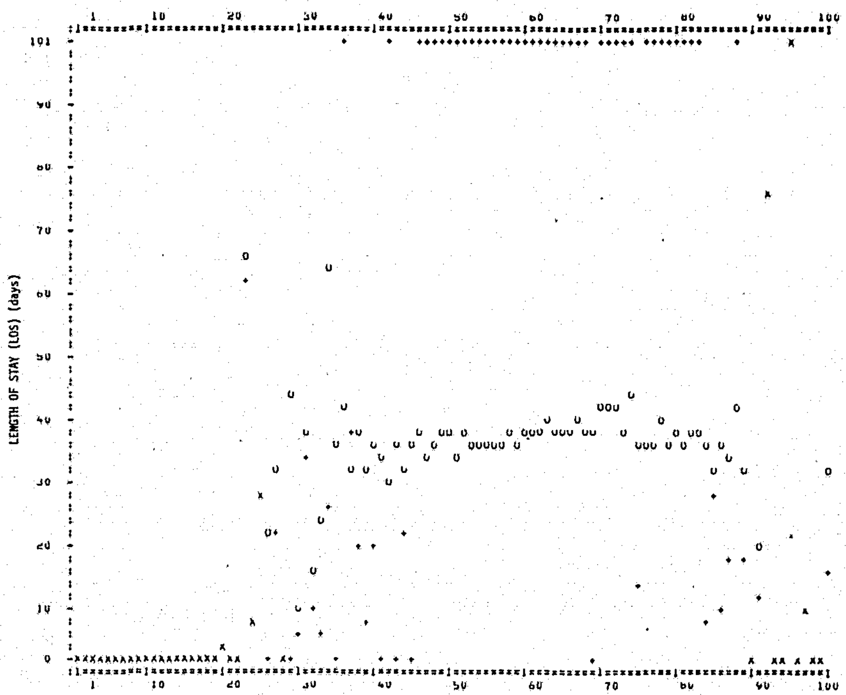
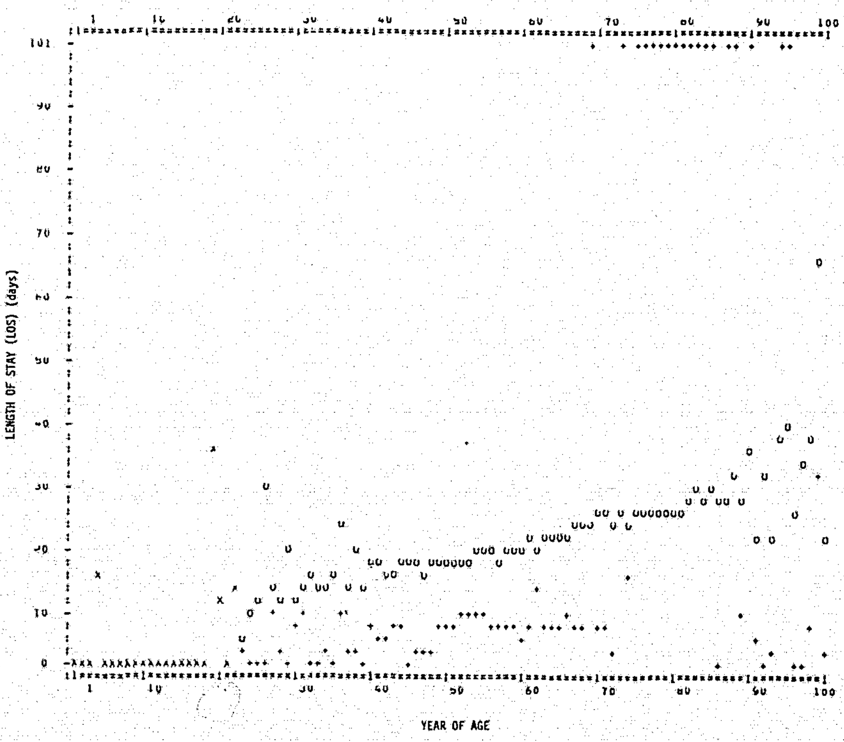



Figure A-12. Age-specific length of stay (LOS) for selected ICDA conditions—all NR cases in VA hospitals, 1973 (1 of 3).

Dx 162.1 NEOPLASM OF BRONCHUS AND LUNG NATIONAL VA 1973 ALL NR CASES




Dx 412 CHRONIC ISCHEMIC HEART DISEASE NATIONAL VA 1973 ALL NR CASES



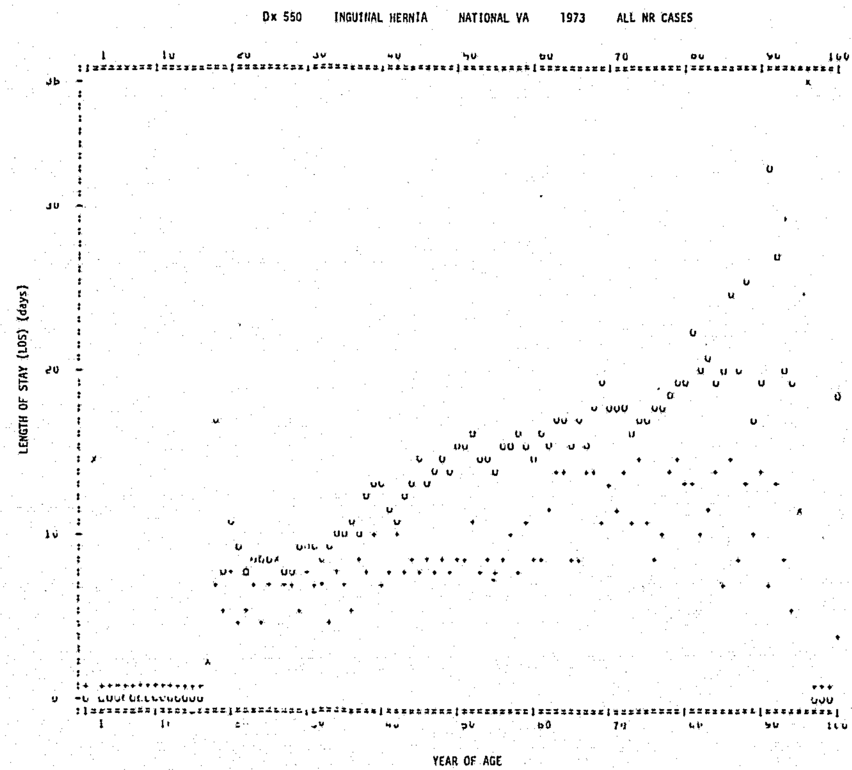
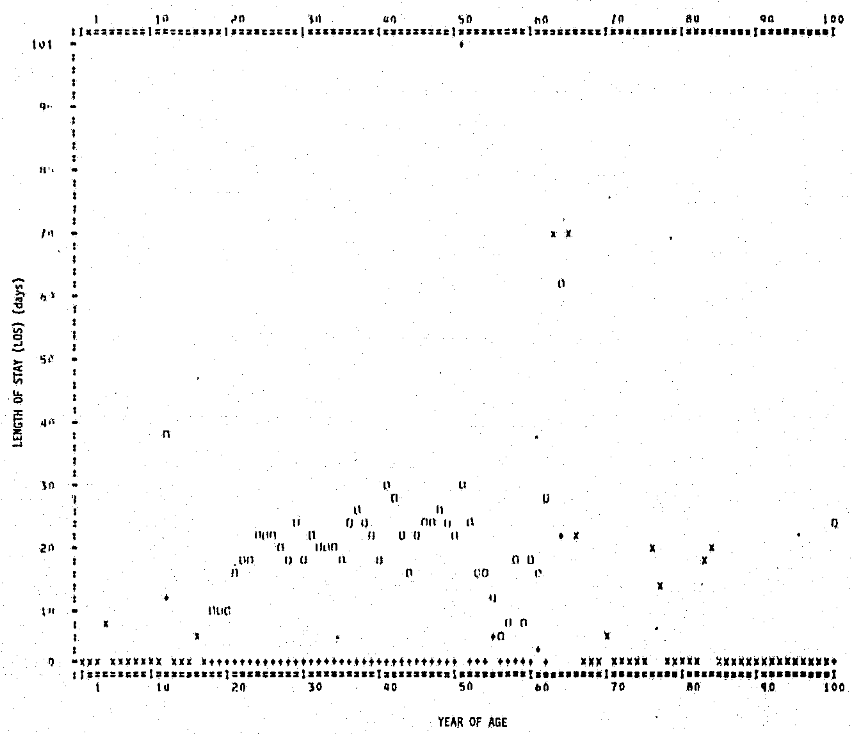
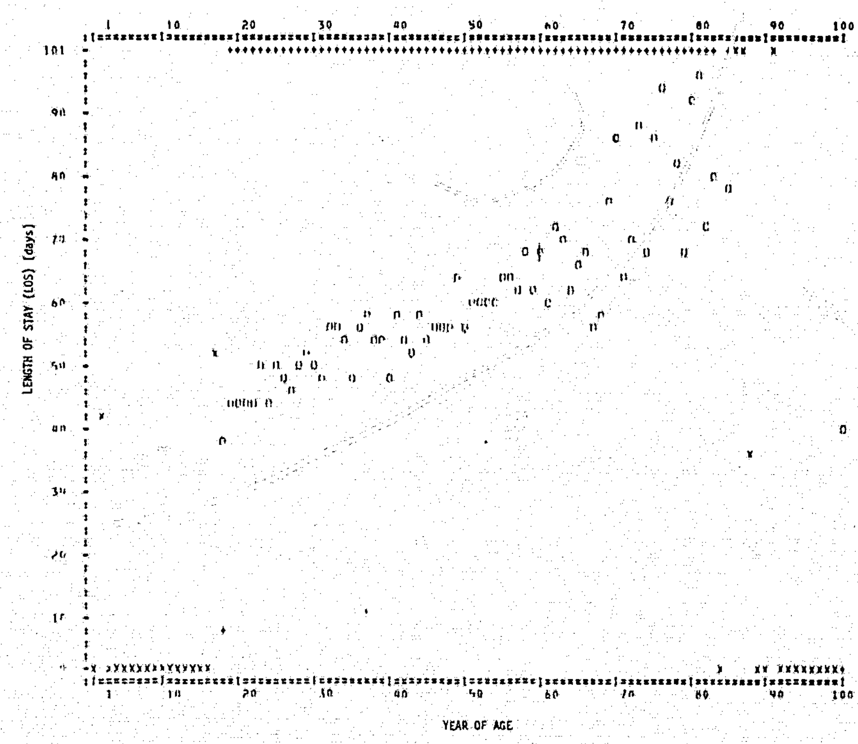



Figure A-12. Age-specific length of stay (LOS) for selected ICDA conditions—all NR cases in VA hospitals, 1973 (2 of 3).

Dx 304.0 OPIATE ADDICTION NATIONAL VA 1973 ALL NR CASES




Dx 295.3 PARANOID SCHIZOPHRENIA NATIONAL VA 1973 ALL NR CASES



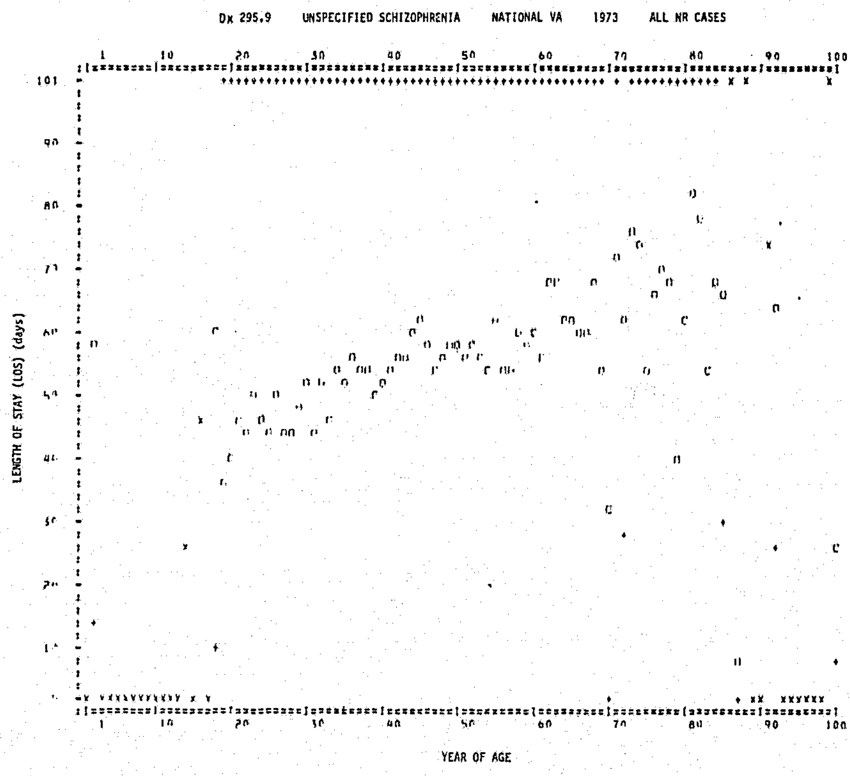



Figure A-12. Age-specific length of stay (LOS) for selected ICDA conditions—all NR cases in VA hospitals, 1973 (3 of 3).

Table A-6. Parameters of some linear models for length of stay (LOS).

| Parameter | Alcoholic Addiction | Alcoholic Cirrhosis | Neoplasm of Bronchus and Lung | Emphysema | Chronic Ischemic Heart Disease | Inguinal Hernia | Paranoid Schizophrenia | Unspecified Schizophrenia | Opiate Addiction |
|---|---|---|---|---|---|---|---|---|---|
| Age Range | 35-79 | 35-80 | 36-80 | 35-80 | 35-80 | 35-80 | 35-80 | 35-80 | 25-50 |
| m | 0.10 | 0.15 | 0.10 | 0.30 | 0.24 | 0.17 | 0.68 | 0.21 | 0.15 |
| b | 30.4 | 23.6 | 31.2 | 6.16 | 7.24 | 5.69 | 25.6 | 46.8 | 16.7 |
| $r^2$ | 0.002 | 0.30 | 0.24 | 0.68 | 0.76 | 0.84 | 0.65 | 0.12 | 0.11 |
| Average LOS | 31 | 32.4 | 37.1 | 23.4 | 20.8 | 15.2 | 64.6 | 58.6 | 22.2 |
| s | 3.18 | 3.74 | 2.82 | 4.90 | 3.64 | 2.42 | 11.27 | 7.88 | 3.3 |

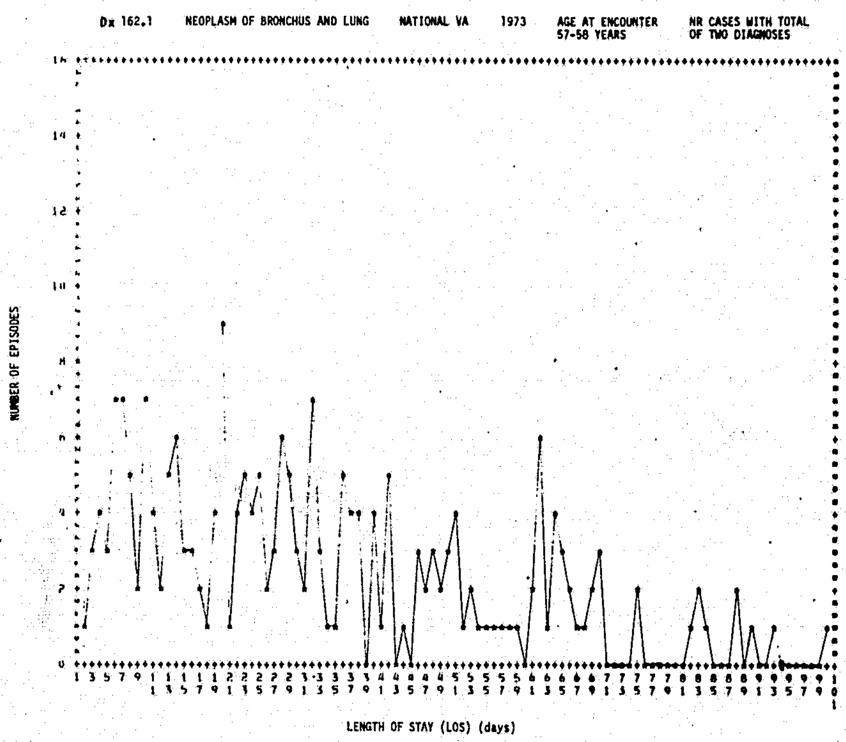
It is perhaps surprising that the slope of the models is so near zero in all cases—that significant increases in average LOS are not more frequently observed as a function of increasing age.

One population of cases (carcinoma of the bronchus and lung) was used to examine the number of cases versus LOS for successive 2-year age groups. Figure A-13 shows two representative plots for the group 57 to 58 years of age. The first represents cases with a total of two diagnoses, the second represents cases with a total of three diagnoses. At least in this situation, the variation in LOS is rather large. Also, no obviously distinct pattern of difference is observed on the basis of the number of diagnoses. Perhaps, in surgical disease, a more distinct change in LOS characteristic would be available on the basis of "operated" versus "nonoperated" cases. The data base precluded such an analysis. Although there is a great deal of variation in number of discharged cases by LOS, the trend is better approximated by an exponential than by a logarithmic curve or a straight line (Figures A-13a, A-13b).

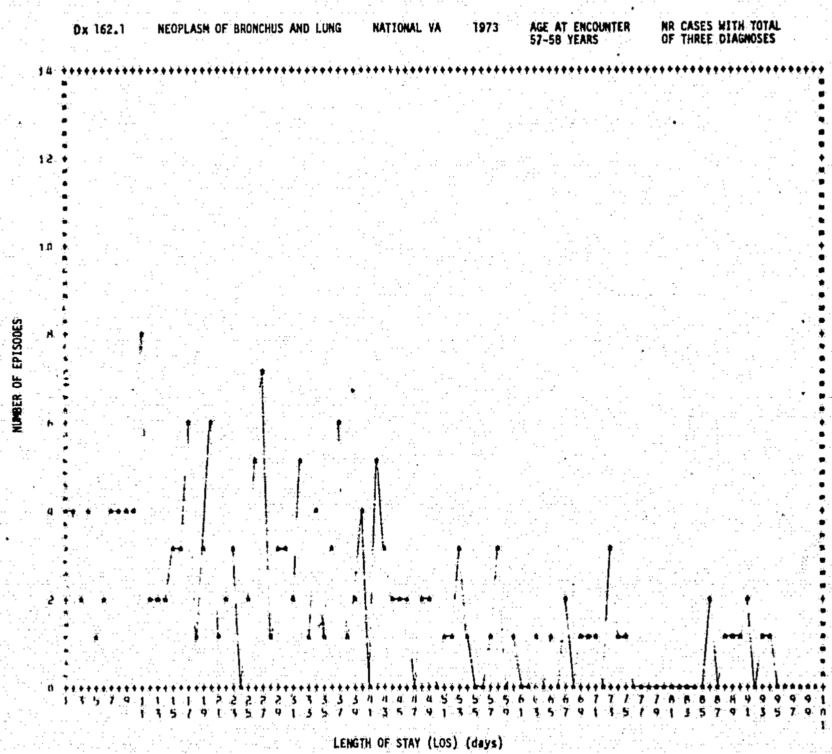
National age-specific LOS characteristics were compared with regional and local data (District 1 and the Boston VA Hospital) in several diagnostic categories. Figure A-14 summarizes such a comparative study for the diagnosis inguinal hernia. As the cases available for analysis decrease, from the national to the institutional level, the variation in mean LOS with year of age increases. Linear-model parameters for this analysis are summarized in Table A-7.

Table A-7. Linear-model parameters for national versus district versus institution—comparison of length of stay (LOS): inguinal hernia.

| Parameter | National | District 1 | BVAH |
|---|---|---|---|
| m | 0.17 | 0.17 | 0.05 |
| b | 5.69 | 2.92 | 7.79 |
| $r^2$ | 0.84 | 0.18 | 0.01 |
| $\overline{y}$ | 15.2 | 12.7 | 10.4 |
| s | 2.42 | 5.43 | 4.78 |




(a) With one associated diagnosis.




(b) With two associated diagnoses.

Figure A-13. Number of cases versus length of stay (LOS) with one and two associated diagnoses, lung cancer—age at encounter: 57 to 58 years.

To summarize these findings:

(1) Mean LOS in the diagnostic categories studied exhibited rather linear age-specific characteristics over the range 35 to 80 years of age.

(2) Some diseases or conditions do not exhibit significant increase in LOS with advancing age.

(3) Within a given year of age, there is considerable variation in the number of patients discharged as a function of number of days of inpatient stay.

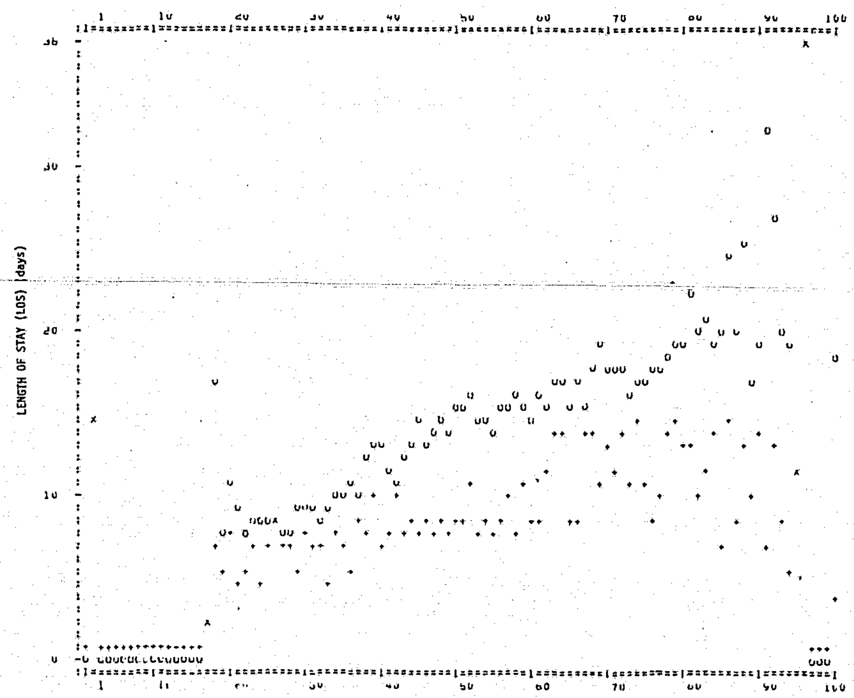
## A.6 Clusters of Diagnoses Found to Occur Frequently in Individual Patients

About 32 percent of the nonrepeating (NR) population of cases had a sole diagnostic code. In cases of multiple diagnosis, however, it is reasonable to assume that some diseases may occur simultaneously in an individual more often than others. The presence of specific associated diseases and conditions may modify the pattern of individual care in predictable ways. Thus, the identification of naturally occurring clusters of diagnoses may provide a key to establishing patterns of resource use—patterns that are more predictable than those observed on the basis of principal diagnosis alone. Clearly, a "fine structure" could be added to the ICDA diagnostic nomenclature, based on the naturally occurring association of multiple conditions. Such a structure may be useful to management after more basic relationships between disease descriptors and health-care resource needs have been defined. In preparation for cluster analysis, however, several indices were defined which help to quantitate the likelihood of an association between specific diagnoses in the VA population. These indices are reported here because of their potential utility in establishing a starting point for future analyses of diagnostic code clusters.

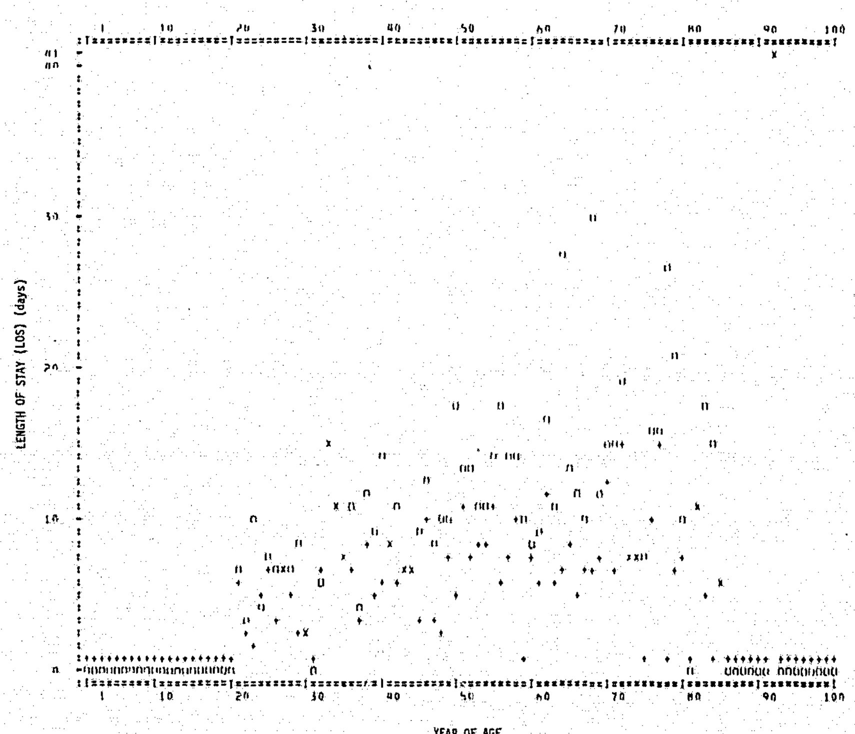
For a total of 316 diagnoses (the 200 most frequently occurring diagnoses, plus 116 other diagnoses with occurrence of more than 1000 cases as an associated diagnosis) in the diagnostic index of all episodes, five indices were calculated.

(1) <u>SNGNES.I</u>—The percentage of occurrence of the diagnosis as a sole diagnosis.

Dx 550 INGUINAL HERNIA NATIONAL VA 1973 ALL NR CASES




Dx 550 INGUINAL HERNIA DISTRICT 1 1973 ALL NR CASES



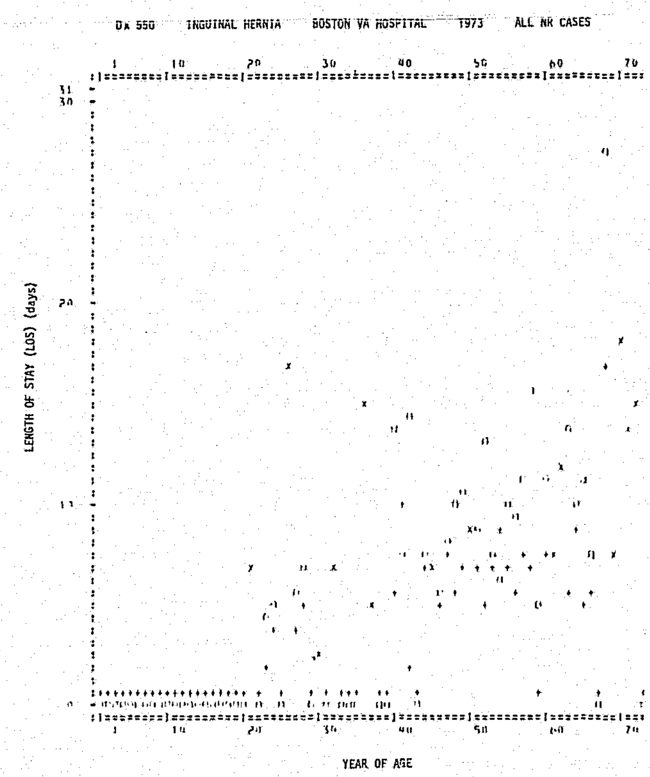



Figure A-14. Age-specific length of stay (LOS)—national versus district versus institution: inguinal hernia.

(2) ASNESS.I—The ratio of the occurrence of the conditions as an associated diagnosis to its total observed occurrence (PDx + ADx occurrence).

(3) PRCH.I—The percentage occurrence of multiple episodes during calendar year 1973 when the condition was a principal diagnosis.

(4) ASCH.I—The percentage occurrence of multiple episodes during calendar year 1973 when the condition was an associated diagnosis.

(5) SNGCH.I—The percentage occurrence of multiple episodes during calendar year 1973 when the condition occurred as a sole diagnosis.

A tabulation of these indices (Figure A-15) is organized into five sections. The first section includes those conditions which occurred most frequently as a sole diagnosis. Succeeding sections contain those conditions that occurred most frequently with one, two, three, or four other (associated) diagnoses.

The rank of diagnoses in this table is ordered by decreasing value of SNGNES.I. The table is potentially useful in two settings: first, in identifying case populations representing frequently observed multiple conditions; second, for exploring the stability (in a large population of cases) of the structure of multiple-word diagnostic statements.

Another tabulation (Figure A-16) was prepared for the 200 most frequently observed principal diagnoses (ranked by descending frequency of occurrence) in the population of all episodes. It lists the following characteristics associated with diagnostic clusters.

(1) TOTPER.I—The percentage of all episodes in which the condition appeared as a principal diagnosis.

(2) CUM.I—The cumulative value of TOTPER.I with descending value of TOTPER.I.

(3) CLUST.I—The ratio SNGNES.I/ASNESS.I. This index is provided on the assumption that conditions which occur rarely by themselves (as sole diagnosis), but occur frequently as associated diagnoses, may be grouping with certain other diagnoses. Such diagnoses would be expected to have a relatively small value of CLUST.I.

(4) SNGNES.I—Previously defined.

| ICDA | SNGNES.I | ASNESS.I | PRCH.I | ASCH.I | SNGCH.I |
|---|---|---|---|---|---|
| DXY101 | 99.6594 | .876453 | 94.5509 | 98.1937 | 94.6604 |
| DX500 | 83.8454 | .194089 | 3.96432 | 8.23045 | 4.13712 |
| DX7062 | 78.6795 | .482341 | 4.15406 | 7.41069 | 4.51049 |
| DX582 | 76.1018 | .045092 | 96.0389 | 34.4077 | 97.463 |
| DX5206 | 75.3754 | .772385 | 1.2012 | 9.82301 | .398406 |
| DX685 | 75.2695 | .174493 | 10.1796 | 8.78187 | 10.1034 |
| DX403 | 69.8116 | .329732 | 77.9569 | 33.9772 | 91.4925 |
| DX2140 | 68.9554 | .49051 | 3.87144 | 6.98027 | 4.76695 |
| DX7531 | 68.827 | .305613 | 88.3194 | 67.0773 | 95.1665 |
| DX3073 | 67.1411 | .154369 | 5.2599 | 12.2034 | 4.97696 |
| DX72518 | 65.4479 | .244093 | 6.94948 | 8.12446 | 7.20682 |
| DX7245 | 64.0599 | .178401 | 5.07487 | 9.1954 | 5.58442 |
| DX5932 | 63.7884 | .450942 | 80.1858 | 17.6153 | 90.3407 |
| DX7011 | 63.5151 | .700653 | 3.27273 | 8.1305 | 3.24427 |
| DX566 | 62.1913 | .28162 | 6.52312 | 9.8546 | 6.61914 |
| DX7099 | 61.7438 | .711054 | 2.66904 | 9.68908 | 3.45821 |
| DX605 | 61.4827 | .419822 | 3.54553 | 6.57016 | 3.93185 |
| DX070 | 61.2882 | .182012 | 3.25309 | 10.2339 | 2.9724 |
| DX3040 | 60.7815 | .191602 | 19.8221 | 12.7345 | 19.3026 |
| DX3049 | 60.1048 | .471855 | 7.28014 | 13.5593 | 6.39535 |
| DX4003 | 59.6583 | .0682261 | 89.2259 | 42.381 | 93.4541 |
| DX583 | 59.4716 | .25 | 79.7639 | 28.8364 | 89.9811 |
| DXY104 | 58.4807 | .426156 | 9.10282 | 14.9912 | 8.84658 |
| DX5225 | 58.1818 | .817377 | .909091 | 8.4631 | 1.5625 |
| DX7061 | 58.0882 | .888616 | 10.2941 | 11.6129 | 8.86076 |
| DX2954 | 58 | .0528415 | 3.57895 | 7.54717 | 2.54083 |
| DX5259 | 57.9832 | .970897 | 5.04202 | 7.07808 | 4.34783 |
| DX2955 | 57.0313 | .202847 | 9.82143 | 11.8421 | 10.1761 |
| DX504 | 56.7713 | .397041 | 4.41609 | 9.31446 | 4.66724 |
| DXY033 | 56.0639 | .562709 | 23.6733 | 11.1441 | 27.003 |
| DX592 | 55.9823 | .354623 | 13.2201 | 10.3047 | 12.9288 |
| DX7934 | 55.4819 | .4437 | 1.80723 | 8.91239 | 1.84582 |
| DX3782 | 55.2224 | .447059 | 9.8646 | 7.6555 | 12.0841 |
| DX3702 | 54.5454 | .994244 | 0 | 7.8421 | 0 |
| DX1733 | 53.9043 | .434204 | 11.2091 | 8.26039 | 11.5265 |
| DX8360 | 53.6424 | .19823 | 4.52539 | 7.14286 | 4.52675 |
| DX2953 | 53.4627 | .0985929 | 25.2841 | 11.8869 | 28.4161 |
| DX9981 | 53.0067 | .706919 | 2.89532 | 12.1884 | 2.10084 |
| DX191 | 52.3476 | .169983 | 24.8751 | 15.122 | 28.0534 |
| DX5250 | 51.8919 | .989277 | 3.78378 | 10.2355 | 4.16667 |
| DX455 | 51.7341 | .576482 | 4.32177 | 8.61793 | 4.8438 |
| DX4549 | 51.325 | .674682 | 6.20642 | 8.77606 | 7.47283 |
| DX29574 | 51.2787 | .0681332 | 14.0984 | 12.5561 | 15.601 |
| DX5651 | 50.7428 | .326923 | 6.17143 | 9.41176 | 6.75676 |
| DX7311 | 50.5197 | .70327 | 2.079 | 10.7018 | 2.46914 |
| DX7287 | 50.4452 | .427616 | 7.98553 | 8.97579 | 9.26641 |
| DX2961 | 50.1499 | .108884 | 16.1919 | 12.2699 | 17.3393 |
| DX3751 | 49.8595 | .626639 | 16.573 | 9.03766 | 16.338 |
| DX9985 | 49.6556 | .655598 | 8.12672 | 11.5412 | 8.04438 |
| DX29590 | 48.9805 | .165076 | 22.0914 | 11.4123 | 24.7704 |
| DX2956 | 48.6577 | .170686 | 14.6532 | 15.7609 | 14.4828 |
| DX201 | 48.5096 | .134985 | 54.5295 | 13.8577 | 62.5301 |
| DXY105 | 48.4375 | .633238 | 8.89757 | 15.3092 | 11.2007 |
| DX2962 | 48.3431 | .22449 | 8.2846 | 11.7845 | 9.07258 |
| DX2114 | 47.5655 | .680048 | 9.73783 | 6.43172 | 13.7795 |
| DX2950 | 47.4522 | .266355 | 10.9342 | 9.94152 | 11.1857 |
| DX601 | 47.2737 | .630979 | 5.04115 | 7.6414 | 5.87595 |
| DX550 | 46.6532 | .368476 | 6.463 | 9.00222 | 6.79537 |
| DX603 | 46.5778 | .62908 | 3.11111 | 7.07547 | 2.67175 |

(a) Conditions occurring frequently as a sole diagnosis.

Figure A-15. Cluster indices of some frequently occurring conditions (sheet 1 of 7).

| | | | | | |
|---|---|---|---|---|---|
| DX604 | 46.2076 | .460064 | 7.79989 | 9.72222 | 8.14901 |
| DX5231 | 46.1538 | .991534 | 3.84615 | 10.5747 | 8.33333 |
| DX2113 | 46.1171 | .588496 | 13.9785 | 8.5213 | 16.3212 |
| DX4540 | 46.0105 | .384808 | 19.4525 | 8.28678 | 29.1139 |
| DX5233 | 45.8823 | .954326 | 0 | 6.64414 | 0 |
| DX3041 | 45.614 | .528194 | 10.8553 | 19.3927 | 10.5769 |
| DX2952 | 45.4423 | .106216 | 12.0189 | 9.09091 | 14.1159 |
| DX6079 | 45.4343 | .743575 | 6.01336 | 11.7512 | 4.90196 |
| DX3899 | 45.2727 | .912629 | 6.18182 | 8.56397 | 7.22892 |
| DX72899 | 44.4444 | .579975 | 6.36364 | 12.7286 | 7.27273 |
| DX3759 | 44.1471 | .845358 | 9.0301 | 11.0431 | 9.4697 |
| DX3749 | 44.0773 | .470098 | 13.1646 | 8.74136 | 12.3942 |
| DX3030 | 43.695 | .485283 | 9.38416 | 16.3297 | 11.4094 |
| DX0092 | 43.1891 | .351068 | 2.25952 | 9.7852 | 2.39163 |
| DX5234 | 42.9752 | .952144 | 1.98347 | 8.19141 | 1.15385 |
| DX700 | 42.9119 | .849914 | 5.36398 | 12.111 | 5.35714 |
| DXY106 | 42.8713 | .674823 | 27.5247 | 11.5935 | 47.3441 |
| DX7299 | 42.8218 | .607767 | 5.19802 | 10.4633 | 7.22543 |
| DX3031 | 42.7637 | .254009 | 19.2101 | 16.4913 | 24.4188 |
| DX690 | 42.647 | .952646 | 7.35294 | 11.769 | 12.069 |
| DX360 | 42.3581 | .885842 | .436681 | 10.242 | 0 |
| DX1109 | 42.2764 | .922593 | 1.62602 | 10.0273 | 0 |
| DX846 | 42.0502 | .342202 | 4.3933 | 7.7748 | 4.64345 |
| DX7201 | 41.8335 | .432077 | 15.2792 | 11.2188 | 15.6171 |
| DX3017 | 41.5371 | .463392 | 12.0035 | 18.1 | 12.474 |
| DX3046 | 41.3828 | .566087 | 9.21844 | 12.7496 | 8.47458 |
| DX7871 | 41.332 | .59274 | 6.17042 | 10.2961 | 7.8199 |
| DX30013 | 41.2969 | .381334 | 6.68942 | 11.2957 | 5.95041 |
| DX5692 | 41.0555 | .684626 | 3.30948 | 11.1248 | 4.57516 |
| DX6929 | 40.7049 | .703323 | 8.52757 | 10.5276 | 8.10056 |
| DX598 | 40.6625 | .524919 | 19.9415 | 9.49441 | 25 |
| DX188 | 40.617 | .214318 | 35.5898 | 11.0995 | 39.6624 |
| DX3019 | 40.5607 | .696368 | 6.54206 | 14.8329 | 7.37327 |
| DX594 | 40.0273 | .594909 | 5.19126 | 7.81395 | 7.16724 |
| DX30181 | 39.7617 | .540117 | 9.77021 | 14.3768 | 10.8305 |
| DX7830 | 38.7615 | .373863 | 5.9633 | 13.5723 | 6.70611 |
| DX7855 | 38.678 | .36752 | 4.24914 | 11.9375 | 4.03756 |
| DX5512 | 38.6754 | .497459 | 8.44287 | 10.2656 | 8.88889 |
| DX0971 | 38.6667 | .9764 | 2.66667 | 11.1827 | 3.44828 |
| DX3042 | 38.594 | .626073 | 12.769 | 16.2811 | 14.8699 |
| DXY0394 | 38.4571 | .799297 | 7.44762 | 15.3721 | 8.12283 |
| DX7893 | 38.4483 | .602921 | 7.47126 | 11.2793 | 9.56652 |
| DX1619 | 38.2218 | .194239 | 23.648 | 9.12547 | 26.3789 |
| DX7873 | 37.7941 | .628415 | 2.35294 | 11.8261 | 1.94553 |
| DX7339 | 37.3796 | .680222 | 4.81696 | 11.3225 | 4.12371 |
| DX404 | 37.1512 | .263383 | 53.4302 | 19.3496 | 76.0563 |
| DX3004 | 36.7896 | .404692 | 11.3427 | 14.5815 | 11.1663 |
| DX5741 | 36.7323 | .283223 | 2.89687 | 9.67742 | 3.15457 |
| DX3039 | 36.4194 | .488567 | 9.04055 | 9.91924 | 10.9723 |
| DX575 | 36.3811 | .425967 | 5.77478 | 11.1543 | 7.14286 |
| DX2914 | 36.1429 | .174528 | 9.71428 | 16.8919 | 10.6719 |
| DX5609 | 35.2518 | .486814 | 7.39979 | 13.0011 | 9.91254 |
| DX6824 | 34.8993 | .484726 | 4.64206 | 12.7229 | 5.28846 |
| DX7130 | 34.8197 | .712937 | 10.5232 | 9.26428 | 14.0581 |
| DX5990 | 34.2543 | .870699 | 5.07191 | 10.5728 | 40.9945 |
| DX6961 | 34.2496 | .685367 | 19.9108 | 11.8008 | 18.872 |
| DX3055 | 33.7398 | .428903 | 3.86179 | 9.60758 | 4.21687 |
| DX150 | 33.6781 | .127959 | 30.8985 | 8.81057 | 33.5892 |
| DX493 | 33.631 | .538596 | 24.6994 | 12.3308 | 30.7457 |
| DX5749 | 33.2785 | .590374 | 5.83402 | 10.5473 | 6.66667 |

(a) Conditions occurring frequently as a sole diagnosis. (Cont.)

Figure A-15. Cluster indices of some frequently occurring conditions (sheet 2 of 7).

| | | | | | |
|---|---|---|---|---|---|
| DX715 | 33.1361 | .745941 | 4.26035 | 8.34341 | 3.57143 |
| DX791 | 33.0818 | .577128 | 6.72956 | 9.53917 | 7.79468 |
| DX1977 | 33.0677 | .920845 | 26.2948 | 25.6849 | 57.8313 |
| DX5320 | 32.933 | .26487 | 2.33881 | 9.47368 | 1.72745 |
| DX5379 | 32.5333 | .738311 | 5.06667 | 8.79017 | 5.7377 |
| DX5339 | 32.3943 | .567461 | 5.17813 | 10.6094 | 6.26598 |
| DX5329 | 32.3732 | .494504 | 6.4672 | 9.74544 | 12.8588 |
| DX2910 | 32.1718 | .420385 | 5.67261 | 8.21229 | 7.43073 |
| DX30470 | 32.1229 | .762284 | 6.42458 | 10.453 | 7.82609 |
| DX3032 | 32.1095 | .441527 | 22.1471 | 10.579 | 27.41 |
| DX4444 | 32.0855 | .545012 | 8.25057 | 9.05612 | 9.7619 |
| DX3000 | 31.9813 | .545537 | 11.6046 | 12.6797 | 10.5116 |
| DX1960 | 31.9277 | .873572 | 16.5663 | 28.9887 | 21.6981 |
| DX2001 | 31.6032 | .178977 | 41.2918 | 8.99471 | 47.8102 |
| DX53199 | 31.3043 | .424084 | 9.80237 | 10.4133 | 13.8889 |
| DX600 | 31.2789 | .621158 | 6.51451 | 8.29576 | 11.3146 |
| DX5039 | 31.2785 | .828705 | 3.65297 | 9.20245 | 5.10949 |
| DX3009 | 31.2655 | .713778 | 2.72953 | 11.3433 | 4.7619 |
| DX7123 | 31.1569 | .487361 | 19.6424 | 9.37589 | 24.2609 |
| DX6983 | 30.6991 | .789103 | 9.72644 | 9.42323 | 2.9703 |
| DX595 | 30.6279 | .754742 | 5.97243 | 12.9137 | 8.75 |
| DX5621 | 30.4681 | .69025 | 11.5012 | 8.20355 | 13.3775 |
| DX279 | 30.4478 | .914147 | 14.0299 | 14.8304 | 23.5294 |
| DX30451 | 30.3317 | .791708 | 2.8436 | 12.4065 | .78125 |
| DX5969 | 29.6267 | .780509 | 9.48678 | 13.2736 | 12.5984 |
| DX5640 | 29.4627 | .672159 | 4.67938 | 11.4962 | 3.52941 |
| DX3579 | 29.437 | .805337 | 6.85434 | 12.2633 | 7.90021 |
| DX4510 | 29.1477 | .498286 | 12.2316 | 12.7088 | 14.9554 |
| DX7862 | 29.1262 | .734809 | 17.0874 | 10.6517 | 23.3333 |
| DX30913 | 28.9433 | .346346 | 10.0689 | 12.3555 | 13.2275 |
| DX7071 | 28.7868 | .573017 | 8.84167 | 9.70378 | 10 |
| DX7131 | 28.6287 | .716329 | 6.18793 | 8.65981 | 7.00467 |
| DX203 | 28.4455 | .208122 | 46.875 | 9.7561 | 60.5634 |
| DX4109 | 27.9952 | .301544 | 4.69077 | 9.37716 | 5.17609 |
| DX4541 | 27.8788 | .731998 | 6.46465 | 10.2071 | 4.34783 |
| DX43599 | 27.8027 | .498313 | 4.93273 | 9.36795 | 6.45161 |
| DX0091 | 27.6316 | .62967 | 4.23977 | 12.8977 | 4.2328 |
| DX470 | 27.6018 | .47785 | .339366 | 6.79852 | .409836 |
| DX1990 | 27.4382 | .791768 | 11.7035 | 26.7442 | 17.0616 |
| DX7805 | 27.1751 | .586406 | 3.54458 | 8.33333 | 3.16206 |
| DX1519 | 26.4706 | .187355 | 23.6243 | 7.81893 | 27.957 |
| DX4589 | 26.0208 | .713269 | 6.08487 | 12.4236 | 6.15385 |
| DX0122 | 25.6493 | .802564 | 9.41558 | 19.6486 | 10.1266 |
| DX9979 | 25.5486 | .627336 | 8.62069 | 11.5456 | 7.36196 |
| DX2899 | 25.5208 | .90234 | 6.25 | 13.5851 | 2.04082 |
| DX2951 | 25.3253 | .181818 | 8.90891 | 8.10811 | 10.6719 |
| DX01199 | 25.278 | .592836 | 3.84226 | 10.8333 | 5.2 |
| DX2915 | 25.0386 | .171575 | 12.3648 | 9.70149 | 13.5802 |
| DX3479 | 24.7646 | .639049 | 10.1376 | 10.1431 | 11.4035 |
| DX7889 | 23.5772 | .872605 | 6.09756 | 19.3472 | 6.89655 |
| DX5236 | 23.3333 | .999069 | 0 | 10.9776 | 0 |
| DX0111 | 22.5543 | .186291 | 6.4538 | 10.9792 | 7.53012 |
| DX0112 | 21.1751 | .101881 | 8.31879 | 7.69231 | 13.7363 |
| DXE819 | 0 | 1 | 100 | 3.88715 | 100 |
| DXE885 | 0 | 1 | 100 | 4.9238 | 100 |
| DXE887 | 0 | 1 | 100 | 5.07005 | 100 |
| DXE960 | 0 | 1 | 100 | 4.51613 | 100 |

(a) Conditions occurring frequently as a sole diagnoses. (Cont.)

Figure A-15. Cluster indices of some frequently occurring conditions (sheet 3 of 7).

| ICDA | SNGNES.I | ASNESS.I | PRCH.I | ASCH.I | SNGCH.I |
|---|---|---|---|---|---|
| DX8240 | 35.6083 | .233045 | 3.67952 | 6.44531 | 4.16667 |
| DX5900 | 32.849 | .535886 | 75.4022 | 28.3146 | 87.2038 |
| DX1101 | 31.9885 | .872754 | 3.45821 | 8.90756 | 2.7027 |
| DX1989 | 29.0155 | .899374 | 18.1347 | 26.4928 | 23.2143 |
| DX2720 | 28.9773 | .941857 | 15.9091 | 13.7145 | 29.4118 |
| DX8230 | 28.9234 | .341742 | 5.56569 | 5.9754 | 8.20189 |
| DX9989 | 28.4821 | .722635 | 6.16071 | 12.2001 | 6.58307 |
| DX5235 | 28.125 | .973255 | 1.5625 | 7.29927 | 5.55556 |
| DX340 | 27.9984 | .292431 | 21.8801 | 7.94118 | 19.2475 |
| DX5210 | 26.3699 | .975279 | 1.19863 | 9.99566 | 1.2987 |
| DX4139 | 26.1001 | .840924 | 7.59494 | 17.0695 | 7.3903 |
| DX3451 | 25.8389 | .70565 | 11.4094 | 15.6495 | 11.6883 |
| DX8737 | 25.6887 | .522682 | 1.30854 | 8.23899 | 1.07239 |
| DX4273 | 25.6449 | .88109 | 11.5326 | 12.1237 | 12.426 |
| DX7837 | 25.5765 | .401661 | 5.74118 | 12.8286 | 6.71573 |
| DX185 | 25.424 | .375539 | 24.3584 | 8.70976 | 23.9079 |
| DX4439 | 25.3977 | .716391 | 11.3468 | 10.9992 | 10.8559 |
| DX1541 | 25.133 | .175439 | 25.7979 | 7.1875 | 24.3386 |
| DX5199 | 24.9254 | .6949 | 12.6866 | 16.055 | 17.3653 |
| DX5770 | 24.4693 | .435635 | 10.2277 | 9 | 11.1987 |
| DX7891 | 24.2424 | .949772 | 0 | 10.4968 | 0 |
| DX1538 | 24.2128 | .218166 | 20.4126 | 7.393 | 22.4215 |
| DX3459 | 24.1692 | .689493 | 8.45921 | 13.6961 | 9.58333 |
| DX4329 | 24.0876 | .554368 | 5.52659 | 8.96899 | 6.92641 |
| DX9600 | 24.0506 | .960381 | 3.79747 | 13.2115 | 0 |
| DX1621 | 24.0412 | .141945 | 31.8005 | 10.4191 | 36.5079 |
| DX3791 | 23.9496 | .828159 | 2.94118 | 8.63121 | 1.75439 |
| DX490 | 23.913 | .668429 | 5.07246 | 12.0058 | 6.66667 |
| DX7802 | 23.913 | .70896 | 9.98825 | 15.1351 | 10.8108 |
| DX1533 | 23.4266 | .209945 | 19.697 | 6.14035 | 22.388 |
| DX465 | 23.3099 | .626238 | 1.73067 | 12.0723 | 1.62413 |
| DX5719 | 23.0098 | .65591 | 9.59651 | 12.0709 | 12.3223 |
| DX7831 | 22.8977 | .549726 | 5.97771 | 14.1079 | 6.63717 |
| DX7385 | 22.7876 | .802361 | 6.85841 | 9.80926 | 5.82524 |
| DX535 | 22.7161 | .594762 | 3.49059 | 10.4051 | 3.72149 |
| DX5963 | 22.3684 | .963706 | 17.1053 | 12.9832 | 17.647 |
| DX5309 | 22.3235 | .728342 | 3.87244 | 13.0841 | 4.08163 |
| DX3959 | 22.2464 | .663486 | 17.2301 | 11.1173 | 18.1373 |
| DX517 | 22.1041 | .757036 | 11.1583 | 9.31105 | 8.65385 |
| DX4279 | 22.0876 | .854646 | 7.26934 | 13.4253 | 10.1266 |
| DX5901 | 22.064 | .686734 | 11.21 | 10.2273 | 19.3548 |
| DX3099 | 22.0532 | .632635 | 6.36018 | 10.4777 | 9.71787 |
| DX401 | 21.6687 | .754757 | 7.41747 | 10.8637 | 8.87134 |
| DX4402 | 21.566 | .613322 | 10.7383 | 10.2398 | 12.6556 |
| DX342 | 21.5591 | .632909 | 11.8149 | 8.01837 | 12.7119 |
| DX2500 | 21.5493 | .356593 | 10.0704 | 9.14867 | 15.0327 |
| DX7832 | 21.4876 | .715127 | 3.09917 | 12.5926 | 3.84615 |
| DX274 | 21.408 | .836274 | 9.57854 | 12.1707 | 8.94855 |
| DX7886 | 21.1646 | .701238 | 4.25532 | 15.8874 | 6.34921 |
| DX5601 | 21.1111 | .920983 | 1.11111 | 13.346 | 0 |
| DX5962 | 20.7334 | .658971 | 5.64175 | 8.32117 | 10.2041 |
| DX7841 | 20.6544 | .681433 | 2.65849 | 16.6348 | 2.9703 |
| DX402 | 20.5304 | .534096 | 7.85855 | 19.2802 | 9.09091 |
| DX4459 | 20.0913 | .630484 | 4.56621 | 8.92061 | 3.78788 |
| DXY01 | 20 | .986714 | 0 | 11.535 | 0 |
| DX19839 | 20 | .889737 | 13.0769 | 30.1239 | 13.4615 |
| DX518 | 19.7154 | .676953 | 13.0081 | 13.676 | 13.4021 |
| DX3092 | 19.305 | .336238 | 13.2046 | 10.9756 | 17.6 |
| DX5771 | 19.2896 | .523395 | 20.1776 | 12.4888 | 21.7391 |

(b) Conditions occurring most frequently with one other diagnosis.

Figure A-15. Cluster indices of some frequently occurring conditions (sheet 4 of 7).

| | | | | | |
|---|---|---|---|---|---|
| DX7825 | 19.016 | .515792 | 4.03538 | 10.6383 | 5.52326 |
| DX4274 | 18.9873 | .881464 | 7.8481 | 13.2433 | 10.6667 |
| DX4100 | 18.7908 | .262206 | 3.92157 | 9.42529 | 3.47826 |
| DX5301 | 18.6495 | .740905 | 7.3955 | 9.14543 | 8.04598 |
| DX8204 | 18.6061 | .311777 | 4.35594 | 7.96703 | 5.01672 |
| DX5513 | 18.0141 | .750398 | 6.27306 | 9.9085 | 5.77281 |
| DX481 | 17.8775 | .473884 | 2.43439 | 13.978 | 3.19149 |
| DX3940 | 17.7254 | .401227 | 28.1762 | 10.3976 | 29.4798 |
| DX466 | 17.7061 | .528415 | 3.54123 | 13.5849 | .895522 |
| DXY0301 | 17.3977 | .861004 | 3.80117 | 9.67666 | 2.52101 |
| DX5112 | 17.3469 | .826651 | 4.7619 | 18.4023 | 3.92157 |
| DX1890 | 16.6667 | .224223 | 30.8017 | 21.8978 | 20.2532 |
| DX1985 | 16.4122 | .939056 | 14.1221 | 28.9324 | 9.30233 |
| DX51920 | 16.4061 | .650569 | 14.9744 | 12.037 | 16.7409 |
| DX1970 | 16.2879 | .881667 | 12.5 | 30.6558 | 6.97674 |
| DX25093 | 16.2328 | .748202 | 15.9304 | 12.2363 | 21.9893 |
| DX3787 | 15.0592 | .775371 | 6.76819 | 16.9118 | 7.86517 |
| DX8202 | 14.7866 | .238979 | 3.42988 | 6.31068 | 4.12371 |
| DX244 | 14.7303 | .792599 | 12.0332 | 15.3094 | 14.0845 |
| DX7861 | 14.5867 | .734966 | 5.18639 | 11.1631 | 7.77778 |
| DX4369 | 13.7041 | .483642 | 3.81307 | 8.69299 | 3.97489 |
| DX5710 | 13.6274 | .621247 | 14.6275 | 10.0633 | 15.1578 |
| DX7884 | 13.5776 | .744071 | 2.58621 | 8.08006 | 1.5873 |
| DX9701 | 13.0148 | .655701 | 2.47117 | 14.1869 | 5.06329 |
| DX4360 | 12.9443 | .391677 | 3.55466 | 8.75 | 3.62694 |
| DX492 | 12.6116 | .726443 | 20.5512 | 10.9099 | 25.8474 |
| DX2859 | 12 | .955642 | 8.14815 | 16.5452 | 18.5185 |
| DX7815 | 10.4418 | .927595 | 3.61446 | 6.55172 | 0 |
| DX280 | 10.2745 | .890313 | 10.0392 | 14.1946 | 9.92366 |
| DX4560 | 7.83132 | .866398 | 6.3253 | 16.5351 | 11.5385 |
| DX792 | 3.38101 | .871769 | 61.1183 | 40.8378 | 7.69231 |
| DX514 | 2.74725 | .851186 | 1.0989 | 12.3919 | 0 |
| DXF819 | 0 | 1 | 100 | 3.88715 | 100 |
| DXE885 | 0 | 1 | 100 | 4.9238 | 100 |
| DXE887 | 0 | 1 | 100 | 5.07005 | 100 |
| DXE960 | 0 | 1 | 100 | 4.51613 | 100 |

(b) Conditions occurring most frequently with one other diagnosis. (Cont.)

Figure A-15. Cluster indices of some frequently occurring conditions (sheet 5 of 7).

(SNGNESS.I) PERCENT ALLEP PDX OCCURS ALONE
(ASNESS.I) PERCENT DX ASSOCIATED
(PRCH.I) PERCENT ALLEP PDX REPEATED
(ASCH.I) PERCENT ALLEP ASDX REPEATED
(SNGCH.I) PERCENT ALLEP PDX REPEATS ALONE

| ICDA | SNGNES.I | ASNESS.I | PRCH.I | ASCH.I | SNGCH.I |
|---|---|---|---|---|---|
| DX5229 | 36.6667 | .987484 | 0 | 8.78749 | 0 |
| DX5236 | 23.3333 | .999069 | 0 | 10.9776 | 0 |
| DX4412 | 22.367 | .597992 | 8.90337 | 15.1095 | 9.70874 |
| DX3442 | 18.8834 | .639645 | 15.1067 | 12.951 | 18.2609 |
| DX7826 | 18.2767 | .802679 | 4.69974 | 14.9551 | 5.71428 |
| DX5699 | 17.3582 | .615059 | 5.53203 | 12.065 | 6.01626 |
| DX2900 | 15.3389 | .578657 | 4.28062 | 6.40693 | 7.75194 |
| DX4130 | 15.1515 | .834699 | 4.40771 | 13.1478 | 1.81818 |
| DX7230 | 14.8649 | .800754 | 10 | 10.6927 | 10.9091 |
| DX7960 | 14.359 | .778241 | 2.90598 | 17.2918 | 3.57143 |
| DX486 | 14.313 | .648836 | 4.18112 | 11.615 | 1.93939 |
| DX8070 | 14.3093 | .619811 | 1.32341 | 9.58904 | 2.89017 |
| DX7853 | 13.9073 | .904551 | 6.62252 | 17.1209 | 19.0476 |
| DX4389 | 13.8118 | .638522 | 5.82261 | 7.7041 | 8.33333 |
| DX428 | 13.6986 | .939116 | 6.84931 | 14.5648 | 10 |
| DX4129 | 13.536 | .596394 | 20.7428 | 10.6341 | 24.2315 |
| DX450 | 13.199 | .675441 | 5.03778 | 11.1111 | 9.54198 |
| DX4339 | 12.8816 | .433378 | 3.75713 | 7.36842 | 4.42708 |
| DX4580 | 12.7551 | .772093 | 2.04082 | 11.8976 | 2 |
| DX491 | 12.7234 | .70879 | 13.7358 | 11.862 | 12.279 |
| DX794 | 12.6829 | .847697 | 5.85366 | 7.62489 | 7.69231 |
| DX5739 | 12.0635 | .778481 | 6.87831 | 13.1888 | 6.14035 |
| DX425 | 12.0249 | .474964 | 22.4603 | 14.9733 | 20.6897 |
| DX7070 | 12.0214 | .789385 | 12.8228 | 11.2378 | 8.88889 |
| DX4120 | 10.933 | .537449 | 13.5028 | 9.84542 | 13.9006 |
| DX4330 | 10.906 | .381422 | 2.93624 | 4.7619 | 2.30769 |
| DX4379 | 10.6944 | .770768 | 4.76432 | 7.552 | 4.2654 |
| DX4272 | 10.4167 | .76 | 0 | 11.1842 | 0 |
| DX2812 | 9.72972 | .851763 | 4.86486 | 8.56068 | 5.55556 |
| DX4370 | 9.52381 | .712919 | 3.80952 | 6.51965 | 2.5 |
| DX4409 | 9.4149 | .79336 | 6.53401 | 8.90384 | 10.7256 |
| DX485 | 9.36876 | .641539 | 1.52824 | 8.91034 | 1.77305 |
| DX2930 | 9.05923 | .308711 | 8.07201 | 7.6723 | 8.33333 |
| DX277 | 8.96674 | .927109 | 6.94774 | 9.81372 | 10.596 |
| DX3441 | 8.93587 | .858152 | 5.59345 | 7.18232 | 6.87023 |
| DX4299 | 7.91367 | .625438 | 8.56115 | 13.3563 | 13.6364 |
| DX4270 | 7.9135 | .844015 | 9.79986 | 15.7731 | 10.4651 |
| DX426 | 7.41482 | .918384 | 7.01403 | 22.5289 | 16.2162 |
| DX2699 | 6.58823 | .907829 | 2.11765 | 9.72289 | 0 |
| DX3093 | 6.22837 | .586907 | 8.16609 | 8.10196 | 8.14815 |
| DX514 | 2.74725 | .851186 | 1.0989 | 12.3919 | 0 |
| DX8069 | 2.46011 | .656464 | 16.0904 | 10.7864 | 13.5135 |
| DX3494 | 2.27273 | .721999 | 13.0165 | 12.0923 | 36.3636 |
| DXF819 | 0 | 1 | 100 | 3.88715 | 100 |
| DXE885 | 0 | 1 | 100 | 4.9238 | 100 |
| DXE887 | 0 | 1 | 100 | 5.07005 | 100 |
| DXE960 | 0 | 1 | 100 | 4.51613 | 100 |

(c) Conditions occurring most frequently with two other diagnoses.

Figure A-15. Cluster indices of some frequently occurring conditions (sheet 6 of 7).

(SNGNES.I) PERCENT ALLEP PDX OCCURS ALONE
(ASNESS.I) PERCENT DX ASSOCIATED
(PRCH.I) PERCENT ALLEP PDX REPEATED
(ASCH.I) PERCENT ALLEP ASDX REPEATED
(SNGCH.I) PERCENT ALLEP PDX REPEATS ALONE

| ICDA | SNGNES.I | ASNESS.I | PRCH.I | ASCH.I | SNGCH.I |
|---|---|---|---|---|---|
| DXE819 | 0 | 1 | 100 | 3.88715 | 100 |
| DXE885 | 0 | 1 | 100 | 4.9238 | 100 |
| DXE887 | 0 | 1 | 100 | 5.07005 | 100 |
| DXE960 | 0 | 1 | 100 | 4.51613 | 100 |
| DX2819 | 19.1358 | .929779 | 8.02469 | 10.2564 | 22.5806 |
| DX3493 | 1.62003 | .770995 | 14.1384 | 12.5109 | 0 |
| DX4290 | 13.4387 | .941217 | 6.71937 | 12.7129 | 5.88235 |
| DX7851 | 10.1695 | .925724 | 2.25989 | 10.9248 | 0 |
| DX7880 | 6.40703 | .869014 | 2.76382 | 13.4444 | 7.84314 |

(d) Conditions occurring most frequently with three other diagnoses.

(SNGNES.I) PERCENT ALLEP PDX OCCURS ALONE
(ASNESS.I) PERCENT DX ASSOCIATED
(PRCH.I) PERCENT ALLEP PDX REPEATED
(ASCH.I) PERCENT ALLEP ASDX REPEATED
(SNGCH.I) PERCENT ALLEP PDX REPEATS ALONE

| ICDA | SNGNES.I | ASNESS.I | PRCH.I | ASCH.I | SNGCH.I |
|---|---|---|---|---|---|
| DX0389 | 8.88889 | .835466 | 1.38889 | 12.2538 | 0 |
| DXE819 | 0 | 1 | 100 | 3.88715 | 100 |
| DXE885 | 0 | 1 | 100 | 4.9238 | 100 |
| DXE887 | 0 | 1 | 100 | 5.07005 | 100 |
| DXE960 | 0 | 1 | 100 | 4.51613 | 100 |

(e) Conditions occurring most frequently with four other diagnoses.

Figure A-15. Cluster indices of some frequently occurring conditions (sheet 7 of 7).

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

| ICDA | TOTPER.I | CUM.I | CLUST.I | SNGNES.I |
|---|---|---|---|---|
| DX582 | 7.59 | 7.59 | 1,687.7 | 76.1018 |
| DX3032 | 5.41 | 13 | 72.7238 | 32.1095 |
| DX4129 | 3.25 | 16.25 | 22.6964 | 13.536 |
| DX2953 | 2.65 | 18.9 | 542.257 | 53.4627 |
| DX29590 | 2.63 | 21.53 | 296.715 | 48.9805 |
| DX25093 | 1.83 | 23.36 | 21.6958 | 16.2328 |
| DX1621 | 1.55 | 24.9099 | 169.37 | 24.0412 |
| DX3000 | 1.44 | 26.3499 | 58.6235 | 31.9813 |
| DX550 | 1.37 | 27.7199 | 126.611 | 46.6532 |
| DX3004 | 1.3 | 29.0199 | 90.9078 | 36.7896 |
| DX492 | 1.29 | 30.3099 | 17.3608 | 12.6116 |
| DX3031 | 1.1 | 31.4099 | 166.355 | 42.7637 |
| DX4120 | 1.07 | 32.4799 | 20.3425 | 10.933 |
| DX600 | 1.07 | 33.5499 | 50.3557 | 31.2789 |
| DX5710 | 1.06 | 34.6099 | 21.9356 | 13.6274 |
| DX3040 | 1.04 | 35.6499 | 317.229 | 60.7815 |
| DX401 | .98 | 36.6299 | 28.7094 | 21.6687 |
| DX491 | .79 | 37.4199 | 17.9509 | 12.7234 |
| DX3749 | .74 | 38.1599 | 93.7618 | 44.0773 |
| DX5932 | .69 | 38.8498 | 141.456 | 63.7884 |
| DX51920 | .68 | 39.5298 | 25.2181 | 16.4061 |
| DX4109 | .66 | 40.1898 | 92.8395 | 27.9952 |
| DX185 | .66 | 40.8498 | 67.7 | 25.424 |
| DXY033 | .59 | 41.4398 | 99.6321 | 56.0639 |
| DX403 | .58 | 42.0198 | 211.723 | 69.8116 |
| DX30181 | .58 | 42.5998 | 73.6167 | 39.7617 |
| DX486 | .57 | 43.1698 | 22.0594 | 14.313 |
| DX455 | .54 | 43.7098 | 89.7411 | 51.7341 |
| DX7855 | .54 | 44.2498 | 105.241 | 38.678 |
| DX5329 | .53 | 44.7798 | 65.4658 | 32.3732 |
| DXY0394 | .52 | 45.2997 | 48.1137 | 38.4571 |
| DX7131 | .52 | 45.8197 | 39.9659 | 28.6287 |
| DX3039 | .5 | 46.3197 | 74.5432 | 36.4194 |
| DX7130 | .5 | 46.8197 | 48.8398 | 34.8197 |
| DX4270 | .43 | 47.2497 | 9.37602 | 7.9135 |
| DX3093 | .43 | 47.6797 | 10.6122 | 6.22837 |
| DX7837 | .42 | 48.0997 | 63.6767 | 25.5765 |
| DX592 | .4 | 48.4997 | 157.864 | 55.9823 |
| DX7531 | .4 | 48.8997 | 225.21 | 68.827 |
| DX7123 | .36 | 49.2597 | 63.9297 | 31.1569 |
| DX535 | .36 | 49.6197 | 38.1936 | 22.7161 |
| DX7062 | .36 | 49.9797 | 163.12 | 78.6795 |
| DX7287 | .35 | 50.3297 | 117.968 | 50.4452 |
| DX72518 | .35 | 50.6796 | 268.127 | 65.4479 |
| DX5699 | .35 | 51.0296 | 26.2219 | 17.3582 |
| DX188 | .35 | 51.3796 | 189.517 | 40.617 |
| DX4369 | .34 | 51.7196 | 28.3353 | 13.7041 |
| DX7802 | .34 | 52.0596 | 33.7297 | 23.913 |
| DX4409 | .33 | 52.3896 | 11.8671 | 9.4149 |
| DX598 | .3 | 52.6896 | 77.4644 | 40.6625 |
| DX4510 | .3 | 52.9896 | 58.4958 | 29.1477 |
| DX29574 | .3 | 53.2896 | 752.624 | 51.2787 |
| DX485 | .3 | 53.5896 | 14.6036 | 9.36876 |
| DX4339 | .29 | 53.8795 | 29.7237 | 12.8816 |
| DX5513 | .29 | 54.1695 | 24.006 | 18.0141 |
| DX493 | .29 | 54.4595 | 62.4421 | 33.631 |
| DX3099 | .29 | 54.7495 | 34.8593 | 22.0532 |
| DX4003 | .28 | 55.0295 | 874.42 | 59.6583 |
| DX5990 | .26 | 55.2895 | 39.3412 | 34.2543 |

Figure A-16. Some cluster indices for the 200 most frequently occurring conditions observed in the VA system (1973) (all episodes) (sheet 1 of 4).

| | | | | |
|---|---|---|---|---|
| DX481 | .26 | 55.5495 | 37.7255 | 17.8775 |
| DX30913 | .26 | 55.8095 | 83.5676 | 28.9433 |
| DX5770 | .26 | 56.0695 | 56.1693 | 24.4693 |
| DX53199 | .25 | 56.3195 | 73.8164 | 31.3043 |
| DX5621 | .24 | 56.5595 | 44.1407 | 30.4681 |
| DX2910 | .24 | 56.7995 | 76.5293 | 32.1718 |
| DX340 | .24 | 57.0395 | 95.7434 | 27.9984 |
| DX5339 | .24 | 57.2795 | 57.0865 | 32.3943 |
| DX1733 | .24 | 57.5195 | 124.145 | 53.9043 |
| DXY101 | .23 | 57.7495 | 113.708 | 99.6594 |
| DXY105 | .23 | 57.9794 | 76.4918 | 48.4375 |
| DX4402 | .22 | 58.1994 | 35.1626 | 21.566 |
| DX274 | .21 | 58.4094 | 25.5993 | 21.408 |
| DX3030 | .2 | 58.6094 | 90.0403 | 43.695 |
| DX504 | .2 | 58.8094 | 142.986 | 56.7713 |
| DX5771 | .2 | 59.0094 | 36.8547 | 19.2896 |
| DX450 | .2 | 59.2094 | 19.5413 | 13.199 |
| DX5512 | .2 | 59.4094 | 77.7459 | 38.6754 |
| DX4379 | .19 | 59.5994 | 13.875 | 10.6944 |
| DX601 | .19 | 59.7894 | 74.9211 | 47.2737 |
| DX5900 | .19 | 59.9794 | 61.2984 | 32.849 |
| DX466 | .19 | 60.1694 | 33.508 | 17.7061 |
| DX4439 | .19 | 60.3593 | 35.4522 | 25.3977 |
| DX604 | .18 | 60.5393 | 100.437 | 46.2076 |
| DX465 | .18 | 60.7193 | 37.2221 | 23.3099 |
| DX7825 | .18 | 60.8993 | 36.8676 | 19.016 |
| DX6824 | .18 | 61.0793 | 71.998 | 34.8993 |
| DX583 | .18 | 61.2593 | 237.886 | 59.4716 |
| DX6929 | .17 | 61.4293 | 57.8752 | 40.7049 |
| DX7893 | .17 | 61.5993 | 63.77 | 38.4483 |
| DX5741 | .17 | 61.7693 | 129.694 | 36.7323 |
| DX2930 | .17 | 61.9393 | 29.3453 | 9.05923 |
| DX404 | .17 | 62.1093 | 141.054 | 37.1512 |
| DX0112 | .17 | 62.2793 | 207.842 | 21.1751 |
| DX3049 | .17 | 62.4493 | 127.38 | 60.1048 |
| DX4540 | .17 | 62.6193 | 119.567 | 46.0105 |
| DX201 | .17 | 62.7893 | 359.371 | 48.5096 |
| DX8240 | .17 | 62.9593 | 152.796 | 35.6083 |
| DX277 | .17 | 63.1293 | 9.67172 | 8.96674 |
| DX685 | .16 | 63.2893 | 431.36 | 75.2695 |
| DX7938 | .16 | 63.4493 | 125.044 | 55.4819 |
| DX4139 | .16 | 63.6093 | 31.0373 | 26.1001 |
| DX342 | .16 | 63.7692 | 34.0635 | 21.5591 |
| DX3579 | .16 | 63.9292 | 36.5523 | 29.437 |
| DX3073 | .16 | 64.0892 | 434.937 | 67.1411 |
| DX8204 | .16 | 64.2492 | 59.6775 | 18.6061 |
| DX791 | .16 | 64.4092 | 57.3214 | 33.0818 |
| DX5320 | .16 | 64.5692 | 124.336 | 32.933 |
| DX566 | .16 | 64.7292 | 220.834 | 62.1913 |
| DX0092 | .15 | 64.8792 | 123.022 | 43.1891 |
| DX150 | .15 | 65.0292 | 263.193 | 33.6781 |
| DX070 | .15 | 65.1792 | 336.727 | 61.2882 |
| DXY104 | .15 | 65.3291 | 137.228 | 58.4807 |
| DX1541 | .15 | 65.4791 | 143.258 | 25.133 |
| DX8069 | .15 | 65.6291 | 3.74751 | 2.46011 |
| DX4360 | .15 | 65.7791 | 33.0485 | 12.9443 |
| DX3451 | .15 | 65.9291 | 36.6172 | 25.8389 |
| DX2952 | .15 | 66.0791 | 427.829 | 45.4423 |
| DX4389 | .15 | 66.2291 | 21.6309 | 13.8118 |
| DX0111 | .15 | 66.3791 | 121.071 | 22.5543 |

Figure A-16. Some cluster indices for the 200 most frequently occurring conditions observed in the VA system (1973) (all episodes) (sheet 2 of 4).

| | | | | |
|---|---|---|---|---|
| DX3441 | .14 | 66.5191 | 10.4129 | 8.93587 |
| DX30013 | .14 | 66.6591 | 108.296 | 41.2969 |
| DX7071 | .14 | 66.7991 | 50.2373 | 28.7868 |
| DX8737 | .14 | 66.9391 | 49.1478 | 25.6887 |
| DX9985 | .14 | 67.0791 | 75.741 | 49.6556 |
| DX425 | .14 | 67.2191 | 25.3174 | 12.0249 |
| DX4549 | .14 | 67.3591 | 76.0728 | 51.325 |
| DX846 | .14 | 67.4991 | 122.881 | 42.0502 |
| DX2500 | .14 | 67.6391 | 60.4311 | 21.5493 |
| DX2914 | .14 | 67.7791 | 207.089 | 36.1429 |
| DX4299 | .14 | 67.9191 | 12.653 | 7.91367 |
| DX3479 | .14 | 68.0591 | 38.7524 | 24.7646 |
| DX2140 | .14 | 68.1991 | 140.579 | 68.9554 |
| DX6961 | .13 | 68.3291 | 49.9727 | 34.2496 |
| DX2961 | .13 | 68.4591 | 460.579 | 50.1499 |
| DX8202 | .13 | 68.5891 | 61.8739 | 14.7866 |
| DX4444 | .13 | 68.7191 | 58.8712 | 32.0855 |
| DX7830 | .13 | 68.849 | 103.678 | 38.7615 |
| DX595 | .13 | 68.979 | 40.5806 | 30.6279 |
| DX3092 | .13 | 69.109 | 57.4147 | 19.305 |
| DX2915 | .13 | 69.239 | 145.934 | 25.0386 |
| DX5969 | .13 | 69.369 | 37.9582 | 29.6267 |
| DX280 | .13 | 69.499 | 11.5403 | 10.2745 |
| DX4589 | .12 | 69.619 | 36.4811 | 26.0208 |
| DX203 | .12 | 69.739 | 136.677 | 28.4455 |
| DX605 | .12 | 69.859 | 146.449 | 61.4827 |
| DX4100 | .12 | 69.979 | 71.6643 | 18.7908 |
| DX5749 | .12 | 70.099 | 56.3686 | 33.2785 |
| DX8070 | .12 | 70.219 | 23.0866 | 14.3093 |
| DX7245 | .12 | 70.339 | 359.079 | 64.0599 |
| DX4330 | .12 | 70.459 | 28.5931 | 10.906 |
| DX4274 | .12 | 70.5789 | 21.5407 | 18.9873 |
| DX3017 | .11 | 70.6889 | 89.6371 | 41.5371 |
| DX603 | .11 | 70.7989 | 74.0411 | 46.5778 |
| DX7070 | .11 | 70.9089 | 15.2288 | 12.0214 |
| DX9989 | .11 | 71.0189 | 39.4143 | 28.4821 |
| DX5692 | .11 | 71.1289 | 59.9677 | 41.0555 |
| DX8230 | .11 | 71.2389 | 84.6351 | 28.9234 |
| DX1619 | .11 | 71.3488 | 196.777 | 38.2218 |
| DX4279 | .11 | 71.4588 | 25.8441 | 22.0876 |
| DX1519 | .1 | 71.5588 | 141.285 | 26.4706 |
| DX575 | .1 | 71.6588 | 85.4083 | 36.3811 |
| DX3782 | .1 | 71.7588 | 123.524 | 55.2224 |
| DX2962 | .1 | 71.8588 | 215.346 | 48.3431 |
| DX7871 | .1 | 71.9588 | 69.7304 | 41.332 |
| DX402 | .1 | 72.0588 | 38.4396 | 20.5304 |
| DXY106 | .1 | 72.1588 | 63.5297 | 42.8713 |
| DX500 | .1 | 72.2588 | 431.993 | 83.8454 |
| DX191 | .1 | 72.3587 | 307.957 | 52.3476 |
| DX2951 | .1 | 72.4587 | 139.289 | 25.3253 |
| DX3046 | .1 | 72.5587 | 73.1032 | 41.3828 |
| DX3459 | .1 | 72.6587 | 35.0535 | 24.1692 |
| DX72899 | .1 | 72.7587 | 76.6317 | 44.4444 |
| DX01199 | .1 | 72.8587 | 42.6391 | 25.278 |
| DX7831 | .1 | 72.9587 | 41.6528 | 22.8977 |
| DX3055 | .1 | 73.0587 | 78.6654 | 33.7398 |
| DX3940 | .1 | 73.1587 | 44.178 | 17.7254 |
| DX5609 | .1 | 73.2587 | 72.4132 | 35.2518 |
| DX4329 | .09 | 73.3487 | 43.4505 | 24.0876 |
| DX2954 | .09 | 73.4387 | 1,097.62 | 58 |

Figure A-16. Some cluster indices for the 200 most frequently occurring conditions observed in the VA system (1973) (all episodes) (sheet 3 of 4).

| | | | | |
|---|---|---|---|---|
| DX7201 | .09 | 73.5287 | 96.8196 | 41.8335 |
| DX1890 | .09 | 73.6187 | 74.3309 | 16.6667 |
| DX5739 | .09 | 73.7086 | 15.4962 | 12.0635 |
| DX2950 | .09 | 73.7986 | 178.154 | 47.4522 |
| DX517 | .09 | 73.8886 | 29.1983 | 22.1041 |
| DX5301 | .09 | 73.9786 | 25.1712 | 18.6495 |
| DX7805 | .09 | 74.0686 | 46.3417 | 27.1751 |
| DX1538 | .09 | 74.1586 | 110.983 | 24.2128 |
| DX4412 | .09 | 74.2486 | 37.4035 | 22.367 |
| DX3959 | .09 | 74.3386 | 33.5296 | 22.2464 |
| DX5719 | .09 | 74.4286 | 35.0807 | 23.0098 |
| DX3041 | .09 | 74.5186 | 86.3584 | 45.614 |
| DX8360 | .09 | 74.6086 | 270.606 | 53.6424 |
| DX2955 | .09 | 74.6986 | 281.154 | 57.0313 |
| DX2956 | .09 | 74.7886 | 285.071 | 48.6577 |
| DX7886 | .09 | 74.8786 | 30.1818 | 21.1646 |
| DX43599 | .09 | 74.9686 | 55.7936 | 27.8027 |
| DX470 | .09 | 75.0586 | 57.7625 | 27.6018 |
| DX5651 | .09 | 75.1486 | 155.213 | 50.7428 |
| DX2001 | .09 | 75.2386 | 176.577 | 31.6032 |
| DX1533 | .08 | 75.3186 | 111.584 | 23.4266 |

Figure A-16. Some cluster indices for the 200 most frequently occurring conditions observed in the VA system (1973) (all episodes) (sheet 4 of 4).

Note that in this tabulation, the first eight primary diagnostic codes include 26 percent of the total population of episodes. The first 43 codes represent 51 percent of the record population, and the 200 codes account for more than 75 percent of the record population.

One diagnostic-cluster analysis was performed. Forty-two diagnoses were selected from Figure A-16 because they either occurred seldomly as a sole diagnosis but frequently as an associated diagnosis (CLUST.I < 30); or frequently appeared as an associated diagnosis, and also enjoyed frequent occurrence as a primary diagnosis.

For each of these diagnoses, cross-tabulation of occurrence with the 316 conditions identified in Figure A-15 was performed. The logical flowchart of this analysis is shown in Figure A-17. The analysis results were used to prepare Figure A-18 which indicates, for each of the 42 selected conditions, the four diagnostic codes which associated most frequently (from the set of 316 most frequently occurring conditions) and the percentage of occurrence frequency. The population of records representing all cases of paired diagnoses (total number of diagnoses this record equals 2) in the NR population were used. Considering the situation when a first or second associated diagnosis occurs more than 10 percent of the time in the population of NR record with two and only two diagnostic codes, we arrive at Table A-8. Perhaps what we see here are common expansions of the individual patient's diagnostic statement which convey, as couplets, more information than the sum of the information conveyed by each. Further analysis of this type may be especially helpful in distinguishing "information packets" which are related to analysis questions addressed by the clinician. This may be especially helpful in the realm of ambulatory care when the diagnostic statement is not well-developed, and a statement of pathology is seldom available.

## A.7 A Prototype Quality-Surveillance Index

During the course of 1975, an HEW committee, chaired by David D. Rutstein, MD, has been developing a systematized nomenclature for those conditions where the clinical knowledge base and the available clinical resources suggest definitive identification of unnecessary disease, disability, and untimely death. An early version of this index, derived from the working papers of the committee, was applied to the NR record population of our data base. Although case disposition

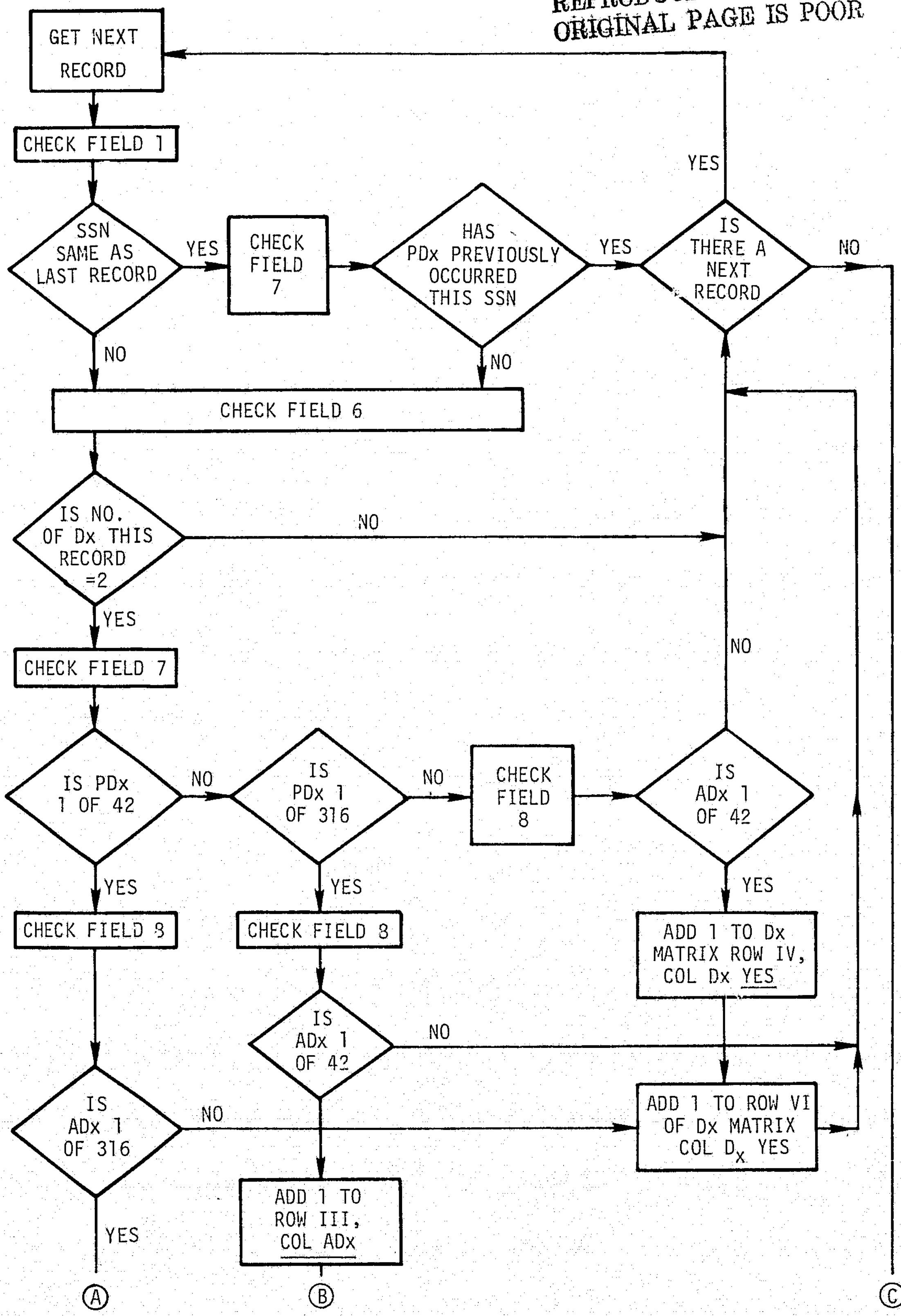



Figure A-17. Flowchart for preparation of Dx cross-tabulation matrix and cluster table (see Figure A-18) (sheet 1 of 3).

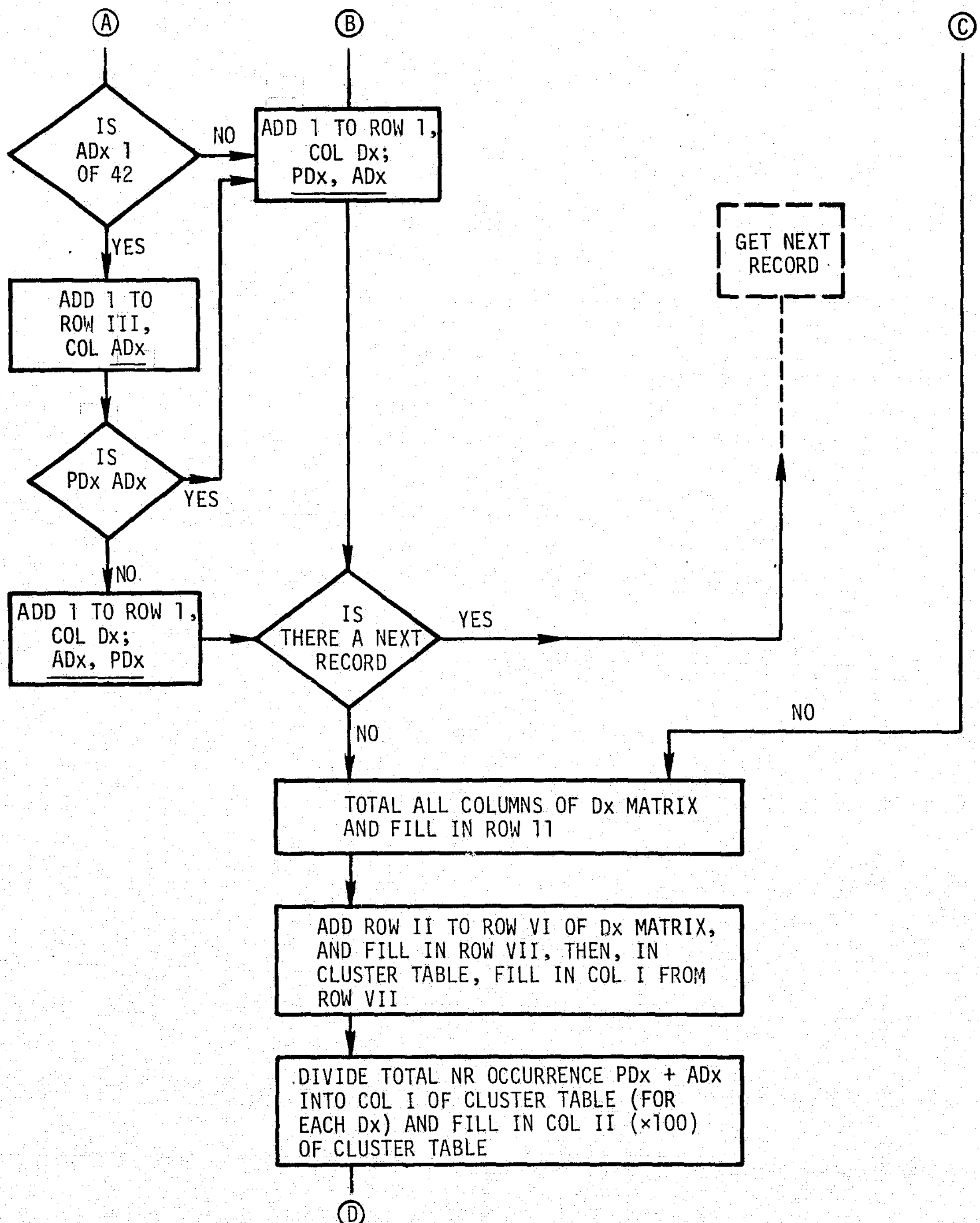



Figure A-17. Flowchart for preparation of Dx cross-tabulation matrix and cluster table (see Figure A-18) (sheet 2 of 3).

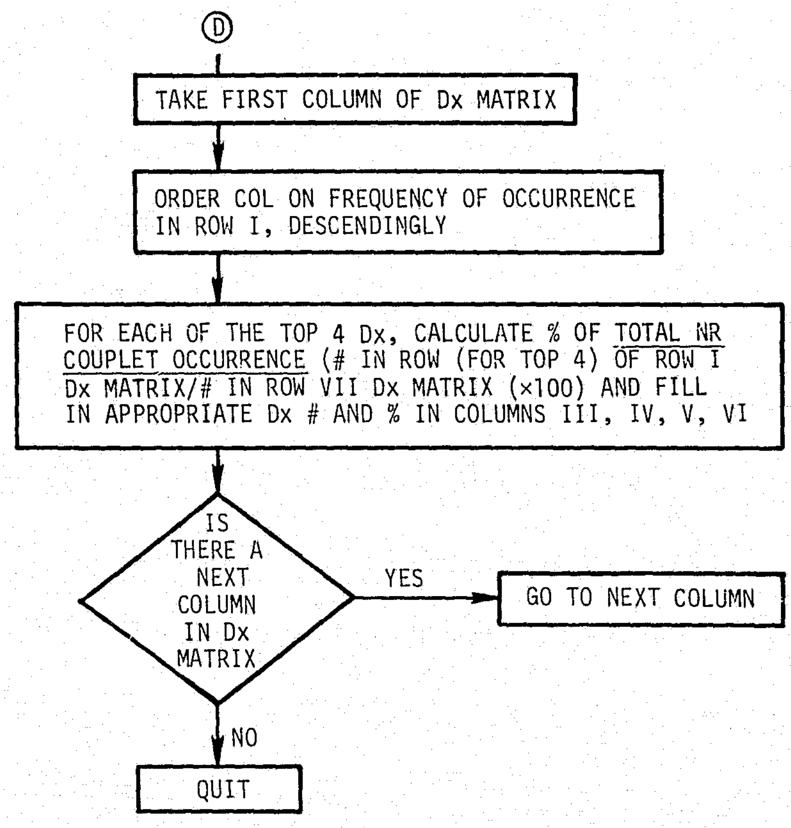



Figure A-17. Flowchart for preparation of Dx cross-tabulation matrix and cluster table (see Figure A-18) (sheet 3 of 3).

| ICDA | TOT OCC PDx+ADx | % COL 1 TOT NR | MOST Dx | FREQ. % | 2ND Dx | FREQ. % | 3RD Dx | FREQ. % | 4TH Dx | FREQ. % |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | | 4 | | 5 | | 6 | |
| Y035 | 2716 | 23.70 | 600 | 3.79 | Y039 | 2.65 | 4129 | 2.25 | 2509 | 2.14 |
| Y101 | 188 | 43.82 | 582 | 71.28 | 403 | 4.79 | 5900 | 4.79 | 2509 | 3.19 |
| 2140 | 309 | 20.02 | 7062 | 7.47 | 550 | 6.29 | 401 | 4.13 | 2509 | 3.54 |
| 2509 | 10533 | 16.49 | 4129 | 5.51 | 3032 | 4.05 | 401 | 3.78 | 2959 | 3.09 |
| 274 | 1263 | 11.22 | 401 | 10.85 | 4120 | 5.62 | 3032 | 4.91 | 4129 | 4.59 |
| 277 | 2489 | 11.92 | 401 | 8.24 | 4129 | 5.06 | 2959 | 3.98 | 3032 | 3.82 |
| 280 | 931 | 9.28 | 3032 | 5.80 | 5699 | 5.26 | 5320 | 4.51 | 5710 | 3.76 |
| 2930 | 344 | 15.00 | 4129 | 9.01 | 485 | 8.43 | 600 | 4.36 | 4379 | 3.78 |
| 3049 | 845 | 28.96 | 2959 | 7.81 | 3018 | 7.22 | 2953 | 6.15 | 3032 | 6.15 |
| 3093 | 797 | 8.27 | 4379 | 12.30 | 4129 | 10.79 | 4409 | 7.53 | 4120 | 2.26 |
| 3441 | 955 | 9.94 | 4339 | 11.30 | 4369 | 8.58 | 401 | 3.56 | 7815 | 3.56 |
| 401 | 6584 | 18.06 | 3032 | 6.87 | 3000 | 3.51 | 550 | 2.57 | 7830 | 2.55 |
| 4120 | 2547 | 12.27 | 4270 | 6.32 | 4130 | 4.28 | 492 | 3.57 | 3032 | 3.06 |
| 4129 | 8920 | 12.83 | 4139 | 8.63 | 4270 | 6.28 | 492 | 3.99 | 3000 | 2.98 |
| 425 | 287 | 12.84 | 4270 | 15.68 | 3032 | 10.45 | 4274 | 5.23 | 5710 | 4.53 |
| 4270 | 1289 | 5.43 | 492 | 9.78 | 4109 | 7.45 | 4274 | 4.50 | 5192 | 3.49 |
| 4274 | 541 | 6.19 | 3940 | 7.76 | 3032 | 5.55 | 492 | 3.33 | 600 | 2.03 |
| 4279 | 621 | 9.62 | 4109 | 4.83 | 7825 | 4.03 | 3000 | 3.38 | 3032 | 3.38 |
| 4299 | 316 | 9.63 | 600 | 4.43 | 3032 | 3.80 | 3000 | 3.16 | 4109 | 2.53 |
| 4330 | 158 | 8.51 | 7815 | 9.49 | 4360 | 5.70 | 402 | 4.43 | 486 | 4.43 |
| 4339 | 480 | 9.64 | 7815 | 5.83 | 4379 | 5.42 | 4369 | 5.21 | 4329 | 5.00 |
| 4369 | 663 | 10.46 | 7815 | 7.39 | 486 | 4.52 | 5990 | 3.32 | 3032 | 3.02 |
| 4379 | 465 | 5.73 | 4409 | 5.83 | 3099 | 3.02 | 600 | 3.02 | 4329 | 2.81 |
| 4389 | 386 | 10.16 | 7815 | 6.99 | 5990 | 3.11 | 550 | 2.59 | 600 | 2.59 |
| 4409 | 886 | 5.94 | 4444 | 5.30 | 3099 | 3.61 | 4109 | 3.05 | 492 | 3.05 |
| 450 | 595 | 10.71 | 4510 | 17.48 | 4109 | 6.22 | 492 | 2.52 | Y039 | 2.02 |
| 485 | 740 | 9.40 | 492 | 10.54 | 3032 | 5.95 | 1621 | 5.81 | 491 | 3.92 |
| 486 | 1774 | 11.83 | 492 | 6.76 | 3032 | 6.48 | 1621 | 4.74 | 5192 | 3.49 |
| 491 | 2720 | 11.30 | 492 | 15.11 | 3032 | 9.89 | 426 | 3.20 | 3000 | 2.76 |
| 492 | 4511 | 10.90 | 3032 | 7.56 | 426 | 4.83 | 466 | 3.28 | 1621 | 3.19 |
| 517 | 303 | 8.67 | 3032 | 5.28 | 426 | 4.95 | 5192 | 3.96 | 550 | 3.63 |
| 5192 | 2011 | 11.81 | 3032 | 7.51 | 1621 | 3.93 | 426 | 3.23 | 550 | 2.69 |
| 5301 | 472 | 14.36 | 5513 | 32.42 | 535 | 8.05 | 3032 | 4.24 | 3000 | 2.33 |
| 5513 | 1156 | 10.64 | 5329 | 5.88 | 3000 | 5.02 | 3032 | 4.84 | 535 | 4.41 |
| 5699 | 949 | 11.40 | 3032 | 10.22 | 5710 | 10.01 | 535 | 5.80 | 5621 | 5.06 |
| 5710 | 3582 | 14.33 | 3032 | 34.00 | 5739 | 3.96 | 4560 | 3.88 | 2910 | 3.55 |
| 5739 | 232 | 6.17 | 3032 | 28.45 | 3040 | 6.90 | 5719 | 4.31 | 3039 | 3.02 |
| 5932 | 516 | 8.43 | 600 | 10.08 | 592 | 5.62 | 185 | 3.88 | 188 | 2.33 |
| 7062 | 1047 | 15.82 | 3032 | 6.88 | 550 | 4.78 | 2959 | 2.67 | 455 | 2.58 |
| 7070 | 327 | 6.94 | 340 | 11.93 | 3442 | 11.93 | 8069 | 5.50 | 3493 | 4.59 |
| 8069 | 287 | 7.50 | 3494 | 17.77 | 3493 | 13.24 | 5969 | 4.18 | 5990 | 4.18 |
| 8070 | 396 | 13.31 | E887 | 10.35 | 3032 | 10.35 | E885 | 3.03 | E819 | 2.53 |

Figure A-18. Frequency of association of 42 selected conditions with the 312 most frequently occurring diagnoses observed in VA inpatient population (1973).

Table A-8. Summary of paired diagnoses occurring together more than 10 percent of the time (VA inpatient NR population, 1973).

| | Most Frequent Association | | Second Most Frequent Association | |
|---|---|---|---|---|
| ICDA-8 Diagnosis | Diagnosis | % | Diagnosis | % |
| Gout | Essential Hypertension | 11 | | |
| Mental Disorder Associated with Circulatory Problem | General Ischemic Cerebrovascular Disease | 12 | CIHD without Hypertension | 11 |
| Hemiplegia | Cerebral Thrombosis without Hypertension | 11 | | |
| Cardiomyopathy | Congestive Heart Failure | 16 | Chronic Alcoholism | 11 |
| Pulmonary Embolism | Congestive Heart Failure | 18 | | |
| Unspecified Bronchopneumonia | Emphysema | 11 | | |
| Chronic Bronchitis | Emphysema | 15 | Chronic Alcoholism | 10 |
| Inflammatory Disease of Esophagus | Diaphragmatic Hernia | 32 | | |
| Intestinal Fistula | Chronic Alcoholism | 10 | Alcoholic Cirrhosis | 10 |
| Alcoholic Cirrhosis | Chronic Alcoholism | 34 | | |
| Other Disease of Liver | Chronic Alcoholism | 29 | | |
| Other Renal Disease | Hyperplasia of Prostate | 10 | | |
| Decubitus Ulcer | Multiple Sclerosis | 12 | Paraplegic | 12 |
| Late Effects of Spinal Fracture | Quadriplegic | 18 | Paraplegic | 13 |
| Closed Rib Fracture | Fall | 10 | Chronic Alcoholism | 10 |

(life-death) was not included in our data base, this information was available from previous analysis for a few of the conditions. The results of this tabulation are presented in Table A-9. PDx, ADx, and total (PDx + ADx) occurrence is indicated, together with associated occurrence rates per 100,000 in the observed population of inpatients who presented themselves for VA care.

Table A-9. Occurrence and occurrence rates of some quality-surveillance indices as observed in the VA system (1973) (sheet 1 of 6).

| Name | ICDA | Total Occur | Rate | PDx Occur | Rate | ADx Occur | Rate | PDx Occur All/NR | Deaths with ICDA as Principal Diagnosis | | | | | Total <65 | PDx Pop Rate* | Total Pop. Rate* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | <25 | 25-34 | 35-44 | 45-54 | 55-64 | | | |
| • Cholera | 000 | 6 | 0.75 | 3 | 0.37 | 3 | 0.37 | 1— | | | | | | | | |
| • Typhoid Fever | 001 | 5 | 0.62 | 2 | 0.25 | 3 | 0.37 | 1— | | | | | | | | |
| Paratyphoid Fever | 002 | 1 | 0.13 | 1 | 0.13 | 0 | — | 1— | | | | | | | | |
| • Salmonella (food as vehicle) | 003.0 | 3 | 0.37 | 3 | 0.37 | 0 | — | 1— | | | | | | | | |
| • Bacillary Dysentery | 004 | 22 | 2.74 | 15 | 1.87 | 7 | 0.87 | 1— | | | | | | | | |
| Food Poisoning (bacterial) | 005 | 34 | 4.24 | 24 | 2.99 | 10 | 1.25 | 1— | | | | | | | | |
| • Tuberculosis (all forms) | | 10,409 | 1,298.18 | 5,866 | 731.59 | 4,543 | 566.59 | not computed | 0 | 3 | 17 | 87 | 85 | 192 | 32.73 | 18.45 |
| • Silicotuberculosis | 010 | 92 | 11.47 | 47 | 5.86 | 45 | 5.61 | 1.128 | | | | | | | | |
| TB of Meninges and CNS | 013 | 45 | 5.61 | 18 | 2.25 | 27 | 3.37 | 1.111 | | | | | | | | |
| Plague | 020 | 2 | 0.25 | 2 | 0.25 | 0 | — | 1— | | | | | | | | |
| Tularemia | 021 | 23 | 2.87 | 17 | 2.12 | 6 | 0.75 | 1.235 | | | | | | | | |
| Anthrax | 022 | | | NOT FOUND IN INDEX | | | | | | | | | | | | |
| Rat-Bite Fever | 026 | | | NOT FOUND IN INDEX | | | | | | | | | | | | |
| • Diphtheria | 032 | 17 | 2.12 | 5 | 0.62 | 12 | 1.50 | 1— | | | | | | | | |
| • Whooping Cough | 033 | | | NOT FOUND IN INDEX | | | | | | | | | | | | |
| • Strep. Throat and Scarlet Fever | 034 | 277 | 34.55 | 122 | 15.22 | 155 | 19.33 | 1— | | | | | | | | |
| Meningococcal Meningitis | 036.0 | 32 | 3.99 | 20 | 2.49 | 12 | 1.50 | 1.300 | | | | | | | | |
| • Tetanus | 037 | 4 | 0.50 | 0 | — | 4 | 0.50 | — | | | | | | | | |
| • Acute Paralytic Bulbar Polio | 040 | 1 | 0.13 | 0 | — | 1 | 0.13 | — | | | | | | | | |
| • Acute Polio with Other Paralysis | 041 | 4 | 0.50 | 2 | 0.25 | 2 | 0.25 | 1— | | | | | | | | |
| • Acute Nonparalytic Polio | 042 | | | NOT FOUND IN INDEX | | | | | | | | | | | | |
| • Acute Polio Unspecified | 043 | 5 | 0.62 | 1 | 0.13 | 4 | 0.50 | 1— | | | | | | | | |
| • Late Effects of Polio | 044 | 131 | 16.34 | 34 | 4.24 | 97 | 12.10 | 1.059 | | | | | | | | |
| • Smallpox | 050 | | | NOT FOUND IN INDEX | | | | | | | | | | | | |
| • Measles | 055 | 8 | 1.00 | 6 | 0.75 | 2 | 0.25 | 1— | | | | | | | | |
| • Rubella | 056 | 5 | 0.62 | 2 | 0.25 | 3 | 0.37 | 1— | | | | | | | | |

Table A-9. Occurrence and occurrence rates of some quality-surveillance indices as observed in the VA system (1973) (sheet 2 of 6).

| Name | ICDA | Total Occur | Rate | PDx Occur | Rate | ADx Occur | Rate | PDx Occur All/NR | Deaths with ICDA as Principal Diagnosis | | | | | Total <65 | PDx Pop. Rate* | Total Pop. Rate* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | <25 | 25-34 | 35-44 | 45-54 | 55-64 | | | |
| • Yellow Fever | 060 | | | NOT FOUND IN INDEX | | | | | | | | | | | | |
| • Infectious Hepatitis | 070 | 1,794 | 223.74 | 1,487 | 185.45 | 307 | 38.29 | 1.034 | 3 | 1 | 0 | 3 | 3 | 10 | 6.77 | 5.57 |
| • Psittacosis | 073 | 5 | 0.62 | 4 | 0.50 | 1 | 0.13 | 1— | | | | | | | | |
| Louse-Borne Typhus | 080 | | | NOT FOUND IN INDEX | | | | | | | | | | | | |
| Flea-Borne Typhus | 081.0 | | | NOT FOUND IN INDEX | | | | | | | | | | | | |
| Spotted Fevers | 082.0 | 9 | 1.12 | 8 | 1.00 | 1 | 0.13 | 1— | | | | | | | | |
| Malaria | 084 | 114 | 14.22 | 62 | 7.73 | 52 | 6.49 | 1.032 | | | | | | | | |
| • Congenital Syphilis | 090 | 55 | 6.86 | 9 | 1.12 | 46 | 5.74 | 1— | | | | | | | | |
| • Early Syphilis (symptomatic) | 091 | 172 | 21.45 | 54 | 6.74 | 118 | 14.72 | 1— | | | | | | | | |
| • Cardiovascular Syphilis | 093 | 228 | 28.44 | 95 | 11.85 | 133 | 16.59 | 1.253 | 0 | 0 | 0 | 2 | 3 | 5 | 52.63 | 21.93 |
| • Syphilis of CNS | 094 | 485 | 60.49 | 131 | 16.34 | 354 | 44.15 | 1.061 | 0 | 0 | 0 | 1 | 2 | 3 | 22.90 | 6.19 |
| Gonococcal Infections | 098 | 651 | 81.19 | 163 | 20.33 | 488 | 60.86 | 1.031 | | | | | | | | |
| Yaws | 102 | 11 | 1.37 | 3 | 0.37 | 8 | 1.00 | 1— | | | | | | | | |
| Trichiniasis | 124 | 9 | 1.12 | 3 | 0.37 | 6 | 0.75 | 1— | | | | | | | | |
| Hookworm | 126 | 94 | 11.72 | 27 | 3.37 | 67 | 8.36 | 1.037 | | | | | | | | |
| Ascariasis | 127.0 | 15 | 1.87 | 5 | 0.62 | 10 | 1.25 | 1— | | | | | | | | |
| • Malignant Neoplasm Lip | 140 | 476 | 59.37 | 375 | 46.77 | 101 | 12.60 | 1.109 | | | | | | | | |
| • Malignant Neoplasm Buccal Mucosa | 145.0 | 178 | 22.20 | 135 | 16.84 | 43 | 5.36 | 1.319 | | | | | | | | |
| Malignant Neoplasm Large Intestine (not rectum) | 153 | 3,050 | 380.39 | 2,315 | 288.72 | 735 | 91.67 | 1.242 | | | | | | | | |
| • Malignant Neoplasm Rectum and Rectosigmoid Junction | 154 | 1,732 | 216.01 | 1,369 | 170.74 | 363 | 45.27 | 1.318 | | | | | | | | |
| • Malignant Neoplasm Larynx | 161 | 2,137 | 266.52 | 1,652 | 206.03 | 485 | 60.49 | 1.288 | 0 | 0 | 5 | 72 | 114 | 191 | 115.62 | 89.38 |
| • Malignant Neoplasm Trachea, Bronchus, Lung | 162 | 13,118 | 1,644.76 | 10,769 | 1,343.08 | 2,349 | 292.96 | 1.465 | 2 | 9 | 180 | 1,241 | 1,799 | 3,231 | 300.03 | 246.30 |
| Malignant Neoplasm Pleura | 163.0 | 48 | 5.99 | 32 | 3.99 | 16 | 2.00 | 1.688 | | | | | | | | |
| • Malignant Neoplasm Skin (not melanoma) | 173 | 7,209 | 899.08 | 3,910 | 487.64 | 3,299 | 411.44 | 1.119 | | | | | | | | |
| • Malignant Neoplasm Cervix Uteri | 180 | 57 | 7.11 | 39 | 4.86 | 18 | 2.25 | 1.462 | | | | | | | | |
| Malignant Neoplasm Vagina | 184.0 | | | NOT FOUND IN INDEX | | | | | | | | | | | | |

Table A-9. Occurrence and occurrence rates of some quality-surveillance indices as observed in the VA system (1973) (sheet 3 of 6).

| Name | ICDA | Total Occur | Rate | PDx Occur | Rate | ADx Occur | Rate | PDx Occur All/NR | Deaths with ICDA as Principal Diagnosis <25 | 25-34 | 35-44 | 45-54 | 55-64 | Total <65 | PDx Pop. Rate* | Total Pop. Rate* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Malignant Neoplasm Bladder | 188 | 3,104 | 387.12 | 2,255 | 281.24 | 849 | 105.89 | 1.553 | | | | | | | | |
| Malignant Neoplasm Thyroid Gland | 193 | 189 | 23.57 | 135 | 16.84 | 54 | 6.74 | 1.341 | | | | | | | | |
| Hodgkin's Disease | 201 | 1,008 | 125.72 | 778 | 97.03 | 230 | 28.69 | 2.199 | | | | | | | | |
| Acute Lymphatic Leukemia | 204.0 | 63 | 7.86 | 52 | 6.49 | 11 | 1.37 | 2.096 | | | | | | | | |
| Myeloid Leukemia | 205 | 827 | 103.14 | 623 | 77.70 | 204 | 25.44 | 1.987 | | | | | | | | |
| Endemic Goiter | 240.0 | | | NOT FOUND IN INDEX | | | | | | | | | | | | |
| Thyrotoxicosis (with or without goiter) | 242 | 1,345 | 167.74 | 752 | 93.79 | 593 | 73.96 | 1.242 | | | | | | | | |
| Cretinism (Congenital) | 243 | 13 | 1.62 | 7 | 0.87 | 6 | 0.75 | 1— | | | | | | | | |
| Myxedema | 244 | 1,984 | 247.44 | 424 | 52.88 | 1,560 | 194.56 | 1.137 | | | | | | | | |
| Diabetes with Acidosis or Coma | 250.0 | 1,992 | 248.44 | 1,277 | 159.26 | 715 | 89.17 | 1.112 | | | | | | | | |
| • Avitaminosis and Nutritional Deficiency | 260-269 | 6,757 | 842.71 | 948 | 118.23 | 5,809 | 724.48 | 1.056 | 0 | 0 | 5 | 15 | 31 | 51 | 49.56 | 6.92 |
| • Nutritional Marasmus | 268 | 617 | 76.95 | 81 | 10.10 | 536 | 66.85 | 1.012 | | | | | | | | |
| Hypervitaminosis A | 278.0 | 1 | 0.13 | 0 | — | 1 | 0.13 | — | | | | | | | | |
| Hypervitaminosis D | 278.2 | 2 | 0.25 | 0 | — | 2 | 0.25 | — | | | | | | | | |
| • Iron Deficiency Anemias | 280 | 10,027 | 1,250.54 | 1,147 | 143.05 | 8,880 | 1,107.49 | 1.112 | 0 | 0 | 1 | 7 | 2 | 10 | 8.72 | 1.00 |
| Pernicious Anemia | 281.0 | 796 | 99.28 | 240 | 29.93 | 556 | 69.34 | 1.096 | 0 | 0 | 0 | 2 | 1 | 3 | 12.50 | 3.77 |
| Other $B_{12}$ Deficiency Anemias | 281.1 | 109 | 13.59 | 13 | 1.62 | 96 | 11.97 | 1— | | | | | | | | |
| Folic Acid Deficiency Anemia | 281.2 | 1,148 | 143.18 | 176 | 21.95 | 972 | 121.23 | 1.051 | | | | | | | | |
| Vitamin $B_6$ Deficiency Anemia | 281.3 | 5 | 0.62 | 3 | 0.37 | 2 | 0.25 | 1— | | | | | | | | |
| Aplastic Anemia | 284 | 632 | 78.82 | 219 | 27.31 | 413 | 51.51 | 2.251 | | | | | | | | |
| Alcoholic Psychoses | 291 | 7,903 | 985.64 | 5,209 | 649.65 | 2,694 | 335.99 | 1.081 | 0 | 1 | 13 | 45 | 44 | 103 | 19.77 | 13.03 |
| Alcoholism | 303 | 106,334 | 13,261.63 | 58,342 | 7,273.98 | 47,992 | 5,985.41 | 1.256 | 0 | 6 | 88 | 244 | 176 | 514 | 8.81 | 4.83 |
| Drug Dependence | 304 | 24,378 | 3,040.35 | 14,096 | 1,758.01 | 10,282 | 1,282.33 | 1.186 | | | | | | | | |
| Enuresis | 306.6 | 17 | 2.12 | 4 | 0.50 | 13 | 1.62 | 1.000 | | | | | | | | |
| Mental Retardation | 310-315 | 766 | 95.53 | 204 | 25.44 | 562 | 70.09 | 1.088 | 0 | 0 | 0 | 0 | 1 | 1 | 4.90 | 1.31 |
| • Influenzal Meningitis | 320.0 | 2 | 0.25 | 2 | 0.25 | 0 | — | 1.000 | | | | | | | | |
| Epilepsy | 345.1 | 4,333 | 540.39 | 1,320 | 164.63 | 3,013 | 375.77 | 1.129 | 0 | 0 | 5 | 11 | 9 | 25 | 18.94 | 5.77 |

Table A-9. Occurrence and occurrence rates of some quality-surveillance indices as observed in the VA system (1973) (sheet 4 of 6).

| Name | ICDA | Total Occur | Rate | PDx Occur | Rate | ADx Occur | Rate | PDx Occur All/NR | <25 | 25-34 | 35-44 | 45-54 | 55-64 | Total <65 | PDxPop. Rate* | Total Pop. Rate* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| • Glaucoma, Chronic, Primary | 375.0 | 309 | 38.54 | 169 | 21.08 | 140 | 17.46 | 1.130 | | | | | | | | |
| Otitis Media without Mastoiditis | 381 | 2,761 | 344.34 | 1,139 | 142.05 | 1,622 | 202.29 | 1.082 | | | | | | | | |
| Otitis Media with Mastoiditis | 382 | 243 | 30.31 | 140 | 17.46 | 103 | 12.85 | 1.043 | | | | | | | | |
| Mastoiditis without Otitis Media | 383 | 189 | 23.57 | 86 | 10.73 | 103 | 12.85 | 1.035 | | | | | | | | |
| Active Rheumatic Fever | 390-392 | 326 | 40.66 | 192 | 23.95 | 134 | 16.71 | 1.068 | | | | | | | | |
| • Hypertensive Disease | | 43,561 | 5,432.79 | 12,760 | 1,591.39 | 30,801 | 3,841.40 | 1.719 | | | | | | | | |
| Acute MI with Hypertension | 410.0 | 1,570 | 195.81 | 1,176 | 146.67 | 394 | 49.14 | 1.041 | | | | | | | | |
| Other Ischemic Heart Diseases with Hypertension | 411.0 | 274 | 34.17 | 117 | 14.59 | 157 | 19.58 | 1.009 | | | | | | | | |
| Angina with Hypertension | 413.0 | 1,939 | 241.83 | 347 | 43.28 | 1,592 | 198.55 | 1.046 | | | | | | | | |
| • Pulmonary Heart Disease | 426 | 4,814 | 600.39 | 464 | 57.87 | 4,350 | 542.52 | 1.075 | | | | | | | | |
| Subarachnoid Hemorrhage with Hypertension | 430.0 | 146 | 18.21 | 101 | 12.60 | 45 | 5.61 | 1.020 | | | | | | | | |
| Cerebral Hemorrhage with Hypertension | 431.0 | 329 | 41.03 | 238 | 29.68 | 91 | 11.35 | 1.004 | | | | | | | | |
| Occlusion Precerebral Arteries with Hypertension | 432.0 | 506 | 63.11 | 229 | 28.56 | 277 | 34.55 | 1.022 | | | | | | | | |
| Cerebral Thrombosis with Hypertension | 433.0 | 1,857 | 231.60 | 1,157 | 144.30 | 700 | 87.30 | 1.030 | | | | | | | | |
| Cerebral Embolism with Hypertension | 434.0 | 73 | 9.10 | 28 | 3.49 | 45 | 5.61 | 1.036 | | | | | | | | |
| Trans. Cerebral Ischemia with Hypertension | 435.0 | 538 | 67.10 | 291 | 36.29 | 247 | 30.81 | 1.045 | | | | | | | | |
| Ill-Defined CV Disease with Hypertension | 436.0 | 2,314 | 288.60 | 1,438 | 179.34 | 876 | 109.25 | 1.037 | | | | | | | | |
| General CV Disease with Hypertension | 437.0 | 1,379 | 171.98 | 404 | 50.39 | 975 | 121.60 | 1.040 | | | | | | | | |
| Other CV Disease with Hypertension | 438.0 | 1,318 | 164.38 | 550 | 68.59 | 768 | 95.78 | 1.053 | | | | | | | | |
| Pulmonary Embolism and Infarction | 450 | 5,557 | 693.05 | 1,885 | 235.09 | 3,672 | 457.96 | 1.053 | | | | | | | | |
| • Acute Respiratory Infection (not flu) | 460-466 | 11,640 | 1,451.70 | 5,017 | 625.70 | 6,623 | 826.00 | 1.025 | 0 | 1 | 2 | 7 | 9 | 19 | 3.10 | 1.39 |
| • Influenza | 470-474 | 2,063 | 257.29 | 1,115 | 139.06 | 948 | 118.23 | 1.004 | | | | | | | | |
| • Pneumonia | 480-486 | 29,763 | 3,711.94 | 12,234 | 1,525.79 | 17,529 | 2,186.16 | 1.029 | 2 | 10 | 85 | 379 | 507 | 983 | 80.35 | 33.03 |
| • Bronchitis (unqualified) | 490 | 1,879 | 234.34 | 655 | 81.69 | 1,224 | 152.65 | 1.053 | 0 | 0 | 7 | 45 | 130 | 182 | 24.08 | 7.02 |
| Chronic Bronchitis | 491 | 24,066 | 3,001.43 | 6,902 | 860.80 | 17,164 | 2,141.89 | 1.159 | | | | | | | | |

Table A-9. Occurrence and occurrence rates of some quality-surveillance indices as observed in the VA system (1973) (sheet 5 of 6).

| Names | ICDA | Total Occur | Rate | PDx Occur | Rate | ADx Occur | Rate | PDx Occur All/NR | Deaths with ICDA as Principal Diagnosis | | | | | Total <65 | PDx Pop. Rate* | Total Pop. Rate* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | <25 | 25-34 | 35-44 | 45-54 | 55-64 | | | |
| • Emphysema | 492 | 41,397 | 5,162.90 | 10,407 | 1,297.43 | 30,990 | 3,864.97 | 1.259 | 0 | 2 | 15 | 118 | 300 | 435 | 41.80 | 10.51 |
| • Asthma | 493 | 5,171 | 644.91 | 2,192 | 273.38 | 2,979 | 371.53 | 1.328 | 0 | 1 | 0 | 7 | 11 | 19 | 8.67 | 3.67 |
| • Hypertrophy Tonsils and Adenoids | 500 | 1,192 | 148.66 | 969 | 120.85 | 223 | 27.81 | 1.041 | | | | | | | | |
| • Pneumonoconiosis—Silica and Silicates | 515 | 678 | 84.56 | 130 | 16.21 | 548 | 68.35 | 1.085 | | | | | | | | |
| • Other Pneumoconiosis and Related Diseases | 516 | 33 | 4.12 | 15 | 1.87 | 18 | 2.25 | 1— | | | | | | | | |
| • Chronic Obstructing Lung Disease | 519.3 | | THIS CODE IS NOT LISTED IN ICDA-8 | | | | | | | | | | | | | |
| Dental Caries | 521.0 | 21,314 | 2,658.21 | 577 | 71.96 | 20,737 | 2,586.25 | 1.012 | | | | | | | | |
| Ulcer of Stomach with Hemorrhage | 531.0 | 1,176 | 146.67 | 738 | 92.04 | 438 | 54.63 | 1.016 | | | | | | | | |
| Ulcer of Stomach with Perforation | 531.1 | 181 | 22.57 | 128 | 15.96 | 53 | 6.61 | 1.047 | | | | | | | | |
| Ulcer of Stomach with Hemorrhage and Perforation | 531.2 | 34 | 4.24 | 24 | 2.99 | 10 | 1.25 | 1— | | | | | | | | |
| Ulcer of Duodenum with Hemorrhage | 532.0 | 2,061 | 257.04 | 1,545 | 192.69 | 516 | 64.35 | 1.024 | | | | | | | | |
| Ulcer of Duodenum with Perforation | 532.1 | 502 | 62.61 | 368 | 45.90 | 134 | 16.71 | 1.025 | | | | | | | | |
| Ulcer of Duodenum with Hemorrhage and Perforation | 532.2 | 97 | 12.10 | 69 | 8.61 | 28 | 3.49 | 1— | | | | | | | | |
| • Appendicitis | 540-543 | 1,690 | 210.77 | 1,407 | 175.48 | 283 | 35.30 | 1.081 | 1 | 1 | 0 | 7 | 7 | 16 | 11.37 | 9.47 |
| Inguinal Hernia without Obstruction | 550 | 20,351 | 2,538.11 | 12,982 | 1,619.07 | 7,369 | 919.04 | 1.069 | | | | | | | | |
| Other Abdom. Hernia without Obstruction | 551 | 16,036 | 1,999.96 | 5,271 | 657.38 | 10,765 | 1,342.58 | 1.072 | 0 | 0 | 1 | 13 | 16 | 30 | 1.60 | 0.81 |
| Inguinal Hernia with Obstruction | 552 | 371 | 46.27 | 280 | 34.92 | 91 | 11.35 | 1.004 | | | | | | | | |
| Other Abdom. Hernia with Obstruction | 553 | 441 | 55.00 | 277 | 34.55 | 164 | 20.45 | 1.018 | | | | | | | | |
| • Alcoholic Cirrhosis of Liver | 571.0 | 24,917 | 3,107.57 | 9,134 | 1,139.16 | 15,783 | 1,968.40 | 1.171 | | | | | | | | |
| Stricture of Urethra | 598 | 5,544 | 691.43 | 2,465 | 307.43 | 3,079 | 384.00 | 1.249 | | | | | | | | |
| • Disease of Uterus and Female Genital Organs | 620-629 | 996 | 124.22 | 402 | 50.14 | 594 | 74.08 | 1.114 | | | | | | | | |
| Disorders of Menstruation | 626 | 294 | 36.67 | 171 | 21.33 | 123 | 15.34 | 1.123 | | | | | | | | |
| Menopausal Symptoms | 627 | 93 | 11.60 | 19 | 2.37 | 74 | 9.23 | 1.105 | | | | | | | | |
| • All Maternal Deaths | 630-678 | | DEATHS NOT IDENTIFIED | | | | | | | | | | | | | |

Table A-9. Occurrence and occurrence rates of some quality-surveillance indices as observed in the VA system (1973) (sheet 6 of 6).

| Names | ICDA | Total Occur | Rate | PDx Occur | Rate | ADx Occur | Rate | PDx Occur All/NR | Deaths with ICDA as Principal Diagnosis | | | | | Total <65 | PDxPop. Rate* | Total Pop. Rate* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | <25 | 25-34 | 35-44 | 45-54 | 55-64 | | | |
| Infections or Skin and Subcutaneous Tissue | 680-686 | 13,529 | 1,687.29 | 6,951 | 866.91 | 6,578 | 820.39 | 1.200 | | | | | | | | |
| Other Eczema and Dermatitis | 692 | 5,973 | 744.93 | 1,790 | 223.24 | 4,183 | 521.69 | 1.086 | | | | | | | | |
| Acute Arthritis (pyogenic organisms) | 710 | 593 | 73.96 | 259 | 32.30 | 334 | 41.66 | 1.004 | | | | | | | | |
| Acute Osteomyelitis | 720.0 | 239 | 29.81 | 136 | 16.96 | 103 | 12.85 | 1.022 | 0 | 0 | 0 | 9 | 10 | 19 | 20.21 | 11.28 |
| Chronic Osteomyelitis | 720.1 | 1,445 | 180.22 | 804 | 100.27 | 641 | 79.94 | 1.180 | | | | | | | | |
| Curvature of Spine | 735 | 856 | 106.76 | 119 | 14.84 | 737 | 91.92 | 1.017 | | | | | | | | |
| • Congenital Abnormalities Associated with Rubella | 744.3 747.0 | 52 | 6.49 | 28 | 3.49 | 24 | 2.99 | 1.143 | | | | | | | | |
| Coarctation of Aorta | 747.1 | | | NOT FOUND IN INDEX | | | | | | | | | | | | |
| Infant Mortality (general) | 760-778 | | | NOT FOUND IN INDEX | | | | | | | | | | | | |
| Symptoms and Ill-Defined Conditions | 780-788 | 80,957 | 10,096.69 | 28,780 | 3,589.35 | 52,177 | 6,507.35 | 1.056 | | | | | | | | |
| • Accidents | E800-E845† | — | — | — | — | 5,197 | 648.15 | 1.039** | | | | | | | | |
| • Accidental Poison (drugs and medicines) | E860-E869† | — | — | — | — | 117 | 14.59 | 1.068** | | | | | | | | |
| • Surgical and Medical Complications | E930-E936† | — | — | — | — | 1,045 | 130.33 | 1.121** | 6 | 11 | 18 | 37 | 30 | 102 | — | 97.61** |

Notes:

*Rates for Total, PDx and ADx Occur are per 100,000 presenting inpatients.

**Death rates are per 1,000 of presenting inpatient population with the specified ICDA code(s).

†Frequency of return ratio for "E" category ICDA codes is based on occurrence of ADx, not PDx ("E codes do not appear as PDx).

# APPENDIX B

## DIAGNOSTIC INDEX OF THE NATIONAL VA CASE LOAD

The following diagnostic index was prepared from records of calendar year 1973 inpatient admissions in general medical and psychiatric institutions. The format of the index is defined in Appendix A. Diagnoses are listed by decreasing frequency of occurrence in the nonrepeating (NR) record populations. The 600 diagnostic codes in this list were found to describe about 90 percent of the system activity.

| ICDA | OCCURANCE ALL | PDX NR | OCCURANCE ALL | ADX NR | NO. DXS KEYED ON PRIMARY DX ALL EPISODES -1- | -2- | -3- | -4- | -5- | NO. DXS KEYED ON PRIMARY DX NON-REPEAT EPISODES -1- | -2- | -3- | -4- | -5- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3032 | 54856 | 42707 | 43369 | 38781 | 17614 | 14905 | 9967 | 5993 | 3463 | 12786 | 11619 | 7951 | 4937 | 2923 |
| 4129 | 32927 | 26097 | 48655 | 43481 | 4457 | 7134 | 7405 | 5685 | 4101 | 3377 | 5509 | 5835 | 4605 | 3356 |
| 29590 | 26680 | 20786 | 5275 | 4673 | 13068 | 6012 | 3658 | 1995 | 1091 | 9831 | 4639 | 2954 | 1643 | 945 |
| 2953 | 26843 | 20056 | 2936 | 2587 | 14351 | 5690 | 3414 | 1788 | 871 | 10273 | 4239 | 2695 | 1455 | 741 |
| 25093 | 18518 | 15568 | 55025 | 48292 | 3006 | 4558 | 4165 | 2926 | 1940 | 2345 | 3680 | 3606 | 2563 | 1714 |
| 550 | 13879 | 12982 | 8098 | 7369 | 6475 | 3536 | 2032 | 1057 | 483 | 6035 | 3289 | 1922 | 1002 | 446 |
| 3000 | 14546 | 12858 | 17461 | 15247 | 4652 | 4187 | 2623 | 1555 | 853 | 4163 | 3678 | 2273 | 1393 | 731 |
| 3004 | 13145 | 11654 | 8936 | 7633 | 4836 | 3776 | 2127 | 1258 | 692 | 4296 | 3312 | 1867 | 1120 | 637 |
| 1621 | 15723 | 10723 | 2601 | 2330 | 3780 | 4314 | 3190 | 2032 | 1234 | 2400 | 2938 | 2158 | 1451 | 894 |
| 492 | 13099 | 10407 | 34785 | 30990 | 1652 | 3244 | 3123 | 2275 | 1488 | 1225 | 2564 | 2466 | 1857 | 1201 |
| 600 | 10822 | 10117 | 17744 | 16272 | 3385 | 2845 | 1970 | 1321 | 820 | 3002 | 2646 | 1854 | 1244 | 776 |
| 4120 | 10857 | 9391 | 12615 | 11373 | 1187 | 2191 | 2485 | 1959 | 1473 | 1022 | 1865 | 2158 | 1721 | 1270 |
| 401 | 9936 | 9199 | 30579 | 27257 | 2153 | 2680 | 2228 | 1405 | 857 | 1962 | 2482 | 2068 | 1307 | 811 |
| 5710 | 10699 | 9134 | 17549 | 15783 | 1458 | 2519 | 2478 | 1754 | 1255 | 1237 | 2122 | 2120 | 1498 | 1090 |
| 3031 | 11166 | 9021 | 3802 | 3175 | 4775 | 3026 | 1671 | 918 | 458 | 3609 | 2468 | 1427 | 815 | 416 |
| 3040 | 10569 | 8474 | 2505 | 2186 | 6424 | 2168 | 1012 | 495 | 286 | 5184 | 1724 | 804 | 387 | 230 |
| 491 | 8001 | 6902 | 19474 | 17164 | 1018 | 1784 | 1806 | 1467 | 1008 | 893 | 1528 | 1563 | 1264 | 859 |
| 3749 | 7505 | 6517 | 6658 | 6076 | 3308 | 1883 | 1121 | 640 | 334 | 2898 | 1605 | 975 | 551 | 300 |
| 4109 | 6694 | 6380 | 2890 | 2619 | 1874 | 1683 | 1326 | 857 | 483 | 1777 | 1601 | 1260 | 825 | 470 |
| 51920 | 6845 | 5820 | 12744 | 11210 | 1123 | 1585 | 1500 | 1128 | 790 | 935 | 1339 | 1274 | 961 | 686 |
| 486 | 5764 | 5523 | 10650 | 9413 | 825 | 1140 | 1283 | 996 | 707 | 809 | 1101 | 1237 | 900 | 685 |
| 30181 | 5875 | 5301 | 6900 | 5908 | 2336 | 1749 | 890 | 482 | 247 | 2083 | 1571 | 821 | 445 | 227 |

| ICDA | OCCURANCE ALL | PDX NR | OCCURANCE ALL | ADX NR | NO. DXS KEYED ON PRIMARY DX ALL EPISODES -1- | -2- | -3- | -4- | -5- | NO. DXS KEYED ON PRIMARY DX NON-REPEAT EPISODES -1- | -2- | -3- | -4- | -5- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7855 | 5507 | 5273 | 3200 | 2818 | 2130 | 1391 | 874 | 522 | 310 | 2044 | 1326 | 841 | 492 | 297 |
| 455 | 5507 | 5269 | 7496 | 6850 | 2849 | 1296 | 663 | 373 | 199 | 2711 | 1247 | 632 | 360 | 196 |
| 185 | 6663 | 5040 | 4007 | 3658 | 1694 | 1739 | 1239 | 887 | 580 | 1289 | 1268 | 940 | 686 | 449 |
| 5329 | 5381 | 5033 | 5264 | 4751 | 1742 | 1481 | 1012 | 623 | 336 | 1518 | 1388 | 945 | 594 | 314 |
| 7131 | 5236 | 4912 | 13222 | 12077 | 1499 | 1306 | 1052 | 663 | 407 | 1394 | 1217 | 996 | 625 | 385 |
| Y0394 | 5250 | 4859 | 20908 | 17694 | 2019 | 1446 | 879 | 453 | 258 | 1855 | 1334 | 819 | 425 | 237 |
| 3039 | 5055 | 4598 | 4829 | 4350 | 1841 | 1419 | 854 | 499 | 239 | 1639 | 1283 | 792 | 468 | 223 |
| Y033 | 6011 | 4588 | 7735 | 6873 | 3370 | 1292 | 646 | 343 | 210 | 2460 | 1016 | 506 | 287 | 186 |
| 7130 | 5046 | 4515 | 12532 | 11371 | 1757 | 1218 | 904 | 521 | 339 | 1510 | 1114 | 811 | 484 | 317 |
| 7837 | 4250 | 4006 | 2853 | 2487 | 1087 | 1126 | 881 | 573 | 327 | 1014 | 1064 | 830 | 545 | 307 |
| 3093 | 4335 | 3981 | 6159 | 5660 | 270 | 607 | 906 | 870 | 683 | 248 | 555 | 820 | 793 | 622 |
| 4270 | 4347 | 3921 | 23521 | 19811 | 344 | 837 | 989 | 865 | 623 | 308 | 753 | 894 | 779 | 563 |
| 535 | 3667 | 3539 | 5382 | 4822 | 833 | 1007 | 797 | 502 | 288 | 802 | 963 | 770 | 489 | 283 |
| 592 | 4062 | 3525 | 2232 | 2002 | 2274 | 864 | 430 | 245 | 133 | 1980 | 747 | 368 | 214 | 116 |
| 7062 | 3635 | 3484 | 3387 | 3136 | 2860 | 478 | 188 | 59 | 35 | 2731 | 463 | 184 | 58 | 34 |
| 4369 | 3488 | 3355 | 3267 | 2983 | 478 | 734 | 720 | 580 | 463 | 459 | 708 | 688 | 560 | 445 |
| 5699 | 3543 | 3347 | 5661 | 4978 | 615 | 689 | 751 | 636 | 434 | 578 | 643 | 712 | 604 | 419 |
| 72518 | 3583 | 3334 | 1157 | 1063 | 2345 | 680 | 306 | 154 | 58 | 2176 | 637 | 280 | 144 | 58 |
| 7287 | 3594 | 3307 | 2685 | 2444 | 1813 | 925 | 429 | 234 | 117 | 1645 | 863 | 404 | 216 | 109 |
| 4409 | 3367 | 3147 | 12927 | 11776 | 317 | 558 | 676 | 592 | 548 | 283 | 515 | 644 | 554 | 521 |
| 7802 | 3404 | 3064 | 8292 | 7037 | 814 | 994 | 721 | 415 | 247 | 726 | 884 | 655 | 379 | 225 |
| 582 | 76872 | 3045 | 3630 | 2381 | 58501 | 14675 | 1955 | 998 | 400 | 1484 | 553 | 357 | 254 | 179 |

| ICDA | OCCURANCE ALL | PDX NR | OCCURANCE ALL | ADX NR | NO. DXS KEYED ON PRIMARY DX ALL EPISODES -1- | -2- | -3- | -4- | -5- | NO. DXS KEYED ON PRIMARY DX NON-REPEAT EPISODES -1- | -2- | -3- | -4- | -5- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7123 | 3691 | 2966 | 3509 | 3180 | 1150 | 928 | 683 | 421 | 262 | 871 | 766 | 552 | 349 | 220 |
| 485 | 3010 | 2964 | 5387 | 4907 | 282 | 516 | 641 | 555 | 472 | 277 | 505 | 635 | 545 | 463 |
| 4339 | 2981 | 2869 | 2280 | 2112 | 384 | 567 | 623 | 520 | 417 | 367 | 549 | 600 | 500 | 402 |
| 5513 | 2981 | 2794 | 8962 | 8074 | 537 | 742 | 680 | 440 | 308 | 506 | 682 | 642 | 412 | 291 |
| 3099 | 2893 | 2709 | 4982 | 4460 | 638 | 658 | 553 | 422 | 274 | 576 | 623 | 512 | 402 | 262 |
| 4510 | 3074 | 2698 | 3053 | 2665 | 896 | 815 | 592 | 339 | 231 | 762 | 720 | 522 | 301 | 210 |
| 29574 | 3050 | 2620 | 223 | 195 | 1564 | 659 | 395 | 227 | 124 | 1320 | 576 | 334 | 204 | 111 |
| 481 | 2629 | 2565 | 2368 | 2037 | 470 | 582 | 537 | 450 | 292 | 455 | 575 | 522 | 440 | 284 |
| 5990 | 2642 | 2508 | 17791 | 15910 | 905 | 616 | 531 | 448 | 232 | 534 | 581 | 508 | 424 | 216 |
| 598 | 3079 | 2465 | 3402 | 3079 | 1252 | 810 | 490 | 284 | 142 | 939 | 651 | 420 | 242 | 124 |
| 30913 | 2612 | 2349 | 1384 | 1213 | 756 | 709 | 485 | 291 | 189 | 656 | 631 | 439 | 275 | 179 |
| 2910 | 2468 | 2328 | 1790 | 1643 | 794 | 700 | 440 | 256 | 156 | 735 | 659 | 425 | 239 | 150 |
| 5770 | 2591 | 2326 | 2000 | 1820 | 634 | 780 | 529 | 329 | 175 | 563 | 690 | 483 | 296 | 161 |
| 5339 | 2414 | 2289 | 3167 | 2831 | 782 | 645 | 431 | 262 | 170 | 733 | 614 | 411 | 249 | 164 |
| 53199 | 2530 | 2282 | 1863 | 1669 | 792 | 586 | 497 | 320 | 193 | 682 | 543 | 445 | 293 | 184 |
| 188 | 3501 | 2255 | 955 | 849 | 1422 | 842 | 525 | 324 | 212 | 858 | 555 | 336 | 227 | 152 |
| 5621 | 2478 | 2193 | 5522 | 5069 | 755 | 658 | 430 | 274 | 176 | 654 | 571 | 386 | 246 | 164 |
| 493 | 2911 | 2192 | 3398 | 2979 | 979 | 742 | 534 | 334 | 171 | 678 | 556 | 427 | 269 | 138 |
| 1733 | 2382 | 2115 | 1828 | 1677 | 1284 | 557 | 287 | 120 | 76 | 1136 | 507 | 245 | 105 | 68 |
| Y105 | 2304 | 2099 | 3978 | 3369 | 1116 | 547 | 318 | 163 | 91 | 991 | 497 | 299 | 157 | 87 |
| 4402 | 2235 | 1995 | 3545 | 3182 | 482 | 564 | 443 | 342 | 189 | 421 | 497 | 396 | 307 | 177 |
| 504 | 2038 | 1948 | 1342 | 1217 | 1157 | 521 | 218 | 91 | 34 | 1103 | 502 | 212 | 82 | 32 |

| ICDA | OCCURANCE ALL | PDX NR | OCCURANCE ALL | ADX NR | NO. DXS KEYED ON PRIMARY DX ALL EPISODES -1- | -2- | -3- | -4- | -5- | NO. DXS KEYED ON PRIMARY DX NON-REPEAT EPISODES -1- | -2- | -3- | -4- | -5- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 340 | 2468 | 1928 | 1020 | 939 | 691 | 697 | 502 | 308 | 133 | 558 | 528 | 391 | 239 | 100 |
| 274 | 2088 | 1868 | 10665 | 9367 | 447 | 493 | 440 | 321 | 209 | 407 | 437 | 399 | 292 | 193 |
| 450 | 1985 | 1885 | 4131 | 3672 | 262 | 389 | 451 | 334 | 264 | 237 | 371 | 418 | 325 | 258 |
| 4379 | 1973 | 1879 | 6634 | 6133 | 211 | 352 | 404 | 377 | 271 | 202 | 341 | 389 | 356 | 252 |
| 3030 | 2046 | 1854 | 1929 | 1614 | 894 | 605 | 279 | 138 | 87 | 792 | 561 | 257 | 126 | 79 |
| 601 | 1944 | 1846 | 3324 | 3070 | 919 | 529 | 252 | 126 | 77 | 865 | 498 | 242 | 126 | 76 |
| 466 | 1892 | 1825 | 2120 | 1832 | 335 | 452 | 450 | 301 | 211 | 332 | 430 | 436 | 289 | 199 |
| 465 | 1849 | 1817 | 3098 | 2724 | 431 | 505 | 385 | 245 | 145 | 424 | 494 | 377 | 242 | 144 |
| 5512 | 1978 | 1811 | 1958 | 1757 | 765 | 526 | 312 | 188 | 107 | 697 | 476 | 292 | 170 | 101 |
| 7825 | 1809 | 1736 | 1927 | 1722 | 344 | 434 | 380 | 273 | 191 | 325 | 418 | 369 | 263 | 186 |
| 604 | 1859 | 1714 | 1584 | 1430 | 859 | 451 | 279 | 141 | 69 | 789 | 419 | 251 | 129 | 66 |
| 6824 | 1768 | 1705 | 1682 | 1468 | 624 | 430 | 300 | 202 | 125 | 591 | 405 | 288 | 199 | 119 |
| 5741 | 1726 | 1676 | 682 | 616 | 634 | 409 | 326 | 188 | 76 | 614 | 398 | 316 | 182 | 76 |
| 4439 | 1886 | 1672 | 4764 | 4240 | 479 | 543 | 349 | 247 | 148 | 427 | 472 | 306 | 221 | 138 |
| 7938 | 1660 | 1630 | 1324 | 1206 | 921 | 349 | 195 | 104 | 58 | 904 | 343 | 190 | 102 | 58 |
| 8240 | 1685 | 1623 | 512 | 479 | 600 | 661 | 223 | 105 | 49 | 575 | 645 | 214 | 97 | 49 |
| 5771 | 2027 | 1618 | 2226 | 1948 | 391 | 523 | 493 | 289 | 182 | 306 | 410 | 395 | 242 | 144 |
| 7893 | 1740 | 1610 | 2642 | 2344 | 669 | 477 | 260 | 171 | 97 | 605 | 440 | 249 | 161 | 93 |
| 6929 | 1759 | 1609 | 4170 | 3731 | 716 | 443 | 268 | 164 | 90 | 658 | 405 | 245 | 149 | 78 |
| 3049 | 1717 | 1592 | 1534 | 1326 | 1032 | 404 | 162 | 64 | 32 | 966 | 363 | 151 | 60 | 29 |
| 2930 | 1722 | 1583 | 769 | 710 | 156 | 326 | 352 | 288 | 249 | 143 | 296 | 319 | 267 | 224 |
| 0112 | 1719 | 1576 | 195 | 180 | 364 | 356 | 352 | 261 | 156 | 314 | 326 | 325 | 245 | 149 |

| ICDA | OCCURANCE ALL | PDX NR | OCCURANCE ALL | ADX NR | NO. DXS KEYED ON PRIMARY DX ALL EPISODES -1- | -2- | -3- | -4- | -5- | NO. DXS KEYED ON PRIMARY DX NON-REPEAT EPISODES -1- | -2- | -3- | -4- | -5- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 277 | 1684 | 1567 | 21419 | 19317 | 151 | 386 | 409 | 322 | 209 | 135 | 355 | 390 | 304 | 193 |
| 5320 | 1582 | 1545 | 570 | 516 | 521 | 370 | 258 | 171 | 143 | 512 | 362 | 247 | 167 | 140 |
| 8204 | 1607 | 1537 | 728 | 670 | 299 | 425 | 304 | 243 | 166 | 284 | 410 | 287 | 233 | 156 |
| 4139 | 1659 | 1533 | 8770 | 7273 | 433 | 468 | 360 | 201 | 124 | 401 | 429 | 334 | 186 | 115 |
| 3073 | 1616 | 1531 | 295 | 259 | 1085 | 291 | 130 | 65 | 32 | 1031 | 272 | 121 | 63 | 31 |
| 3579 | 1634 | 1522 | 6760 | 5931 | 481 | 377 | 305 | 212 | 123 | 443 | 349 | 286 | 198 | 117 |
| 0092 | 1549 | 1514 | 838 | 756 | 669 | 363 | 243 | 144 | 67 | 653 | 358 | 236 | 141 | 66 |
| 685 | 1670 | 1500 | 353 | 322 | 1257 | 278 | 82 | 28 | 16 | 1130 | 247 | 71 | 28 | 15 |
| 070 | 1537 | 1487 | 342 | 307 | 942 | 361 | 139 | 60 | 23 | 914 | 347 | 133 | 59 | 22 |
| 791 | 1590 | 1483 | 2170 | 1963 | 526 | 442 | 297 | 169 | 89 | 485 | 405 | 283 | 159 | 86 |
| 566 | 1579 | 1476 | 619 | 558 | 982 | 312 | 157 | 68 | 35 | 917 | 290 | 146 | 64 | 34 |
| 342 | 1642 | 1448 | 2831 | 2604 | 354 | 416 | 345 | 217 | 131 | 309 | 359 | 303 | 194 | 116 |
| 4360 | 1491 | 1438 | 960 | 876 | 193 | 331 | 323 | 267 | 173 | 186 | 319 | 312 | 254 | 170 |
| 8737 | 1452 | 1433 | 1590 | 1459 | 373 | 607 | 269 | 102 | 51 | 369 | 598 | 265 | 100 | 51 |
| 4389 | 1477 | 1391 | 2609 | 2408 | 204 | 302 | 329 | 251 | 191 | 187 | 289 | 310 | 236 | 179 |
| Y104 | 1527 | 1388 | 1134 | 964 | 893 | 330 | 174 | 63 | 33 | 814 | 296 | 159 | 57 | 30 |
| 5932 | 6995 | 1386 | 5745 | 4733 | 4462 | 1636 | 344 | 207 | 150 | 431 | 249 | 245 | 173 | 125 |
| 3441 | 1466 | 1384 | 8869 | 8232 | 131 | 319 | 322 | 305 | 197 | 122 | 306 | 303 | 293 | 183 |
| 4540 | 1717 | 1383 | 1074 | 985 | 790 | 383 | 240 | 156 | 74 | 560 | 336 | 208 | 140 | 67 |
| 0111 | 1472 | 1377 | 337 | 300 | 332 | 325 | 305 | 211 | 146 | 307 | 307 | 286 | 201 | 136 |
| 846 | 1434 | 1371 | 746 | 688 | 603 | 416 | 220 | 112 | 53 | 575 | 399 | 213 | 105 | 53 |
| 30013 | 1465 | 1367 | 903 | 801 | 605 | 413 | 228 | 107 | 57 | 569 | 390 | 213 | 94 | 52 |

| ICDA | OCCURANCE ALL | PDX NR | OCCURANCE ALL | ADX NR | NO. DXS KEYED ON PRIMARY DX ALL EPISODES -1- | -2- | -3- | -4- | -5- | NO. DXS KEYED ON PRIMARY DX NON-REPEAT EPISODES -1- | -2- | -3- | -4- | -5- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4549 | 1434 | 1345 | 2974 | 2713 | 736 | 323 | 176 | 111 | 45 | 681 | 305 | 171 | 103 | 44 |
| 9985 | 1452 | 1334 | 2764 | 2445 | 721 | 419 | 167 | 69 | 49 | 663 | 386 | 149 | 66 | 46 |
| 7071 | 1459 | 1330 | 1958 | 1768 | 420 | 353 | 288 | 193 | 107 | 378 | 324 | 257 | 178 | 102 |
| 3451 | 1490 | 1320 | 3572 | 3013 | 385 | 450 | 308 | 172 | 92 | 340 | 404 | 268 | 144 | 88 |
| 2140 | 1369 | 1316 | 1318 | 1226 | 944 | 232 | 114 | 49 | 16 | 899 | 228 | 112 | 48 | 16 |
| 2952 | 1481 | 1303 | 176 | 160 | 673 | 297 | 199 | 127 | 82 | 578 | 265 | 172 | 117 | 71 |
| 403 | 5893 | 1299 | 2899 | 1914 | 4114 | 766 | 490 | 239 | 138 | 350 | 313 | 232 | 162 | 116 |
| 2500 | 1420 | 1277 | 787 | 715 | 306 | 335 | 299 | 213 | 133 | 260 | 308 | 256 | 202 | 125 |
| 4299 | 1390 | 1271 | 2321 | 2011 | 110 | 242 | 291 | 241 | 211 | 95 | 220 | 272 | 217 | 193 |
| 8202 | 1312 | 1267 | 412 | 386 | 194 | 315 | 297 | 195 | 155 | 186 | 303 | 290 | 187 | 151 |
| 2914 | 1400 | 1264 | 296 | 246 | 506 | 443 | 224 | 134 | 50 | 452 | 394 | 206 | 124 | 46 |
| 8069 | 1504 | 1262 | 2874 | 2564 | 37 | 174 | 225 | 220 | 218 | 32 | 158 | 196 | 170 | 184 |
| 3479 | 1381 | 1241 | 2445 | 2197 | 342 | 336 | 284 | 177 | 124 | 303 | 297 | 262 | 160 | 114 |
| 7830 | 1308 | 1230 | 781 | 675 | 507 | 355 | 209 | 102 | 71 | 473 | 331 | 197 | 100 | 67 |
| 595 | 1306 | 1228 | 4019 | 3500 | 400 | 361 | 213 | 146 | 97 | 365 | 337 | 203 | 142 | 96 |
| 4444 | 1309 | 1201 | 1568 | 1426 | 420 | 358 | 242 | 151 | 80 | 379 | 334 | 219 | 138 | 76 |
| 605 | 1241 | 1197 | 898 | 839 | 763 | 283 | 106 | 46 | 21 | 733 | 275 | 104 | 43 | 21 |
| 8070 | 1209 | 1193 | 1971 | 1782 | 173 | 274 | 295 | 200 | 147 | 168 | 272 | 292 | 197 | 146 |
| 4100 | 1224 | 1176 | 435 | 394 | 230 | 307 | 272 | 167 | 135 | 222 | 297 | 253 | 164 | 130 |
| 4589 | 1249 | 1173 | 3107 | 2721 | 325 | 323 | 241 | 165 | 98 | 305 | 308 | 221 | 154 | 93 |
| 5969 | 1286 | 1164 | 4573 | 3966 | 381 | 353 | 263 | 141 | 90 | 333 | 326 | 240 | 129 | 82 |
| 4330 | 1192 | 1157 | 735 | 700 | 130 | 242 | 288 | 206 | 156 | 127 | 235 | 279 | 197 | 151 |

| ICDA | OCCURANCE ALL | PDX NR | OCCURANCE ALL | ADX NR | NO. DXS KEYED ON PRIMARY DX ALL EPISODES -1- | -2- | -3- | -4- | -5- | NO. DXS KEYED ON PRIMARY DX NON-REPEAT EPISODES -1- | -2- | -3- | -4- | -5- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 280 | 1275 | 1147 | 10349 | 8880 | 131 | 278 | 265 | 225 | 169 | 118 | 204 | 253 | 215 | 162 |
| 5749 | 1217 | 1146 | 1754 | 1569 | 405 | 293 | 244 | 120 | 84 | 378 | 275 | 231 | 114 | 80 |
| 7245 | 1202 | 1141 | 261 | 237 | 770 | 271 | 102 | 32 | 17 | 727 | 263 | 96 | 30 | 15 |
| 2915 | 1294 | 1134 | 268 | 242 | 324 | 307 | 273 | 165 | 105 | 280 | 263 | 237 | 147 | 95 |
| 3092 | 1295 | 1124 | 656 | 584 | 250 | 317 | 292 | 193 | 119 | 206 | 268 | 265 | 164 | 110 |
| 425 | 1447 | 1122 | 1309 | 1113 | 174 | 301 | 311 | 277 | 201 | 138 | 218 | 251 | 221 | 146 |
| 2961 | 1334 | 1118 | 163 | 143 | 669 | 296 | 194 | 82 | 46 | 553 | 247 | 173 | 69 | 38 |
| 1541 | 1504 | 1116 | 320 | 297 | 378 | 408 | 320 | 175 | 109 | 286 | 292 | 234 | 131 | 81 |
| 4274 | 1185 | 1092 | 8812 | 7645 | 225 | 292 | 265 | 170 | 120 | 201 | 277 | 241 | 151 | 113 |
| 603 | 1125 | 1090 | 1908 | 1773 | 524 | 317 | 149 | 72 | 38 | 510 | 307 | 143 | 69 | 36 |
| 5692 | 1118 | 1081 | 2427 | 2157 | 459 | 264 | 177 | 114 | 44 | 438 | 259 | 172 | 109 | 44 |
| 6961 | 1346 | 1078 | 2932 | 2586 | 461 | 338 | 267 | 136 | 78 | 374 | 265 | 216 | 109 | 61 |
| 150 | 1547 | 1069 | 227 | 207 | 521 | 409 | 291 | 158 | 93 | 346 | 271 | 208 | 113 | 70 |
| 9989 | 1120 | 1051 | 2918 | 2562 | 319 | 415 | 188 | 94 | 65 | 298 | 389 | 180 | 89 | 59 |
| 8230 | 1096 | 1035 | 569 | 535 | 317 | 373 | 189 | 116 | 42 | 291 | 356 | 180 | 110 | 41 |
| 3017 | 1158 | 1019 322,507 | 1000 | 819 | 481 | 323 | 174 | 106 | 46 | 421 | 280 | 155 | 95 | 42 |
| 4279 | 1073 | 995 | 6309 | 5462 | 237 | 270 | 217 | 168 | 83 | 213 | 249 | 202 | 161 | 78 |
| 7070 | 1123 | 979 | 4209 | 3736 | 135 | 146 | 231 | 189 | 147 | 123 | 125 | 200 | 166 | 131 |
| 575 | 1039 | 979 | 771 | 685 | 378 | 260 | 151 | 121 | 74 | 351 | 250 | 142 | 114 | 72 |
| 500 | 1009 | 969 | 243 | 223 | 846 | 116 | 35 | 6 | 4 | 811 | 111 | 35 | 6 | 4 |
| 7871 | 1021 | 958 | 1486 | 1333 | 422 | 303 | 143 | 76 | 40 | 389 | 287 | 137 | 72 | 39 |
| 01199 | 989 | 951 | 1440 | 1284 | 250 | 244 | 192 | 141 | 86 | 237 | 235 | 185 | 134 | 86 |

| ICDA | OCCURANCE ALL | PDX NR | OCCURANCE ALL | ADX NR | NO. DXS KEYED ON PRIMARY DX ALL EPISODES -1- | -2- | -3- | -4- | -5- | NO. DXS KEYED ON PRIMARY DX NON-REPEAT EPISODES -1- | -2- | -3- | -4- | -5- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3055 | 984 | 946 | 739 | 668 | 332 | 302 | 174 | 80 | 54 | 318 | 293 | 163 | 80 | 51 |
| 2962 | 1026 | 941 | 297 | 262 | 496 | 233 | 133 | 94 | 33 | 451 | 212 | 126 | 88 | 30 |
| 402 | 1018 | 938 | 1167 | 942 | 209 | 265 | 238 | 140 | 79 | 190 | 246 | 221 | 127 | 74 |
| 3782 | 1034 | 932 | 836 | 772 | 571 | 231 | 141 | 55 | 24 | 502 | 212 | 130 | 52 | 24 |
| 7831 | 987 | 928 | 1205 | 1035 | 226 | 243 | 209 | 137 | 75 | 211 | 236 | 196 | 126 | 68 |
| 72899 | 990 | 927 | 1367 | 1193 | 440 | 253 | 155 | 74 | 37 | 408 | 236 | 147 | 73 | 33 |
| 2954 | 950 | 916 | 53 | 49 | 551 | 199 | 94 | 52 | 37 | 537 | 193 | 91 | 49 | 31 |
| 2951 | 999 | 910 | 222 | 204 | 253 | 198 | 157 | 126 | 106 | 226 | 177 | 143 | 115 | 94 |
| 3459 | 993 | 909 | 2205 | 1903 | 240 | 309 | 204 | 106 | 80 | 217 | 277 | 190 | 99 | 75 |
| 3046 | 998 | 906 | 1302 | 1136 | 413 | 260 | 141 | 88 | 45 | 378 | 227 | 127 | 82 | 45 |
| 4329 | 959 | 906 | 1193 | 1086 | 231 | 249 | 208 | 117 | 80 | 215 | 234 | 198 | 109 | 79 |
| 5609 | 973 | 901 | 923 | 803 | 343 | 253 | 180 | 92 | 54 | 309 | 237 | 168 | 88 | 49 |
| 7805 | 931 | 898 | 1320 | 1210 | 253 | 219 | 184 | 132 | 72 | 245 | 208 | 179 | 126 | 69 |
| 470 | 884 | 881 | 809 | 754 | 244 | 240 | 170 | 121 | 58 | 243 | 240 | 170 | 120 | 58 |
| 5739 | 945 | 880 | 3321 | 2883 | 114 | 169 | 224 | 174 | 126 | 107 | 152 | 213 | 165 | 114 |
| 8360 | 906 | 865 | 224 | 208 | 486 | 284 | 80 | 27 | 18 | 464 | 268 | 77 | 27 | 18 |
| 5301 | 933 | 864 | 2668 | 2424 | 174 | 256 | 187 | 137 | 95 | 160 | 237 | 173 | 130 | 86 |
| 7886 | 893 | 855 | 2096 | 1763 | 189 | 220 | 164 | 143 | 73 | 177 | 211 | 156 | 138 | 72 |
| 43599 | 892 | 848 | 886 | 803 | 248 | 197 | 203 | 118 | 67 | 232 | 193 | 198 | 112 | 61 |
| 5409 | 846 | 842 | 111 | 104 | 614 | 137 | 53 | 21 | 12 | 612 | 135 | 53 | 21 | 12 |
| 2950 | 942 | 839 | 342 | 308 | 447 | 209 | 130 | 77 | 33 | 397 | 188 | 113 | 68 | 29 |
| 4412 | 921 | 839 | 1370 | 1163 | 206 | 203 | 209 | 122 | 98 | 186 | 187 | 189 | 114 | 86 |

| ICDA | OCCURANCE ALL | PDX NR | OCCURANCE ALL | ADX NR | NO. DXS KEYED ON PRIMARY DX ALL EPISODES -1- | -2- | -3- | -4- | -5- | NO. DXS KEYED ON PRIMARY DX NON-REPEAT EPISODES -1- | -2- | -3- | -4- | -5- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 517 | 941 | 836 | 2932 | 2659 | 208 | 215 | 201 | 146 | 89 | 190 | 192 | 176 | 126 | 79 |
| 1619 | 1091 | 833 | 263 | 239 | 417 | 310 | 146 | 110 | 64 | 307 | 245 | 107 | 88 | 52 |
| 5719 | 917 | 829 | 1748 | 1537 | 211 | 227 | 166 | 138 | 79 | 185 | 206 | 156 | 124 | 72 |
| 5651 | 875 | 821 | 425 | 385 | 444 | 239 | 95 | 52 | 28 | 414 | 224 | 90 | 48 | 28 |
| 3041 | 912 | 813 | 1021 | 823 | 416 | 218 | 145 | 71 | 35 | 372 | 193 | 128 | 63 | 33 |
| 715 | 845 | 809 | 2481 | 2274 | 280 | 220 | 158 | 80 | 55 | 270 | 210 | 151 | 76 | 52 |
| 2955 | 896 | 808 | 228 | 201 | 511 | 191 | 101 | 60 | 23 | 459 | 177 | 87 | 57 | 19 |
| 1519 | 1054 | 805 | 243 | 224 | 279 | 278 | 215 | 122 | 71 | 201 | 208 | 170 | 99 | 60 |
| 2900 | 841 | 805 | 1155 | 1081 | 129 | 174 | 183 | 134 | 104 | 119 | 171 | 174 | 126 | 102 |
| 7201 | 949 | 804 | 722 | 641 | 397 | 268 | 140 | 78 | 37 | 335 | 228 | 117 | 65 | 32 |
| 404 | 1720 | 801 | 615 | 496 | 639 | 501 | 233 | 139 | 96 | 153 | 199 | 161 | 118 | 78 |
| 7011 | 825 | 798 | 1931 | 1774 | 524 | 167 | 65 | 40 | 21 | 507 | 161 | 63 | 40 | 19 |
| 5089 | 841 | 791 | 812 | 746 | 450 | 230 | 85 | 41 | 20 | 427 | 209 | 80 | 40 | 20 |
| 2980 | 847 | 785 | 192 | 156 | 365 | 189 | 130 | 86 | 43 | 334 | 177 | 119 | 81 | 41 |
| 2911 | 857 | 781 | 494 | 459 | 216 | 207 | 167 | 105 | 78 | 196 | 193 | 143 | 97 | 71 |
| 201 | 1711 | 778 | 267 | 230 | 830 | 379 | 231 | 122 | 78 | 311 | 199 | 115 | 70 | 45 |
| 7880 | 796 | 774 | 5281 | 4571 | 51 | 120 | 151 | 159 | 144 | 47 | 119 | 148 | 153 | 140 |
| 8730 | 780 | 773 | 649 | 592 | 193 | 335 | 130 | 77 | 22 | 193 | 332 | 126 | 77 | 22 |
| 3012 | 839 | 772 | 701 | 612 | 404 | 219 | 106 | 68 | 25 | 369 | 202 | 96 | 64 | 24 |
| 7299 | 808 | 766 | 1252 | 1121 | 346 | 230 | 113 | 56 | 29 | 321 | 215 | 111 | 56 | 29 |
| 2956 | 894 | 763 | 184 | 155 | 435 | 243 | 101 | 62 | 22 | 372 | 205 | 86 | 54 | 17 |
| 3959 | 917 | 759 | 1808 | 1607 | 204 | 237 | 197 | 121 | 83 | 167 | 195 | 155 | 100 | 77 |

| ICDA | OCCURANCE PDX ALL | PDX NR | OCCURANCE ADX ALL | ADX NR | NO. DXS KEYED ON PRIMARY DX ALL EPISODES -1- | -2- | -3- | -4- | -5- | NO. DXS KEYED ON PRIMARY DX NON-REPEAT EPISODES -1- | -2- | -3- | -4- | -5- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 8022 | 805 | 756 | 313 | 292 | 225 | 282 | 146 | 82 | 36 | 205 | 268 | 140 | 76 | 35 |
| 191 | 1001 | 752 | 205 | 174 | 524 | 224 | 140 | 61 | 33 | 377 | 166 | 110 | 52 | 31 |
| 6821 | 774 | 742 | 675 | 588 | 380 | 176 | 111 | 59 | 23 | 360 | 171 | 108 | 56 | 22 |
| 5310 | 750 | 738 | 475 | 438 | 183 | 168 | 128 | 110 | 78 | 181 | 164 | 124 | 109 | 78 |
| 1538 | 921 | 733 | 257 | 238 | 223 | 259 | 187 | 121 | 72 | 173 | 193 | 152 | 93 | 68 |
| Y106 | 1010 | 732 | 2096 | 1853 | 433 | 211 | 168 | 97 | 52 | 228 | 172 | 146 | 95 | 49 |
| 2960 | 801 | 729 | 228 | 214 | 340 | 176 | 131 | 72 | 51 | 307 | 161 | 120 | 65 | 47 |
| 2113 | 837 | 720 | 1197 | 1095 | 386 | 176 | 118 | 79 | 47 | 323 | 152 | 102 | 72 | 44 |
| 3811 | 795 | 718 | 719 | 661 | 385 | 218 | 103 | 49 | 19 | 345 | 197 | 94 | 47 | 17 |
| 6111 | 759 | 717 | 776 | 671 | 384 | 180 | 99 | 48 | 24 | 361 | 172 | 93 | 46 | 22 |
| 3940 | 976 | 701 | 654 | 586 | 173 | 264 | 213 | 141 | 99 | 122 | 182 | 164 | 96 | 71 |
| 8209 | 785 | 701 | 663 | 606 | 229 | 218 | 138 | 83 | 50 | 195 | 199 | 122 | 75 | 46 |
| 8120 | 732 | 694 | 335 | 306 | 208 | 251 | 108 | 81 | 38 | 196 | 239 | 101 | 78 | 35 |
| 594 | 732 | 694 | 1075 | 991 | 293 | 163 | 114 | 71 | 42 | 272 | 157 | 110 | 67 | 41 |
| 372 | 783 | 693 | 752 | 691 | 569 | 115 | 56 | 32 | 7 | 499 | 103 | 52 | 28 | 7 |
| 8052 | 707 | 690 | 644 | 585 | 157 | 249 | 119 | 68 | 37 | 151 | 243 | 118 | 64 | 37 |
| 1533 | 858 | 689 | 228 | 214 | 201 | 217 | 169 | 124 | 83 | 156 | 164 | 139 | 110 | 63 |
| 7336 | 707 | 685 | 494 | 457 | 461 | 148 | 57 | 24 | 12 | 449 | 140 | 56 | 23 | 12 |
| 0999 | 777 | 681 | 619 | 558 | 587 | 124 | 40 | 17 | 7 | 508 | 112 | 36 | 16 | 7 |
| 1990 | 769 | 679 | 2924 | 2142 | 211 | 206 | 134 | 80 | 72 | 175 | 184 | 120 | 73 | 66 |
| 512 | 752 | 679 | 822 | 714 | 332 | 168 | 108 | 81 | 36 | 299 | 148 | 98 | 76 | 33 |
| 5962 | 709 | 669 | 1370 | 1256 | 147 | 193 | 166 | 86 | 65 | 132 | 185 | 159 | 81 | 62 |

| ICDA | OCCURANCE ALL | PDX NR | OCCURANCE ALL | ADX NR | NO. DXS KEYED ON PRIMARY DX ALL EPISODES -1- | -2- | -3- | -4- | -5- | NO. DXS KEYED ON PRIMARY DX NON-REPEAT EPISODES -1- | -2- | -3- | -4- | -5- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7873 | 680 | 664 | 1150 | 1014 | 257 | 166 | 116 | 68 | 47 | 252 | 162 | 114 | 65 | 46 |
| 203 | 1248 | 663 | 328 | 296 | 355 | 257 | 215 | 176 | 113 | 140 | 130 | 125 | 111 | 63 |
| 8500 | 668 | 663 | 363 | 351 | 126 | 213 | 153 | 75 | 58 | 126 | 210 | 152 | 75 | 57 |
| 9972 | 748 | 660 | 554 | 497 | 298 | 203 | 113 | 72 | 33 | 254 | 177 | 104 | 68 | 31 |
| Y0301 | 684 | 658 | 4237 | 3827 | 119 | 173 | 150 | 111 | 67 | 116 | 165 | 145 | 106 | 62 |
| 1890 | 948 | 656 | 274 | 214 | 158 | 297 | 211 | 130 | 88 | 126 | 175 | 148 | 91 | 67 |
| 490 | 690 | 655 | 1391 | 1224 | 165 | 177 | 137 | 102 | 56 | 154 | 167 | 132 | 99 | 52 |
| 0091 | 684 | 655 | 1163 | 1013 | 189 | 156 | 121 | 99 | 53 | 181 | 148 | 117 | 96 | 51 |
| 6825 | 684 | 652 | 750 | 687 | 241 | 176 | 127 | 67 | 35 | 229 | 167 | 121 | 64 | 34 |
| 7969 | 670 | 650 | 450 | 412 | 460 | 84 | 53 | 36 | 21 | 450 | 80 | 50 | 34 | 20 |
| 8024 | 669 | 642 | 387 | 356 | 158 | 256 | 133 | 66 | 32 | 152 | 246 | 130 | 61 | 29 |
| 4459 | 657 | 627 | 1121 | 1021 | 132 | 152 | 129 | 98 | 64 | 127 | 145 | 118 | 96 | 64 |
| 2859 | 675 | 620 | 14542 | 12136 | 81 | 159 | 156 | 111 | 85 | 66 | 144 | 145 | 106 | 80 |
| 5083 | 684 | 613 | 452 | 407 | 414 | 150 | 65 | 33 | 16 | 366 | 134 | 62 | 31 | 14 |
| 29634 | 678 | 611 | 50 | 44 | 310 | 163 | 89 | 50 | 39 | 285 | 144 | 78 | 45 | 35 |
| 144 | 842 | 609 | 250 | 230 | 314 | 231 | 146 | 77 | 46 | 223 | 163 | 104 | 63 | 33 |
| 3042 | 697 | 608 | 1167 | 977 | 269 | 173 | 124 | 55 | 41 | 229 | 156 | 108 | 45 | 36 |
| 3751 | 712 | 594 | 1195 | 1087 | 355 | 169 | 90 | 42 | 31 | 297 | 137 | 77 | 36 | 27 |
| 6822 | 617 | 594 | 498 | 436 | 325 | 143 | 79 | 35 | 19 | 309 | 140 | 77 | 34 | 19 |
| 4450 | 621 | 593 | 834 | 763 | 104 | 135 | 128 | 127 | 75 | 97 | 123 | 124 | 115 | 73 |
| 5234 | 605 | 593 | 12037 | 11051 | 260 | 159 | 90 | 52 | 24 | 257 | 156 | 87 | 50 | 23 |
| 7335 | 708 | 592 | 723 | 666 | 352 | 158 | 108 | 54 | 20 | 288 | 137 | 92 | 45 | 16 |

| ICDA | OCCURANCE ALL | PDX NR | OCCURANCE ALL | ADX NR | NO. DXS KEYED ON PRIMARY DX ALL EPISODES -1- | -2- | -3- | -4- | -5- | NO. DXS KEYED ON PRIMARY DX NON-REPEAT EPISODES -1- | -2- | -3- | -4- | -5- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9701 | 607 | 592 | 1156 | 992 | 79 | 198 | 163 | 86 | 51 | 75 | 193 | 160 | 85 | 49 |
| 5303 | 759 | 590 | 967 | 858 | 236 | 189 | 131 | 86 | 62 | 157 | 147 | 113 | 74 | 49 |
| 7179 | 612 | 589 | 770 | 674 | 194 | 155 | 123 | 69 | 43 | 187 | 151 | 115 | 66 | 42 |
| 5199 | 670 | 585 | 1526 | 1281 | 167 | 169 | 135 | 79 | 78 | 138 | 151 | 124 | 66 | 66 |
| 7861 | 617 | 585 | 1711 | 1520 | 90 | 170 | 142 | 84 | 62 | 83 | 158 | 137 | 82 | 60 |
| 8250 | 603 | 585 | 385 | 346 | 200 | 263 | 74 | 37 | 13 | 195 | 253 | 72 | 37 | 13 |
| 5631 | 682 | 583 | 349 | 316 | 253 | 194 | 101 | 67 | 34 | 213 | 160 | 87 | 64 | 30 |
| 3493 | 679 | 583 | 2286 | 2000 | 11 | 64 | 125 | 146 | 117 | 11 | 54 | 100 | 121 | 98 |
| 4273 | 659 | 583 | 4883 | 4291 | 169 | 184 | 131 | 79 | 52 | 148 | 160 | 114 | 72 | 48 |
| 9979 | 638 | 583 | 1074 | 950 | 163 | 139 | 145 | 92 | 51 | 151 | 123 | 128 | 89 | 49 |
| 463 | 600 | 583 | 241 | 216 | 443 | 99 | 41 | 11 | 2 | 426 | 99 | 41 | 11 | 2 |
| 8134 | 594 | 581 | 325 | 303 | 204 | 235 | 86 | 34 | 26 | 199 | 230 | 86 | 34 | 23 |
| 5210 | 584 | 577 | 23040 | 20737 | 154 | 199 | 112 | 49 | 43 | 152 | 196 | 110 | 49 | 43 |
| 376 | 709 | 576 | 377 | 331 | 329 | 186 | 87 | 58 | 33 | 260 | 158 | 73 | 45 | 25 |
| 7090 | 636 | 573 | 463 | 418 | 394 | 144 | 53 | 29 | 12 | 344 | 136 | 49 | 28 | 12 |
| 7140 | 620 | 573 | 931 | 849 | 245 | 170 | 79 | 50 | 38 | 228 | 156 | 74 | 45 | 34 |
| 9992 | 585 | 569 | 338 | 278 | 242 | 189 | 77 | 40 | 23 | 234 | 186 | 73 | 39 | 23 |
| 7960 | 585 | 568 | 2053 | 1698 | 84 | 97 | 119 | 91 | 69 | 81 | 95 | 115 | 89 | 67 |
| 505 | 605 | 556 | 586 | 545 | 296 | 171 | 85 | 22 | 17 | 271 | 154 | 80 | 21 | 17 |
| 5730 | 569 | 553 | 590 | 524 | 264 | 129 | 85 | 42 | 28 | 257 | 127 | 85 | 41 | 25 |
| 8239 | 655 | 552 | 451 | 415 | 274 | 226 | 86 | 33 | 20 | 223 | 189 | 73 | 31 | 20 |
| 5641 | 566 | 552 | 595 | 548 | 187 | 166 | 91 | 59 | 28 | 180 | 164 | 87 | 59 | 27 |

| ICDA | OCCURANCE ALL | PDX NR | OCCURANCE ALL | ADX NR | NO. DXS KEYED ON PRIMARY DX ALL EPISODES | | | | | NO. DXS KEYED ON PRIMARY DX NON-REPEAT EPISODES | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | -1- | -2- | -3- | -4- | -5- | -1- | -2- | -3- | -4- | -5- |
| 3787 | 591 | 551 | 2040 | 1695 | 89 | 255 | 124 | 65 | 40 | 82 | 235 | 116 | 62 | 38 |
| 4380 | 579 | 550 | 834 | 768 | 69 | 123 | 120 | 92 | 83 | 66 | 116 | 115 | 88 | 78 |
| 5640 | 577 | 550 | 1183 | 1047 | 170 | 152 | 104 | 55 | 49 | 164 | 144 | 100 | 50 | 47 |
| 299 | 568 | 549 | 810 | 738 | 213 | 107 | 94 | 68 | 38 | 206 | 102 | 93 | 66 | 35 |
| 7099 | 562 | 547 | 1383 | 1249 | 347 | 111 | 46 | 25 | 14 | 335 | 111 | 44 | 25 | 14 |
| 3573 | 607 | 545 | 678 | 606 | 313 | 138 | 78 | 48 | 17 | 275 | 126 | 69 | 47 | 15 |
| 0113 | 569 | 545 | 291 | 260 | 155 | 121 | 134 | 73 | 41 | 150 | 114 | 128 | 70 | 40 |
| 8830 | 555 | 545 | 232 | 205 | 246 | 262 | 32 | 7 | 5 | 241 | 259 | 30 | 7 | 5 |
| 9220 | 552 | 545 | 623 | 579 | 132 | 181 | 97 | 65 | 43 | 131 | 180 | 96 | 63 | 42 |
| 3759 | 598 | 544 | 3269 | 2908 | 264 | 123 | 109 | 53 | 30 | 239 | 105 | 102 | 51 | 29 |
| 3068 | 559 | 544 | 716 | 664 | 182 | 165 | 97 | 55 | 35 | 177 | 162 | 92 | 54 | 35 |
| 386 | 589 | 540 | 324 | 294 | 414 | 95 | 51 | 12 | 12 | 386 | 81 | 47 | 11 | 10 |
| 8478 | 555 | 539 | 336 | 302 | 234 | 177 | 71 | 39 | 15 | 229 | 169 | 71 | 36 | 15 |
| 3048 | 601 | 534 | 416 | 361 | 319 | 138 | 61 | 38 | 29 | 283 | 127 | 53 | 33 | 23 |
| 5630 | 731 | 528 | 286 | 253 | 261 | 222 | 124 | 58 | 32 | 191 | 148 | 91 | 45 | 25 |
| 4119 | 548 | 525 | 807 | 697 | 158 | 146 | 114 | 71 | 35 | 153 | 140 | 108 | 68 | 33 |
| 6869 | 537 | 525 | 856 | 731 | 229 | 131 | 88 | 50 | 22 | 222 | 127 | 88 | 50 | 21 |
| 2901 | 596 | 522 | 253 | 234 | 224 | 146 | 101 | 57 | 36 | 191 | 129 | 88 | 49 | 35 |
| 1959 | 587 | 518 | 362 | 322 | 228 | 162 | 85 | 52 | 30 | 194 | 145 | 80 | 45 | 28 |
| 3442 | 609 | 517 | 1081 | 941 | 115 | 134 | 146 | 94 | 62 | 94 | 110 | 120 | 83 | 59 |
| 3899 | 550 | 516 | 5745 | 5253 | 249 | 143 | 89 | 35 | 21 | 231 | 135 | 83 | 34 | 20 |
| 513 | 540 | 514 | 586 | 513 | 108 | 145 | 96 | 88 | 48 | 101 | 137 | 94 | 86 | 44 |

| ICDA | OCCURANCE ALL | PDX NR | OCCURANCE ALL | ADX NR | NO. DXS KEYED ON PRIMARY DX ALL EPISODES -1- | -2- | -3- | -4- | -5- | NO. DXS KEYED ON PRIMARY DX NON-REPEAT EPISODES -1- | -2- | -3- | -4- | -5- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2160 | 520 | 513 | 993 | 941 | 355 | 97 | 43 | 14 | 6 | 349 | 97 | 43 | 13 | 6 |
| 7124 | 580 | 511 | 792 | 721 | 193 | 125 | 103 | 78 | 41 | 175 | 109 | 91 | 64 | 34 |
| 2001 | 867 | 509 | 189 | 172 | 274 | 199 | 166 | 91 | 75 | 143 | 111 | 115 | 52 | 42 |
| 5604 | 529 | 508 | 202 | 190 | 207 | 125 | 85 | 48 | 39 | 196 | 119 | 81 | 48 | 39 |
| 9270 | 514 | 507 | 541 | 481 | 151 | 159 | 87 | 55 | 37 | 147 | 158 | 85 | 55 | 37 |
| 2943 | 541 | 505 | 196 | 174 | 231 | 140 | 63 | 46 | 38 | 211 | 133 | 59 | 44 | 35 |
| 681 | 517 | 505 | 559 | 492 | 276 | 114 | 63 | 31 | 14 | 270 | 111 | 62 | 29 | 14 |
| 7312 | 538 | 504 | 689 | 622 | 283 | 127 | 71 | 34 | 14 | 268 | 116 | 64 | 33 | 14 |
| 3453 | 558 | 503 | 448 | 385 | 202 | 172 | 88 | 60 | 21 | 185 | 159 | 79 | 49 | 17 |
| 5650 | 525 | 502 | 500 | 455 | 261 | 150 | 66 | 26 | 14 | 248 | 145 | 63 | 24 | 14 |
| 72508 | 529 | 501 | 431 | 392 | 273 | 125 | 55 | 35 | 25 | 257 | 120 | 52 | 34 | 24 |
| 3019 | 535 | 500 | 1227 | 1045 | 217 | 139 | 85 | 50 | 27 | 201 | 133 | 77 | 50 | 22 |
| 5901 | 562 | 499 | 1232 | 1106 | 124 | 140 | 113 | 74 | 56 | 100 | 112 | 108 | 72 | 54 |
| 7561 | 569 | 497 | 809 | 743 | 267 | 156 | 80 | 34 | 22 | 222 | 136 | 75 | 32 | 22 |
| 72029 | 543 | 495 | 684 | 615 | 226 | 143 | 78 | 49 | 28 | 203 | 130 | 72 | 44 | 28 |
| 7339 | 519 | 494 | 1104 | 979 | 194 | 126 | 91 | 46 | 30 | 186 | 121 | 85 | 43 | 29 |
| 2935 | 556 | 492 | 144 | 131 | 100 | 138 | 101 | 90 | 56 | 90 | 117 | 86 | 78 | 53 |
| 3572 | 547 | 491 | 361 | 323 | 289 | 117 | 74 | 41 | 15 | 259 | 106 | 64 | 37 | 15 |
| 3013 | 545 | 489 | 286 | 243 | 270 | 147 | 73 | 39 | 8 | 241 | 132 | 67 | 54 | 7 |
| 3960 | 670 | 487 | 347 | 305 | 133 | 150 | 134 | 100 | 78 | 96 | 104 | 96 | 75 | 56 |
| 8210 | 512 | 486 | 275 | 259 | 90 | 139 | 95 | 81 | 47 | 84 | 133 | 92 | 73 | 45 |
| 5369 | 500 | 486 | 591 | 532 | 182 | 133 | 82 | 57 | 24 | 175 | 130 | 80 | 56 | 24 |

| ICDA | OCCURANCE ALL | PDX NR | OCCURANCE ALL | ADX NR | NO. DXS KEYED ON PRIMARY DX ALL EPISODES -1- | -2- | -3- | -4- | -5- | NO. DXS KEYED ON PRIMARY DX NON-REPEAT EPISODES -1- | -2- | -3- | -4- | -5- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2114 | 534 | 482 | 1135 | 1062 | 254 | 138 | 74 | 35 | 15 | 219 | 127 | 70 | 33 | 15 |
| 4272 | 480 | 480 | 1520 | 1350 | 50 | 91 | 102 | 77 | 74 | 50 | 91 | 102 | 77 | 74 |
| 1530 | 562 | 479 | 163 | 153 | 124 | 139 | 117 | 87 | 40 | 100 | 115 | 103 | 74 | 38 |
| 8150 | 486 | 478 | 411 | 369 | 230 | 190 | 40 | 16 | 5 | 229 | 186 | 40 | 13 | 5 |
| 1610 | 585 | 477 | 145 | 126 | 285 | 145 | 74 | 38 | 22 | 228 | 120 | 58 | 30 | 22 |
| 4319 | 490 | 476 | 351 | 315 | 146 | 123 | 89 | 60 | 48 | 141 | 118 | 87 | 59 | 48 |
| 7841 | 489 | 476 | 1046 | 872 | 101 | 114 | 88 | 83 | 56 | 98 | 110 | 86 | 83 | 54 |
| 844 | 488 | 476 | 282 | 263 | 223 | 151 | 60 | 29 | 12 | 216 | 147 | 60 | 29 | 12 |
| 7531 | 4058 | 474 | 1786 | 588 | 2793 | 838 | 239 | 87 | 47 | 135 | 99 | 107 | 60 | 34 |
| 5900 | 1927 | 474 | 2225 | 1595 | 633 | 793 | 222 | 110 | 59 | 81 | 71 | 87 | 77 | 56 |
| 7311 | 481 | 471 | 1140 | 1018 | 243 | 92 | 67 | 36 | 24 | 237 | 91 | 66 | 35 | 23 |
| 7832 | 484 | 469 | 1215 | 1062 | 104 | 111 | 97 | 74 | 51 | 100 | 107 | 96 | 73 | 48 |
| 2912 | 489 | 467 | 127 | 110 | 235 | 129 | 70 | 26 | 16 | 222 | 128 | 63 | 26 | 15 |
| 5400 | 475 | 467 | 99 | 93 | 245 | 118 | 53 | 26 | 22 | 240 | 117 | 52 | 26 | 21 |
| 426 | 499 | 464 | 5615 | 4350 | 37 | 81 | 121 | 101 | 77 | 31 | 77 | 117 | 93 | 71 |
| 4541 | 495 | 463 | 1352 | 1214 | 138 | 125 | 92 | 58 | 42 | 132 | 118 | 85 | 53 | 36 |
| 7313 | 487 | 462 | 201 | 180 | 351 | 86 | 27 | 11 | 7 | 335 | 80 | 25 | 10 | 7 |
| 1732 | 515 | 460 | 374 | 338 | 255 | 143 | 59 | 31 | 18 | 230 | 128 | 52 | 24 | 17 |
| 7235 | 537 | 459 | 417 | 368 | 247 | 127 | 77 | 40 | 20 | 213 | 103 | 71 | 34 | 16 |
| 3872 | 504 | 457 | 553 | 499 | 300 | 127 | 47 | 21 | 4 | 267 | 118 | 44 | 19 | 4 |
| 9975 | 490 | 456 | 511 | 413 | 194 | 144 | 74 | 32 | 24 | 182 | 134 | 66 | 29 | 24 |
| 9976 | 523 | 452 | 569 | 353 | 195 | 150 | 98 | 39 | 26 | 163 | 133 | 86 | 35 | 21 |

| ICDA | OCCURANCE ALL | PDX NR | OCCURANCE ALL | ADX NR | NO. DXS KEYED ON PRIMARY DX ALL EPISODES -1- | -2- | -3- | -4- | -5- | NO. DXS KEYED ON PRIMARY DX NON-REPEAT EPISODES -1- | -2- | -3- | -4- | -5- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7884 | 464 | 452 | 1349 | 1240 | 63 | 93 | 92 | 80 | 62 | 62 | 88 | 91 | 78 | 61 |
| 8080 | 456 | 449 | 378 | 359 | 62 | 135 | 97 | 70 | 49 | 60 | 132 | 96 | 70 | 49 |
| 3015 | 506 | 448 | 446 | 386 | 209 | 138 | 79 | 46 | 17 | 186 | 121 | 70 | 41 | 14 |
| 1460 | 640 | 445 | 167 | 140 | 189 | 203 | 108 | 67 | 44 | 125 | 136 | 79 | 50 | 36 |
| 398 | 518 | 445 | 640 | 585 | 57 | 98 | 131 | 86 | 61 | 50 | 90 | 105 | 80 | 49 |
| 7240 | 510 | 445 | 126 | 119 | 389 | 86 | 22 | 10 | 2 | 343 | 74 | 17 | 8 | 2 |
| 8310 | 465 | 444 | 180 | 171 | 190 | 178 | 59 | 21 | 14 | 180 | 169 | 58 | 20 | 14 |
| 2041 | 683 | 443 | 415 | 365 | 136 | 164 | 143 | 98 | 72 | 94 | 103 | 91 | 71 | 45 |
| 4275 | 511 | 439 | 878 | 758 | 158 | 151 | 92 | 50 | 35 | 134 | 127 | 74 | 46 | 34 |
| 5511 | 452 | 437 | 754 | 668 | 187 | 116 | 69 | 45 | 21 | 182 | 109 | 67 | 44 | 21 |
| 9981 | 449 | 436 | 1083 | 951 | 238 | 110 | 50 | 27 | 12 | 233 | 105 | 48 | 26 | 12 |
| 0110 | 451 | 433 | 239 | 213 | 84 | 113 | 89 | 61 | 48 | 80 | 106 | 89 | 57 | 46 |
| 518 | 492 | 428 | 1031 | 890 | 97 | 129 | 110 | 77 | 45 | 84 | 112 | 96 | 62 | 42 |
| 7862 | 515 | 427 | 1427 | 1275 | 150 | 149 | 83 | 68 | 30 | 115 | 119 | 75 | 58 | 27 |
| 135 | 633 | 426 | 301 | 273 | 187 | 257 | 72 | 64 | 32 | 161 | 124 | 61 | 43 | 23 |
| 6820 | 434 | 426 | 333 | 297 | 214 | 108 | 67 | 21 | 11 | 209 | 106 | 66 | 21 | 11 |
| 244 | 482 | 424 | 1842 | 1560 | 71 | 111 | 93 | 82 | 59 | 61 | 103 | 77 | 74 | 52 |
| 6079 | 449 | 422 | 1302 | 1149 | 204 | 108 | 74 | 29 | 20 | 194 | 102 | 67 | 26 | 19 |
| 5309 | 439 | 422 | 1177 | 1023 | 98 | 120 | 98 | 54 | 37 | 94 | 113 | 96 | 52 | 36 |
| 5039 | 438 | 422 | 2119 | 1924 | 137 | 127 | 79 | 48 | 17 | 130 | 122 | 79 | 47 | 16 |
| 3494 | 484 | 421 | 1257 | 1105 | 11 | 57 | 89 | 84 | 78 | 7 | 51 | 68 | 70 | 71 |
| 7385 | 452 | 421 | 1835 | 1655 | 103 | 132 | 104 | 58 | 26 | 97 | 122 | 95 | 53 | 26 |

| ICDA | OCCURANCE ALL | PDX NR | OCCURANCE ALL | ADX NR | NO. DXS KEYED ON PRIMARY DX ALL EPISODES -1- | -2- | -3- | -4- | -5- | NO. DXS KEYED ON PRIMARY DX NON-REPEAT EPISODES -1- | -2- | -3- | -4- | -5- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0791 | 438 | 417 | 906 | 840 | 320 | 69 | 24 | 9 | 5 | 308 | 62 | 23 | 9 | 4 |
| 7939 | 426 | 417 | 56 | 53 | 348 | 47 | 19 | 8 | 2 | 340 | 46 | 19 | 8 | 2 |
| 2699 | 425 | 416 | 4186 | 3779 | 28 | 60 | 95 | 89 | 69 | 28 | 59 | 91 | 87 | 69 |
| 462 | 418 | 415 | 767 | 664 | 156 | 112 | 74 | 41 | 19 | 155 | 112 | 73 | 40 | 19 |
| 3950 | 523 | 413 | 432 | 383 | 115 | 132 | 110 | 68 | 50 | 90 | 105 | 86 | 54 | 41 |
| 5030 | 446 | 413 | 916 | 836 | 208 | 116 | 66 | 25 | 23 | 190 | 105 | 63 | 24 | 23 |
| 7316 | 428 | 413 | 346 | 318 | 245 | 97 | 37 | 29 | 15 | 235 | 94 | 36 | 28 | 15 |
| 8520 | 439 | 412 | 219 | 197 | 105 | 136 | 92 | 51 | 32 | 98 | 129 | 85 | 48 | 31 |
| 5740 | 420 | 411 | 106 | 94 | 157 | 96 | 64 | 51 | 33 | 156 | 94 | 62 | 49 | 33 |
| 1579 | 511 | 410 | 148 | 135 | 119 | 169 | 100 | 62 | 27 | 90 | 127 | 94 | 52 | 22 |
| 30451 | 422 | 410 | 1604 | 1405 | 128 | 112 | 58 | 49 | 36 | 127 | 109 | 55 | 48 | 33 |
| 3016 | 430 | 409 | 802 | 682 | 174 | 118 | 70 | 42 | 18 | 161 | 114 | 68 | 41 | 18 |
| 307 | 420 | 407 | 309 | 262 | 198 | 111 | 61 | 25 | 14 | 191 | 109 | 60 | 25 | 12 |
| 8130 | 421 | 405 | 281 | 261 | 125 | 180 | 62 | 26 | 23 | 120 | 172 | 59 | 26 | 23 |
| 5718 | 441 | 404 | 941 | 838 | 62 | 114 | 87 | 76 | 54 | 58 | 103 | 78 | 70 | 50 |
| 4370 | 420 | 404 | 1043 | 975 | 40 | 70 | 96 | 87 | 53 | 39 | 69 | 94 | 83 | 52 |
| 8540 | 406 | 402 | 242 | 217 | 57 | 118 | 89 | 60 | 42 | 57 | 117 | 88 | 59 | 42 |
| 7827 | 422 | 401 | 664 | 603 | 183 | 121 | 57 | 30 | 20 | 175 | 116 | 56 | 27 | 18 |
| 2022 | 575 | 399 | 151 | 138 | 180 | 138 | 107 | 63 | 44 | 122 | 100 | 75 | 42 | 31 |
| 2919 | 417 | 399 | 236 | 218 | 145 | 107 | 71 | 41 | 29 | 140 | 101 | 67 | 41 | 26 |
| 9200 | 395 | 394 | 559 | 513 | 70 | 125 | 92 | 54 | 27 | 70 | 125 | 92 | 53 | 27 |
| 8810 | 395 | 394 | 495 | 440 | 121 | 175 | 65 | 18 | 9 | 121 | 174 | 65 | 18 | 9 |

| ICDA | OCCURANCE PDX | | OCCURANCE ADX | | NO. DXS KEYED ON PRIMARY DX ALL EPISODES | | | | | NO. DXS KEYED ON PRIMARY DX NON-REPEAT EPISODES | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ALL | NR | ALL | NR | -1- | -2- | -3- | -4- | -5- | -1- | -2- | -3- | -4- | -5- |
| 2422 | 485 | 393 | 496 | 451 | 167 | 140 | 89 | 42 | 25 | 133 | 117 | 72 | 33 | 21 |
| 8509 | 428 | 392 | 466 | 417 | 96 | 97 | 89 | 62 | 49 | 92 | 84 | 83 | 58 | 41 |
| 3009 | 403 | 392 | 1005 | 891 | 126 | 114 | 93 | 38 | 19 | 120 | 113 | 90 | 37 | 19 |
| 8219 | 443 | 391 | 286 | 272 | 151 | 135 | 74 | 38 | 19 | 132 | 120 | 62 | 36 | 17 |
| 8549 | 417 | 390 | 681 | 606 | 75 | 126 | 78 | 65 | 31 | 70 | 120 | 71 | 60 | 31 |
| 3010 | 415 | 384 | 449 | 395 | 200 | 103 | 60 | 31 | 13 | 187 | 95 | 53 | 29 | 13 |
| 4580 | 392 | 384 | 1328 | 1170 | 50 | 76 | 84 | 61 | 65 | 49 | 73 | 83 | 61 | 64 |
| 346 | 397 | 379 | 460 | 417 | 171 | 106 | 65 | 27 | 19 | 162 | 103 | 60 | 27 | 18 |
| 3789 | 410 | 378 | 933 | 847 | 174 | 126 | 59 | 22 | 19 | 158 | 117 | 57 | 20 | 18 |
| 3480 | 457 | 377 | 143 | 133 | 179 | 123 | 82 | 36 | 27 | 150 | 104 | 64 | 25 | 25 |
| 561 | 385 | 377 | 373 | 322 | 150 | 79 | 58 | 46 | 33 | 149 | 78 | 56 | 45 | 31 |
| 1410 | 542 | 372 | 158 | 133 | 169 | 159 | 104 | 47 | 34 | 112 | 116 | 65 | 36 | 21 |
| 7844 | 389 | 372 | 692 | 615 | 104 | 98 | 76 | 51 | 29 | 97 | 93 | 73 | 49 | 29 |
| 8220 | 387 | 371 | 155 | 140 | 120 | 152 | 54 | 34 | 17 | 114 | 147 | 53 | 31 | 17 |
| 8450 | 378 | 370 | 324 | 292 | 203 | 119 | 27 | 20 | 6 | 200 | 117 | 25 | 19 | 6 |
| 5321 | 377 | 368 | 144 | 134 | 169 | 75 | 46 | 32 | 26 | 162 | 73 | 46 | 32 | 26 |
| 442 | 390 | 366 | 355 | 319 | 138 | 96 | 70 | 37 | 25 | 132 | 92 | 65 | 35 | 23 |
| 8100 | 379 | 366 | 344 | 324 | 107 | 133 | 72 | 32 | 13 | 101 | 130 | 69 | 31 | 13 |
| 2969 | 396 | 365 | 166 | 150 | 201 | 94 | 47 | 28 | 17 | 186 | 85 | 46 | 25 | 15 |
| 3559 | 392 | 365 | 756 | 656 | 139 | 94 | 66 | 53 | 18 | 123 | 90 | 64 | 50 | 18 |
| 7826 | 383 | 365 | 1558 | 1325 | 70 | 61 | 80 | 64 | 59 | 66 | 60 | 77 | 61 | 54 |
| 5649 | 371 | 364 | 467 | 406 | 141 | 98 | 61 | 42 | 20 | 137 | 96 | 61 | 42 | 19 |

| ICDA | OCCURANCE ALL | PDX NR | OCCURANCE ALL | ADX NR | NO. DXS KEYED ON PRIMARY DX ALL EPISODES -1- | -2- | -3- | -4- | -5- | NO. DXS KEYED ON PRIMARY DX NON-REPEAT EPISODES -1- | -2- | -3- | -4- | -5- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4519 | 389 | 363 | 803 | 710 | 104 | 90 | 83 | 56 | 23 | 95 | 83 | 82 | 50 | 22 |
| 30439 | 383 | 362 | 743 | 645 | 149 | 113 | 61 | 28 | 20 | 134 | 107 | 61 | 28 | 20 |
| 583 | 1779 | 360 | 593 | 422 | 1058 | 503 | 89 | 60 | 32 | 106 | 77 | 67 | 51 | 28 |
| 3819 | 375 | 360 | 922 | 831 | 171 | 106 | 48 | 24 | 16 | 161 | 104 | 48 | 21 | 16 |
| 7059 | 419 | 359 | 445 | 398 | 217 | 108 | 51 | 21 | 10 | 181 | 92 | 46 | 18 | 10 |
| 5379 | 375 | 356 | 1058 | 965 | 122 | 92 | 81 | 34 | 19 | 115 | 89 | 78 | 32 | 17 |
| 0389 | 360 | 355 | 1828 | 1604 | 32 | 40 | 58 | 57 | 71 | 32 | 39 | 57 | 56 | 71 |
| 3094 | 419 | 354 | 222 | 191 | 116 | 106 | 76 | 51 | 40 | 93 | 90 | 64 | 43 | 37 |
| 7803 | 363 | 353 | 962 | 881 | 115 | 81 | 82 | 43 | 27 | 111 | 81 | 79 | 42 | 25 |
| 1419 | 455 | 351 | 140 | 114 | 150 | 124 | 83 | 45 | 25 | 123 | 93 | 61 | 34 | 19 |
| 510 | 396 | 351 | 632 | 552 | 120 | 109 | 71 | 49 | 26 | 103 | 93 | 66 | 43 | 26 |
| 8820 | 354 | 350 | 220 | 200 | 133 | 172 | 37 | 6 | 5 | 133 | 170 | 36 | 5 | 5 |
| 3096 | 369 | 347 | 423 | 386 | 68 | 83 | 82 | 44 | 40 | 61 | 76 | 78 | 43 | 37 |
| 4130 | 363 | 347 | 1833 | 1592 | 55 | 94 | 97 | 53 | 37 | 54 | 90 | 91 | 50 | 37 |
| 1618 | 452 | 342 | 137 | 120 | 189 | 119 | 67 | 42 | 24 | 150 | 88 | 47 | 35 | 13 |
| 0799 | 347 | 341 | 289 | 255 | 137 | 87 | 46 | 37 | 24 | 134 | 87 | 43 | 37 | 24 |
| 8249 | 370 | 336 | 275 | 247 | 176 | 118 | 40 | 21 | 11 | 163 | 103 | 36 | 20 | 10 |
| 4309 | 366 | 336 | 162 | 153 | 152 | 89 | 55 | 27 | 22 | 140 | 77 | 54 | 25 | 21 |
| 30470 | 358 | 335 | 1148 | 1028 | 115 | 91 | 68 | 35 | 32 | 106 | 86 | 66 | 31 | 30 |
| 1101 | 347 | 335 | 2380 | 2168 | 111 | 122 | 72 | 23 | 11 | 108 | 118 | 68 | 22 | 11 |
| 7298 | 356 | 334 | 437 | 386 | 195 | 88 | 39 | 19 | 5 | 181 | 86 | 34 | 18 | 5 |
| 7230 | 370 | 333 | 1487 | 1328 | 55 | 76 | 79 | 68 | 44 | 49 | 70 | 69 | 61 | 37 |

| ICDA | OCCURANCE ALL | PDX NR | OCCURANCE ALL | ADX NR | NO. DXS KEYED ON PRIMARY DX ALL EPISODES -1- | -2- | -3- | -4- | -5- | NO. DXS KEYED ON PRIMARY DX NON-REPEAT EPISODES -1- | -2- | -3- | -4- | -5- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7860 | 343 | 331 | 294 | 269 | 188 | 94 | 30 | 10 | 15 | 182 | 91 | 29 | 9 | 14 |
| 3051 | 343 | 329 | 292 | 270 | 141 | 84 | 54 | 43 | 11 | 133 | 82 | 54 | 39 | 11 |
| 5206 | 333 | 329 | 1130 | 1019 | 251 | 62 | 8 | 7 | 1 | 250 | 59 | 8 | 7 | 1 |
| 1731 | 379 | 327 | 243 | 219 | 180 | 88 | 47 | 31 | 23 | 154 | 74 | 42 | 27 | 21 |
| 597 | 335 | 327 | 700 | 650 | 166 | 92 | 35 | 20 | 5 | 161 | 90 | 35 | 20 | 5 |
| 5225 | 330 | 327 | 1477 | 1352 | 192 | 65 | 36 | 18 | 11 | 189 | 65 | 36 | 18 | 11 |
| 447 | 353 | 326 | 555 | 487 | 91 | 79 | 68 | 56 | 31 | 81 | 76 | 68 | 49 | 28 |
| 7562 | 344 | 323 | 458 | 412 | 123 | 110 | 49 | 32 | 14 | 114 | 104 | 46 | 31 | 13 |
| 3443 | 388 | 322 | 605 | 535 | 68 | 85 | 106 | 61 | 29 | 59 | 68 | 84 | 54 | 24 |
| 8010 | 329 | 320 | 217 | 203 | 43 | 86 | 89 | 55 | 30 | 42 | 81 | 87 | 54 | 30 |
| 7387 | 343 | 319 | 479 | 440 | 148 | 116 | 47 | 14 | 11 | 141 | 105 | 44 | 13 | 10 |
| 7901 | 325 | 319 | 730 | 642 | 65 | 72 | 60 | 51 | 37 | 65 | 69 | 59 | 51 | 36 |
| 7297 | 347 | 318 | 312 | 299 | 197 | 95 | 35 | 9 | 7 | 178 | 87 | 33 | 9 | 7 |
| 7816 | 331 | 315 | 929 | 847 | 113 | 84 | 56 | 36 | 24 | 103 | 83 | 53 | 35 | 23 |
| 2149 | 316 | 314 | 432 | 399 | 201 | 60 | 35 | 11 | 6 | 200 | 59 | 35 | 11 | 6 |
| 2420 | 399 | 313 | 130 | 114 | 167 | 107 | 71 | 28 | 15 | 136 | 82 | 54 | 20 | 12 |
| 350 | 338 | 311 | 711 | 633 | 116 | 81 | 64 | 41 | 22 | 103 | 76 | 63 | 38 | 19 |
| 4560 | 332 | 311 | 2153 | 1797 | 26 | 88 | 84 | 45 | 53 | 23 | 79 | 79 | 44 | 52 |
| 4003 | 2868 | 309 | 210 | 121 | 1711 | 874 | 200 | 31 | 27 | 112 | 77 | 49 | 27 | 22 |
| 8910 | 314 | 309 | 227 | 216 | 90 | 154 | 48 | 13 | 7 | 87 | 154 | 46 | 13 | 7 |
| 8059 | 324 | 305 | 657 | 576 | 70 | 92 | 59 | 29 | 29 | 63 | 91 | 53 | 29 | 29 |
| 8369 | 315 | 304 | 97 | 86 | 160 | 102 | 34 | 12 | 5 | 151 | 100 | 34 | 12 | 5 |

| ICDA | OCCURANCE ALL | PDX NR | OCCURANCE ALL | ADX NR | NO. DXS KEYED ON PRIMARY DX ALL EPISODES -1- | -2- | -3- | -4- | -5- | NO. DXS KEYED ON PRIMARY DX NON-REPEAT EPISODES -1- | -2- | -3- | -4- | -5- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6075 | 314 | 303 | 371 | 340 | 158 | 69 | 37 | 29 | 15 | 151 | 68 | 37 | 27 | 14 |
| 2000 | 547 | 302 | 79 | 70 | 198 | 134 | 87 | 63 | 33 | 100 | 77 | 53 | 30 | 20 |
| 3190 | 305 | 302 | 11 | 10 | 282 | 16 | 2 | 2 | 2 | 279 | 16 | 2 | 2 | 2 |
| 2313 | 317 | 301 | 367 | 326 | 100 | 84 | 48 | 49 | 21 | 94 | 81 | 42 | 49 | 21 |
| 3949 | 345 | 300 | 991 | 848 | 86 | 92 | 64 | 48 | 29 | 70 | 81 | 58 | 43 | 24 |
| 8020 | 308 | 300 | 418 | 378 | 94 | 99 | 65 | 27 | 14 | 91 | 97 | 63 | 27 | 14 |
| 2168 | 307 | 300 | 469 | 438 | 216 | 52 | 24 | 8 | 2 | 210 | 51 | 24 | 8 | 2 |
| 792 | 769 | 299 | 5228 | 3093 | 26 | 495 | 57 | 65 | 48 | 24 | 53 | 46 | 58 | 43 |
| 2050 | 686 | 298 | 54 | 49 | 268 | 164 | 106 | 56 | 49 | 85 | 69 | 49 | 34 | 31 |
| 6983 | 329 | 297 | 1231 | 1115 | 101 | 97 | 55 | 35 | 17 | 98 | 85 | 50 | 26 | 16 |
| 7030 | 316 | 297 | 467 | 415 | 237 | 44 | 19 | 9 | 4 | 221 | 42 | 18 | 9 | 4 |
| 5603 | 309 | 297 | 413 | 359 | 87 | 74 | 62 | 34 | 28 | 85 | 71 | 57 | 32 | 28 |
| 3310 | 352 | 292 | 163 | 155 | 159 | 87 | 44 | 22 | 23 | 132 | 68 | 37 | 20 | 19 |
| 4350 | 304 | 291 | 258 | 247 | 51 | 63 | 71 | 63 | 32 | 48 | 60 | 71 | 59 | 31 |
| 6823 | 299 | 291 | 177 | 148 | 146 | 67 | 36 | 29 | 11 | 142 | 66 | 34 | 29 | 10 |
| 1401 | 326 | 290 | 72 | 61 | 172 | 85 | 38 | 15 | 9 | 154 | 73 | 36 | 11 | 9 |
| 7239 | 305 | 289 | 784 | 688 | 124 | 79 | 38 | 30 | 17 | 116 | 75 | 35 | 30 | 16 |
| 279 | 335 | 288 | 3567 | 3038 | 102 | 72 | 52 | 42 | 23 | 78 | 65 | 45 | 36 | 23 |
| 385 | 322 | 287 | 268 | 247 | 131 | 72 | 62 | 24 | 22 | 118 | 62 | 55 | 21 | 20 |
| 8050 | 308 | 285 | 99 | 89 | 74 | 98 | 63 | 28 | 17 | 68 | 91 | 56 | 28 | 15 |
| 7845 | 290 | 285 | 446 | 387 | 54 | 60 | 69 | 41 | 30 | 52 | 60 | 68 | 40 | 30 |
| 1570 | 344 | 284 | 77 | 66 | 73 | 114 | 61 | 38 | 27 | 62 | 92 | 46 | 30 | 27 |

| ICDA | OCCURANCE ALL | PDX NR | OCCURANCE ALL | ADX NR | NO. DXS KEYED ON PRIMARY DX ALL EPISODES -1- | -2- | -3- | -4- | -5- | NO. DXS KEYED ON PRIMARY DX NON-REPEAT EPISODES -1- | -2- | -3- | -4- | -5- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7284 | 300 | 284 | 379 | 350 | 96 | 73 | 45 | 29 | 29 | 90 | 70 | 44 | 27 | 29 |
| 9589 | 322 | 281 | 529 | 476 | 17 | 71 | 74 | 62 | 41 | 14 | 63 | 65 | 52 | 35 |
| 702 | 296 | 281 | 637 | 600 | 176 | 63 | 26 | 13 | 13 | 167 | 59 | 25 | 12 | 13 |
| 480 | 282 | 281 | 174 | 152 | 97 | 79 | 33 | 38 | 21 | 96 | 79 | 33 | 38 | 21 |
| 5112 | 294 | 280 | 1402 | 1144 | 51 | 82 | 64 | 39 | 32 | 49 | 77 | 60 | 39 | 29 |
| 552 | 281 | 280 | 104 | 91 | 116 | 56 | 50 | 25 | 23 | 116 | 56 | 49 | 25 | 23 |
| 8139 | 310 | 279 | 230 | 210 | 146 | 91 | 40 | 21 | 10 | 129 | 85 | 36 | 18 | 9 |
| 0122 | 308 | 279 | 1252 | 1006 | 79 | 75 | 57 | 30 | 34 | 71 | 69 | 54 | 27 | 29 |
| 726 | 291 | 279 | 180 | 171 | 131 | 81 | 32 | 21 | 12 | 128 | 75 | 32 | 20 | 11 |
| 5779 | 302 | 278 | 709 | 625 | 77 | 80 | 56 | 42 | 20 | 68 | 69 | 54 | 41 | 20 |
| 1960 | 332 | 277 | 2294 | 1629 | 106 | 91 | 62 | 38 | 19 | 83 | 77 | 54 | 33 | 16 |
| 4829 | 276 | 276 | 393 | 346 | 55 | 65 | 46 | 46 | 24 | 55 | 65 | 46 | 46 | 24 |
| 5933 | 363 | 274 | 512 | 429 | 166 | 86 | 51 | 27 | 15 | 107 | 68 | 44 | 23 | 14 |
| 6073 | 278 | 274 | 420 | 394 | 141 | 58 | 41 | 21 | 11 | 139 | 58 | 40 | 21 | 11 |
| 9986 | 304 | 273 | 447 | 371 | 121 | 106 | 36 | 20 | 12 | 107 | 92 | 34 | 19 | 12 |
| 7288 | 294 | 273 | 185 | 169 | 156 | 69 | 33 | 17 | 6 | 146 | 62 | 3[illegible] | 16 | 6 |
| Y121 | 293 | 273 | 152 | 138 | 112 | 96 | 53 | 13 | 11 | 103 | 90 | 50 | 11 | 11 |
| 8212 | 286 | 271 | 98 | 93 | 57 | 83 | 52 | 37 | 25 | 53 | 76 | 51 | 35 | 25 |
| 8510 | 281 | 271 | 201 | 195 | 43 | 60 | 65 | 48 | 25 | 42 | 59 | 60 | 45 | 25 |
| 9290 | 271 | 271 | 498 | 472 | 57 | 81 | 51 | 36 | 22 | 57 | 81 | 51 | 36 | 22 |
| 9670 | 290 | 270 | 361 | 317 | 43 | 92 | 58 | 48 | 27 | 39 | 88 | 52 | 46 | 24 |
| 9779 | 276 | 270 | 503 | 431 | 70 | 72 | 50 | 36 | 26 | 70 | 68 | 50 | 36 | 25 |

| ICDA | OCCURANCE ALL | PDX NR | OCCURANCE ADX ALL | NR | NO. DXS KEYED ON PRIMARY DX ALL EPISODES -1- | -2- | -3- | -4- | -5- | NO. DXS KEYED ON PRIMARY DX NON-REPEAT EPISODES -1- | -2- | -3- | -4- | -5- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1481 | 405 | 269 | 99 | 85 | 114 | 134 | 77 | 32 | 25 | 70 | 88 | 48 | 27 | 19 |
| 251 | 293 | 269 | 617 | 549 | 66 | 82 | 57 | 43 | 20 | 59 | 76 | 51 | 41 | 18 |
| 2051 | 476 | 268 | 136 | 115 | 131 | 109 | 104 | 59 | 35 | 79 | 53 | 57 | 32 | 19 |
| 5370 | 275 | 265 | 485 | 432 | 66 | 86 | 53 | 36 | 21 | 63 | 83 | 52 | 36 | 18 |
| 3879 | 284 | 263 | 283 | 252 | 142 | 84 | 22 | 17 | 12 | 134 | 79 | 20 | 14 | 12 |
| 7817 | 269 | 261 | 563 | 497 | 27 | 54 | 62 | 51 | 39 | 25 | 54 | 62 | 47 | 37 |
| 8479 | 268 | 261 | 172 | 156 | 106 | 85 | 43 | 20 | 9 | 104 | 84 | 39 | 20 | 9 |
| 7571 | 262 | 260 | 520 | 477 | 174 | 54 | 19 | 10 | 4 | 172 | 54 | 19 | 10 | 4 |
| 581 | 350 | 258 | 444 | 328 | 119 | 78 | 52 | 51 | 23 | 73 | 61 | 42 | 40 | 21 |
| 186 | 511 | 256 | 65 | 61 | 188 | 158 | 74 | 38 | 29 | 94 | 73 | 43 | 24 | 10 |
| 4400 | 278 | 255 | 699 | 585 | 62 | 71 | 50 | 37 | 28 | 57 | 66 | 45 | 34 | 26 |
| 5110 | 259 | 255 | 551 | 497 | 61 | 73 | 54 | 36 | 22 | 59 | 72 | 54 | 35 | 22 |
| 1929 | 309 | 251 | 64 | 62 | 130 | 87 | 47 | 18 | 13 | 103 | 70 | 39 | 15 | 11 |
| 6076 | 256 | 251 | 392 | 362 | 112 | 67 | 48 | 20 | 7 | 108 | 67 | 47 | 20 | 7 |
| 8470 | 255 | 250 | 156 | 148 | 78 | 89 | 42 | 23 | 12 | 76 | 89 | 40 | 22 | 12 |
| 8140 | 254 | 250 | 190 | 174 | 98 | 102 | 28 | 13 | 8 | 96 | 101 | 28 | 12 | 8 |
| 1991 | 294 | 249 | 403 | 334 | 49 | 80 | 70 | 30 | 32 | 36 | 68 | 57 | 28 | 29 |
| 2419 | 270 | 248 | 381 | 334 | 128 | 77 | 32 | 23 | 7 | 114 | 74 | 29 | 21 | 7 |
| 1734 | 267 | 248 | 329 | 300 | 124 | 79 | 29 | 18 | 10 | 112 | 73 | 28 | 18 | 10 |
| 700 | 261 | 247 | 1478 | 1299 | 112 | 70 | 37 | 27 | 8 | 106 | 65 | 36 | 25 | 8 |
| 3870 | 265 | 246 | 295 | 275 | 144 | 69 | 29 | 16 | 3 | 137 | 63 | 23 | 16 | 3 |
| 9100 | 247 | 246 | 534 | 465 | 58 | 79 | 49 | 35 | 12 | 58 | 79 | 48 | 35 | 12 |

| ICDA | OCCURANCE ALL | PDX NR | OCCURANCE ALL | ADX NR | NO. DXS KEYED ON PRIMARY DX ALL EPISODES -1- | -2- | -3- | -4- | -5- | NO. DXS KEYED ON PRIMARY DX NON-REPEAT EPISODES -1- | -2- | -3- | -4- | -5- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9987 | 246 | 223 | 256 | 211 | 100 | 59 | 44 | 20 | 10 | 88 | 54 | 39 | 20 | 10 |
| 3771 | 246 | 223 | 771 | 694 | 135 | 47 | 35 | 12 | 8 | 119 | 43 | 32 | 12 | 8 |
| 5081 | 240 | 223 | 118 | 108 | 165 | 44 | 13 | 9 | 5 | 154 | 39 | 12 | 9 | 5 |
| 7314 | 234 | 223 | 137 | 123 | 168 | 49 | 13 | 2 | 1 | 159 | 47 | 13 | 2 | 1 |
| 8900 | 225 | 223 | 95 | 92 | 49 | 118 | 34 | 12 | 9 | 49 | 116 | 34 | 12 | 9 |
| 7291 | 232 | 221 | 373 | 348 | 96 | 65 | 38 | 14 | 9 | 92 | 62 | 35 | 13 | 9 |
| Y103 | 477 | 220 | 225 | 129 | 315 | 95 | 47 | 13 | 4 | 134 | 49 | 25 | 7 | 3 |
| 6829 | 224 | 220 | 351 | 305 | 89 | 51 | 41 | 23 | 8 | 87 | 51 | 40 | 23 | 8 |
| 284 | 493 | 219 | 589 | 413 | 165 | 90 | 77 | 72 | 46 | 51 | 45 | 38 | 37 | 25 |
| 3007 | 229 | 219 | 275 | 250 | 67 | 59 | 42 | 27 | 14 | 65 | 56 | 40 | 26 | 14 |
| 1540 | 257 | 216 | 63 | 58 | 57 | 60 | 54 | 38 | 25 | 48 | 54 | 46 | 27 | 21 |
| 7244 | 229 | 215 | 42 | 41 | 142 | 56 | 18 | 7 | 5 | 136 | 48 | 18 | 7 | 5 |
| 5760 | 229 | 214 | 317 | 285 | 54 | 74 | 45 | 23 | 24 | 50 | 65 | 44 | 22 | 24 |
| 174 | 298 | 213 | 59 | 53 | 56 | 90 | 76 | 27 | 26 | 43 | 67 | 50 | 20 | 16 |
| 366 | 231 | 213 | 403 | 373 | 78 | 60 | 42 | 26 | 16 | 68 | 58 | 38 | 25 | 15 |
| 2931 | 224 | 213 | 128 | 120 | 27 | 42 | 52 | 30 | 35 | 26 | 40 | 49 | 29 | 32 |
| 215 | 219 | 213 | 197 | 191 | 131 | 44 | 23 | 12 | 6 | 126 | 43 | 23 | 12 | 6 |
| 3449 | 227 | 212 | 631 | 567 | 44 | 55 | 47 | 34 | 19 | 42 | 51 | 42 | 32 | 18 |
| 2255 | 223 | 211 | 166 | 153 | 120 | 49 | 29 | 18 | 6 | 111 | 48 | 28 | 17 | 6 |
| 4249 | 222 | 211 | 985 | 891 | 48 | 58 | 35 | 42 | 19 | 47 | 53 | 34 | 39 | 19 |
| 9650 | 235 | 209 | 377 | 323 | 82 | 72 | 37 | 25 | 11 | 67 | 62 | 37 | 24 | 11 |
| 8700 | 213 | 209 | 183 | 169 | 48 | 90 | 40 | 23 | 10 | 46 | 89 | 40 | 23 | 9 |

| ICDA | OCCURANCE ALL | PDX NR | OCCURANCE ALL | ADX NR | NO. DXS KEYED ON PRIMARY DX ALL EPISODES -1- | -2- | -3- | -4- | -5- | NO. DXS KEYED ON PRIMARY DX NON-REPEAT EPISODES -1- | -2- | -3- | -4- | -5- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3059 | 244 | 232 | 246 | 225 | 85 | 67 | 40 | 26 | 12 | 81 | 60 | 40 | 26 | 11 |
| 1970 | 264 | 231 | 1967 | 1364 | 43 | 63 | 59 | 38 | 30 | 40 | 50 | 54 | 33 | 25 |
| 591 | 253 | 231 | 846 | 746 | 61 | 66 | 56 | 33 | 20 | 55 | 61 | 49 | 33 | 17 |
| 7889 | 246 | 231 | 1685 | 1359 | 58 | 43 | 54 | 39 | 22 | 54 | 41 | 50 | 35 | 22 |
| 3791 | 238 | 231 | 1147 | 1048 | 57 | 61 | 48 | 36 | 18 | 56 | 59 | 46 | 34 | 18 |
| 8790 | 234 | 231 | 129 | 120 | 32 | 115 | 49 | 23 | 8 | 32 | 113 | 48 | 23 | 8 |
| 7089 | 243 | 229 | 293 | 260 | 86 | 68 | 53 | 22 | 11 | 82 | 65 | 49 | 20 | 10 |
| 4320 | 234 | 229 | 301 | 277 | 34 | 54 | 54 | 33 | 30 | 32 | 53 | 53 | 32 | 30 |
| 360 | 229 | 228 | 1777 | 1595 | 97 | 53 | 33 | 19 | 19 | 97 | 52 | 33 | 19 | 19 |
| 3209 | 256 | 227 | 289 | 258 | 97 | 59 | 50 | 30 | 12 | 83 | 54 | 44 | 26 | 12 |
| 3499 | 251 | 227 | 255 | 229 | 63 | 53 | 43 | 27 | 26 | 59 | 51 | 36 | 24 | 22 |
| 23819 | 247 | 227 | 181 | 170 | 104 | 64 | 29 | 20 | 13 | 101 | 58 | 25 | 17 | 12 |
| 380 | 235 | 227 | 891 | 799 | 100 | 63 | 37 | 19 | 6 | 97 | 61 | 34 | 19 | 6 |
| 9731 | 230 | 227 | 802 | 684 | 14 | 33 | 48 | 45 | 42 | 14 | 33 | 46 | 45 | 42 |
| 19839 | 260 | 226 | 2098 | 1466 | 52 | 95 | 45 | 31 | 22 | 45 | 81 | 42 | 26 | 20 |
| 5272 | 236 | 226 | 217 | 186 | 98 | 70 | 34 | 18 | 8 | 96 | 68 | 31 | 15 | 8 |
| 3786 | 232 | 226 | 554 | 489 | 103 | 63 | 36 | 13 | 6 | 99 | 62 | 36 | 13 | 6 |
| 7930 | 228 | 226 | 39 | 37 | 166 | 33 | 14 | 7 | 6 | 164 | 33 | 14 | 7 | 6 |
| 2825 | 306 | 225 | 857 | 766 | 95 | 90 | 62 | 27 | 14 | 67 | 67 | 45 | 21 | 9 |
| 1985 | 262 | 225 | 4037 | 2869 | 43 | 84 | 61 | 33 | 26 | 39 | 69 | 50 | 29 | 24 |
| 3630 | 250 | 224 | 198 | 177 | 121 | 50 | 39 | 25 | 7 | 106 | 44 | 34 | 25 | 7 |
| 5286 | 227 | 224 | 421 | 396 | 111 | 59 | 27 | 13 | 11 | 109 | 59 | 26 | 13 | 11 |

| ICDA | OCCURANCE ALL | PDX NR | OCCURANCE ALL | ADX NR | NO. DXS KEYED ON PRIMARY DX ALL EPISODES -1- | -2- | -3- | -4- | -5- | NO. DXS KEYED ON PRIMARY DX NON-REPEAT EPISODES -1- | -2- | -3- | -4- | -5- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3770 | 277 | 245 | 533 | 467 | 104 | 78 | 40 | 25 | 10 | 89 | 66 | 38 | 23 | 10 |
| 7835 | 255 | 245 | 453 | 401 | 110 | 72 | 41 | 12 | 6 | 107 | 71 | 37 | 12 | 6 |
| 1730 | 264 | 244 | 168 | 159 | 131 | 62 | 31 | 17 | 12 | 122 | 56 | 27 | 16 | 12 |
| 7852 | 251 | 244 | 736 | 653 | 44 | 57 | 48 | 29 | 33 | 43 | 56 | 46 | 28 | 32 |
| 208 | 300 | 243 | 773 | 673 | 54 | 59 | 65 | 52 | 41 | 40 | 51 | 52 | 41 | 34 |
| 8029 | 278 | 242 | 254 | 232 | 107 | 87 | 44 | 19 | 9 | 94 | 71 | 41 | 15 | 9 |
| 9983 | 253 | 242 | 813 | 736 | 121 | 68 | 34 | 13 | 12 | 113 | 67 | 33 | 13 | 11 |
| 7319 | 246 | 242 | 307 | 273 | 157 | 47 | 26 | 11 | 4 | 154 | 47 | 25 | 11 | 4 |
| 1451 | 303 | 240 | 171 | 135 | 114 | 80 | 54 | 23 | 16 | 92 | 63 | 43 | 17 | 13 |
| 2810 | 263 | 240 | 620 | 556 | 54 | 58 | 66 | 32 | 23 | 49 | 52 | 58 | 30 | 21 |
| 7815 | 249 | 240 | 3190 | 2981 | 26 | 71 | 60 | 43 | 19 | 26 | 67 | 60 | 41 | 18 |
| 1531 | 311 | 239 | 76 | 71 | 70 | 88 | 52 | 40 | 28 | 51 | 55 | 42 | 35 | 26 |
| 03104 | 278 | 238 | 116 | 103 | 56 | 73 | 66 | 36 | 24 | 45 | 61 | 61 | 32 | 23 |
| 691 | 267 | 238 | 344 | 294 | 92 | 76 | 42 | 36 | 14 | 80 | 71 | 36 | 33 | 11 |
| 5999 | 248 | 238 | 930 | 828 | 60 | 64 | 57 | 26 | 15 | 57 | 62 | 55 | 25 | 14 |
| 4310 | 239 | 238 | 102 | 91 | 48 | 69 | 50 | 32 | 16 | 47 | 69 | 50 | 32 | 16 |
| 4290 | 253 | 236 | 4051 | 3536 | 34 | 48 | 54 | 55 | 29 | 32 | 41 | 52 | 51 | 29 |
| 8122 | 243 | 235 | 174 | 159 | 59 | 74 | 39 | 26 | 27 | 56 | 71 | 38 | 25 | 27 |
| 1468 | 317 | 234 | 121 | 98 | 93 | 95 | 71 | 27 | 20 | 71 | 61 | 60 | 19 | 16 |
| 8129 | 278 | 234 | 276 | 247 | 95 | 64 | 54 | 38 | 15 | 77 | 53 | 47 | 33 | 13 |
| 7079 | 241 | 234 | 464 | 412 | 78 | 62 | 40 | 33 | 14 | 77 | 61 | 37 | 31 | 14 |
| 351 | 270 | 233 | 248 | 202 | 120 | 60 | 50 | 27 | 6 | 103 | 53 | 44 | 22 | 5 |

| ICDA | OCCURANCE ALL | PDX NR | OCCURANCE ALL | ADX NR | NO. DXS KEYED ON PRIMARY DX ALL EPISODES -1- | -2- | -3- | -4- | -5- | NO. DXS KEYED ON PRIMARY DX NON-REPEAT EPISODES -1- | -2- | -3- | -4- | -5- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6959 | 244 | 208 | 301 | 262 | 66 | 70 | 40 | 32 | 22 | 58 | 59 | 30 | 30 | 19 |
| 8160 | 214 | 208 | 338 | 302 | 78 | 91 | 24 | 12 | 7 | 76 | 90 | 23 | 10 | 7 |
| 5349 | 222 | 207 | 145 | 134 | 69 | 54 | 40 | 34 | 14 | 64 | 52 | 36 | 32 | 13 |
| 2270 | 215 | 205 | 395 | 371 | 149 | 40 | 17 | 4 | 5 | 142 | 38 | 16 | 4 | 5 |
| 99779 | 379 | 204 | 697 | 184 | 88 | 153 | 48 | 52 | 21 | 63 | 60 | 37 | 16 | 16 |
| 353 | 210 | 203 | 324 | 301 | 78 | 63 | 31 | 20 | 15 | 76 | 60 | 30 | 20 | 14 |
| 72596 | 209 | 203 | 210 | 198 | 133 | 35 | 20 | 11 | 3 | 129 | 34 | 20 | 10 | 3 |
| 9210 | 206 | 203 | 349 | 311 | 31 | 67 | 44 | 35 | 19 | 31 | 67 | 44 | 33 | 18 |
| 1550 | 255 | 202 | 96 | 83 | 74 | 58 | 50 | 28 | 23 | 53 | 44 | 42 | 22 | 19 |
| 2169 | 203 | 202 | 318 | 295 | 143 | 32 | 18 | 4 | 1 | 142 | 32 | 18 | 4 | 1 |
| 4210 | 223 | 199 | 233 | 205 | 29 | 42 | 46 | 37 | 28 | 27 | 41 | 36 | 34 | 24 |
| 1736 | 220 | 199 | 250 | 224 | 109 | 64 | 19 | 13 | 14 | 95 | 61 | 16 | 12 | 14 |
| 7370 | 211 | 199 | 303 | 271 | 67 | 61 | 37 | 22 | 15 | 59 | 59 | 36 | 21 | 15 |
| 3780 | 201 | 195 | 263 | 238 | 163 | 21 | 9 | 4 | 2 | 157 | 21 | 9 | 4 | 2 |
| 507 | 195 | 194 | 893 | 819 | 63 | 62 | 32 | 18 | 10 | 62 | 62 | 32 | 18 | 10 |
| 423 | 218 | 193 | 594 | 459 | 61 | 62 | 36 | 28 | 15 | 57 | 55 | 30 | 23 | 15 |
| 794 | 205 | 193 | 1141 | 1054 | 26 | 41 | 54 | 34 | 13 | 24 | 40 | 50 | 32 | 13 |
| 1737 | 209 | 192 | 238 | 214 | 116 | 53 | 22 | 11 | 4 | 103 | 49 | 22 | 11 | 4 |
| 7800 | 194 | 191 | 343 | 313 | 25 | 40 | 29 | 21 | 33 | 25 | 40 | 28 | 21 | 32 |
| 506 | 200 | 190 | 248 | 224 | 114 | 40 | 23 | 15 | 5 | 109 | 38 | 22 | 13 | 5 |
| Y0001 | 220 | 188 | 991 | 865 | 166 | 40 | 12 | 0 | 1 | 143 | 31 | 12 | 0 | 1 |
| 7171 | 196 | 188 | 365 | 319 | 88 | 37 | 30 | 23 | 10 | 83 | 37 | 28 | 22 | 10 |
| TOTAL | 1013269 | 801817 | 1504738 | 1312949 | 375976 | 246720 | 162066 | 103249 | 64531 | 259392 | 197865 | 140641 | 91020 | 57624 |

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