CASE-MIX CLASSIFICATION FOR CORRECTIONS HEALTH: AN EPISODE APPROACH

by

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A Thesis

Presented to

The Oregon Health Sciences University

School of Nursing

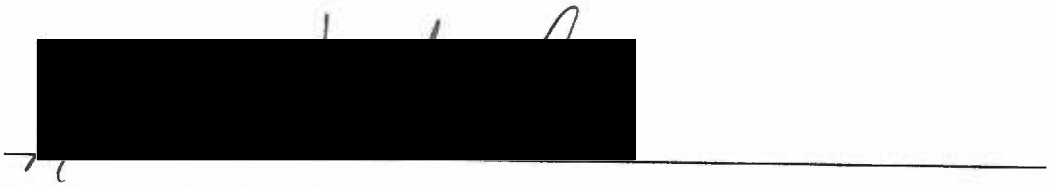
in partial fulfillment

of the requirements for the degree of

Master of Science in Nursing

July, 1987

APPROVED:



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ACKNOWLEDGMENTS

Thanks are in order and they come easily, more so than the conceptualization of health service output. This has been a joint production effort. I greatly appreciate the support I received.

To Mark Hornbrook, Joyce Semradek and Patty Patterson, I thank you for excellence in teaching. This has been the richest of my educational experiences.

To Kay Kendall, Burt Reich and staff of the Instructional Media Department, you have been a constant source of invaluable technical support. Without your special services and your friendship, this thesis might still be in rough draft form.

To Kathy Page and the MCDC nursing staff, my thanks for continued access to the jail and for your expertise over the course of this research effort.

To my husband and our children, Lynn, Leslie and Julie, I appreciate your waiting patiently while I worked to finish this project.

And, finally, to Mr. Otis English of Cleveland, Ohio, my all-time favorite patient and friend who died some twenty years ago, I dedicate this thesis to you.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INFORMATION SYSTEM DEFICIENCIES AND MANAGEMENT OF CORRECTIONS HEALTH RESOURCES

Policy Problem

A high crime rate creates multiple problems for many communities. There is intensive debate about overcrowded correctional facilities, effective sanctions for criminal behavior, protection of inmates' civil rights, public safety, and the ultimate taxpayer burden.

At a cost of almost $10 billion a year, about 700,000 persons are incarcerated in the nation's jails and prisons (Behar, 1986). Facility capacity is estimated at 10% over authorized levels, with nearly 70% of those crowded institutions under court order to decrease the inmate population (Becker & Stanley, 1985).

Jail facilities are experiencing the most serious overcrowding. The nation's jail population rose 23% to 274,000 during a three year period ending in June 1986. On the average, large jails housing more than 100 persons are operating at 8% over design capacity. A quarter of these are under court order to reduce occupancy (Oregonian, 10-26-87).

Oregon has its own version of the national corrections crisis. It ranks fifth highest across the nation for serious crimes and second highest for burglaries (Oregonian, 7-29-86). Serious crime in Oregon rose 8.3% during 1985 compared to a national increase of 5%. State facility overcrowding may force premature release of inmates before new prison construction can be completed (Oregonian, 6-3-87).

At a community level, the Multnomah County jail system which serves Oregon's largest urban area is in turmoil. A brief description of its correctional facilities is found in Appendix A. The largest facility, Multnomah County Detention Center (MCDC), has been crowded since its opening in 1983. As the entry point for all adult males and females taken into county custody, MCDC is currently under court order to reduce its inmate population to design capacity levels by June 1988. Even so, the number of bookings continues to rise, forcing rapid inmate turnover, often with premature releases. During the last year 2,500 inmates gained early release. Voters recently approved a levy to lease additional jail space for 100 sentenced men and 90 sentenced women by early 1988 (Oregonian, 7-1-87).

During fiscal year (FY) 1985-1986 there were 18,000 bookings in Multnomah County. For FY 1986-87 that number is expected to increase to 20,000 (Multnomah County Sheriff's Department Approved Budget 1986-87). In terms of bed days for 1986-1987, a 3.9% annual increase of 10,000 days (to a total of 269,000) has been projected. If population limitations are enforced, the number of bed days may be fewer than expected.

Facility crowding and rapidly changing inmate populations are of concern to jail health providers. They must decide how best to distribute limited health care resources across the increasing number of incarceration episodes. Whether to provide health care is not the issue; every inmate has constitutional entitlement to "adequate" levels of medical and mental health services. The unresolved problem is how to determine the type and level of service that meets an ill-defined criterion of adequacy, while remaining within the constraints of a limited corrections health budget and precarious public support.

This allocational problem is of particular importance to nurses who are primary health providers in the county jail system. MCDC nurses are

responsible for the intake health screening of all newly arrested persons, the delivery of the majority of direct care within county jail system, and the coordination of both on-site and off-site health referral services. A description of the corrections health program and providers is found in Appendix B.

Under the direction of a nurse-manager who is active in budgeting and policy formulation within the corrections health program, MCDC nurses deal directly with determining what services should be provided, how they should be produced, and who should receive them.

In order to continue to justify, request and manage limited inmate care resources, MCDC health providers need an appropriate conceptual framework and meaningful information to address inmate health needs and provider productivity. This study is a first step toward defining and meeting these conceptual and information requirements.

Current System Limitations

The current information system at MCDC is not structured to provide enough relevant, accessible, and timely information about service outputs and costs. Accordingly, providers do not have adequate information to guide them in the distribution of

limited resources among competing demands, either at one time or over time.

Conceptual and functional deficiencies inherent in the existing health information system create two specific problems for program planning. First, the system fails to make available useful information about how health status and care needs vary within the inmate population as a whole. Consequently, it is not possible to monitor how the level of need fluctuates across time and changing populations. Second, system information elements do not fully recognize the multidimensional mix of jail health care service outputs.

Booking, Census, and Service Visit Counts

Inadequate measurement of variation in population health needs can be largely attributed to the use of booking, census, and service visit counts (health provider encounters) as proxy measures of that need. All three indicators provide information that is too highly aggregated to reveal actual resource use patterns in terms of who gets what type and amount of service. Providers who rely on booking, census, and visit counts to explain service need make the assumption that all inmates and all visits are

homogeneous, or at least that differences in diagnostic and treatment needs "average out" across changing inmate populations within defined time periods. Neither assumption is useful, particularly in a context of cost containment and limited resources. Intake of even a few cases of active Acquired Immune Deficiency Syndrome (AIDS), high-risk pregnancy, chemotherapy, or other costly diagnostic/treatment types could clearly upset the "law of averages" and the assumption of a smooth, predictable course of inmate health needs during incarceration for a month, quarter or the year.

Inmate booking and census counts are both relevant aspects of measuring service requirement in terms of its volume dimension, but neither addresses the equally important factor of changing mix of health needs of populations over time. Similarly, service visit counts convey only the number of provider-inmate encounters, not what type of need precipitated the visit or how it was managed. Used alone or in combination, none of these indicators gives enough relevant information about resource distribution at either an individual or population level: who received care (all inmates, males and female, just

those who were unwell, etc.), why they got it, how much, how often and with what outcome.

Service visits even when labeled by general health problem type (e.g., dental, pregnancy, infection, behavior, etc.) are insensitive to important variation in service requirements. Consider how little information about health need would be conveyed, either at one point or for the entire inmate jail stay, by using number of "seizure problem visits" to report health service rendered in the following cases. Two inmates each have a seizure problem that is detected soon after jail entry. The first inmate presents as a "controlled" type (no seizures during the last five years on current medical regimen), and the second patient as an "uncontrolled" type (current seizure activity with no previous seizure history).

During a single "intake" visit, the corrections nurse makes a straightforward response to the controlled type by identifying the problem and assigning the inmate a "restricted" medical housing status (limiting housing options in the county correctional system to MCDC which has the highest concentration of medical resources). If the inmate stays in the jail long enough to require medication

maintenance, the nurse will contact the existing provider for a medication order. Subsequent visits throughout the inmate's stay will consist of continued monitoring and maintenance of well established and effective drug therapy.

Provider visits for the second inmate with active seizures are markedly different because they reflect a another problem management strategy. In this instance, the initial provider visit is for emergency treatment (e.g., maintaining an airway, protecting the inmate from injury during seizures) and transferring the inmate under guard to a hospital for treatment and problem "work up." Even when the inmate returns to jail, the nature of subsequent provider visits will differ from those provided to the first inmate. By clinical history, the second inmate remains at higher risk of sudden health deterioration during incarceration. He will predictably consume more resources associated with close monitoring of a new health problem, including follow-up laboratory tests and further provider consultation. While given the same general problem label, these two clinical manifestations clearly call for different kinds and intensities of nursing and other health provider effort.

Booking, census, and service visit counts do not provide a way to assess the logical relationship between what the inmate required and how the provider responded during either single or multiple encounters. If such important differences are not recognized in the budgeting and staffing systems, service may be unintentionally compromised and lead to inadequate care.

Representing and Reporting Output

The second information system deficiency is incomplete representation of service outputs. Two points need to be made about this problem. First, MCDC providers do not use an economic approach in analyzing resource allocation information needs. Such an approach is used in this study because it is helpful in understanding and overcoming system limitations. An important requirement of the economic approach is that inputs and outputs be conceptually independent to enable their separate measurement in production of a good or a service. These distinctions enable the evaluation of efficiency in production.

Second, when an economic perspective is used to analyze the MCDC health information system, the information elements now collected and reported

actually represent inputs (number of service visits, number of inmates), not outputs. Inputs alone do not allow for nontautological justification of service expenditures. In economics, a measure of output cannot be derived by merely summing inputs. The present rationale is circular: "more resources are needed because more are being used."

Across settings, a number of conceptual and measurement complexities make the definition of health provider output inherently difficult. In the jail it is particularly hard to define a measure of output that represents the inclusive service domain. Corrections health service is more broadly focused than that of traditional acute care settings where diagnosis and treatment are emphasized. Jail providers deal with additional issues: preventing health deterioration of well inmates; maintaining inmate rights, including access to service; and reducing facility and staff liability associated with service delivery. An extensive network of both on-site and off-site resources are used in delivery of inmate care.

The current MCDC information system captures features of service designed for unwell patients, yet

all well inmates receive service too. MCDC provider output tends to be "explained" in terms of number of provider visits, medical diagnoses, diagnostic studies and/or treatment procedures, and number of hospitalizations. Such limited focus leaves important, but less traditional, service dimensions either unrecognized or not fully recognized.

Services that are now not systematically observed and reported include crucial efforts that are congruent with the dominant goals of safe inmate custody, a secure facility, maintenance of inmate legal rights, responsible use of public resources, and maintenance of public health. Taken together, these information deficiencies generally cluster about the dimension of prevention.

Prevention, as a dimension of output, presents a very complex measurement issue. Its measurement requires establishment of a conceptual linkage among inmate need, provider effort, and the absence of certain patient or setting characteristics. Specific examples of prevention efforts that are now either unreported or underreported include the following: (1) denial of jail entry for medically unstable inmates; (2) determination of health risk relative to housing

and transfer options; (3) communication and coordination to facilitate timely return of hospitalized inmates to the jail; (4) consultation with corrections staff regarding module (MCDC inmate living areas) management of inmates with physical and/or behavioral problems; (5) consultation with inmate counselors, attorneys and judges; and (6) arrangement of post-release health care, e.g., follow-up tuberculosis monitoring in a county clinic. While individual medical records and numerous, separate departmental forms may document some of these services on a case by case basis, such information is not practically retrievable for aggregation and analysis. In short, providers heavily emphasize prevention as an output, but it does not get "counted" in the present information system.

Another concern is that some of the limited data now reported in computerized form, particularly those that code general type of health problem (if any) at intake, are based on ambiguous and subjective decision rules as well as inconsistent data entry patterns. Consequently, they are of questionable value to decision-makers.

The overall service domain of jail health providers has both indirect and direct dimensions. For this study, indirect care refers to such activities as planning inservice programs, guiding jail tours for student nurses, coordinating regional jail health care conferences, preparing the budget, and meeting with corrections officials to coordinate organizational efforts.

Direct care refers to health maintenance as well as to medical, mental health and dental intervention for specific health problems. Direct service may involve actual inmate contact or not, but it means that care is given on behalf of a specific individual inmate or group of inmates. Measuring provider output associated with direct care is the focus of this study.

Features of an Improved System

An improved jail health information system would focus on provider outputs and their comprehensive specification for administrative use in planning for resource distribution. A measure designed to overcome present system deficiencies would do the following: (1) provide a uniform and clearly documented way to count provider output over time and across large,

rapidly changing inmate populations; (2) refer to an inclusive set of feasible and appropriate services delineated by specified provider objectives; (3) document both basic service provision and nonroutine service (if needed) for all inmates; (4) use relevant attributes of an inmate's health status, not solely provider judgment, to justify service need; (5) be sensitive to individual service need fluctuation (if any) during incarceration; and (6) enable the evaluation of service efficiency and efficacy.

Such a measure, then, would count what providers do (their outputs and how they distribute their time across particular activities) and would document more carefully which inmates get what, when, where, and how often. Additionally, it would provide a conceptual framework to enable evaluation of efficiency, access, and quality of care for both administrative and policy purposes.

An Episode-Based System

An episode-based classification system (also called here a case-mix measure) can incorporate these desired features. An inmate stay-specific episode can serve as the basic jail health provider output unit that provides more relevant and meaningful information

about output than do booking, census, and visit counts.

In this study, a "health management episode" will be defined to capture a particular pattern of resource use over an entire incarceration stay, the same time period during which MCDC health providers have ongoing responsibility for providing care that inmates cannot secure on their own. The aim is to capture the overall contribution of the health provider to stable or changed inmate health status.

The episode approach is critical for a number of reasons, one being its ability to capture the crucial (and often elusive) output dimension of prevention. Prevention activities emphasized in clinical practice at the jail are linked to the notions of personal and group health risk as well as to facility and staff liability. As described earlier, this scope of prevention is broader than that found in traditional care settings where focus is on management of disease or illness.

A set of episode types, each indicating a different expected pattern of service need, will specify the relevant direct care service domain for this study. The domain is a conceptual structure of

feasible and appropriate outputs against which services can be evaluated and justified. Within this overall framework providers are held accountable for meeting the relevant health needs of inmates. Fluctuation in service requirements is captured since inmates are classified by health management episodes that are defined to recognize these differences. Episodes that are alike can be aggregated to allow a population view of variation within the specified output domain. Over time, the case mix of episode types that determine provider output will change as the inmate health requirements do.

Case Mix

"Case mix" is a term used in traditional settings to refer to variation in health need requirements within a specified population; it is one dimension of provider output. For this study, case mix defines the jail health service output in terms of the set of relevant personal and/or situational attributes that an inmate presents to health care providers at booking into the jail or within the first 72 hours thereafter. Relevant attributes refer to direct care efforts, including prevention of disease and injury, maintenance of wellness, provision of access to care,

and management of new or ongoing health problems. Without provider efforts directed at these aspects of inmate health, there could be undesirable consequences for an inmate's health status, for the liability of the county and jail staff, or both.

Stay-specific episodes, described earlier, provide the basis for determining various inmate classes that constitute MCDC's case mix. In this way, a reference to an episode is also a reference to provider output.

It is important to consider what case mix means in the jail context. Case mix refers to a set of distinct case types or classes that are grouped according to similar resource utilization patterns. The concepts of health risk and an episode of care are crucial in the occurrence of these patterns.

Case mix does not have uniform meaning across settings and applications. Hornbrook (1982) emphasizes the term's definitional confusion and measurement complexity. He cautions that case mix should not be construed as mere (and arbitrary) labeling of cases. Instead, the term should reflect a purposeful design and a carefully conceptualized process that incorporates features of intended utility and certain taxonomic and performance criteria.

Case-mix measures vary in quality and utility according to the integrity of the conceptual framework (what is being measured and why, how its elements are defined and linked) and how well the case-mix measure meets these specifications. Accordingly, the term case mix per se carries little meaning without reference to its specific design, development, testing, and application features.

Together with the dimensions of quality and volume, case mix can specify a global (comprehensive) health service output measure (Hornbrook, 1982). Over specified time periods and changing populations, separate case-mix indices can show trends and reflect variation in service requirements. In this sense, the concept is a dynamic one.

Since an episode-based case-mix measure has the potential to "explain" output variation by systematically accounting for important similarities and differences, it can provide rationale for requesting and allocating resources. As such, it is appropriate for inclusion in an improved MCDC information system.

Both large and small correctional facilities use a variety of staff and service delivery modalities

(on-site, off-site, or some combination) to deliver federally mandated inmate health care. Regardless of differences regarding who provides care and where, the common problem is how limited resources can best be used. Although this study focuses on a particular jail health care program in order to analyze the resource allocation problem, it is important to view the need for an innovative classification scheme as a general measurement challenge in the field of corrections health.

Thesis Plan

Given the problems of the current MCDC corrections health information system and features of a more useful output measure, the thesis objective is to design an improved system. Chapter 2 describes a literature search that found no inmate health care classification systems. Additionally, existing patient classification systems (PCS) were not suitable for use in corrections health. Study of acute care patient classification systems, including those used in nursing, did provide insight into design and structural requirements for the independent classification effort undertaken in this study.

Chapter 3 outlines study aims, and presents general and specific case-mix system design and

performance criteria. The methodological approach to classification is divided into two sections that lead to (1) conceptualization of MCDC health provider intermediate outputs and (2) derivation of two theoretical classification schemes.

Chapter 4 provides the conceptual foundation and definitions needed for measuring output of the MCDC health service. The stay-specific episode, the economic perspective, and differences between traditional and jail health services are emphasized as crucial elements in the conceptualization.

Chapters 5 and 6 deal with actual derivation of two sets of inmate classes: the first classifies inmates at intake into the jail; the second considers preliminary episode categorization for inmates who have additional provider contact after intake. Rationale for derivation of the separate schemes is given, and conceptual gaps that hinder episode definition for some classes are identified.

Chapter 7 suggests a plan for the next phase of system development. It focuses on data collection and the empirical testing of classes derived in Chapters 5 and 6. Rationale for the selection of a comprehensive resource use measure to test actual patterns of

current resource use is given and its components are discussed in detail. The final section presents study conclusions and implications for further research in case-mix measurement for corrections health.

CHAPTER 2

REVIEW OF THE LITERATURE

Little if any work has been done on corrections health case-mix classification systems. No references were found in the medical, nursing, or case-mix literature to indicate (1) ongoing, independent development of a case-mix measure in the corrections health field, or (2) attempts by classification specialists to modify and/or apply their systems to the corrections setting. However, a review of the patient classification literature was useful to define the nature of the problem and to select an appropriate methodological approach for developing an inmate classification system.

The literature review was directed at determining the suitability of existing patient classification systems (PCS) for use in defining jail health provider output. It became clear that the present PCS focus on inpatient populations in traditional care settings is too narrow for capturing the broader health care activities in the jail setting.

Patient Classification in General

A patient classification system attempts to classify patients according to a single underlying

phenomenon, e.g., costliness or probability of death. Some grouping systems are statistically derived while others are developed on a conceptual basis. Whatever the purpose or design approach, all systems reflect, more or less, imprecisely understood relationships among numerous patient, provider, treatment, and situational variables. Consequently, no method is inherently "better" until viewed within a particular context and purpose.

Statistical systems that employ analysis of variance splitting methodologies develop groupings of observations that best explain variance in the dependent variable, e.g., lengths of stay or minutes of nursing time (Cameron, 1985). The analysis of variance algorithms are interactive in the sense that users can make modifications in the splitting protocol. Even with statistical derivation of homogeneous groupings, there is disagreement over the mathematical and validity implications associated with the selection of various statistical grouping algorithms (Horn, 1986).

Another approach is to define patient classes according to a conceptual specification. Such systems are often developed by clinicians and are

characterized commonly by high validity, high clinical relevance, low reliability and limited or no statistical testing before implementation. They tend to reflect local and unique setting and population features (Semradek et al., 1986).

Most information system development and refinement is being done for inpatient populations, with recent interest in outpatient groups. Even among the more carefully developed and tested inpatient PCS's, there are system characteristics that make them unsuitable for use in a corrections health setting. A brief look at the basic assumptions and data requirements for several popular systems will illustrate the point.

Inpatient Classification Systems

Diagnosis Related Groups (DRG's)

DRG's are used in Medicare's prospective payment system for hospital care. In this statistically derived scheme all inpatients can be classified into one of 468 DRG's, with some "outlier" exceptions (Meyer, 1987). Hospitals receive fixed payments per DRG. The primary patient grouping is done using data such as medical diagnosis, procedures, and discharge status. DRG categories are based on bodily organ systems; an example of a Major Diagnostic Category

(MDC) is "Diseases and Disorders of the Eye." Patient groups are intended to be medically meaningful and to have similar lengths of stay. However, DRG's have been criticized for lack of homogeneity within groups (Frank & Lave, 1985). Also, the system's conceptual derivation is based on inpatient populations, so it has limited application.

Disease Staging

Disease Staging, developed by Joseph Gonnella, MD, et al. is a theoretically derived system (Gonnella, Hornbrook, Louis, 1984). It has two forms: (1) "clinical staging" that requires manual abstraction of hospital records for classifying patients into 420 disease groups, with 4 or more levels of severity each; and (2) "coded staging" in which ICD-9-CM (International Classification of Diseases, Clinical Modification, 9th Revision) diagnostic discharge codes are used in conjunction with computer software to classify patients into the 420 groups (Meyer, 1987).

The concept of severity of illness is linked to progressive disease in terms of increasing bodily involvement (localized, organ, system or multiple system). Criteria for increased severity are different for various diagnostic groups. The system

uses medical diagnoses and each one is given a severity score based upon considerations of comorbidity, sex, procedures performed, and discharge mortality. When applied to discharge data rather than intake data to enable classification, staging, like most systems, cannot distinguish what health status features were present at intake, and what ones occurred as a result of provider intervention (Meyer, 1987). That is, provider inputs and outputs are confounded.

Computerized Severity Index (CSI)

This theoretically derived system developed by Susan Horn, PhD, is an up-dated version of the manual Severity of Illness Index. CSI intends to avoid a disease-specific orientation and attempts to assess how ill the patient is at hospital admission. It uses objective clinical findings in the patient record (lab data, vital signs, diagnosis, sex, age, procedures, and signs and symptoms) to classify patients into a 700-group disease scheme, each of which has 4 levels of severity (Meyer, 1987).

A patient's CSI score can be obtained at any point of the hospital episode, either as an overall rating or one that is applicable to the last 24-48 hours

only. Although it is still being tested, critics suggest CSI may be too subjective and its 2,800 possible categories too unwieldy to be useful (Meyer, 1987).

Acute Physiology and Chronic Health Evaluation (APACHE II)

This theoretically derived system was developed by William Knaus, MD and is currently being modified for broader application in the hospital (Meyer, 1987). It does not use a medical diagnosis for classification but considers severity in terms of risk of death by collecting data on 12 physiologic variables within the first 24 hours following admission. It has been criticized for its limited application in hospital intensive care units.

Medical Illness Severity Grouping System (MEDISGRPS)

As of April 1987, Pennsylvania has ordered all 300 hospitals in the state to use this theoretically derived system for generating data that eventually can be used by the public for quality comparison (Meyer, 1987). This PCS is "diagnosis-independent" and uses selected objective clinical findings from medical charts assessed after patient discharge. It requires clinical data that relate to treatment and physical

exam, e.g., number of units of blood, chemistry blood screen data, presence of blood in urine. MEDISGRPS has been criticized for two reasons: (1) it classifies patients after they have been hospitalized for 48 hours, confounding provider inputs and outputs and (2) its five severity groupings may be too simplistic to capture important variation in health problem severity.

Patient Management Categories (PMC's)

PMC's were developed by Wanda Young, DSc, and are intended to define hospital inpatient types as well as the associated cost of their production (Meyer, 1987). Categories are based on what is required to manage the patient's condition. They were determined using physician panels who judged what constitutes appropriate diagnostic and treatment services.

The system classifies patients into one of 839 groups that reflect severity of illness (Meyer, 1987). The ICD-9-CM codes are used in the software program to assign broad disease classes (PMC's). An individual patient may be assigned up to 46 PMC's. The software program "weighs" these categories to make final assignments. The system has been criticized on two major counts: (1) it uses discharge data and (2)

it uses actual service utilization patterns to justify patient need.

Outpatient Classification Systems

Ambulatory Patient Related Groups (APG's) is an incompletely developed system intended to classify "ambulatory" (noninpatient) patients using 14 major ambulatory categories (MACS) that incorporate fewer medical diagnostic elements than the above inpatient systems,e.g., infective/parasitic disorder, nervous system disorder (Meyer, 1987). Subdivision variables focus on the nature of the patient's problem (acute, chronic, postoperative, well adult/child exam).

Suitability of PCS's in the Jail Setting

The systems reviewed above differ from one another in these ways: the conceptual basis for the disease and severity variation; the number and type of indicators that are used to sort patients into groups; the time at which classification occurs; the way in which data are collected to enable classification (manual abstraction of patient charts or the use of discharge codes); the number of final classes or types in the scheme; and the degree to which systems have been developed, tested and accepted by users. Even considering these differences, there are common system

features that make them unsuitable for use in the incarceration setting.

First, patient grouping (with the exception of APACHE and APG's) is based on the availability of, or at least efforts to obtain, either an implicit or explicit medical diagnosis that is the principal reason for health provider contact. The infirmary-like jail setting has limited on-site diagnostic resources, both in terms of equipment and staff. Diagnosis per se may or may not be confirmed during incarceration. In jail, problem management is often directed at the short-term control of symptoms, or avoiding having to deal with the clinical manifestations of a known but currently "clinically silent" problem. The point is that management of symptoms and confirmation of a diagnosis involve different technologies. It is important to make these distinctions in the counting of provider output. In jails, the nature of the underlying problem is not always confirmed in terms of strict diagnostic protocols, e.g., substance withdrawal, behavioral problems. But sometimes a clear diagnosis is made, e.g., pregnancy, urinary tract infection, hepatitis. Thus, an appropriate output measure for jail providers

will reflect broader service objectives than those of inpatient settings.

Second, these systems are also too narrowly focused for use in the jail setting since there is no provision for classifying well inmates with no health problems. Each of the systems reviewed assumes the presence of illness or disease severe enough to warrant hospitalization. Many inmates report no health problems yet they receive health services that relate to access and facility liability issues.

Third, inpatient settings (hospitals, nursing homes, clinics), operate from a perspective of voluntary admission and mutual choice. There is a basic noncontentious "match" between the patient's presence (to get care) and the health care institution's objective (to give care). For inpatient and outpatient PCS's this relationship is assumed. In contrast, jail forces custodial status and health provider selection upon the inmate population. The provider-inmate relationship may be cooperative, "neutral" or the focus of considerable strain and manipulation by inmates who often have longstanding anti-social and poor coping behavior patterns. Consequently, the variables of patient attitude and

compliance have considerably more effect on the production activities of jail providers than they do on providers in the nonincarceration setting.

Clearly, none of the inpatient systems is based on a broad enough service domain definition to be useful in the jail setting. Traditional inpatient institutions focus on managing illness and disease in an environment of unrestricted patient access and "open" provider choice. In the jail health providers need to be concerned with additional issues of incarceration such as safe inmate housing, maintenance of inmate civil rights, physical safety of staff and inmates, and facility security.

Patient Classification Systems in Nursing

Since nurses are the primary providers in the corrections health program under study, PCS's used in nursing were reviewed to determine their suitability for use in corrections health. The fundamental rationale is that the professional responsibilities and activities of nursing may be generalizable from one setting to another.

Nursing has used patient classification systems to match patient care need or "acuity" with nursing resources (Giovanetti, 1979; Dijkers & Paradise, 1986;

Alward, 1983). Early attempts to classify need included the use of easily obtained data (medical diagnoses, sex and age), but more recent effort has grown in complexity as systems attempt to account for resource variation by using patient attributes that infer acuity of illness, severity of symptoms, nursing dependency and/or nursing interventions required (Alward, 1983; Bermas & Van Slyck, 1984; Curtin, 1985; Mowry, 1986). Emphasis on justifying service efforts has extended nursing concerns beyond traditional intra-departmental needs (e.g., daily or weekly staffing, budget formulation) to broader system or institutional issues such as marketing, cost and revenue monitoring, and utilization review/quality assurance (Lichtig, 1986).

While the need to document and justify service effort is clear, the literature acknowledges that determining what constitutes "right or good" information for objective assessment of efficiency, appropriateness and effectiveness of nursing service has posed a difficult conceptual task (Curtin, 1984, 1985; Arbitman, 1986; Plomann, 1982; Mowry, 1986). Although many patient classification systems exist, they vary widely in terms of integrity and utility.

There are basically two types of nursing PCS's: (1) prototype and (2) factor evaluation (Giovanetti, 1979; Dijkers & Paradise, 1986; Bermas & Van Slyck, 1984). The former is largely subjective, and evaluates care needs by placing patients into groups that use descriptors of typical patients. Nursing staff are then assigned to these groups. An example of such a system is the Montefiore System (Dijkers & Paradise, 1986).

Factor evaluation design differs in its purported higher level of "objectivity" (Cullen & Keene, 1983). This system rates individual patients by scoring them on a number of criteria and then making the appropriate classification. An example of this kind of design is the Therapeutic Intervention Scoring System (TISS) used in critical care areas. Although there are many variations of these two types, all are proxy measures since the patient's actual need cannot be precisely stated. Both prototype and factor evaluation systems have been criticized for lacking objectivity, reliability and validity (Giovanetti, 1979).

PCS Limitations in Traditional Settings

There is widespread concern regarding utilization of PCS's that have undergone little or no

validity/reliability testing in traditional settings where they were designed for use, rendering them of questionable value (Haas, 1984). If a PCS has not been tested to determine whether or not it measures what it is intended to measure (validity), then it has limited usefulness and meaning in clinical and/or administrative decision-making.

This next section highlights some system problems associated with use of PCS's in traditional nursing practice sites.

Documenting the Status Quo

Numerous authors point out the problem of circular reasoning whereby PCS's categorize patient need based on time-driven determinants of "what the provider does" rather than patient need-driven estimates of "what the provider should do" (Curtin & Zurlage, 1986; Dijkers & Paradise, 1986). That is, the focus is on reporting the quantity of services delivered without analyzing and accounting for what is delivered based on demonstrated patient need. Unless the PCS captures patient need and provider effort independently and accurately, there is no way to specify appropriate service or to evaluate provider efficiency.

Another problem exists when actual service provision is used as the basis for classification. Unwanted systematic errors in staffing (too much, too little), provider style, or redundant/superfluous services, etc. are perpetuated. When inputs are assumed to be correct in terms of what is being done and why, discrepancies between what patients need and what providers do about those needs go undetected by the system.

Noninclusion of Provider Level/Skill Mix

Another problem with PCS's is that few link patient need to a provider type and skill level. If a PCS is using the number of "nursing hours" needed for certain patient case types in the intensive care unit, it is important to know if the term "nursing" refers to aides, staff nurses, nurse practitioners, or a combination of these provider types. The variable of skill mix is important in PCS application (Dijkers & Paradise, 1986; Curtin, 1986; Herzog, 1985; Mowry, 1986).

Medical Data as Critical Indicators

Medical diagnoses, as classification variables, do not necessarily explain variation in nursing care within patient populations. This has been

demonstrated by Mowry and Korpman (1985) whose study suggests there may be up to a 500% variation in nursing costs within a single Diagnostic Related Group (DRG). Prescott (1986), Trofino (1986), Mowry (1986) and Vaughn & MacLeod (1985) concur that medical diagnoses do not suggest an associated level of need for nursing care.

Lack of an Episode Concept

Nursing PCS's are not based on the stay-specific episode used in this study. Instead, PCS's used by nursing tend to classify patients using fragmented service units that are not linked to the overall course of care or hospital stay (e.g., hours of nursing care required per shift while in intensive care). The isolated classification of such service conveys no meaningful information about the nurses' overall management of illness or its impact, yet a stay is the period of continuous nursing responsibility for each patient.

Heavy Inpatient Focus

PCS development has been primarily limited to inpatient facilities, and more recently to outpatient care. No reference was found for development of a PCS in the field of corrections nursing.

Suitability of PCS's Used in Nursing for the Jail Setting

Overall, PCS development and use are the focus of increased concern for nurses but none of the inpatient systems appear suitable for use in the corrections health care setting. Existing systems have application limited to acute care settings where diagnostic and treatment efforts receive heavy emphasis.

The methodology for determining economically relevant criteria in the complex process of producing nursing care is still being developed and refined in traditional inpatient and outpatient settings. No comparable effort is ongoing in nontraditional nursing practice settings.

PCS's in Nontraditional Settings

There are few, if any, patient classification systems for nontraditional nursing practice sites. What has not been emphasized, and needs to be, is PCS development in those practice settings where (1) nurses are primary (and sometimes sole) providers, (2) nursing's presence is not necessarily subsumed in the dominant organizational objective, and (3) direct health care delivery is only part of the organization's production effort.

Nontraditional practice areas such as corrections health, school health and occupational health use nurses to fill a need that is compatible with (but different from) the overall objective of the dominant institution. For example, schools operate to educate students and jails operate to maintain inmate custody. Their nursing services take on a supplemental role in the overall operation of the facility. Unique organizational constraints, goals and population needs affect what nursing outputs are required and how they should be defined. Accordingly, health provider output in nontraditional settings can be expected to vary from that of inpatient facilities.

The jail setting is of particular concern because, while "adequate" inmate health care is federally mandated, the jail operates with wavering public consensus. There is a constant need for nurses, already active in budget and policy formulation, to report about the need and impact of their service. Public support and continued funding at the requested level are not at all certain.

Second, in the last decade inmate rights have been challenged, increasing the liability of penal

institutions and all their employees to provide a reasonably safe and clean environment as well as access to adequate and timely health care services.

Third, some health problems represent public health risks to the inmate population and staff as well as to the community at large. The degree of this risk can change dramatically, presenting new and very costly treatment challenges. AIDS is a recent example of a particularly threatening and resource-intensive public health problem.

Fourth, some health problems are "hidden" in the criminal charge label and should be disaggregated for guiding innovative (and perhaps more effective) approaches to offender management. For example, theft, forgery and recividism are often linked to substance abuse problems. Offenders who steal to support a drug habit may be better handled in a work-release center than in jail. Chronically mentally ill inmates who have repeated arrests for minor offenses may be more successfully managed in a half-way house. Here, regular supervision of a medication regimen may effectively control the recurrence of unacceptable behavior and arrest.

Fifth, health problems that relate to group management and inmate safety in the jail's living modules need to be identified. Examples of health problems with safety implications that MCDC nurses encounter are suicide threats/attempts, extended periods of depression, assaultive behavior, overt psychosis, imminent labor and delivery, "cheeking" medication (avoidance of swallowing prescribed medication in an effort to hoard it), and inability to comply with security protocol because of a physical or mental health problem (e.g., failing to understand guard orders and incurring disciplinary consequences).

Corrections health nurses need to collect and report data for internal and external use at two levels: administrative and clinical. Ideally, data will relate to the inclusive domain of relevant service as well as to defined output specifications that indicate why nurses are employed at the jail.

Information systems that can be used to guide difficult resource allocation decisions need to be the focus of continued refinement in traditional settings, and the focus of new concern in nontraditional settings where an urgent need exists to demonstrate what it was about the patient and what it was about

the provider that made an appropriate, demonstrable and measureable difference that is worth buying. This study is designed to begin to fill the gap between PCS availability in traditional settings and its nonavailability in nontraditional sites.

The next chapter outlines basic system requirements of a case-mix measure for corrections health. It presents an overview of the process used in this study to complete early stages of system development.

CHAPTER 3

AIMS AND METHODS

This chapter describes the study aims and gives an overview of the two phases of system development that were completed in this study: (1) conceptualization and definition of jail health service output and (2) derivation of two sets of output classes. These sets of classes provide the basis for further system development that will result in final derivation of a single, global output measure.

Study Aims

The general aim of this study is to develop an episode-based inmate case-mix classification tool. The measure will be based on pertinent health attributes of inmates; on the legal, social and professional mandates that specify the inmate health care domain; and on managerial imperatives regarding allocation of limited corrections health resources.

There are five specific study aims: (1) to provide further rationale for the classification approach; (2) to conceptualize the direct care output domain and define intermediate outputs; (3) to develop the system of output classes; (4) to design a plan for empirical testing of the classes; and (5) to identify

priorities for further research and theoretical development for corrections case mix.

The long term aim of the classification tool is to help health providers, the Sheriff and county administrators understand the basic output structure of corrections health and allow them to predict, budget, and account for flux of inmate need and resource use over time and across changing populations.

The case-mix measure (or classification system) is intended to pick up global norms within the inmate population, not precise clinical detail on a case by case basis. The tool, upon completion, should capture, weight and predict service requirements at time of inmate entry to jail or at a point soon after entry. It can be used to monitor trends of changing case types over time.

The system will be designed to provide information that can be used to plan or evaluate these aspects of service: cost control, budget requests, number and mix of providers, management of new public health risks, internal budget justification (e.g., showing how the case mix of a large urban jail differs from that of smaller or more rural jails within a

multi-facility corrections system), and current patterns of jail resource use by specific population sub-groups for whom alternatives to incarceration are being considered.

The proposed system will not provide data regarding details of individual case management. For example, it is not intended to generate data that would suggest ineffective control of a particular inmate's diabetes, nor would it detect a case of active tuberculosis that was diagnosed only after unintended, widespread facility exposure of the infection. Instead, the tool is designed to pick up norms and changing trends within the health service requirements of the inmate population.

Methodological Approach

In order to develop an inmate classification system or tool that can predict different patterns of health need and resource use within the jail health service domain, conceptual and empirical testing methodologies must be established. Basic theoretical concepts have to be defined, theoretical measures of those concepts developed, and empirical measures derived to test and to evaluate the classification system against design and performance criteria.

For clarity in describing the methodological approach to episode-based classification, steps that generally describe the process will be enumerated. The conceptualization had a number of distinct elements but the developmental process did not progress in a straightforward step-by-step fashion.

The conceptualization of provider output drew on an economic perspective to determine the nature of the jail health service. Legal, social, professional, inmate population and setting factors were identified and incorporated into intermediate output definitions. In turn, these were incorporated into a higher-order, episode-based output definition.

The conceptualization of provider output and the derivation of classes themselves were guided by the use of empirical data and classification criteria. Both served as tools at multiple times during various points of the classification study to define dimensions of service output and to check on the adequacy of the conceptualization itself. In this way, empirical data and criteria were used in an interactive manner in the derivation of classes.

Empirical Data

Given the early developmental stage of patient classification, the relatively unrefined status of

PCS's, and their unsuitability for use in corrections health, clinical observation provided the empirical data necessary to conceptualize, classify and "test" the system.

Empirical data from the jail site were collected over a period from September 1984 through June 1987. They came from a number of sources: (1) systematic and planned clinical observation; (2) study of the current MCDC health record-keeping system, including review of selected case histories; (3) analysis of the corrections health budget request and preparation processes; (4) interviews with key persons in the corrections health program and in the Sheriff's Department; (5) a study of 33 female inmates regarding self-perception of health status (Gibson, 1984); and (6) field notes kept throughout the data collection period.

Empirical data provided basic information about the corrections health care program: the clinical process of delivering on-site care; the extra-facility health service referral system; the professional activities and problems of providers; the facility security/custody protocols; and setting and population features that affect service output.

In the classification process, empirical data were used in the following ways: (1) to identify corrections and nursing objectives in the health care process; (2) to identify critical indicators that differentiate inmate classes; (3) to note recurring combinations of indicators representing service needs; (4) to serve as a baseline against which initial classes can be evaluated to determine if they do discriminate different patterns of service need; and (5) to guide planning of the next phase of system development.

Classification System Criteria

In order to build a valid case-mix measure (one that serves the intended purpose), it should meet certain taxonomic and performance criteria (Hornbrook, 1982, 1986; Arbitman, 1986). Criteria were specified; some applied to the system as a whole, and others applied to indicators (independent variables) and to classes (groups).

System Level Taxonomic Criteria

Taxonomic criteria are theoretical guidelines that apply to any classification system, regardless of what is being measured and why. These include the following: exhaustiveness, mutual exclusivity, homogeneity, and variability.

Exhaustiveness

Exhaustiveness means that the scheme ought to capture the whole domain of interest in developing the measure. The system should contain classes such that all inmates can be categorized into an episode class. If some inmates are not classifiable, the measure will be inherently inaccurate "by omission" since all inmates do receive health services by law and by MCDC protocol.

Mutual Exclusivity

Mutual exclusivity means that the classes should be constructed so as to assign an inmate a unique classification. If an inmate can be classified into more than one group, ambiguity exists. Ambiguity has the effect of making random the assignment of inmates to output categories, thereby introducing unwanted inaccuracy and distortion of the measure. In this way, the system's meaningfulness and utility can be reduced.

Homogeneity

Homogeneity means that the set of inmate classes or groups should be uniformly structured along the same relevant dimension of health resource use. Additionally, members of one group should be similar

along that grouping criterion to other members of that same group. Members from different groups should show consistent "between group" differences.

Variability

Variability means that the system should capture differences along the phenomenon of interest. If there is no variation in the inmate population along the dimension of resource use, then there is no logical basis for any classification effort.

Exhaustiveness, mutual exclusivity, homogeneity, and variability were "tested" by submitting intake classes to MCDC clinical and administrative staff for review. All criteria require further empirical testing.

Case-Mix Performance Criteria

There are desirable and interrelated properties of a case-mix measure that refer to different aspects of its performance (Hornbrook, 1982). For this early phase of system development, two overarching criteria (that are, in turn, related to the selection of indicator and group criteria) are of particular relevance: reliability and validity.

Reliability

Reliability refers to the dependability or consistency of results using the measure across time

and independent raters on the same unchanged phenomenon. A reliable case-mix measure will have little random or chance error (Hornbrook, 1982). The concept of reliability is multi-faceted and actually reflects aspects of sample size, and the quality of data (the availability and observability of system components, how data are collected and processed, and how persons participate in the system's operation). Reliability will not be tested in this first phase of conceptualization, but the way in which indicators are selected and classes are formed relates to how reliable the system is expected to be upon statistical testing over time.

Validity

Validity refers to whether the system measures what it intends to measure. A valid system will have distinct inmate groups with (1) different clinical characteristics and (2) observed differences in direct care resource utilization patterns.

Two types of validity are relevant: content and predictive. Content validity refers to the representativeness and comprehensiveness of the system. In the jail context, clinical meaningfulness is an aspect of content validity. If the case-mix

measure has clinical meaningfulness, its classes have similar clinical management approaches. Content validity cannot be quantified but is derived from expert judgment.

Predictive validity refers to the measure's ability to predict some outcome that is hypothesized to be related to the underlying phenomenon of interest, which in this study is direct care service use. If a measure is designed to pick up variation in resource use and it has predictive validity, "High Use" case types will predict actual patterns that, in fact, do use more services, a higher level mix of providers, and more costly services than do "Low Use" types.

Indicator Criteria

Selected criteria apply to the indicator or classification variables. They are related to overall system validity and reliability.

Validity

Validity means that an indicator should predict resource use associated with direct care provision because it is pertinent to the provision of adequate inmate health care. For example, at intake screening the health provider focuses on accurate assessment of

an inmate's health status to determine the degree of medical risk associated with facility entry and immediate celling. A valid indicator is one that uses inmate attributes to predict variation in relevant service requirements that relate to specifed provider objectives. An appropriate indicator for intake classification may be inmate mobility since an inmate's ability to walk unassisted, or only with full assistance, provides information about his or her incoming health status. Irrelevant indicators (those that are not linked to provider objectives) are not valid. Examples of such indicators may include inmate employment status at time of arrest, place of birth, and amount of cash on his/her person.

Additionally, valid indicators should not be measures of actual resource use. The aim is to measure inmate or situational characteristics that occur regularly and predict appropriate administrative and clinical service responses.

Inmate-Based

Inmate-based means that the indicators should reflect attributes of the inmate and his/her incarceration experience. The crucial point affecting the measure's validity is avoiding the use of

indicators that reflect actual service utilization patterns or provider attributes. The aim is to identify indicators that predict inmate need but are "free" of provider bias.

Variability

Variability means that indicators should predict actual differences in direct care service use. Another important aspect of variability is the need for an indicator to have widespread and variable expression in the inmate population being classified. An indicator that is hypothesized to account for differences in resource use may have limited usefulness in the classification scheme because it does not occur regularly within the population. Self-inflicted injury is such an example; pregnancy is another.

An indicator initially conceptualized as useful may be eliminated from the scheme because its expression of variation is "flattened" in the service setting. For example, if one were to use ability to interact with others in a group situation as an health status indicator, and all inmates were segregated in individual cells, actual variation in ability to interact in groups would, for practical purposes, be suppressed by custody protocol.

Variation also means that indicators should co-vary with the measure of resource use selected for empirical testing during that stage of system development.

Nonredundancy

Nonredundancy means that an indicator should not duplicate the prediction power of another indicator.

Reliability

Reliability means that an indicator should consistently be coded in the same way by independent raters for the same inmate whose health status remains unchanged over the course of the separate ratings.

Observability

Observability relates to reliability and means that the indicator, as a data element, should be readily apparent and available within the inmate population.

"Nongameability"

"Nongameability" means that the indicator ought to be used in such a way that actual patient attributes are not distorted during classification.

Class Criterion

There is one class or group criterion: clinical meaningfulness. As previously noted, this is a

dimension of content validity. Clinical meaningfulness means that the defined episode groups ought to make clinical sense to providers in terms of requiring similar types of clinical skills or planning for case management (e.g., critically-ill neonates and outpatient dialysis patients are not clinically meaningful groupings, while adult diabetic and seizure patients who use daily medication for effective problem control are).

Function of Criteria

The above sets of criteria served a dual role in the complex conceptualization process: to "select" and to "screen" data. This pattern of using criteria in sorting, deriving and preliminary testing process recurred in cyclic fashion during the classification scheme's development. First, criteria were used to begin tool construction by "shaping" or guiding the earliest data selection along appropriate and feasible objectives, within consumer preferences and MCDC resource capacity.

Second, indicators (key factors about the patient or his/her situation conceptualized to account for differences in resource use) underwent checking against their pre-specified criteria. Consequently,

they were either included, eliminated or put "on hold" in the conceptualization process.

Third, upon formation of case-type groupings (classes) that met specified criteria, the latter were used to check on how well a particular grouping "fit" the intended design and purpose of the output measure.

Fourth, upon completion of intake and other episode classifications, the two sets were evaluated against overall system criteria to guide planning of the next stage of development.

In short, at time of group construction the criteria served as a way to filter, sort, and begin categorization. Upon construction of the grouping scheme, criteria checked on its integrity.

Conceptualizing Service Output

A number of conceptual elements were used in derivation of the two sets of output classes: (1) the episode as the basic dimension of output; (2) economic principles; (3) legal, social, professional mandates for service; (4) inmate population and jail setting features that characterize jail health service delivery and; (5) jail health service products (intermediate outputs).

The conceptualization of jail health output incorporated the above elements to derive two sets of classes, one for intake health screening, and another for preliminary or "early" episodes. Basically, the process progressed as follows:

Step 1: Identification and Application of an Economic Approach

Economic principles influenced problem analysis and selection of the methodologic approach to classification. Requirements of the economic approach were useful in designing a measure that attempts to overcome present system deficiencies.

Definitional complexities associated with defining provider output within a complex, multidimensional service domain were clarified by addressing three relevant questions suggested by Hornbrook (1982). These are the following: (1) what is the relevant firm (production unit)? (2) whose preferences count? and (3) what is the nature of the product? Analysis of these questions elicited a perspective on what constitutes appropriate output from a specified consumer's view.

Step 2: Selection of the Episode as the Output Unit

The conceptualization process drew on expanded rationale for the use of a "health care management

episode" as the basic unit for classifying jail health care provider output. Justification for the use of a stay-specific type episode was emphasized throughout the conceptualization.

Step 3: Specification of the Legal, Social, and Professional Mandates That Characterize Output

Broad relevant attributes of jail health output that define its general nature are determined by legal, social and professional mandates. These were identified as important in early framing of the output definition.

Step 4: Identification of Unique Population and Setting Features That Characterize Jail Health Service

Certain features of the inmate population and incarceration setting make the delivery of health care in the jail different from that of traditional health care settings. These were identified as important to consider in conceptualizing and defining jail health care output.

Step 5: Identification of Jail Direct Care Output Domain and Its Intermediate Outputs

An inclusive and relevant direct care service domain, consistent with the study purpose and provider output specifications, was defined using empirical

data. Within that domain, provider activities were sorted into five intermediate output groups: intake screening, reassessment, problem identification, problem management, and advanced/complex case management. In the preliminary classification schemes, resource use patterns associated with various intermediate outputs were reflected in episode definitions.

Classification Process

To this point, the following system features needed for the actual classification had been derived: the measurement purpose; rationale for using the episode as a basic output unit; and a conceptualization of the jail health provider direct care domain and its intermediate outputs.

The following steps outline the subsequent process by which the two sets of classes were constructed.

Step 1: Identification of the Need to Classify Inmates at Intake Health Screening

Based on the measurement purpose, characteristics of the population, provider objectives, and erratic lengths of stay, the need to classify inmates at time of intake was motivated.

Step 2: Derivation of Intake Classes

Provider objectives have specific clinical and administrative implications at time of intake screening. Dimensions of provider interest consistent with these imperatives were identified along with a series of clinical decisions that allowed individual, group, and facility risk assessments. Indicators that generate data used in making these assessments were identified and sorted against pre-specified criteria. Partitioning of inmates using five decision rules and multiple indicators resulted in a set of seven (7) risk classes.

Step 3: Intake Classsification Review With MCDC Staff

Review of intake classes was done with a clinician and an administrator from the MCDC nursing staff. Their recommendation was to include the important variables of data quality and quantity (associated with inmate self-report) in the second set of episode classes. This suggestion was incorporated into the effort to define preliminary episodes.

Step 4: Derivation of Preliminary Episode Classes

Intake classification also represents final episode categorization for many inmates who have very brief jail stays. For those inmates who have more

than a single provider contact, a second set of classes was needed. These were called preliminary to avoid their being construed as final episode definitions. A number of conceptual gaps were identified that hindered direct derivation of some final episode classes.

Step 5: Derivation of Plan for the Next Phase of System Development

Data collection and empirical testing of classes follow the work of this study. A plan to complete this phase of system development is presented. It includes a data collection effort that would (1) enable classification of inmates into the intake classes, (2) check on how well the system differentiates actual direct care resource use patterns, and (3) provide a basis for refining and completing episode definitions.

The next chapter describes basic conceptual issues and derives intermediate output definitions. The derivation of intake screening classes is described in Chapter 5, and the derivation of preliminary episode classes in Chapter 6. Chapter 7 presents a post-study data collection and empirical testing plan.

CHAPTER 4

HEALTH SERVICE OUTPUT IN THE JAIL

This chapter provides the conceptual foundation and definitions of jail health provider intermediate outputs that were needed before actual classification could proceed. The conceptual approach was guided by three overarching features: (1) the use of an economic perspective to view provider output; (2) the suitability of the stay-based episode to define output classes; and (3) identification of relevant features of the jail health setting and population that make episode definition either more complex or less complex than that of traditional care settings.

The main focus in the chapter is to provide rationale for selection of the stay-specific episode as the basic output classification unit. The chapter is divided into four sections, each of which motivates use of the stay-episode. The first section presents the economic approach used to broadly frame the output conceptualization. Its requirements aided system output conceptualization in two ways: (1) they deal directly with present system deficiencies that need to be overcome in the classification effort; and (2) given the study purpose, they provide an appropriate structural basis for viewing and defining output.

In the second section, general advantages of the episode concept are presented. Specific benefits of the stay-episode type are enumerated as particularly useful for this study. The strength of the stay-episode is demonstrated by contrasting it with properties of alternative measures that are judged to be less suitable for the same purpose.

The third section identifies multiple setting and population features that either add or lessen complexity in episode definition.

The fourth section defines five intermediate output products of jail health providers. These constitute the direct care service domain and are used as integral conceptual elements in the actual classification efforts found in Chapters 5 and 6.

The Economic Approach

An economic approach to general output definition was particularly useful to gain a perspective on how to frame the broadest dimensions of jail health provider output. Economics focuses on the relationship between ends and scarce means with alternative uses (Whynes, 1983). It can set forth various models of resource use with sufficient explanatory and predictive powers to foster more

rational decision-making (Blum, 1981). The use of economic principles is consistent with the plan to use the classification system to evaluate current resource use patterns and to make budgetary requests in the jail setting.

Economic principles require that two conceptual elements be included in the specification of a production process: (1) independent inputs and outputs; and (2) distinct consumer and provider objectives that govern their behaviors. These elements provide a structure within which efficiency can be evaluated.

These basic requirements are difficult to satisfy when defining service output because health service production is much less straightforwardly conceptualized than production of a tangible good. Conceptual distinction between outputs and inputs tends to be elusive; neither the notion of outputs nor inputs is fixed (Luke, 1979). Depending on who is defining service production and why, the definition of output will vary.

Health service output measures reflect a multi-dimensional and sometimes highly variable production process. Even in areas of medical care

specialization (e.g., oncology, cardiovascular surgery, treatment of burns), patients with identical problem labels vary considerably in terms of what type, duration, and frequency of service are required.

Not only is health service multidimensional, but it is also jointly-produced. Behaviors of consumers (patients) and producers (health care providers) are interactive and often the result of shared decision-making (Curtin & Zurlage, 1986). As in all health care delivery settings, inmate care is based on the concept of informed consent, and the willingness of the inmate (whenever possible) to participate in his/her own care. In jails the joint production issue is further complicated by the role of guards. They supervise and observe the inmates 24 hours a day, and often detect and notify health providers regarding an inmate's changed mental and/or physical status. Such overlapping of consumer and producer roles contributes to the problem of conceptualizing independent inputs and outputs. In this way, it is difficult to isolate the contribution of a specific group of providers.

Hornbrook (1982) suggests that responding to three questions about health service production will deal with the definitional complexities and lead to a

general definition of output: (1) What is the relevant production unit? (2) Whose preferences count? and (3) What is the nature of the product?

What is the Production Unit?

The service production unit is the county-run jail health program and its providers. According to economic theory, the firm makes decisions about production specifications (Hornbrook, 1982). Within the broad program goal to provide adequate care, specific service components need to be designed and set into operation. In this study, the relevant firm is the Human Resources Department of Multnomah County, Division of Health Services. They set general policy and program goals. Actual operation of the program is the shared responsibility of the Sheriff, a physician and a nurse-manager.

Whose Preferences Count?

In economics, consumer preferences are assumed to be sovereign. Who is the relevant consumer of jail health care output--inmates, the Sheriff, elected officials, the county or taxpayers? Since each would be expected to view appropriate output differently, it is necessary to identify the consumer most relevant to the study purpose. Justification of public

expenditures is the central concern in this study. Accordingly, the ultimate consumer of jail health services is the taxpayer who pays for them. Elected County Commissioners and the Sheriff serve as the taxpayer's agents.

What is the Nature of the Product?

The nature of jail health services can be determined by considering the source of relevant output attributes. A general sense of the type and scope of service can be given by considering three mandates: social, legal, and professional.

The social mandate is the taxpayer view of what constitutes appropriate health service output for inmates. It must be inferred from political expression. During 1984, two levies to build additional jail space were soundly defeated by voters. In June 1987, amid severe jail overcrowding, many early inmate releases, and a court ordered population limit at MCDC, a levy to lease additional jail space for about two hundred sentenced men and women was approved. The social charge consistent with this voting record is to minimize the cost of incarceration of inmates, while meeting constitutional requirements and avoiding successful inmate-initiated lawsuits against the county and providers.

The legal mandate establishes constitutional entitlement of "adequate" physical and mental health services for all inmates but leaves interpretation of what that means and how to provide that level of service to local corrections administrators and staff. In general, successful lawsuits have been based on denial of timely and accessible health care comparable to the quality of diagnostic and treatment service that a nonincarcerated member of the community could expect (Page, 1984). This concept of a "community standard of care" markedly affects production activities of jail health providers, pushing staff into a defensive mode of practice. This means that practice decisions about what to do, when, and where are markedly affected by provider concern about meeting the community standard of care and avoiding lawsuits.

In terms of the professional mandate, the MCDC facility maintains voluntary accreditation with the National Commission on Correctional Health Care (NCCHC), an organization involving 28 national professional associations, including the American Nurses Association and the American Medical Association. The NCCHC's Standards for Health

Services in Jails (1987) suggest that inmates have access to a comprehensive array of medical, dental, and mental health services. The Commission clearly endorses the "community standard" concept: jail health care ought to be equivalent to that offered elsewhere in the general community. This implies comparable physical access, choice of provider, and access to specialized treatment and diagnostic facilities. It is not far-fetched, using this logic, to anticipate inmate requests for chromosomal studies for fetal disorder screening, organ transplants, and access to experimental medical protocols.

The three mandates put conflicting output demands on jail health providers: within the dominant custody objective, they are to conserve limited resources while giving "adequate" care in a facility with limited diagnostic and treatment resources, on a case by case basis that is comparable to community standards.

At the actual program level, health care output does reflect legal, security and custody specifications as well as specific health problem management. There are a wide range of service requirements in a population whose health status

ranges along a continuum from "well" to acutely ill. Erratic lengths of jail confinement lead to different kinds, amounts, and intensity of service output even for the same type of health problem. That is, health service output in jail is not homogeneous, either across inmates, health problems, or length of stay.

Provider objectives have both an individual and group focus that include: (1) prevention of illness, disease, and injury; (2) maintenance of inmate's civil rights; (3) clinical and administrative management of existing and potential health problems; and (4) reduction of facility and staff liability. Accordingly, the nature of the jail health care product is broad in scope and multidimensional in content.

The Episode Concept

This section describes basic advantages of using the episode as a general classification approach. In particular, a stay-specific episode is conceptualized as the most useful and basic output unit for measuring jail provider output.

An episode defines output in terms of a summary measure that captures provider efforts over a specified course of health need. Although episodes

can be defined in a number of ways, they are most commonly used in traditional settings where problem management is heavily emphasized. Their definitions focus on diagnostic and treatment interventions for illness or disease.

Across definitions and applications, the episode's main advantage is found in its linkage of patient requirement and provider response over a defined period of patient-provider interaction. In this way, the episode provides a higher level and more meaningful output measure than an isolated service visit.

How well episode classes delineate jail provider responsibility is a function of success in capturing and sorting inmates according to the logical flow between the health status of an incoming inmate, what is detected in terms of relevant health problems during incarceration and how both get managed until his or her release/transfer from county custody.

The carefully defined episode is useful in four specific ways. First, it can delineate the incremental contribution of jail providers to the overall health status of the inmate. Some health problems are associated with longstanding inmate

behavior patterns not under provider control (e.g., smoking, poor nutrition, substance abuse, etc.). It is unreasonable to hold the provider accountable for more than what is feasible and appropriate given the service objectives, inmate's health status at intake, constraints of the practice setting and the unpredictable duration of stay. The episode can be defined to measure appropriate service provision.

Second, the episode concept allows for simultaneous counting of multiple and varied provider objectives. Since the nature of the jail health product has been established as broad and multidimensional, traditional episode definitions used in acute care settings will not be sufficient for corrections health objectives. An episode can be defined to include all relevant direct care output dimensions.

Third, an episode, because of its level of aggregation, can address the difficult issue of how to account for potential wide fluctuation in health care requirements during incarceration. Some inmates require only routine monitoring throughout a jail stay, while others have a variety of additional nonroutine needs. Separate health management episodes can be defined to capture these differences.

Fourth, the episode, as a standard output measure, is useful for analyzing output at both the individual inmate and population levels. Episodes of the same type can be aggregated for case-mix analysis. Over time, the variation in episode case mix can account for flux in provider output and establish a basis for guiding resource allocation decisions.

These general advantages are useful in capturing jail provider output. Additional benefits are associated with using an episode type that predicts resource use over an entire incarceration stay.

The Stay-Specific Episode

Advantages

The stay-episode approach to jail provider output measurement is critical for a number of reasons, including those just elaborated. It satisfies requirements of the economic approach by maintaining distinctions between inputs and outputs, and between consumers and producers. It uses a standard time frame of health care production and can provide the means to enable evaluation of provider efficiency.

The main strength of the stay-episode is its ability to capture the crucial (and often elusive) output dimension of prevention throughout an entire

jail stay. For all inmates providers emphasize prevention in clinical practice. Prevention is the main "reason for admission" from a health provider's view. Based on this clinical and administrative requirement, staff need an output unit that will predict the health care needs of inmates so that efficient and effective ways of managing those needs can be developed and instituted. Provider management of risk through prevention can be viewed as the "real output."

The nature of prevention in jail health care is, at the same time, both broader and narrower than that found in acute care settings. It is directed at limiting the use of in-patient hospital stays and avoiding excessive liability risks, both of which relate to heavy resource consumption. These preventive efforts receive emphasis in jail: avoiding or reducing the incidence of communicable disease spread in the jail; reducing the risk of physical injury to inmates and staff; reducing facility liability and personal health risk by making housing designations based on health status; preventing avoidable progression of disease; and avoiding complications of diagnostic and treatment interventions (or lack of them).

Alternative Approaches

In order to better understand the stay-episode, it is helpful to describe alternative units of measurement and their properties.

Outcome. The ultimate in measuring output would be the linkage of incoming and ongoing inmate need to provider response, in order to derive a direct separate measure of outcome, or changed health status attributable to the provider. Conceptual and measurement complexities, already discussed, currently preclude this direct approach. While not as powerful as the outcome concept, the stay-episode is particularly strong for approximating the desired linkage between need, response and impact when compared with other proxy output measures that could be used to measure output.

A problem contact. A problem contact or visit is weak across nearly all measurement purposes because it is not linked in the logical flow between a need and a set of appropriate provider interventions. A visit conveys output only as a "reactive," isolated, and ill-specified provider response. It conveys no sense of independent inputs and outputs or any notion of prevention, acute care, or monitoring activities.

Further, a visit is provider-determined and is not necessarily a function of patient need. Providers can gain output credit by making patients sicker, or by arbitrarily increasing the number of service visits, neither of which is socially or professionally acceptable. The undifferentiated visit gives no information about what the patient needed, what the provider did, and what difference intervention made. Accordingly, a visit has little administrative or clinical meaning per se and cannot be used to evaluate provider efficiency and efficacy. Its main strength is that it is easily monitored and counted.

A problem episode. A conventional problem-based episode is insufficient given the nature of the jail health product. A problem episode is defined according to surgical or medical treatment, diagnostic effort or other illness management encounter that is fairly well circumscribed about disease, illness, or complaint, e.g., urinary tract infection, lice/scabies infestation. While health problem-driven dimensions of output need to be counted, equal attention needs to be paid to protocol-driven services that are congruent with the dominant custody objectives of safe, short-term inmate custody.

The problem episode would not classify well inmates or count routine service that is not specifically problem related. Even used in the context of a health problem, the conventional problem episode does not capture the jail provider's unique management strategies.

Consider how the problem episode with its clinical emphasis would not capture jail provider output in the following case. At intake, an inmate reports no current symptomatology but gives a disturbing history of two myocardial infarctions in the last year, near total occlusion of three major coronary vessels, and a very recent hospitalization for acute respiratory distress. The reception nurse deals at once with efforts to confirm the reported history and reduce facility liability. Nurse administrators, existing or past health providers, corrections officials, attorneys and judges communicate to determine what offender management options exist for this person. In the context of a light criminal behavior charge, early release might be expedited. In this instance, health provider effort is preventive, intensive, and brief. It has an administrative focus, not a clinical one. A typical problem episode would not count this output

because it is essentially avoidance of care that defines the episode.

The strength of the problem episode is that provider output may be relatively easy to conceptualize and measure given an accurate medical or surgical diagnosis for which an appropriate set of provider services can be specified.

While classification schemes that use visits or problem-based episodes may be useful in guiding resource allocation decisions, they have limited meaningfulness. They do not capture health maintenance activities for well inmates and they make only general reference to service for unwell inmates. On that basis, neither is suitable for the measurement purpose.

The stay-specific episode has the needed level of sensitivity to capture relevant output. At a higher and more powerful level of aggregation, the stay-specific episode overcomes limitations of the visit and the problem episode: (1) it can define provider responsibility in terms of inclusive provider objectives during the entire stay; (2) it can capture both routine and nonroutine service and account for highly unpredictable lengths of stay not under health

provider control; and (3) it can be defined to account for variation in service duration, frequency, and complexity. However, the stay-episode has some limitations.

Limitations of the Stay-Episode

The limitations are associated with both the level of aggregation and application of the stay-episode in a context of highly varied health management challenges. Several assumptions underlying the use of this episode type need to be examined: (1) the provider's incremental contribution can be delineated across problems, (2) appropriate service sets exist for those problems, and (3) production of health, liability reduction and safe medical housing are under health provider control. If these assumptions do not hold in the context of limited problem data, forced custody, unpredictable lengths of stay and limited diagnostic resources, measurement error and unreasonable provider demands may be created.

The episode concept, while trying to account for multiple and different health provider objectives, may not take into account enough features of joint production of health by inmates, guards and health providers. If not, the episode may assign too little

output responsibility to corrections guards (and inmates) and too much to health providers. Guards, not health care staff, supervise inmates constantly. They often detect changes in an inmate's physical and/or health status. After health staff assessment, and perhaps institution of a treatment regimen, it is still the guard who most closely monitors the inmate.

The inmate himself or herself may manipulate the process of health service provision by not reporting or misrepresenting health data, or by "cheeking" medication and not taking it as prescribed. Such behavior, if not detected, may result in negative health consequences that may be interpreted as inappropriate provider response.

Another limitation is that some health status changes may not be under provider control. An example is inmate injury from unprovoked attack; another is injury sustained during recreation periods. Under the stay-episode scheme, the provider is held accountable for such happenings. This is a general problem with all prediction-based models of output. That is, within the overall acceptable predictability of a system that accounts well for most cases, some unpredictable events can be expected.

Finally, it is not always clear as to what constitutes an appropriate set of services for inmates. Behavioral problems tend to illustrate this problem better than do medical problems with straightforward clinical implications, e.g., antibiotics for infection, x-ray and casting for broken extremities, insulin for unstable diabetics. What is the appropriate set of health services for an angry inmate who throws coffee at the guard and reports insomnia and weight loss? Which part of the management problem is disciplinary, which is health-related? Can these dimensions be isolated and measured? How should this problem be managed and by whom? Complex behavioral problems associated with patterns of anti-social behavior and coping with the incarceration experience produce a variety of treatment challenges which elude definitive prescriptive protocols.

In sum, the episode has several limitations associated with its assumptions and its use across highly varied health management patterns and problems. Most limitations relate to trying to measure output in an atypical jail health care setting with unique population characteristics. Despite

these drawbacks, the stay-specific episode offers the most useful basis on which to proceed. The logical caveat is to work carefully toward establishing system validity. Classes have to be defined and tested with care.

Episode Definition in the Jail Setting

Hornbrook et al. (1985) suggest that an episode used to define provider output in terms of an appropriate service package should have four elements: a starting point, a stopping point, a clinical course, and an association to resource use. These elements were defined by considering the nature of jail health service and its provider objectives.

The logical starting point for an episode in the jail is the point at which health provider responsibility begins. In contrast to the traditional setting where provider responsibility is likely to begin after negotiation for care, perhaps at time of the first direct care "hands on" encounter, MCDC health provider responsibility begins when the inmate is brought into the jail for booking. The nurse's first visual contact with the inmate marks the start of the episode. That contact point can provide enough inmate data to enable the nurse to make a decision

about denying or accepting the inmate's entry to jail on the basis of his or her health status. If the inmate has a visible gaping wound or is unconscious, sufficient clinical data exist to make an entry decision.

More often than not, the first visual encounter and brief verbal screening elicits no reported or observed health problem. In this sense, MCDC health screening service frequently relates more closely to the important issues of provider responsibility to maintain an inmate's civil rights and to facility and staff liability for undetected health problems than to actual problem management.

The course of an episode of health care management consists of basic monitoring and reassurance services provided for all inmates plus a measure of needed nonroutine services (if any). Courses of health care management in the jail vary widely. Some consist only of routine services that are provided to all inmates; others show combinations of basic service plus some nonroutine services. There are many possible combinations of service types. The aim is to define episodes in terms of regular patterns of predictable resource use. The implication for such a scheme at

the level of individual case analysis is this: the inmate will be classified appropriately into an episode type that discriminates service requirement well, albeit not perfectly.

The end of the episode, the stopping point, is defined in this study as the point of inmate release or transfer from the county correctional system, the time at which health provider responsibility ends for that incarceration stay. Special provision in the classification scheme is made for inmates who leave control of MCDC providers but who remain in custody. This group of inmates have a hospital stay that occurs after jail entry but before custody release.

Using the four elements, every episode captures basic service provision for each inmate, no matter how brief. Episodes take into account different courses of health management and lengths of stay. In order to derive valid episode class definitions, the nature of jail health services needs further analysis.

Service Features in the Jail Setting

This section identifies certain factors regarding the institutional setting and its custody protocols, the health service delivery modalities, the inmate-health provider relationship, and the inmate

population that make jail health service output complex and different from that produced in traditional care settings.

MCDC Features That Add Complexity

Institutional Factors

Custody, not health care. Unlike the health care institution where there is a "match" between the primary institution's objective (to give care) and the patient's primary reason for being there (to get care), the inmate is in jail for custody, not health care. All nursing and other health providers follow a practice pattern that is subject to constraints of the dominant custody objective. The county Sheriff is responsible for jail operations, including contracting for corrections nurses from the county Human Resources Division.

Length of stay. With the exception of newly-arrested persons who may be denied facility entry for health reasons, or who may be transferred subsequent to the discovery of a problem that exceeds the resources of the facility, length of stay is rarely contingent on health status. Instead, it is a factor of multiple (and often unpredictable) legal and institutional decisions. For inmates undergoing

treatment, release and transfer protocols may result in truncated health service packages when compared with those offered for the same problem in traditional settings.

Provider-inmate access. To a large degree, rigid security and custody protocols control both timing and physical access of providers to inmates. This has obvious implications for the time a particular task takes in the corrections setting versus that in the hospital. While providing service, health care providers must travel through a maze of locked doors and security check points, await the clearance of elevators, or the termination of "lock down" periods in the living modules before gaining access to inmates.

Overcrowding. Constant facility overcrowding makes it difficult for the nurse to predict a likely length of stay even across similar charges; there are few "norms" for determining how long an inmate will stay in the MCDC facility.

Service Delivery Factors

Nurse as primary provider. Unlike the hospital, clinic or office setting where there is both an "open time frame" and a mix of providers who could be

involved with initial assessment and disposition decisions (even if it means the patient has to travel to several locations), the corrections nurse is typically alone in making rapid initial disposition decisions.

Health problem legitimacy. Recognizing an inmate's constitutional entitlement to accessible and timely care (Estelle v. Gamble, U.S., 97 S. Ct. 1976), the inmate's inability to secure health care for him/herself in the jail, and the highly litigious environment, the nurse as primary provider considers all health problem requests for care as legitimate until proven otherwise. This situation is in contrast to the hospital, medical office or clinic-based provider who may deny acceptance of a particular patient--that is, never negotiate for care--on the grounds of an inappropriate request, or judgment that the problem would be managed better elsewhere.

Full care spectrum. The traditional care setting commonly separates service delivery patterns and location of service by type of health problem and acuity. For example, patients with the problems of pregnancy, overt psychosis, gunshot wounds, communicable disease, diabetes and epilepsy are not

initially "worked up" or evaluated comprehensively in the same departmental setting. The service is more likely to be provided in a setting where the physical and staff resources are directed at providing a specialized service.

In the jail, inmates enter with a full range of service need, and one reception nurse is responsible for triaging and handling even complex problems that may be presented in the context of noncompliance and inappropriate demands. Moreover, the nurse handles all problems in a very constrained physical setting.

Diagnostic/treatment constraints. On-site diagnostic and treatment capability is best viewed as comparable to that of a well-equipped infirmary. Lab, x-ray, dental, physical therapy and exam facilities are located in the jail. Nurses provide 24-hour coverage and are able to monitor a limited number of inmates at night (for intravenous infusion, oxygen therapy, etc.). Physicians and dentists work under contract part-time and "on call" at MCDC, but there is no resident medical or dental staff.

Uncertain service impact. In the context of erratic service episodes and a population often characterized by chronic health problems, poor coping

skills and antisocial behavior patterns, it is often difficult to determine what difference service intervention makes. What makes this even harder is inmate release prior to or during a treatment course. Providers often are not able to assess the discharge health status just prior to release. Accordingly, it is important to attempt to measure that part of provider output that relates to what is feasible and appropriate in the incarceration setting.

Fragmented follow-up. Even if service follow-up is indicated after jail release (e.g., outpatient clinic monitoring for active tuberculosis infection), it is often not possible to locate an ex-inmate. If substance abuse rehabilitation services are court-ordered, the MCDC corrections health program does not monitor that aspect of treatment, although the ex-inmate's problem may have been detected and treatment initiated during incarceration. This is in contrast to the patient served in a traditional setting where it is often relatively easy to track both the patient and the pattern of post-discharge care.

Inmate Characteristics

The user does not pay. As literal consumer of services, the inmate does not reimburse providers for

service. If an inmate has insurance coverage and requires hospitalization, the insurance carrier may pay for hospital expenses, but all other care given to persons in county custody is taxpayer-funded.

Inmate communication. Inmates are not motivated to reveal certain health problems, particularly those related to substance abuse. If a newly-booked inmate is arrested on a narcotics charge, and hopes for early release, there is little reason to think that he or she may reveal recent ingestion of the substance (even in the context of confidentiality with health providers). The clinical implications of this communication problem are that the inmate may experience rapid physical and/or behavioral deterioration that cannot be explained by health screening data provided by the inmate.

Comorbidity. Inmates enter the facility with a number of long-term coping and health deficits (often implicit in the criminal behavior charge) that force providers to deal simultaneously with physical and behavioral problems in both acute and chronic stages. Substance abuse, with its local and systemic physiologic manifestations, is common among offenders. It tends to confound the assessment of

other physical and psychological problems.

Features of the Inmate-Health Provider Relationship

Forced choice. Unlike the health care institution in which there is mutual choice and agreement between provider and patient about who will provide and manage care, the jail relationship is one of forced choice. The inmate and the nurse do not have options to select another patient or another nurse. The inmate has a right to refuse care, or to terminate ongoing treatment.

Inmate attitude and compliance. Inmates with poor coping skills and patterns of persistent anti-social behavior may be unwilling to accept responsibility for self-care or to comply with health providers. There is a problem in the inmate population of feigning illness (transfer to a hospital means greater chance to escape or to receive more personalized treatment). Difficult behavior problems are common and particularly hard to assess in the context of forced custody.

Features That Lessen Complexity

Two features of the MCDC setting make the definition of output easier than that in traditional hospital and clinic settings.

Professional/Nonprofessional Task Separation

Nurses and other health providers in the jail setting do not engage in activities that often are considered outside the realm of professional responsibility (making beds, emptying trash, delivering food trays, mopping floors, delivering flowers, relaying family messages to the patient, etc.). In the jail, inmates themselves manage all the aspects of keeping the living areas clean, delivering/serving food, taking responsibility for personal hygiene, etc. These activities are supervised by corrections personnel.

Benefits of Security Protocol and Direct Supervision

Security protocol makes measurement of output easier because health providers do not enter inmate living areas except for planned access and care. This feature helps the measurement of direct care effort.

MCDC's direct supervision model makes observation of changes in the inmate's physical or behavioral condition quite easy. Guards are in the living modules interacting and communicating directly with inmates at close range (as opposed to more traditional arrangements whereby a guard observes inmate activity from a tower or from a station removed from the actual

inmate living areas). Security protocol includes orientation of all inmates to a set of behavioral, disciplinary and daily schedule expectations that specify norms for the population as a whole. Daily schedule rigidity and consistency help staff observe deviations from the norms that may relate to a health problem.

These features of the physical setting and the inmate population capture the nature of jail health service provision. Next, intermediate outputs are identified that provide the basis for the higher order output classification scheme.

Identification of MCDC Health Service Domain and Its Intermediate Outputs

Service delivery can be conceptualized quite straightforwardly as the continuous provision of routine services for all inmates. For some inmates that routine service is punctuated with nonroutine triage and management interventions.

The direct care service domain is conceptualized to include the following: (1) physical and/or verbal care given by health providers in the inmate's presence, (2) case management efforts made on behalf of an inmate's health during an incarceration episode,

and (3) referral interventions for securing inmate health care outside the jail.

Five intermediate service products or outputs in this domain were identified: (1) intake screening; (2) monitoring, reassurance and continued access; (3) reassessment; (4) problem management; and (5) advanced case management and coordination.

Intake Screening

All inmates undergo photographing, personal property check and fingerprinting during the booking (admission) process. These events usually occur in full view of the nurse before actual health screening takes place. After talking with the nurse, the inmate is taken directly to a cell or other holding area.

Standard questions asked by the nurse include the following: name, address, friend (name and phone number), name and location of existing health provider and whether or not the inmate has health problems. The query may go further into the nature of the problem, its current symptomatology, and treatment modality.

The main purpose of the screening is to triage newly arrested inmates and their health problems, and to assess his/her health risk relative to safe

facility entry and immediate housing in a double-occupancy cell. Other objectives are to institute access to care, provide timely direct care, make a housing/transfer designation, arrange necessary hospital transfer, screen for communicable disease, and plan for follow-up case management needs, particularly for those inmates who appear unable/unwilling to initiate the next nonroutine request for service.

Monitoring, Reassurance, Continued Access

All inmates receive monitoring and reassurance services during nursing rounds held three times daily in inmate housing areas. This routine service maintains access to care, provides time for distributing selected over-the-counter (OTC) medications, administering prescribed medications, and giving verbal reassurance to inmates who may complain of minor problems that do not indicate need for full assessment (e.g., diet not acceptable, too cold at night, smoke bothers inmate, scratched face, slept poorly last two nights, etc.).

Reassessment

Nonroutine reassessment services are provided for an inmate-reported or staff-perceived health problem

not previously detected nor controlled. Problem identification can be relatively straightforward (e.g., pregnancy diagnosis, urinary tract infection diagnosis), or it may entail numerous visits by several providers (identifying the nature of bizarre, threatening behavior in context of previously normal behavior pattern).

Problem Management

Problem management services with a wide range of clinical interventions are offered on a case by case basis. Most service is provided in the facility by nurses, nurse practitioners, dentists and part-time physicians. Some cases handled by the jail providers are clinically complex. For example, an inmate who required rehabilitation for recent onset of paraplegia was managed in this setting after initial stabilization in a hospital. Other problems such as a serious suicide attempt clearly exceed facility resources. This type of case is referred to a local hospital or other facility.

Advanced Case Management/Coordination

Advanced case management services are another nonroutine service product. They include the following: (1) staff nurse consultation with in-house

nurse administrators, physicians and dentists; (2) case management coordination with off-site hospital and clinic providers; (3) consultation with attorneys, judges and inmate counselors; and (4) court-ordered provider testimony regarding some aspect of an inmate's health status.

The five service products are separated by existing service delivery protocols into routine (services for all inmates) and nonroutine service (those that require special planning above and beyond those routinely provided). "Intake screening" and "monitoring, reassurance, continued access" are routine. "Reassessment," "problem management," and "advanced coordination/communication" are nonroutine.

Together, the five intermediate products relate to specification of what constitutes appropriate direct care output for jail health providers. There are numerous combinations of intermediate outputs possible in the health management of an inmate during one jail stay. The set of episode classes will identify expected patterns of resource use associated with their occurrence.

Final jail provider output can be defined by assembling intermediate outputs into a higher order

of episode (output) classes that are meaningfully structured for administrative decision-making. The next chapter presents the derivation of intake classes.

CHAPTER 5

INTAKE SCREENING CLASSES

To this point, the stay-episode has been selected as the basic classification unit and intermediate outputs have been conceptualized. This chapter presents derivation of intake screening classes that define a higher order measure of provider output. These episode-based classes are iso-risk groupings with respect to need for health care services.

The presentation is divided into three sections: (1) rationale for classification at time of intake health screening, (2) effects of population and setting characteristics on availability of data to enable classification, and (3) the actual derivation of intake classes. The chapter emphasizes output definition and its conceptual linkage to taxpayer-consumer demand, dominant corrections goals, health provider objectives, and relevant inmate needs. Figure 1 presents an overview of the conceptualization of intake screening classes.

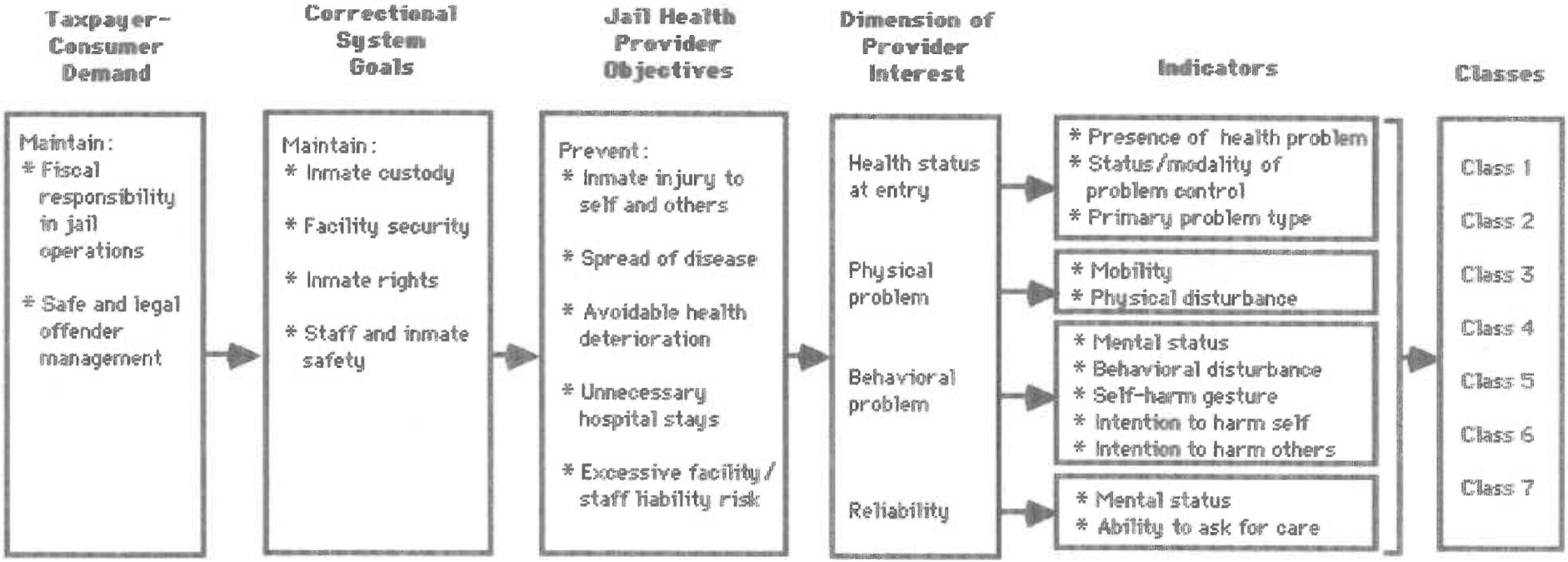

Figure 1.

Conceptualization of Intake Screening Classes

The Need for Intake Classification

The Notion of Risk

Jail health provider output can be conceptually grouped under the general heading of prevention. At all levels of service intervention in the jail, prevention is heavily emphasized. Since prevention is reduction in the probability of an undesired event, it is appropriate to incorporate the notion of health risk, its assessment, and management into a jail health classification scheme.

Risk can have an adverse impact on the budget in two ways: (1) direct health care consumption; and (2) successful lawsuits against the county and its providers. A high-risk inmate is expected to use more staff and fiscal resources, and/or to be more vulnerable to health deterioration, than a low-risk inmate. In this classification scheme, iso-risk groups serve as the foundation for evaluating the appropriateness of patterns of use, outcome, and costs for corrections health providers.

Risk has two important dimensions: an expected course (duration), and severity (magnitude). Prevention efforts focus on forestalling onset of an illness indefinitely and on reduction of duration and

severity once it occurs. These aspects need to be considered in episode specification. Since providers are held accountable for managing an inmate through the course of a jail stay by forecasting health care resource needs prospectively, risk assessment needs to be reasonably accurate, at least across the majority of inmates. This means that risk has to be "adjusted" carefully across differences and similarities in inmate health needs during incarceration. For example, some types of health risks are both easily identified and highly predictable. They can be managed via a well defined protocol. Other types of risks are predictable only for large groups and do not have well established treatment protocols.

The major classification challenge is how to adjust risk, taking into consideration complex time and severity dimensions. Both are crucial to assess, especially in the context of erratic lengths of jail stays. Unpredictable incarceration stays result in truncated service packages when compared to those of traditional settings. For example, an inmate who reports possible pregnancy, heroin addiction, and a gynecological infection may be released before any (or all) of these problems can be completely addressed.

However long she stays in jail, this inmate remains relatively high-risk. All provider output related to management of this risk needs to be counted, even if the jail stay is very brief.

Risk adjustment involves trade-offs. On the one hand, output measurement stresses the importance of keeping inputs and outputs separate. In order to do that, it is necessary to use prospective data that are "free" from the confounding effects of provider intervention. This infers the need to collect classification data at intake, the earliest time possible to do so. However, the brief intake encounter may produce insufficient data that lead to unacceptable, imprecise risk assessments.

On the other hand, since providers are accountable for the prediction of resource use over an entire stay, they need to have sufficient accurate data to enable a predictable pattern of resource use (classification). Such data may be available only at a reassessment point sometime after initial screening. These data can be expected to enable more precise risk assessments, but at a cost of confounding output measurement. Thus, the measurement dilemma related to the timing of classification is this:

"early collection, independent output dimension, few data, less accurate prediction" versus "later collection, confounded outputs, more data and more accurate prediction."

At this stage of preliminary system development, intake classification is hypothesized to account well for resource use over the first 72 hours after admission and less precisely thereafter. Subsequent system development needs to address sufficiency and accuracy of intake data for classification. These data requirements are further discussed in Chapters 6 and 7.

Some risk adjustment error is expected because information is never "complete." Time and other resource constraints restrict how much information is gathered and utilized. Some clinical diagnoses suggest imprecisely the types and amounts of resources needed over the long run. For example, AIDS infection (defined by HIV virus seropositivity) has a very unpredictable clinical course. It is not known who among infected patients will develop a fatal active infection and when. Even for persons with active disease, there is considerable diversity in clinical management strategies since AIDS patients develop a number of different problems, e.g., pneumonia, cancer.

The relationship between risk and prevention is not always well understood across different types of health problems. For example, the profile of a "high" suicide risk closely resembles that of the average incarcerated male (Hess, 1987). Clearly, a risk-based system needs to be kept updated in terms of contemporary epidemiology and management technologies.

The Timing of Classification

All inmates must be classified at time of jail entry. For many inmates, intake screening represents the only contact with a health provider during their brief stays. For this large population sub-set, the intake encounter is the only possible time to classify important provider output. In this way, intake classification is the most relevant output definition. Additionally, jail protocol requires that every newly arrested person must be screened at intake.

Intake also marks the beginning of health provider responsibility. During that brief contact, the nurse makes important decisions that may have both immediate and long-term impact on resource use patterns and costs. For example, assessment may lead to denial of jail entry for inmates too ill to be safely

incarcerated, e.g., head injury with decreased level of consciousness, active seizures. Or assessment may lead to immediate and definitive treatment for a problem known to be associated with rapid health deterioration if not treated in a timely fashion, e.g., administration of sugar to treat early signs of insulin shock. It is important to capture health status at intake so that the output measure can give providers credit for early risk reduction activities.

Provider Objectives at Screening

The purpose of health screening is to detect and triage inmate health problems (if any) on jail arrival. Reception nurses make clinical decisions regarding the relative risk that inmate health status presents to immediate double occupancy "celling" and medically safe, short term custody.

Risk assessment in the jail setting is particularly complex since it is not limited to understanding clinical implications of individual inmate health status. Reception nurses deal simultaneously with these issues: (1) maintenance of inmates' constitutional entitlement to accessible care (explaining availability and procedure for requesting care); (2) protection of group health (screening for

communicable disease); (3) assistance with smooth management by corrections officers of inmate living areas (assigning a housing/transfer designation that indicates associated medical risk of such a move); and (4) reduction of facility and staff liability (denying facility entry of medically unstable inmates, or planning follow-up care for inmates who appeared unreliable at intake). Each of these has important implications for resource use.

Provider objectives lead to clinical evaluation of the inmate at intake. This assessment, in turn, sets up logical risk categories that fall along a continuum of service requirement from "no need" to "urgent need." How those groups are defined depends on the quality and quantity of available data.

Effects of Population and Setting Characteristics on Data Availability

Given the need and purpose of intake classification, availability of data to enable classification must be considered. The intent in developing the case-mix measure is to account for jail health provider output in a way that avoids circular reasoning about service needed and service delivered. The emphasis, then, is deliberately on the use

of inmate attributes hypothesized to account for service requirement, rather than on quantification of services actually provided. In contrast to the usual situation in traditional care settings, there are features of the jail setting and the inmate population that often make collecting enough reliable data very difficult.

Triaging during brief verbal intake encounters routinely produces very limited data. By consistent MCDC staff report, those few data are not necessarily complete, reliable or correct. It is crucial in development of the case-mix measure to understand why intake data may be of questionable value in attempting to predict varying patterns of resource use across a single stay.

The booking and intake health screening processes are dominated by a security concern for rapid housing of the inmate. One nurse is present with limited diagnostic and treatment resources. Usually the screening proceeds quickly (often lasting about 2 minutes) with no "hands on" evaluation, although sometimes vital signs may be taken or a blood sugar determined. Close visualization of the inmate is limited as the fully-clothed inmate stands behind a high counter while the nurse conducts the interview.

Data for initial health assessment are limited to the following: (1) what the inmate reports in response to standard questions about the presence of a health problem, its management, the current provider, and name of person to contact in case of emergency; and (2) what the nurse sees, hears and reads (if the inmate arrives with written records) during the short screening.

Clearly what the inmate chooses to report markedly affects the designation of a risk category. Many inmates have long-standing patterns of anti-social and manipulative behavior. Moreover, the recent arrest experience produces tension, stress and sometimes unpredictable behavioral responses. It is not uncommon, according to MCDC staff report, for inmates to feign, misrepresent, or fail to report health problems. Motivation may be either to "work the system" or to conceal problems that relate to criminal charge (e.g., recent street drug ingestion and a charge of possession of illegal drugs) or both.

Nurses at intake collect limited data of uncertain quality for making predictions about varying patterns of resource use across stays. Development of the intake classes is based upon data as they are now collected during verbal screening.

Derivation of Intake Classes

This section deals with the actual derivation of seven iso-risk intake classes. To provide an overview of the complex process, the conceptualization generally proceeded in this way: (1) clinical decisions relating to specified provider objectives were isolated and sequentially ordered in a clinically relevant manner; (2) inmate-based indicators, conceptualized to enable clinicians to make decisions relevant to safe jail entry and housing, were identified; (3) indicators were evaluated against pre-specified criteria and generally sorted for inclusion or exclusion in the classification scheme; and (4) indicators considered appropriate for inclusion were again sorted and ordered into a scheme of five decision rules to derive the set of intake classes.

Clinical Decisions

Provider objectives lead to a set of clinical questions at time of inmate health evaluation. The immediate focus is on determination of the relative risk of safe facility entry and safe medical housing. Questions are presented here as they are conceptualized to occur in systematic health

evaluation and decision-making by the nurse: (1) Is the inmate medically stable for safe jail entry? (2) Does the inmate who is granted entry have a health problem? (3) What direct care service tract (routine or nonroutine) does the primary problem fall into? (4) Can the inmate be relied upon to initiate a request for care if needed or must the nurse accept responsibility for the next nonroutine encounter? and (5) Does the inmate require special housing for health reasons?

Indicators

Indicators, either personal inmate attributes or situational factors, provide the data which enable the nurse to respond to the above questions, assess risk, and make necessary disposition decisions.

Preliminary Sorting

A general group of indicators from empirical data were conceptualized as being potentially useful to make the intake assessment. These included attributes regarding the inmate's overall health, specifically his or her physical and behavioral status. Others included the availability of personal health data, the existence of a provider, time of last visit with health provider, location prior to arrest, and the

criminal behavior charge. All were sorted against system design criteria. Table 1 lists indicators initially considered for use in classification. Some were included in the final scheme; others were excluded.

Table 1

Indicators Considered for Intake Classification

Overall Health Status
Presence of a health problem
Status of problem control by modality
Primary problem type
* Comorbidity
Physical Status
Mobility
Provider-observed physical disturbance
Behavioral/Reliability Status
Mental Status
Provider-observed behavioral status
Intention to do self-harm
Self-harm gesture
Intention to harm others
Ability to initiate health care request
Available Health Data
* Location of inmate prior to jail entry
* Location of Inmate's Existing Provider
* Date of Last Provider Contact
Other
* Medical care request source
* Criminal behavior charge

* Initially considered for use in intake classes, but not used in their actual derivation. These indicators were retained for use as potential supplements or substitutes in subsequent phases of system development.

Final Sorting

Inclusion. Indicators that were included for use in the classification scheme are divided into two groups, those that met all (or nearly all) criteria and those that met few criteria but had important clinical significance.

Indicators that met most or all criteria and had relevance at screening included the following: presence of a health problem, primary problem type, status of problem control, observable physical or behavioral disturbances, inmate mobility, mental status, ability to initiate a health care request, and self harm gesture.

Two indicators met few criteria but were included because of their high clinical significance. In general, they failed to meet the criterion of variability; they are not widely observable in the inmate population. These indicators are intention to harm self and intention to harm others.

Exclusion. Some indicators, as shown in Table 1, were considered in the intake classification but were not included in final class definitions. They are retained as listed for potential use in subsequent system development or for further use in case-mix research.

One group of indicators was excluded because they were conceptualized to be more relevant to episode definition for unwell inmates who receive nonroutine service than to initial intake classification. These indicators include health data availability, location of existing provider, last provider contact, medical request source (intra-facility), and comorbidity.

Two indicators were retained for possible use in continued research. They are location of inmate prior to jail transport and criminal behavior charge. Table 2 summarizes the rationale underlying final disposition of indicators initially conceptualized as potentially useful in derivation of intake classes.

Table 2

Indicator Criteria Analysis

Rationale/Disposition in Intake Classification	Indicators
Inclusion	
Conceptually met all/most criteria	Presence of health problem Status of problem control by modality Primary problem type Mobility Physical Disturbance Mental Status Behavior disturbance Ability to initiate health care request Self harm gesture
Conceptually failed to meet most criteria but of high clinical significance	Intention to do self harm Intention to harm self/others
Exclusion	
Conceptually not relevant at intake; retained for use in later developmental phases	Existence of provider Provider location Last provider contact Medical care request source Comorbidity
Retained for reasearch	Location prior to jail transport Criminal behavior charge

Table 3 shows how indicators selected for inclusion are subdivided into value units that are hypothesized to capture differences among inmates on those variables. Value units are briefly described as to their meaning and relevancy to resource use. They will need further specification in the next phase of testing.

Table 3

Intake Classification Indicators

Overall Health Status

Presence of health problem (by inmate report)
- (a) Reports no problem
- (b) Yes, reports a problem
- (c) Unwilling or unable to report

Rationale: distinguishes likelihood of need for routine versus nonroutine service.

Status of problem control by modality (by inmate report)
- (a) Reports no problem
- (b) Self-controlled, by monitoring, diet, OTC, other
- (c) Controlled by prescribed medication
- (d) Not controlled
- (e) Unwilling, unable to report

Rationale: distinguishes progressively greater need for nonroutine service, and for a higher provider skill mix to make response to problem

Primary problem type (by inmate report)
- (a) Reports no problem
- (b) Minor complaint--within routine service tract
- (c) Dental--see dentist only
- (d) Uncomplicated pregnancy--rt.svc. only

Table 3 (continued)

(e) Communicable disease (CD), recent exposure
(f) CD, confirmed disease--tx. is meds. and isolation until not at risk of spreading infection
(g) Noninsulin dependent diabetes mellitus (NIDDM)--diet/oral med control
(h) Other physical problem (dermatological, genito-urinary, cardiovascular, gastrointestinal, musculoskeletal, respiratory, metabolic, etc.)
(i) Insulin dependent diabetes mellitus (IDDM)--insulin qd, guard alert, blood sugar testing qd or bid
(j) Known seizure disorder--maintain med, monitor
(k) Substance abuse (SA)--wide variation of manifestation, need, and risk
(l) Behavioral, previous hospitalization for mental illness
(m) Behavioral, no previous hospitalization for mental illness
(n) Unwilling, unable to give information

Rationale: distinguishes problems according to likely sets of service needed. Progression from well-defined service packages per problem type, to less well-defined problems and increasing risk for wide variation in problem manifestation and rapid deterioration of patient.

Physical Status

Mobility: (by provider observation)
(a) Ambulates easily and unassisted
(b) Enters with aid used on "outside"--cane, wheelchair, crutches or limb prosthesis
(c) Staggering gait
(d) Unable to stand alone
(e) Cannot evaluate

Rationale: distinguishes need to evaluate inmate beyond what he/she reports.

Table 3 (continued)

Physical disturbance (by provider observation)

(a) None
(b) Minor--injury, discomfort, NO head injury, NO ETOH odor on breath
(c) Moderate--may have ETOH odor/breath, head trauma but with no diminished level of consciousness, jaundice, open or closed wounds that need no suture, no heavy pressure dressing
(d) Severe--may have heavy bleeding, seizures, incontinence with <LOC, acute respiratory distress, cardiovascular instability, complaint of chest pain, guarding of body part, head trauma with N&V, c/o visual disturbance, clear fluid draining from nose/ears (?CSF), unstable IDDM, self-inflicted injury, or signs of active labor.

Rationale: distinguishes what can likely be handled easily and what cannot, and where it should be handled (on/off site). Types follow progressive need for higher provider skill, and carry greater risk of rapid deterioration.

Behavioral/Reliability Status

Mental status (by communication with nurse at intake)

(a) Easy, appropriate, complete responses
(b) Incomplete or inappropriate answers, may be unable or unwilling
(c) Unwilling or unable to participate in screening

Rationale: distinguishes routine versus nonroutine need, who needs evaluation (even in the context of no complaint), checks cognition, attitude and speech.

Behavioral disturbance (by nurse observation of inmate during booking procedure).

(a) "Appropriate"--follows procedure and officer instructions easily with no verbal or physical resistance
(b) "Uncertain"--follows procedure with some hesitation, may need repetition of instructions, but is not verbally abusive or physically-resistant with officer.
(c) "Inappropriate"--unwilling/unable to cooperate; may be physically or verbally abusive
(d) Did not observe

Table 3 (continued)

Rationale: distinguishes who will need further evaluation despite what he or she reports; progressively infers the need to rule out organic problems, to take responsibility for care of inmate and plan follow-up care at time of intake.

Intention to harm self (by provider observation of behavior and physical appearance)
- (a) No verbalized intent, no gesture
- (b) Stated intention to harm self
- (c) Visible self-inflicted injury
- (d) No information

Rationale: distinguishes those who have or are likely to hurt themselves. [Suicide is leading cause of jail deaths.]

Self-harm gesture (not visible to provider, by inmate report)
- (a) None reported
- (b) Reports deliberate intake substance to do self harm

Rationale: distinguishes behavioral features not visible to provider that are very worrisome both in terms of potential to cause rapid physical and/or behavioral deterioration, and cause increased facility and provider liability and high resource use.

Intention to harm others (by inmate report)
- (a) No verbalized intent, no gesture
- (b) Stated intention to harm other(s)
- (c) Previous assault during incarceration
- (d) No information

Rationale: distinguishes progressive likelihood of assault.

Ability to initiate health care request (inmate can be relied upon to follow health care request procedure that is standard for the jail; this is called filing a "MRRF.")
- (a) Indicates understanding of request procedure and agrees to ask for care if needed
- (b) Same as (a), but gives inappropriate or incomplete responses during screening
- (c) Procedure reviewed, inmate gives no indication of understanding or did not agree
- (d) Procedure not reviewed

Rationale: distinguishes those inmates who can be relied upon versus those who cannot. Infers the need for more resource use when nurse has to be responsible for follow-up.

Assembly of Intake Classes

Overview

Seven iso-risk classes were derived in the final scheme developed for intake. In general, classes differ according to how an inmate is assessed against these variables: existence of a health problem; whether or not that problem (if any) falls into the routine or nonroutine service tract; inmate reliability regarding the initiating of a health care request if needed, and whether or not there is a need for special housing. Class 1 inmates are denied admission to the jail on the basis of health status. Class 2 inmates report no health problem, nor do staff perceive any. Class 3 inmates have health problems but they are relatively easy to manage. Class 4 inmates report health problems that require provider intervention beyond that routinely offered; however, inmates are reliable and need no special housing. Class 5 inmates also have health problems that require nonroutine services, but they are unreliable necessitating even more intensive monitoring. Class 7 inmates have health

problems that require nonroutine care, are not reliable, and require special housing for health reasons. As such, these classes tend to represent a hierarchy of risk and need.

Derivation

Conceptualization of intake classes uses five decision rules and multiple indicators shown in the overview in Figure 2. A complete conceptualization is found in Appendices C and D. Appendix C lists indicators by number. Appendix D shows the derivation of classes using those numbered indicators. Included is detailed rationale for each rule's "yes" and "no" decision split. This complete conceptualization may be helpful during the next phase of system testing and refinement when indicator substitutes and supplements will be considered.

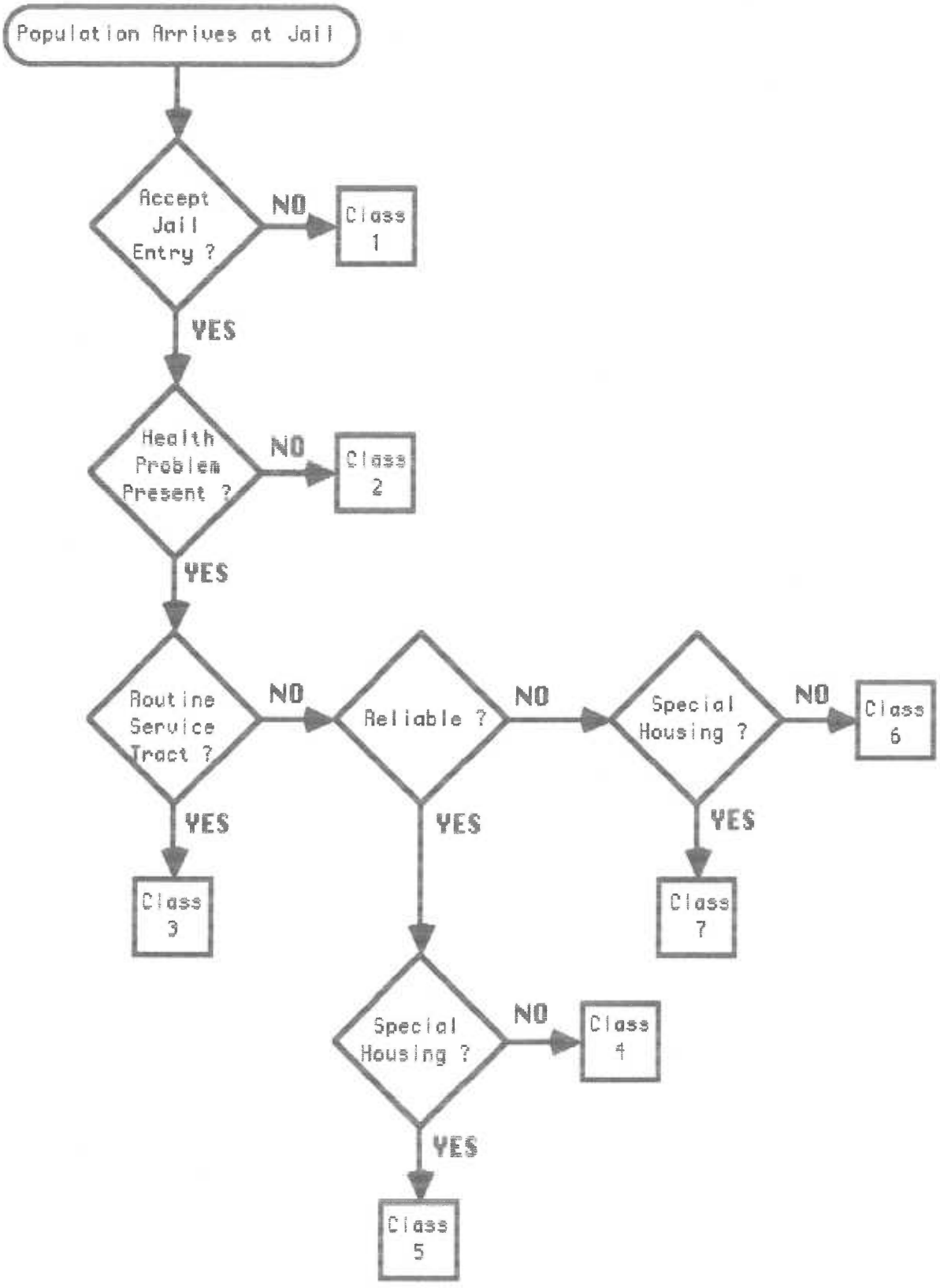

Figure 2.

Classification at Intake Health Screening

As shown in Figure 2, the first split of the inmate population uses indicators that relate to the question of whether or not an inmate's health status is stable enough for safe facility entry. A "deny entry/accept entry" decision rule is derived. To deny jail entry, an inmate must either report a health problem not under control, or be unable/unwilling to report it. Additionally he or she must have a "severe" provider-observed physical problem, "inappropriate" interaction with the officer during the booking procedure and/or visible self-inflicted injury. Inmates denied jail entry on the basis of health status are Class 1 types. All others enter jail.

The second split uses indicators to partition the entering inmate group according to whether or not they have a health problem. A "no problem/yes problem" decision rule is made. To be designated as a Class 2 type, the "no health problem" group, an inmate has to meet each of the following criteria: report no health problem, have no provider-observed physical disturbance, have "appropriate" interaction with the officer during the booking procedure and have appropriate and complete responses during health screening. All others who do not meet these requirements are assigned to the health problem group.

The third split is based on whether or not those inmates who do have a problem can be managed in the routine service tract (defined by provider monitoring, reassurance, and over-the counter (OTC) medication administration only) or into the nonroutine tract (defined by services exceeding those provided in the routine category). A "routine/nonroutine" split decision rule is derived, using a large number of indicators. To enter the routine tract, an inmate must report a self-managed problem. Additionally, the inmate may report a minor physical complaint, or uncomplicated pregnancy, or minor injury but it must occur within the context of normal mobility, appropriate interaction with the officer during booking, and appropriate communication with the nurse during health screening.

The routine/nonroutine service groups are subdivided using a fourth split that determines whether or not an inmate can be considered reliable enough to initiate the next needed nonroutine health care request. A "reliable/not reliable" rule is derived. To be classified as "reliable," an inmate must meet all three of these criteria: have "appropriate" interaction with the officer during booking, understand

and agree at intake to initiate the next nonroutine health care request if needed, and have easy, appropriate communication with the nurse at intake health screening. All others are considered not reliable.

The fifth split uses indicators on both the reliable and unreliable groups to to determine if the inmate needed special housing related to health status, including its behavioral dimensions. A "unrestricted/special" housing rule is derived. To indicate need for special housing, an inmate must report recent exposure to communicable disease or report the presence of communicable disease, show evidence of self-injury, threaten self harm or harm to others. All those with a record of previous assault during incarceration are in this group. All others require no special housing.

Table 4 details this decision-making process further, showing how the use of specific indicators create splits of the inmate population into seven intake classes.

Table 4

Assembly of Intake Classes by Decision Rules and Indicators

#1 CUT: TO DENY ENTRY OR TO ACCEPT ENTRY

Rule:
TO DENY JAIL ENTRY MUST HAVE:
Inmate report of health problem not under control
OR:
Inmate unwilling, unable to report problem presence or not
PLUS ONE OF THESE:
"severe" provider-observed physical disturbance
OR
"Inappropriate interaction with officer during booking procedure
OR
Visible self-inflicted injury

Rule:
Accept all those not denied entry.

#2 CUT: DOES THE INCOMING INMATE HAVE A HEALTH PROBLEM?

Rule:
TO HAVE NO HEALTH PROBLEM MUST HAVE:
Inmate report of no health problem
PLUS
No provider-observed physical disturbance
PLUS
"Appropriate" interaction with officer during booking process
PLUS
Easy, appropriate, complete responses during health screening

Table 4 (continued)

Rule:
All others have a health problem.

#3 CUT: DOES PROBLEM FALL INTO ROUTINE OR NONROUTINE SERVICE TRACT?

Rule:
ROUTINE SERVICE TRACT MUST HAVE:
Self-managed problem, under control
AND
Inmate reports no complaint
OR
Inmate reports minor complaint
OR
Inmate has uncomplicated pregnancy,
OR
Provider observes "minor injury"
AND
Inmate has normal mobility
AND
Inmate is appropriate during interaction with officer during booking
AND
Inmate understands and agrees to health request procedure

Rule:
All others go into non-routine service tract.

4 CUT: IS INMATE RELIABLE ENOUGH THAT HE/SHE WILL INITIATE NEXT NONROUTINE HEALTH CARE REQUEST?

Rule:
RELIABLE MUST HAVE:
"Appropriate" interaction with officer during booking procedure
AND
Understands, agrees to initiate request prn
AND
Easy, appropriate, and complete responses during health screening

Table 4 (continued)

Rule:
All others are not reliable.

5 CUT: DOES THE INMATE REQUIRE SPECIAL HOUSING FOR HEALTH STATUS?

Rule:
SPECIAL HOUSING MUST HAVE:
Recent exposure to communicable disease
OR
Confirmed communicable disease by inmate report
OR
Stated intention to harm self
OR
Visible self-inflicted injury
OR
Stated intention to harm others
OR
Previous assault during incarceration

Rule:
All others do not require special housing.

Application of the five decision rules resulted in a seven (7) group hierarchical partitioning. Descriptions of each class are presented below:

Class 1: "Deny Entry" Inmates upon jail arrival have severe observable health problems that exceed the diagnostic and treatment resources of the facility. Inmates are at high risk for physical and/or behavioral deterioration and, as such, also represent high liability to the jail and its staff. Members of this group are denied jail entry and are transported

to a hospital; many return to MCDC after treatment. At that time, they will be re-classified and tracked as a separate episode.

Class 2: "Very Low Risk" Inmates at entry report no health problem. They appear reliable, need no special housing and require only routine monitoring and reassurance services.

Class 3: "Low Risk" Inmates in this group report a minor health problem under control with self-managed modalities. Inmates do not require more than routine health care services, need no special housing and are reliable.

Class 4: "Moderate Risk" Inmates have reported health problems that require management services beyond those offered in the routine tract. Their health problems tend to be straightforwardly reported by the inmate as under control with prescribed medication or treatment. This is reinforced by provider observation. The present regimen can be continued within the jail without requiring a comprehensive work-up of the problem. All inmates whose primary problem type is uncomplicated dental, uncomplicated pregnancy, or NIDDM are in this group. None in this group requires special housing. If the

inmate stays for a very short time and the existing provider does not need to be contacted for order renewal, the problem still requires evaluation efforts greater than those for Types 1 and 2. Inmates are reliable and exhibit appropriate behavior.

Class 5: "Moderate High Risk" Inmates in this group are comparable to those of Type 4 with the exception that they require special housing as part of the nonroutine care provision. Their care likely involves body-fluid precautions and a communicable disease work-up.

Class 6: "High Risk" Inmates are not reliable and enter with visible physical and behavioral disturbances, impaired mobility and/or an unwillingness or inability to talk with the nurse. Confirming the presence, type and severity of a problem takes more effort than that required for reliable inmates. Service for members of this group often involve contacts with attorneys, judges and corrections officials to coordinate case management.

Class 7: "Very High Risk" Inmates in this group are like those in Type 6, with the exception that they require special housing. All those who state intention to harm self or others, or who have any

self-inflicted injury are in this group. All those who have a strong suicide potential profile are in this group: first offense, a heavy criminal behavior charge, arrival in inebriated state, young and male.

Table 5 shows the final seven intake classes by salient clinical characteristics conceptualized to have relevance to resource use variation.

Table 5

Intake Health Screening Classes

Class Type	
Class 1:	Deny entry
Class 2:	No problem, routine service tract, reliable, in unrestricted housing
Class 3:	Has problem, routine service tract, reliable, in unrestricted housing
Class 4:	Has problem, non-routine service tract, reliable, in unrestricted housing
Class 5:	Has problem, non-routine service tract, reliable, in special housing
Class 6:	Has problem, non-routine service tract, not reliable, in unrestricted housing
Class 7:	Has problem, non-routine service tract, not reliable, in special housing

The next chapter discusses derivation of episode classes for inmates who receive more than a single intake health provider contact. Rationale for the separate development of this scheme is given and conceptual gaps between the intake and episode classes are identified.

CHAPTER 6

PRELIMINARY EPISODE CLASSES

This chapter expands the classification effort to include a second set of episode-based classes for inmates who have more than a single provider contact during incarceration. While intake classes themselves represent final output for many inmates who have only one provider encounter in jail, additional classes are needed for the remaining "longer stay" inmates. Episode definition for this latter population sub-set is the focus of this chapter.

It is important to understand that preliminary episode classes derived in this chapter are incomplete. Conceptual gaps create some unwanted definitional flux that must be eliminated before a final set of classes can be defined and tested. The ultimate aim of system design is to incorporate the set of intake classes and the completed set of preliminary episode classes (derived here and with suggested data collection and analysis) into a single, global case-mix measure.

The chapter is divided into three sections: (1) rationale for expanding the intake classification scheme; (2) identification of existing conceptual gaps that make final episode definition difficult for some

inmate groups; (3) and actual derivation of preliminary episode classes.

Need for Additional Classes

To review, the health management episode is an administratively useful and conceptually appropriate way to characterize health service requirements for an inmate during one entire jail stay. Separate classes capture variation in health service requirement by predicting different patterns of expected resource use. As such, a class serves to measure provider output. For many inmates (likely a majority) who stay in jail for a very brief time, their sole provider contact at intake represents the entire episode of care. Thus, intake classification defines final output for the majority of bookings.

A single visit episode means that no additional health provider and inmate contact occurred after the intake visit. In order to establish that only a single contact actually occurred (i.e., that no routine monitoring or nonroutine care took place), the intake health screening forms completed for all inmates will need to be modified. One approach would be to add a simple checklist indicating whether or not the inmate received further care after screening. The

separate medication record now used could also be incorporated with intake data into a single form.

The present purpose is to derive additional classes for inmates who do receive further service after intake. Episode definition for this group of inmates varies in conceptual and definitional complexity. In general, it is easier to define episodes for inmates in this group who experience no health status change during their stay than for inmates who do. This generalization holds even if inmates have a health problem when they enter jail. In the context of early assessment, inmate reliability, accurate problem definition (if any), and available resources, many health problem management courses can be easily predicted with reasonable accuracy.

Good predictability in this study refers to a "correct" and early estimation about the type(s), amount(s), and combination of intermediate outputs that will be required for an inmate's overall course of health management. Examples of stable health problems/conditions that commonly have such predictability include the following: diabetes, seizure disorder, hypertension, uncomplicated

pregnancy, manic depressive disorder, casted bone fractures, and impaired vision or hearing. In most cases of either no problem or a stable one, the variable most often difficult for health providers to predict is length of stay.

The definitional challenge is more complex for inmates who experience health status change while incarcerated.

Conceptual Gaps in Changing Health Status

The nature of health status transition and its patterns of occurrence are neither clear nor documented at the population level, creating uncertainty in the definitional approach. That is, information regarding the incidence of health status change in the population, the frequency of change in individuals over a single stay, and the type of problem(s) associated with changed status, is not available for analysis. Since the episode-based scheme holds the provider responsible for "correct and early" prediction of resource use patterns (at least for most cases), study of existing conceptual gaps is required before a complete set of final episodes can be derived.

Three factors contribute to the complexity of episode definition for inmates who experience changed

health status during incarceration. First, it may not be feasible, given current technologies and/or jail resource constraints, to detect early clinical signs and symptoms that suggest the likely occurrence of a specific problem. Signs and symptoms may not be evident to either the inmate or to the provider at brief and isolated assessment points. Consider this case. An asymptomatic and reliable inmate reports current heroin addiction at intake (intake screening). Two days after admission, during nursing rounds (monitoring), the inmate asks for an analgesic, Tylenol, but relates no specific complaint. [Commonly inmates do not explain why they are requesting an over-the-counter medication; the provider records only its dispensing.] Later that day, the inmate feels increased general malaise and initiates the standard written request for nonroutine care (reassessment). At time of provider evaluation the inmate is febrile. Further problem work-up suggests localized infection, likely from use of contaminated needles associated with his heroin habit (problem management). If the infection is resistant to standard antibiotic treatment and becomes systemic, the inmate then requires further health referral for a guarded

hospital transfer and stay (advanced case management/coordination).

This case is an example of an intensive, heavy resource use course of health problem management that could not be predicted from intake data. It also illustrates the problem of holding the provider accountable at intake for "missing" onset of sepsis. Other problems such as trauma from unprovoked attack or injuries sustained during recreation periods may unpredictable. This type of case can be expected to occur in all classification schemes that use a prediction model. Again, the aim is to make correct predictions for most cases.

Second, as discussed in the last chapter, some data collected at intake are of uncertain quality and may lead to inaccurate predictions. Although no study has been done to ascertain the incidence of unreliable data, it is likely that this problem contributes to a sometimes poorly understood linkage between health status at intake and service requirement during the stay.

Third, difficulty understanding the flow of transition between incoming and discharge status can be attributed, in part, to the dominance of the

custody objective in the practice setting. Health care provision, while a constant concern, is secondary to security and custody objectives. This forces a constant overlay of protocol that drives the health care delivery system into a triage mode that accommodates security and legal constraints. This feature of service is in contrast to the normal flow of constant bedside monitoring and unrestricted patient access found in traditional settings. Hence, in the jail setting collection of timely information about changes in health status can be difficult.

Conceptual and definitional complexities lead to specific questions for study: (1) how many inmates convert from original intake health status during their stay? (2) when, how often and in what direction (improved or worsening) does conversion occur? (3) is conversion associated with continuous management of a single primary problem or with sporadic intervention efforts that identify new and multiple problems? (4) how often is problem detection "late" because an inmate did not reveal its existence at intake? (5) at what point during the stay and by whom are unreported problems detected (the joint production issue)? (6) what kinds of new (iatrogenic or not) health problems

characterize conversion to nonroutine service provision? (7) what level and type of provider handles which kind of problem? and (8) how often do inmates require hospitalization, for what type problems (medical/surgical/psychiatric/obstetric)? Data collection that examines these issues and identifies their patterns of occurrence would enable completion of class definitions.

Derivation of Preliminary Episode Classes

Features of Post-Intake Service

Three important dimensions of provider effort characterize post-intake health service. The first is continuation of routine service provision for all inmates. For inmates who were classified at intake as Class 2 or 3 (no health problem or a minor one) routine service often is the only service type provided throughout a stay. Their preliminary episodes are relatively simple to define as time-dependent extensions of the original classification. For others, daily routine service is only part of the overall service package.

The second dimension is routine service plus nonroutine, brief, and intensive intervention directed at avoiding actual clinical management of an existing

or potential problem. The focus of output here is not on diagnosis and/or treatment but on rapid reduction of an excessive facility and personal health risk. Consider the following case. At intake an asymptomatic inmate gives a disturbing history of two myocardial infarctions within the last year, severe coronary artery disease with near total occlusion of the major vessels, and recent hospitalization for increased angina. This inmate's health status represents high risk to himself, to the facility, and to staff since the inmate may experience sudden cardiovascular deterioration or death. In this instance, after intake screening, provider efforts will be directed at prevention, in terms of immediate advanced case management and coordination of an asymptomatic inmate, not at problem "work-up" and treatment. Corrections staff, attorneys, judges, and health personnel will be rapidly involved in determining what should be done considering the inmate's charge, the validity of the health history, and the medical safety of his continued incarceration. Data are needed to determine how often this type of case occurs. Following data collection and analysis, an episode may be defined in terms of a

very brief stay (likely less than 24 hours) with intensive administrative disposition of a potential health problem.

The third service dimension is another combination of routine and nonroutine care. It contrast to the former, it does emphasize clinical management in terms of specific diagnostic and treatment efforts related to a particular problem. Here a medical diagnosis or at least labeling of problem type (e.g., substance withdrawal, insomnia for greater than 3 weeks, high blood sugar in previously well controlled diabetic, etc.) is important in defining appropriate episodes.

These dimensions, though not mutually exclusive, tend to characterize the nature of post-screening health services.

Data Collection Period

For this set of classes, a compromise is made to accommodate the need for more health data than what is now collected at intake. In order to make reasonably accurate predictions about resource use across an entire stay, data to enable classification of preliminary episodes will be gathered during the first 72 hours of stay. Additional time to reassess the inmate and gather data should improve prediction of

resource use. This "extended" data collection period is acknowledged as a factor that will confound output measurement to some degree. However, since intake classification is expected to be the final class designation for a majority of inmates, the measurement compromise affects less than half the population.

Classification Data

It is currently feasible to derive early episode classes that depict well known health management scenarios for some jail stays. Many common inmate health problems (e.g., dental, lice/scabies infestation, substance withdrawal, unstable diabetes, behavior problems) do manifest themselves within the first 3 days after entry. Thus, the 72-hour data collection period should enable their accurate classification.

Episodes that characterize common health problems take into account some or all of these variables: timeliness of problem detection ("early" is within 72 hours, "late" is after 72 hours); intensity of service; status of inmate compliance; use of hospital resources; and type of primary health problem.

Preliminary episodes have medical and behavioral distinctions. These are consistent with (1) the

manner in which clinical problems manifest themselves after three days (at time of transfer into group living situations); (2) separate MCDC medical and mental health nursing and physician teams; (3) on-site, 10-bed separate housing areas for managing those problems; and (4) the 72-hour data collection period that make these distinctions evident.

At intake, provider effort is directed at safe immediate celling; the type of problem is not as important as whether or not it can be managed well given facility resources. However, as inmates move out of the short stay reception or booking area to general living areas, more data become available that suggest separate behavioral/physical dimensions with specific clinical and administrative implications. [As of this writing, a change in MCDC protocol sends all females directly from booking to general living areas.]

After two or three days of incarceration, not only do more health data become available (reassessment opportunities, old health records, confirmation with existing providers regarding health needs, new lab data since jail entry, etc.), but also corrections and nursing staff have had several days of close inmate

observation, creating a baseline against which changes in the inmate's general status can be noted. Within rules of confidentiality, corrections and health care staff can detect and share information regarding the inmate's status and compare those observations against a more complete picture of his or her adjustment to incarceration.

Clarification of problem types after three days of incarceration shifts provider focus from medically safe housing to managing those different kinds of problems over several days, weeks or months. The emphasis becomes how (and whether or not) to manage health related problems, while maintaining inmate constitutional rights in the context of a medically-safe group living situation.

The variable of inmate compliance is very important in defining longer stay episodes. The status of inmate compliance/noncompliance with providers is hypothesized to account for considerable differences in resource use. Inmates cannot be forced in this setting to take medications, even psychotropics known by patient history to prevent behavior deterioration. Much provider time is spent in helping inmates understand and accept such

therapeutic intervention. However, policy dictates that an inmate who refuses medication can only be made to take the drugs in a psychiatric hospital, under special legal provisions. Sometimes noncompliance results in an inmate's getting the extra attention he or she wants. For example, diabetics may purchase candy and then complain of symptomatology related to elevated blood sugar. Other inmates "cheek" medications, or smoke and then complain of respiratory symptoms.

Hospitalization and the use of extra-facility health care resources that involve inmate transport to and from jail during incarceration infer heavy and unusual resource use. Although there is an incentive in this scheme, should it be used to allocate resources, for providers to "overuse" the hospital, indicators that infer the need to hospitalize can be incorporated into a refined scheme.

Inmate-based indicators used in intake classification were considered again in this preliminary episode set; some were retained and several new ones added to capture provider emphasis on physical and behavioral aspects of problem management. Table 6 lists the indicators used in deriving additional episode classes.

Table 6

Episode Classification Indicators

Medical
Substance Abuse by type
Pregnancy
Hypertension
Infectious Disease by communicability
Trauma
Diabetes, by status of insulin dependency
Dental Problems
Seizure Disorder
Other Medical Problems
Behavioral
Potential for Self Harm
Abusive, Aggressive, Antagonistic Behavior
Chronic Mental Illness
Drug-seeking Behavior
Other Behavioral Problems
Other
No medical or behavioral problem
Death, by self, others, uncertain

Medical Episodes

Medical episode classes are divided into nine categories: (1) substance abuse, (2) pregnancy, (3) hypertension, (4) infectious disease, (5) trauma, (6) diabetes, (7) dental, (8) seizure disorder, and (9) "other."

1. Substance abuse episodes are ordered along a hierarchy of increasing resource need. Alcohol and illegal drug use are very common among the inmate population. They are examples of health problems frequently associated with certain criminal behavior charges (possession of illegal substance, theft, forgery) and recividism. MCDC staff report that both alcohol and illegal drug use often go unreported at intake. If a problem is reported early (at intake), the provider can begin secondary prevention efforts that might include observation of the inmate for onset of withdrawal and timely institution of therapy (e.g., force fluids, administer Librium to lower seizure potential, monitor body temperature, move inmate to medical unit, etc.).

Alcohol abuse represents a particularly difficult problem for MCDC providers since its withdrawal course tends to be associated with severe, sometimes

life-threatening hyperthermia, dehydration, and seizures. Non-alcohol drug withdrawal tends to be uncomfortable for the inmate but does not present the same threat to health as does alcohol withdrawal, nor does it require the same intensive observation and intervention.

2. Pregnancy can be a difficult problem for jail health providers. If the inmate is aware of the pregnancy, has had pre-natal care and is not using alcohol or illegal drugs, associated jail health resource use is most often low, as an "uncomplicated" pregnancy. If, however, the inmate has not seen a provider, has hypertension, uses street drugs and/or alcohol, has contractions, vaginal bleeding, interuterine growth retardation (IUGR) or other problems, the "complicated" pregnancy case can be both a heavy resource user (often trips to extra-facility consultants and resources are required) and a high liability risk.

3. Hypertension can be a particular problem for blacks who make up nearly 12% of the MCDC population. It also has implications for all inmates who are asymptomatic but for whom there is considerable health risk. Controlled hypertension in a compliant inmate

is easily managed, while uncontrolled hypertension and noncompliance (refusing medications, choosing to eat a high salt diet, refusing to lose weight, not exercising, etc.) is a much more difficult management challenge and a higher health risk. For the compliant inmate whose hypertension persists following conventional therapy, there may be heavy resource use, including physician consultations and hospitalization.

4. Infectious disease can be problematic both in terms of personal and public health. Management of noncommunicable disease tends to be less resource-intensive than communicable disease in this setting, particularly because inmates and staff are in very close and constant contact. Noncommunicable disease can carry considerable personal risk (e.g., septicemia) but its management, however intensive, is easily focused and constrained. In contrast, communicable disease has important group implications that can present difficult epidemiological challenges to providers.

Early reporting of confirmed or suspected communicable disease is far easier to manage than late detection of the problem after widespread facility exposure to the infection. Hepatitis A is an example

of such a problem. If detected late, all close contacts should receive gamma globulin protection. If tuberculosis is detected late after prolonged facility exposure, it would be appropriate to test and potentially to treat all close contacts. Since there is high turnover in and out of jail, and frequent housing transfers within, it would be very difficult logistically to track, locate, and treat (if indicated) inmates exposed to the infection.

5. Trauma is common among inmates at jail entry. It can be obvious or not, minor or major, and may involve a hospital stay. Trauma episodes have been defined grossly using these variables. More data needs to be collected to determine patterns within these broad classes.

6. Diabetes is not particularly common in the inmate population, but like pregnancy, requires very careful provider attention in the context of custody. Noninsulin dependent diabetes mellitus (NIDDM) tends to be less of a problem than insulin-dependent diabetes mellitus (IDDM) since, by diagnostic definition, the latter is more clinically serious. Diabetes is one problem over which the MCDC health provider has limited control, even with close

monitoring of diet, insulin, and/or blood sugar. Compliance is a key issue. An inmate has access to exercise equipment (exercise can cause fluctuation in disease control), and sugar in the form of candy or in packets used for coffee in the living areas. Either or both means can be readily used by inmates to change health status to gain more attention or even hospital transfer.

7. Dental problems are the single most frequently reported problem according to staff. The dental episodes are defined straightforwardly according to severity of problem with associated resource use levels.

8. Seizures are another difficult problem for jail health providers. Seizures can be well documented and controlled, or previously unknown and difficult to control. Some are linked to use of illegal drugs or to alcohol; others are not. Problems that have been previously worked up are generally less resource-intensive than are "new" seizure problems. Again, the issue of compliance has important resource use implications in seizure problem management.

9. "Other" medical problem episodes are designed to capture what the preceding episodes did not. The nature of problems and the patterns of their occurrence will be evaluated during the next phase of system testing. The variables of compliance and use of the hospital were retained in this category.

Behavioral Episodes

Behavioral problems were divided into the following categories: (1) potential self-harm; (2) abusive, aggressive and antagonistic; (3) chronic mental illness (CMI); (4) drug-seeking; (5) behavioral secondary to organic problem; and (6) "other."

1. Potential self harm is of great importance in jail since suicide is the number one reason for deaths in jail. The jail suicide rate is ten times higher than that of prisons (Hess, 1987). The value units of the indicators are designed to infer episodes of increasing resource use. Those who have attempted suicide need direct transfer. Inmates who enter with a high risk profile or stated intent or previous history of attempt need intensive observation and intervention from the mental health team.

2. Abusive, aggressive and antagonistic behaviors are defined as separate episodes because they have

particular relevance to both health provider and corrections objectives. An inmate who is abusive, aggressive and/or antagonistic represents a threat to self and others, especially in the setting of an open dayroom living area. One type requires rapid evaluation and short term intervention for adequate management. A second type uses more resources, requiring service for the duration of his or her stay in jail. This group tends to be emotionally disturbed and assaultive, either by history or current behavior. Management of this type is often complex and may include the following: special housing; psychiatric consultation and monitoring; institution and careful monitoring of medication; and frequent provider communication with guards regarding module management of the inmate.

3. Chronic mental illness (CMI) episodes are defined to include inmates with a prior hospitalization for mental illness. If compliant on a regimen that controls the problem, the CMI inmate can be a low resource user in jail. The noncompliant inmate is otherwise. An inmate who refuses to take Lithium because he is "well," may deteriorate and require repeated intensive provider intervention

directed at convincing the inmate to recognize the need to take Lithium. If this is not successful, the inmate may require hospital transfer.

4. Drug-seeking inmates can present a heavy resource use pattern in jail. One type tends to set up a short-lived crisis based on a bogus problem and a "one time" try at manipulation of the provider (e.g., "I just took 20 pills before I was arrested"). A second type sets up a series of repeated requests to providers for assistance with somatic complaints or emotional problems. This inmate does not stop trying and testing providers; inmates can present a number of legitimate sounding requests that can chronically drain health resources during their entire stay (pretending to fall, pretending to have serious emotional disorders, complaining of nonexistent blood in stool, headaches, internal injuries, etc.).

5. "Other" behavioral episodes are designed, like "other medical," to allow for improved episode classification in the next stage of system development. At this point, it is not clear what other patterns of behavioral management problems tend to occur in this population.

Other Episodes

There are two categories that fall outside the medical/behavioral dichotomy: death and no health problem. Death is not a common occurrence but it has high clinical and administrative significance. Conceptualized as a valid health status outcome that results in the context of provider ouput during the jail stay, it is included in the scheme. Death is further divided by cause: self, other, or uncertain.

"No health problem" refers to longer stay episodes that have more than one provider encounter during which only routine services are required.

Preliminary episode classes are shown in Table 7. Counting the seven intake classes, the overall scheme has 68 basic classes. The plan is to consolidate these into a managable number during subsequent testing and refinement efforts.

Table 7

Discharge Episode Classes

Screening Episodes (single contact episodes)
Intake Classes 1-7

Preliminary Episode Classes
Medical Problems:

Substance Use
1. Non-ETOH substance abuse, early report, no withdrawal or complication
2. Non-ETOH substance abuse, previously unreported, with withdrawal or complication
3. ETOH, early report, no withdrawal or complication
3. ETOH, early report, with withdrawal or complication
4. ETOH, previously unreported, with withdrawal or complication
5. Combination, previously unreported, with withdrawal or complication
6. Substance abuse with hospital stay

Pregnancy
1. Pregnancy, new diagnosis only
2. Uncomplicated pregnancy, previously known
3. Complicated pregnancy, without hospital stay
4. Complicated pregnancy, with hospital stay

Hypertension
1. Controlled, with compliance
2. Uncontrolled, with compliance
3. Uncontrolled, without compliance

Infectious Disease
1. Non-communicable, localized infection
2. Non-communicable, systemic infection without hospital stay
3. Non-communicable, systemic infection with hospital stay
4. Communicable, confirmed with isolation
5. Communicable, suspected, with isolation
6. Communicable, confirmed, no isolation
7. Communicable, confirmed, late isolation with need to follow contacts

Table 7 (continued)

Trauma
1. Treated minor trauma, no complications
2. Treated major trauma, without hospital stay
3. Treated major trauma, with hospital stay

Diabetes
1. NIDDM, compliant
2. NIDDM, noncompliant
3. IDDM, compliant
4. IDDM, noncompliant

Dental
1. Dental, no treatment
2. Filling or simple extraction
3. Extraction with abscess
4. Extraction with abscess and complication
5. Dental problem with hospital stay

Seizures
1. Known history, no recent seizure, compliant
2. Known history, no recent seizure, not compliant
3. Known history, recent seizure, compliant, with hospital stay
4. Known history, recent seizure, not compliant, with hospital stay
5. Previously unknown, recent seizure, compliant, with hospital stay
6. Previously unknown, recent seizure, not compliant, with hospital stay

Other Medical
1. Compliant, without hospital stay
2. Noncompliant, without hospital stay
3. Compliant, with hospital stay
4. Noncompliant, with hospital stay

Behavioral Problems:

Potential Self Harm
1. Self-harm gesture
2. Self-harm, with high risk profile
3. Self-harm, stated intent
4. Previous attempt to harm self by history

Abusive, Aggressive, Antagonistic
1. Without physical assault
2. With physical assault

Table 7 (continued)

Chronic Mental Illness
1. Hospitalization history, compliant with regimen
2. Hospitalization history, not compliant with regimen
3. Hospitalization history, not compliant, with hospital stay

Drug-seeking
1. One feigned complaint, later admitted
2. Repetitive somatic complaints, unconfirmed problem by provider, not admitted

Other Behavioral
1. Compliant, without hospital stay
2. Noncompliant, without hospital stay
3. Compliant, with hospital stay
4. Noncompliant, with hospital stay

Other Episodes:

Death
1. By self
2. By other
3. Uncertain

No health problem during incarceration

The next chapter outlines a plan for multi-purpose data collection. It also discusses empirical testing of the preliminary classes.

Chapter 7

DATA COLLECTION AND EMPIRICAL TESTING PLAN

This final chapter presents a plan for the next phase of system development. Its major emphasis is on data collection and on empirical testing of classes. Both of these efforts directly address the system's crucial validity issue: does the scheme measure what it is intended to measure?

The following developmental sequence is suggested. A data collection plan that involves considerable design effort, including creation of new forms and staff training protocols, must be implemented. Additional data are needed to enable definition of episodes to complete the set of classes. Upon their completion, a sufficient number of inmates (that number remains to be determined) will be classified into each of the groups. Classes will then be evaluated by statistical testing techniques to determine how well they meet both individual class and overall system criteria. Testing will determine the extent to which classes distinguish different resource use patterns, both within and between groups. Based heavily on that analysis, classes will be retained, eliminated, combined, and perhaps new ones created.

The chapter is divided into four sections. The first outlines general areas of data needs. Their nature suggests the likelihood of an extended and comprehensive collection effort. The second section presents an overview of statistical tests appropriate for evaluation of class properties and system performance features. These tests provide rationale for how system refinement should proceed. The third section gives study conclusions, and the final section discusses policy and research implications for corrections health case mix development.

Data Collection

There are four data collection purposes: (1) to enable classification itself; (2) to make available potential indicator supplements and substitutes for use in improved class definitions; (3) to close conceptual gaps (identified earlier as hindering final episode definition for some types of health management courses); and (4) to enable empirical measurement of current resource use within the classes.

Classification Data

Data are needed to allow inmate classification. Since indicators are conceptualized as having relevant and variable expression in the inmate population, that

variation needs to be observable and measurable. It is the basis for inmate categorization.

To review, indicators should be objective, inmate-based, regularly occurring, reliable attributes of the inmate or his/her situation, and predictive of service needs for the entire jail stay. A clinical assessment protocol manual needs to be developed to elicit consistent, reliable judgments on indicators across providers over time.

Generalizations can be made about classification variables. Many indicator value units vary straightforwardly both in terms of their hypothesized relationship to resource use and with respect to their expression. Their variation is not hard to recognize or to document uniformly across raters. Such variables tend to differ in terms of presence or absence of data. For example, an inmate may easily be assessed as to whether or not these attributes are present: gaping wound, willingness to talk with provider, acute respiratory distress, ability to walk unassisted, and stated intention to harm others.

Other indicator values are less easily measured because they reflect more subtle inmate attributes. Their observation and assessment entail more provider

subjectivity, making it more difficult to achieve consistency in measurement across raters. Behavioral variables tend to fall into this group while many physical ones fall into the former.

Some indicators with high clinical and administrative importance must be included in the classification scheme, but are hard to assess and measure consistently. For example, suicide is the primary cause of death in jails, yet indicators of that problem (with the exception of an obvious gesture) are often elusive because the risk factors are not well understood. As previously noted, the profile of a high suicide risk is the same as that of the average incarcerated male (Hess, 1987). Another example of this kind of indicator is intention to harm others. In the absence of an actual gesture or knowledge of previous assault, it is hard to predict which inmates will harm others and which will not. In the scheme derived in this study, only gross distinctions are made to capture variation in intention to harm self and intention to harm others. For this reason, measurement per se may be easy but oversimplified and perhaps of limited clinical meaning.

Given the above limitations, the following variables, detailed in Appendices C and D (pgs. 198-209), are hypothesized to be "easily" measured in terms of data absence or presence: presence of health problem, status of problem control, primary problem type, self-harm gesture, and stated intention to harm others.

Less easily measured classification variables (those that depend on consistent provider observation and agreement in clinical interpretation) include the following: some physical disturbances, mobility, some behavioral disturbances, ability to initiate health care request, and mental status.

General comments can be made about measuring physical disturbances. Some disturbances that require only basic monitoring services are measured by the "none" or "minor" categories. Very minor injuries that warrant only reassurance or a small dressing are included here.

The "moderate" category includes indicators that predict less straightforward management courses requiring more provider monitoring. Two such indicators are alcohol breath odor and minor head trauma with no diminished level of consciousness.

These would be assessed by a quick mental status exam, or by evaluating the responses of the inmate to officers during booking and to the nurse at screening. Deviation in behavior or communication does have a subjective element; however, clinical decision protocols can be established to derive reliable assessments.

The "severe" category should be less difficult to measure than the former because inmate symptoms indicate clear physical and/or mental distress; none of the symptoms associated with this level of disturbance is subtle. Measure of acute distress can be detected on the basis of any of the following problems in the context of unstable vital signs (pulse, blood pressure and respiratory rate): heavy bleeding, seizures, marked deterioration in level of consciousness, self-inflicted injury or signs of active labor.

Mobility variables are readily measured as presented in the hypothesized scheme.

The measurement of behavioral variables requires the attentive and sustained observation of the nurse as the inmate is processed through photographing, checking in of personal property, fingerprinting, and

health screening. Similarly, measuring the inmate's ability to request health care (if needed) depends on the nurse's actually reviewing and checking inmate understanding of the standard medical care request procedure. Again, development and adherence to clinical assessment protocols will be necessary to ensure reliable and consistent measurement.

Mental status measurement may be particularly difficult to assess at booking. This is, in large part, attributable to varied emotional responses to very recent arrest and perhaps to the behavior or event that precipitated arrest. It can be hard for providers to sort out, and then agree upon, how emotions affect mental status. Distinguishing normal anxiety and stress associated with arrest from physiological abnormalities (head injury, diabetic coma/incipient insulin shock, recent illegal drug use, etc.) can be difficult. In this scheme, mental status is measured by evaluating the inmate's communication and type of verbal response during screening. Since the screening questions are standard, it is not difficult to pick up incomplete or inappropriate responses. "Normal" mental status is measured by complete, easy responses; "incomplete, or

inappropriate" that picks up any verbal response other than normal, and the final measure "unwilling/unable" is straightforwardly appraised.

As previously noted, two indicators need to be part of sustained data collection and system up-dating as more is learned about their risk factors: potential to harm self and to harm others. As presented in this scheme, their value units are easy to measure but have uncertain clinical meaningfulness.

In sum, measurement of variables that are expressed in terms of presence or absence of observable, quantifiable data is often not difficult. Behavioral variables that involve provider interpretation of inmate-provider interaction are less easily measured. Still other indicators are critical to include in the classification scheme but are not easily evaluated. This pattern suggests a hierarchy of measurement complexity that, in turn, has implications for the complexity of data collection design, protocol development, and staff training.

Class definitions within the proposed scheme can be quite easily operationalized. The scheme can be easily applied in practice because of its validity and its straightforward structure. Suggested empirical

research is intended to demonstrate this and to test alternative indicators in terms of validity, reliability, and cost.

Data for Indicator Substitutes and Supplements

Data also need to be collected to provide potential indicator substitutes and supplements. Substitutes are alternatives for the variables used in the preliminary scheme. Supplements are variables that can be used in conjunction with present indicators to enhance their power of prediction.

A number of indicators shown in Table 1 (p. 113) were considered for intake classification but, for reasons already cited, were not included in the final scheme. As potential indicator supplements and substitutes, they include the following: location of inmate prior to jail entry, existence of a provider (non-dental), location of the provider, last health provider contact, source of health care request, criminal behavior charge, and comorbidity.

Additional substitutes or supplements may be identified following data collection and empirical testing of classes. For example, if mental status measures are shown to distinguish different resource use patterns, this variable may be even more

accurately (and meaningfully) be measured by using a standard mental health assessment. Laboratory tests (serum drug screen, urinalysis, antibody testing, serum chemistry profiles, etc.) may also have similar potential utility.

As noted earlier, substitute and/or supplemental variables are clearly needed, but currently unavailable, to measure potential to harm self and potential to harm others.

Data to Lessen Conceptual Gaps

Data to clarify the nature of health status change during incarceration are also needed to complete episode definitions for derivation of a single set of classes. These general data requirements have been outlined in the eight (8) study questions presented in Chapter 6 (pgs. 140-1). The "other medical" and "other behavioral" episode classes are deliberately included as "catch all" categories for episode types that are not captured by the other medical and behavioral classes. Analysis of the inmates classified into these two categories will help to clarify conceptual gaps.

Data to Enable Measurement of Resource Use

Data are also needed to enable measurement of actual resource use within the complete set of

classes. This means that an empirical measure is needed to test the adequacy of the conceptualization. Such empirical measurement will additionally provide the basis for deriving category or class weights.

The importance of measure selection cannot be overemphasized. The measure will affect how well the needs of users will be met over the short and long run. For example, if the system were used in making resource allocation decisions, the manner in which classes are conceptually constructed, evaluated, modified, and assigned relative weights has great impact. The measure may determine what type and amount of resources the corrections health program receives. Also, clinical practice changes might be based on the way in which classes are conceptualized to account for provider output. This is due, in part, to the system's ability to address issues of efficiency and quality.

It is important to understand that the resource use measure, like the conceptualized output classes themselves, is a proxy one. It is neither feasible nor necessary to attempt to account for each and every provider activity to derive a suitable measure. The aim is to find a measure that effectively captures

relevant differences and similarities in resource use patterns while not creating an excessive data collection burden.

A global resource use measure that consists of several variables has been selected for testing of the classes. Three general points need to be made. First, no single variable is appropriate for the purpose of capturing service packages for both well and unwell inmates. Consider each of the following single variables in terms of how it fails to account adequately for a complete package of health maintenance and, if needed, health management: the number of intake screenings, surgical procedures, medical care requests, medical diagnoses made in jail, provider contacts (the current indicator), or health problems assessed (some inmates have none but receive service). The need for an aggregate measure is clear.

Second, the resource use measure needs to discriminate between those outputs over which MCDC providers have control and those over which they do not. The classes have been defined in terms of efforts for which MCDC staff are responsible; the resource measure should be consistent with that definition. The issue of inmate hospitalization

presents a measurement dilemma. Inpatient hospital care expenses are conceptualized to account for particularly heavy resource use. Hospital charges are reimbursed from the same corrections health budget that covers on-site jail care. However, MCDC provider responsibility for care stops upon inmate hospital admission and resumes only when, and if, the inmate returns to jail. Thus, there is a need to measure inpatient hospital resource use and to keep it distinct from MCDC provider output. Accordingly, separate cost accounting systems will be derived to resolve this problem.

Third, the variables used in an aggregated resource use measure need to be expressed in common measurement units. For this study, cost will be that unit.

Based on the above considerations, the following variables were selected as components of a global resource use measure. They are inclusive of both on-site and off-site delivery under direct MCDC supervision or control (with the exception of hospital stays as noted above).

1. Number and type of MCDC provider direct care encounters. These two variables measure frequency and

intensity of on-site care. Encounters are defined as either provider visits to the inmate for routine and nonroutine direct care or communication contacts made by staff and/or administrators on behalf of an inmate's health management. These are to be counted by provider type, skill level, reason for visit (new problem, need for more data to identify problem or follow-up known problem), context of patient participation (reliable, compliant or not) and minutes spent giving care.

Cost of routine care can easily be determined by averaging the number of minutes a nurse spends on daily rounds per inmate and multiplying that figure by number of days incarcerated. Nonroutine care personnel costs can be determined and assigned to encounters using analysis of provider salaries and fringe benefits, etc.

2. Use of special supplies/procedures. Special supplies are defined as those that are either rented or purchased for use in the jail by an individual inmate. They include the following: non-OTC pharmaceutical drugs, casts, braces, prostheses, dressings, intravenous fluids, suture materials, wheelchair or other convalescent equipment (overbed

trapeze, wheelchair, cane, crutches, etc.). Special procedures are defined to include all invasive and noninvasive diagnostic and treatment procedures done on a noninpatient basis. They do not include the professional provider charges (e.g., physician fee for reading an x-ray or EKG) but are independent procedure charges. They include the following: lab, x-ray, ultrasound, EKG, and dental supplies. Their costs can be determined from analysis of supplier or service billings.

3. Number of inmate round trips to hospital or clinic-based providers during incarceration. This variable refers only to off-site inmate visits to a health provider that do not require an overnight extra-MCDC facility stay. High resource use is associated in the classification scheme with the need to obtain care outside the jail. Costs for this service can be assessed from consultant and facility billings.

4. Hospital charges associated with overnight admission. This variable refers to those hospital inpatient service charges (costs) incurred during a single incarceration stay. There are two types of inmates who use hospital inpatient services. The

first is Class 1 intake screening types who are denied entry to the jail and get direct guarded transport to the hospital. The resource use associated with caring for Class 1 types is important to consider, but under separate cost analysis from that relating to care by MCDC providers. The second type are those inmates who incur a hospital stay subsequent to jail entry. They, too, need to have separate hospital costs monitored so they can be evaluated in the context of the direct care resource use measure.

In order to obtain enough inmates to be classified into all the classes and to show resource use relationships among members of the same class and between different classes and their members, the information gathering is likely to require, at a minimum, several months. The duration of sampling will have to be determined as progression of the classification process is monitored. The classes that are hypothesized to capture the least frequently observed variables of importance should provide the basis for monitoring the probable duration of the process (e.g., pregnancy, insulin dependent diabetes, self-harm).

In sum, type and frequency of provider-inmate encounters, use of pharmaceutical and medical supplies

and tests, and number of nonovernight trips to extra-facility providers will provide the basic cost-based resource use measure. An independent cost dimension will document the important variable of a hospital stay after booking into the jail.

Statistical Testing Plan

To analyze and to evaluate the properties of the classes a number of statistical tests will be used. Statistical testing specifically considers (1) how well the system and its indicator elements meet design and performance criteria and (2) what type of modification(s) are indicated to improve the system of classes.

Methodological Criteria

Homogeneity

Inmates classified into the same class should be more similar to each other--in terms of resource use--than to inmates in other classes. This means that separate case types should (1) differ in their mean resource use and (2) have more between group variance than within group variance.

To check for homogeneity of classes, it will be necessary to determine how variance in resource use varies across classes. The Bartlett-Box F is the appropriate statistical test.

To assess intra-group variation, coefficients of variation of each class will be computed to identify groups with high relative intra-group variation. This provides rationale to collapse classes into others (too little within group variance) or to make additional splits (too much within group variance).

Ordinality

The intake screening classes are hypothesized to show a hierarchical ranking. They should rank in the same order when evaluated against actual resource use. To check if the classes rank in an ordinal manner, various components of the composite resource measure will be used to evaluate the hierarchy. Intake class types should predict varying resource use on a consistent basis (e.g. Class 2 "very low risk" types should regularly show lower use than Classes 3 through 7).

Predictive Validity

This test follows evaluation of homogeneity and ranking. It involves the computation of a case-mix index using the resource use measure. Validity will be tested by the ability of the case-mix measure to predict variation in overall cost of care which is expected to vary with changes in case mix. This is

necessary because there is no existing resource measure that can be employed.

In sum, a multi-purpose data collection needs to be designed and implemented in order to enable classification, to test class properties, and to make available more data for use in system refinement. Statistical techniques will evaluate how well classes distinguish relevant resource use patterns and suggest ways in which those groupings might be modified to enhance overall system validity.

Conclusions

There are five general study conclusions regarding the appropriateness of the classification effort, the choice of an episode approach, and further data collection needs.

First, rationale for independent case-mix measurement in the field of corrections health is strengthened by the work of this study. Corrections health care providers share a common measurement challenge in their area of practice: how to account in a useful and meaningful way for inmate care expenditures. A logical approach to this complex problem is to account for provider output by considering the "case mix" of different inmate case

types. A patient classification system (PCS) of different episode types is derived in this study to predict a variety of distinct health service requirements for jail stays. As empirical data continued to be collected throughout the conceptualization of classes, it became increasingly clear that nontraditional features of the setting, population, and the incarceration experience markedly affect episode definition. Specifically, inmate rights, broad and multiple provider objectives, and security protocol guided the conceptualization of output classes. In fact, attributes of inmates and their incarceration experience affected not only how, but if, final episodes could be derived.

Second, the episode approach to classification is most appropriate despite some acknowledged limitations. From a variety of possibilities, the stay-specific episode was selected as the most suitable output unit. After analysis of the strengths and weaknesses of alternatives, the episode seemed to offer the best way to achieve nontautological, relevant and "independent" output measurement for guiding resource allocation decisions. That is, the episode approach makes the fewest measurement

compromises relative to the study purpose. Its selection does carry initial data collection and testing burdens that infer rather slow and more extensive system development efforts than might be associated with adoption of a less highly aggregated measure, e.g., number of problem episodes. However, this burden is associated with very early work on a new measurement challenge that attempts to achieve a high level of system validity and generalizability.

Third, the most immediate need is to understand more about the nature of health status transition during stays of more than 72 hours. Without study of this area, the set of classes cannot be completed. Identification of the patterns associated with health changes may be difficult to establish. Specifically, the issues of data quality and quantity may be difficult to understand given the general anti-social behavior of inmates, their rapid turnover rates in and out of the jail, and limited exposure to health providers during incarceration. It may be difficult to determine who gives correct complete information and who does not, and under what circumstances.

Fourth, the set of seven intake classes are likely to sort inmates in a clinically meaningful way. This

set of classes, representing final output definition for most inmates, has a relatively well-refined set of indicators and decision rules. At face validity, incoming inmates are sorted well into a workable number of categories that credit providers for important prevention activities.

Finally, a comprehensive data collection effort is crucial to establish the validity of the proposed case-mix measure. Multi-purpose data requirements and the number of classes (68) infer the need for an extended data collection period.

Policy Implications

The need for further case-mix development in the field of corrections health is motivated in this study. Existing inpatient systems used in traditional hospital settings are not appropriate for use in jails and prisons where there is a need to measure provider output in terms of broader and sometimes different service dimensions. This study points out the complexity of developing such a measure.

Case-mix development in corrections health can provide a better way to understand, manage, and monitor additional aspects of the inmate health program. This study points out a number of policy implications.

Case-mix measures have potential utility for both administrators and clinicians. Whatever their different clinical and nonclinical information needs, they share a concern about accounting for variation of health needs within the inmate population. Case-mix classification provides a way to deliberately expose and sort inmates by accounting for relevant similarities and differences.

Case mix also provides a way to visualize and manage inmate health care as a production line. Analysis of that production function, in turn, allows evaluation of staff efficiency and program efficacy (utilization review).

Case mix development can provide the basis for an automated, contemporary information system that has both internal and external utility. Alone or merged with another computerized data base, it can provide the county administrators, program administrators, and the taxpayer with information about what the health care dollar is buying and whether or not it might be better used.

Research Implications

Several areas for future research to improve the generalizability and validity of a jail health case-mix system can be identified.

Generalizability of the case-mix scheme to other corrections health settings is desirable. Variables that may affect this system attribute include facility size; geographic location; justice system structure, including staff and physical resources; and type of inmate health care delivery system. Research should focus on the replicability of the episode classes postulated herein for other types of correctional facilities. Although prison populations differ from jail populations in a number of important ways (prison inmates are screened for health problems well in advance of arrival; they are sentenced and have predictable lengths of stay; they have had time to adjust to incarceration, etc.), a global case-mix measure that can be used across and between these settings may be ultimately developed. Before this level of system sophistication is achieved, a number of questions regarding population differences must be addressed. One relevant need is to determine if some facilities have inmates who tend to cluster around the "borders" of the classes.

Regardless of its purpose and intended application, a corrections health case-mix measure should have a high level of validity. In this scheme,

validity depends on accurate prediction of iso-resource groups for the majority of the inmate population over time. This means that physical and mental health assessments have to be accurate and reliable. Research is required to reduce provider subjectivity in clinical assessment and classification. Efforts will be needed to translate clinical impression algorithms in this study into a series of specific objective items which are fed into a computerized decision algorithm to generate a class assignment.

Another research need is to develop an outcomes assessment protocol that will assess how providers are varying significantly in their criteria for classification, e.g., an inappropriate low threshold for inmate hospitalization.

Finally, features of new epidemiologic, diagnostic and treatment methodologies need to be recognized and incorporated into refined or new class definitions to maintain or improve predictability. For example, with substance abuse increasingly common among offenders, over time new classes that distinguish differences within this problem type may be needed. Providers may eventually determine that serum drug assays at intake

are needed to provide service requirements. In this instance, laboratory findings may be classification indicators.

Corrections health case-mix measures are complex to develop, particularly if the aim is to achieve independent measurement of health provider output. Nevertheless, present accounting systems that employ bookings, census, and service visit counts are seriously misspecified. Prospective classification of inmates into health risk classes provides an improved approach to measurement of provider output.

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Appendix A

Multnomah County Jail Facilities

Appendix A

Multnomah County Jail Facilities

As of June 1986, Multnomah County has two full-time jail facilities, a restitution center, and a holding area in the county Court House. The primary facility is the Multnomah County Detention Center (MCDC), with a design capacity for 478 inmates. The Multnomah County Correctional Facility (MCCF) at Troutdale houses 185 inmates. Both run at capacity, or more, every day of the year.

MCDC is the most secure facility. It has a variety of housing options, including protective custody, medical or psychiatric unit housing (10 beds each), and maximum security.

The MCCF facility houses sentenced male prisoners who have "work release" status. MCCF has less stringent security protocols and allows social passes, accepts persons sentenced to serve time on weekends only, and gives job search and work release counseling and support.

An 80-bed Restitution Center opened in 1987. At present it is nearly full. Inmates are allowed to leave the facility to work in the community during the day, but remain under close supervision and return to the facility at night.

The Court House jail houses 60 inmates and currently runs at full capacity.

Six police agencies use Multnomah County correctional facilities: Gresham Police, Multnomah County Sheriff's Office, Portland Police, Port of Portland, Oregon State Police, and Tri-Met. Portland Police arrest more than eighty-percent (80%) of persons booked at MCDC. The facility also temporarily houses prisoners for the US Marshal, Immigration and Naturalization Service, and the Armed Forces.

The majority of sentenced persons are housed at MCCF, but some remain at MCDC for closer supervision. Of total custody days at MCDC, sixty-nine (69%) are used by unsentenced persons, and thirty-one (31%) by those sentenced.

Appendix B

MCDC Corrections Health Program

Appendix B

MCDC Corrections Health Program

The corrections health program in Multnomah County is under the auspices of the Department Of Human Resources. Community public health nurses are employed this Department but are under contract with the Sheriff to provide services in the county's jails.

Nursing staff are primary providers in the jails; they are present 24 hours a day. Other providers staff main MCDC facility on a part-time basis. Inmates who require more than routine monitoring and simple drug regimens are housed at the MCDC facility.

The number and types of MCDC health providers, as well as the number of hours they work at the facility are listed below:

Registered Nurses (25), full-time (40 hours/week)

Registered Nurse (1), part-time (20 hours/week)

Nurse Practitioners (2), (100 hours total service/week)

Physician, internist (1), part-time, (20 hours/week)

Physicians, psychiatric (2), part-time (8 hours total service/week)

Physician, orthopedic (1), part-time, (8 hours/ every other week)

Physician, obstetric/gynecology (2), part-time 4 hours/week)

Dentist, (1), 10 hours/week

MCDC nurses provide 4-6 hours of care each day at both the MCCF and the Court House facilities. Nurses spend an average of 3-4 hours daily at the Restitution Center.

Appendix C

Intake Classification Indicators

Appendix C
Intake Classification Indicators

#1 PRESENCE OF HEALTH PROBLEM (by inmate report)
- (a) Reports no problem
- (b) Yes, reports a problem
- (c) Unwilling or unable to report

Rationale: distinguishes likelihood of need for routine versus nonroutine service.

#2 STATUS OF PROBLEM CONTROL BY MODALITY (by inmate report)
- (a) Reports no problem
- (b) Self-controlled, by monitoring, diet, OTC, other
- (c) Controlled by prescribed medication
- (d) Not controlled
- (e) Unwilling, unable to report

Rationale: distinguishes progressively greater need for nonroutine service, and for a higher provider skill mix to make response to problem

#3 PRIMARY PROBLEM TYPE (by inmate report)
- (a) Reports no problem
- (b) Minor complaint--within routine service tract
- (c) Dental--see dentist only
- (d) Uncomplicated pregnancy--rt.svc. only
- (e) CD, recent exposure
- (f) CD, confirmed disease--tx. is meds, and isolation until not at risk of spreading infection
- (g) NIDDM--diet/oral med control
- (h) Other physical problem (Derm, GU, CV, GI, Musculoskeletal, Respiratory, Metabolic, etc.)
- (i) IDDM--insulin qd, guard alert, BS bid
- (j) Known seizure disorder--maintain med, monitor
- (k) SA--wide variation of manifestation, need, and risk
- (l) Behavioral, previous hospitalization for mental illness
- (m) Behavioral, no previous hospitalization for mental illness
- (n) Unwilling, unable to give information

Rationale: distinguishes problems according to likely sets of service needed. Progression from well defined service packages per problem type, to less well defined problems and increasing risk for wide variation in problem manifestation and rapid deterioration of patient.

#4 *COMORBIDITY (by inmate report)
- (a) No health problem
- (b) Single health problem
- (c) More than one health problem

#5 MOBILITY: (by provider observation)
- (a) Ambulates easily and unassisted
- (b) Enters with aid used on "outside"--cane, wheelchair, crutches or limb prosthesis
- (c) Staggering gait
- (d) Unable to stand alone
- (e) Cannot evaluate

Rationale: distinguishes need to evaluate inmate beyond what he/she reports.

#6 PHYSICAL DISTURBANCE (by provider observation)
- (a) None
- (b) Minor--injury, discomfort, NO head injury, NO ETOH odor on breath
- (c) Moderate--may have ETOH odor/breath, head trauma but with no diminished level of consciousness, jaundice, open or closed wounds that need no suture, no heavy pressure dressing
- (d) Severe--may have heavy bleeding, seizures, incontinence with <LOC, acute respiratory distress, cardiovascular instability, complaint of chest pain, guarding of body part, head trauma with N&V, c/o visual disturbance, clear fluid draining from nose/ears (?CSF), unstable IDDM, peri-arrest self-inflicted injury, or signs of active labor,

Rationale: distinguishes what can likely be handled easily and what cannot, and where it should be handled (on/off site). Types follow progressive need for higher provider skill, and carry greater risk of rapid deterioration.

#7 MENTAL STATUS (by communication with nurse at intake)
(a) Easy, appropriate, complete responses
(b) Incomplete or inappropriate answers, may be unable or unwilling
(c) Unwilling or unable to participate in screening

Rationale: distinguishes routine versus nonroutine need, who needs evaluation (even in the context of no complaint), checks cognition, attitude and speech.

#8 BEHAVIORAL DISTURBANCE (by nurse observation of inmate during booking procedure).
(a) "Appropriate"--follows procedure and officer instructions easily with no verbal or physical resistance
(b) "Uncertain"--follows procedure with some hesitation, may need repetition of instructions, but is not verbally abusive or physically-resistant with officer.
(c) "Inappropriate"--unwilling/unable to cooperate; may be physically or verbally abusive
(d) Did not observe

Rationale: distinguishes who will need further evaluation despite what he or she reports; progressively infers the need to rule out organic problems, to take responsibility for care of inmate and plan follow-up care at time of intake.

#9 INTENTION TO HARM SELF (by provider observation of behavior and physical appearance)
(a) No verbalized intent, no gesture
(b) Stated intention to harm self
(c) Visible self-inflicted injury
(d) No information

Rationale: distinguishes those who have or are likely to hurt themselves. Suicide is no. 1 reason for jail deaths.

#10 SELF HARM GESTURE (not visible by inmate report)
(a) None reported
(b) Reports deliberate intake substance to do self harm

Rationale: distinguishes behavioral features not visible to provider that are very worrisome both in terms of potential to cause rapid physical and/or behavioral deterioration, and cause increased facility and provider liability and high resource use.

#11 INTENTION TO HARM OTHERS (by inmate report)
(a) No verbalized intent, no gesture
(b) Stated intention to harm other(s)
(c) Previous assault during incarceration
(d) No information
Rationale: distinguishes progressive likelihood of assault.

#12 ABILITY TO INTITIATE HEALTH CARE REQUEST
(inmate can be relied upon to follow health care request procedure that is standard for the jail; this is called filing a "MRRF.")
(a) Indicates understanding of request procedure and agrees to ask for care if needed
(b) Same as (a), but gives inappropriate or incomplete responses during screening
(c) Procedure reviewed, inmate gives no indication of understanding or did not agree
(d) Procedure not reviewed
Rationale: distinguishes those inmates who can be relied upon versus those who cannot. Infers the need for more resource use when nurse has to be responsible for follow-up.

#13 *LOCATION OF INMATE PRIOR TO JAIL ENTRY (by police report)
(a) Hospital--data easy to get, likely with inmate at entry
(b) Other penal institution--data exist but harder to get
(c) "Street"--day may/may not exist, hardest to get

#14 *PROVIDER LOCATION (non-dental, by inmate report)
(a) MCDC & external--2 data sources, 1 on site
(b) MCDC only--fewer data but on site
(c) Non MCDC--data even harder to get
(d) Reports no provider--no data
(e) Unwilling to give information
Rationale: distinguishes amount of effort/time to get needed data to confirm existence/current of reported health problem.

#15 *LAST PROVIDER CONTACT (by inmate report)
(a) Very recently
(b) Recently
(c) Not recently
(d) Has not seen provider
(e) Unable, unwilling to report
Rationale: distinguishes relevancy of available data if any, and the need to repeat work up, and the skill level needed to deal with problem.

#16 *MEDICAL REQUEST SOURCE (request for nonroutine service in jail)
(a) Written request by inmate
(b) Guard request
(c) Nurse initiated request
(d) Combination
Rationale: distinguishes group versus personal impact of some problems

#17 *CRIMINAL BEHAVIOR CHARGE (by review of computer card accompanying inmate at time of screening)
(a) Very Light
(b) Light
(c) Heavy
(d) No information
Rationale: distinguishes relevancy of reported/observed health problems relative to the likelihood of needing to respond to a problem

* Not used in intake classification; retained for use as supplements or substitutes.

Appendix D

Derivation of Intake Classes

Appendix D

Decision Rules for Intake Classes

#1 CUT: TO DENY ENTRY OR TO ACCEPT ENTRY

Rule:
TO DENY JAIL ENTRY: 2(d) or 2(e) plus either 6(d), 8(c) or 9(c).

TO DENY MUST HAVE,

[ ] 2(d) Inmate report of health problem not under control

OR:

[ ] 2(e) Inmate unwilling, unable to report problem presence or not

PLUS ONE OF THESE:

[ ] 6(d) "severe" provider-observed physical disturbance

OR

[ ] 8(c) "Inappropriate interaction with officer during booking procedure

OR

[ ] 9(c) Visible self-inflicted injury

Rule:
Accept all those not denied entry.

#2 CUT: DOES THE INCOMING INMATE HAVE A HEALTH PROBLEM?
Rule:
NO PROBLEM: Must have all four: 1(a), 6(a), 8(a) and 7(a)

NO HEALTH PROBLEM MUST HAVE:

[ ] 1(a) Inmate report of no health problem

PLUS

[ ] 6(a) No provider-observed physical disturbance

PLUS

[ ] 8(a) "Appropriate" interaction with officer during booking process

PLUS

[ ] 7(a) Easy, appropriate, complete responses during health screening

Decision Rules (continued)

Rule:
YES, PROBLEM: May have any of the following: 3(b), 8(b), 8(c), 9(c), 9(d), 10(b), 10(c), 12(b), 14(b), 14(c), 16(b) or 16(c).

YES, PROBLEM MUST HAVE:

[ ] 1(b) Inmate reports presence of health problem
OR
[ ] 6(b) "Minor" provider-observed physical disturbance
OR
[ ] 6(c) "Moderate" provider-observed physical disturbance
OR
[ ] 5(c) Has staggering gait
OR
[ ] 5(d) Cannot stand alone
OR
[ ] 8(b) "Limited/uncertain" interaction with officer during booking
OR
[ ] 8(c) "Inappropriate" interaction with officer during booking procedure
OR
[ ] 7(b) Incomplete or inappropriate responses during health screening
OR
[ ] 9(b) Stated intention to harm self
OR
[ ] 9(c) Visible self-inflicted injury
OR
[ ] 11(b) Stated intention to harm others
OR
[ ] 11(c) Previous assault during incarceration

#3 CUT: DOES PROBLEM FALL INTO ROUTINE OR NONROUTINE SERVICE TRACT?

Rule:
ROUTINE TRACT: Either 1(a) or 2(b) and at least one of the following: 3(a), 3(b), 3(c), 3(d), 6(b), 5(a), 8(a), or 12(a).

Decision Rules (continued)

ROUTINE TRACT MUST HAVE:

[ ] 1(a) Inmate reports no health problem
OR
[ ] 2(b) Problem is self controlled
AND
[ ] 3(a) Inmate reports no complaint
OR
[ ] 3(b) Inmate reports minor complaint
OR
[ ] 3(c) Inmate has dental problem
OR
[ ] 3(d) Inmate has uncomplicated pregnancy,
OR
[ ] 6(b) Provider observes "minor injury"
AND
[ ] 5(a) Inmate has normal mobility
AND
[ ] 8(a) Inmate is appropriate during interaction with officer during booking
AND
[ ] 12(a) Inmate understands and agrees to health request procedure

Rule:
ALL Others

NONROUTINE TRACT: Any one of the following: 2(c), 2(d), 2(e), 3(e) through 3(m), 6(c), 5(c), 5(d), 9(c), 12(b), 12(c), 9(b), 9(d), 11(b) or 11(c)

NONROUTINE TRACT MUST HAVE:

[ ] 2(c) Problem control by prescribed med/tx.
OR
[ ] 2(d) Problem not controlled
OR
[ ] 2(e) Inmate unwilling/unable to report
OR
[ ] 3(e)-3(m) See list of problem types
OR
[ ] 6(c) "Moderate" provider-observed physical disturbance
OR
[ ] 5(c) Has staggering gait
OR

Decision Rules (continued)

[ ] 5(d) Cannot stand alone
OR
[ ] 18c) "Inappropriate" interaction with officer during booking procedure
[ ] 12(b) Inappropriate, incomplete responses at health screening
OR
[ ] 12(c) Inmate gives no understanding/no agreement to initiate health care request prn.
OR
[ ] 9(b) Stated intention to harm self
OR
[ ] 9(c) Visible self-inflicted injury
OR
[ ] 11(b) Stated intent to harm others
OR
[ ] 11(c) Previous assault during incarceration

4 CUT: IS INMATE RELIABLE ENOUGH THAT HE/SHE WILL INITIATE NEXT NONROUTINE HEALTH CARE REQUEST?

Rule:
RELIABLE: Must have 8(a) and 12(a) and 7(a)
RELIABLE MUST HAVE ALL THREE;

[ ] 8(a) "Appropriate" interaction with officer during booking procedure
AND
[ ] 12(a) Understands, agrees to initiate request prn
AND
[ ] 7(a) Easy, appropriate, and complete responses during health screening

Rule:
NOT RELIABLE: Any of the following: 8(b), 8(c), 12(b), 12(c), 7(b) or 7(c).

NOT RELIABLE MUST HAVE ONE OF THESE
[ ] 8(b) "Uncertain" interaction with officer during booking
OR
[ ] 8(c) "Inappropriate" interaction with officer during booking
OR
[ ] 12(b) Inappropriate or incomplete responses during health screening

Decision Rules (continued)

OR

[ ] 12(c) Inmate gives no understanding/agreement about initiating health care request

OR

[ ] 7(b) Incomplete or inappropriate answers during health screening

OR

[ ] 7(c) Unwilling or unable to participate in screening

5 CUT: DOES THE INMATE REQUIRE SPECIAL HOUSING FOR HEALTH STATUS?
Rule:
REQUIRES SPECIAL HOUSING: either 3(e) OR 3(f)

SPECIAL HOUSING MUST HAVE:

[ ] 3(e) recent exposure to communicable disease

OR

[ ] 3(f) confirmed communicable disease by inmate report

OR

[ ] 9(b) stated intention to harm self

OR

[ ] 9(c) visible self-inflicted injury

OR

[ ] 10(b) reports deliberate intake of substance to do self harm

OR

[ ] 11(b) stated intention to harm others

OR

[ ] 11(c) previous physical assault during incarceration

Case Types Produced by Five Splits

Type 1: Deny entry
Type 2: No problem, routine service tract, reliable, in unrestricted housing
Type 3: Has problem, routine service tract, reliable, in unrestricted housing
Type 4: Has problem, non routine service tract, reliable, in unrestricted housing
Type 5: Has problem, non routine service tract, reliable, in unrestricted housing
Type 6: Has problem, non routine service tract, not reliable, in special housing
Type 7: Has problem, nonroutine service tract, not reliable, in special housing

AN ABSTRACT OF THE THESIS OF

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For the degree of MASTER OF SCIENCE

Date of receiving this degree: June 10, 1988

Title: CASE-MIX CLASSIFICATION FOR CORRECTIONS HEALTH: AN EPISODE APPROACH

APPROVED: [redacted]

Mark C. Hornbrook, PhD, Thesis Advisor

This study provides the conceptual foundation for a case-mix classification system for use in corrections health. The system defines output of jail health providers and is a useful guide for jail administrators in the distribution of limited inmate health care resources.

An economic approach guides the conceptualization of output. A stay-specific episode of health care management is the fundamental output unit. The episode has a number of advantages that overcome information deficiencies typical of jail reporting systems.

Five intermediate outputs are defined: intake screening; monitoring, reassurance, continued access; reassessment; problem management; and advanced case management/coordination. These provide the foundation for definition of seven (7) intake screening classes and sixty-one (61) preliminary episode classes.

The ultimate goal is to derive a complete, integrated classification system that is a global output measure. At this point in system development, conceptual gaps hinder direct derivation of the completed set. The nature of these gaps is identified, and a data collection plan presented that will enable completion of the class definitions. Statistical testing techniques that can be used to evaluate how well the final set of classes meet structural and design criteria are discussed.