PEDIATRICS AND INTERNAL MEDICINE RESIDENCY TRAINING AT MICHIGAN STATE UNIVERSITY: A PATIENT FLOW STUDY

By

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ABSTRACT

PEDIATRICS AND INTERNAL MEDICINE RESIDENCY TRAINING AT MICHIGAN STATE UNIVERSITY A PATIENT FLOW STUDY

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The present research describes patient flow at Michigan State University's Clinical Center during Pediatrics and Internal Medicine residency training. The more comprehensive understanding gained of the appointment process serves the primary purpose of maximizing fixed resources. Subsequently, the study's findings directly and indirectly improve the administration of the facility, meliorate the quality of residency training and provide patients with more efficient service.

Incorporating Queuing Theory principles into a time study during clinic hours provides the data necessary to explore patient flow. The resulting 287 patient cases are then analyzed through four statistical measures: (1) patient flow diagrams describing the various patient paths traveled; (2) relative frequency histograms illustrating each of the informational, service, wait and summary time variables' variability; (3) correlational matrixes showing the

variables' strength of association; (4) absolute facility utilization percentages by examination room and by day of the week.

Analysis of the patient flow at Michigan State's Clinical Center suggests that the module wait time has the strongest correlation to the total appointment time. The total wait and module service times closely follow with equal r score values.

More detailed analysis reveals that Wait 3 or the primary time a patient spends in the waiting room has a significantly higher correlation to the summary time variable than any of the other eight possible wait variables or waiting periods within the appointment process. The waiting period between the first service stop and the second service stop or Wait 4 has the second strongest correlation. Therefore, increasing the number of patients flowing through the Clinic, thereby maximizing present fixed resources, requires a reduction of the total wait time spent in all the waiting periods. Consideration should focus, however, on Wait 3 and Wait 4 due to the significantly higher correlational strength exhibited.

The total wait variable is identical to the module wait variable except for the inclusion of Wait 1 or registration time. The addition of Wait 1 to the module wait variable only slightly weakens the module wait variable's strength to the total appointment time. Consequently, the major findings for the total wait variable are very similar

to module wait findings. The major difference is that all the correlations are slightly weaker.

Analyzing the six service variables (vitals, primary examination, attending re-examination, final instructions, test and/or immunizations, and lab work and/or x-rays) which comprise the module service time variable indicates that the service time required for the primary examination represents the service stop which has the strongest correlational strength to the module service variable. Therefore, like the waiting room time, investigation should first center upon reducing the primary examination time while maintaining quality service. The service time for lab work and/or x-rays followed by the service time for the attending re-examination represents the next two most significant service times.

When service and wait times are simultaneously correlated to the total appointment time variable, the stronger correlations indicate those overall variables which have the greatest potential for improving patient flow. The ranking of the six most significant variables are as follows: (1) Wait 3 (waiting room); (2) primary examination; (3) lab work and/or x-rays; (4) attending re-examination; (5) Wait 5 (the waiting period between the second and third service stops, regardless of the service rendered); (6-tie) Wait 4 (the waiting period between the first and second service stop, regardless of the service rendered); (6-tie) Wait 6 (the waiting period between the third and fourth service

stop, regardless of the service rendered). Time reduction for the above mentioned variables in the order listed increases the probability of maximizing fixed Clinical Center resources.

The study also reveals that fixed resources may be significantly maximized by increasing the number of patients who visit the Clinic in a set time period. Analysis reveals that examination rooms are in use only 48 percent to 1 percent of the available time. Thus, reducing appointment service and waiting times where appropriate has limited value if the facility and its resources sit idle for over 50 percent of the time. The Clinical Center, therefore, must consider increasing facility utilization along reducing of wait and service times.

To my parents

Irma and Robert

in appreciation of their continual

love and support

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CHAPTER I

THE PROBLEM

Introduction

The health care system combines certain configurations of organizations and human resources to meet the "direct responsibility of health and disease care" (Parker, 1974, p. 18). Within the system each "subgrouping" concerns itself with more specific areas. Personal health care represents the most visible subgrouping by providing services that help "an individual in the context of his family and community keep healthy, get well, or learn to live with a disability" (Parker, 1974, p. 18). Personal health care further breaks down into five "subsystems": medical care, dental care, mental health services, optometry and podiatry (Parker, 1974).

Primary care is one of three functional levels within personal health care; secondary and tertiary care embody the two remaining levels:

1. primary level--where the health care system is entered and basic services received and where all health services are mobilized and coordinated.

2. secondary level--is represented by ambulatory services of a specialist nature and inpatient services provided in a community hospital-type facility.
3. tertiary level--includes the highly complex and sophisticated services available only at a 'medical center' (Parker, 1974, p. 18).

Primary care is characterized by its general or broad focus, in contrast, to the specialized or narrow focus of secondary and tertiary care. Consequently, the primary care physician often is referred to as a generalist; the secondary care physician as a specialist and the tertiary care physician as a sub or super specialist. The primary care physician, however, is usually more specifically referred to as an internist, pediatrician, family physician or obstetrician.

Primary care is distinguished from secondary and tertiary care in that the primary care physician not only deals with sickness or disease, but also assists patients and their families in normal development. The distinction necessitates longitudinal and referral responsibilities. Thus, the primary care physician maintains contact with patients in health and acts, when necessary, as an intergrationist during sickness. For example, depending on the problem encountered, the patient may be referred to a psychiatrist, social worker or specialist. The patient, however, still maintains contact with his/her respective

primary care physician during and after the referral process. In summary, the primary care physician not only oversees the curing of illness, but also helps individuals with disabilities or assists individuals in maintaining their health.

Dr. Harold B. Wise (1975) presents the following illustration which highlights primary care's distinguishing characteristic:

> If a person's heart stops, students learn there is a technology to deal with this: an army of white-coated residents decends on the patients and, through horn-rimmed glasses, stare at the electrocardiogram tracings making serpentine movements through the I.V. fluid spilled onto the floor. Here the disease model is useful and the metaphor of the magic buller (that is, the resuscitation team as the "injection") provides a framework for an energetic response.
>
> But the disease model is of limited use, as evidence by a decreasing interest in the patient on the part of the house staff as the heartbeat returns to normal. After the third week, only the intern shows up at morning rounds to see the patient. At this point, instead of dealing with a cardiac arrest, house staff faces a person with a damaged heart who must learn to live with incredible life changes. And for this situation members of the house staff have very few answers. Many members of the house staff see their role as limited to writing discharge orders with enough digitalis, diuretics, and sedatives. The problems the family faces--a husband and father suddenly dependent, a wife who may have to become the major income-producer, and children who may face the prospect of moving into their late adolescence without a functioning father--are left to the family physician (if any). Or they are left to the physician working in the outpatient clinic who also may lack training in family dynamics and human intervention skills. At this point, the disease model proves inadequate for the primary care practitioners (pp. 61-62).

The actual delivery of primary care services usually occurs in one or a combination of the following modes: comprehensive health care programs [health centers developed under the Office of Equal Opportunity (OEO) or the Department of Health, Education and Welfare (HEW)]; prepaid group practices or the Health Maintenance Organization (HMO); private physicians' offices; and outpatient departments in hospitals, clinics or emergency rooms.

Investigating patient flow in an ambulatory setting, such as Michigan State University's Clinical Center, reveals certain unique aspects or contingencies which exist within the health care environment: general organization, physician identity, governance structure, health care team, economics, accessibility/availability and patient flow. These contingencies directly affect the delivery of primary care. For example, consider the complicated interplay of factors which reinforce a physician's identity: "the medical personality, how physicians are socialized and what society expects of physicians" (Weisbord, 1976, p. 13). Consider also the physician's self-concept "which is built primarily on the technical expertise required to diagnosis and treat disease coupled with the mental toughness necessary to make life and death decisions" (Weisbord, 1976, p. 13). Briefly, the physician's identity "evolves from his self-concept and from the public recognition of professional credentials which confer status and a sense of self worth" (Weisbord, 1976, p. 13). The physician's identity and the resultant

consequences it manifests, affects the medical profession in general and creates additional hurdles for primary care administrators and physicians. Understanding the identity contingency in greater detail assists an administrator in devising a more efficient and effective means of primary care delivery.

Each contingency molds and shapes the delivery of primary care in a different way. Understanding the impact of the various aspects which affect the administration of primary care, increases the probability of making planned positive improvements.

Studying patient flow during pediatric and internal medicine residency training at Michigan State's Clinical Center also necessitates consideration of another important factor: graduate medical education, the final stage in preparing a physician to practice primary care medicine. Graduate education in primary care is a recent phenomenon. In the 1950s, graduate medical education emphasized the training of specialists for the 1970s and 1980s. "Today's task for medical education is preparing physicians to practice primary care in the year 2000 and beyond" (Boufford, 1977, p. 359). As a result, primary care training is still in the evolving stage. No nationally accepted model exists "to prepare physicians to assume both the independent and collaborative roles required in primary care service" (Hudson and Gialalone, 1975, p. 215) coupled with the

acquisition of the necessary technical knowledge. This situation is a sharp contrast to the established specialty training programs.

A major part of the difficulty is the profession's lack of consensus on how primary care should be practiced (Joel, 1975, p. 123). Therefore, an urgent need exists "to clarify goals and rationale for promoting primary care programs" (Hudson and Gialalone, 1975, p. 123). Residency training may then develop clearer and more responsive objectives rather than borrow so heavily from specialty training. More effective and efficient patient flow within a residency program not only improves a part of the educational value of the residency program, but also perfects the delivery of primary care services to patients. In this fashion, primary care training can develop independently to meet the specific needs of its population.

As taxpayers and legislators continue to place educational programs under closer scrutiny and inflation remains on the rampage, the educational, technical, and political ramifications of residency training in primary care will demand further investigation and study. For "as matters of public health become issues of public policy, each professional group will need to assess its own particular function in the over all provision of health services to our modern society" (Bergman, Dussel, & Wedgewood, 1966, p. 263). A published symposium, Primary Care: Where

Medicine Fails (1973), the Institute on Primary Care (1974), the Association of American Medical College's (AAMC) primary care surveys (1973 & 1976) and federal dollars and programs support the recent interest and concern for primary care training.

The brief overview of primary care, its relevant administrative contingencies and the state of its residency programs, put the remaining portion of Chapter I into clear perspective. The Chapter continues with the purpose of the study and a statement of the problem. Then the study's significance and anticipated limitations/delimitations are discussed. After defining pregnant terms, Chapter I concludes with the study's organization.

Purpose of the Study

Describing patient flow or how medical services are sequentially provided to patients who wait in line at Michigan State University's Clinical Center during Pediatrics and Internal Medicine Residency Training is the general purpose of the study. A time study incorporating Queuing Theory principles serves as the means by which to analyze patient flow.

The specific purpose for studying patient flow at the Clinical Center is to maximize current resources. Due to the high fixed costs, e.g., professional salaries, sophisticated equipment, and capital outlay, the improvement of patient flow is especially important. If patient flow

through the system is maximized for a given fixed cost, the organization stands to benefit through extending its services to a larger population. Increasing the number of patients served not only enables the medical profession to better meet its service to society, but also increases the organization's spendable income. Patients also benefit by encountering a more time efficient and subsequently more available service. Because of the prevalence in the United States of "third party" payers for medical expenses, this factor holds particular significance. Patients are not directly paying for medical services. Thus, in most instances, the major cost to the patient shifts from dollars spent to time expended.

Michigan State's Clinical Center is also the setting for pediatrics and internal medical residency training. An improvement of patient flow directly and indirectly affects the residency experience through the residents daily encounter with patients. The conscious and subconscious learning occurring during residency training certainly expands if such learning occurs in a well administered Clinic. Highlighting facility administration also represents a current trend in primary care residency training. Thus, a patient flow study at Michigan State University's Clinical Center during Pediatric and Internal Medicine Residency Training:

1. Improves the administration of the medical facility.

2. Meliorates the quality of the residency training.
3. Provides the patients visiting the Clinic efficient and effective service.

Significance of the Study

To fully understand the importance of a patient flow study at Michigan State's Clinical Center requires the examination of four distinct areas. First, the present status of primary care needs highlighting. Second and third, an explanation of the educational and administrative values of the study requires investigation. Lastly, the study's importance to the researcher is considered

Examining the delivery of medical care reveals the existence of forces which are presently exerting pressure to change medical care's delivery system. First, the population on the average is becoming better educated, more affluent and, very importantly, older. O'Connor (1978) states that in 1940, 6.8 percent or 9.036 million Americans were "older" compared to 9.9 percent or 21.127 million persons in 1975; an increase of 134 percent (p. 267). Older persons also "tend to have more chronic and degenerative illness for which there is no cure" (O'Connor, 1978, p. 267); thereby requiring more long-term "custodial care"; a function, according to the literature, not performed by the country's excessive supply of specialists. Another factor to consider is payment for medical care. The source of payment has shifted primarily to "third-party" payers.

Sumers (1971) estimates that in 1970 "approximately 80 percent of the total population under 65 is covered by some form of health insurance policy" (p. 46). To be considered along with the source of payment is the magnitude of the health care industry as reflected by the actual cost of payment to the consumer. "Medical care has become the third largest industry in the United States" (Bowen and Jeffers, 1971, p. 4). Medical health care expenditures in 1975 amounted to over 8 percent of the Gross National Product or 119 billion dollars in the 1975 fiscal year (O'Connor, 1978). In contrast, only 12 billion dollars were spent on health care in 1950 (O'Connor, 1978). Certainly, the American people have demonstrated their increased support and dependence upon the medical profession.

Presently serious inquiry exists as to whether or not the health care industry is appropriately meeting the people's needs. Are there too many specialists and not enough primary care physicians? More and more people are feeling this is the case. Rogers (1975) expressed the following sentiment:

> We largely ignored an increasing number of signals from many sectors that our physician products were not satisfactorily meeting the real or perceived medical needs of the nation. What people wanted from their physicians and other health professionals was more help in coping with their day-to-day health problems of a less catastrophic nature than those which preoccupied us and we failed to heed this message (p. 171).

The abundance of specialists in the 1970s originated in the 1950s when specialty training was encouraged

(Boufford, 1977). The following reasons and incentives prompted the future specialists: (1) the rapidly expanding body of knowledge in the medical field made it easier to become an expert in a comparatively narrow area than in a broad one; (2) the increased professional satisfaction felt in having detailed knowledge and bringing it to bear on clinical problems, as opposed to having comparatively superficial knowledge; (3) a promise of greater financial rewards; (4) the greater satisfaction experienced by having two certificates hanging on the wall; (5) an expectation that government would set greater financial premiums on subspecialty medicine, rather than general medicine; (6) the extraordinary prestige, administrative organization, and financial resources of the specialty divisions in departments of medicine. Little wonder when generalists realized they could double their income, have more leisure time and enjoy more prestige, the shift from primary care to specialization occurred (Peterdorf, 1975, p. 10). As a result, only 38 percent of today's physicians are involved in primary care in contrast to 94 percent in 1931 (Roark, 1978, p. 13).

The nation's need for primary care services is real. The actions of the federal government and private foundations support this fact. The government and private foundations are:

> channeling massive resources into program development for medical students and especially graduate level training in primary care. There is also substantial governmental pressure to increase the number of primary care physicians produced and their location in

> underserved areas. Recent legislation mandates that 50 percent of the residency positions be offered in primary care specialties--pediatrics, internal medicine and family practice--by 1980 (Boufford, 1977, p. 359).

Thus, medical training--graduate medical training in particular--acts as a catalyst for changing the nation's medical delivery emphasis to better meet current and future health care needs.

Due to the emerging state of graduate medical education in primary care, further study and analysis is mandatory. A patient flow study conducted during residency training for pediatrics and internal medicine at Michigan State University's Clinical Center provides meaningful research into a timely, important area that touches almost every American physically or monetarily at one time or another. More efficient and effective patient flow service at the Clinical Center not only enhances the service and satisfaction of those patients visiting the Clinic, but also serves as an implicit and explicit educational experience to all residents. Such educational experience is especially pertinent to primary care training due to the present need for primary care physicians, the large number of primary care patients in need of services and the current emphasis placed on understanding and improving administration and administrative communications in primary care. For as Ferns (1975) says, " . . . we will be required to offer evidence that primary care medicine is prepared to develop efficient patterns of delivering medical care--patterns

that are designed to meet the needs and demands of patients, that are not wasteful of scarce resources and that help contain inflationary pressures" (p. 21).

The researcher also feels that conducting a patient flow study in primary care has professional significance. First, a time study analysis lends itself to any administrative area where the service of people may result in the forming queues. Recognizing the importance of improvement or change in any area, the researcher also is interested in how the advocates of primary care services are attempting to gain political, administrative and educational acceptance in the medical care industry. Parallels and insights, once again, may be applied to other fields. Therefore, a patient flow study of pediatric and internal medicine training at Michigan State University offers the medical profession, the Clinical Center at Michigan State and the researcher significant insights.

Statement of the Problem

Based upon an interdisciplinary team's six years of research on a project entitled "The Design and the Evaluation of Outpatient Systems" (Rising, 1977). The discussion which follows clarifies and brings the problems to be investigated into sharper focus.

The first step in improving patient flow is to gain an understanding of exactly how patient's flow through the facility. Observing the various service stops encountered by patients visiting the Clinic establishes the basic framework. At the Clinical Center six possible service stops comprise a service sequence: vital signs; primary examination by the primary physician (in most cases the primary physician is a resident); re-examination by an attending; final instructions; tests and/or immunizations; and lab work and/or X-rays. In order to gain a thorough understanding of patient flow, identification of the various combinations of service stops experienced by patients is necessary. For example, answers to the following questions deserve attention: When in the service sequence are tests administered? What is the most commonly travelled service sequence? A time study and the construction of a patient flow diagram from the data generated answers such questions and others by identifying exactly how patients flow through the facility.

To maximize current Clinical Center resources, the next step is to determine how long patients spend in the Clinic. A break down of the length of time expended by patients in the six possible service stops and a time break down for the waits endured by the patients to receive services identifies possible patient flow problem areas. Also important is a determination of the percent utilization

of the facility. Graphs illustrating the relative frequency of the appropriate variables mentioned above describe more in depth how patients flow through the Clinic.

The final query is to identify if any correlations exist between variables: informational, service, wait or summary time. For example, does the amount of time spent in the waiting room correlate with how early or late the patient arrives for his/her appointment; does the length of time spent in a service stop correlate with only the service and summary time variables or does service time also correlate with the wait variables.

Analyzing the above mentioned specific problem areas permits the researcher to operationalize the study's purpose. Therefore, the implementation of specific recommendations could maximize the Clinical Center's current resources by improving the Clinic's administration, meliorating pediatric and internal medicine residency training's quality and providing patients visiting Michigan State University's Clinical Center with more efficient and effective service.

Anticipated Limitations and Delimitations of the Study

In studying patient flow at Michigan State University's Clinical Center certain limitations and delimitations exist. Recognition of limiting factors identify possible weaknesses within the study's design, thereby delineating

the finding's confidence. Identification of research delimitations builds the parameters to which the study's findings are applicable. Therefore, the acknowledgment of limitations and delimitations is necessary to qualify the study's purpose and results.

The patient flow study contains two valid limitations, both of which could be interrelated. First, in order to collect data, the researcher relies upon the Clinical Center staff to promptly punch time sheets. Other than through verbal pleas, the staff's promptness cannot be guaranteed. Also, within the timing process a small interval of patient wait time is not measured and instead is counted as patient service time. This limitation occurs because three time clocks are strategically located within the appointment module, rather having a time clock located at every precise place where time sheet punching may occur. For example, the physician must walk to the nurse's station from the examination room before she/he can punch "Primary Examination-OUT" on the provided time sheet.

The second general limitation centers entirely on the behavior of the Clinical Center staff members and the degree to which the individual's regular behavior changes due to his/her active participation in a study. This phenomenon is referred to as the "Hawthrone effect." According to studies conducted at the Hawthrone Plant of the Western Electric Company, "if an individual is aware that she/he is participating in an experiment, this knowledge may alter

his performance and therefore invalidate the experiment" (Borg and Gall, 1971, p. 105). Thus, increased performance levels on the part of the medical staff may result as a consequence of the acknowledgment that they are being observed with interest and their specific inputs are being taken into consideration (Huse and Bowditch, 1973).

The delimitations of the research study are two-fold. The population primarily consists of pediatrics and internal medicine patients examined and treated at Michigan State's Clinical Center and the attendings, residents, registered nurses and receptionists serving these patients. Thus, the scope of the study is restricted to the unique residency training program for pediatrics and internal medicine at the College of Human Medicine, Michigan State University. Therefore, only two of the three principle residencies for primary care--family practice being the third--are considered in tandem as part of an unique residency training program.

The second delimitation considers the sample. The study is drawn by conducting the time study during nineteen consecutive half-day clinic sessions. However, Wednesdays are excluded and for each day either a morning or an afternoon Clinic session is sampled; the morning and afternoon schedules do alternate on each day's second, third and fourth timing. Thus, like the population, the study's scope is somewhat restricted.

Definition of Terms

Throughout the study the following key words or phrases appear with regularity. So that consistency of interpretation exists, each term is defined or qualified.

Attending--an individual licensed to practice medicine; also referred to as a provider; in the case of this study, attendings are licensed in either internal medicine or pediatrics

Encounter--a patient's medical appointment or visit to a clinic or outpatient facility

Graduate Medical Education in Primary Care--a three year period of residency training, usually following graduation from medical school; internships where applicable are also considered a part of graduate medical education

Internal Medicine--a branch of medical practice that deals with the diagnosis, treatment and care of non-surgical diseases and/or family problems in a continual comprehensive and personal manner

Patient Flow--the process of bringing together the patient and the appropriate provider within the proper environment

Patient Flow Diagram--a graphic representation of patient flow in a clinic, hospital or outpatient facility

Patient Flow Study--the analysis of bringing together the patient and the appropriate provider within the proper environment through the application of Queuing Theory

Pediatrics--a branch of medical practice that deals with the development, care, and diseases of children in a continual, comprehensive and personal manner

Queue--a waiting line formed by a patient or patients due to the facility's inability to provide the patient immediate service

Queuing Theory--a method of analyzing waiting line problems through consideration of service times, waiting time and the percentage of facility usage

Resident--a physician serving a period of advanced medical training under the supervision and guidance of an attending

Organization of the Study

The researcher's dissertation analyzes patient flow during residency training for internal medicine and pediatrics at Michigan State University's Clinical Center in order to maximize fixed resources. The study is organized into five chapters which discuss pertinent aspects pertaining to the research project.

Chapter I presents an overview of the research study's problem. A brief introduction acquaints the reader with primary care, relevant administrative contingencies in primary care and the state of primary care's graduate medical education. The specific purpose of the study and a statement of the problem follows. The chapter continues by relating the study's significance, limitations and delimitations and by defining frequently used terms. A section discussing the study's organization concludes Chapter I.

Chapter II reviews related literature in conducting a patient flow study at Michigan State's Clinical Center. Primary Care is first defined. The next section examines contingencies which affect the administration of primary care: general administration, physician identify, governance

structures, economic considerations, the health care team, availability and accessibility and patient flow. The final section discusses graduate medical education in primary care: its goals and objectives, the basic mechanisms for education intervention and its future.

Chapter III explains the research study's methodology and research design. After defining the study's population, a description of the research instrument follows. A discussion then relates the equipment/facilities utilized, the orientation program and the data collection and processing procedures implemented. A presentation of how the collected data is analyzed--patient flow diagram, relative frequency histograms, Pearson Product-Moment Correlation, absolute facility utilization--concludes Chapter III.

Chapter IV reveals the results of the procedures employed to analyze the collected data. First, the patient flow diagrams are described. The chapter ends with a presentation of relative frequency histograms for pertinent observed variables, correlational matrixes showing Pearson Product-Moment correlations and graphics/charts showing absolute facility utilization.

Chapter V integrates the research by presenting the generated results in relation to the purpose of the study. The major findings, practical implications and/or recommendations for each of the four summary variables are discussed first: module wait, total wait, module service

and total appointment time. Then, a break down for pertinent wait, service and informational variables follows. The summary or final section briefly recapitulates the study's major findings, subsequent implications and/or recommendations in order to show how and where Michigan State's Clinical Center may maximize fixed resources.

Chapter VI suggests directions for future research. Limitations found in the study and their implication for future studies are first described. The chapter and the study concludes with recommendations for future research.

CHAPTER II

RELATED LITERATURE

Introduction

The related literature chapter examines revelant aspects relating to patient flow at Michigan State University's Clinical Center. Primary care is first defined and its distinguishing characteristics are then identified. After understanding the broad focus of primary care, a discussion follows which points out contingencies within the primary care environment which affect administration. This section examines such topical areas as general administration, physician identity, governance structures, economic considerations, the health care team, availability and accessibility and patient flow. In order to put the study into a timely organizational mode, a general commentary on graduate medical education in primary care concludes the chapter: goals and objectives, the two basic mechanisms for educational intervention and the future. Therefore, the related literature chapter presents primary care and the relevant contingencies identified through the literature which influence its delivery. An awareness of these contingencies when formulating, conducting and analyzing a

patient flow study increases the probability of positively impacting the delivery of primary care at Michigan State's Clinical Center.

What is Primary Care

The health care system combines certain configurations of organizations and human resources to meet the "direct responsibility of health and disease care" (Parker, 1974, p. 18). Each assigned responsibility and its subsequent task objective comprises a "subgroup" within the health care system. Each "subgrouping" focuses upon various concerns, for example, activities that protect people from unavoidable hazards in their environment, activities that consider the community as a whole, and activities that center upon planning. Personal health care, the most visible "subgrouping," provides "services that help an individual keep healthy, get well or learn to live with a disability" (Parker, 1974, p. 18).

The personal health care "subgrouping" further breaks down into five "subsystems": dental care, medical care, mental health services, optometry and podiatry. Each "subsystem" contributes its respective functional expertise to personal health care (Parker, 1974).

Very generally, primary care represents the first or most fundamental of the three functional levels within personal health care. Secondary care and tertiary care embody the two remaining levels.

More specifically, the following quoted or paraphrased definitions present a precise picture of how primary care is defined in the literature:

1. The first contact medicine which assumes longitudinal responsibility for the patient regardless of the presence or absence of disease and where the provider functions as an 'integrationist' of health care for the patient (Alpert and Charney, 1973).

2. "The first contact care . . . ; a contact for longitudinal responsibility between a patient and a doctor even in the absense of disease . . . ; an integration for the patient of all aspects of health care . . ." (Haggerty, 1974, p. 840).

3. Primary care must accomplish four tasks: "(a) serve as an entry, screening and routing (referral) point for the rest of the personal health care system; (b) provide a full range of the basic health services necessary to preserve health, prevent disease, and care for the common illnesses and disabilities of client populations and provide the services necessary to ensure utilization; (c) provide the stabilizing human support needed by patients and their families in times of trouble or crisis around health related conditions; (d) assume responsibility for the continuing management and coordination of personal health care services throughout the entire care process . . . These tasks are accomplished through interventive/direct services, enabling services or formative/indirect services" (Parker, 1974, p. 25).

4. A primary care physician can be defined as one who: "(a) is the physician of first contact for the patient; (b) makes the initial assessment and attempts to solve as many of the patient's problems as possible; (c) coordinates the remainder of the health care team including ancillary health personnel as well as consultants that are necessary in dealing with the patient's problem; (d) provides continued contact with the patient and often his/her family; (e) acts as the patient's adviser and confident; (f) assumes continued responsibility for his/her care" (Petersdorf, 1975, p. 5).

5. A primary care physician "knows us as individuals; sees us when necessary on a drop-in basis; has no great urge to send us to the hospital and brings

> both personnel support and scientifically based medical expertise to bear on our medical problems" (Rogers, 1975, p. 172).

A major distinction consistently alluded to in the literature between primary care and secondary/tertiary care centers upon the focus of the three levels. Primary care has a generalistic or broad focus while secondary and tertiary care is characterized by a specialist or narrow focus. Often times the literature refers to the primary care physician as a generalist; the secondary care physician as a specialist; and the tertiary care physician as a sub or super specialist.

Another unique aspect of primary care consistently stressed in the literature is the requirement that the primary care physician function deals not only with disease, but also assists patients and families in their normal development (Kowalewski, 1975). This distinction implies longitudinal and referral responsibilities. In this sense the primary care physician maintains contact with the patient in sickness and in health and acts when necessary as an "intergrationist" (Alpert and Charney, 1973). For example, certain potential programs or diagnosed problems by the physician may be better handled by another professional, such as a psychiatrist or a social worker. For as Kowalewski (1975) points out, a crisis may be predictable, and if predicted, the resulting saved energies may be turned into positive channels for growth rather than channels focused on combating illness.

Another important aspect of primary care is the physician's referral of patients to specialists. Referrals are dependent upon the nature/extent of the disease and the expertise of the primary care physician. After the secondary or tertiary treatment is completed, the patient then returns to his/her primary care physician. Thus, the patient's relationship with the primary physician contains the following three requirements: (1) comprehensive; (2) continuing; (3) personal (Evans, 1975, p. 53).

Usually the primary care physician (also referred to as provider, attending or practitioner) is an internist, pediatrician, obstetrician, general practitioner or family physician. The field of family practice (the family physician) was "established in 1969 to attract more students into primary care, both by raising the status of the physicians' engaged in this type of practice and by providing more and better training opportunities for students interested in primary care" (Steven, 1971, p. 99).

The primary care physicians' services are usually delivered in one or a combination of the following organizational modes: comprehensive health care programs (health centers developed under the Office of Equal Opportunity (OEO) or the Department of Health, Education and Welfare Department (HEW); prepaid group practices or the Health Maintenance Organization (HMO); private physicians (private practice); outpatient departments in hospitals; clinics; or emergency rooms.

In summary,

> the future primary care physician must develop the broadened clinical perspective that views health and illness as points on a continuum. The dynamic equilibrium of this continuum can be thrown out of balance at any given moment by the complex interaction of multiple influences--a germ, a drug, an accident, an environmental hazard, emotional stress, family disequilibrium or the life stage of the individual. We must begin to reassess our definition of illness looking at points of stress as potential times for rebuilding and individual growth. We must define the physician's role in health as well as in illness and explore means for promoting greater self-actualization for the patient and practitioner. The primary care educator and researcher must work to delineate the appropriate focus in each of these areas" (Boufford, 1977, p. 359).

Contingencies Within the Primary Care Environment Which Affect Administration

In order to more fully understand the specific contribution of a patient flow study in an ambulatory setting, a general foundation must be laid. Certain unique aspects or contingencies exist within the health care environment which affect the administration of primary care.

A discussion follows identifying and explaining these contingencies: general organization, physician identity, governance structure, health care team, economics, accessibility/availability and patient flow. Some of the aspects, such as general organization, pertain more to the medical care "subsystem" at large. While the health care team, availability/acceptability and patient flow contingencies zero in more specifically on a primary care level and its attempts to provide better services for the ambulatory population.

General Organization

The literature suggests that primary care delivery has a general service mission. The patient receives a preventative, curative, rehabilitative service from the medical profession in exchange for some type of payment.

A similar service mission also exists in business. Organizational differences, however, exist between medicine and business. Not until recently were these differences and their implications appearing with any frequency in the literature. Most of the literature, even during the last two years, does not deal extensively with the organizational area. Studies tend to center primarily around nurses and their function within the system. For example, in a review of 1,303 hospital studies from 1960-1970, Georgopoulos (1978) reports that: (1) virtually no studies deal with goals; (2) only 1.9 percent of the studies focus on institutional reward structures; (3) experimentation with other than bureaucratic management structures is nearly nonexistent; (4) nursing studies far exceed those of any other group.

Behavioral scientists, however, are now studying delivery of primary care with a broadened base of inquiry. As a result, physicians and their unique contributions to administration coupled with other administrative concerns are surfacing in the literature, especially in medical education. Thus, by generally understanding the health care model and by contrasting medicine against business,

the current status of medicine's unusual organizational structure becomes evident.

Applying systems thinking and a contingency approach, the health care organizational model rests on a premise that organizational performance or output is a function of the characteristics of each component within the model and the way in which each of these components interrelates and fits into a functioning system. Carrying this thinking further, the health care model may then be divided into five general components: (1) "mission, strategy, objectives"; (2) "sociotechnical arrangements"; (3) "organizational processes"; (4) "people"; and (5) "emergent networks" (Tichy, 1978, p. 306). From the interaction of all these components, a dynamic interplay takes place between the organization and its environment. Also, dynamic and often times multiple interdependencies form between the various components of the organization (Khadwalla, 1977). In this fashion medical care reaches the population.

Weisbord (1976) contends that "medical centers, unlike industrial firms, have coordination problems not subject to rationalization, even by state-of-the-art administrative practice (p. 10). For this reason an organizational development (OD) approach often falls short of its intended outcome. In other words, "an interplay of values and technologies" through a belief in "the open sharing of valid information, the virtues of task interdependence for productivity and job satisfaction, and the

use of planned methods to promote participative organizational problem solving" may not completely "improve the fit between the individual and organization goals" (Weisbord, 1976, p. 18).

The main reason for the poor fit between the individual and organizational goals rests primarily with the fact that (1) "medical centers have few of the formal characteristics of industrial firms where organizational development, like all management science, was first recognized"; (2) "physicians and scientists are socialized to a form of rational, autonomous, specialized, expert behavior, which is antithetical to the organization of any but the most narrow individualized pursuits"; and (3) "medical centers, therefore, require three different social systems, not one, as in industry" (Weisbord, 1976, p. 18). The links between "the task system which administrators manage, the identity system which undergrids professional status, and the governance system which sets standards are extremely tenuous" (Weisbord, 1976, p. 18).

Weisbord (1976) further elaborates in his frequently quoted article, "Why Organizational Development Hasn't Worked (So Far) In Medical Centers," on five points which typify business. The first of these points stresses the premise that the structure in business enables the creation of a "rational, systematic relationship." This relationship constitutes "the essence of an organization." The second point flows from the first, in that the organization

through its various relationships makes it possible for people to do things they value and cannot do alone. Third, the business organization contains four balanced structural features--the keys to its organizational structure--which restrain individual behavioral constraints: task independence, concrete goals, performance measures and formal authority. Business's fourth typifying point rests with bureaucracy's strength in certainty and order. However, at some point, the constraints for certainty and order outweigh the benefits. The resulting product is business's restricting of personal judgment which tends to effect output, self-esteem and moral. Finally, organizational development offers "counter bureaucratic values and practices" through examining group problem solving, team building. In this way the organization achieves a better balance among goals, authority, task interdependence and measured results. In summary, industry may be depicted as one system. All processes point in the direction of the "task system and its management." In this system goals are concrete; authority is formal; and task interdependence and performance measures exist (pp. 18-20).

In contrast, the medical center tends towards diverse goals, diffuse authority, low interdependence and few performance objectives. These processes inculcate a value for autonomous decision making centering on personal achievement and improvement of personal performance, rather than on institutional performance. As a consequence, the

physician identifies more with the culture of medical science and less with the specific institution. Furthermore, the physician's means for rewards and consequently, his/her respect, and reputation is generated from outside the work setting (Weisbord, 1976, pp. 19-20).

Weisbord (1976) then concludes that the health care model contains three systems in comparison to business's single system. The over all administration of a "task" system, like business, exists. However, health care includes the coordination of one or more areas within the task system which do not necessarily function interdependently: patient care, education, research and administration. Medical care's "task" system also lacks concrete goals as each physician may independently select any weighted combination of the areas mentioned above. The system also does not provide major indices to be used as performance measures and does not confer the formal authority necessary to sanction team building and to establish formal boss-subordinate relationships. Added to health care's multifaceted task system are two other unique aspects or systems: governance and professional identity. (Each of these systems will be elaborated upon later.) Weisbord (1976) finally points out that varying degrees of overlapping occurs between each of these systems. Certainly, the complexity of health care's general organization makes administration difficult and unique.

Two years after Weisbord's article, Plounick, Fry and Rubin (1978) published insights into the unique organization of health care. They attribute three primarily physician oriented characteristics to health care's resistance to improvement in the organizational structure: a non-managerial perspective coupled with imputed values prevalent both in education and in professional orientations.

To support their point, Plounick, Fry and Rubin (1978) note that during their medical education--medical school, internship and residency--medical students and physicians received little, if any, training or discussion in organizational effectiveness or in understanding a managerial perspective by skilled professionals. This, they suggest, is readily identified in the attitudes, knowledge and skills of the physicians. For example, "physicians' professional training stresses the principle of 'Primum non nocere' (First do no harm!) with respect to patient care" (Plounick, Fry and Rubin, 1978, p. 350). Also, physicians' strategies are based on "pat" or proven solutions to problems requiring "short term investment with difficult-to-measure long term pay-off" (Plounick, Fry and Rubin, 1978, p. 350). As a consequence of the physician's conservative posture--which may be appropriate to patient care--physicians lean towards an "overly cautious and seemingly resistant stance on organization and management change issues" (Plounick, Fry and Rubin, 1978, p. 350).

The value placed on education represents a second characteristic which is also felt to be a determining factor in the health care organizational structure by Plounick, Fry and Rubin (1978). This characteristic is evidenced by the physician's greater receptivity to training programs or to an "organizational expert" in lieu of a consultant. Thus, a person with a well defined body of knowledge who can focus such inputs on perceived organizational problems, promises to be better received and stands a better chance for improving the structure. Also, the professional orientations--reference groups, reward systems, loyalities--are external to the organization and oriented toward professional versus organizational ends. "Little wonder that organizational objectives are occasionally perceived as contradictory to the ideals and values" of the physicians (Plounick, Fry and Rubin, 1978, pp. 350-1). Studies by Goss (1962), Cadmus (1965b), Cadmus and Glass (1963b) and Stoelwinder and Clayborn (1978) further support the premise that physicians' characteristics hinder the functioning and improvement of medical care's organizational structure.

Based upon all the general organizational aspects previously discussed, a projection into the future reveals a list of core problem areas: (1) understanding and specifying the mission of the health care organization; (2) understanding and mapping--planning, identifying,

predicting--environmental pressures upon the organization; (3) managing the organizational planning processes; (4) setting strategies and operational objectives; (5) creating organizational designs to cope with changing tasks; (6) managing consensual decision making; and (7) coordinating and integrating interunit and interorganizational conflict (Tichy and Beckhard, 1976).

In summary, an environment in health care exists, "where the laws of supply and demand to not work" (Roark, 1978, p. 13), and where "contradictory societal and economic pressures" (Tichy, 1978, p. 305) are often pitted against one another. Therefore, the "large non-profit sector, singular sense of competition, goals and behavior patterns contrary to the economic person, government standards and licensing, lack of organization knowledge and so forth seriously threatens the outcome of desirable solutions to health care's general organizational dilemmas" (Weisbord, 1976, p. 20).

Physician Identity

When considering any organization, one factor almost always is at the root of any problem. "An exasperated corporate executive summed this point up well in relation to his company: It's full of people" (Weisbord, 1976, p. 18).

The medical care "subsystem" is no different. The wide and varied social, economical and educational characteristics of people interrelating and functioning within a

medical organization, creates an unduplicated environment. The physician's identity plays the major role in explaining this environment and greatly aids one in understanding the over-all medical care subsystem.

A complicated interplay of forces--"medical personality, how physicians are socialized, what society expects of physicians" (Weisbord, 1976, p. 23)--serves to reinforce a physician's self concept. Therefore, a physician's self concept is built primarily on the technical expertise needed to diagnose and treat disease and on the mental toughness required to make life and death decisions alone. From this self concept the physician's identity evolves largely based on "public recognition of professional credential which confer status and a sense of self worth" (Weisbord, 1976, p. 23).

As a result of such an identity system, Weisbord (1976) states that the physician must constantly address four binds: (1) self-concept bind; (2) accountability bind; (3) knowledge bind; (4) task interdependence bind. Briefly, the self-concept bind takes into account three factors. First, the difficulty physicians' experience as they try to internalize all data outside of the medical model, let alone act upon it as compared to their constant use of "the scientific definition of knowledge relevant to disease" (Weisbord, 1976, p. 23). Second, the physicians are unable to see a middle ground of choices between uncontrolled and self-controlled responses. Finally, the

frustrations which a physician experiences between the intuitive trust in professional judgments versus the formal medical standards. The varying degrees of interaction between these factors places considerable demands upon the physician which in turn greatly impacts the physician's self-concept. The accountability bind centers around the unwritten law that "doctors do not judge each other's work publicly" (Weisbord, 1976, p. 23). Yet, each physician has strong opinions about the health care system's goals and what roles all other (non-physicians) should play in achieving them. According to Weisbord (1976) the knowledge bind also translates into a physician's deliberate acquisition of expertise in one specialty representing to other physicians an incompetence in all other areas. Also important to consider within the knowledge bind is the physician's maintenance of an "illusion" of keeping up in his/her specialty or area. Actually keeping current is impossible, for as one doctor stated, "If I did nothing but read journals all day, I'd just fall behind at a slower rate" (Weisbord, 1976, p. 23). Within this bind, the bureaucracy can then serve as a scapegoat to the physician for his/her lack of knowledge, instead of accepting human limitation. The final bind is the task interdependence bind. "Physicians, caught in their other binds, feel compelled to direct, control, decide and be responsible for every patient and every patient decision within their purview. It is hard for

doctors to share life-and-death risks with anybody, even the patients themselves" (Weisbord, 1976, p. 24).

The constant interplay between the four binds has serious consequence for both the physician and the organization. This is especially true in primary care due to the need for organization and interdependence between physicians, professionals, and other related non-physician personnel.

Also important in understanding the physicians identity is the consideration of what general type of individual pursues a career as a professional. "Professionals, in general, seek more autonomy and status" (Haggerty, 1974, p. 841). The medical profession has been considered the ultimate of professional success because it offers the greatest autonomy (Haggerty, 1974, p. 841). The main reason for medicine achieving this autonomy and status was its marriage to science and technology between 1910-1930, a technical advance not yet completely shared by primary care (Freidson, 1970). Hence, primary care may be perceived as giving fewer benefits to patients, and as being less progressive due to a more limited association with science and technology. Thus, the accompanying lower status level tends to follow. Hopefully, primary care can fuse the often time incompatible elements of science, technology, status and autonomy with the equally great need of patients for warm, humane, personalized services (Freidson, 1970).

Unfortunately, "most physicians soon learn that they must turn off feelings, ignore their standards of humanity and limit themselves to the technological aspects of care" (Kowalesky, 1975, p. 64).

The final aspect to consider when discussing a physician's identity is the physician's tendency to be an "obsessive and compulsive type person" (Egerton, 1978, p. 11). A person who consciously elects to enter the medical profession in order to be one's own boss (Young, 1972). Medical school reinforces these characteristics through a "selection process which favors high achievers and goal oriented individuals" (Kowalewsky, 1975, p. 64); through intense competition for entrance into, status within, and internship/residency after medical school and through the role model influence and shaping of the physician throughout the entire educational process (Kowalewsky, 1975). All these forces bombarding the physician helps to explain "why doctors have high divorce rates, why doctors have high suicide rates, why so many middle aged doctors are depressed and why doctors experience so many heart attacks or simply burn themselves out" (Egerton, 1978, p. 11).

Further research into the physician's identity is needed which would aid in delineating other aspects impacting the medical subsystem. With such knowledge, medical care could be better understood and physicians could be better educated so as to reduce inherent stress and pressure.

Presently, the literature reveals that primarily nurses, in a somewhat restricted sense, are the only target for such study.

Governance Structures

In medical care "the governance system sets and maintains health and medical practice standards" (Weisbord, 1976, p. 25). Governance is both internal and external to medical institutions. Internally, governance is exercised by trustees, hospital and medical boards, audit committees. In medical schools, add faculty senates, executive faculty (chairpersons), task forces, and committees on everything from admissions to curriculum and grading. Professional societies, specialty boards, accrediting groups, granting agencies and government composes the external governance structures. These structures influence admission to the field, ethical practice, funding educational, clinical and research criteria (Weisbord, 1976).

The external governing structures tend to exert the greatest controlling force upon medical care. However, in most instances, internal and external governance cannot be clearly separated. For instance, consider Secretary of Health, Education and Welfare Joseph Califano's recent decision to "defer action on proposed regulations concerning the government's reimbursement of health care costs to teaching hospitals" (Roark, 1978, p. 13). If this proposed legislation is enacted, the amount of money teaching

physicians could collect under Medicare would be limited. Under existing policies, "doctors at teaching hospitals can in some circumstances collect for services from patients whose care is the primary responsibility of interns or residents whose salaries have already been paid by Medicare" (Roark, 1978, p. 13).

In the above example, the government through legislation is proposing a form of governance over physicians. The American Medical Association (AMA) and the Association of American Medical Colleges (AAMC)--outside professional societies representing physicians--could very well be the main reason for the delay of action. Undoubtedly physicians, medical boards, specialty boards, etc. have contributed to the AMA and AAMC's position.

Another interesting aspect is governing structures bid for control. In many cases, the web between internal and external governing structures can exert a great deal of pressure in stipulating governance policy. Also, the dependence of medicine on government and foundations for the vast sums of money for operations and research makes the interrelationship more complex. The examples are countless as to how the interplay between multiple governance structures determines policies which in turn control or attempt to control medical care. One of the most far reaching is the realization that the bountiful number of specialists in the 1970s initially was determined back in the 1950s through funding legislation.

The role of the specialty boards plays a major part in the governance of medical education. Generally, specialty boards "convey to their applicants, by the content of their examinations and their requirements, the message of what's important" (Joel, 1975, p. 127). "The boards will have an even greater influence as recertification becomes common and compulsory rather than a voluntary practice" (Joel, 1975, p. 127).

Because of the impact generated by specialty boards, primary care physicians need to overcome yet another obstacle in the quest for recognition. The boards place a heavy emphasis on secondary and tertiary care, thereby channeling physicians to divert their time and energies away from primary care. Changes are taking place, however. The American Board of Internal Medicine (ABIM) "is in the process of modifying its requirements and its examinations in order to adapt to the needs of primary care and I suspect that the American Board of Pediatrics (ABP) is doing the same" (Myers, 1975, p. 190). This action will give primary care a needed yardstick to measure and encourage standards of performance.

From an organization standpoint, the medical care subsystem's governance mechanisms tend to have three major flaws: (1) licensure by a government group, not an employee contract which undergrids identity"; (2) "governance systems tend to become more closed than the task system, which requires daily interaction with patients, students and the

public"; (3) "governance systems which many times work interdependently" (Weisbord, 1976, p. 25). The deficiencies in each of these areas further complicates the governance of medical care. The first flaw serves as an example. After technical competence is certified (passing "the boards"), ability to work with others and to understand organizational complexity is assumed. In most instances, the technical competence which is mandatory for licensing is achieved at the expense of organizational understanding and personal relation skills. Thus the governance system, in this sense, works against improvement of over-all medical care.

The public is responding to some of the shortcomings of the medical governance system through pressures applied in part through elected legislators. According to Evans (1975), "pressure for major change in health care payments and mounting anger toward the support of the health care dollar for research and education without the receipt of care in return" is being voiced (p. 52). Secondly, increasing resistance exists in the area of "funding the substantial capital outlays required for new academic medical centers which duplicate existing community-constructed facilities" (Evans, 1975, p. 52). Also, the public feels "ambiguous dissatisfaction with the role played by the physician graduates of our system of medical education within their communities" (Evans, 1975, p. 52). These pressures all point in the direction of the public's

need and desire for primary care services. Recognition by the medical profession is slow, but coming. Wading through the multitude of governance structures to alter opinion takes time.

Economic Considerations

Medical care enjoys extravagances which few organizations or institutions could possibly afford. Presently the "country's health bill is approximately 200 billion dollars a year" (Roark, 1978, p. 13). By 2000, should current spending levels continue, the United States health care bill would reach an expected one trillion dollars or 12 percent of the Gross National Product (Roark, 1978, p. 13). Little wonder dollars represent an important aspect to be considered when discussing health care.

In an economical sense, the literature reveals some unique aspects present in medical care. Generally two distinctions create this situation. First, a large percentage of the American population is covered by some form of medical insurance. Employed persons receive renumerations for distinct medical services through their employment benefits package. The elderly and the poor can rely in varying degrees upon the benefits of medicare and medicaid respectively. Therefore, more individuals only indirectly pay for their own and others' medical services. In other words, third party fee structures exist. Secondly, medical funding levels are "heavily supplemented through endowments,

gifts and grants, government appropriations (city, state and federal) and government grants and contracts" (Heneman, 1964, p. 148). Because of such funding, high cost procedures can be pursued and utilized with little thought regarding payment of incurred costs.

Consider these distinctions in light of the previously discussed aspects of the medical environment--general organization, physician identity and governance structure. It then becomes apparent that "in health care we find a large non-profit sector, a singular lack of competition, some goals and behavior patterns that are not those of the economic man, government standards and licensing, lack of organizational knowledge and so forth" (Fein, 1975, p. 17). As a result, "many student of the health care sector do not believe that market forces in health are such as to yield just and desirable solutions" (Fein, 1975, p. 17). For example, the laws of supply and demand do not work because as the number of medical practitioners increase, the cost of medical care actually goes up, not down. This fact is substantiated through investigation. In some parts of Maine, where the per-capita proportions of surgeons who perform gall-bladder operations is highest; the actual number of gall-bladder operations performed is actually more than double in these areas compared to other parts of the state (Roark, 1978, p. 13).

More specifically, "in the delivery of services, it is not the system but the physician that is the

determining factor, because the physician determines who shall be hospitalized, what tests are administered and where each patient is to be referred" (Reid and Lantz, 1977, p. 305). According to Roark (1978), this breaks down to over 70 percent of the medical bill being controlled by the physician (p. 7). This percentage, according to Fuchs, may be divided into the following categories: 40 percent for hospitalization, 20 percent for physician fees and 10 percent for drugs (Garg, Mulligan, McNamara, Skipper and Parekh, 1975, p. 1085).

Because the majority of the costs are controlled by the physician, the physician and the medical "student must understand their role as central figures in the economics of medical care" (Reid and Lantz, 1977, p. 306). Many physicians are not even "well informed about the costs of goods and services they commonly order for their hospitalized patients" (Roth, 1973, pp. 16-17). A primary reason for this lack of knowledge is that "traditionally, knowing the total price of health care has not been within the purview of the medical profession. Similarly, in the course of their training, young physicians are often chastised for doing too little. They rarely, if ever, are criticized for doing too much" (Roark, 1978, p. 7).

The physician's lack of knowledge in these aspects is changing. Studies are beginning to center upon costs and the physicians and administrators' containment of them.

Also, legislation is considering costs and its counterpart, accountability, due to the state of the American economy and the strong competition for limited funds (Feing, 1975, p. 19). Therefore, cost containment is being considered in some institutions. How much is yet to be determined.

The most recent support for cost containment came in the form of a survey conducted by the Association of American Medical Colleges (AAMC) which attempted to determine how many medical colleges--119 current members--provide some form of instruction in health costs. In the memo accompanying the survey, AAMC President, John Cooper, stated, "There is no reason to expect that if and when Congress re-authorizes health manpower legislation in the future, each medical school that wants to qualify for federal assistance will have to develop full fledge costs containment programs" (Roark, 1978, p. 17). Also, the Carter Administration's desire to hold all future annual increases in hospitals to a 9 percent level, further supports a move in the direction of cost containment (Roark, 1978).

The economic picture for primary care specifically is no different. However, Bergman, Dassel and Wedgewood (1966) point out a most serious "economic criticism." They state that total income measures are insufficient in primary care because "a pediatrician is financially penalized for spending time with patients" (p. 260). The surgically oriented third party fee structures are the norm: "doing something for a patient pays, talking to him

does not" (Bergman, Dassel, and Wedgewood, 1966, p. 261). However, a pediatrician's most valuable assets are his/her knowledge and experience. Instead of charging for time the pediatrician is forced "to charge for visits or procedures" (Bergman, Dassel and Wedgewood, 1966, p. 261). Perhaps primary care should rethink its billing procedures.

In primary care the costs and returns of medical education must also be reviewed. For example, consider the funding levels for medical education. The federal expenditure rose from "24.7 million dollars in 1963 to almost 1.4 billion dollars in 1973" (Roark, 1978, p. 17). In the tertiary level cancer cures or other breakthroughs helped substantially in justifying the difference in funding levels. However, what did the American people tangibly receive for the 437 percent increase between 1963 and 1973? Reviewing these figures and the history of federal support coupled with measuring medical care's responses against mandates imposed upon them, Rogers (1975) concludes that "the academic health centers must find ways of helping Americans achieve better primary care services if they wish to continue enjoying the freedoms and affluence that society has bestowed upon them" (p. 173). Thus, the economics of medicine plays a primary role in determining the medical services received by the public.

The Health Care Team

One of the most distinguishing aspects of primary care, centers around the existence and use of a health care team. The health care team "coordinates the efforts of medical and allied medical personnel to give comprehensive health care to multi-problem families" (Beloff and Willet, 1968, p. 663). In other words, the team approach basically represents "the conscious and collaborative development of skills and the rules governing the work of the group on shared health related tasks" (Kindig, 1975, p. 100). Thus, a physician, public health nurse, health aid plus available consultants--social worker, psychiatrist, nutritionist--work interdependently toward accomplishing the health care team's goal of providing the patient and his/her family with the best possible comprehensive health care. In this way a large number of tasks can be accomplished which otherwise could not be. Also, the needs of the patient population may be flexibly met.

The interdisciplinary approach toward primary care delivery has evolved over the past twenty-five years. The first developed and recorded use of team delivery occurred in the late 1940s at Montefiore Hospital. Actual popularization of the concept did not come about until 1966 when the team approach was suggested in the Office of Economic Opportunity's (OEO) Neighborhood Health Center Guidelines. (Interestingly, George Silver left Montefiore to become deputy assistant secretary of HEW at the same time the new

OEO was being designed and funded.) Thus, government dollars stimulated the health care team's existence while experts from the field of management placed the delivery approach on a sound theoretical basis (Kindig, 1975, pp. 97-99).

Generally, the health care team has two main objectives: "maintaining continual responsibility for the family in their respective specialty areas and keeping other team members informed of changing health needs" (Beloff and Willet, 1968, p. 663). To assist in accomplishing these objectives organizational details were designed to improve communication and coordination; such as, more formalized intake procedures (screening tests and social information about each family), family health records, family health plans with routine reviews and total team conferences. By incorporating a team approach, primary care is also better able to place emphasis on preventative medicine and health education with team leadership varying according to the nature of the problem (Beloff and Willet, 1968, pp. 664-6).

Not to be confused with the health care team is the new health practitioner (NHP). New health practitioners "perform expanded roles to provide a wider range of services more cost-effectively" (Kindig, 1975, p. 102). In other words, new health practitioners are "non-physician personnel who are trained to carry out many of the tasks in the provision of primary care which heretofore have been the sole province of the physician or to perform important

tasks which have been often times forgotten" (Sadler, 1975, p. 61). Examples of possible NHP responsibilities include performance in the following areas: taking detailed patient history, giving physical exams, performing office diagnostic and therapeutic procedures, giving competent and immediate emergency care, counseling and teaching patients about their illness and the treatment prescribed, and performing follow-up activities in patient management (Sadler, 1975, p. 61). In this sense the new health practitioners--also referred to as physician assistant (PA), physicion associate, nurse practitioner, health associate, Medex, Primex, child health associate--meet the following objectives: (1) to provide a possible solution to the perceived manpower shortage in primary care; (2) to improve the quality of care by freeing the physician from management of common illness so that she/he can concentrate efforts on more complex problems; (3) to increase the quality of care by increasing the amount of time spent with the patient thereby decreasing the possibility of mistakes due to hurried procedures; (4) to aid in checking the soaring costs of medical care; and (5) to provide a career for individuals who do not want to be a physician or nurse, but who are interested in becoming more heavily involved in health care (Sadler, 1974, pp. 845-6).

The health care team approach is not without problems. The literature reveals the greatest difficulty centers on the team's inability to consistently work interdependently. Behavioral scientists are studying the

organization and the health care personnel in an attempt to determine specific courses of action to solve this problem. The changing of traditional relationships in such a unique environment which is limited by cognition of organization problems, out-moded structures and limited group and interpersonal skills, requires further investigation in order to understand the team member's "authority, status, power, control, decision-making and use of information" (Cammert, 1978, pp. 324-5). The emphasis, however, of the health care team continues to "center on the patient or family health needs, with the services of the most appropriate team member; rather than those of a fixed physician or his/her personally designated agent" (Beloff and Willet, 1968, p. 665).

Availability and Accessibility

Of primary importance in discussing the environment of primary care is the availability and accessibility of services. Perhaps availability and accessibility appear indistinguishable, however, differences do exist. Availability is concerned more with "the actual existence of primary care services" while accessibility is defined as "the ability to reach, obtain or afford enterence to services" (Parker, 1974, p. 34). In this sense, availability could be considered as "only one factor influencing accessibility and not sufficient unto itself to guarantee effective utilization" (Parker, 1974, p. 34).

Availability is "impossible to measure in absolute terms; seemingly, this could be accomplished with surety only when services stand at zero. For in all other cases, availability is complicated by locational factors and the number of people to be served" (Parker, 1974, p. 34). Therefore, the number of primary care physicians represents the best "obtainable indicator" (Parker, 1974, p. 34).

In primary care the number of physicians in practice is not encouraging. For example, a total number of 84,099 or 41 physicians for every 100,000 patients (1:2430) existed in 1973 (Parker, 1974, p. 35). In 1931 the primary care physician ratio was a fraction over double that of 1973; 94/100,000 (1:1060) (Parker, 1974, p. 35). The striking decrease becomes "more serious by the fact that primary care physicians have customarily seen more patients than the specialist and have worked longer hours" (Parker, 1974, p. 36).

The literature is filled with other statistics revealing the need and impact of the decreasing numbers of primary care physicians. The evidence was so strong that in 1974 the Sun Valley Forum on National Health--"a non-profit educational organization which works toward the improvement of the health of Americans and of the health care delivery system" (Andreopoulous, 1974, p. 203)--sponsored a symposium on primary care where both availability and accessibility were main issues.

One means to help correct the physician shortage is "the development of different types of health care personnel" (Begen, 1974, p. 105). This solution incorporates a full implementation of the health care team and the new health practitioner previously discussed. Employing this method extends the physician's services.

Lewis (1974) advocates Bergen's solution and promulgates the need for a better geographic distribution of primary care physicians. The literature reveals that most primary care physicians tend to form pockets in metropolitan or urban areas which support their preferred life styles. A recent report from the United States Government Accounting Office (GAO) found that over "90 percent of new physicians practiced in urban sites where 75 percent of the population lives" or "one out of ten medical school graduates between 1967 and 1971 chose to practice in metropolitan areas" (Coughlin, 1978, p. 12). These statistics supported government's attempts to influence physician distribution through various programs: (1) National Health Service Corps Scholarships--medical students receive tuition fees and a stipend of $6,750 in return for a year's service in a medically underserved area for each year of scholarship support; (2) Federal Loan Forgiveness Program--only 1.7 percent of the graduating medical students choose to take advantage of having their loans forgiven in return for settling in an underserved area; (3) Health Profession Education Assistance Act of 1976--gives the Secretary of HEW the discretion to

forgive certain outstanding loans in return for services in a remote or poverty-stricken district; (4) "long term potential" of university based area health education centers for attracting health professionals to under served areas--66 million dollars appropriated to 11 university medical centers to set up remote training centers aimed at filling local health manpower needs (Coughlin, 1978, p. 12). Clearly, a change in the distribution of physicians is being attempted. The only problem is that results are not yet good enough.

Parker (1974) identifies the two aforementioned strategies to increase the availability of primary care physicians. He also suggests the idea that the production of primary care physicians be increased. Actually the issue is a redistribution of physicians from secondary and tertiary care to primary care. "If emerging physicians are to be more concerned with primary care than those of the past, there must be changes in the way students are selected, in the process of medical education, in the characteristics of those acting as academic leaders, in the academic emphasis on research and in the relationship of the medical school to the community" (Parker, 1974, p. 44).

The availability of primary care as measured through the number of primary care physicians is not the only situation which warrants attention for primary care services to reach the American public. The accessibility of services must also be considered.

Primarily, two barriers inhibit the patient's access to primary care services: financial barriers and attitudinal barriers (Davis, 1974). When considering these access barriers, however, availability--which could be considered as a third or "physical" barrier--cannot be totally disregarded. For all three areas often interrelate or exert influence over each other.

Financial barriers represent the actual cost paid by the patient for the services performed. The non-monetary costs, such as transportation, time and search costs are considered by Davis (1974) to be a part of the physical barrier. The important aspect is not whether these non-monetary "costs" are classified under physical or financial barriers, but that they are considered when discussing the availability and accessibility of primary care. Also when examining these barriers, depending upon the type of care required, the costs--monetary or non-monetary--do shift. Such shifts directly affect the patient and his/her accessibility to primary care. For example, preventative medicine seldom reaches the poor. Only a serious emergency increases the probability that the poor will seek medical help.

The attitudinal barriers take into account both the attitudes of the patient and the provider. Davis (1974) states that, "If individuals fail to seek treatment out of fear or ignorance about the efficacy of care, one may argue that the care is not truly accessible to them. If hospitals

or physicians refuse to treat certain types of patients or treat them in an undignified, inhumane way in order to discourage such patients from seeking further care, health care may be considered equally inaccessible" (p. 159).

Like the physical barriers, attitudinal barriers may be reduced, especially in the routine primary care level, by "financial intervention" (Davis, 1974, p. 179). However, programs like medicare and medicaid do not necessarily guarantee accessibility. Davis (1974) reveals a disparity in the utilization of physicians' services not only among varying income levels but also among racial and geographical groups. For example, "reimbursements for physician services are 63 percent higher for elderly whites than for persons of other races. Elderly persons in the West receive payments 60 percent above that received by elderly persons in the North Central region" (Davis, 1974, p. 179).

Bergen (1974) adds another dimension to the accessibility of primary care. He considers access from the physician's standpoint. The organizational structure of primary care must attract all physicians through equal access to all components of the health care delivery system. Otherwise, physicians will seek other medical careers and patients will not receive the services they desire.

"The quality of care includes access to health care . . . as well as satisfactory outcome from illness" (Reid and Lantz, 1977, p. 305). Lewis (1974) suggests that

patients must also be taught to use the system effectively. "Certainly the ultimate solution to the problem of access to care would be to prevent the need for requiring access" (Lewis, 1974, p. 94). However, a great number of primary care problems are not solely "biological in origin," but have considerable "psychosocial components." This implies not only teaching the patients how to prevent disease, but also teaching them how to deal with behaviors associated with the causes of the disease (Lewis, 1974). Primary care must insure availability and accessibility to its comprehensive breadth of services by eliminating barriers.

Patient Flow

All techniques considered when analyzing patient flow fall under the basic framework of queuing theory: "a body of knowledge that systematizes the study of how services are provided sequentially for customers who wait in line" (Rising, 1977, p. 5). In other words, "whenever demand exceeds capacity, a waiting line or queue is formed; that is, the customers do not get service immediately upon request, but must wait" (Turban and Meredith, 1977, p. 409).

The entire queuing theory process incorporates three steps: (1) "establishing the measure of performance (or the operating characteristics) of the queuing system"; (2) "computing the measures of performance"; (3) "conducting a comparative analysis" (Turban and Meredith, 1977, p. 412). From this, information management then has the capabilities

"to design service systems and to improve their operations through measures of performance" (Turban and Meredith, 1977, p. 425). Thus, administration is planned, it does not merely occur haphazardly.

It is difficult to image good primary care without good administration. The development of systems of delivery emphasizing "the access to first contact, the treatment of basic (even uninteresting) problems with an emphasis on and concern for the total patient, the greater understanding of the needs of the patient and of his desires for support and care, and the opportunity to move from primary care to other parts of the health care system is essential" (Fein, 1975, p. 21). It is difficult to imagine all this happening without good organization. These administrative issues may not appear to be the world's most exciting agenda they are "not a dramatic or heroic matter." Nevertheless, "success often hinges on organization and administration. Without organization and administration designed to promote primary care and linked to the rest of the health care system, we will fail to reach our goals" (Fein, 1975, p. 22).

The study of patient flow is one such important administrative aspect in the delivery of primary care. Very simply, improvement of patient flow in the primary care setting reduces patient waiting time. Analyzing, identifying and correcting patient flow problems contributes not only to patient satisfaction through the elimination of

confusing and frustrating feelings, but also to society and the health care organization through financial returns. The health care staff and the organization, also enjoys the benefits of more equalized scheduling--the time spent idle versus the time spent overworked. Thus, "the problem of patient flow is bringing together the presenting patient and the appropriate providers within the proper environment" (Rising, 1977, p. 4).

Originally medical care delivery was on a first come, first serve basis. Even in the late twenties, a large crowd outside the doors of an outpatient facility before opening was not unusual. Not until the late 1950s and early 1960s have appointment systems replaced the old "FIFO" (First In, First Out) method of health care delivery. Nevertheless, remnants of the unpredictable, uncontrollable, FIFO method still remain (Felter and Thompson, 1966, pp. 66-67).

Serious inquiry into patient flow began in England during the 1950s. The National Health Service--a governmental agency which salaries physicians and provides patients medical service--spurred the move by expressing concern over the efficiency of the medical service rendered and its acceptability to the patient. The Nuffield, Welsh and Bailey and White and Pike studies of the late 1950s resulted. Areas such as patient complaints, factors affecting the relations between patient's waiting time versus the physician's idle time, appointment intervals and patient

punctuality were researched and discussed in these studies" (Felter and Thompson, 1966, p. 68).

The Yale Studies--a series of three unpublished Master's Theses--in 1962 and 1963 first explored similar concerns in the United States (Felter and Thompson, 1966). These studies investigated issues such as whether waiting times would be affected by a change in physical location and whether walk-in patients were being seen more quickly than patients with regular appointments. The need for a more defined definition of waiting time also resulted. For instance, at first waiting time represented the length of time the patient waited from arrival to appointment time (only used for those patients arriving early). While presently the waiting time represents the total length of time a patient waits before receiving medical care (Felter and Thompson, 1966, pp. 68-70).

Similar questions are still addressed, especially with the increasing emphasis placed on primary care. Research ranges from simple patient flow studies to the development of a patient flow simulation model, CLINIC, used to design outpatient systems.

In the case of outpatient systems, such as primary care, patient flow problems "benefit most by using the more basic, straightforward techniques of queuing theory" (Rising, 1977, p. 10). Using this technique, the delivery system is defined by three variables: (1) arrivals; (2) configuration of the system (including priorities); (3) service time.

Judgment as to the efficiency of the system is then determined by the waiting time of patients flowing through the system and the percent utilization of the service facility. Patient flow diagrams and relative frequency histograms--"two of the simplest, yet most useful tools for diagnosing patient flow problems" (Rising, 1977, p. 9)--serve as the means by which to quantify delivery efficiency (Rising, 1977).

Nonetheless, one important concept remains central to the study of patient flow. Investigating and "designing any patient flow system requires that the sources of variation also be understood in order to make the best possible trade-off between waiting time and utilization. In systems containing variation, with other things being equal, it is possible to either have very low values of waiting time for patients or very high values of provider utilization. But in any given situation, improvements in the one must be obtained at the expense of the other (Rising, 1977, p. 9).

In the outpatient facilities the appointment system represents "the most common method of controlling the flow of patients" (Rising, 1977, p. 33). Appointment systems fall into two basic designs: individuals and block. The individual system assigns each patient to an individual time period. The block system specifies a number of patients to a designated block of time. The actual number of patients assigned to a block depends upon the number of physicians and the length of time for each block. Once again the

object of the appointment system is to supply a steady stream of patients to the physician. If the system is functioning optimumly, the patient is secured access to the physician at a convenient time with as little wait as possible. The other appointment system assigns patients to various time slots which reflect the average amount of time a physician spends with each patient, e.g., one patient scheduled every thirty minutes. The number of drop-ins and emergency patients, of course, also affects the appointment system's operation, together with the physician's schedules.

In conclusion, application of simple queuing theory concepts enables the outpatient facility to more efficiently and effectively service its patients. Pay offs are directly experienced by the patient, the physician and the organization. The previously discussed aspects of the primary care environment must also be considered. By understanding these operating contingencies, the organizational objectives and the strategies by which they are implemented stand a better chance of benefiting the organization. The improvement of patient flow is essential to the delivery of primary care.

Graduate Medical Education in Primary Care

As noted earlier, primary care emphasizes not only a generalist or broad focus toward illness, but also stresses assistance to patients and families in their normal development. As a result, good primary care physicians must be able to demonstrate skills which are technically

comprehensive, and which are administered on a personal, continual manner. Graduate medical education serves as the final stage in preparing the physician to accomplish these tasks.

A discussion follows identifying and explaining the goals and objectives, the two basic mechanisms for educational intervention and the future of graduate medical education in primary care. From this commentary, a general perspective of graduate medical education in primary care occurs.

Goals and Objectives

According to Lewis (1975), medical education has experienced three developmental phases. Briefly, in the first stage--"before the Flexner Report"--medical education was relatively informal with "strong intrapreneurial" underpinnings. The second stage--"after the Flexner Report and before Fogarty, Hill, Lasher and Shannon or after Flexner's Carnegie Foundation Report and before the National Institutes of Health (NIH)"--was characterized by more formal structures within universities which were spear-headed by strong leaders who were both explorers and risk takers. In this sense, the second stage was a "formative and substantive period." The final stage--"after NIH and before ?"--is considered as an "interorganizational" period when "faculties became increasingly dependent upon allegiances to specialty

societies, study sections and other forces outside the medical school" (Lewis, 1975, pp. 75-6).

Using Lewis' historical perspective of medical education as a basis, graduate medical education in primary care appears to have characteristics of both the second and third developmental stages. Primary care training is still in the process of evolving formal structures, yet is also dependent upon allegiances.

Originally, general practitioners (the primary care physician of yesterday) graduated from medical schools and then went directly into practice after just one year of a rotating internship. The internship's composition was identical to the first year of graduate education experienced by physicians in specialty training. Thus, the customary three year residency was not necessary for the general practitioner. "This pathway assumes that general practice deals with simpler or more mundane aspects of medicine. It also suggests that there is nothing particular about primary care medicine that cannot be learned in medical school followed by a universal internship" (Petersdorf, 1975, p. 5). Increased emphasis in primary care and the advent of family practice--early 1970s--has caused such practices to cease. Now most universities require three years of graduate education for primary care physicians.

The major goal of graduate medical education (internship and residency) in primary care is "to prepare

physicians to assume both the independent and collaborative roles required of primary care service" (Hudson and Gialalone, 1975, p. 215) coupled with the acquisition of the technical knowledge necessary. This represents a point of departure from the internship experience which emphasized the highly technical training of the specialist. Thus, primary care training, "in addition to facilitating the development of a basic understanding of disease pathology" also provides a "setting in which to refine patient management skills and an opportunity to participate in the provision of services which are characteristic of primary need" (Hudson and Gialalone, 1975, p. 219). Such a broad clinic perspective is imperative to the primary care physician.

Charney (1975) more specifically divides primary care's residency training goal into eight topic areas: (1) experience with patients in a facility or facilities which yields a representative cross section of the community; (2) "development of the doctor's interview skills"; (3) "experience with longitudinal management of chronic disease and with preventative services"; (4) "experience with acute or common illness"; (5) study of the organizational aspects of primary care (that is, administration, patient flow, medical records, costs, etc.); (6) involvement with nurse practitioners or other middle level health personnel; (7) "continuous responsibility for first-contact medicine (24 hour on-call system)"; and (8) "experience with the milieu

of practice (to be contrasted with the milieu of the hospital)" (p. 131).

Two years later, Boufford (1977) reiterated many of Charney's objectives. He also stressed the fact that training must "accent synthesis and problem solving skills" due to the "collaboration of multiple disciplines not traditionally involved in medical education" (p. 359). Therefore, the learning environment and schedules must permit ample flex during primary care residence training to accommodate the acquisition of a broad range of skills.

In contrast, Delbanco (1975) stresses a slightly altered approach. His philosophy is that the provision of "services should come first, before education and research" (p. 31). From this philosophical base, he suggests the following chronologically ordered objectives for primary care education: (1) "to provide first class primary care to all those who desire care from the given institution thereby ridding once and for all the distinction between the service patient and the private patient"; (2) "to provide a training ground for young health providers with adequate role models"; (3) "to document, to study, to evaluate what is done well and not done well, to experiment in the best tradition of academic medicine and to disseminate the results" (p. 31).

The literature also consistently highlights the importance of role models when considering education goals and objectives. In primary care a serious lack of appropriate role models exists. Many authors feel that the

specialty role model with its accompanying status and prestige--so prevalent in medical education--consciously and subconsciously steers students into the specialties. Quality primary care role models could help to counteract this phenomenon. Consequently, "to become a physician, the student not only stores away knowledge and develops skills, but also changes his/her self concept" (Grubbs, 1977, p. 195). This change is as much intuitive and implicit as it is intellectual and explicit which helps account for the variation seen among physicians, even those who practice the super-specialties. Nonetheless, "role changes are essential if the physician is to treat patients humanly rather than as a sterile technician" (Grubbs, 1977, p. 195). Even though progress is being made, the development of role models who can positively affect resident physician's self concepts remains a high priority goal to primary care education.

A review of the literature reveals that primary care training's major stumbling block is the profession's lack of consensus on exactly how primary care should be practiced. Hence, the development of educational pathways is difficult and sometimes conflicting (Joel, 1975, p. 123). Thus, an urgent need exists to further clarify the goals and the rationale for promoting the expansion of primary care programs. After achieving a national consensus of priorities, "it is then essential that more specific educational objectives be set, necessary resources for program

implementation be defined and evaluative methodologies be developed to measure progress" (Hudson and Gialalone, 1975, p. 233). These processes are "imperative tasks for the immediate future" (Hudson and Gialalone, 1975, p. 233).

"The very essence of education is that it serves a desirable intervention; and it is successful to the extent that it causes worthy changes in students in a direction and/or at a rate that would not have occurred otherwise" (Jason, 1975, p. 183). Within this experience "the period of residency training is viewed by many as the focal point for educational change" (Boufford, 1977, p. 359). Therefore, good residency training programs built on solid objectives remains paramount to the primary care's future. The present "state of the art" is constantly putting these priorities into sharper focus. Thus, perhaps programs can better "combine the difficult goals of teaching efficiency and efficacy, while at the same time emphasize the broad humane care of individuals and families in their environment" (Haggerty, 1974, p. 839).

The Two Basic Mechanisms for Educational Intervention

Graduate medical education's existing goals and objective in primary care serve as the foundation upon which residencies are structured. Onto this foundation two basic mechanisms exert pressure thereby enabling the medical resident to emerge as a practicing physician: the faculty

and the programs. A general discussion follows explaining each area's contribution to primary care residency training.

The primary care faculty member's major responsibility is to organize, direct and take part in the educational program, to conduct research and to perform varying degrees of administratively related duties. Contrary to most academic faculty, primary care faculty also must serve patients which are dependent upon them for health care needs (Charney, 1975, pp. 133-4).

Education, research, administration and patient care are all "independently valuable to a reasonably complete academic health care system" (Weisbord, 1976, p. 20). Nevertheless, the lack of commonality between the four tasks coupled with the previously discussed environmental aspects, such as governance structures and physician identify systems, makes it "extremely hard to achieve organizational support and even harder to avoid financial loss" (Weisbord, 1976, p. 20). Such an environment creates an additional hurdle for primary care faculty in their attempts to train residents.

Some programs like the Residency Program in Social Medicine at Montefiore Hospital and Medical Center have attempted to ease this situation somewhat by employing three kinds of full time faculty: the delivery preceptor, the teacher preceptor and the consultant. The delivery preceptor acts as the primary service provider who cares

for the patients at the health center. The teacher preceptor has the major obligation to teach residents, while the consultant covers the subspecialty areas. Also inherent to this program is that, once selected, faculty are "prepared to work collaboratively with residents in defining, implementing and evaluating the educational program" (Boufford, 1977, pp. 363-4). No published evaluations suggest how well this system works.

Some institutions are not afforded Montefiore's option. Serious problems which curb commitment in one or a portion of all four previously mentioned tasks result due to the necessity of hiring part-time faculty. For instance, as Kahn and Perhoff observe, "when primary practitioners in a teaching program earn most of their own salary through practice, it leaves little enough time for teaching and even less for productive research" (Charney, 1975, p. 133). Such situations retard the future of the profession through inadequate training of residents.

Other issues are prevalent regarding the faculty's ability to successfully train primary care residents. First, some institutions are hiring young faculty members who are entering the primary care faculty ranks directly after residencies or fellowships. The net effect is mutual suspicion both on the part of full-time appointed specialists and on the part of the young faculty. Each member seriously questions the qualifications and abilities of the other to effectively train residents (Charney, 1975). Another

problem in training primary care residents centers around faculty composition. Some primary care faculties are "composed largely of people who have acquired great depth in some subspecialty at the expense of their general competence" (Relman and Arnold, 1975, p. 141). Can the subspecialists extend the training experience beyond the technical aspects? Such concerns have a direct effect on primary care training because "primary care can not be understood as cognitive data alone. It is a discipline of function and approach. The cognitive data necessary for application may even be taught best by the various specialties, but the system controls and emphasis can only be taught and transmitted by the teacher who believes primary care as a way of life and work" (Evans, 1975, p. 51).

Of equal importance when considering the faculty's contribution to the resident's learning experience is the previously mentioned concept of role modeling. Plovnick (1975) states that "more students might consider primary care if more primary care experiences and role models were available in medical school" (p. 185). If such role models are not hired to assist primary care residents in training, attempts to meet the demands for primary care physicians certainly will be jeopardized. Residents simply will pursue, as in the past, a career in the specialty areas.

In summary "the common requirements for all faculty are a commitment to teaching, an understanding and acceptance of the goals of the primary care training program and

a sensitivity to patients and other health professionals" (Boufford, 1977, p. 364). Faculty must also demonstrate capabilities to work collaboratively with residents and other faculty members to stimulate learning and the advancement of primary care. Unfortunately, faculty which fulfill the necessary requirements are difficult to locate. Worse yet, if the faculty are found, some institutions are not in position to maximumly utilize them. Primary care faculty shortages and a fuzziness in educational goals and objectives appears to be at the root of the problem. Both of these situations must be corrected for faculty to effectively assume their teaching responsibilities.

Though national acceptance of specific programs may be advocated, no such model is accepted. Designers of "programs are faced with the conceptual problem of clearly defining what they are attempting to accomplish, what their program objectives are and how a curriculum should be designed to meet those objectives" (Dorsey, 1975, p. 138). The recognized demand for primary care physicians is increasing program development. However, to a large degree, institutions decide individually upon their programs using more of a trial and error method. Some published guidelines do exist. A discussion of these guidelines follows which takes into account published general curricular requirements, models and settings.

When developing a program in primary care residency training, Hudson and Giacolone (1975) advocate consideration of the following essential curricular elements:

1. Curriculum designers should carefully assess community health needs on a local, regional and national basis.

2. Educational programs for health professionals should be based on an analysis of the services which must be provided to meet these community needs.

3. Educational objectives should be clearly stated for each type of student based on the above considerations.

4. Evaluative methodology should be established to assure the educational program's success in reaching the above objectives before curriculum implementation has begun (p. 221).

Currently, primary care residency training curricular development basically breaks down into two, three or four different models. The setting within which these models take place varies according to their different components.

Charney (1975) views two curricular patterns or models. The first path "resembles the family practice model (Montefiore Social Medicine and Pediatrics Program, Harvard Community Health Plan Medical Residence Program)" (p. 134). The primary medicine track is distinguished from the traditional residency by a strong emphasis on primary medicine from the very start. The residency is highlighted by several months of block experience in the practice settings and by special conferences and seminars. Inpatient rotations are interspersed throughout the

residency rather than the customary dominance in the initial year. The second path "resembles a traditional experience, emphasizing inpatient and short-term outpatient rotations" (Charney, 1975, p. 134). During the last year or two, concentration occurs in the ambulatory specialties (Charney, 1975).

In contrast, Hudson and Giacalone (1975) break the residency experience into four models: (1) The Internist-Pediatrician Group Practice Model--"long term management of chronic disorders, special training in the dynamics of family interaction, increased experience in dermatology, office ophthalmology, office orthopedis, office gynecology and expanded training in the psychosocial aspects of medicine" (p. 225); (2) The Family Practice Model--questions the legitimacy of training the internist or pediatrician as a generalist; training should instead take place under family practice which is not as affected by the specialties of pediatrics and internal medicine (p. 225); (3) The Single Model With Closely Interrelated Components (a pediatrics/internal medicine/family practice multi-specialty group)--a working unit of two or three family practitioners, a general pediatrician and a general internist addressing together the "benefits of collaborative rather than competitive interaction thereby maximizing each member's skills and interests" (p. 225); (4) The Dual Group Practice Model (pediatrics/internal medicine multi-specialty group and

family practice groups developed at the same institution but not interrelated)--"a popular concept," however, because of "competition for faculty, space, patients, finances and potential duplication, this model is of limited usefulness" (p. 226). Each of these four models utilizes a difficult configuration of settings. The setting--clinic, classroom, patient's home, hospital, etc.--is determined by the curriculum and the general area of practice (pediatrics, internal medicine, family practice).

Boufford (1977) suggests dividing the residency curriculum into three areas for all pediatricians, internists and family practitioners: the in-hospital training, the ambulatory site training and the social medicine training. The in-hospital curriculum "involves traditional teaching and learning activities on the inpatient, in the emergency room and in subspecialty elective rotations that are within the traditional subspecialty departments" (p. 361). During the third or final year a "broad range of electives in gynecology, dermatology, rehabilitation, psychiatry, combined surgical subspecialties (otolaryngology, orthopedics, minor procedures) are combined with hospital-office based electives in the medical subspecialties (cardiology, neurology and dermatology). The ambulatory curriculum addresses "those clinical specialties of the residents as applied to ambulatory care and the behavioral skills required of the primary care practitioners, especially in the area of individual psychiatry, family therapy and team

skills" (p. 361). The social medicine curriculum stresses development of "behavioral and team skills plus community health skills (health systems, skills, community and organizational skills, research and evaluation skills and educational and teaching skills)" (p. 361). Each resident determines activities from the three curriculums which best fits his/her "personal learning contract" (p. 361).

In summary, no particular model, curriculum or setting is universal to primary care training like is the case for specialty training. Instead, the basic elements in primary care training "closely parallel those of the perceived optimum health service system in an academic medical center" (Hudson and Giacalone, 1975, p. 219). Usually educational training is determined by a community needs assignment coupled with the faculty's ability and knowledge. The development of a program then proceeds within these parameters (Hudson and Giacalone, 1975, p. 219). Of course, the design of a training program must also strike a balance between the ideal curriculum and the program's financial reality. "In the absence of external support, the need to be financially self sufficient may necessitate more training time in direct patient care and less exposure to formal teaching or subspecialty clinical experiences" (Stern, Jennings, Delbanco, Dorsey, Stoe and Lawrence, 1977, p. 643).

The field is still attempting to consolidate ideas into a more unified and more specific posture as to directly

what primary care training programs should encompass and how best to teach this knowledge to residents. Presently, however, some consensus does exist that the training process must generally: (1) accent synthesis and problem solving skills; (2) teach the physician communication skills that permit him/her to work with patients and other members of the health care team who bring their expertise to solving complex primary care problems; (3) incorporate involvement with the patient in and out of his/her house environment over a period of time, in both health and illness; (4) create flexible schedules to permit the growth of such clinical experiences; and (5) permit the collaboration of multiple disciplines not traditionally involved in medical education (Boufford, 1977, p. 359).

The Future

The emerging state of residency training in primary care makes its future difficult to accurately predict. Issues surrounding primary care education--status, residency training models, patient demands, physician enrollment, methods of delivering services--are not yet resolved and thereby primary care's future is not predictable. Reviewing evaluative information yields some insight into the future and helps, at least, to identify some possible paths primary care training may follow.

"The principle impetus behind the development of primary care educational programs is an attempt to respond

to the growing need for personal health services" (Hudson and Giacalone, 1975, p. 231). In order to meet this need, many academic medical centers have adapted their curriculum to include the learning of primary care skills. Primary care programs, therefore, must implement mechanisms to determine whether in fact residency training programs are effectively and efficiently responding to the personal health needs of our country. Unfortunately, little published information exists in this area.

Currently the primary yardstick used to measure physician effectiveness is the "boards"--examinations for licensing purposes. Problems arise for the primary care profession in that only the family practice model can use board performance as a reliable indicator of physician knowledge. The primary care "boards" for internal medical and pediatrics are still heavily weighted on second and tertiary care (Boufford, 1977, p. 367). The reason for the secondary and tertiary focus dates back to the original purpose for residency training-specialty training. Residency training was never intended to educate physicians for primary care practice. The consequential strong focus on secondary and tertiary care contained in internal medicals and pediatric's boards also accounts for some of the specialty shift occurring in primary care. Thus, primary care residency programs in internal medicine and pediatrics must clearly determine their own set of performance standards until the

"boards" more accurately reflect the primary care level. Could this mean a future shift to a family practice model for primary care training?

Internally, other types of evaluations conducted within the residency training purview are necessary: students, faculty, curriculum, administrative, setting, etc. For example, in the administrative area, patient flow studies not only have the potential to increase patient and physician satisfaction through more economical use of time, but also the improved flow indirectly affects resident's administrative understanding. This evaluation "increases knowledge and skills" and "provides feedback of product/quality information" (Evans, 1975, p. 53). In this sense "evaluation promotes flexibility and adaptability, but generates conflict with those who desire the security on contined stability. Evaluation both promises and threatens, and both are essential to its success" (Dressel, 1976, p. 10).

External pressures also create a need for graduate program evaluation. "The pressures to produce more primary care practitioners coupled with real or anticipated reduction in specialty training grants" stimulate these efforts (Charney, 1975, p. 129). For example, in 1973 and 1976, the Association of American Medicine Colleges (AAMC) surveyed all academic medical centers in the United States concerning their programs in health service delivery and primary care. One reiterated recommendation was the need for medical

colleges to develop the capacity to evaluate the impact of changes in admission policies and curriculum on patterns of career choice by medical school graduates (Schroder, Werner and Piemme, 1973; Giacalone and Hudson, 1976). Further analysis also must consider such questions as: where primary care physicians locate and why; if primary care is adequately responding to public need; and where needed financial support efforts might best be directed.

Because primary care residency training is a "new area and applying educational principles rarely used in graduate medical education, we must involve ourselves in action research, evaluating and using the data to develop new models that are more effective and responsive to the specific needs of the residents" (Boufford, 1977, p. 368).

The 1976 AAMC survey of all 117 medical schools reports a "marked increase in the number of schools with affiliated generalist residency training programs" (Giacalone and Hudson, 1976, p. 971). The survey also reveals "no well defined focus for coordinating institutionwide primary care training efforts" (Giacalone and Hudson, 1976, p. 971). Therefore, primary care's evolving residency training appears to be moving in the direction that each specific medical college feels is in its best interest. Future prediction indeed becomes more difficult in such an environment. Nevertheless, some indicators do exist.

According to Hudson and Giacalone (1975), present trends in primary care residency training "represents a long term trend based on several interrelated economic, cultural and educational factors" (p. 211). These factors include: (1) "the financial and cultural incentives directly associated with the urban practice"; (2) "the inclination to relate to people of similar social class and lifestyle, leading to suburban practice patterns"; (3) the absolute financial disincentives associated with many pockets of the rural United States where purchasing power to support medical practice under the current system of reimbursement is grossly inadequate"; and (4) "factors identifiable in many rural areas related to eventual professional disenchantment, such as inadequate quality of public schools and professional and cultural isolation experienced by physicians and spouse alike" (p. 211).

The legislative incentives mentioned earlier, like the National Health Service Corps, are attempting to fight these economic, cultural and educational trends. According to the literature, however, efforts have not shown any significant improvement of the situation. Most physicians still settle in urban or metropolitan areas and those physicians who do settle in rural areas would have most probably settled there anyway (Davis, 1974). Therefore, in the future, stronger types of incentive are necessary, not only from a locational standpoint, but also in striking a better

mix between the number of practicing primary care physicians versus the number of specialists. The accessibility from a financial and attitudinal standpoint, for medicare and medicaid recipients also needs further attention and possible change. Dr. Welsh McDermott suggests "putting all residency training within the purview of academic health centers hoping that they might come to agreement about the number of residency posts required in various specialties and kind of educational experience necessary to prepare all members of the health care team for the future demands placed upon the profession" (Rogers, 1975, p. 177). Residency selection and education in the future may have to change to accommodate such current needs in primary care.

The two other significant future modifications in primary care residency training, aside from securing the necessary dollars, center upon broadening the educational experience of the resident and improving administration. In many respects these areas work hand in hand; separation of one from the other results in a loss to both.

"Part of the problem is that physicians are not adequately prepared to relate effectively to patients at the interpersonal level in all settings" (Knowlewski, 1975, p. 61). The emphasis in primary care is still too technically based. Good interpersonal skills are especially necessary in a primary care level if the physician is going to understand the full extent of the patient's problem.

Interpersonal skills are also needed for physicians to work effectively as a member of the health care team. Therefore, further resident training may extend the resident's learning experience well beyond technical knowledge and expand the teaching role or learning experiences to include exposure to public health nurses, social workers, nutritionists, psychiatrists and other institutional support systems (Beloff and Willet, 1968; Sadler, 1975). Increased national interest in developing a better health care team approach for organizational effectiveness and to better utilize the scant source of primary care physicians, adds further support for the resident's need to develop interpersonal skills.

Physicians and humanists have already gotten together to explore philosophical and moral questions during a Vanderbuilt seminar. Seminar participants agreed "that the lack of a humanist dimension in the health care field is perpetuated by the way in which doctors and other medical practitioners are selected and educated" (Egerton, 1978, p. 11).

The other major future thrust in primary care training considers the improvement of health care administration. "It is important to develop methods to teach the practitioner skills in the organization and delivery of services" (Reid and Lantz, 1977, p. 301). For a basic example, medical students have little knowledge pertaining to the cost of the most frequently used diagnostic tests.

Medical training only slightly increases this knowledge (Skipper, Smith, Mulligan, 1975). As a result, some medical colleges are adding seminars to the curriculum which examine administrative principles in hopes of improving primary care delivery. "Teaching tools which are objective, reproducible, and relatively inexpensive are needed to assist in the development of organization skills. Such tools should also provide the motivation necessary to alter behavior" (Reid and Lantz, 1977, p. 302).

The practicing physician and health care administrator also need a better understanding of the medical organization. Without such knowledge, the teaching of residents is seriously hampered. Attendance at a recent one week management course designed to expose medical deans to subject areas involved in organizational development and program improvement confirms the medical profession's concern regarding the management of institutions or the management of change. Out of 114 possible American medical colleges, 107 deans participated in the course (Beckhard, 1978, p. 434). Also, an entire issue of the Journal of Applied Behavior Science discussed related areas in organization development for health care. Beckhard (1978) sums up the medical profession's organizational needs as follows: (1) "more diagnosis, organizational planning and managing for change"; (2) "more formal education inside the medical schools as well as in management schools"; (3) "more viable,

usable, transferable diagnostic models"; (4) "more education programs"; and (5) more apprenticeships or joint appointments among behavior scientists in medical schools and hospitals" (p. 436).

Residency training is also beginning to recognize "the need for residents to participate more fully in decisions involving their educational process and their learning/work setting" (Frey, Engebretsen, Olson, Carmichael, 1975, p. 765). By structuring training in this fashion, programs can become more responsive to change. Consequently, the physicians produced are also better able to respond to change. Primary care, the training programs and the profession, need such individuals because change must constantly occur for improvement to result (Frey, Engebretsen, Olson, Carmichael, 1975, p. 772).

In conclusion, the primary care training professional and administrator must build an institutional goal consensus which is consistent with the environment, but not entirely shaped by it. Also, the formation of an adequate organizational structure which incorporates task conflict management is necessary (Weisbord, Lawrence, and Charns, 1978, pp. 301-2). More specific future organizational improvements can then occur from this general base which stand a better chance of being successful: outreach programs; development of course and clinical experiences to expose residents to outlying community problems; administrative

and organizational concerns; and accessibility and availability problems and interpersonal relations. In this manner the primary care profession stands a better chance of competing with the specialists and providing the health care services our country desperately needs.

Summary

In order for Michigan State University's residency training in internal medicine and pediatrics to maximumly benefit from a patient flow study, a general review of relevant areas within primary care delivery is desirable.

First, consider what is primary care and what are some of its distinguishing characteristics. Primary care is characterized within the medical care "subsystem" by a generalist or broad focus of delivery, in contrast to the narrow specialized focus of the secondary and tertiary levels. Distinctions, such as the physician's longitudinal and referral responsibilities and the comprehensive and personal services rendered, characterize primary care delivery.

Delivery of these comprehensive services is directly affected by certain contingencies which exist within the health care's administrative environment. Some contingencies like the general administration dilemma of coordinating diverse and often conflicting functions within an environment where the laws of supply and demand do not hold represent one of many hurdles which as of yet are not fully

researched. Because of this dilemma, the efficiency and effectiveness of delivery is curtailed. Other contingencies--physicians identity, governance structures, economic considerations, the health care team, availability and accessibility and patient flow--exert further pressure which continually bend and shape primary care's administration.

Finally, an educational perspective is needed. More specifically, a commentary on graduate medical education in primary care--the final stage in preparing the resident to assume the physician's role--best serves this purpose. Lack of national consensus regarding primary care residency training's goals and objectives, and a national lack of clarity regarding the role of the faculty and the programs they teach make the residency experience and the future physician's practice somewhat diffuse.

Considering these factors in their proper relation, guarantees a higher probability that the results of a patient flow study will more positively impact Michigan State's Clinical Center. Thus, the residents and the physicians, through the clinic experience can more efficiently and effectively service their patients. Educational enhancement follows through conscious and subconscious association and experience of being a part of a more productive environment.

CHAPTER III

METHODOLOGY AND RESEARCH DESIGN

Introduction

Chapter III describes the methodology and research design utilized to investigate and analyze patient flow during residency training at Michigan State University's Clinical Center. After defining the study's population, the research instrument is described. A discussion then relates the procedures used to collect data from the research sample. An examination of the procedure employed to analyze collected data concludes the chapter.

Research Population

The major portion of the study's population consists of pediatrics and internal medicine patients examined and treated at Michigan State's Clinical Center. The attendings, residents, registered nurses and receptionists in pediatrics and internal medicine employed by Michigan State comprise the remaining portion of the population.

The basis of the study's research sample was obtained by applying simple queuing theory principles; particularly, those methods used by Edward Rising, the principle investigator of a University of Massachusetts's

five-member interdisciplinary team which has been working on a project entitled "The Design and Evaluation of Outpatient Systems" (Rising, 1977). Thus, internal medicine and pediatric patients, attendings, primary physicians and nurses scheduled to work during the nineteen consecutive Monday, Tuesday, Thursday and Fridays comprise the sample. The sample's composition is more precisely illustrated in Tables 3-1 through 3-5.

Table 3-1

Sample Distribution of Professionals

Professionals		No. in Sample	% of Professional Sample
Attendings	- Pediatrics	5	16
Attendings	- Internal Medicine	4	13
Primary Physician	- Pediatrics	7	23
Primary Physician	- Internal Medicine	7	23
Nurses	- Pediatrics and Internal Medicine	8	19
Receptionists	- Pediatrics and Internal Medicine	2	6
GRAND TOTAL		23	100

Table 3-2

Professional Sample Distribution by Sex

Sex	No. in Sample	% in Professional Sample
Female - Primary Physician in Pediatrics	3	9
Female - Primary Physician in Internal Medicine	3	9
Female - Attendings in Pediatrics	1	3
Female - Attendings in Internal Medicine	1	3
Female - Nurses	8	24
Female - Receptionists	2	6
Total Female Professional	18	55
Male - Primary Physician in Pediatrics	4	12
Male - Primary Physician in Internal Medicine	4	12
Male - Attendings in Pediatrics	4	12
Male - Attendings in Internal Medicine	3	9
Male - Nurses	0	0
Male - Receptionists	0	0
Total Male Professional	15	45
GRAND TOTAL	33	100

Table 3-3

Sample Distribution of Patients

Patients	No. in Sample	% of Patient Sample
Pediatrics	161	56
Internal Medicine	126	44
TOTAL	287	100

Table 3-4

Patient Sample Distribution by Sex

Sex	No. in Sample		% of Patient Sample	
Female - Pediatrics	81		29	
Female - Internal Medicine	68		24	
Female - Pediatrics and Internal Medicine		149		52
Male - Pediatrics	77		27	
Male - Internal Medicine	56		20	
Male - Pediatrics and Internal Medicine		133		46
Missing	5	5	2	2
GRAND TOTAL		287		100

Table 3-5

Patient Sample Distribution by Age

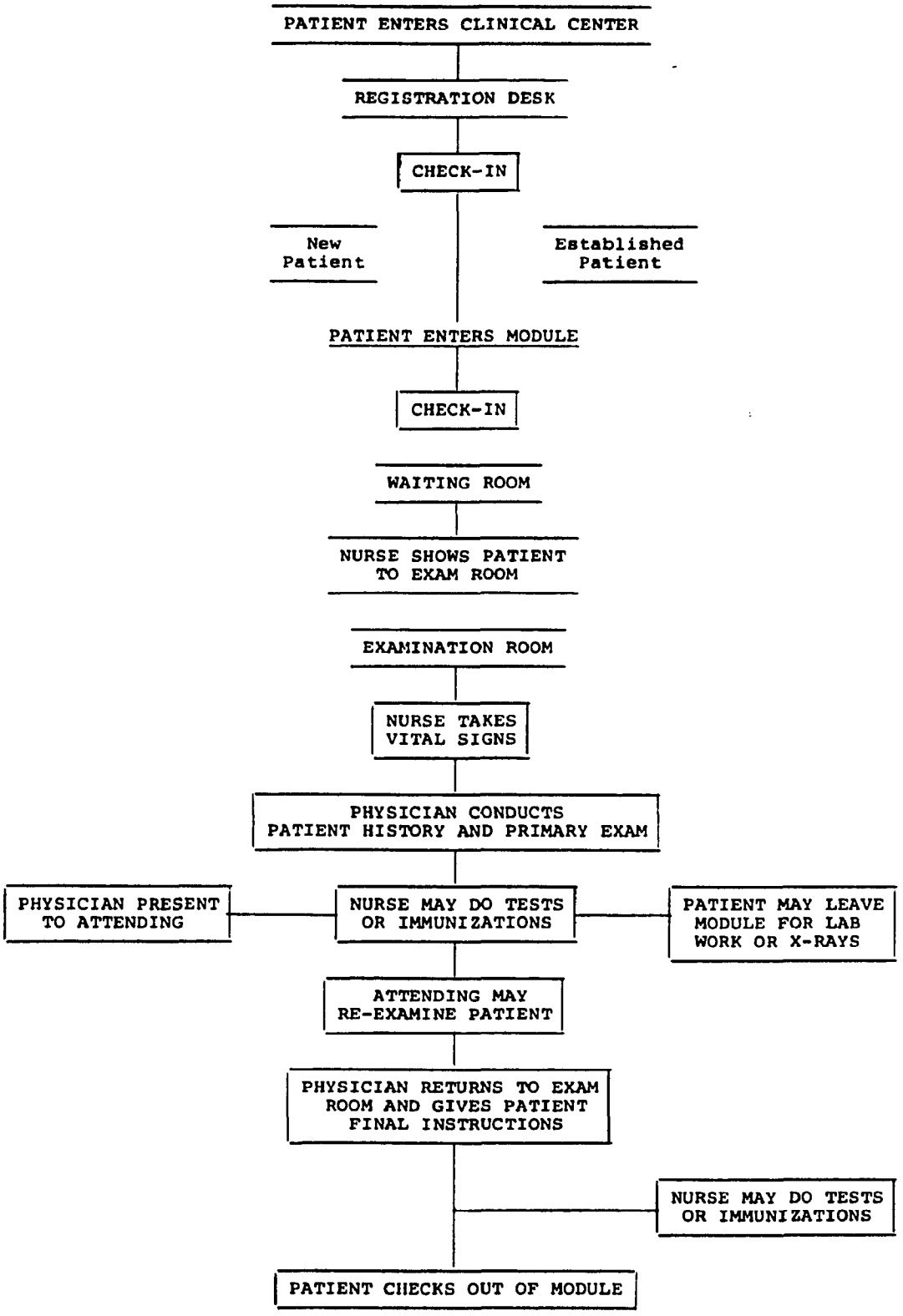
Age	No. in Sample	% of Patient Sample
1 day - 7 years	108	38
8 - 14 years	35	12
15 - 21 years	32	11
22 - 28 years	26	9
29 - 35 years	33	11
36 - 42 years	7	3
43 - 49 years	9	3
50 - 56 years	17	6
57 - 63 years	8	3
Over 63 years	8	3
Missing	4	1
TOTAL	287	100

Research Instrument

The research instrument designed for studying patient flow basically establishes a means for monitoring patients through the medical system. The monitoring process enables the researcher to calculate the service time and the waiting time for each patient. Both the total service time and waiting time measurements are further subdivided into each of the various service stops experienced by the patient, for example, the stop required for taking the vital signs by the nurse or the stop which occurs when the physician takes the patient's history and administers the physical examination or the waiting time spent by the patient in a queue before each service. From the time-measurements obtained, patient flow is analyzed.

When devising the research instrument or monitoring sheet employed at Michigan State's Clinical Center for studying patient flow, three general task objectives are taken into consideration. The first task objective is to determine all the various stops possible during a patient's visit. Walking through the system reveals ten possible spots where time measurements are necessary: appointment time; registration time; post time; vital signs (in and out); primary examination (in and out); attending re-examination (in and out); final instructions (in and out); tests or immunizations (in and out); and total module time (in and out). Figure 3-1 depicts the general service path a patient follows through the Clinical Center. The boxed in captions represent the various timed points in the patient's medical visit. [Note: patients may not experience each stop or may follow a different ordered sequence depending upon the treatments deemed necessary by the physician.]

In order to more completely analyze patient flow, additional information must also be secured. This represents the second task in devising the monitoring sheet. Provisions for the following informational items are provided on the timing sheet: exam room; nurse taking vitals; test; test lag; attending conducting re-examination; appointment time; registration time; post time; resident physicians/ attending handling appointment; patient's sex; patient's reason for visit; patient's problems treated; and sequence


PATIENT ENTERS CLINICAL CENTER
REGISTRATION DESK
CHECK-IN
New Patient
Established Patient
PATIENT ENTERS MODULE
CHECK-IN
WAITING ROOM
NURSE SHOWS PATIENT TO EXAM ROOM
EXAMINATION ROOM
NURSE TAKES VITAL SIGNS
PHYSICIAN CONDUCTS PATIENT HISTORY AND PRIMARY EXAM
PHYSICIAN PRESENT TO ATTENDING
NURSE MAY DO TESTS OR IMMUNIZATIONS
PATIENT MAY LEAVE MODULE FOR LAB WORK OR X-RAYS
ATTENDING MAY RE-EXAMINE PATIENT
PHYSICIAN RETURNS TO EXAM ROOM AND GIVES PATIENT FINAL INSTRUCTIONS
NURSE MAY DO TESTS OR IMMUNIZATIONS
PATIENT CHECKS OUT OF MODULE

of stops by the patient. Other items of interest to the Department of Human Development are also included on the timing sheet.

The third or final task in devising the research instrument is to organize the various components onto the timing sheet. Care is taken to keep the form as simple and as understandable as possible. The actual timing aspects and those informational items which the professional staff completes are contained on the front side of the time sheet, for example, the times "in" and "out" of the various stops, the nurse taking the vital signs and the exam room used. The informational items coded by the researcher--primary physician, attending, patient's sex, patient's birth date, reason for visit, problems treated and sequence of stops--are primarily located on the back side of the timing sheet.

The timing sheet's design also takes into consideration future key punching. The information collected on both front and back sides of the sheet are illustrated such that a key punch operator punches cards directly from the timing sheets, thereby eliminating possible copying errors. [See Appendix A for a sample of the timing sheet utilized.]

Data Collection

The data collection process encompasses those areas which directly or indirectly provide the necessary data to analyze patient flow during pediatrics and internal medicine residency training. More specifically, the processes

necessary for the collection of patient services times; patient waiting times; examination room utilization percentages; and other related patient and professional biographical/informational items previously described in the research instrument section are: (1) equipment and facilities; (2) orientation; (3) data collection; and (4) data processing. A discussion follows describing each of these aspects.

Equipment and Facilities

The patient flow study takes place during pediatric and internal medicine residency training at Michigan State University's Clinical Center. The ambulatory training setting basically houses a registration desk, a module check-in desk, an accompanying waiting area, and a treatment module consisting primarily of nine examination rooms, a nurses station and physician conference space. Within these confines the study takes place.

To accurately collect time measurements requires a time-date stamping machine. Three identical twenty-four hour clocks are rented from Simplex to serve this purpose. Each clock imprints on paper the date and the hour to the one hundredth of a second.

The time-date clocks are strategically located within the facility to allow quick and easy access. One clock is located at the appointment module check-in desk where the patients report after the registration procedures

are performed. The remaining two clocks are located at the two extreme ends of the centrally located nurses station. This positioning permits quick access for the nurses who primarily handle the taking of the patient's vital signs and administering tests and/or immunizations. The positioning, also, provides easy access for the primary physicians and attendings performing their various patient treatment responsibilities. Generally, one of the clocks at the nurse's station handles a set of four or five examination rooms and their respective physicians; the other clock suffices for the remaining four or five examination rooms and the physicians using them.

Orientation Program

An orientation period helps guarantee a successful study in two ways. First, the medical staff needs an opportunity to become familiarized not only with the purpose of the study, but also with the specific procedures they must follow. The researcher is also afforded a trial run period. Alterations in procedures, etc., if needed, may be implemented without any serious loss or misrepresentation of data. Thus, an orientation program is of great benefit.

The orientation period for the study was conducted in three phases over a three-week period. During a scheduled meeting of the entire medical staff, the general purpose of the study--to analyze patient flow during pediatric and internal medicine residency training--was

introduced. The staff was also instructed as to the general procedural steps. The meeting concluded with a question and answer session.

In the second phase, conducted one week later, each participating staff member received a memo reiterating major points of the general meeting and identifying that particular person's specific role in the study and the specific procedures which she/he must follow. The memo also alerted the staff member to the third orientation phase. Questions were also encouraged during this phase.

One week after receiving the memo, the final orientation stage or the trial run began. Prior to starting each clinical session, the appropriate medical staff members were again briefed and encouraged to ask any question regarding their procedures in the time study. Each medical staff member participated and was supervised in handling their specific procedures for at least two patients. Thus, the medical staff was fully prepared when the study began on the following Monday.

Data Collection Procedures

In order to fully understand the patient flow study, the clinical center's procedures as augmented by this study are highlighted.

Before the arrival of any patients, the Clinical Center prepares the day's appointment schedule. First, a Clinical Center staff member enters the day's appointments

onto a daily appointment sheet which is given to the receptionist at the registration desk. The medical records office is also alerted as to that day's expected patient appointment schedule. They in turn deliver the day's medical records of established patients to the nurse's station. Finally, the appointment schedule sheet is transcribed onto the conference room's blackboard where nurses and physicians may refer to it. Now the Clinic is ready to receive the first patient.

Upon entering the Clinical Center, the patient initially stops at the registration desk. At this point, the receptionist--after syncronizing her watch to the time clock--writes the registration "time-in" on the patient's encounter form. New patients receive a Clinical Center card, a blank medical record and an encounter form. Established patients are only given an encounter form. The patient is then instructed to go to the appointment module and his/her name is crossed off the receptionist's appointment list. [Note: the encounter form is routinely used by the Clinic as a medical record of the appointment.] The form documents the reason for the visit, the problems experienced, the health care charge, the treatment procedures, the orders given and the disposition. [See Appendix B for a sample encounter form.]

From the registration area the patient proceeds, paper work in hand, to the appointment module. At the

module's entrance the patient gives the encounter form--and medical record, if the patient is new--to a staff member seated behind a desk. The staff member receives the patient's paper work and instructs the patient to have a seat in the waiting area. The receptionist then punches the time sheet under "Total Module Time - IN." After paper clipping the time sheet to the patient's encounter form, the receptionist walks the paper work to the nearby nurses station.

At the nurse's station, the nurse punches the time sheet on the left hand side of the "Total Module Time section--this clocking represents the "post time"--and matches the patient's paper work to the patient's medical records. As soon as an examination room becomes available, the nurse uses the encounter form to call the patient to his/her examination room and punches the time sheet under "Vital Signs Taken-IN." After taking the patients vital signs, the nurse then uses the time clock to punch the time sheet under "Vital Signs Taken-OUT" and appropriately initials and writes the examination room letter on the time sheet. The medical records together with the time sheet and encounter form are deposited into a holder next to each examination room's door. The nurse then writes the patient's examination room letter next to the patient's name on the conference room blackboard.

The physician is signaled that the patient is ready to be examined by the recording of the patient's examination

room letter on the blackboard. Before entering the examination room, the physician first uses the time clock to punch the time sheet under "Primary Examination-IN." The primary physician then proceeds to complete the patient's medical history and to give the physical examination. After completing the examination, the physician leaves the room, punches the time sheet under "Primary Examination-OUT" and proceeds to present the patient to the attending physician. Depending upon the resident's presentation, the attending may opt to re-question or re-examine the patient. If this procedure is elected, the time sheet is appropriately initialed and punched under "Attending Re-examination-IN" and "Attending Re-examination-OUT." Ideally, tests or immunization are performed by the nurse during or directly after the attending's re-examination. If tests or immunizations are deemed necessary, the time sheet is appropriately initialed and punched under "Test or Immunizations Done By Nurse-IN" and "Test or Immunizations Done By Nurse-OUT." A provision in the time study is also made for the event that the patient must leave the module entirely due to required lab work or x-rays. The module nurse or physician punches the time sheet under "If Patient Leaves During Examination-OUT" and "If Patient Leaves During Examination-IN," respectively.

Once the patient proceeds through his/her module stops, the appointment module ends. The patient then carries his/her paper work to the appointment module

receptionist who in turn punches the time sheet under "Total Module Time-OUT." The receptionist separates the medical history and record form from the encounter form and the time sheet. After paper clipping the encounter form and time sheet together, the paperwork is deposited in a labeled box. A patient may also schedule his/her next appointment at this time.

Data is collected for the patient flow study during nineteen consecutive half day Clinic sessions excluding Wednesdays. These days are Monday and Friday from 1:00 p.m. to 5:00 p.m.; Tuesday and Thursday from 8:00 a.m. to 12:00 noon. The morning and afternoon schedules for each day alternate. For example, on the second Monday, the morning session is timed, instead of the afternoon; on the third Monday, once again the afternoon session is timed. Also, during the entire course of the study, an individual is present to advise and supervise the study's implementation.

Data Processing

The encounter forms and time sheets which are collected at the end of each half day clinical session are ready for the coding of the informational/biographical data. The data items previously cited as being designed into the time sheet are now coded by hand for each patient; including the additional items needed by the Department of Human Resources. Thus, thirty-three items are coded primarily from the encounter form onto the time sheet. Such items as

the examination room and the initialed procedures generated during the patient's visit are also coded directly from the time sheet. For the purpose of coding the patient's health problem or problems, the International Classification of Health Problems in Primary Care is consulted--a classification officially accepted by the World Organization of National Colleges, Academies and the Association of General Practitioners/Family Physicians (WONCA) at its General Assembly on November 7, 1974 (Continuing Education, 1975). See Appendix C for the coding listings. [Note: the time/date stamp, as previously discussed, is stamped directly onto the time study form.]

The coded time sheets are ready for key punching. Once computer cards are key punched, the completed data deck is ready for statistical analysis.

Data Analysis

"Most research in education can be classified as one of two types--descriptive studies and those aimed at discovering causal relations" (Borg and Gall, 1974, p. 272). In attempting to improve the health care delivery system for pediatrics and internal medicine residency training at Michigan State's Clinical Center, both types of research designs are employed.

The data is first described through the use of patient flow diagrams and relative frequency histograms. This analysis applies simple queuing theory to judge the

system's effectiveness through the waiting time of patients flowing through the system and the percent utilization of the service facility. The discovery of causal relationships through bivariate correlational analysis, more specifically through Pearson product-moment correlation, clarifies these relationships. Percentages for the absolute facility utilization depict how much the facility is used. A combination of the Statistical Package for the Social Sciences (SPSS) and fortran is employed for transformations; whereas SPSS is used for statistical analysis. A discussion follows which describes the four types of data analysis.

Patient Flow Diagram

The construction of a patient flow diagram describes the pattern of patient flow through Michigan State's Clinical Center during pediatric and internal medical residency training. Very simply, the joining together of appropriately labeled standardized symbols comprises a flow chart.

Four standard symbols adequately explain patient flow: (1) "squares represent services (coded by physician); (2) "diamonds represent decision boxes where patients converge or diverge (coded by the priority systems used)"; (3) "arrows represent the directional flow of patients between the elements of the diagram"; and (4) "rectangles represent possible pools of patients (either external to the system from which the patients are drawn or internal pools that represent patients waiting for service within

the system, although internal pools of waiting patients are often omitted from diagrams)" (Rising, 1977, p. 31). From the symbols, the paths of patients through the Clinical Center is graphically illustrated. Specific labeling of the boxes, rectangles and diamonds identifies the services, decisions and pools of patients, respectively.

"No particular method of drawing flow diagrams should be considered as being correct or incorrect" (Rising, 1977, p. 31). "Usually diagrams with fewer symbols and less detail help the analyst visualize the overall situation, and detailed diagrams help analyze those portions of the system where difficulties or bottlenecks occur" (Rising, 1977, p. 32). Thus, the flow diagram's construction is dependent upon the particular needs or problems of the system in question. The complexity of the priority system's attributes coupled with the resulting basis for decision making, determines to a large degree the complexity of the patient flow chart.

Aside from being a description tool, a patient flow diagram acts as a problem solving device. Inconsistencies and contradictions within the Clinic are revealed through the process of diagramming patient paths and having to prioritize potential decisions encountered by the medical staff when treating patients--from the time that patient enters the facility until she/he departs. Following this analysis procedure often improves patient flow through the conscience attention required when constructing the flow

diagram and priority listings (Rising, 1977). As a result bottlenecks are often discovered. Thus, "attention and a little common sense alone will solve many flow problems, and those that are not solved are highlighted so that they can be given the additional attention they need" (Rising, 1977, p. 27).

The patient flow diagram also serves as an instructional tool for residents and new staff members. The permanent record of how the system is intended to operate may be used initially in orientation sessions, for instructional purposes, or as a point of departure.

In summary, the patient flow diagram defines the paths and priorities that a patient encounters during a medical appointment. Symbols document specific provider services received by the patient. In this fashion, patient flow charts are conducive to either the descriptive, educational, managerial and/or analytical needs of Michigan State's Clinical Center.

Relative Frequency Histograms

The relative frequency histogram is another statistical tool used to describe the basic data required to analyze patient flow at Michigan State's Clinical Center. The graphic representation identifies at a glance the data's variability.

When analyzing data, the first task is usually to define the basic distributional characteristics of the

variables in question. With such knowledge the researcher then selects the subsequent statistical techniques required for further analysis.

The frequency distribution or frequency histogram provides a picture of the phenomenon's variability. Very simply, the frequency distribution, after establishing lower and upper class limits and boundaries, indicates the exact number of cases--discrete or continuous variables--within each class boundary. In other words, the frequency distribution discloses the number of times an outcome falls into various established categories; the frequencies are listed in tabular form. Using the midpoints of each interval and their corresponding frequencies to construct a graphic representation makes the frequency distribution easier to grasp. The resulting graphic representation is called the frequency histogram.

The relative frequency histogram differs from the frequency histogram in one major way. Even though the diagrams are similar, the relative frequency histogram plots the percentage of events or occurrences that fall in the various class intervals instead of the raw frequency. Thus, to construct a relative frequency diagram, an ordinary frequency histogram is first constructed. Then the number of events in each class interval is transformed to a percentage of the total amount of data being plotted.

Construction of relative frequency histograms for the various service times, waiting times, summary times,

facility utilization, and informational variables--primary physician, attending, patient's birthdate, the reason for the visit, the problems treated and the sequence of stops encountered in the visit graphically illustrates information on each variable's distribution, variability and central tendencies. The patient flow chart together with relative frequency histograms thereby provides a straightforward and simple technique for understanding the overall operation of the Clinical Center.

Pearson Product-Moment Correlation

Correlational or "relationship studies are concerned primarily with gaining a better understanding of complex behavior patterns by studying the relationship between test patterns and the variables to which they are hypothesized to be related" (Borg and Gall, 1974, p. 321). In other words, a single number or a correlation coefficient expresses the degree of variation or change one variable has in relation to the variation of another variable. The correlation coefficient also may compare the strength of association between two different pairs of variables, instead of just the strength of association between a single pair of variables.

The Pearson product-moment correlation is appropriate for analysis of variables which are measured at the interval or ratio level and for ordinal level variables with many categories. Thus, continuous scores most

frequently utilize this correlational technique due to the small standard of error generated.

The Pearson product-moment correlation coefficient is symbolized as r scores which determine the "goodness of fit" measure of the regression line. A + 1.0 or - 1.0 r score denotes a perfect fit. The negative r score means an inverse relationship exists between the two variables while a positive r score connotes a direct relationship. When there is lack of a linear relationship between the two variables, the r score will be close to zero or the regression line is a poor fit to the data. Therefore, as the r score value approaches + 1.0 or - 1.0 a strong linear relationship exists in either a positive (+1.0) or negative (-1.0) direction. As the r score value approaches zero, little or no relationship exists between the variables.

In the patient flow study the informational, service, wait, and summary time variables are correlated to determine the existence of relationships. Such relationships are important for understanding and improving patient flow.

Facility Utilization

The percentage of facility utilization is another means employed to describe and analyze patient flow at Michigan State's Clinical Center. The percent utilization figure of the service facility provides another measure to judge the facility's efficiency. Quite obviously, an efficient facility is in use 100 percent of the time. The

lower the utilization percentage, the lower the facility's efficiency due to the existence of idle space and equipment. Therefore, good facility utilization maximizes the use of fixed resources.

In the present patient flow study, the periods of time a patient spends in an examination room determines facility utilization--the service variables time plus Waits 4-9 minus the lab work and/or x-ray variable time. Utilization for each of the nine examination rooms is calculated separately to analyze if any one room is severely under-utilized and to what extent. The percentage for room utilization is figured for each room by totaling the utilization time for all the patients in a respective room for all the possible days and then dividing by the maximum utilization time available (240 minutes times 19 days). [Note: utilization figures reflect half day periods since the study is conducted only during either morning or afternoon Clinic sessions of equal four hours or 240 minutes in length.] Another graph reveals facility utilization in a different manner by combining all the examination rooms and breaking down facility utilization into the four days of the week during which the study was conducted--Monday, Tuesday, Thursday and Friday. The minimum and maximum percent utilization for each day of the week is calculated by summing all the patient utilization time for all the rooms on a given day of the week and then dividing by 240 minutes

times the number of days for each day of the week sampled. Graphs and tables show minimum and maximum percent utilization in the above mentioned areas.

Summary

Chapter III explains the methodology and research design employed to analyze patient flow at Michigan State's Clinical Center. After defining the population and the research instrument, a narrative follows which describes the procedures employed for the time study. The chapter concludes with a discussion of the four means of analysis: patient flow diagrams, relative frequency histograms, Pearson product-moment correlations and absolute facility utilization percentages. In other words, Chapter III illustrates what information is generated for the study, how it is secured, and how it is refined.

CHAPTER IV

RESULTS

Introduction

Chapter IV relates the results of the procedures employed to analyze and interpret the data collected as stated in Chapter III. First, the patient flow diagrams are described. The chapter continues with a presentation of relative frequency histograms which depict the variability of pertinent observed variables: informational, wait, service, and summary time. Correlational matrixes relating Pearson product-moment correlation coefficients for the aforementioned variables and percent utilization graphs and charts conclude the chapter.

Patient Flow Diagrams

Graphic representation of the various possible paths followed by patients upon entering Michigan State's Clinical Center best identifies exactly how patients flow through the facility. In other words, a patient flow diagram addresses the first of four steps aimed at maximizing the Clinical Center's resources.

Upon entering the Clinical Center, all patients initially stop at the registration desk. Patients proceed

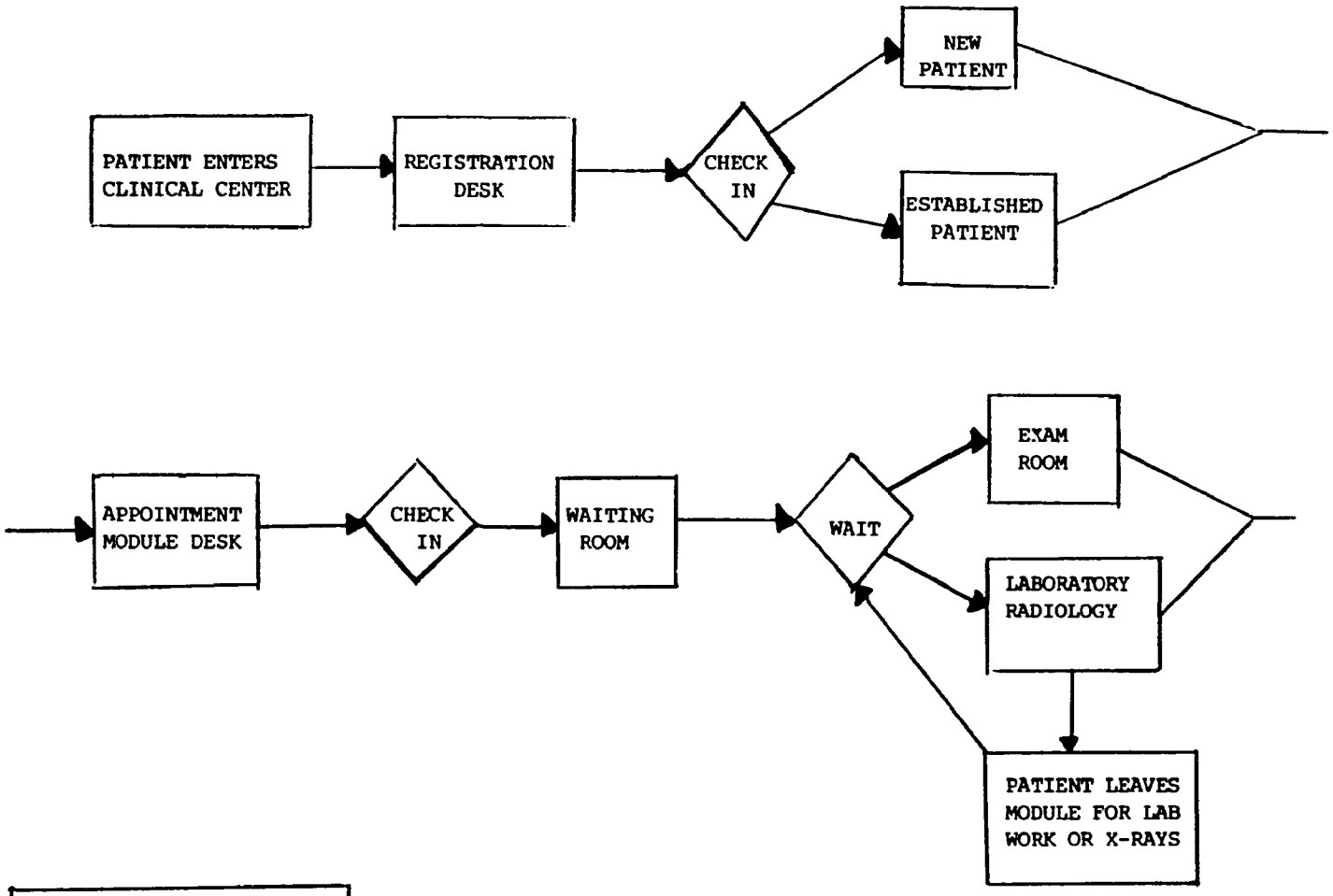
to the appointment module desk and then the waiting room area. At this point the patient either enters an examination room or temporarily leaves the appointment modules--going to the laboratory for lab work or to radiology for x-rays. Once in an examination room the patient may experience a combination of six possible service stops: vitals, primary examination, attending re-examination, final instructions, tests and/or immunizations, lab work and/or x-rays. Each service stop in the combination is preceded by a waiting period.

After the patient receives the services deemed necessary by the primary physician, the patient either schedules his/her next appointment or directly leaves the appointment module. From the appointment module exit the patient leaves the Clinical Center. Figure 4-1 graphically depicts patient flow at Michigan State University's Clinical Center.

Figure 4-2 once again shows patient flow at the Clinical Center. Note that the average time in minutes is shown for each of the service stops. Also included in the diagram is the average amount of time in minutes for each of the nine possible waits experienced by the patient:

Wait 1 - the waiting period from the registration desk to the appointment module desk

Wait 2 - the waiting period from the module-in time to the post time (when the patient's paper work is received by the nurse at the nurse's station)


PATIENT ENTERS CLINICAL CENTER
REGISTRATION DESK
CHECK IN
NEW PATIENT
ESTABLISHED PATIENT
APPOINTMENT MODULE DESK
CHECK IN
WAITING ROOM
WAIT
EXAM ROOM
LABORATORY RADIOLOGY
PATIENT LEAVES MODULE FOR LAB WORK OR X-RAYS
KEY
= Patient Pools
= Direction
= Service Stops
= Wait/Decision

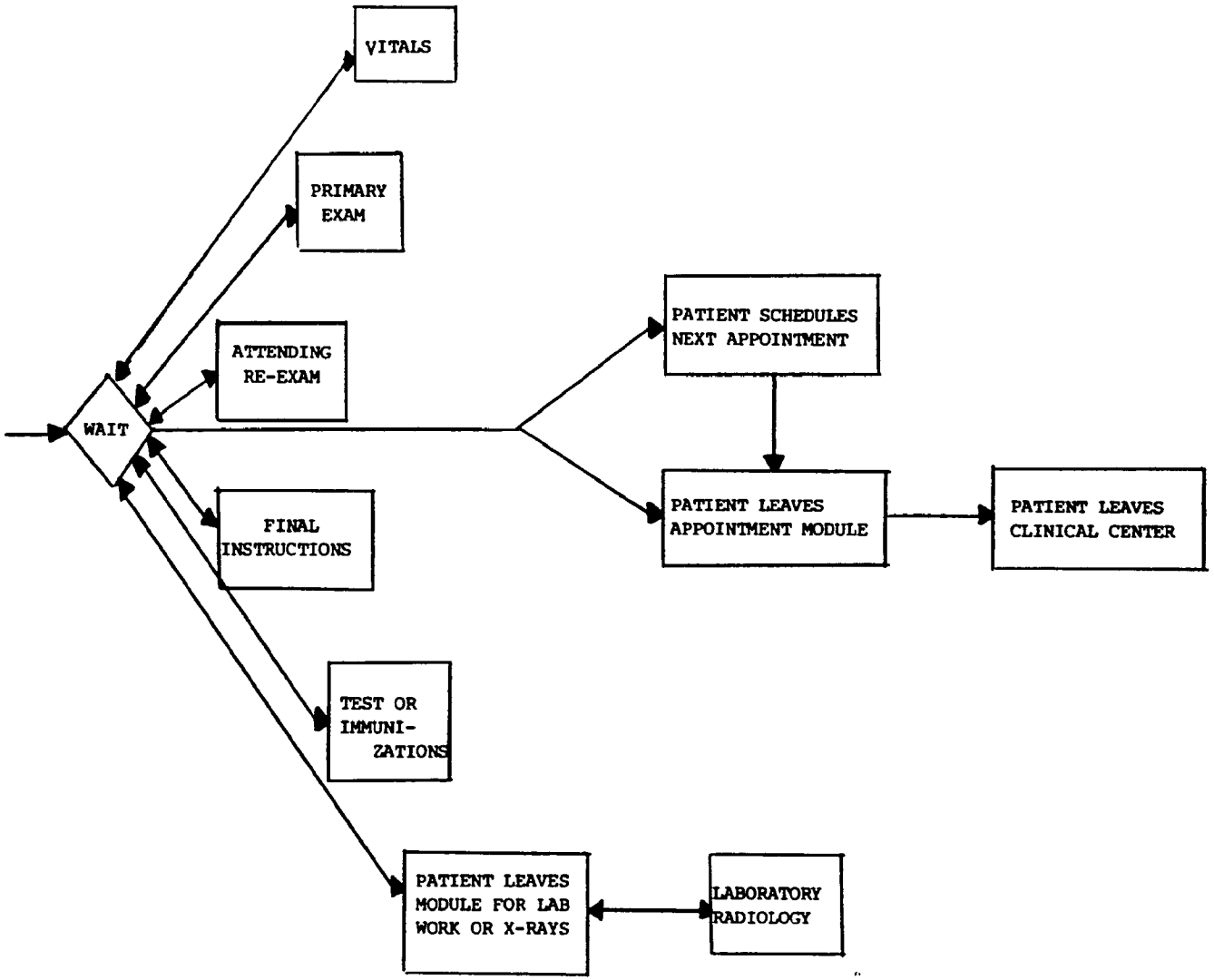
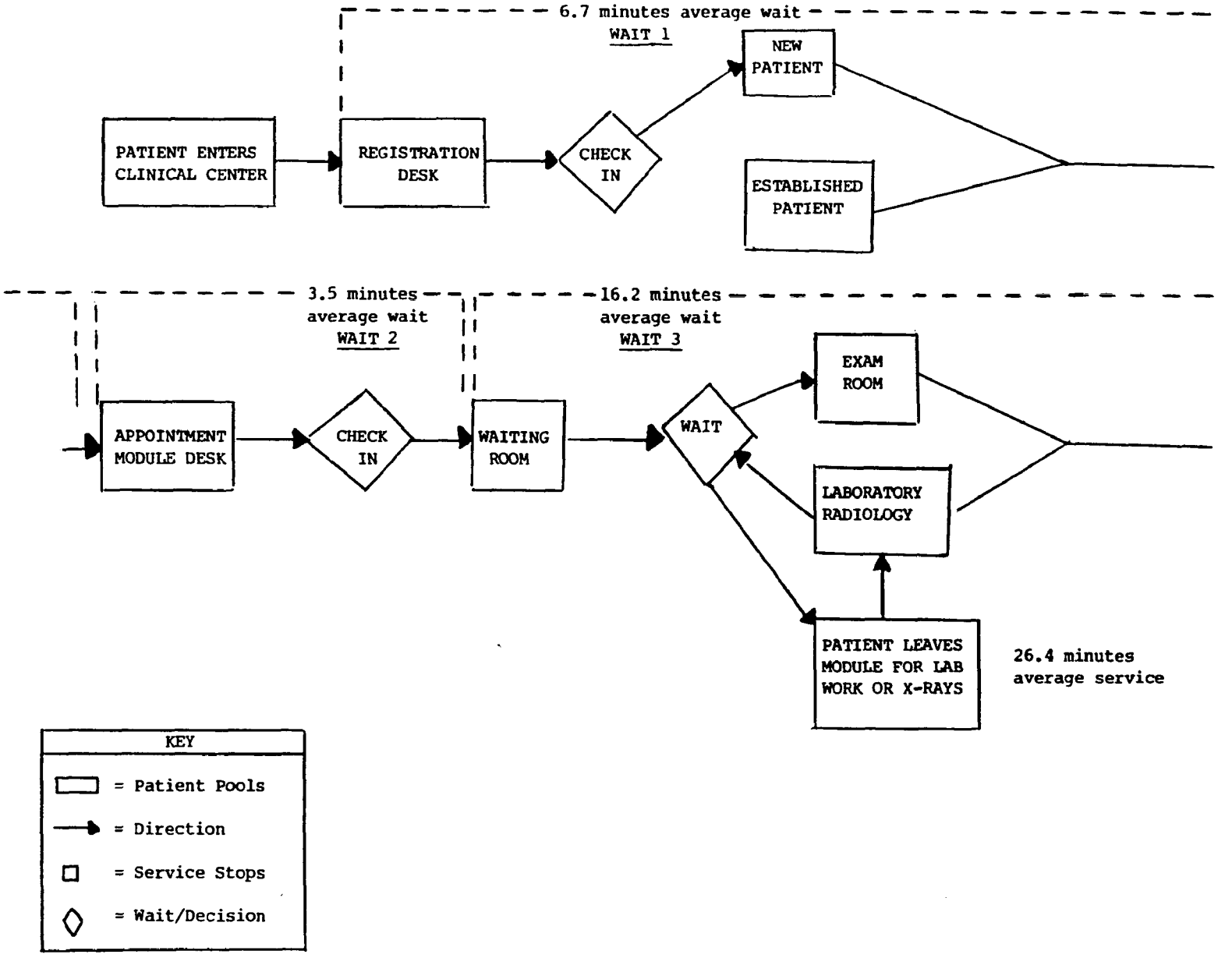


Figure 4-1

Patient Flow Diagram at Michigan State University's Clinical Center


6.7 minutes average wait
WAIT 1
NEW PATIENT
PATIENT ENTERS CLINICAL CENTER
REGISTRATION DESK
CHECK IN
ESTABLISHED PATIENT
3.5 minutes average wait
WAIT 2
16.2 minutes average wait
WAIT 3
EXAM ROOM
APPOINTMENT MODULE DESK
CHECK IN
WAITING ROOM
WAIT
LABORATORY RADIOLOGY
PATIENT LEAVES MODULE FOR LAB WORK OR X-RAYS
26.4 minutes average service
KEY
= Patient Pools
= Direction
= Service Stops
= Wait/Decision

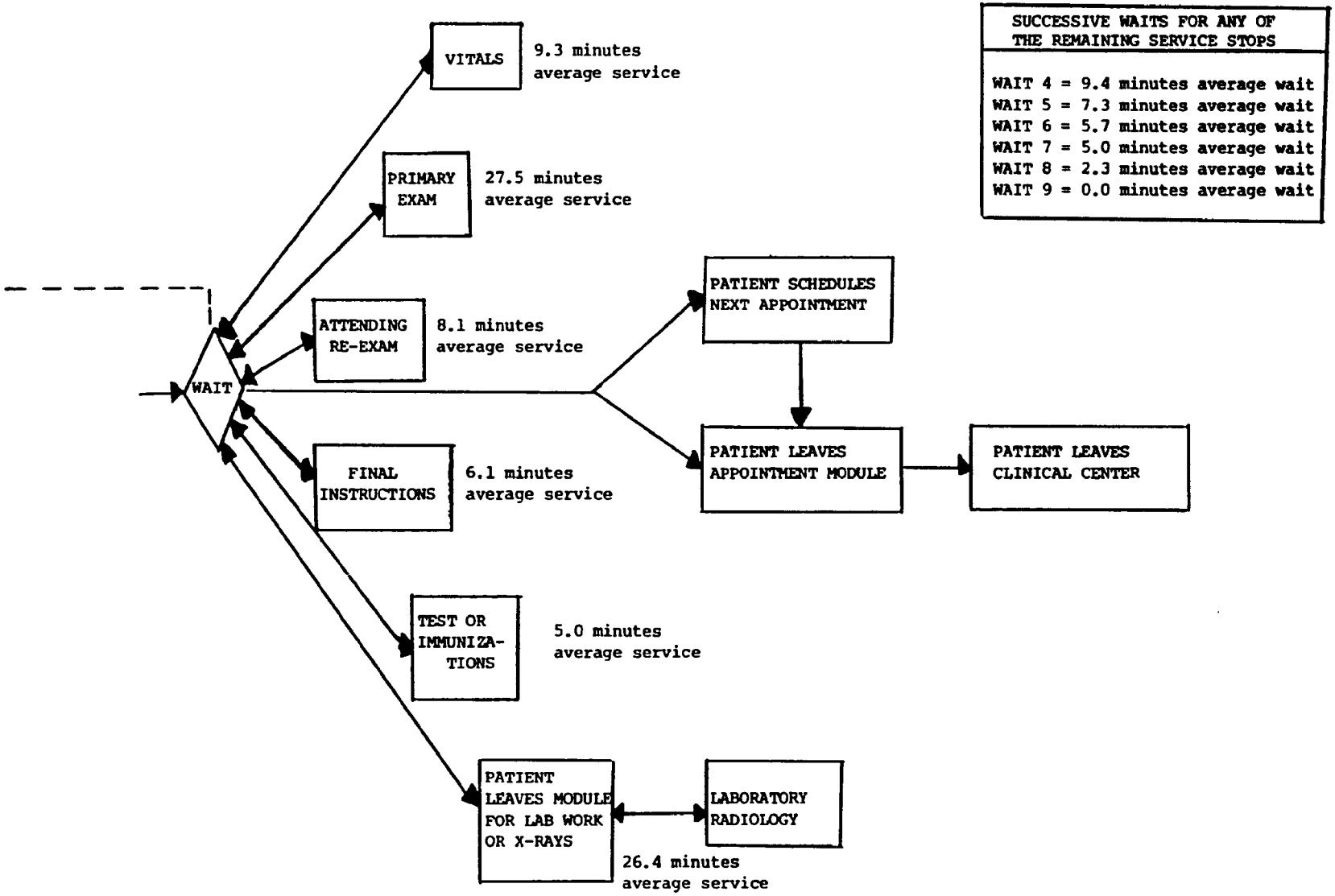


Figure 4-2

Patient Flow Diagram at Michigan State University's Clinical Center
with Average Service and Wait Times

Wait 3 - the waiting period from the post time to the first service stop (vitals, lab work and/or x-rays, primary examination); generally speaking, wait 3 represents the waiting room time

Wait 4 - the waiting period from the first service stop to the second service stop (vitals, primary examination, attending re-examination, final instructions, tests and/or immunization lab work and/or x-rays) or the time period from the first service stop to module-out

Wait 5 - the waiting period from the second service stop to the third service stop (primary examination, attending re-examination, final instructions, tests and/or immunizations, lab work and/or x-rays) or the time period from the second service stop to module-out

Wait 6 - the waiting period from the third service stop to the fourth service stop (attending re-examination, final instructions, tests and/or immunizations, lab work and/or x-rays) or the time period from the third service stop to module-out

Wait 7 - the waiting period from the fourth service stop to the fifth service stop (attending re-examination, final instructions, tests and/or immunization, lab work and/or x-rays) or the time period from the fourth service stop to module-out

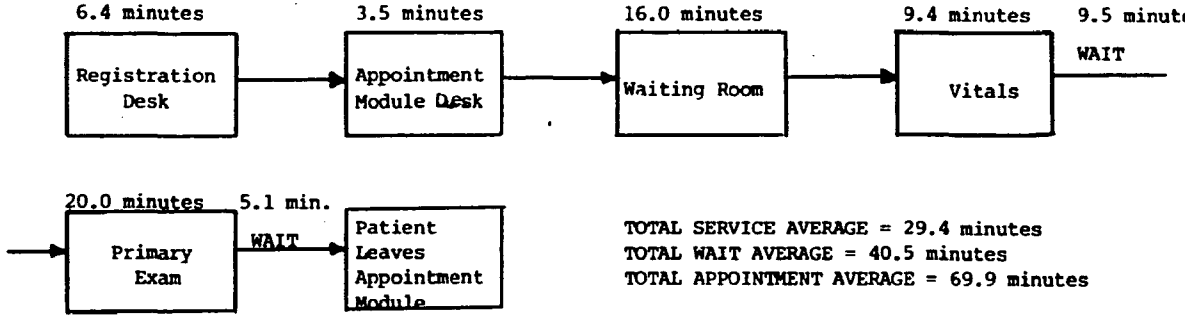
Wait 8 - the waiting period from the fifth service stop to the sixth or final service stop (tests and/or immunizations, lab work and/or x-rays) or the time period from the fifth service stop to module-out

Wait 9 - the waiting period from the sixth service stop to module-out (no cases)

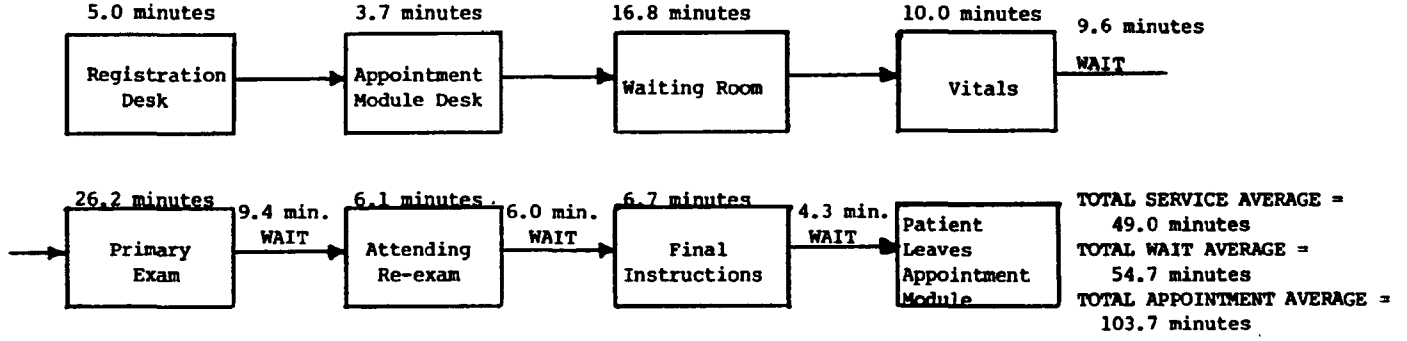
Figure 4-3 identifies the paths of the seven most travelled service stops. These seven paths account for 83.7 percent of the patients visiting the Clinical Center.

Statistics included on the flow diagram are: (1) the average time in minutes for each particular service

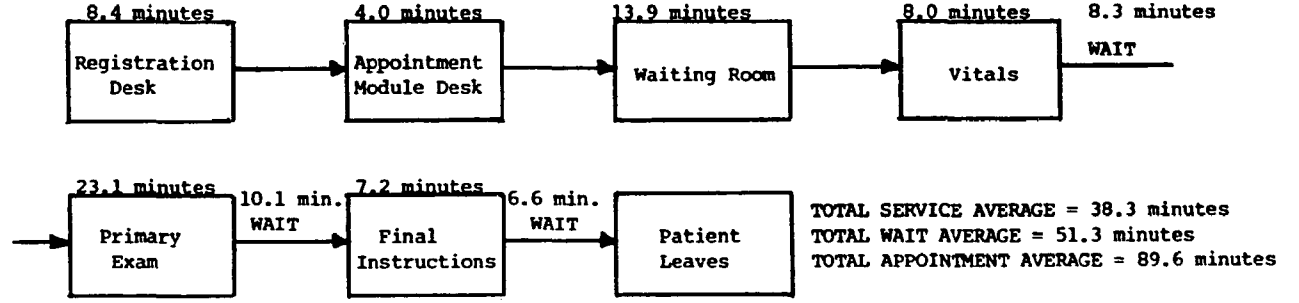
FIRST MOST TRAVELLED PATIENT SERVICE PATH 40.8%



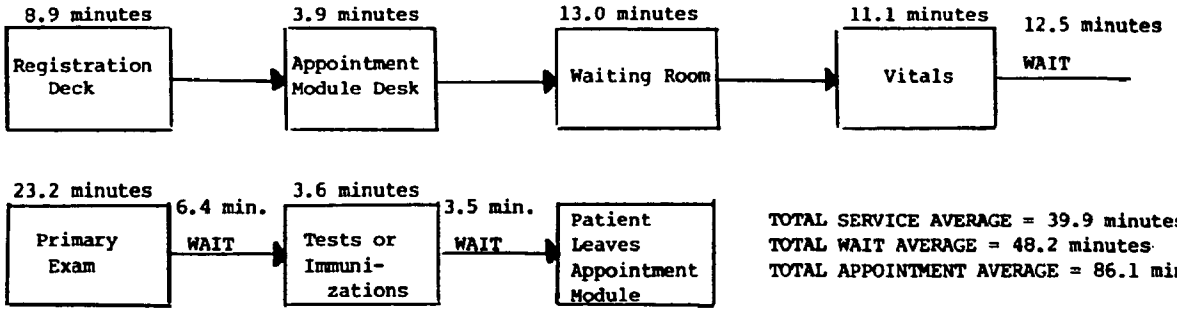
SECOND MOST TRAVELLED PATIENT SERVICE PATH 16.4%



THIRD MOST TRAVELLED PATIENT SERVICE PATH 9.8%

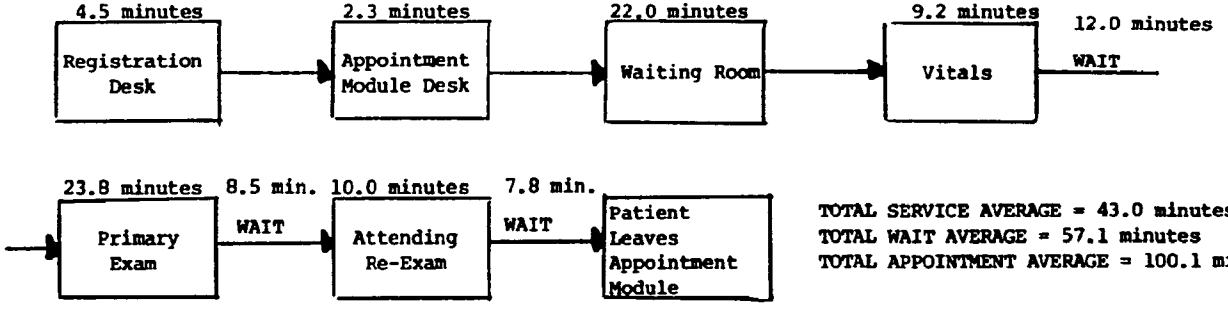


FOURTH MOST TRAVELLED
PATIENT SERVICE PATH
4.9%



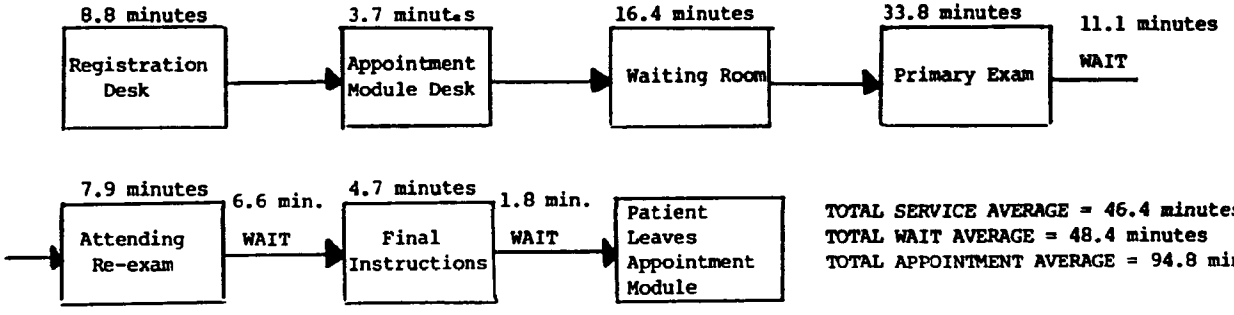
TOTAL SERVICE AVERAGE = 39.9 minutes
TOTAL WAIT AVERAGE = 48.2 minutes
TOTAL APPOINTMENT AVERAGE = 86.1 minutes

FIFTH MOST TRAVELLED
PATIENT SERVICE PATH
4.5%

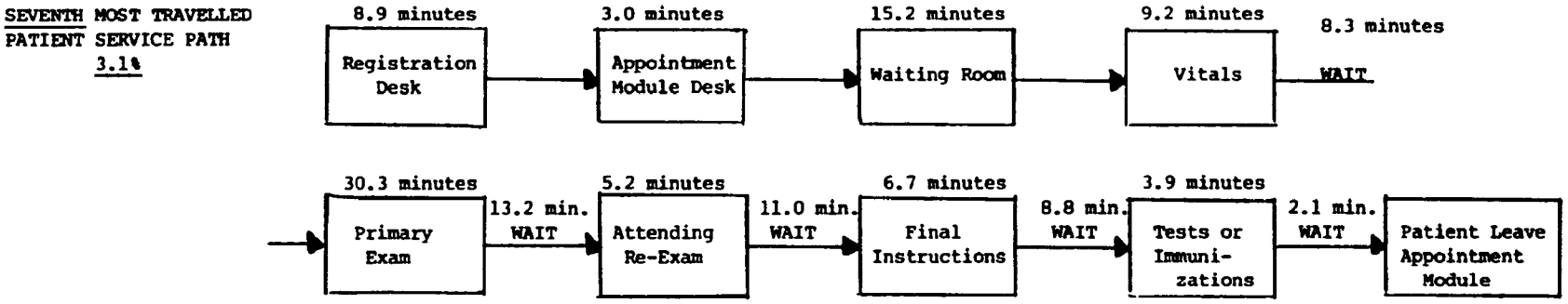


TOTAL SERVICE AVERAGE = 43.0 minutes
TOTAL WAIT AVERAGE = 57.1 minutes
TOTAL APPOINTMENT AVERAGE = 100.1 minutes

SIXTH MOST TRAVELLED
PATIENT SERVICE PATH
4.2%



TOTAL SERVICE AVERAGE = 46.4 minutes
TOTAL WAIT AVERAGE = 48.4 minutes
TOTAL APPOINTMENT AVERAGE = 94.8 minutes



TOTAL SERVICE AVERAGE = 55.3 minutes
TOTAL WAIT AVERAGE = 70.5 minutes
TOTAL APPOINTMENT AVERAGE = 125.8 minutes

Figure 4-3

Patient Flow Diagram at Michigan State University's Clinical Center Identifying the Paths of the Seven Most Travelled Service Stops

stop within the identified path; (2) the average time in minutes for the period of wait between any two service stops within the identified path; (3) the total average service time in minutes for each identified path; (4) the total average waiting period in minutes between each service stop for each identified path; and (5) the total average appointment time. Please note, the average times reported for each of the seven identified service paths are distinct to only those patients travelling that specified path.

Relative Frequency Histograms

The presentation of relative frequency histograms provides a graphic representation of pertinent variables. Understanding the variability of each variable clarifies the number of times during the study that an outcome falls into any of the various designated categories. Thus, the variability of the total time patients spend at Michigan State's Clinical Center, the variability of the various breakdowns of service and waiting periods and the variability of other informational variables provide necessary information for maximizing Clinical Center resources. The histograms which follow are introduced according to the general grouping into which each variable is classified: informational service, wait and summary time.

Informational Variables

Data is collected on thirteen informational variables: (1) the examination rooms used; (2) the primary physician; (3) the attendings; (4) the patient's sex; (5) the patient's year of birth; (6) the reason for the patient's visit; (7) a patient's first problem treated by the primary physician; (8) a patient's second problem treated by the primary physician; (9) a patient's third problem treated by the primary physician; (10) examination rooms used; (11) the number of service stops experienced by a patient; (12) the difference in time between registration and appointment time; (13) the difference in time between module in and appointment time.

The following histograms describe the relative frequency of only the most pertinent variables to the study: Examination room used, number of service stops, difference in time between registration and appointment time, difference in time between module in and appointment time. Those histograms not included in Chapter IV are found in Appendix D.

Figure 4-4 shows the relative frequency of use for the nine examination rooms available for pediatrics and internal medicine. Five rooms have similar relative use: Rooms C, D, E, F, G. Rooms B, H and I are all utilized approximately 10 percent less than the above mentioned rooms. Room J particularly stands out in that it was only used 1 percent of the time.

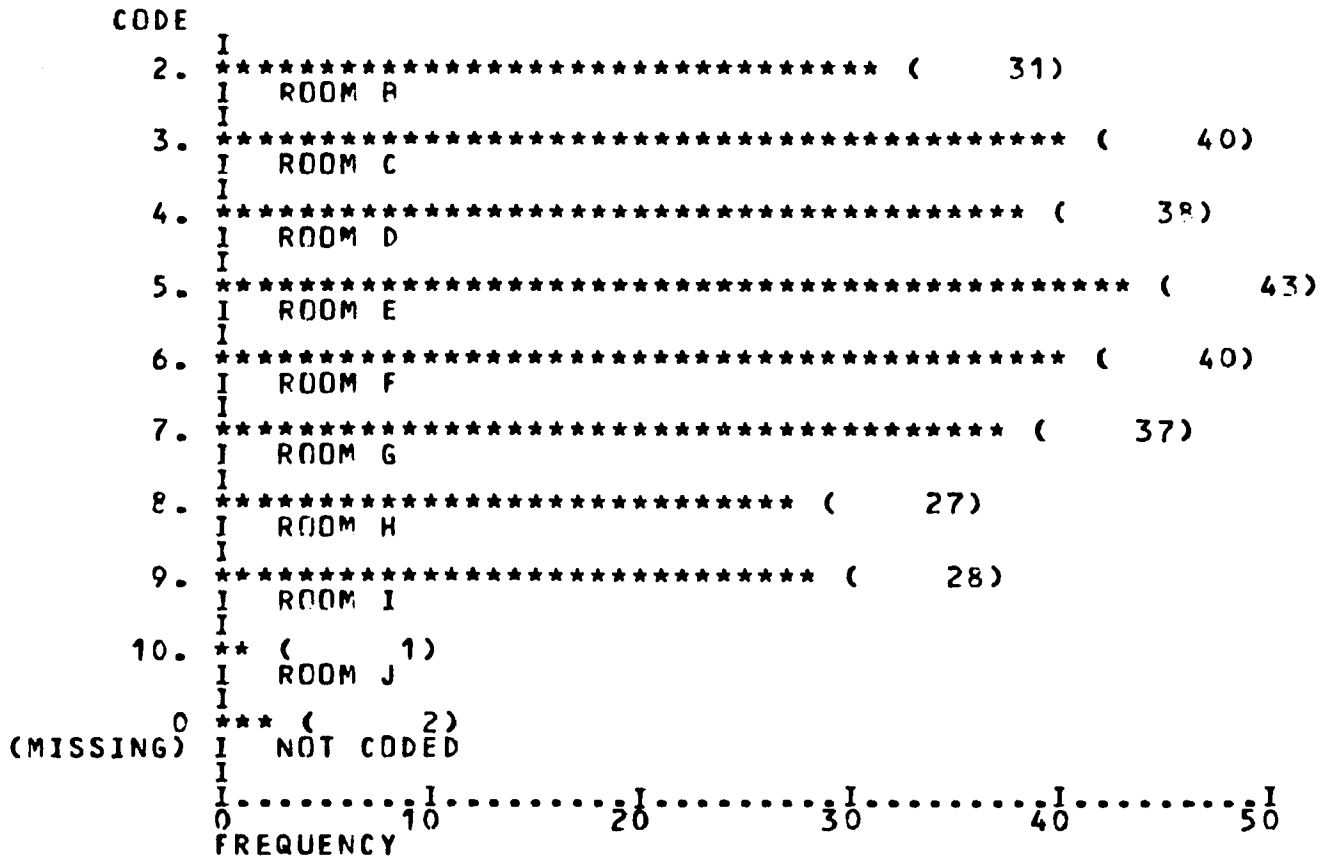


Figure 4-4

The Relative Frequency of
Examination Rooms

A patient visiting the Clinical Center follows a service sequence which contains from one to six possible service stops: vitals, primary examination, attending re-examination, final instructions, tests and/or immunizations, and lab work and/or x-rays. Figure 4-5 reveals that patients during the study experienced as few as one service stop (2.1% or 6 patients) and as many as five service stops (6.3% or 18 patients). The most travelled service sequence path contains only two service stops. In these cases, 44.9 percent or 129 patients visited a combination of two possible service stops: vitals and primary examination (40.8%); vitals and test/immunizations (1%); primary examination and attending re-examination (1.4%); primary examination and final instructions (1.4%); and lab work/x-rays and primary examination (.3%). The least travelled service sequence path contained one service stop. Six patients or 2.1 percent of the sample encountered only one service stop; vitals (.3%) or primary examination (1.7%). Two hundred and three patients, or 70.7 percent of the patients experienced three or four service stop sequences.

During the patient flow study, the registration desk is the first timed period a patient encounters upon entering the Clinical Center. All patients arrive on an appointment basis. Therefore, the difference between the registration and appointment time indicates how early or late the patient arrives for his/her appointment.

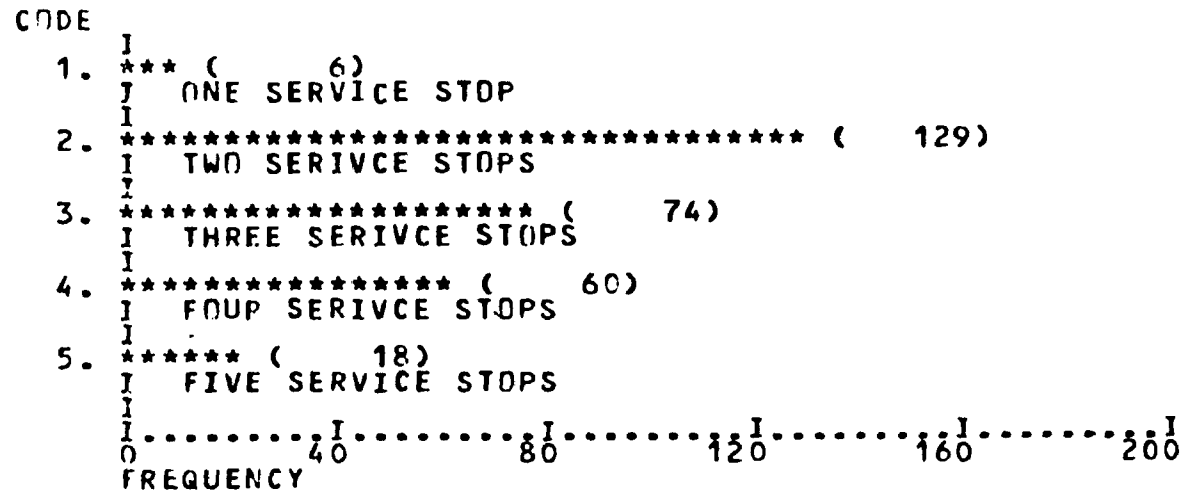


Figure 4-5

The Relative Frequency of The Number of Service Stops Experienced by a Patient

Figure 4-6 reveals that most patients arrive early to the Clinical Center for their appointment--82.2 percent or 236 patients. Fifty-one patients or 17.8 percent of the sample arrived after their scheduled appointment. The arrival time period which most frequently occurs is from twenty-four minutes before the appointment time to the exact appointment time. One hundred seventy-two patients or 59.9 percent of the sample arrived during the above mentioned time interval. The earliest patient arrived two hours and ten minutes early while the latest patient arrived one hour and ten minutes late. In Figure 4-6, the negative numbers equal the number of minutes the patient is early for his/her appointment. Conversely, the positive numbers equal the numbers of minutes the patient is late.

The module-in time represents the time at which the patient enters the appointment module. The difference between the module-in time and the appointment time signifies how many minutes before or after the appointment time the patient enters the appointment module. Note: the waiting room period is included in the appointment module.

Figure 4-7 shows that a little less than half of the patients entered the appointment module before their scheduled appointment time: 43.9 percent of the sample or 126 patients. One hundred sixty-one patients or 56.1 percent of the sample entered the appointment module after

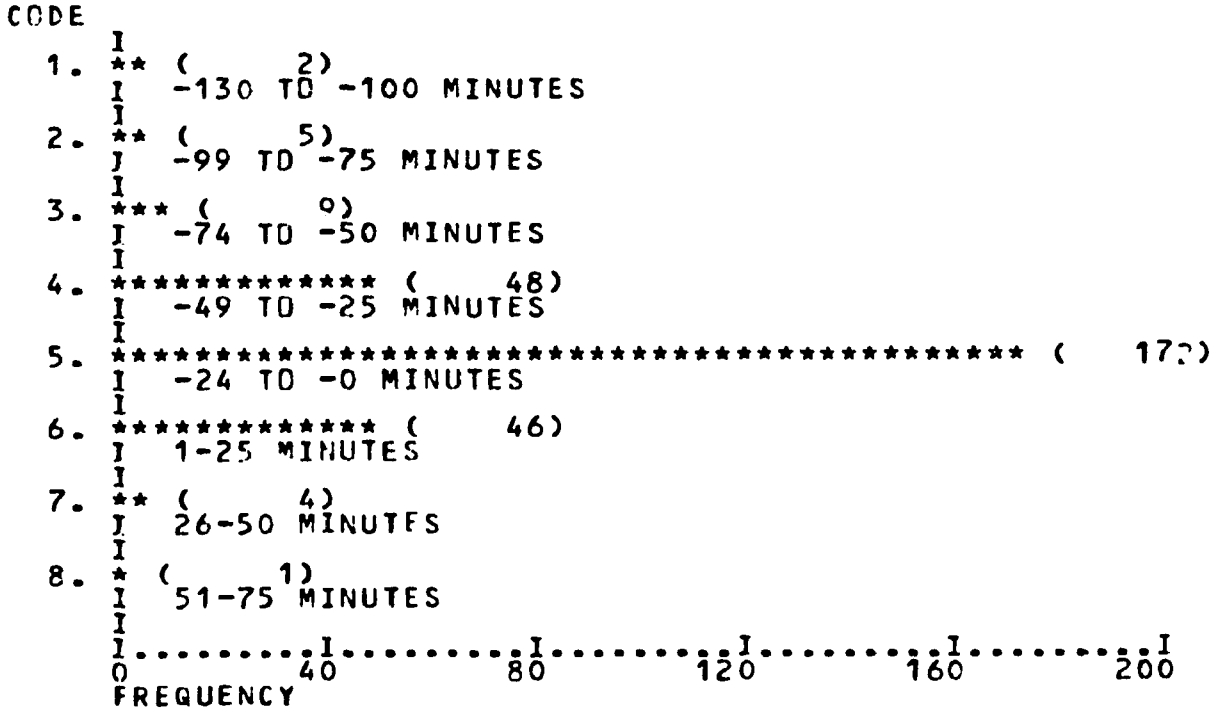


Figure 4-6

The Relative Frequency of the Difference in Time Between Registration and Appointment Time

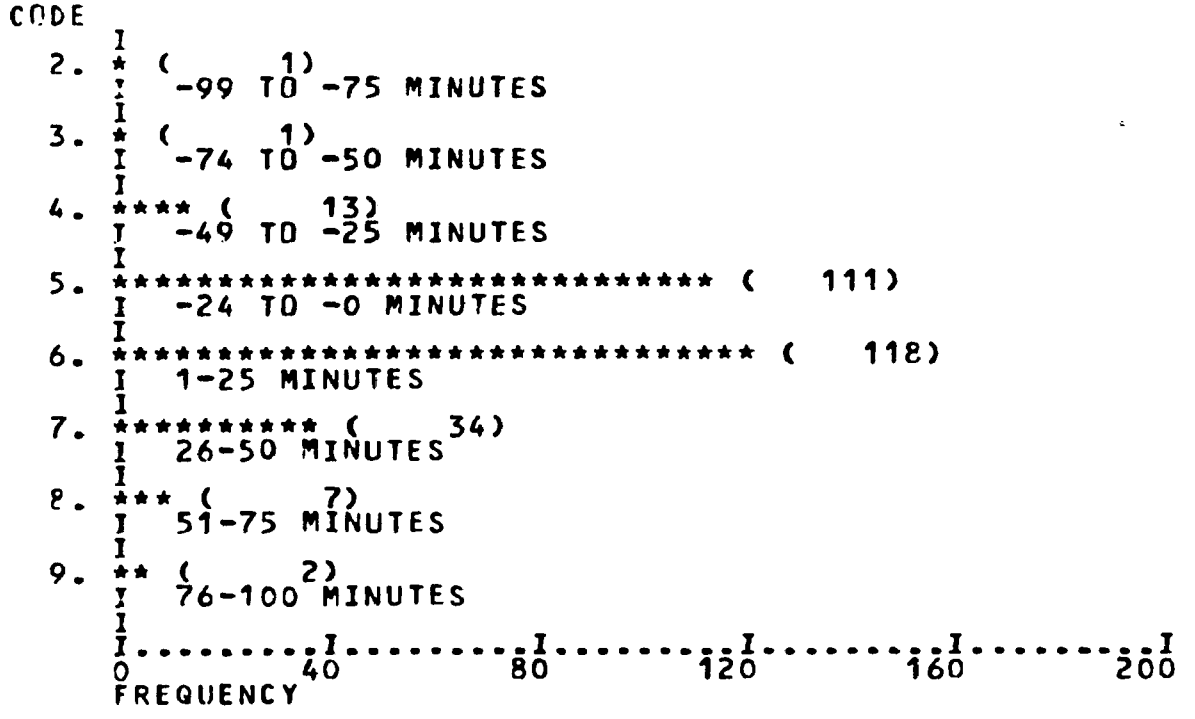


Figure 4-7

The Relative Frequency of the Difference
in Time Between Module-in Time
and Appointment Time

their scheduled appointment time. Two hundred twenty-nine patients or 79.8 percent of the sample arrived for their appointment between 24 minutes before and 25 minutes after their scheduled appointment time. The earliest a patient entered the appointment module was one hour and fifteen minutes before their scheduled appointment time. The latest a patient entered the appointment module was one hour and thirty-three minutes after the scheduled appointment. In Figure 4-7, the negative numbers equal the number of minutes the patient entered the appointment module before his/her scheduled appointment time. The positive numbers represent the number of minutes after the patient's scheduled appointment time she/he entered the appointment module.

Service Variables

During an appointment at Michigan State's Clinical Center a patient could conceivably visit six different service stops: (1) vitals; (2) primary examination; (3) attending re-examination; (4) final instructions; (5) texts and/or immunizations, and; (6) lab work and/or x-rays. The histograms which follow describe the relative frequency of each of the six possible service stops.

Figure 4-8 reveals that a little over half the patients who had vitals taken (253 patients out of a possible 287) experienced a four to nine minute service time: 52.6 percent or 133 patients. Sixty patients or 23.7 percent of the examined sample had their vitals taken in ten to twelve

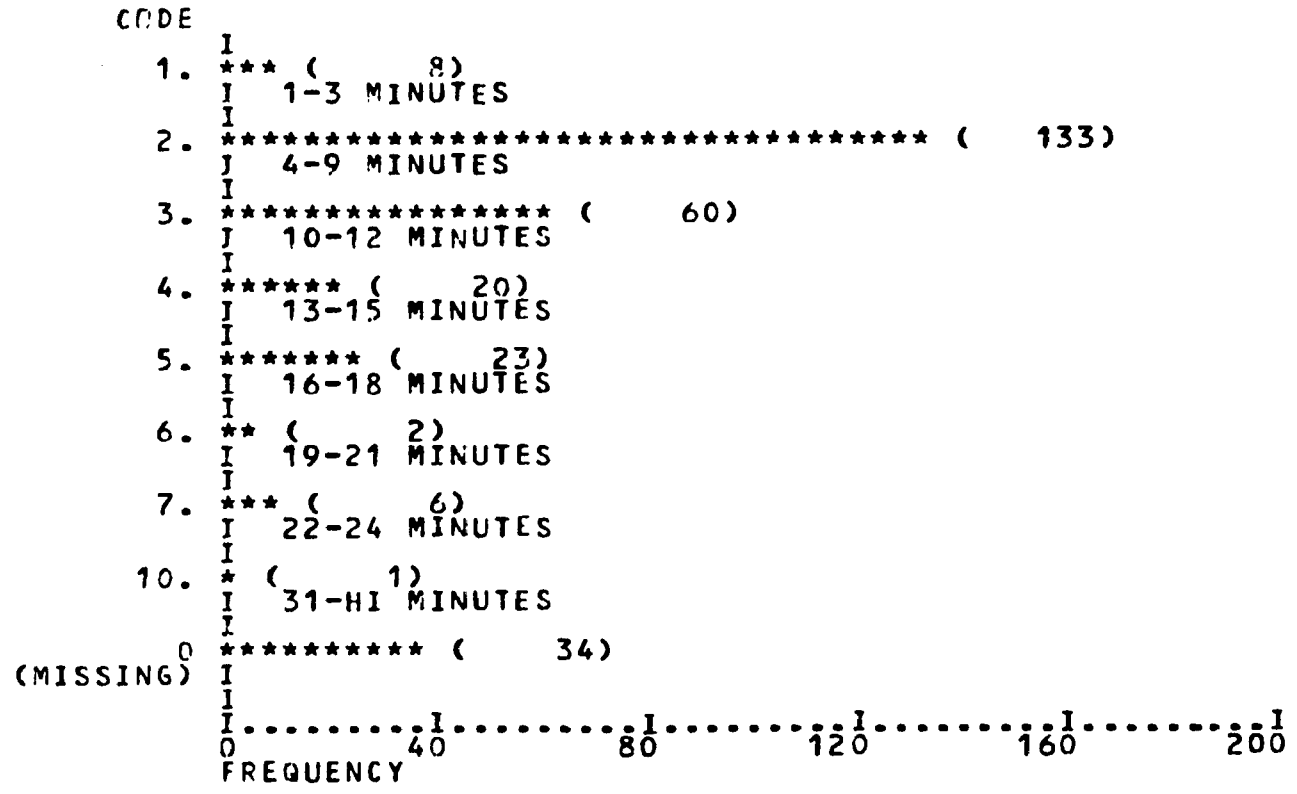


Figure 4-8

The Relative Frequency of the Service Time Required for Vitals

minutes. The shortest period of time for taking a patient's vitals was one minute. The most extreme period of time for vitals was forty-two minutes. However, 79.5 percent of the examined sample or 199 patients spent from four to twelve minutes for the vitals service stop.

All but five of the patients received a primary exam administered by the primary physician. In the vast majority of the cases the primary physician is a resident in pediatrics or internal medicine. The average time for a primary examination is 27.5 minutes; two minutes is the shortest examination period while one hour and thirty-nine minutes is the longest.

The relative frequency histogram indicates that the greatest number of patients (70) or 24.8 percent of the examined sampled received their primary examination in one to fourteen minutes. The second most frequently occurring time interval is fifteen to twenty-one minutes. Sixty-six patients or 23.4 percent of the examined sample fall into this time interval, only a 1.4 percent difference from the most frequent time interval. Therefore, 136 or 48.2 percent of the examined patients had their primary examination administered in twenty-one minutes or less. Eighty-one patients or 28.7 percent of the sample experienced a twenty-two through thirty-five minute primary examination. Thus, 77 percent of the sample or 217 patients received a primary examination in thirty-five minutes or less.

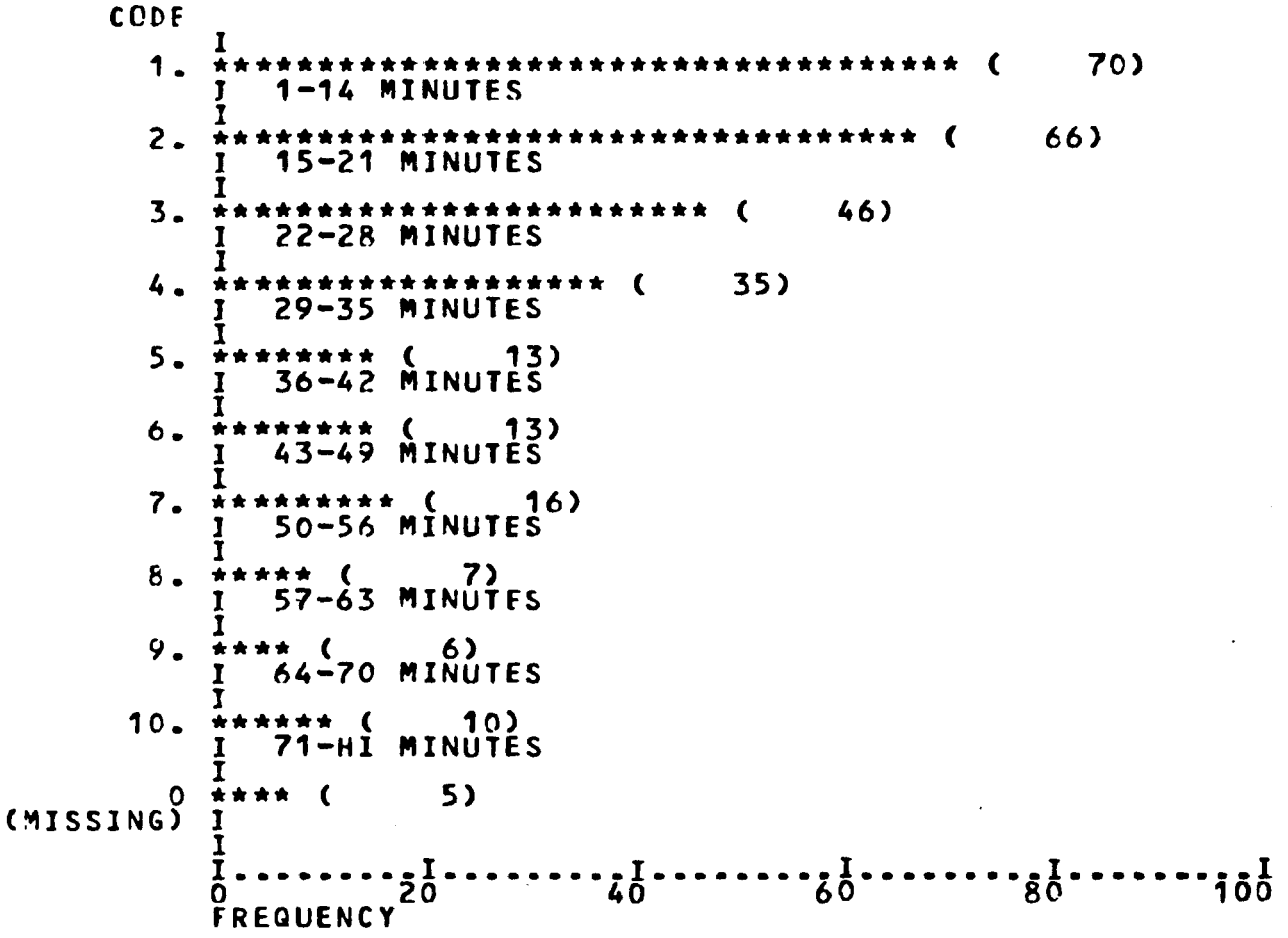


Figure 4-9

The Relative Frequency of the Service Time Required for Primary Examinations

The attending re-examination is administered only in those cases where the attending deems it necessary. As indicated in Figure 3-1, the resident usually presents the patient to an attending after the primary examination. The patient's problem, the experience of the resident and the manner in which the resident presents the patient to the attending determines whether the attending feels a re-examination is required. A re-examination was performed in 103 cases; 184 times a re-examination was not deemed necessary.

Figure 4-10 indicates that the most frequent period of time for an attending re-examination was from four to nine minutes; fifty-four patients or 52.4 percent of the re-examined sample. Nineteen patients or 18.5 percent of the re-examined sample received a re-examination in from one to three minutes. Thus, 70.9 percent of the re-examined sample or seventy-three patients experienced a nine minute or less attending re-examination. When the re-examination was conducted in twelve minutes or less, 84.5 percent or eighty-seven patients received an attending re-examination.

The primary physician makes the determination as to whether or not final instructions are necessary. Final instructions were given to patients 42.5 percent of the time. In other words, 122 patients received final instructions.

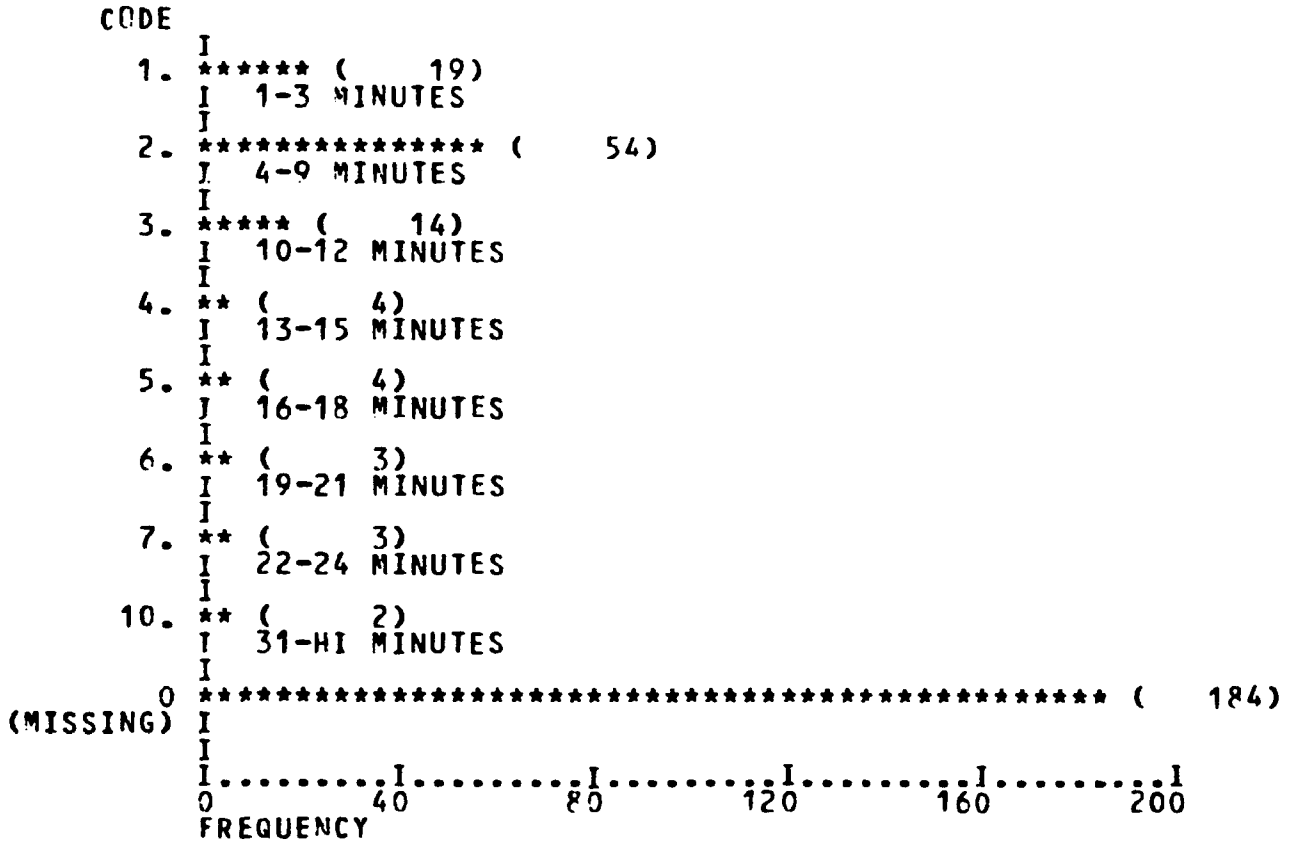


Figure 4-10

The Relative Frequency of the Service Time Required for Attending Re-examinations

Figure 4-11 indicates that seventy-seven or 63.1 percent of the final instructions sub-sample received their final instructions in four to nine minutes. The next most frequent time interval for issuing of final instructions was from one to three minutes: 21.3 percent or twenty-six patients. Therefore, 84.4 percent of the sub-sample or 102 patients received their final instructions in nine minutes or less. The longest period of time taken for a primary physician to give the patient final instructions was twenty-two minutes.

Depending upon the diagnosed problem, the primary physician may elect to have a test or immunization administered by a nurse. Thirty-nine patients or 13.6 percent of the sample received tests or immunizations.

The longest period of time for a test and/or immunization was twenty-eight minutes. The shortest time period was one minute. Figure 4-12 suggests that 51.3 percent of the sub-sample or twenty patients received their tests and/or immunizations in from four to nine minutes. Seventeen patients or 43.6 percent of the sub-sample experienced a one to three minute test and/or immunization service time period. Therefore, 94.6 percent of the sub-sample or thirty-seven patients spent nine minutes or less in the tests and/or immunization service stop.

The final service stop possible for a patient to encounter is for lab work and/or x-rays. In either case,

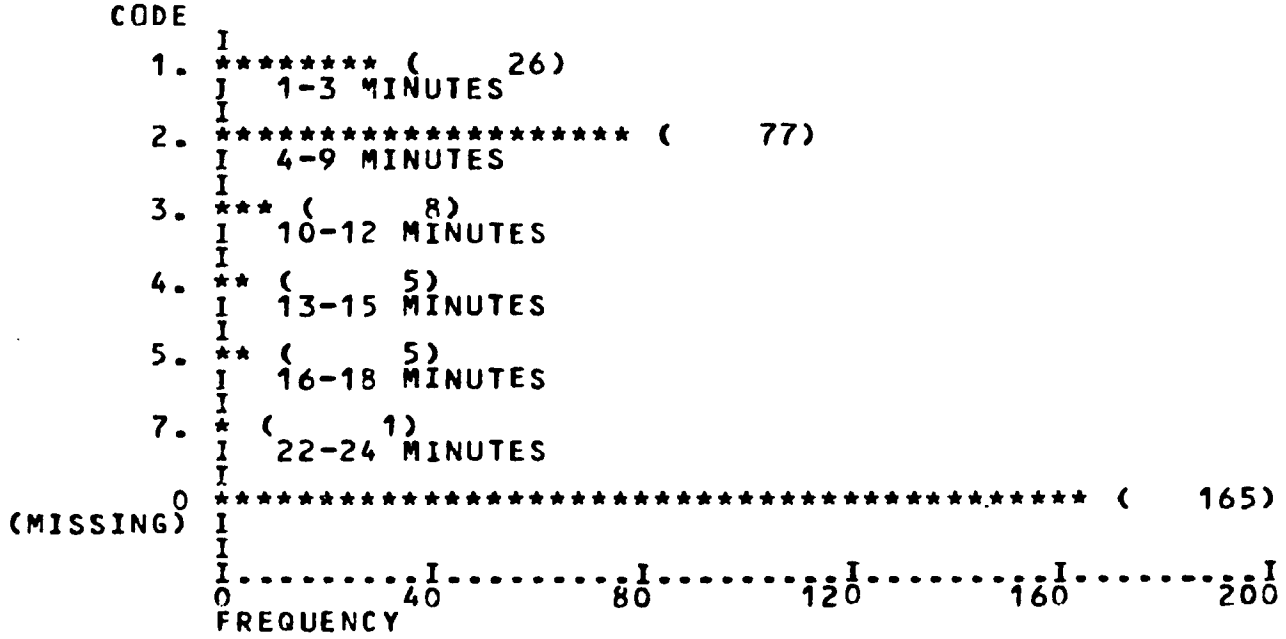


Figure 4-11

The Relative Frequency of the Service Time Required for Final Instructions

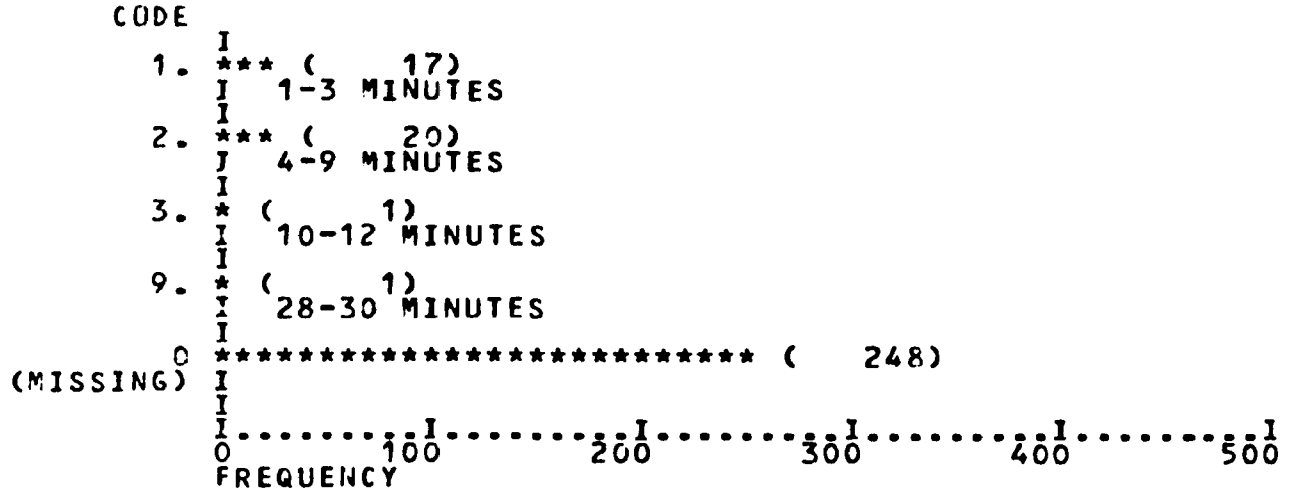


Figure 4-12

The Relative Frequency of the Service Time Required for Tests and/or Immunizations

the patient leaves the appointment module and proceeds to the lab or radiology. The time periods indicated are not the exact service time, but also include the time required for walking to the lab or radiology (relatively short distance) and any waiting time experienced by the patient prior to lab work or x-rays.

Only sixteen patients or 5.6 percent of the sample were diagnosed by the primary physician as requiring lab work or x-rays. Figure 4-13 shows that the most frequent time interval required for lab work and/or x-rays was twenty-nine through thirty-five minutes: four patients or 25 percent of the sub-sample. Three other time intervals--one through fourteen, fifteen through twenty-one and twenty-nine through thirty-five--each had three patients or each received 18.8 percent of the patients. Ten patients or 62.5 percent of the sub-sample received their lab work and/or x-rays in twenty-eight minutes or less. The longest period of time for this service stop was one hour and two minutes; the shortest period was seven minutes. See Figure 4-13 for the relative frequency histogram of the final service stop.

Wait Variables

When visiting Michigan State's Clinical Center a patient may experience as many as nine different waiting periods. These periods are described in depth in Chapter II, Patient Flow Diagrams. The histograms which follow

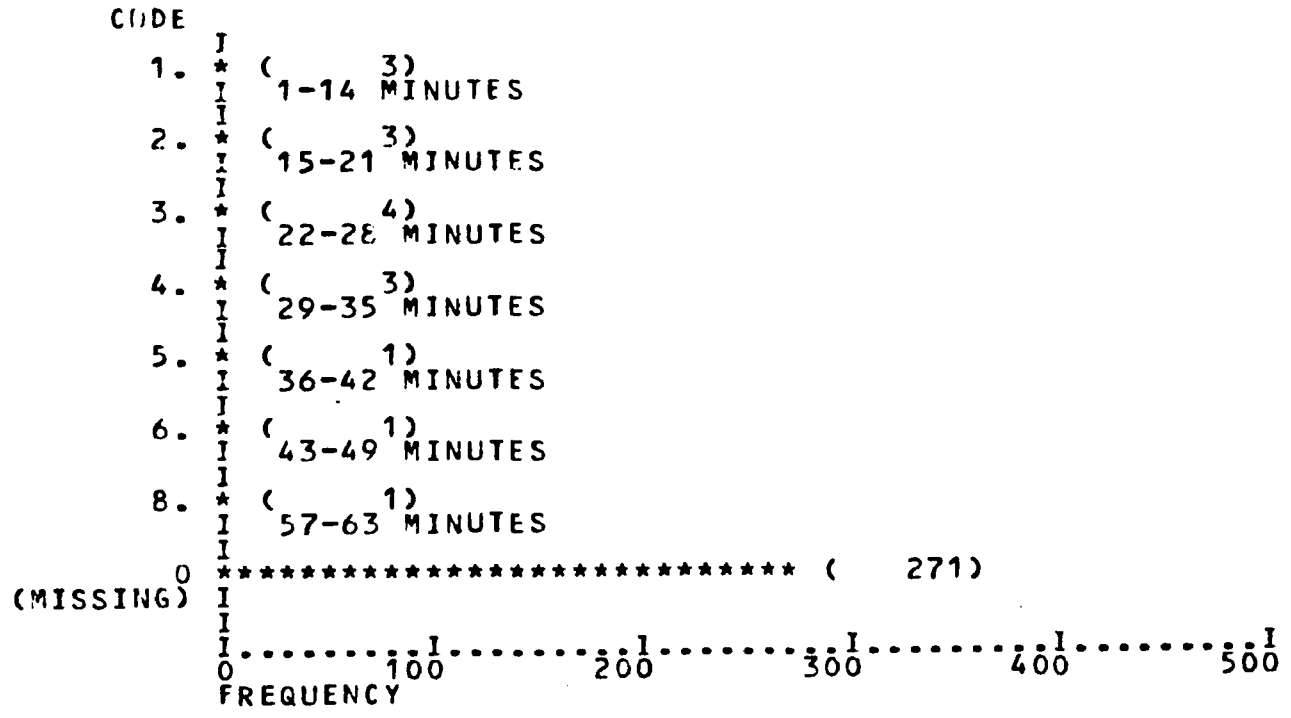


Figure 4-13

The Relative Frequency of the Service Time Required for Lab Work and/or X-rays

present the relative frequency for each of the nine possible waiting periods. Please note that every patient experienced Wait 1 through Wait 3 identically. Wait 4 through Wait 9 began the service stop sequence. The times indicated do not consider which service stop sequence the patient travelled. For example, in Wait 4, the time interval applies to the difference between the first service experienced and the second service experienced, regardless of exactly what the first or second service stop actually is. For the exact waiting time between the seven most travelled service path sequences see Figure 4-3.

Figure 4-14 depicts the relative frequency for the period of time the patient waited from the registration desk to the appointment module desk; in other words, the registration time. The most frequently occurring time interval for Wait 1 was from one to three minutes; ninety-six patients or 33.4 percent of the sample. Forty-four patients or 15.3 percent of the sample experienced no wait. These patients went directly from the registration desk to the appointment module desk and were served immediately at the appointment module desk. Two hundred ten patients or 73.2 percent of the sample waited nine minutes or less, while 248 patients or 86.7 percent of the sample waited twelve minutes or less.

Figure 4-15 shows the relative frequency for the waiting period between the appointment module desk check-in and when the nurse receives the patient's paperwork from

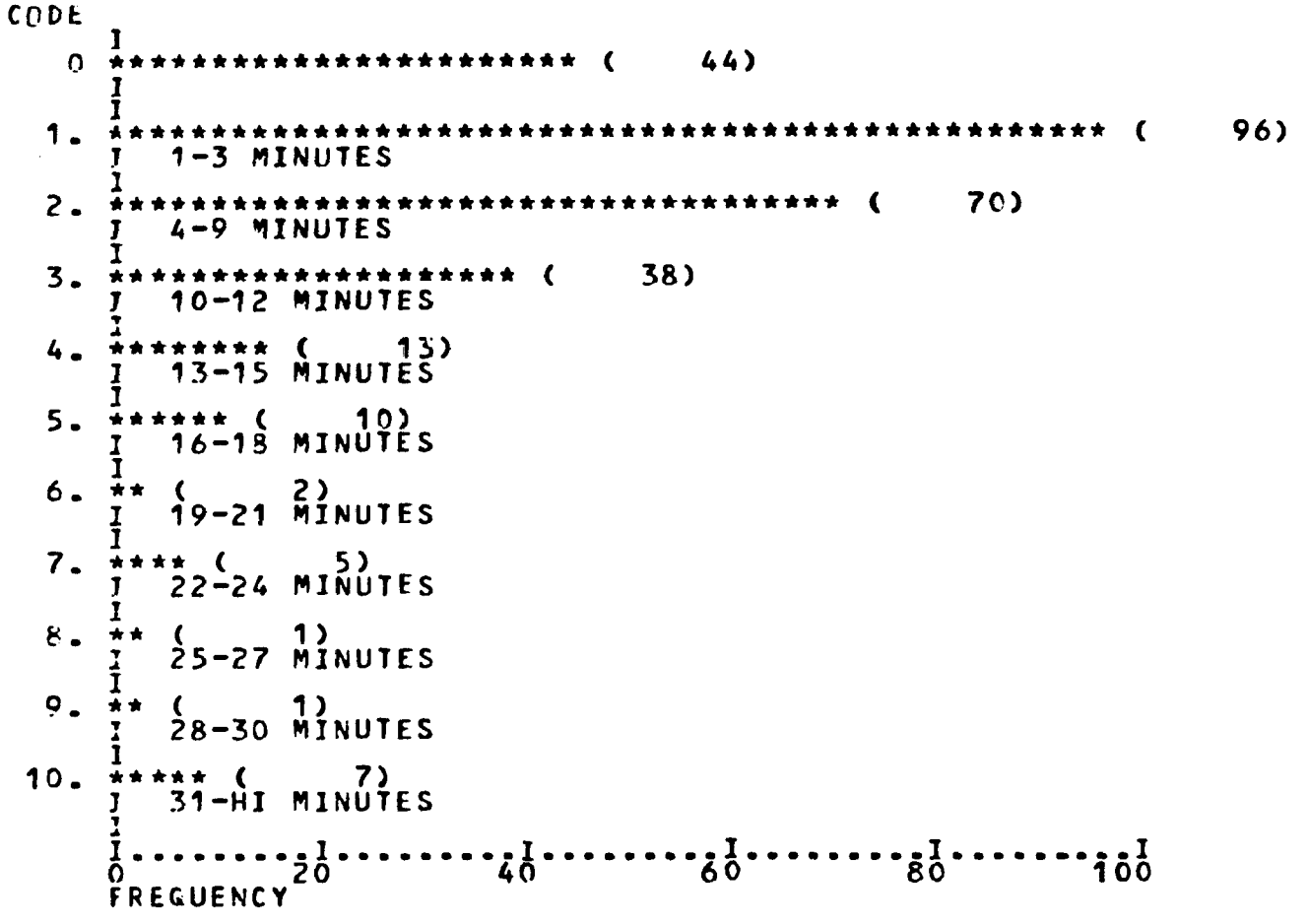


Figure 4-14

The Relative Frequency of the Time for Wait 1

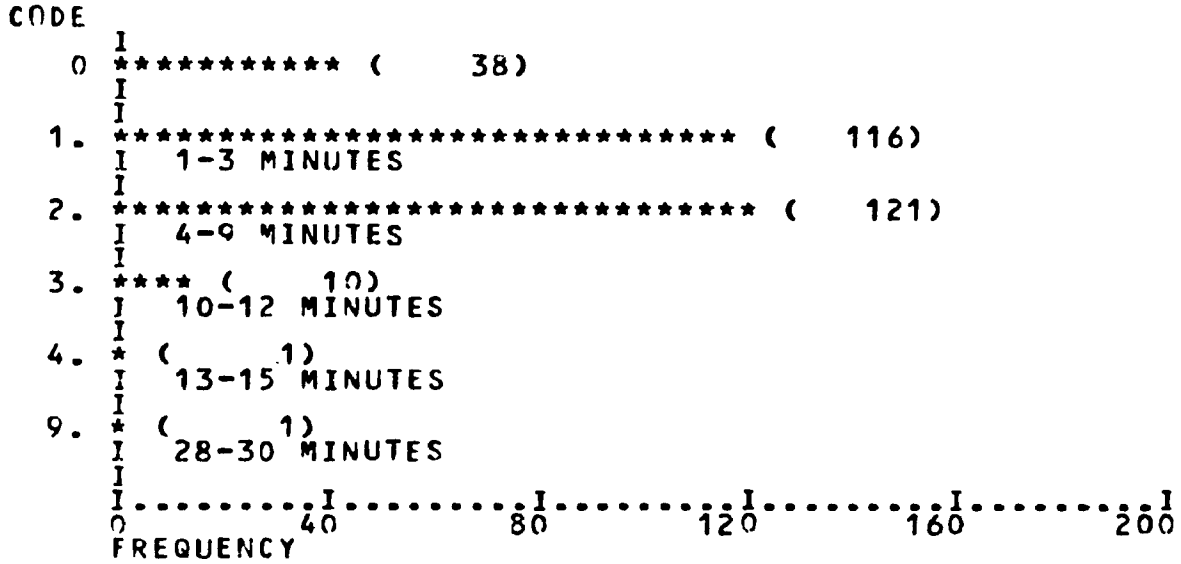


Figure 4-15

The Relative Frequency of the Time for Wait 2

the appointment module desk receptionist. The appointment module receptionist walks the patient's paperwork from her desk to the nurse's station when time permits. Wait 2 ends when the nurse receives the paperwork.

The most frequent time interval for Wait 2 is from four to nine minutes: 121 patients or 42.2 percent of the sample. Thirty-eight patients or 13.2 percent of the sample experienced no wait for Wait 2. The longest wait experienced by a patient for Wait 2 was thirty minutes. Two hundred seventy-five patients or 95.8 percent of the sample encountered a nine minutes or less waiting period for Wait 2.

Wait 3 is the period of time between when the nurse receives the patient's paperwork until the patient is escorted into an examination room or is asked to go to the laboratory for lab work or to radiology for x-rays. In forty-four cases, Wait 3 represents the period of time the patient waits in the waiting room. For the remainder of the sample, the precise waiting room time is determined by adding Wait 2 and Wait 3 together. The average time for Wait 2 is 3.5 minutes.

Figure 4-16 reveals the most commonly endured Wait 3 time period was from one to fourteen minutes: 185 patients or 64.5 percent of the sample. Five patients went directly into an examination room and experienced no wait before the first service stop. The longest Wait 3 encountered by a

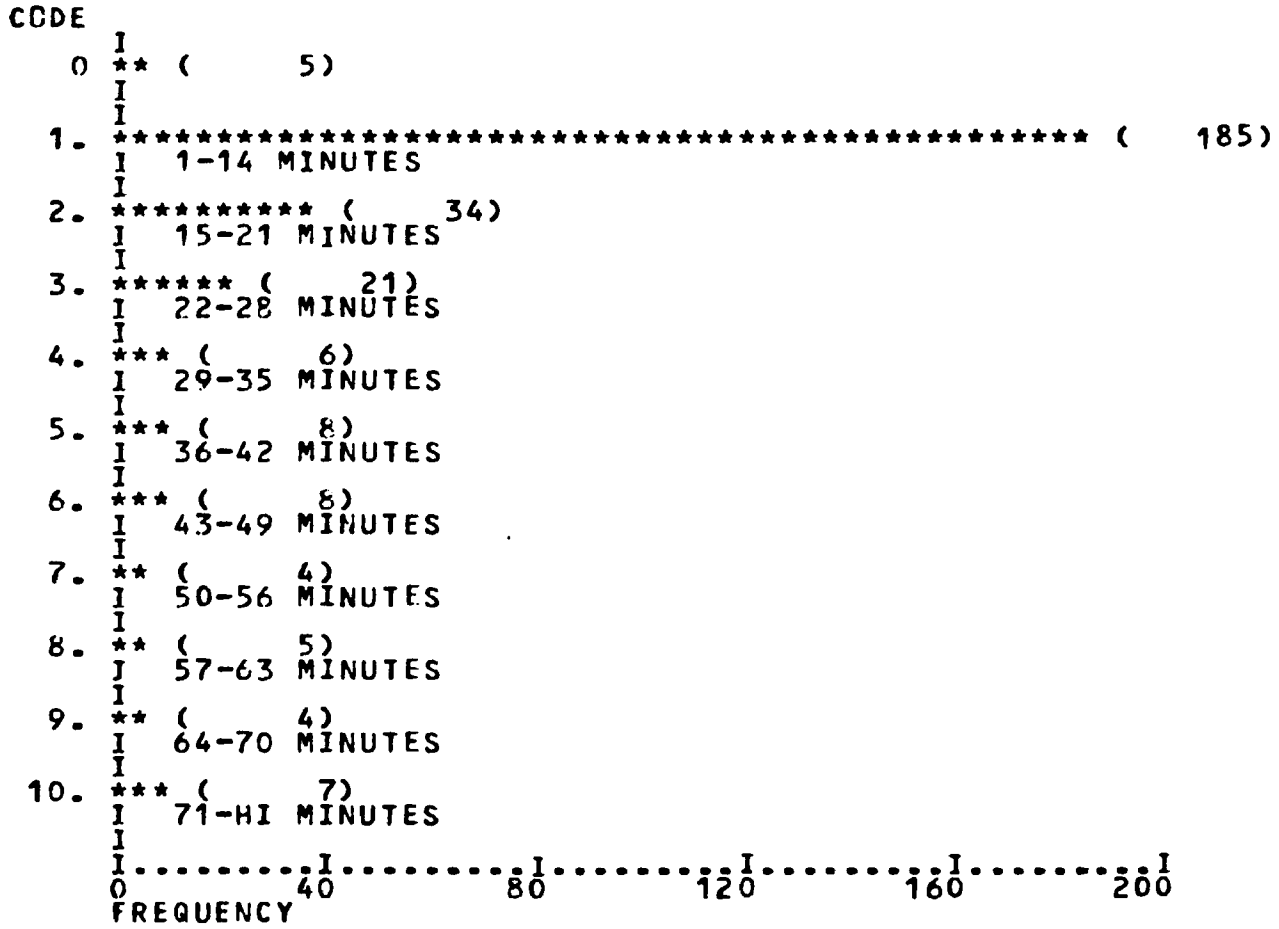


Figure 4-16

The Relative Frequency of the Time for Wait 3

patient was one hour and forty-six minutes. Two hundred forty-five patients or 85.4 percent of the sample received their first service in twenty-eight minutes or less.

Wait 4 is the period of wait experienced by a patient between his/her first and second service stop or the period of time between the first service stop and when the patient leaves the appointment module. Two hundred fifty-nine cases encountered a second service stop. Twenty-eight cases left the Clinical Center after only one service stop.

Figure 4-17 shows the one hundred three patients or 39.8 percent of the indicated sampled waited from four to nine minutes between their first and second stop. Sixty-seven patients or 25.9 percent of the indicated sample waited only one to three minutes between the first and second service stop. While the shortest wait was one minute, the longest wait for a patient between the two service stops was one hour and fourteen minutes. However, 206 patients or 79.5 percent of the sample waited fifteen minutes or less between service stop one and service stop two.

Wait 5 is the waiting period between the second service stop and the third service stop or the period of time between the second service stop and when the patient leaves the appointment module. Two hundred forty-eight patients experienced a third service stop; thirty-nine patients did not.

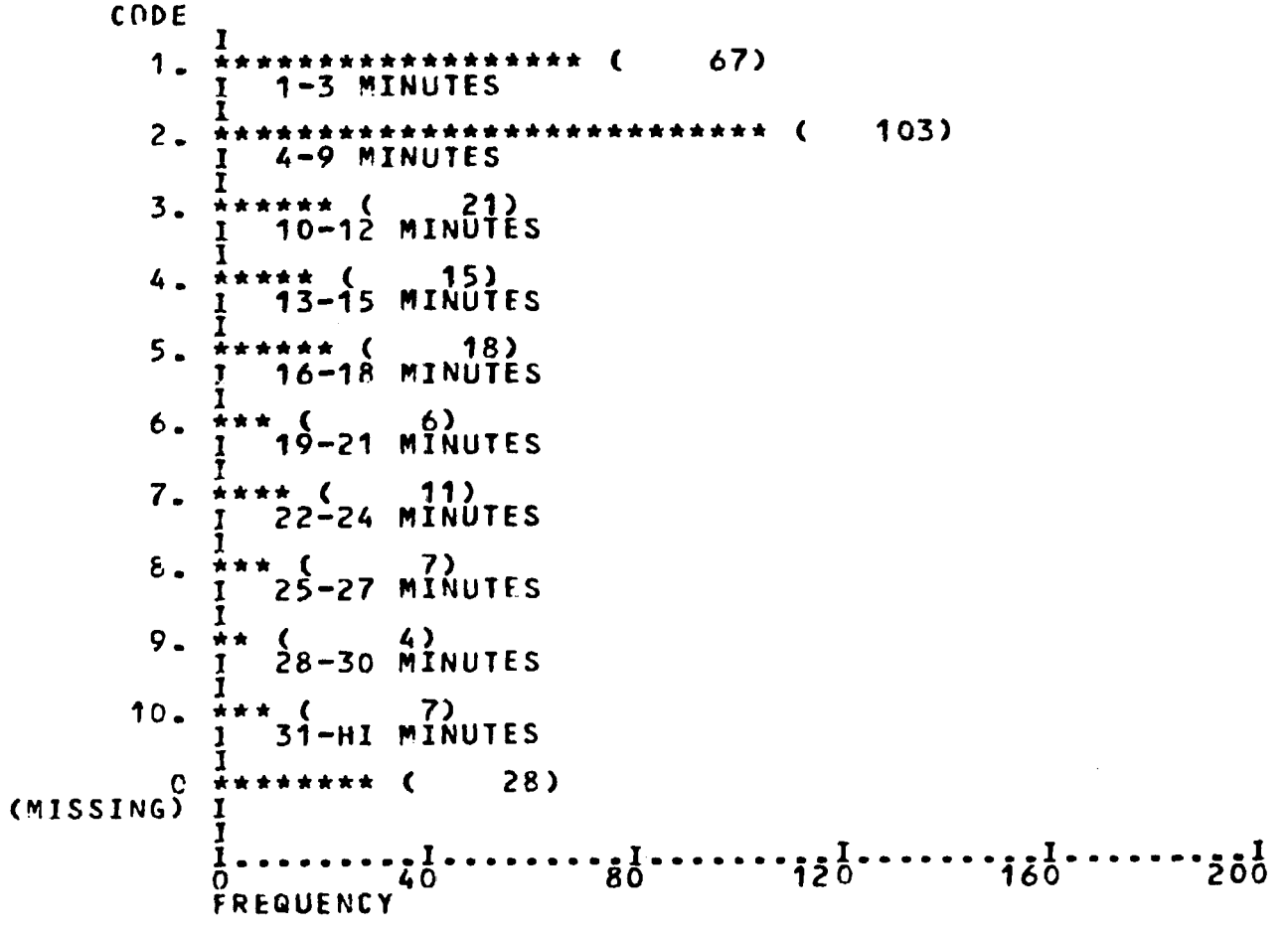


Figure 4-17

The Relative Frequency of the Time for Wait 4

The most frequent time interval between the second and third service stop was from four to nine minutes, as shown in Figure 4-18: 113 patients or 45.6 percent of indicated sample. Sixty-six patients or 26.6 percent of the indicated sample waited from one to three minutes between the second and third stop. The longest waiting period between these stops was forty-three minutes. Two hundred nine patients or 84.3 percent of the sample waited for the third service stop twelve minutes or less.

Wait 6 is the difference between the third and fourth service stop or the time interval between the third service stop and when the patient leaves the appointment module. Ninety-five patients received a fourth service, while 192 patients did not.

Figure 4-19 suggests that almost an equal number of patients waited between one and three minutes for their fourth service stop as waited four to nine minutes: forty-two and forty-three patients or 44.2 percent and 45.3 percent of the indicated sample, respectively. Thus, 89.5 percent of the indicated sample or eighty-five patients moved to their next service stop in nine minutes or less. The longest waiting period between the third and fourth service stop was forty-five minutes.

Wait 7 is the difference between the fourth and fifth service stop or the time between the fourth service stop and when the patient leaves the appointment module.

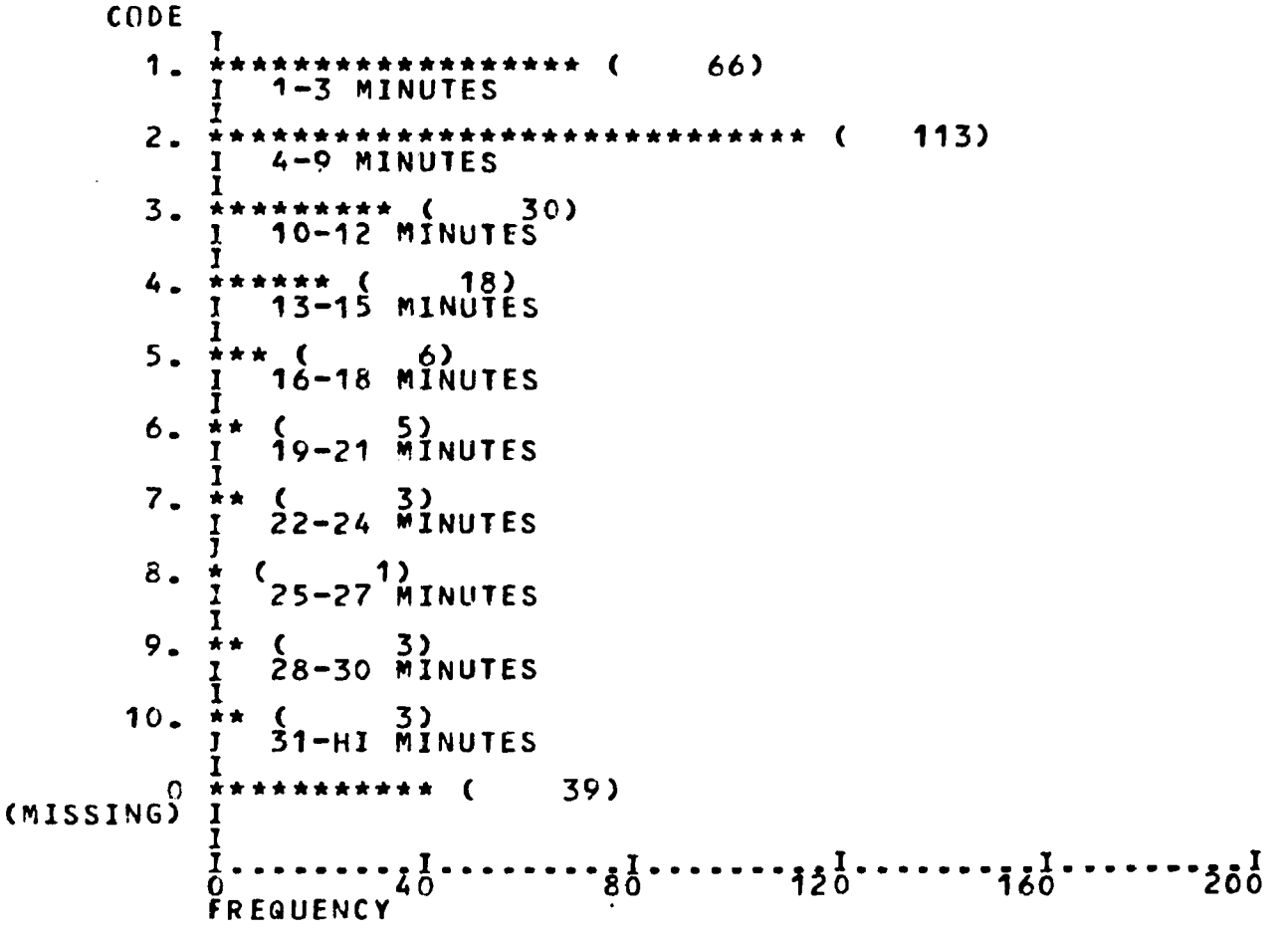


Figure 4-18

The Relative Frequency of the Time for Wait 5

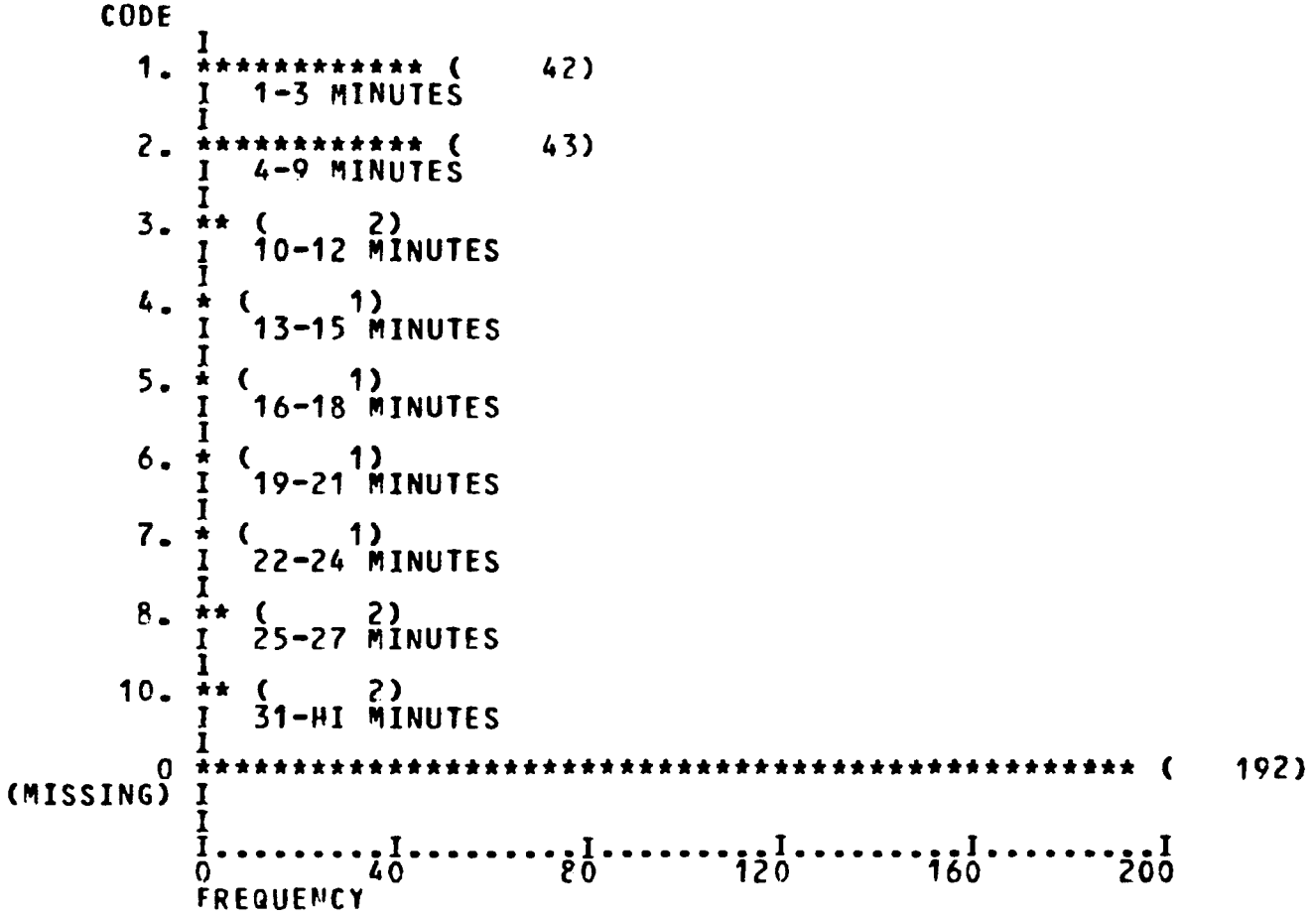


Figure 4-19

The Relative Frequency of the Time for Wait 6

Sixty-two patients out of 287 experienced a fifth service stop.

Figure 4-20 discloses that most patients waited only one to three minutes between the fourth and fifth service stop--thirty-two patients or 51.6 percent. Fifty-four patients or 87.1 percent of the indicated sample waited nine minutes or less between these service stops. Forty-one minutes was the longest waiting period encountered by a patient prior to receiving their fifth service.

Wait 8 is the time period between the fifth and sixth service stop or the time period between when the patient's fifth service and when she/he left the module. Because no patients experienced all six service stops, the time period for Wait 8 represents the time which elapsed between the fifth service stop and when the patient left the appointment module.

Figure 4-21 displays the relative frequency for Wait 8. Most patients--twelve or 80 percent of the sub-sample--left the Clinical Center in one to three minutes. The longest waiting time between the fifth service stop and when the patient leaves the appointment module was six minutes.

Wait 9 is the time period between the sixth service stop and when the patient leaves the appointment module. Due to the fact that no patient encountered a sixth service stop, no data is available nor presented for Wait 9.

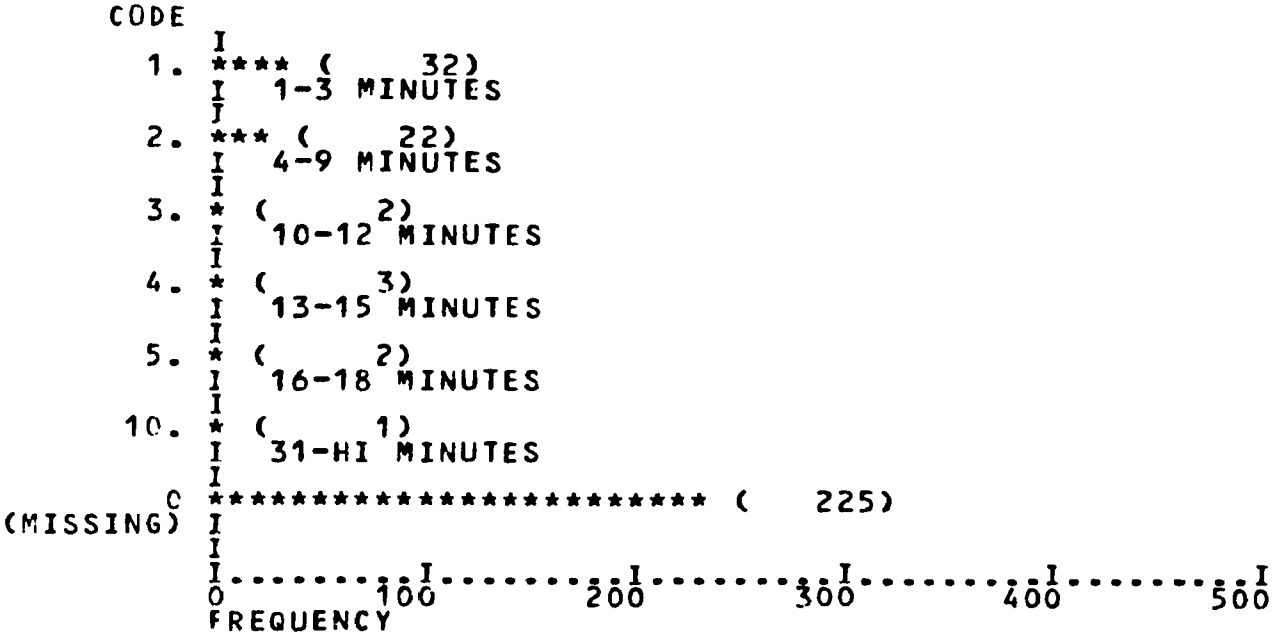


Figure 4-20

The Relative Frequency of the Time for Wait 7

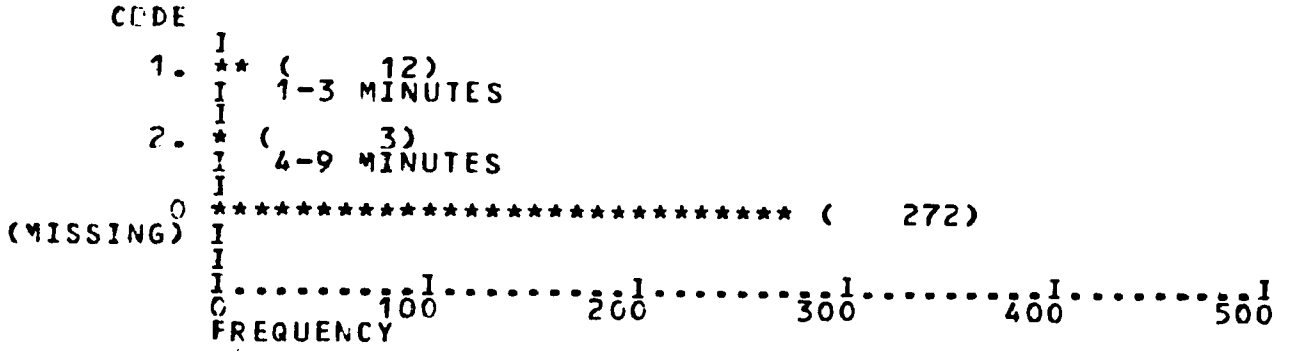


Figure 4-21

The Relative Frequency of the Time for Wait 8

Summary Time Variables

The summary time variables combine various configurations of service and wait variables. The four summary variables described are: (1) module wait; (2) total wait time; (3) module service time; (4) total service and wait time. The histograms which follow present the relative frequency for each of the four summary time variables.

The module wait time is a combination of Wait 2 through Wait 9. In other words, the module wait is the period of time a patient spends in the appointment module.

Figure 4-22 indicates that the most frequent waiting time interval spent in the appointment module was from twenty-one to forty minutes. One hundred sixteen patients or 40.4 percent of the sample experienced the above mentioned time interval. One hundred eighty-seven patients or 65.2 percent of the sample spent forty minutes or less time in the appointment module. The least amount of time spent in the appointment module was seven minutes. The longest period of time in appointment module was two hours and thirty-seven minutes.

The total wait time variable sums all nine wait variables. Thus, the total wait variable represents the amount of time a patient waits from the registration desk check-in point until she/he leaves the appointment module.

Figure 4-23 reveals that 125 patients or 43.6 percent of the sample waited between twenty-one to forty

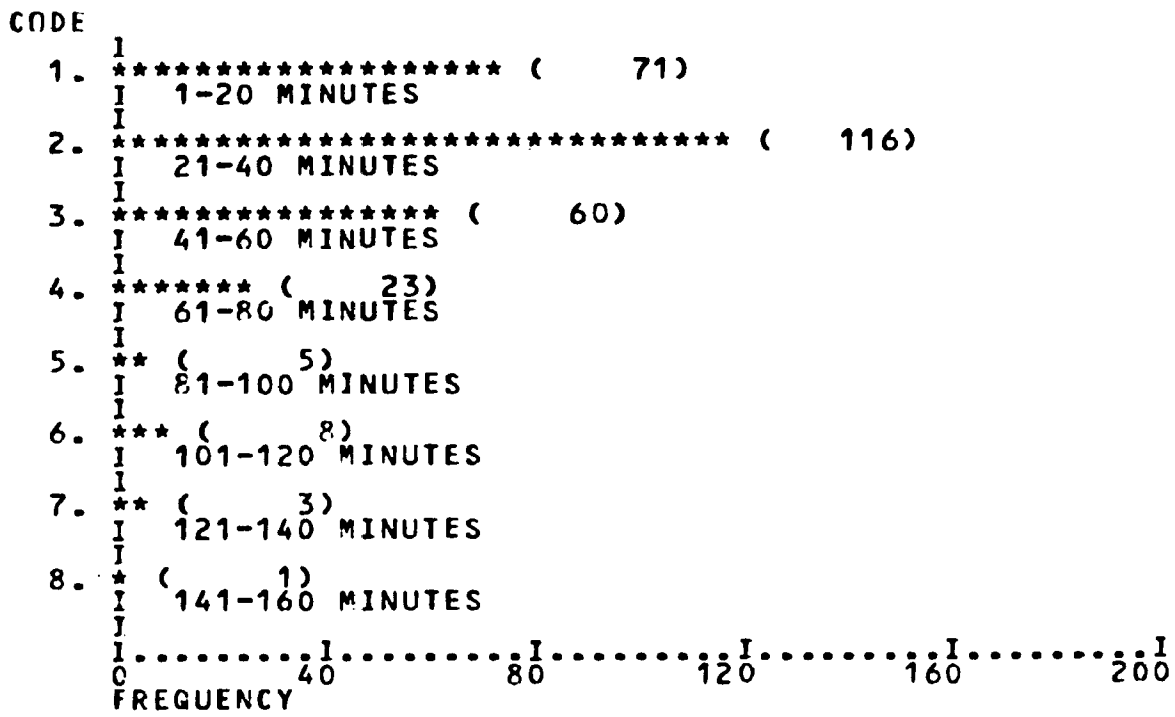


Figure 4-22

The Relative Frequency of Module Wait Time

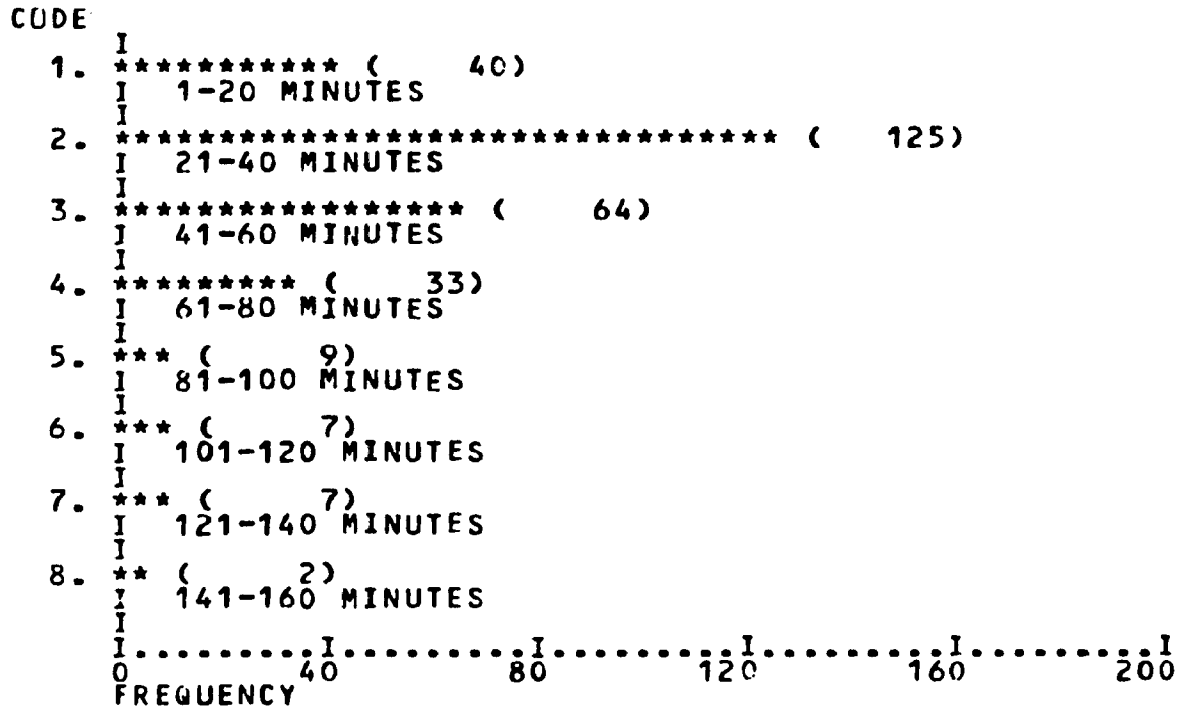


Figure 4-23

The Relative Frequency of Total Wait Time

minutes for an appointment at Michigan State's Clinical Center. One hundred sixty-five patients or 57.5 percent of the sample waited forty minutes or less. Two hundred twenty-nine patients or 79.8 percent of the sample encountered a sixty minute wait or less. The shortest waiting period for a patient was eight minutes. The longest total module waiting period was two hours and thirty-eight minutes, one minute longer than the longest module wait period.

The total module service variable represents the total amount of time spent by a patient receiving service. In other words, the sum of all the service variables for each patient.

One hundred twenty-five patients or 43.6 percent of the sample experienced between twenty-one and forty minutes of service. One hundred fifty-eight patients or 55.1 percent of the sample took forty minutes or less for the service portion of their appointment. The quickest service occurred in two minutes while the longest service sequence encountered took one hour and fifty-five minutes. Therefore, the total waiting period and total service time had similar extremes. The averages for the above mentioned variables were 44.1 minutes for total wait and 43 minutes for total service. Figure 4-24 on the next page graphically illustrates the relative frequency of the total module service time.

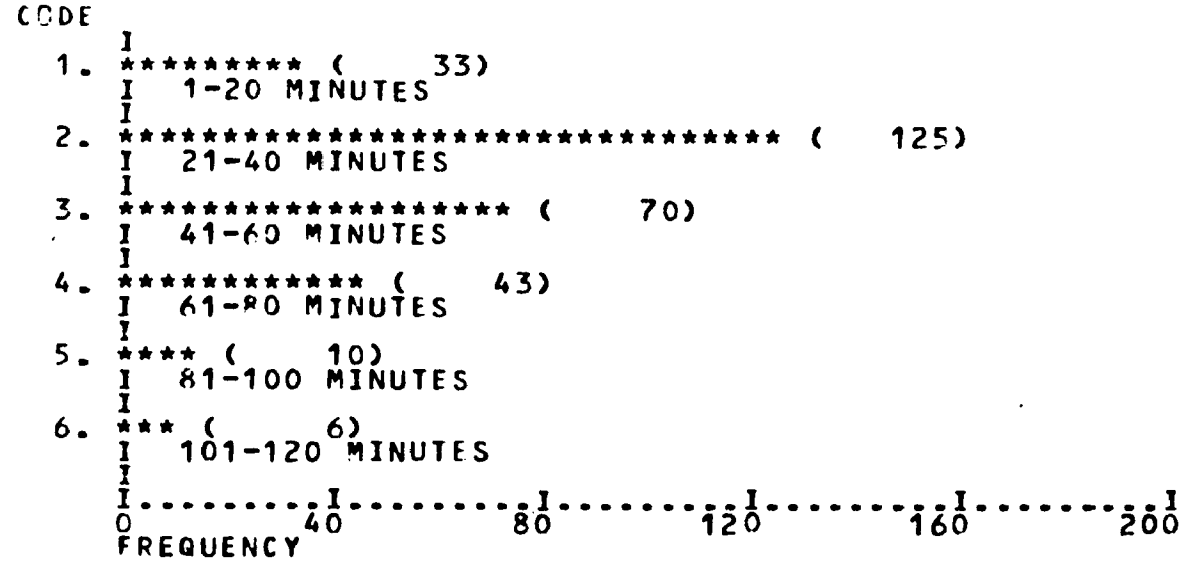


Figure 4-24

The Relative Frequency of Total Module Service Time

The total time variables indicates the total amount of time a patient spends at Michigan State University's Clinical Center. Thus, the total module wait time variable and the total module service time variable equals the total appointment time.

Figure 4-25 depicts the total appointment time. Almost half the patients (141) or 49.1 percent of the sample encountered an appointment lasting from forty-one minutes to one hour and twenty minutes. Twenty-five patients or 8.7 percent of the sample's appointment time was forty minutes or less. One hundred twenty-one patients or 42.2 percent of the sample experienced an appointment which lasted eighty-one minutes or longer. The longest appointment for a patient at the Clinical Center continued for three hours and forty minutes. The shortest appointment lasted twenty minutes.

Pearson Product-Moment Correlation

Correlational studies compare the strength of association between two different pairs of variables. The relationships existing between variables, as denoted by r scores, provide further insight into patient flow at Michigan State's Clinical Center. Three correlational matrixes relate how the summary time variables relate to: (1) the informational variables; (2) the service variables; and (3) the wait variables. A final correlational matrix shows how the service variables and wait variables correlate.

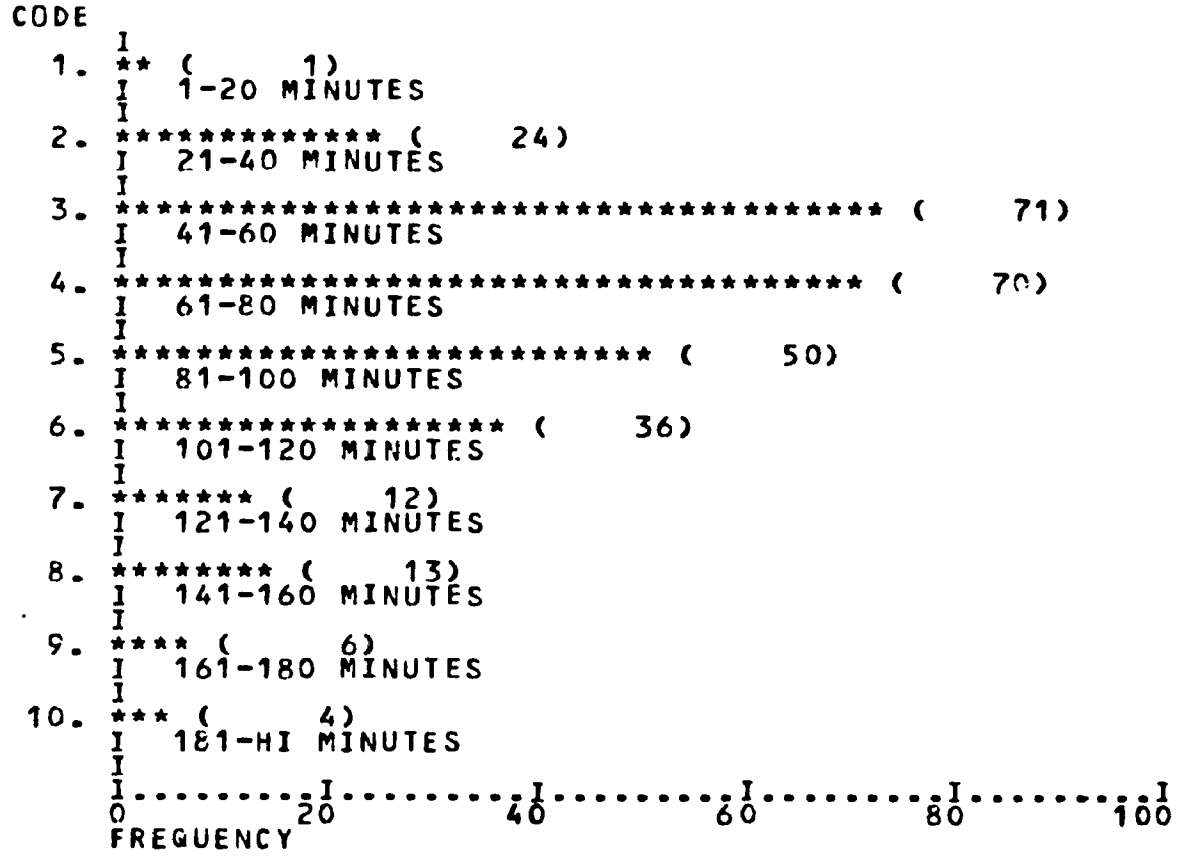


Figure 4-25

The Relative Frequency of Total
Module Service and Wait Time

Table 4-1 shows the correlational matrix between the summary time variables and the informational variables. The summary time variables include:

Module wait - the total waiting time experienced by the patient from the appointment module desk to the first service stop, and between all the service stops until the patient leaves the appointment module; Wait 2 through Wait 9.

Total wait - the total waiting time experienced by the patient from the registration desk to the appointment module desk, plus the module wait; Wait 1 through Wait 9.

Module-service - the total period of time for those service stops--vitals, primary examination, attending re-examination, final instructions, tests and/or immunizations, lab work and/or x-rays--deemed necessary by the primary physician for the patient

Total Time - the total time period of patient wait and patient service; total wait plus module service.

The informational variables are self-explanatory except for variables 5-10. The reason for visit variable represents one of fifteen "reasons for visit" listed on the encounter form as indicated by the primary physician (see Appendix B): acute problem, acute problem follow-up, chronic problem routine, chronic problem flare-up, pre/post natal care, pre/post organ care, well adult/child examination, family planning, patient education, counseling, medication administration, medicine renewal, referral, administrative and other. Problems 1, 2 and 3 are those problems identified

Table 4-1

Correlational Matrix of Informational and Summary Time Variables
(n = 287)

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Informational															
1. Exam Room															
2. Primary Physician	-.14														
3. Attending	-.30	.85													
4. Sex	.00	.00	.00												
5. Patient's Birth	.16	-.69	-.75	.00											
6. Reason for Visit	.00	.00	.00	.00	.00										
7. Problem 1	.00	.00	.00	.00	.00	.00									
8. Problem 2	.00	.00	.00	.00	.00	.00	.00								
9. Problem 3	.00	.00	.00	.00	.00	.00	.00	.00							
10. Reg-Appt Time	.00	.00	.00	.00	.14	.00	.00	.00	.00						
11. Mod in-Appt Time	.00	.11	.00	.00	-.17	.00	.00	.00	.00	-.89					
Summary Time															
12. Module Wait	.00	-.13	.00	.00	.00	.00	.00	.00	.00	-.47	.47				
13. Total Wait	.00	-.13	.00	.00	.00	.00	.00	.00	.00	-.62	.40	.91			
14. Module Service	-.12	.00	.00	.10	-.11	.00	.00	.00	.53	-.16	.16	.14	.13		
15. Total Time	.00	.00	.00	.00	.00	.00	.00	.00	.00	-.43	.43	.78	.72	.72	

and then ordered--1, 2 or 3--by the primary physician. In other words, for a patient to have a problem 3, the physician has already diagnosed two other problems. All problems are coded according to the eighteen general classifications set forth in the International Classification of Health Problems in Primary Care (See Appendix C): (1) ineffective and parasitic diseases; (2) neoplasms; (3) endocrine, nutritional and metabolic diseases; (4) diseases of blood and blood-forming organs; (5) mental disorders; (6) diseases of the nervous system and sense organs; (7) diseases of the circulatory system; (8) diseases of the respiratory system; (9) diseases of the digestive system; (10) diseases of the genito-urinary system; (11) pregnancy, childbirth and puerperium; (12) diseases of the skin and subcutaneous tissue; (13) diseases of the musculoskeletal system and connective tissue; (14) congenital anomalies; (15) perinatal conditions; (16) physical sign symptoms and ill-defined conditions not otherwise specified, or not yet diagnosed, referrable to; (17) accidents, poisoning and violence; (18) supplementary classification. The remaining two variables indicate the time difference between the patient's appointment time and registration time (reg-appt time) and the patient's appointment time and module in time (module-in-appt time).

As excepted, positive correlations are found between the primary physician, the attending and the patient's year of birth. These correlations exist primarily

because a patient visits either an internist or a pediatrician as a function of the patient's age; patients sixteen years and older tend to see an internist rather than a pediatrician. A negative correlation exists between the patient's sex and problem 3 ($r = -.58, p \leq .05$); surprisingly no correlation of significance is present for problem 1 and 2. Another positive correlation of interest exists between the patient's age and the registration to appointment (reg-appt) time variable ($r = .14$, $p \leq .05$) and the module-into appointment (module-in-appt) time variable ($r = -.17$, $p \leq .01$). To be expected, a positive correlation prevails between the reg-appt time variable and the module in-appt time variable ($r = .89$, $p \leq .001$).

When the informational variables are correlated with the summary time variables, no noteworthy correlations exist except in the cases of the reg-appt time and the mod in-appt time variables. The reg-appt time variable has the following correlations between the summary time variables: module wait ($r = -.47$, $p \leq .001$), total wait ($r = -.62$, $p \leq .001$), module service ($r = -.16$, $p \leq .05$), total time ($r = -.43$, $p \leq .001$). The mod in-appt time variable is somewhat similarly correlated to all the summary variables as the reg-appt time variable is, except all the correlations are positive: module wait ($r = -.47$, $p \leq .001$), total wait ($r = -.40$, $p \leq .001$), module service ($r = -.16$, $p \leq .01$), total time ($r = -.43$, $p \leq .001$).

Significant positive correlations are found between all the summary time variables. The strongest correlation to the total time variable exists between the module wait variable ($r = .78$, $p \leq .001$). Total wait and module service variables interestingly, have identical correlational strength to the total module time variable ($r = .72$, $p \leq .001$). As expected, module wait and total wait also have a strong correlation ($r = .91$, $p \leq .001$). Both wait summary time variables, module wait and total wait, have a significantly weaker correlation to the module services variable ($r = .14$, $p \leq .05$; $r = .13$, $p \leq .05$ respectively). See Table 4-1 for the correlational matrix between service variables and summary time variable.

The correlational matrix between the summary time variables and the service variables reveals intercorrelations between some of the service variables: primary examination with attending re-examination ($r = .24$, $p \leq .01$) and attending re-examination with lab work/x-rays ($r = .72$, $p \leq .05$). No other intercorrelations exist between the services variable.

Significant positive correlations are present between five of the six service variables--the final instructions variable is the exception--and the module service variable: vitals ($r = .25$, $p \leq .001$); primary examination ($r = .84$, $p \leq .001$); attending re-examination ($r = .46$, $p \leq .001$); test and/or immunizations

($r = .28$, $p \leq .05$); lab work and/or x-rays ($r = .80$, $p \leq .001$). Weaker and less significant positive correlations compared to the module service variable are also present between the total time variable and vitals ($r = .13$, $p \leq .05$); primary exam ($r = .55$, $p \leq .001$); attending re-exam ($r = .33$, $p \leq .001$) and lab work/x-rays ($r = .50$, $p \leq .05$). No correlations exist between the service variables and the module wait or total wait variables. Table 4-2 identifies all the correlations between the service variables and the summary time variables.

The correlational matrix between the summary time variables and the wait variables reveals only three inter-correlations between the wait variables. The most significant correlation is found between wait 7 and wait 8 ($r = .18$, $p \leq .001$). The other two correlations are between wait 5 and wait 4 ($r = .11$, $p \leq .05$) and between wait 2 and wait 3 ($r = .16$, $p \leq .01$).

When correlating the wait variables with the summary time variables, the strongest correlations, as expected, are between module wait variables: wait 2 ($r = .25$, $p \leq .001$); wait 3 ($r = .81$, $p \leq .001$); wait 4 ($r = .42$, $p \leq .001$); wait 5 ($r = .32$, $p \leq .001$); wait 6 ($r = .31$, $p \leq .001$); wait 7 ($r = .14$, $p \leq .01$); no correlation exists between wait 1, wait 8 and wait 9. Moving to the total wait variable, slightly weaker positive correlations are present for the same wait variables just previously mentioned.

Table 4-2

Correlational Matrix Service and Summary Time Variables
(n = 287)

Variables	1	2	3	4	5	6	7	8	9	10
Service										
1. Vitals										
2. Primary Exam	.00									
3. Attending Re-Exam	.00	.24								
4. Final Instructions	.00	.00	.00							
5. Tests/Immunizations	.00	.00	.00	.00						
6. Lab Work/X-Rays	.00	.00	.72	.00	.00					
Summary Time										
7. Module Wait	.00	.00	.00	.00	.00	.00				
8. Total Wait	.00	.00	.00	.00	.00	.00	.91			
9. Module Service	.25	.84	.46	.00	.28	.80	.14	.13		
10. Total Time	.13	.55	.33	.00	.00	.50	.78	.72	.72	

Also, Wait 1 has a .45 r score ($p \leq .001$) with the total wait variable. Only three wait variables weakly correlate with the module service variable: wait 5 ($r = .15$, $p \leq .01$); wait 7 ($r = .18$, $p \leq .001$); wait 8 ($r = .12$, $p \leq .05$). Finally, the total time variable positively correlates with seven out of the nine wait variables. The correlational strength for the total time variables follows a somewhat similar pattern as did the module wait and total wait variables--the strength gets progressively weaker with the same wait variables. Finally, wait 8 weakly correlates with the total time variable ($r = .11$, $p \leq .05$) while no correlation exists with wait 1. Table 4-3 summarizes the wait and summary time variable's correlations.

Very few of the service and wait variables correlate. Negative correlations exist between final instructions and wait 1 ($r = -.16$, $p \leq .05$) and primary examination and wait 2 ($r = -.10$, $p \leq .05$). Three other positive correlations are formed between wait 3 and attending re-examination ($r = .23$, $p \leq .05$), test/immunizations ($r = .34$, $p \leq .05$) and lab work/x-rays ($r = .50$, $p \leq .05$). Table 4-4 illustrates the correlational matrix for the service and wait variables. In Appendix E the correlational matrixes for service and informational variables and wait and informational variables are presented.

Table 4-3

Correlational Matrix of Wait and Summary Time Variables
(n = 287)

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13
Wait													
1. Wait 1													
2. Wait 2	.00												
3. Wait 3	.00	.16											
4. Wait 4	.00	.00	.00										
5. Wait 5	.00	.00	.00	.11									
6. Wait 6	.00	.00	.00	.00	.00								
7. Wait 7	.00	.00	.00	.00	.00	.00							
8. Wait 8	.00	.00	.00	.00	.00	.00	.18						
9. Wait 9	.00	.00	.00	.00	.00	.00	.00	.00					
Summary Time													
10. Module Wait	.00	.25	.81	.42	.32	.31	.14	.00	.00				
11. Total Wait	.45	.21	.74	.39	.31	.28	.12	.00	.00	.91			
12. Module Service	.00	.00	.00	.00	.15	.00	.18	.12	.00	.14	.13		
13. Total Time	.00	.13	.62	.27	.31	.27	.21	.11	.00	.78	.72	.72	

Table 4-4

Correlational Matrix of Service and Wait Variables
(n = 287)

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Service															
1. Vitals															
2. Primary Exam	.00	.00													
3. Attending Re-Exam	.00	.24													
4. Final Instructions	.00	.00	.00												
5. Test/Immunizations	.00	.00	.00	.00											
6. Lab Work/X-Rays	.00	.72	.00	.00	.00										
Wait															
7. Wait 1	.00	.00	.00	-.16	.00	.00									
8. Wait 2	.00	-.10	.00	.00	.00	.00	.00								
9. Wait 3	.00	.00	.23	.00	.34	.50	.00	.00							
10. Wait 4	.00	.00	.00	.00	.00	.00	.00	.00	.00						
11. Wait 5	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00					
12. Wait 6	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00				
13. Wait 7	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00			
14. Wait 8	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00		
15. Wait 9	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	

Facility Utilization

The percent utilization figure of the service facility, in this case the examination rooms, serves as a measure to judge the facility's efficiency. The utilization figures are presented in two formats. First, a graph and a chart show percentage of facility utilization by the nine examination rooms in the appointment module. The second format depicts facility utilization by the day of the week. Note: as indicated in Chapter III, utilization figures are based upon 4 hours or 240 minute morning or afternoon Clinic sessions, not the entire day's facility use.

Figure 4-26 illustrates the percentage of facility utilization for each of the nine examination rooms. Room 3 has the highest utilization percentage--48 percent. Room J has the lowest percentage of examination room use with on a 1 percent utilization figure. Six examination rooms were used in the 41 percent to 48 percent range while the remaining three examination rooms were used 36 percent, 32 percent and 1 percent of the time.

Table 4-5 repeats the percent utilization figures shown on Figure 4-26 and displays the following additional pieces of information: (1) the number of days each examination room was used--nine days being the maximum number of days possible; (2) the minimum percent utilization figure for each examination room on a given day and how many patient appointments were conducted during that lowest utilized day; (3) the maximum percent of utilization for

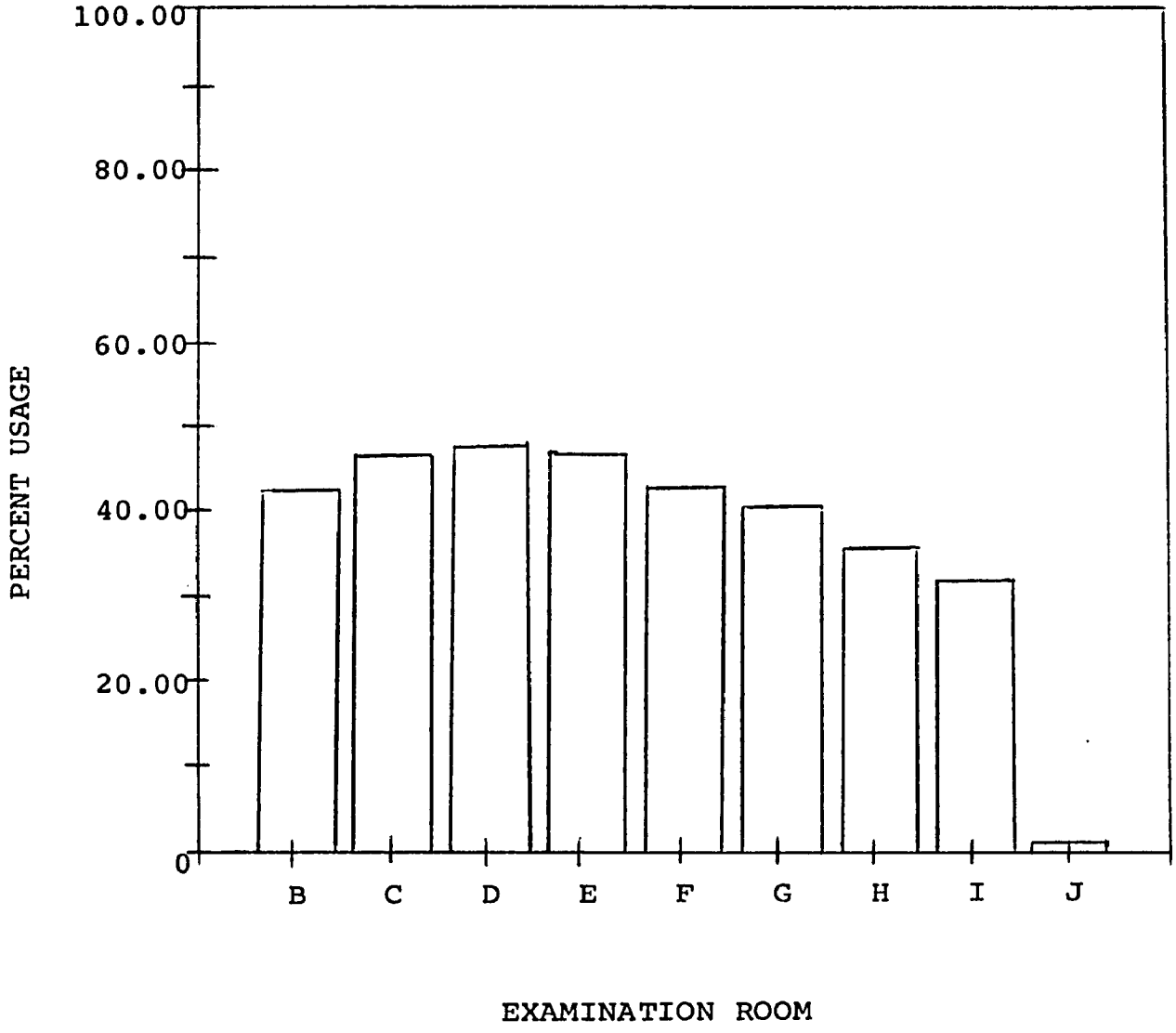


Figure 4-26

Percentage of Facility Utilization
by Examination Room

Table 4-5

Facility Utilization by Examination Room

Examination Room	Percent Utilization	Number of Days Room is Used	Minimum Percent Utilization	Number of Appointments During Minimum Percent Utilization	Maximum Percent Utilization	Number of Appointments During Maximum Percent Utilization
B	43%	17	26%	1	78%	2
C	47%	18	12%	1	85%	4
D	48%	19	13%	1	87%	2
E	47%	18	18%	1	86%	4
F	43%	19	19%	1	70%	3
G	41%	19	13%	1	74%	2
H	36%	13	7%	1	92%	3
I	32%	15	15%	1	92%	3
J	1%	1	0%	0	2%	1

each examination room for a given day and how many appointments were held on that particular day.

As indicated earlier, the study was conducted during a nineteen day period. Therefore, the maximum number of days an examination room may be used is 19. The table shows that only three examination rooms were used at least once per day during the study. Room J was the poorest utilized room in that it was only used one time out of the nineteen days. The lowest minimum percent utilization figure for a given day consequently occurred in Examination Room J--0 percent. (Because only one patient was examined in Room J, the room did not have a value for the minimum percent utilization figure.) Twenty-six percent utilization for Room B and 7 percent for Room H are the high and low figures for minimum examination room use. During all the minimum use days, only one patient was seen in each of the examination rooms, except Room J where no patients were seen.

Table 4-5 also indicates the maximum percent utilization figure. Examination Rooms II and I are tied with the highest utilization figure of 92 percent and three appointments each. The lowest maximum percent utilization is 2 percent in Room J. The other examination rooms' maximums lie within 70 percent through 87 percent range. The number of appointments conducted in all nine rooms ranges from 1 to 4 appointments during a clinic session.

Figure 4-27 illustrates the percentage of facility utilization during the study by the day of the week.

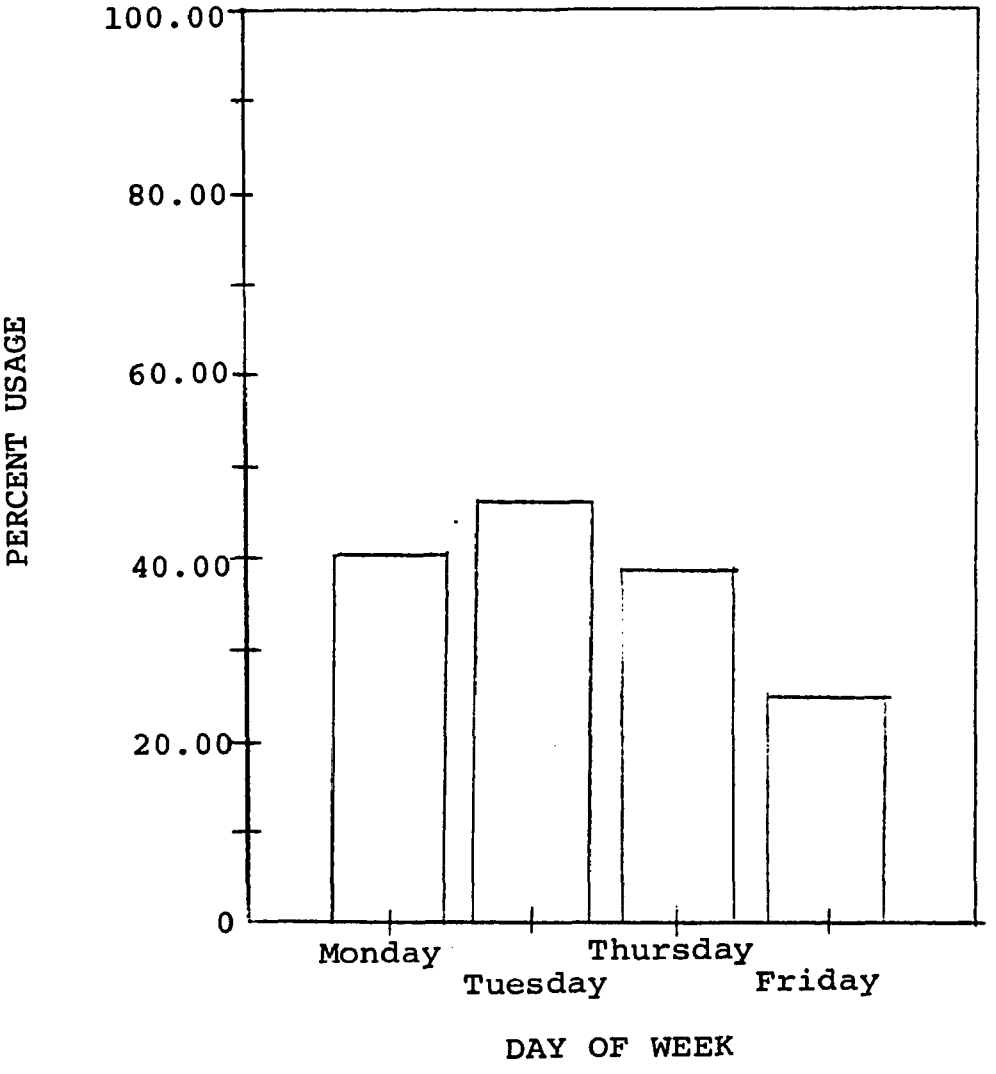


Figure 4-27

Percentage of Facility Utilization
by the Day of the Week

Tuesdays had the highest facility utilization figure, 47 percent, closely followed by Monday's, 41 percent. Thursday had a 39 percent utilization figure. Friday represents the most under utilized day with only 25 percent utilization.

Table 4-6 repeats the percent utilization figure for each day of the week as indicated in Figure 4-27. The minimum and maximum percent utilization figures coupled with the number of appointments for all nine rooms for each of the given days are also included.

A Monday and a Tuesday shared identical minimum utilization figures--36 percent. However, during minimum use on Monday, seventeen appointments were conducted while fifteen appointments were scheduled on Tuesday. A Friday was the lowest utilized day, 18 percent, and has least amount of appointments conducted, six.

A Tuesday was the highest utilized day with 58 percent utilization derived from twenty-one appointments. Once again, Friday had the lowest maximum utilization figure, 38 percent, and the lowest number of appointments, fourteen. Monday and Thursday were both maximumly utilized in a similar fashion, 44 percent with sixteen appointments and 50 percent with seventeen appointments, respectively.

Summary

Chapter IV presents the results of the study. Patient flow diagrams describe how patients travel through

Table 4-6

Facility Utilization by the Day of the Week

	Percent Utilization	Minimum Percent Utilization	Number of Appointments During Minimum Percent Utilization	Maximum Percent Utilization	Number of Appointments During Maximum Percent Utilization
Day of The Week					
Monday	41%	36%	17	44%	16
Tuesday	46%	36%	15	58%	21
Thursday	39%	25%	9	50%	17
Friday	25%	18%	6	38%	14

the Clinical Center. Average service and wait times together with a diagram depicting the seven most travelled paths explain the flow patterns in greater detail. Relative frequency histograms provide graphic representations of the time variability for each of the informational, service, wait and summary time variables. Four correlational matrixes compare r score values to show the strength of association between the two pairs of variables: (1) informational and summary time variables; (2) service and summary time variables; (3) wait and summary time variables; (4) service and wait variables. Finally, the absolute facility utilization for each of the eight examination rooms used is graphically illustrated. Together the results reported describe patient flow at Michigan State's Clinical Center and enable, after analysis, the generation of recommendations to improve flow at the Clinic.

CHAPTER V

DISCUSSION AND CONCLUSIONS

Introduction

Pediatrics and Internal Medicine Residency Training at Michigan State University: A Patient Flow Study describes patient flow at Michigan State's Clinical Center during pediatrics and internal medicine residency training. The main purpose for such a study is to maximize current fixed resources at the Clinic.

Due to the unique environment in which the study takes place, maximization of existing resources through a patient flow study encompasses three interrelating areas: administration, residency training, and patients. Conducting a time study during Clinic hours takes these areas into consideration and represents an appropriate means by which to potentially improve the facility's administration, the quality of residency training, and the satisfaction of patients receiving services.

Chapter V integrates the research study by explaining the generated results in relation to the purpose of the study. Each of the four variables--summary time, service, wait and informational--are discussed in three

parts. First, the major findings are summarized. Then from the major findings, practical implications are generated, followed by appropriate recommendations. The major findings, implications and/or recommendations for the summary time variables are discussed first to give the reader an overall understanding of a patient appointment. After the summary variables, the breakdowns for the wait, service and informational variables follow. The chapter concludes with a commentary on facility utilization.

Once such an understanding of patient flow at Michigan State's Clinical Center is understood, present and future operation may be maximized by incorporating changes which improve the number of patients flowing through the facility. For example, the greater the number of patients that visit or flow through the Clinic in one day, the greater the use per day or maximization of such fixed cost resources as professional staff, equipment and capital outlay.

Summary Time Variables

The following section discusses the interrelationship between the summary time variables' major findings, practical implications and/or recommendations for the Clinical Center operation. Once again, the summary time variables are module wait, total wait (module wait plus registration time), module service (the six service stops) and total appointment time (total wait and module service).

Findings for each of the four different summary time variables are presented. Some duplication exists, however, because of the importance of understanding the total time picture, the major finding, implication and/or recommendations are not consolidated at this time.

Module Wait

According to the correlational study conducted, the module wait time for the patient positively correlates to the total waiting time ($r = .91$, $p \leq .001$), total appointment time ($r = .78$, $p \leq .001$) and the module service time ($r = .14$, $p \leq .05$). A strong positive correlation is expected between the module wait time and the total wait time. The primary reason for the strong correlation is that the only difference between the two summary time variables is the incorporation of registration time into the total wait variable. On the average, registration time is 6.7 minutes. Otherwise, the variables are identical. Thus, a patient who consumes the average module wait time of 37.4 minutes can expect a 44.1 minutes total wait time. Therefore, the registration time required for the patient accounts for the .09 r score difference between the module wait and total wait variables.

Because a strong positive correlation exists between the module wait time and the total appointment time ($r = .78$, $p \leq .001$), the patient can logically expect longer appointment times if the module wait time increases.

A significantly weaker correlation is present between the module wait time and the module service time ($r = .14$, $p \leq .05$). Obviously, the more service stops experienced, the greater the potential for wait. However, service and wait time do not appear to go beyond this relationship as evidenced by the r score value. The findings for the module wait variable reveal that in order for the Clinical Center to service more patients, the module wait period must be reduced.

Total Wait

Aside from having the strong correlation with the module wait variable previously discussed, the total wait variable also has positive relationships with the total appointment time ($r = .72$, $p \leq .001$) and the module service time ($r = .13$, $p \leq .05$). The correlation between the total wait time and the total appointment time is slightly weaker than the correlation between the module wait time and the total appointment time (r score difference of .05). Thus, even though total wait has a strong relationship to the total appointment time, the module wait time is a slightly stronger determinant of the total appointment time. Therefore, when attempting to reduce the total appointment time, the waiting periods forming the module wait variable should be studied first. Then the registration period should be considered.

The module service variable and the total wait variable have almost the identical correlational value as does the module service variable and the module wait variable (.01 r score difference). This indicates that neither the total wait variable nor the module wait variable are better determinants of the module service time. Like the module wait variable, the findings for the total wait variable suggest that the total appointment time may be reduced by decreasing the total amount of time the patient waits. Because the correlational strength for the total module wait is slightly less than the correlational strength for the module wait variable, the inclusion of registration time slightly weakens the correlation. Thus, when attempting to reduce the total appointment by concentrating on waiting time, reduction should first center in the appointment module.

Module Service

The module service variable has a strong positive correlation to the total appointment time variable ($r = .72$, $p \leq .001$). Thus, the length of time required in the various service stops is a strong indicator of the length of time required for the total appointment. Therefore, to increase the number of patients flowing through the Clinical Center, either the number of service stops must be reduced (a somewhat impractical solution due to the possible deterioration

of quality care) or the amount of time for each service stop experienced by the patient must be reduced.

Significantly weaker positive correlations are evident between the module service time and the module wait time ($r = .13$, $p \leq .05$) and total module wait time ($r = .13$, $p \leq .05$). In this sense, the module wait and total module wait times only weakly determine the amount of service time required. The correlations exist because the wait time obviously increases as the number of service stops increases. This also accounts for the reason why the correlational strength for the module wait variable is slightly greater than the total wait variable--the addition of the registration time weakens an already weak correlation to the service time variable.

Total Appointment Time

Since the identification of ways to maximize fixed resources is the ultimate objective of the study, the correlations between the total appointment time variables are very important. They illustrate the relationship between the time for the other summary time variables and time for the total appointment. This general understanding gives the service and wait variables greater meaning and permits concentration to center in the most appropriate area.

The results of the study indicate that the total appointment time variable has strong positive correlations with the module wait time ($r = .78$, $p \leq .001$), the total

module wait time ($r = .72$, $p \leq .001$) and the module service time ($r = .72$, $p \leq .001$). The strength of the relationships are expected due to the appointment time being a combination of service and wait times. However, a significant finding is the relative strength of the correlations. The strongest correlation for the total appointment time is with the module wait time. Thus, decreasing the amount of time spent waiting in the module is the most appropriate means by which to reduce the total appointment time. [An investigation of the breakdown for the various different wait variables follows in the next section.]

The total module wait and module service variables have identical r score ($r = .72$, $p \leq .001$) values when correlated to the total appointment time variable. A major reason for this rests on the fact that the mean times for the variables in question have only a nine-tenths of a minute difference. Like the module wait variable, reduction of the total appointment time may be achieved by decreasing the amount of time for the total module wait and the total module service. Whenever reducing module service time, caution must prevail so that quality of service rendered to the patient is not reduced.

Wait Variables

The wait variable section presents the major findings, implications and/or recommendations of the wait variables studied. All nine wait variables discussed

represent a breakdown of the summary variable, total module wait. Wait 2 through Wait 9 corresponds to the breakdown for the module wait summary variable. Based upon the findings in the Summary Time Variables section, the wait variables, especially Wait 2 through Wait 9, are the best means by which to maximize patient flow in Michigan State's Clinical Center. The wait variables are discussed in the following manner: wait variables related to summary time variables, wait variables interrelated to other wait variables, wait variables related to service variables and wait variables related to informational variables.

Wait Variables Related to Summary Time Variables

The strongest correlation between the individual wait variables and summary time variables, as expected, is between the module wait variable: Wait 3 ($r = .81$, $p \leq .001$); Wait 4 ($r = .42$, $p \leq .001$); Wait 5 ($r = .32$, $p \leq .001$); Wait 6 ($r = .31$, $p \leq .001$); Wait 2 ($r = .25$, $p \leq .001$); Wait 7 ($r = .14$, $p \leq .01$); no correlations exist between Wait 1, Wait 8 and Wait 9. Wait 1 has no correlation because Wait 1 is not included in the module wait variable calculation. Wait 3 or the time period which includes the majority of the waiting room time (add Wait 2 for the entire waiting room period; average time for Wait 2 is 3.5 minutes; average time for Wait 3 is 16.2) is the strongest correlations of all the wait variables to the module wait variable by a r score of .39. For the other

wait variables, correlational strength weakens as the average time in minutes for each of the waits decreases. For example, Wait 4 ($r = .42$, $p < .001$, mean time = 9.4 minutes); Wait 5 ($r = .32$, $p \leq .001$, mean time = 7.3 minutes); Wait 6 ($r = .31$, $p \leq .001$, mean time = 5.7 minutes). This relationship does not hold for Wait 7 and Wait 2, because Wait 7 has a weaker correlation strength and higher average waiting time than Wait 2. A very similar type of relationship described above for the wait variables and the module wait time exists between the wait variables and the total module wait variables. The major difference being that the correlational strength for all the total module wait variables is weaker and Wait 2 does not have a significant correlation to the module wait variable.

As previously mentioned, the module wait variable correlates most strongly to the total appointment time. Breaking down the module wait time into the seven possible wait variables as done in the above paragraph (no significant correlation between the final two wait variables, Wait 8 and Wait 9) indicates which wait variable correlates best to the module wait variable. Wait 3 has a considerably higher positive correlational strength than the other wait variables. Also note, Wait 3 has the strongest relationship of all the wait variables to the total appointment time variable: Wait 3 ($r = .62$, $p \leq .001$); Wait 5 ($r = .31$, $p \leq .001$); Wait 4 ($r = .27$, $p \leq .001$); Wait 6 ($r = .27$,

$p \leq .001$); Wait 7 ($r = .21$, $p \leq .001$); Wait 2 ($r = .13$, $p \leq .05$); Wait 8 ($r = .11$, $p \leq .05$); Wait 1 (no significant correlation); Wait 9 (no significant correlation). Therefore, to increase Patient Flow through the Clinical Center, thereby maximizing fixed resources, concentration should center upon decreasing the period of time a patient spends in Wait 3 or the waiting room. Decreasing the waiting time of the other wait variables to decrease the total appointment time is also important. Time reduction for the remaining wait variables should then center upon Wait 5, Wait 4 and Wait 6, all of which have very similar correlational strength to the total appointment time. Finally Wait 7, Wait 2, Wait 8 and Wait 1 should be investigated.

Only three wait variables correlate with the module service variable: Wait 7 ($r = .18$, $p \leq .001$); Wait 5 ($r = .15$, $p \leq .01$) and Wait 8 ($r = .12$, $p \leq .05$). Therefore, reducing the waiting period of Wait 7, Wait 5 and Wait 8 would slightly reduce the module service time along with reducing the total appointment time.

Wait Variables Interrelated to Other Wait Variables

For the most part wait variables do not correlate among themselves. The exceptions are: (1) Wait 2 with Wait 3 ($r = .16$, $p \leq .01$); (2) Wait 4 with Wait 5 ($r = .11$, $p \leq .05$), and (3) Wait 7 with Wait 8 ($r = .18$, $p \leq .001$). Thus, on the few occasions wait variables positively correlate with other wait variables, the correlation is, however,

always sequential. In other words, Wait 2 correlates with Wait 3; Wait 4 correlates with Wait 5; and Wait 7 correlates with Wait 8. Therefore, improving Wait 2 should slightly improve Wait 3, etc.

Wait Variables Related to Service Variables

When wait variables are correlated directly with service variables, few significant relationships exist. However, Wait 3 positively correlates with lab work and/or x-rays ($r = .50$, $p \leq .05$); tests and/or immunizations ($r = .34$, $p \leq .05$) and attending re-examination ($r = .23$, $p \leq .05$). Wait 1 also has an negative relationship with final instructions ($r = -.16$, $p \leq .05$) while Wait 2 has an negative relationship with primary examination ($r = -.11$, $p \leq .05$).

The correlations which exist for Wait 3 and the designated service variables indicate that patients who have lab work, x-rays, tests and/or immunizations as part of their medical appointment can expect to wait longer in the waiting room. The negative relationships suggest that as the relationship between a patient's waiting time for Wait 1 and Wait 2 increases, the service time for the final instructions and the primary examination decreases, respectively. Thus, only Wait 1, Wait 2 and Wait 3--waits which do not occur between service stops--have any kind of relationship to the service variables. Therefore, the time spent waiting between service stops has no correlation to the services received by the patient.

Wait Variables Related to Informational Variables

The most significant correlation between the wait variables and the informational variables exists between the following two informational variables: (1) the difference between the appointment time and the registration time; (2) the difference between the appointment time and the module-in time. The difference between the appointment time and registration time correlates negatively with the first three wait variables: Wait 1 ($r = -.47$, $p \leq .001$); Wait 2 ($r = -.13$, $p \leq .05$); Wait 3 ($r = -.50$, $p \leq .05$). The findings are the result of a statistical artifact, because early registration times were scored as a negative number. Thus, the earlier a patient arrives for an appointment, the greater the probability that the patient will wait was for Waits 1 - 3, especially during Wait 1 and Wait 3. The Clinical Center, therefore, does not encourage late patients due to a shorter initial waiting period experienced when the patient arrives late. The check-in procedures (Wait 1) and time spent in waiting room (Wait 2 and Wait 3) might be further structured so as to give more preference to patients who are moderately early or on time for their appointment.

The difference between the appointment time and the module-in times correlates with: (Wait 2 ($r = .12$, $p \leq .05$); Wait 3 ($r = .52$, $p \leq .001$) and Wait 4 ($r = .01$, $p \leq .05$). The result in this case again indicates that the earlier a patient reaches the appointment module desk before his/her

scheduled appointment, the shorter the waiting periods experienced for Waits 2 - 4. The correlations are somewhat similar to the correlation just described between Waits 1 - 3 and the difference between the appointment time and the registration time. However, in Waits 1 - 3 and the difference between the appointment time and the registration time, the strongest correlation is found in Waits 1 and 3. Also, Wait 1 has been replaced with Wait 4. In Waits 2 - 4 and the difference between the appointment time and the module-in time, the strongest correlation is found in Wait 3. Therefore, arriving early at Michigan State's Clinical Center decreases the probability of a long waiting room period of time.

Service Variables

The service variables section discusses the major findings, implications and/or recommendations for the six possible service stops at Michigan State's Clinical Center: vitals; primary examination; attending re-examination; final instructions; tests and/or immunizations; and lab work and/or x-rays. To better understand patient flow the service variables are first compared to the summary variables. The service variables are then interrelated with the other service variables. Finally the service variables and the informational variables are investigated.

Service Variables Related to Summary Time Variables

As expected, significant positive correlations exist between five of the six service variables--final instructions being the exception--and the summary variable, module service: primary examinations ($r = .84$, $p \leq .001$); lab work and/or x-rays ($r = .80$, $p \leq .001$); attending re-examination ($r = .46$, $p \leq .001$); tests and/or immunizations ($r = .28$, $p \leq .05$); vitals ($r = .25$, $p \leq .001$). In the majority of the cases, the strength of the correlations has a direct relationship to the mean number of minutes required for performing the various services: primary examination ($r = .84$, $p \leq .001$, mean time = 27.5 minutes); lab work and/or x-rays $r = .80$, $p \leq .001$, mean time = 26.4 minutes); attending re-examination ($r = .46$, $p \leq .001$, mean time = 8.1 minutes); tests and/or immunizations ($r = .28$, $p \leq .05$, mean time = 6.1 minutes); vitals ($r = .25$, $p \leq .001$, mean time = 9.4 minutes). The service time for vitals is the exception in that the mean time is the third longest, however, the correlational strength of the variable to the module service variable ranks fifth.

Those services which require the longest service time, have the strongest correlation to the module service variable. Therefore, when attempting to cut the module service time, and consequently shorten the total appointment time, services like the primary examinations and lab work and/or x-rays are areas where investigation should first

center. The relative frequency histograms reveal that all but five patients (282 patients) required a primary examination and only sixteen patients experienced lab work and/or x-rays. Thus, the time required for the primary examination should seriously be investigated. Is an average time of 27.5 minutes excessive during residency training?

Weaker and less significant correlations compared to the module service variable also exist between the total appointment time variable and the primary examination ($r = .55$, $p \leq .001$); lab work and/or x-rays ($r = .50$, $p \leq .05$); attending re-examination ($r = .33$, $p \leq .001$); and vitals ($r = .13$, $p \leq .05$). These results strengthen the conclusion reached in the above paragraph.

No correlations are present between the service variables and the module wait and total wait variables. Improvement in the amount of time required for performing the various services, once again, has no effect on improving the wait periods experienced by the patient.

Service Variables Interrelated to Other Service Variables

Little interrelationship is present between the service variables. The strongest relationship exists between the attending re-examination and the lab work and/or x-rays ($r = .72$, $p \leq .05$). Once again, the histograms show that this relationship is based on a total of sixteen lab work and/or x-ray patients. Thus, the relationship occurs in relatively few cases. Remembering that the study takes

place during residency training, accounts primarily for the reason why an attending would probably re-examine a patient before sending him/her to the laboratory for lab work or to radiology for an x-ray. This practice certainly saves the patient time and money. A mean service time for lab work and/or x-rays of 26.4 minutes--includes service and waiting time in these cases--however, may be improved and deserves further study.

The only other interrelationship of the service variables exists between the primary examination and the attending re-examination ($r = .24$, $p \leq .01$). The identical explanation previously mentioned holds for the explanation of the correlation.

Service Variables Related With Informational Variables

When correlating service variables with informational variables, only one relationship particularly stands out: final instructions and the third problem ($r = -.99$, $p \leq .001$). Practically speaking, any patient who has three separate problems diagnosed by the primary physician would most probably require some kind of final instructions: discussion, medication, level of activity, symptoms which warrant concern, etc. Therefore, it is not surprising that such a high correlation would result. The negative relationship signifies that when a longer time period for the final instructions is required, the problem tends to have a lower classification number from the International

Classification of Health Problems in Primary Care. Thus, the nature of the disease would tend to be infective and parasitic; nesplasmic, endocrine nutritional and metabolic; of the blood and blood forming organs or a mental disorder when the time period for final instructions is longest.

The other correlations which are present between service variables and informational variables relate to the primary physician, attending, patient's sex and patient's year of birth. These relationships are not significant because they are to be expected due to a patient visiting either a pediatrician or internist depending upon age, services required, etc.

Informational Variables

The informational variables netted few significant major findings. Those meaningful findings for the wait and service variables are discussed in the appropriate section--Wait Variables or Service Variables.

Informational Variables Related to Summary Time Variables

Three major findings between the informational variables and the summary time variables exist. The primary physician covering internal medicine has shorter module waits ($r = -.13$, $p \leq .05$) and total waits ($r = -.13$, $p \leq .05$) than does the pediatrician. Thus, older patients can expect shorter waiting periods than a younger patient. Significant positive correlations are also present for the

module service or total appointment time variables. However, a pediatrician does conduct a quicker primary examination ($r = .27$, $p \leq .001$) and attending re-examinations ($r = .25$, $p \leq .01$) than does an internist.

Like in the Wait Variables section, the difference in time between the registration time and the appointment time has negative relationships to total wait ($r = -.62$, $p \leq .001$); module wait ($r = -.47$, $p \leq .001$); total appointment time ($r = -.43$, $p \leq .001$); module service ($r = -.16$, $p \leq .05$). The difference in time between the module-in times and the appointment time is somewhat similar to the above correlations except that its relationship is positive and the r score values are weaker: module wait ($r = .43$, $p \leq .001$); total appointment time ($r = .43$, $p \leq .001$); total wait ($r = .40$, $p \leq .001$) and module service ($r = .16$, $p \leq .01$). The explanation for this seemingly contradictory phenomena is again the result of a statistical artifact. The early times were scored as negative numbers, thereby resulting in negative correlations when correlating the difference in time between the registration and the appointment time. Thus, the earlier a patient arrives for an appointment, the shorter the waiting periods and the total appointment time. An early arrival does not impact the service time as strongly.

Informational Variables Interrelated to Other Informational Variables

No major findings which have meaning to the study exist when informational variables are interrelated. The findings simply substantiates facts already established. For example, a patient who is six years old correlates to a pediatrician, because a pediatrician, not an internist, would examine a six year old patient. Therefore, the histograms presented in Chapter IV and Appendix D yield a more complete understanding of the sample through the statistics presented via the histograms of the informational variables.

Facility Utilization

The percent of facility utilization reported in Chapter IV indicates what percentage of a 4 hour (240 minute) clinic session, the examination rooms are utilized. The closer to a 100 percent utilization, the more efficient the facility. Consequently, at 100 percent utilization fixed resources are maximized.

The percent utilization reported in Chapter IV indicates that Michigan State University's Clinical Center is severely under-utilized. For example, no examination room is used even 50 percent of the time. During peak days, however, utilization does climb upward to the 70 percent through 92 percent range in the examination rooms. Balancing off the peak days are the low days which range from 7 percent to 26 percent. Examination Room J represents the all time low example of facility utilization, only one appointment

conducted over the nineteen day sample period in the room certainly underlines the need for better examination room utilization.

The low facility utilization suggests that patients who come to the Clinical Center should not have to endure extremely long waits because all the rooms are available at least half of the time. Thus, possible patient scheduling problems and/or shortage or poor scheduling of physicians may account in varying degrees for the poor facility utilization. An insufficient supply of patients may also be at the bottom of the problem. Therefore, patient scheduling, physician shortage and scheduling together with patient availability and accessibility all require further investigation. Furthermore, more equalized use of the rooms, especially Rooms H, I and J is necessary.

When utilization is figured according to the days of the week for all the examination rooms, once again unbalanced room use is evident. The first two days of the week hold the strongest probability for patient wait due to Monday and Tuesday's higher utilization percentage. Friday would probably be the best time for an appointment because of the facility being utilized only 25 percent of the time. Of course, if the staff is reduced on Fridays or appointments discouraged, that could help account for the low utilization figure and would negate in part the above recommendation.

Summary

Chapter V highlights the results contained in Chapter IV by discussing the major findings, implications, and/or recommendation as they relate to the purpose of the study. In this manner a better understanding of patient flow at Michigan State University's Clinical Center is achieved so that the fixed resources at the Clinic may be maximized.

Increasing the number of patients who flow through the Clinical Center at any given time maximizes the present fixed resources. A time study indicates the total appointment time for every patient visiting the Clinic. Also, the study breaks down the appointment time into the times required for the various services rendered and waits experienced. Analyzing these times yields a better understanding of patient flow and suggests the most appropriate means to attack the improvement of patient flow.

Investigating the summary time variables--module wait, total wait, module service and total appointment time--reveals which overall areas are most critical to improving patient flow. Analysis of the flow diagrams, the histograms and the Pearson product-moment correlations indicate that at Michigan State the module wait time has the strongest correlation to the total appointment time. The total wait and module service time closely follow with equal r score values. Therefore, the waiting periods within

the module--Wait 2 through Wait 9--require the most attention and need to be shortened first.

Analysis of the nine individual wait variables reveals that the time a patient spends in the waiting room has a significantly stronger correlation to the module wait variable, total wait variable and total appointment time variable than any of the other eight possible wait periods. Thus, administrative alterations are necessary to shorten the period of time a patient spends in the waiting room. The next wait period which warrants investigation is the period of waiting time from the first patient service stop to the second patient service stop. Once again reduction of this time period will significantly shorten the module wait time and, therefore, the total appointment time.

The total wait variable is identical to the module wait variable except for the inclusion of registration time. Consequently, the major finding for the total wait variable is very similar to module wait findings. The major difference is that correlations are slightly weaker. However, the correlational analysis reveals that when all the waiting periods are considered (total wait), the time expended for the waits experienced and the services received have equal correlational strength to the total appointment time.

Analysis of the six service variables which comprise the summary time variable, module service, indicates that the service time required for the primary examination represents the service stop which has the strongest

correlation to the module service variable. Therefore, like the waiting room time, investigation should be conducted to determine how much time may be cut from the primary examination without jeopardizing the quality of service. The shorter the primary examination, the shorter the module service. Hence, the appointment time is reduced and patient flow is maximized. The service time for lab work and/or x-rays followed by the service time for the attending re-examination represent the next two most significant service times to be reduced.

When the service and wait times are correlated directly to the total appointment, a priority order is established which signifies the areas having the greatest impact upon reducing total appointment time. The ranking is as follows: (1) Wait 3 (waiting room); (2) primary examination; (3) lab work and/or x-rays; (4) attending re-examination; (5) Wait 5 (the waiting period between the second and the third service stop, regardless of service rendered); (6-tie) Wait 4 (the waiting period between the first and second service stop, regardless of service randered); and (6-tie) Wait 6 (the waiting period between the third and fourth service stop, regardless of service rendered). Thus, in order to improve patient flow, the time periods in the order of the ranking mentioned above need to be reduced for more effective and more efficient service or maximization of fixed resources.

The primary means by which to maximize the Clinical Center's fixed resources is to use existing resources 100 percent of the time or as close to 100 percent as possible. Reducing appointment time and increasing the number of patients served as previously cited represents an appropriate approach by which to accomplish this purpose. The flow study, however, reveals that actual facility utilization desperately warrants attention, too. According to the study, the facility and its fixed resources sit idle for over half of each of the Clinic's sessions. Therefore, reducing appointment waiting and service times where appropriate has limited value if the facility and its resources sit idle for the majority of the time as the patient flow study indicates: Room B = 45 percent utilization; Room C = 47 percent utilization; Room D = 48 percent utilization; Room E = 47 percent utilization; Room F = 43 percent utilization; Room G = 41 percent utilization; Room H = 36 percent utilization; Room I = 32 percent utilization; Room J = 1 percent utilization; or an average total facility utilization of 38 percent.

As mentioned earlier, investigation into possible changes of the scheduling system is necessary. Both patient scheduling as evidenced through appointments and the physician scheduling could impact the total appointment time. For example, heavier scheduling on Fridays--which are only utilized 25 percent of the session compared to the average 42 percent for the other days would more equitably distribute

the patient flow and the required resources. The change could very possibly reduce the total appointment time, especially the appointment waiting periods experienced by the patient, thereby, resulting in more satisfied patients. Another more drastic measure would be to open the Clinical Center for only one session per day--morning or afternoon. Equipment and capital outlay are not maximized, however, staffing costs--another fixed resource--would be sliced in half. As patient flow warrants, the Clinic could institute two sessions a day on Tuesdays--the most utilized day of the week with 46 percent utilization--then Mondays and so on until the facility is open five days a week for double sessions.

Therefore, the reduction of appointment time--waiting periods and service times--and an increase of facility utilization are necessary to maximize fixed resources. The research study's findings, implications and/or recommendation outline means which have the greatest probability of achieving this purpose.

CHAPTER VI

DIRECTIONS FOR FUTURE RESEARCH

Introduction

The study provides insights into the operation of the Michigan State University's Clinical Center with the ultimate purpose being to maximize fixed resources. The major findings and implications discussed reflect the results generated. However, the recommendations are rather general due to the state of the art of residency training in primary care. Chapter VI ties the time study, the Clinical Center and residency training tighter together. First, limitations found in the study are reviewed. Then a more in depth discussion follows which comments upon the suggested recommendations and connects them to the present state of the art of residency training.

Limitations Found in the Present Study

This section elaborates on the anticipated limitations and delimitations of the study stated in Chapter I. Through collecting, analyzing and discussing the data other limitations beyond those mentioned in Chapter I were identified. Thus, in order to further qualify the study's purpose and results, these limitations are acknowledged.

Even though no cases were lost when the data was collected, certain cases contained irrepairable bad data. In other words, mistakes were made by the professional staff in punching the patient flow study time sheets, and/or by the key punchers in punching the data deck. Extracting the forty-six contaminated cases left a working sample of 287 patients. The sample, however, still gives a reasonably good representation of patient flow.

Because of bad data, the discussions centering upon absolute facility utilization are inaccurate by forty-seven patients. The relative frequency histogram for the examination rooms used and the extremely low absolute facility utilization percentage figures, however, support the conclusion that the facility is significantly under utilized.

Another adjustment was made when figuring absolute facility utilization. As previously stated, facility utilization is based upon four-hour morning and four-hour afternoon clinic sessions: 8:00 a.m. through 12:00 noon or 1:00 p.m. through 5:00 p.m. Some patients did arrive a little before the session's start, other patients stayed as much as an hour past the session's end. These cases were truncated so that during analysis, a patient arriving early, arrived at 8:00 a.m. or 1:00 p.m.; late patients subsequently left at 12:00 noon or 5:00 p.m. Therefore, any utilization periods outside of the morning and afternoon sessions are not reflected in absolute facility utilization figures.

Finally, the timing procedures are not completely accurate. No major difficulty exists. However, having time clocks in each of the eight examination rooms or directly outside rather than having two clocks at the nurses station would have made the service and wait variables completely accurate. Also, the service and wait times for the lab work and/or x-rays service stop are not as accurate as the other five service stops. Going to the laboratory and/or radiology necessitates being clocked in and out for the stop at the appointment module, not from the actual place of destination. Because both the laboratory and radiology are located outside the module, times ensued for service and for possible waits experienced are included within the service time. Therefore, the precise wait and service time for the lab work and/or x-ray service stop are not completely reflective of the actual time spent waiting and obtaining service.

The limitations discussed pinpoint areas where conclusions may be slightly tainted. Future research in the field could benefit by taking measures so as to eliminate these limitations.

Recommendations for Future Research

Studying patient flow at Michigan State's Clinical Center not only outlines areas, which if altered, could maximize the Clinic's fixed resources, but also opens up several avenues for future study. The latter is especially

significant due to the current state of the art of residency training in primary care.

Because graduate education in primary care is a recent phenomenon, residency training is still in an evolutionary stage. No model is nationally accepted which prepares physicians to acquire the requisite technical knowledge and "to assume both the independent and collaborative roles required in primary care service" (Hudson and Giacalone, 1975, p. 215). The underlying difficulty stems from the profession's lack or consensus as to how primary care medicine should be practiced (Joel, 1975, p. 123). As a result, the literature reveals that primary care residency training occurs in different settings with different points of emphasis; a sharp contrast to the established programs and practices of specialty training.

Residency training for Pediatrics and Internal Medicine at Michigan State represents one such approach to the training of primary care physicians. The ambulatory clinic provides residents with a set of learning opportunities ranging from patient care over an extended three year period to lectures/discussions on organizational behavior.

Certainly patient flow in a residency training program is improved by reducing all the service times. However, at what point is learning and quality forsaken for quantity? Primary care literature does not answer this question. Thus, recommendations from this study suggesting

shorter service time have somewhat limited value because no comparison is available. Therefore, recommendations have concentrated more heavily on presenting a ranking of the correlational strength of the various services to the module service time, module wait time and total appointment time. These results show that time reductions in certain services have a greater potential for maximizing resources than a reduction in time for some other service.

Now, further investigation is needed to clarify the learning quality versus quantity issue and resident time versus licensed physician time issue in regards to the required time for performing certain patient services. Also, other patient flow studies are needed in other settings so that over all service time comparisons may be drawn. Through such study the probability of nationally endorsing a better program model of residency training is increased.

The parameters for further study mentioned above also exist for the different waiting periods endured by patients. For example, is the average 16.2 minutes time period spent in the waiting room at the Clinical Center considered good? Alteration of improvement of what specific aspects will decrease waiting time?

The total appointment time also warrants further investigations. A mean time of 80.4 minutes at the Clinical Center for an appointment seems rather long, however, research in primary care residency training does not confirm or reject the legitimacy of an 80.4 minute appointment.

Again, further operations research in primary care residency training is needed. Except for Rising, few specific studies are published in this area.

Finally, further facility utilization studies are necessary both at Michigan State University and at other institutions where primary care residency training programs exist. What is the average facility utilization figure in a primary care training clinic? How are residents, attendings and patients scheduled? How much will increased facility utilization and decreased appointment time maximize resources and impact revenues. These questions and many more are not answered in the literature.

To further study patient flow in depth at Michigan State requires simulation. Using a simulation model "involves trial-and-error experimentation with a mathematical model in order to describe and evaluate the systems' behavior" (Turban and Meredith, 1977, p. 446). Future simulation research more accurately determines ways to improve patient flow. The simulation model techniques when understood and properly used will yield a great deal more information concerning the effectiveness of different operating policies under various conditions and assumptions. The patient flow study performed provides the background knowledge needed to channel simulation research in the most beneficial vein.

Once answers are found, the problem then becomes incorporating the recommendations into current operations.

One of primary care training's unique points of emphasis is a general recognition of the importance of understanding the medical organization. This objective is necessary if the physician is going to effectively maintain the health care team and adequately continue the referral activities. For example, the health care team "coordinates the efforts of medical and allied medical personnel to give comprehensive health care to multi-problem families" (Beloff and Willet, 1963, p. 663). How can the health care team function effectively and efficiently if the physician and his/her team--a combination of public health nurse, health aide, social worker, psychiatrist and nutritionist--working interdependently do not acquire a general understanding of organizational skills?

When attempting to operationalize recommendations, the problem then becomes the physician's identity--a factor which has greatly impeded the functioning of an organizational structure which heretofore has been designed from an industrial model. Therefore, further research into the physician's identity, in this case primary care physicians, and the investigation into incorporating the best learning styles for physicians is required. Also, further research into the health care's organizational environment and the various contingencies which come into play is mandatory. Then, the modifications for improved patient flow together with the findings in both of the above mentioned areas may

be integrated into practice and into primary care residency training. Such an approach, answers many unanswered questions in the literature and increases the probability of offering primary care services to patients and primary care training residents at the Clinical Center in the most economical, efficient and effective manner.

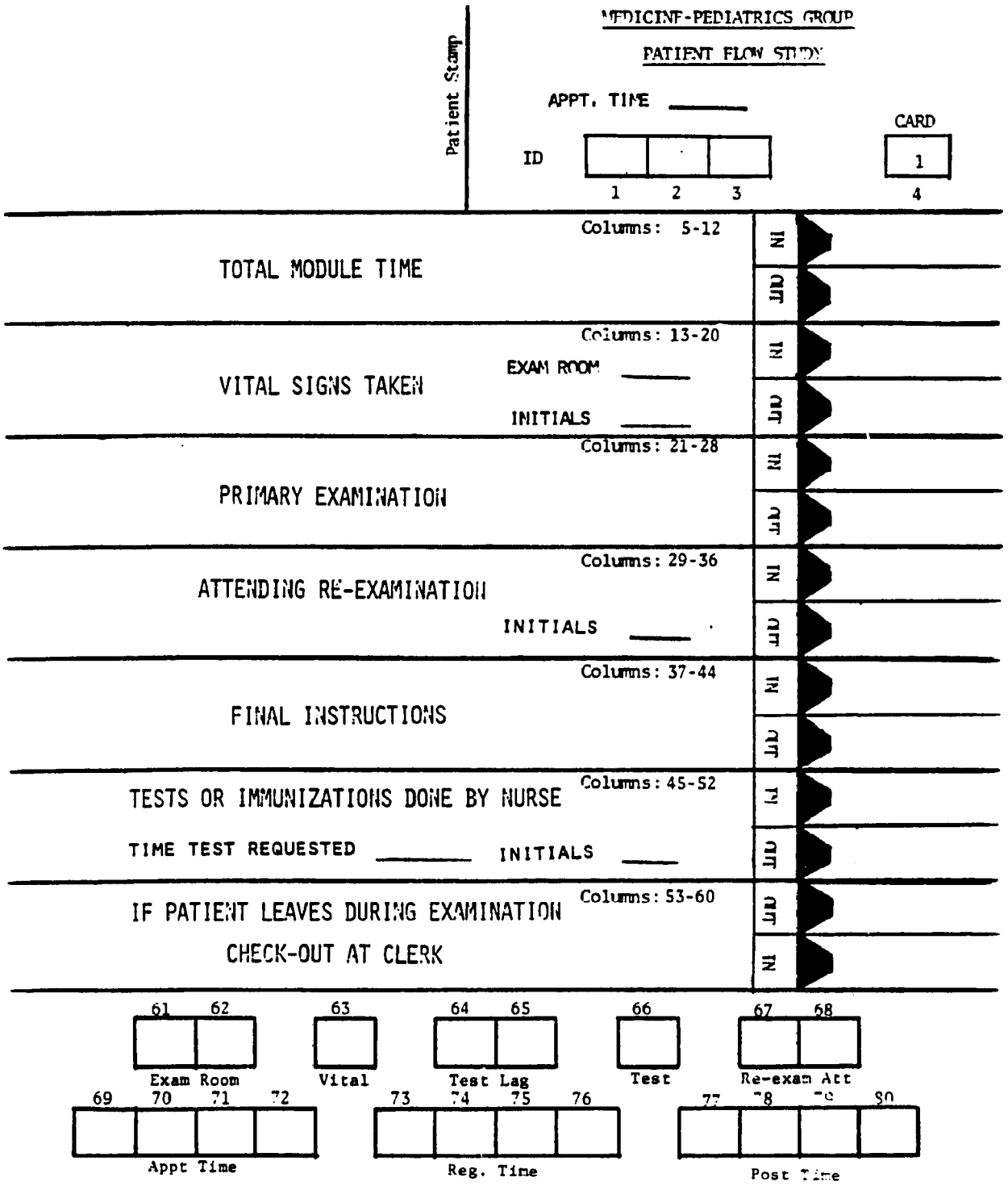
Summary

The directions for future research in the area of maximizing fixed resources through improvement in patient flow are vast and far reaching. Narrowly, research can focus at Michigan State's Clinical Center by simply making improvement to the present study. More broadly, studies may further investigate primary care's contribution to society and recommend processes and procedures, considering the persons, the profession and the organizational structure which would best achieve quality primary health care. The state of the art of primary care can greatly benefit through researched and planned resource management.

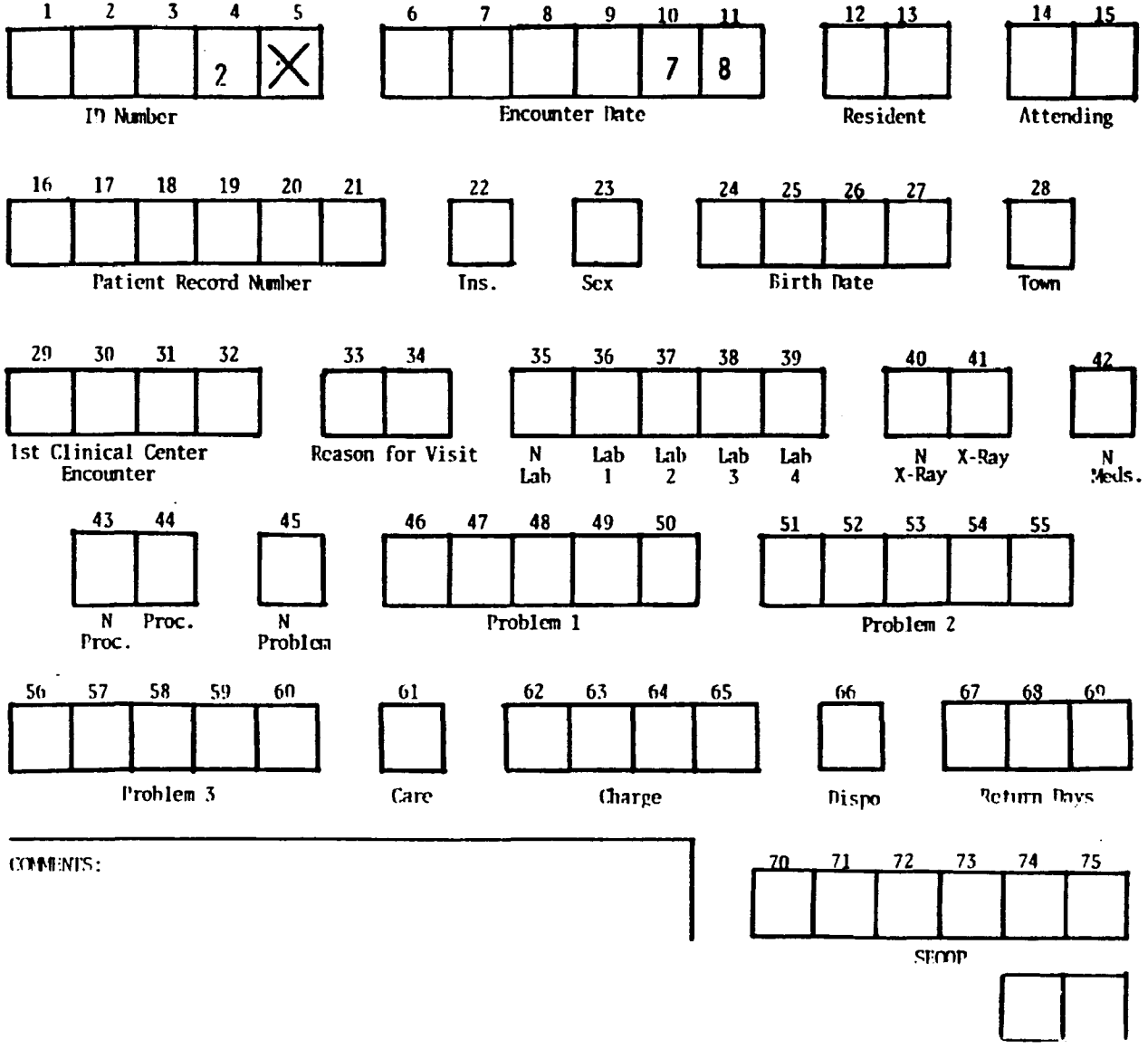
APPENDICES

APPENDIX A

PATIENT FLOW TIME STUDY FORM


Patient Stamp
MEDICINE-PEDIATRICS GROUP
PATIENT FLOW STUDY
APPT. TIME
ID
1 2 3
CARD
1
4
Columns: 5-12
TOTAL MODULE TIME
IN
OUT
Columns: 13-20
VITAL SIGNS TAKEN
EXAM ROOM
INITIALS
IN
OUT
Columns: 21-28
PRIMARY EXAMINATION
IN
OUT
Columns: 29-36
ATTENDING RE-EXAMINATION
INITIALS
IN
OUT
Columns: 37-44
FINAL INSTRUCTIONS
IN
OUT
Columns: 45-52
TESTS OR IMMUNIZATIONS DONE BY NURSE
TIME TEST REQUESTED
INITIALS
IN
OUT
Columns: 53-60
IF PATIENT LEAVES DURING EXAMINATION
CHECK-OUT AT CLERK
OUT
IN
61 62
Exam Room
63
Vital
64 65
Test Lag
66
Test
67 68
Re-exam Att
69 70 71 72
Appt Time
73 74 75 76
Reg. Time
77 78 79 80
Post Time

MEDICINE-PEDIATRICS GROUP PATIENT FLOW STUDY



APPENDIX B

PATIENT ENCOUNTER FORM

№ 12518

CLINIC

CLINICAL CENTER
Michigan State University
133 Service Road
East Lansing, Michigan 48824

PT. TIME IN: :

DATE | DEPT. | PATIENT NO. | PROVIDER NO.

PATIENT'S NAME | PROVIDER NAME | NO.

DISCOUNT CODE

10%	15%	20%	30%	50%	75%	100%	N.C.
9	3	5	4	7	2	6	8

D-10178

DEPT. OF FAMILY PRACTICE — **IM/PEDS PRIMARY CARE RESIDENCY**

REASONS FOR VISIT	x	code
ACUTE PROBLEM		RV01
A. PROB. FOLLOW-UP		RV02
CHRONIC PROB. ROUTINE		RV03
C. PROB. FLARE-UP		RV04
PRE/POST NATAL CARE		RV05
PRE/POST OR. CARE		RV06
WELL ADULT/CHILD EX		RV07
FAMILY PLANNING		RV08
PATIENT EDUCATION		RV09
COUNSELING		RV10
MEDICATION ADMIN.		RV11
MEDICINE RENEWAL		RV12
REFERRAL		RV13
ADMINISTRATIVE		RV14
OTHER (Specify)		RV15
PROVIDER TIME IN		

ORDERS	x	code
LABORATORY		
UA		
Sed Rate		
WBC		
CBC		
Throat Culture		
Urine Culture		
Vag. Smear		
Skin Scrapings		
Hct.		
LCM 19		
X-RAY		
MEDICATION		
OTHER DIAG. PROC.		
EKG		

PROBLEMS	x	PSI CARE CODE	INCDA II CODE
ANXIETY		70	3100
DEPRESSION		72	3105
ECONOMIC PROBLEM		356	Y861
HOUSING PROBLEM		357	Y862
ARTERIOSCLEROSIS		111	4409
NURSING CARE EVALUATION		358	Y841
MARITAL PROB. (ie sexl.)		359	Y851
OSTEOARTHRITIS		229	7130
PARENT-CHILD PROBLEM		360	Y852
PROB. WITH AGED PARENT		361	3174
FAM. DISRUPTION DIVORCE		362	Y850
OTHER PROB. OF FAMILY			
RELATIONSHIP		363	Y853
OTHER PROB. OF SOCIAL			
ADJUSTMENT		368	Y859
ES. HYPERTENSION		120	4010
ACUTE URI		133	4650
DIABETES MELLITUS—			
(Adult onset)		50	2500
UTI, UNSPECIFIED		174	5995
ASHD — CHRONIC IHD		110	4129
VAGINITIS-VULVITIS		186	6221
OBESITY, NOS		55	2589
OTITIS MEDIA		101	3819
BRONCHITIS		138	4900
ACUTE PHARYNGITIS		133	4620
ANEMIA		58	2859
DERMATITIS, ECZEMA NOS		231	6929
OTHER (Specify):			

HEALTH CARE	PROVIDER 1	2	3	4	5	code	cms.
NEW PATIENT							
Limited Visit — Rout.						90010	16.00
Intermediate Visit						90015	21.00
Comprehensive Visit						90620	40.00
ESTABLISHED PT.							
Limited Visit — Rout.						90050	12.00
Intermediate Visit						90060	16.00
Comprehensive Visit						90620	35.00
Brief Visit						90040	6.00
FAMILY COUNSELING						99847	
INDIVIDUAL COUNSELING						99083	
INITIAL INTERVIEW						99082	12.00
HOSPITAL VISITS							
Initial-Comp-1st						90220	65.00
Limited Ex-Sub.						90250	20.00
TREATMENT PROCEDURES							
Sigmoid. diag. 1st						3400	25.00
Sigmoid. w/biopsy						3402	30.00
Ex. B. Lesion ¼"						0095	30.00
Ex. B. Lesion ¼ - ½"						0096	40.00
Ex. B. Lesion ½ - ¾"						0097	50.00

PROVIDER TIME OUT :

TOTAL COST THIS VISIT

TOTAL CHARGE THIS VISIT

PATIENT TIME OUT :

DISPOSITION	x	code
No Follow-up Planned		DP 01
Telephone Follow-up		DP 02
Referred to:		DP 03
Returned to:		DP 04
Admit to Hosp.		DP 05
Return PRN		DP 06
Return in:		DP 07
To see:		
Date:		
No Show		DP 08
Cancellation — Patient		DP 09
Cancellation — Provider		DP 10

APPENDIX C

INTERNATIONAL CLASSIFICATION OF HEALTH CARE PROBLEMS IN PRIMARY CARE

Position No.	ICHPPC Code	Condensed Title

I. INFECTIVE & PARASITIC DISEASES

1	008–	PROVEN INFECTIOUS INTESTINE DISEASE
2	009–	PRESUMED INFECTIOUS INTESTIN DISEAS
3	0091	DIARRHEA, CAUSE UNDETERMINED
4	011–	TUBERCULOSIS
5	0122	PLEURAL EFFUSION NOS
6	033–	WHOOPING COUGH
7	034–	STREP THROAT,SCARLET FEV,ERYSIPELAS
8	040–	POLIO & CNS ENTEROVIRAL DISEASES
9	052–	CHICKENPOX
10	053–	HERPES ZOSTER
11	054–	HERPES SIMPLEX
12	055–	MEASLES
13	056–	RUBELLA
14	057–	OTHER VIRAL EXANTHEMS
15	070–	INFECTIOUS HEPATITIS
16	072–	MUMPS
17	075–	INFECTIOUS MONONUCLEOSIS
18	078–	VIRAL CONJUNCTIVITIS
19	0791	WARTS, ALL SITES
20	0799	VIRAL INFECTION NOS
21	084–	MALARIA
22	090–	SYPHILIS, ALL SITES & STAGES
23	098–	GONORRHEA, ALL SITES
24	110–	DERMATOPHYTOSIS & DERMATOMYCOSIS
25	112–	MONILIASIS EXCL UROGENITAL
26	1121	MONILIASIS, UROGENITAL, PROVEN
27	131–	TRICHOMONIASIS, UROGENITAL, PROVEN
28	127–	OXYURIASIS, PINWORMS, HELMINTH NEC
29	132–	PEDICULOSIS & OTHER INFESTATIONS
30	133–	SCABIES & OTHER ACARIASIS
31	136–	OTHER INFECT/PARASITIC DISEASES NEC

Position No.	ICHPPC Code	Condensed Title
		II. NEOPLASMS
		MALIGNANT NEOPLASMS
32	151–	MALIG NEOPL GASTROINTESTINAL TRACT
33	162–	MALIGNANT NEOPL RESPIRATORY TRACT
34	173–	MALIG NEOPL SKIN/SUBCUTANEOUS TISSU
35	174–	MALIGNANT NEOPLASM BREAST
36	180–	MALIG NEOPL FEMALE GENITAL TRACT
37	188–	MALIG NEOPL URINARY & MALE GENITAL
38	201–	HODGKINS DISEASE,LYMPHOMA,LEUKEMIA
39	199–	OTHER MALIGNANT NEOPLASMS NEC
		BENIGN NEOPLASMS
40	214–	LIPOMA, ANY SITE
41	216–	BENIGN NEOPLASM SKIN
42	217–	BENIGN NEOPLASM BREAST
43	218–	BENIGN NEOPLASM UTERUS
44	227–	HEMANGIOMA & LYMPHANGIOMA
45	228–	OTHER BENIGN NEOPLASMS NEC
		UNSPECIFIED NEOPLASMS
46	239–	NEOPL NYD AS BENIGN OR MALIGNANT
		III. ENDOCR, NUTRIT, METABOL DISEAS
47	240–	NONTOXIC GOITER & NODULE
48	242–	THYROTOXICOSIS W/WO GOITER
49	244–	HYPOTHYROIDISM, MYXEDEMA, CRETINISM
50	250–	DIABETES MELLITUS
51	251–	ABNORMAL UNEXPLAINED BIOCHEM TEST
52	260–	AVITAMIN & NUTRITIONAL DISORDER NEC
53	2699	FEEDING PROBLEM IN BABY
54	274–	GOUT & HYPERURICEMIA
55	277–	OBESITY
56	272–	LIPID METABOLISM DISORDERS
57	279–	OTHER ENDOCR,NUTRITN,METABOL DISORD

Position No.	ICHPPC Code	Condensed Title

IV. BLOOD DISEASES

58	280–	MICROCYTIC & IRON DEFICIENCY ANEMIA
59	281–	MACROCYTIC & OTHER DEFICIENC ANEMIA
60	282–	HEREDITARY HEMOLYTIC ANEMIAS
61	285–	ANEMIA, OTHER/UNSPECIFIED
62	287–	PURPURA,HEMORRHAG & COAGULAT DEFECT
63	2891	LYMPHADENITIS, CHRONIC/NONSPECIFIC
64	2896	ABNORMAL HEMATOLOGICAL FINDINGS NYD
65	2899	BLOOD/BLOOD FORMING ORGAN DISOR NEC

V. MENTAL DISORDERS

PSYCHOSES EXCEPT ALCOHOLIC

66	294–	ORGANIC PSYCHOSIS EXCL ALCOHOLIC
67	295–	SCHIZOPHRENIA, ALL TYPES
68	296–	AFFECTIVE PSYCHOSES
69	298–	PSYCHOSIS, OTHER/NOS EXCL ALCOHOLIC

NEUROSES

70	3000	ANXIETY NEUROSIS
71	3001	HYSTERICAL & HYPOCHONDRIAC NEUROSES
72	3004	DEPRESSIVE NEUROSIS
73	3009	NEUROSIS, OTHER/UNSPECIFIED

OTHER MENTAL, PSYCHOLOG DISORDERS

74	3061	SPECIFIC LEARNING DISTURBANCE
75	3064	INSOMNIA & OTHER SLEEP DISORDERS
76	3068	TENSION HEADACHE
77	307–	TRANSIEN SITUAT DISTURB, ADJ REACT
78	308–	BEHAVIOR DISORDERS NEC
79	3056	SEXUAL PROBLEMS
80	3031	ALCOHOL ABUSE & ALCOHOLIC PSYCHOSIS
81	3039	ACUTE ALCOHOLIC INTOXICATION
82	3049	TOBACCO ABUSE

Position No.	ICHPPC Code	Condensed Title
		V. MENTAL DISORDERS (Cont.)
		OTHER MENTAL, PSYCHOLOG DISORDERS (Cont.)
83	3048	OTHER DRUG ABUSE, HABIT, ADDICTION
84	301–	PERSONALITY & CHARACTER DISORDERS
85	315–	MENTAL RETARDATION
86	309–	OTHER MENTAL & PSYCHOLOGIC DISORDER
		VI. NERV SYSTEM, SENSE ORGAN DISEAS
		NERVOUS SYSTEM DISEASES
87	340–	MULTIPLE SCLEROSIS
88	342–	PARKINSONISM
89	345–	EPILEPSY, ALL TYPES
90	346–	MIGRAINE
91	355–	OTHER NERVOUS SYSTEM DISEASES NEC
		EYE DISEASES
92	360–	CONJUNCTIVITIS & OPHTHALMIA
93	361–	EYELID INFECTIONS/CHALAZION
94	370–	REFRACTIVE ERRORS
95	3789	EYE PAIN
96	374–	CATARACT
97	375–	GLAUCOMA
98	379–	BLINDNESS
99	378–	OTHER EYE DISEASES
		EAR DISEASES
100	380–	OTITIS EXTERNA
101	3810	ACUTE OTITIS MEDIA
102	3811	CHRONIC & CHRON SEROUS OTITIS MED
103	384–	EUSTACHIAN BLOCK OR CATARRH
104	385–	LABYRINTHINE DISORDERS
105	386–	DEAFNESS, PARTIAL OR COMPLETE
106	3871	WAX IN EAR
107	3879	OTHER EAR & MASTOID DISEASES

Position No.	ICHPPC Code	Condensed Title

VII. CIRCULATORY SYSTEM DISEASES

HEART DISEASES

108	390–	RHEUMATIC FEVER/HEART DISEASE
109	410–	AC MYOCARD INFARCT/SUBAC ISCHEMIA
110	412–	CHRONIC ISCHEMIC HEART DISEASE
111	415–	OTHER ATHEROSCLEROTIC HEART DISEASE
112	4270	HEART FAILURE, RIGHT/LEFT SIDED
113	4274	ATRIAL FIBRILLATION & FLUTTER
114	4275	PAROXYSMAL TACHYCARDIA
115	4277	ECTOPIC BEATS, ALL TYPES
116	4278	HEART MURMURS NEC/NYD/FUNCTIONAL
117	426–	PULMONARY HEART DISEASE
118	429–	OTHER HEART DISEASES NEC

BLOOD PRESSURE PROBLEMS

119	4011	ELEVATED BLOOD PRESSURE NYD
120	401–	HYPERTENSION, UNCOMPLICATED
121	400–	HYPERTENSION INVOLVING TARGET ORGAN
122	4012	HYPERTENSION NOS

VASCULAR SYSTEM DISEASES

123	435–	TRANSIENT CEREBRAL ISCHEMIA
124	438–	OTHER CEREBROVASCULAR DISEASE
125	440–	ATHEROSCLEROSIS EXCL HEART & BRAIN
126	443–	OTHER ARTERIAL DISEAS EXCL ANEURYSM
127	450–	PULMONARY EMBOLISM & INFARCTION
128	451–	PHLEBITIS & THROMBOPHLEBITIS
129	454–	VARICOSE VEINS OF LEGS
130	455–	HEMORRHOIDS
131	4580	POSTURAL HYPOTENSION
132	4589	OTHER PERIPHERAL VESSEL DISEASES

Position No.	ICHPPC Code	Condensed Title

VIII. RESPIRATORY SYSTEM DISEASES

133	460–	ACUTE UPPER RESPIR TRACT INFECTION
134	461–	SINUSITIS, ACUTE & CHRONIC
135	463–	ACUTE TONSILLITIS & QUINSY
136	500–	HYPERTROPH/CHRON INFECT TONSL/ADEN
137	464–	LARYNGITIS & TRACHEITIS, ACUTE
138	466–	BRONCHITIS & BRONCHIOLITIS, ACUTE
139	470–	INFLUENZA
140	486–	PNEUMONIA
141	511–	PLEURISY ALL TYPES EXCL TUBERCUL
142	491–	BRONCHITIS, CHRONIC
143	492–	EMPHYSEMA, BRONCHIECTASIS, & COPD
144	493–	ASTHMA
145	507–	HAY FEVER
146	508–	BOIL IN NOSE
147	519–	OTHER RESPIRATORY SYSTEM DISEASES

IX. DIGESTIVE SYSTEM DISEASES

148	520–	TEETH & SUPPORT STRUCTURE DISEASES
149	528–	MOUTH,TONGUE,SALIVARY GLAND DISEASE
150	530–	ESOPHAGEAL DISEASES
151	532–	DUODENAL ULCER W/WO COMPLICATIONS
152	533–	OTHER PEPTIC ULCER
153	536–	OTHER STOMACH & DUODEN DIS/DISORD
154	540–	APPENDICITIS, ALL TYPES
155	550–	INGUINAL HERNIA W/WO OBSTRUCTION
156	551–	HIATUS/DIAPHRAGMATIC HERNIA
157	553–	OTHER HERNIAS ABDOMINAL CAVITY
158	562–	DIVERTICULAR DISEASE OF INTESTINE
159	564–	IRRIT BOWEL SYNDR/INTEST DISOR NEC
160	563–	CHRONIC ENTERITIS,ULCERATIV COLITIS
161	5640	CONSTIPATION

Position No.	ICHPPC Code	Condensed Title

IX. DIGESTIVE SYSTEM DISEASES (Cont.)

162	565–	ANAL FISSURE/FISTULA/ABSCESS
163	5690	PROCTITIS
164	5692	BLEEDING PER RECTUM NOS
165	571–	CIRRHOSIS & OTHER LIVER DISEASES
166	574–	GALLBLADDER & BILIARY TRACT DISEASE
167	578–	OTHER DIGESTIVE SYSTEM DISEASES NEC

X. GENITOURINARY SYSTEM DISEASES

URINARY SYSTEM DISEASES

168	580–	GLOMERULONEPHRITIS, ACUTE & CHRONIC
169	5901	PYELONEPHRITIS & PYELITIS, ACUTE
170	595–	CYSTITIS & URINARY INFECTION NOS
171	592–	URINARY SYSTEM CALCULUS, ALL TYPES
172	597–	URETHRITIS NOS, NEC, NONSPECIFIC
173	5932	ORTHOSTATIC ALBUMINURIA
174	599–	OTHER URINARY SYSTEM DISEASES NEC

MALE GENITAL ORGAN DISEASES

175	600–	BENIGN PROSTATIC HYPERTROPHY
176	601–	PROSTATITIS & SEMINAL VESICULITIS
177	603–	HYDROCELE
178	604–	ORCHITIS & EPIDIDYMITIS
179	605–	REDUNDANT PREPUCE & PHIMOSIS
180	607–	OTHER MALE GENITAL ORGAN DISEASES

BREAST DISEASES

181	610–	CHRONIC CYSTIC BREAST DISEASE
182	611–	OTHER BREAST DISEASES

FEMALE GENITAL ORGAN DISEASES

183	612–	PELVIC INFLAMMATORY DISEASE
184	620–	CERVICITIS & CERVICAL EROSION
185	6221	VAGINITIS NOS

Position No.	ICHPPC Code	Condensed Title

X. GENITOURINARY SYSTEM DISEASES (Cont.)

FEMALE GENITAL ORGAN DISEASES (Cont.)

186	623--	UTEROVAGINAL PROLAPSE
187	627-	MENOPAUSAL SYMPTOMS
188	6268	PREMENSTRUAL TENSION SYNDROME

DISORDERS OF MENSTRUATION

189	6260	ABSENT, SCANTY, RARE MENSTRUATION
190	6262	EXCESSIVE MENSTRUATION
191	6263	PAINFUL MENSTRUATION
192	6264	FREQUENT & IRREGULAR MENSTRUATION
193	6269	POSTMENOPAUS & INTERMENSTR BLEEDING
194	629--	OTHER FEMALE GENITAL ORGAN DISEASES

FERTILITY PROBLEMS

195	606-	STERILITY & REDUCED FERTILITY

XI. PREGNANCY, CHILDBIRTH, PUERPERIUM

196	631-	ECTOPIC PREGNANCY
197	632--	BLEEDING DURING PREGNANCY
198	635-	URINARY INFECTION, PREG & POSTPART
199	637-	TOXEMIAS OF PREG & PUERPERIUM
200	640--	INDUCED ABORTION W/WO COMPLICATIONS
201	643--	ABORTION, SPONTANEOUS & NOS
202	649--	OTHER COMPLICATIONS OF PREGNANCY
203	605-	NORMAL DELIVERY
204	661	COMPLICATED DELIVERY
205	678-	MASTITIS & LACTATION DISORDERS
206	677	OTHER COMPLICATIONS OF PUERPERIUM

XII. SKIN, SUBCUTANEOUS TISSU DISEAS

207	680	BOIL & CELLULITIS EXCL FINGR & TOE
208	681-	BOIL & CELLULITIS OF FINGER & TOE

Position No.	ICHPPC Code	Condensed Title

XII. SKIN, SUBCUTANEOUS TISSU DISEAS (Cont.)

209	683-	LYMPHADENITIS, ACUTE
210	684-	IMPETIGO
211	685-	OTHER INFECTIONS SKIN/SUBCUTANEOUS
212	690-	SEBORRHOEIC DERMATITIS
213	691-	ECZEMA & ALLERGIC DERMATITIS
214	692-	CONTACT & OTHER DERMATITIS NEC
215	6929	DIAPER RASH
216	6963	PITYRIASIS ROSEA
217	6961	PSORIASIS W/WO ARTHROPATHY
218	698-	PRURITIS & RELATED CONDITIONS
219	700-	CORNS & CALLOSITIES
220	7062	SEBACEOUS CYST
221	703-	INGROWN TOENAIL & NAIL DISEASE NEC
222	704-	ALOPECIA & OTHER HAIR DISEASES
223	705-	POMPHOLYX & SWEAT GLAND DIS NEC
224	7061	ACNE
225	707-	CHRONIC SKIN ULCER
226	708-	URTICARIA,ALLERGIC EDEMA,ANGIOEDEMA
227	709-	OTHER SKIN & SUBCUTANE TISSU DISEAS

XIII. MUSCULOSKELET, CONNECTIV TISSU DISEASE

ARTHRITIS & ARTHROSIS

228	712-	RHEUMATOID ARTHRIT & ALLIED CONDITN
229	713-	OSTEOARTHRITIS & ALLIED CONDITIONS
230	714-	TRAUMATIC ARTHRITIS
231	715-	ARTHRITIS NEC/DIFF CONN TISS DIS

NONARTICULAR RHEUMATISM

232	717-	SHOULDER SYNDROMES
233	731-	OTHER BURSITIS & SYNOVITIS
234	7179	OTHER NONARTICULAR RHEUMATISM

Position No.	ICHPPC Code	Condensed Title

XIII. MUSCULOSKELET, CONNECTIV TISSU DISEASE (Cont.)

VERTEBRAL COLUMN SYNDROMES

235	720–	CERVICAL SPINE SYNDROMES
236	728–	THORACIC SPINE SYNDROMES
237	7131	OSTEOARTHRITIS OF LUMBAR SPINE
238	7289	LOW BACK PAIN WO RADIATING SYMPTOMS
239	725–	OTHER LUMBAR SYNDROMES
240	735–	ACQUIRED DEFORMITIES OF SPINE

OTHER MUSCULOSKEL, CONNECT TISS DISORD

241	7319	GANGLION OF JOINT & TENDON
242	722–	OSTEOCHONDROSIS
243	7230	OSTEOPOROSIS
244	724–	CHRONIC INTERNAL JOINT DERANGEMENT
245	738–	OTHER ACQUIRED DEFORMITY
246	739–	OTHER MUSCULOSKEL, CONNECTIV DISEAS

XIV. CONGENITAL ANOMALIES

247	746–	CONGENITAL ANOMALY HEART & CIRCULAT
248	754–	CONGENITAL ANOMALIES OF LOWER LIMB
249	7521	UNDESCENDED TESTICLE
250	7571	MOLE & PIGMENTED NEVUS
251	7448	BLOCKED TEAR DUCT
252	758–	OTHER CONGENITAL ANOMALIES NEC

XV. PERINATAL MORBIDITY & MORTALITY

253	778–	ALL PERINATAL CONDITIONS

XVI. SIGN, SYMPTOM, ILL DEFINED COND

CENTRAL & PERIPHERAL NERV SYSTEM

254	7802	CONVULSIONS
255	7803	ABNORMAL INVOLUNTARY MOVEMENT

Position No.	*ICHPPC Code*	*Condensed Title*

XVI. SIGN, SYMPTOM, ILL DEFINED COND (Cont.)

CENTRAL & PERIPHERAL NERV SYSTEM (Cont.)

256	7805	DIZZINESS & GIDDINESS
257	7815	DISTURBANCE OF SPEECH
258	791–	HEADACHE
259	7816	DISTURBANCE OF SENSATION
260	7810	BLURRED VISION
261	7813	TINNITUS

CARDIOVASCULAR & LYMPHATIC SYSTEM

262	7820	CHEST PAIN
263	7821	PALPITATIONS
264	7825	SYNCOPE, FAINT, BLACKOUT
265	7826	EDEMA
266	7827	ENLARGED LYMPH NODES, NOT INFECTED

RESPIRATORY SYSTEM

267	7830	EPISTAXIS
268	7831	HEMOPTYSIS
269	7832	DYSPNEA
270	7833	COUGH
271	7835	HOARSENESS
272	7837	PAINFUL RESPIRATION & PLEURODYNIA

GASTROINTESTINAL SYSTEM & ABDOMEN

273	7840	ANOREXIA
274	7841	NAUSEA/VOMITING
275	7843	HEARTBURN
276	7845	HEMATEMESIS & MELENA
277	7851	HEPATOMEGALY/SPLENOMEGALY
278	7847	FLATULENCE, BLOATING, ERUCTATION
279	7855	ABDOMINAL PAIN

GENITOURINARY SYSTEM

280	7860	URINARY SYSTEM OR MICTURITION PAIN
281	7862	ENURESIS

Position No.	ICHPPC Code	Condensed Title
		XVI. SIGN, SYMPTOM, ILL DEFINED COND (Cont.)
		GENITOURINARY SYSTEM (Cont.)
282	7863	STRESS INCONTINENCE
283	7864	FREQUENCY OF URINATION
284	7867	PAIN REFERABLE TO GENITAL ORGANS
285	7868	PAINFUL BREAST
		LIMBS AND JOINTS
286	787–	PAIN IN LIMB
287	7871	LEG CRAMPS
288	7873	PAIN IN JOINT
289	7874	SWELLING OF JOINT
		GENERAL SIGNS & SYMPTOMS
290	7881	EXCESSIVE SWEATING
291	7888	FEVER OF UNDETERMINED CAUSE
292	7882	RASH & OTHER NONSPECIFIC SKIN ERUPT
293	7884	WEIGHT LOSS
294	788–	LACK OF EXPECTED PHYSIOLOG DEVELOP
295	7901	MALAISE, FATIGUE, TIREDNESS
296	7960	MASS & LOCALIZED SWELLING NOS/NYD
297	794–	SENILITY WITHOUT PSYCHOSIS
		UNEXPLAINED ABNORMAL FINDINGS
298	789–	ABNORMAL URINE TEST FINDING
299	7887	OTHER UNEXPLAINED FINDINGS NEC
		SIGN, SYMPTOM, ILL DEFINED COND NEC
300	7889	SIGN, SYMPTOM, ILL DEFINED COND NEC
		XVII. INJURIES & ADVERSE EFFECTS
		FRACTURES
301	802–	FRACTURE SKULL & FACIAL BONES
302	805–	FRACTURE VERTEBRAL COLUMN
303	807–	FRACTURE RIBS

Position No.	ICHPPC Code	Condensed Title

XVII. INJURIES & ADVERSE EFFECTS (Cont.)

FRACTURES (Cont.)

304	810–	FRACTURE CLAVICLE
305	812–	FRACTURE HUMERUS
306	813–	FRACTURE RADIUS/ULNA
307	814–	FRACT (META)CARPAL & (META)TARSAL
308	816–	FRACTURE PHALANGES FOOT/HAND
309	820--	FRACTURE FEMUR
310	823--	FRACTURE TIBIA/FIBULA
311	829–	FRACTURE ALL OTHER SITES NEC

DISLOCATIONS & SUBLUXATIONS

312	836–	DISLOC/SUBLUX KNEE & PATELLA
313	839–	DISLOC/SUBLUX OTHER SITES NEC

SPRAINS & STRAINS

314	840--	SPRAIN/STRAIN SHOULDER & ARM
315	842--	SPRAIN/STRAIN WRIST, HAND, FINGERS
316	844	SPRAIN/STRAIN KNEE & LOWER LEG
317	8450	SPRAIN/STRAIN ANKLE
318	8451	SPRAIN/STRAIN FOOT & TOES
319	8470	SPRAIN/STRAIN NECK
320	8478	SPRAIN/STRAIN VERTEBRAL EXCL NECK
321	848-	SPRAIN & STRAIN ALL OTHER SITES NEC

OTHER TRAUMAS

322	850–	CONCUSSION & INTRACRANIAL INJURY
323	889--	LACERAT/OPEN WOUND/TRAUM AMPUTATN
324	907--	ANIMAL BITE
325	910--	INSECT BITES & STINGS
326	918	ABRASION, SCRATCH, BLISTER
327	929–	BRUISE, CONTUSION, CRUSHING
328	949--	BURNS & SCALDS, ALL DEGREES
329	888--	FOREIGN BODY IN TISSUES
330	930–	FOREIGN BODY IN EYE

Position No.	ICHPPC Code	Condensed Title

XVII. INJURIES & ADVERSE EFFECTS (Cont.)

OTHER TRAUMAS (Cont.)

331	939–	FOREIGN BODY ENTERING THRU ORIFICE
332	950–	LATE EFFECT OF TRAUMA
333	959–	OTHER INJURIES & TRAUMA

ADVERSE EFFECTS

334	977–	ADVERSE EFFECTS OF MEDICINAL AGENTS
335	989–	ADVERSE EFFECTS OF OTHER CHEMICALS
336	998–	SURGERY & MEDICAL CARE COMPLICATION
337	994–	ADVERSE EFFECTS OF PHYSICAL FACTORS

SUPPLEMENTARY CLASSIFICATION

PREVENTIVE MEDICINE

338	y00–	MEDICAL EXAM, NO DISEASE DETECTED
339	y04–	CONTAC/CARRIER, INFEC/PARASIT DIS
340	y02–	PROPHYLACTIC IMMUNIZATION
341	y16–	OBSERV/CARE PT ON HI RISK MEDICAT
342	y17–	OBSERV/CARE OTHER HI RISK PATIENT

FAMILY PLANNING

343	y40–	STERILIZATION OF MALE OR FEMALE
344	y41–	ORAL CONTRACEPTIVES
345	y42–	INTRAUTERINE DEVICES
346	y43–	OTHER CONTRACEPTIVE METHODS
347	y44–	GENERAL CONTRACEPTIVE GUIDANCE

ADMINISTRATIVE PROCEDURES

348	y50–	LETTER, FORMS, PRESCRIPTION WO EXAM
349	y51–	REFERRAL WO EXAM OR INTERVIEW

MATERNAL & CHILD HEALTH CARE

350	y60–	DIAGNOSING PREGNANCY
351	y61–	PRENATAL CARE
352	y62–	POSTNATAL CARE

Position No.	ICHPPC Code	Condensed Title

SUPPLEMENTARY CLASSIFICATION (Cont.)

MISCELLANEOUS

353	y70–	MED/SURG PROCEDURE WO DIAGNOSIS
354	y71–	ADVICE & HEALTH INSTRUCTION
355	y72–	PROBLEMS EXTERNAL TO PATIENT

SOCIAL, MARITAL, FAMILY PROBLEMS

Whole Family Problems

356	y80–	ECONOMIC PROBLEM
357	y81–	HOUSING PROBLEM
358	y83–	MEDICAL CARE PROBLEM
359	y84–	MARITAL PROBLEM
360	y85–	PARENT & CHILD PROBLEM
361	y86–	AGED PARENT OR INLAW PROBLEM
362	y87–	FAMILY DISRUPTION W/WO DIVORCE
363	y89–	OTHER FAMILY PROBLEMS

Individual Problems

364	y90–	EDUCATIONAL PROBLEM
365	y91–	PREGNANCY OUT OF WEDLOCK
366	y92–	SOCIAL MALADJUSTMENT
367	y93–	OCCUPATIONAL PROBLEM
368	y94–	OTHER INDIVIDUAL PROBLEMS

Other Social Adjustment Problem

369	y95–	OTHER SOCIAL ADJUSTMENT PROBLEM

Legal Problems

370	y96–	LEGAL PROBLEMS

OTHER PROBLEMS NEC

371	y99–	PROBLEMS NEC IN CODES 008– TO y96–

APPENDIX D

RELATIVE FREQUENCY HISTOGRAMS FOR INFORMATIONAL VARIABLES

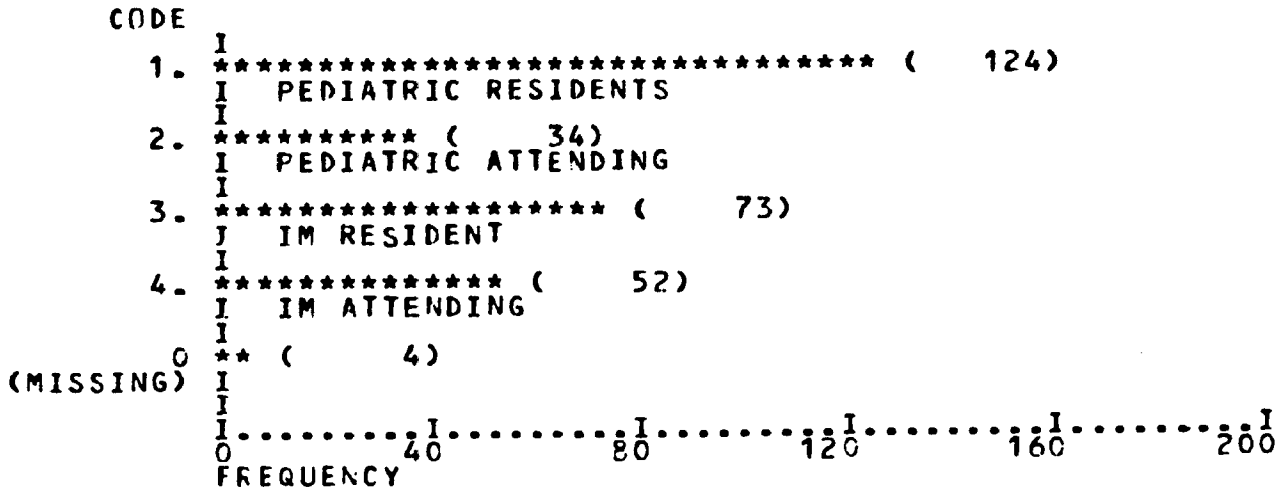


Figure D-1

The Relative Frequency of
the Primary Physician

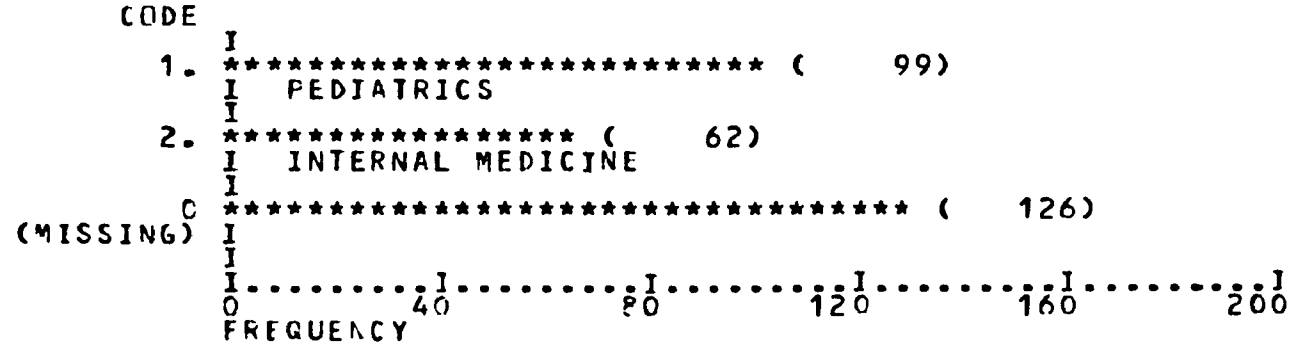


Figure D-2

The Relative Frequency of
the Attending

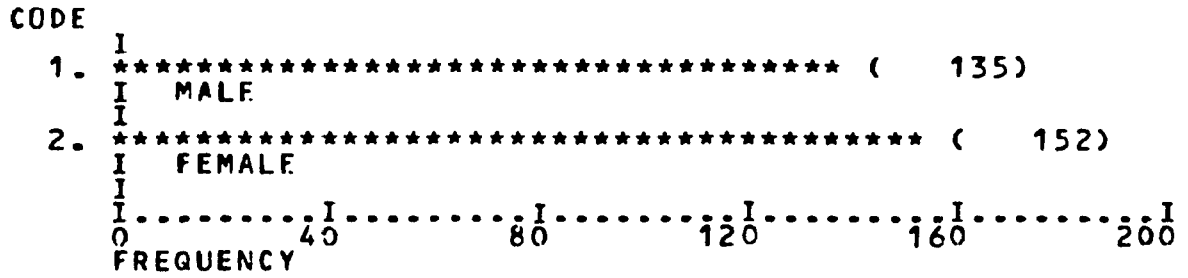


Figure D-3

The Relative Frequency of
Patient's Sex

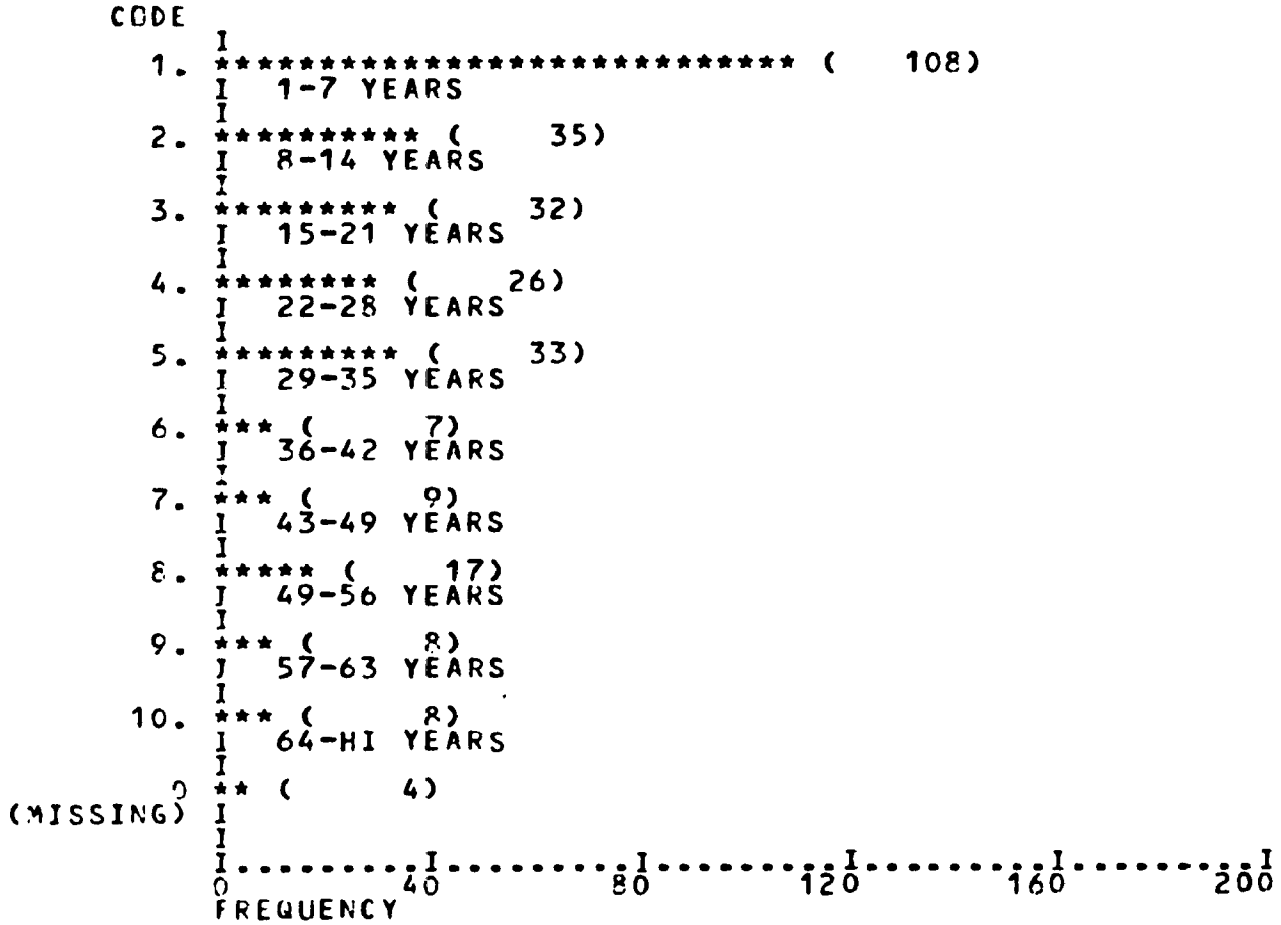


Figure D-4

The Relative Frequency of the Patient's Year of Birth

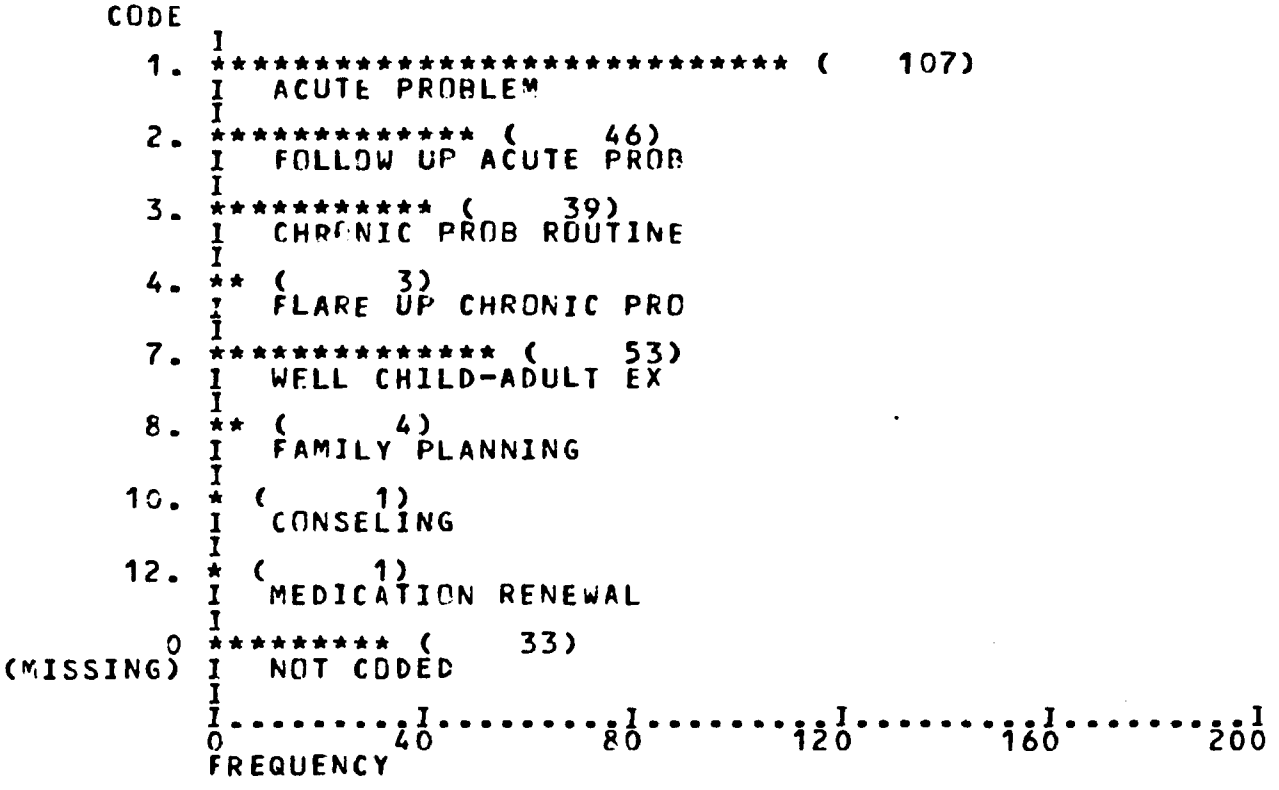


Figure D-5

The Relative Frequency of the Patient's Reason for the Visit

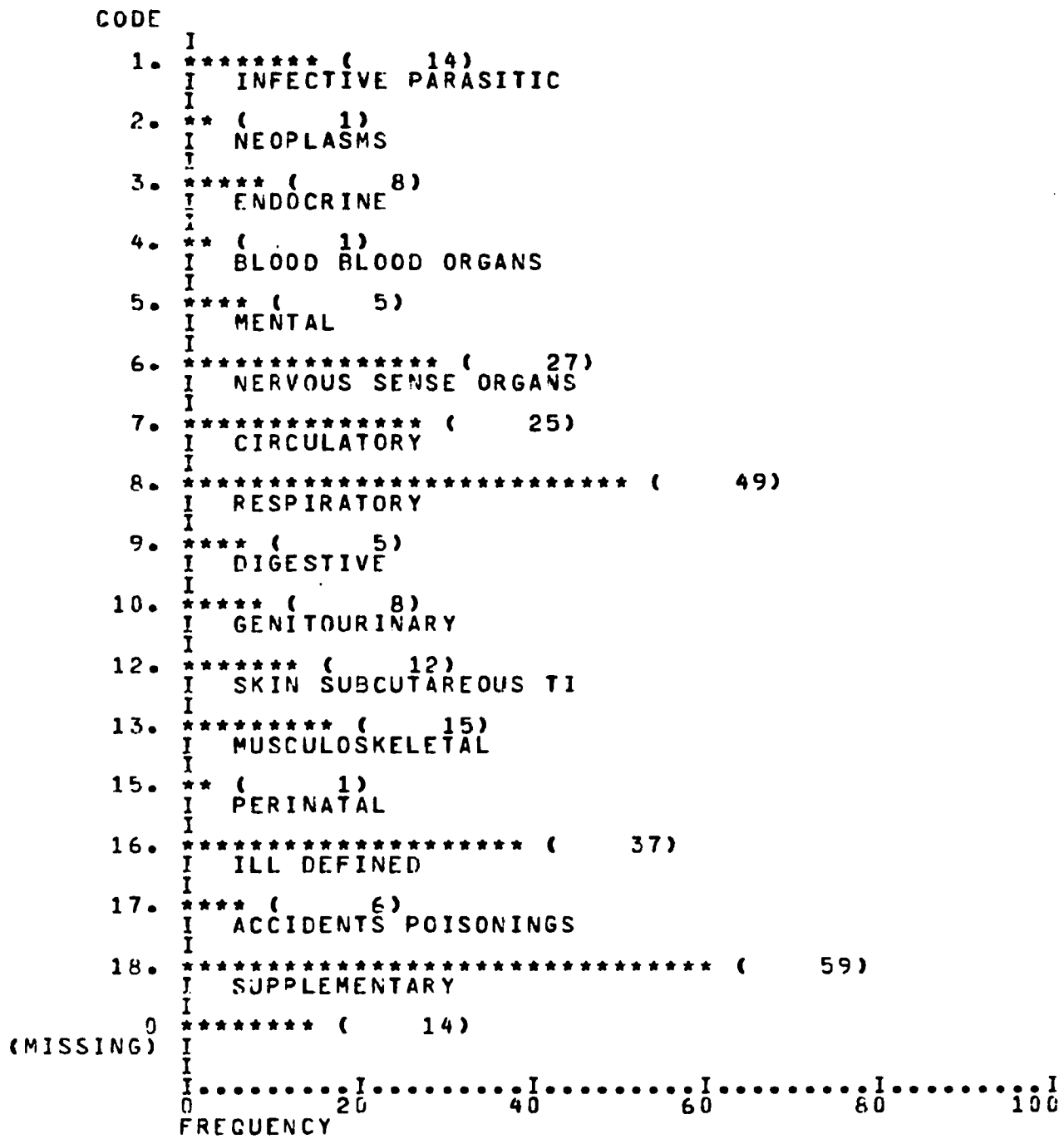


Figure D-6

The Relative Frequency of the Patient's
First Problem Encountered

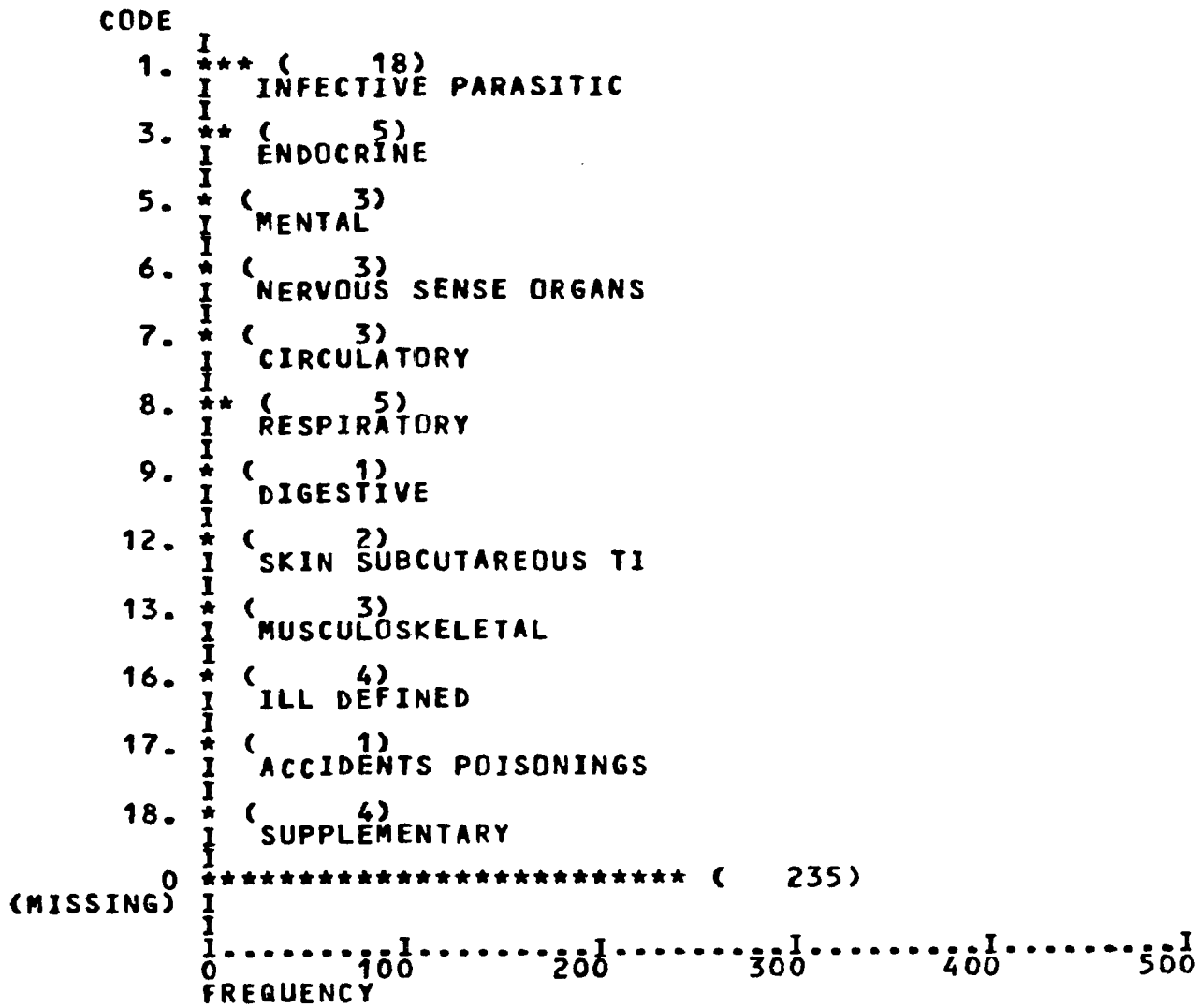


Figure D-7

The Relative Frequency of the Patient's Second Problem Encountered

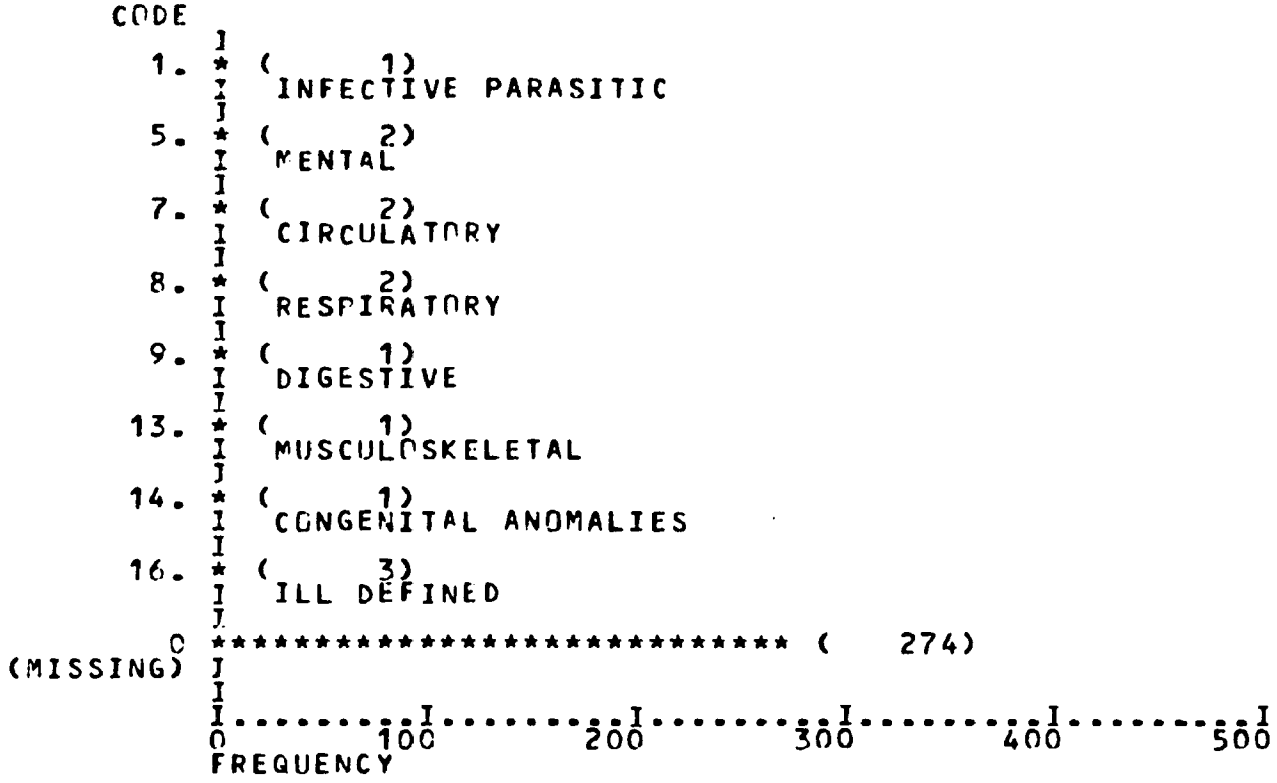


Figure D-8

The Relative Frequency of the Patient's Third Problem Encountered

APPENDIX E

CORRELATIONAL MATRIXES

Table E-1

Correlational Matrix of Wait and Informational Variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Wait																				
1. Wait 1																				
2. Wait 2	.00																			
3. Wait 3	.00	.00																		
4. Wait 4	.00	.00	.00																	
5. Wait 5	.00	.00	.00	.00																
6. Wait 6	.00	.00	.00	.00	.00															
7. Wait 7	.00	.00	.00	.00	.00	.00														
8. Wait 8	.00	.00	.00	.00	.00	.00	.00													
9. Wait 9	.00	.00	.00	.00	.00	.00	.00	.00												
Informational																				
10. Exam Room	.00	.00	.00	.00	.00	.00	.00	.00	.00											
11. Primary Physician	-.11	.00	.00	.00	-.10	-.10	.00	-.11	.00	-.14										
12. Attending	.00	.00	.00	.00	.00	.00	.00	.00	.00	-.30	.85									
13. Patient's Sex	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00								
14. Patient's Birth Year	.00	.00	.00	.00	.00	.00	.00	.00	.00	.16	-.69	-.75	.00							
15. Reason for Visit	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00						
16. Problem 1	.00	.00	.00	.00	.00	.00	.26	.00	.00	.00	.00	.00	.00	.00	.00					
17. Problem 2	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00				
18. Problem 3	.00	-.62	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00			
19. Reg-Appt Time	-.47	-.13	-.50	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.14	.00	.00	.00	.00		
20. Mod in-Appt Time	.00	.12	.52	.10	.00	.00	.00	.00	.00	.00	.11	.00	.00	-.17	.00	.00	.00	.00	.89	

Table E-2

Correlational Matrix of Service and Informational Variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Service																	
1. Vitals																	
2. Primary Exam	.00																
3. Attending Re-Exam	.00	.24															
4. Final Instructions	.00	.00	.00														
5. Tests/Immunizations	.00	.00	.00	.00													
6. Lab Work/X-Rays	.00	.00	.72	.00	.00												
Informational																	
7. Exam Room	.00	.00	.00	.00	.00	.00											
8. Primary Physician	-.23	.27	.25	.00	.00	.00	-,14										
9. Attending	-.27	.00	.30	.20	.00	.00	-.30	.85									
10. Patient's Sex	.00	.12	.00	.00	.00	.00	.00	.00	.00								
11. Patient's Birth Year	.29	-.22	.00	-.18	.00	.00	.16	-.69	-.75	.00							
12. Reason for Visit	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00						
13. Problem 1	.00	.00	.20	.00	.00	.00	.00	.00	.00	.00	.00	.00					
14. Problem 2	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00				
15. Problem 3	.00	.53	.00	-.99	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00			
16. Reg-Appt Time	.00	-.16	.00	.00	.00	.00	.00	.00	.00	.00	.14	.00	.00	.00	.00		
17. Mod in-Appt Time	.00	.14	.00	.00	.00	.00	.00	.11	.00	.00	-.17	.00	.00	.00	.00	-.89	

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