Report No. LMSC-682684

TECHNICAL REPORT

ANALYSIS OF INFORMATION NEEDS OF NURSING STATIONS

Medical Information Systems
LOCKHEED MISSILES & SPACE COMPANY
A Group Division of Lockheed Aircraft Corporation
Sunnyvale, California

MAY 1969

Work Carried Out Under Contract PH 110-68-47
National Center For Health Services Research and Development
Health Services and Mental Health Administration
Public Health Service
Department of Health, Education and Welfare

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FOREWORD

This technical report is the final report on the Analysis of Information Needs of Nursing Stations. The study was performed and all related effort accomplished by Lockheed Missiles & Space Company (LMSC) for the U.S. Public Health Service, National Center for Health Services Research and Development, under Contract PH 110-68-47. The work performed by LMSC and the report itself are fully responsive to the contract and fulfill all its terms.

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This study was performed by the Lockheed Information Systems Division, Medical Programs Group, W. D. Fuller, Manager. Key members of the Lockheed Program group were as follows:

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This study was completed for the National Center for Health Services Research and Development, U.S. Public Health Service. The study was conducted under the cognizance of the Health Care Technology Program – Dr. Bruce Waxman, Director; Miss Bertha Bryant, R.N., Project Officer.

ACKNOWLEDGMENTS

Achievement of the analysis results and data would not have been possible without the cooperation of hospitals and hospital associations (listed below) which furnished information and material for use in the study. Particular appreciation is also extended to the nursing service directors at the hospitals. They supported the study effort with enthusiasm and made significant contributions to its accomplishment.

- HOSPITALS

  Barnes Medical Center, St. Louis, Missouri
  Campbell Community Hospital, Campbell, California
  Canonsburg General Hospital, Canonsburg, Pennsylvania
  Children's Hospital of Akron, Akron, Ohio
  Institute of Living, Hartford, Connecticut
  Los Angeles County General, Los Angeles, California
  Mercy Hospital of Pittsburgh, Pittsburgh, Pennsylvania
  Park Lane Memorial Hospital, St. Louis, Missouri
  St. Anthony's Hospital, St. Louis, Missouri
  St. Clair Memorial Hospital, Pittsburgh, Pennsylvania
  St. John's Hospital, Joplin, Missouri
  San Jose Hospital & Health Center, San Jose, California
  St. Lawrence Hospital, Lansing, Michigan
  Stanford University Hospital, Palo Alto, California
  Texas Institute for Rehabilitation and Research, Houston, Texas

- HOSPITAL ASSOCIATIONS

  Hospital Association of Metropolitan St. Louis
  Hospital Council of Northern California
  Hospital Council of Western Pennsylvania

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Section 1
INTRODUCTION

Under conventional forms of hospital organization, the nursing station is the focal point for the exchange of virtually all patient medical information. As such, the nursing station is a highly significant element of any hospital communication system.

Medical information may be operationally defined as data or news concerning patients and their care. Within the hospital environment, this information begins with the admitting process and flows continuously throughout all the subsequent procedures associated with the patient or his pathology. As a result of the increasing quantities and types of information required for the maintenance of patient care and cure regimens, a massive data processing requirement problem has developed over the past 50 or more years.

It is the purpose of this study to (1) perform a detailed examination and analysis of the information handling requirements of typical hospital nursing stations, as they exist today, and (2) provide an analysis of the findings in light of typical developments in computer-assisted hospital information systems.

This technical report reflects the condensation of data collected at 15 different hospitals in 5 different Bureau of Census regions of the United States. Several levels of data reduction are involved. The basic raw data collected have been reduced to a first-level status in a separate, unpublished report.* Some second-level reduction of the data is provided in the Appendixes A through F of this report. The body of the report contains third-level or more refined data. Some of these latter data are presented in the form of computer-generated graphs.

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*Lockheed Missiles & Space Company, Documentation of Sample Observations, LMSC-689260, Sunnyvale, Calif., 17 Mar 1969 (special report to Project Officer, National Center for Health Services Research and Development).

Data presented in this report are identified at various points by a hospital identification code used in lieu of the specific names of the hospitals participating in the analysis effort. Codes employed for hospitals where work sampling was performed are as follows:

- Large Hospitals — L1, L2, L3
- Medium Hospitals — M1, M2, M3
- Small Hospitals — S1, S2, S3

Codes employed for hospitals where computer surveys were conducted are A, B, C, D, and E.

Major aspects of the study for the Analysis of the Information Needs of Nursing Stations are presented in the following sections of this report:

Section	
2	Approach — Overall approach to the analysis effort
3	Information Processed at Nursing Station — Characterization of information processed at nursing stations
4	Information-Processing Models — Pictorial and dynamic models of information-processing requirements at nursing stations
5	Hospital Computer Systems Survey — Commentary on findings of survey of computer applications at nursing stations
6	Comparison of Hospital Computer Systems With Model — Assessment of degree to which the surveyed hospital computer systems fulfill perceived needs
7	Improved Systems — Description of concept of total hospital information processing system considered attainable within the present state-of-the-art

The first page of each appendix in this report contains a summary of the contents of that appendix.

Section 2
APPROACH

2.1 GENERAL

A multifaceted approach to the nursing station information needs analysis, involving separate but interrelated avenues of analysis, was employed by LMSC. (See Fig. 2-1.) This approach led to the postulation of a total hospital information processing system for the future. The analysis is based on data collected at 15 different hospitals throughout the United States and is tempered and supported by the prior LMSC experience in related endeavors.

2.2 HOSPITAL SAMPLE SELECTION

Selection of hospitals to participate in the study involved two separate categories. One category included hospitals in which observations of nursing station information processing requirements were to be studied. The other category consisted of hospitals with existing computer installations that have some impact on the nursing station activity.

2.2.1 Hospitals Selected for Nursing Station Observations

The hospital selection process involved obtaining data for a small hospital (under 100 beds), a medium hospital (100 to 300 beds), and a large hospital (over 300 beds), each in three different census regions of the country. In general, large urban centers were avoided since it was reasonable to expect that a concentration of advanced health care developments in such areas might tend to bias the sample. The regions were searched for metropolitan areas of about 1 to 2 million population which tended to show average values for several parameters considered pertinent. A directed selection was made which afforded a statistical comparison of some of the more relevant data. Areas

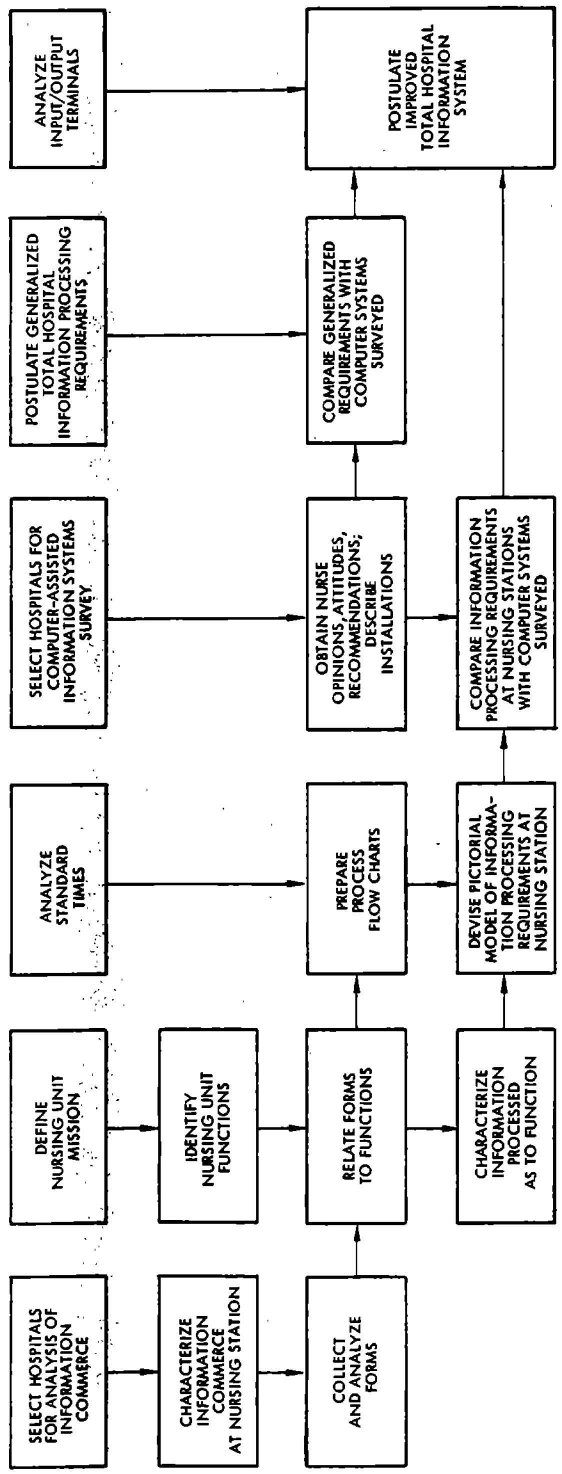

Fig. 2-1 Study Approach

were chosen which tended to represent regions of the United States and metropolitan areas which had in common near-average values for the parameters used for the selection. Table 2-1 shows the selection criteria and some of the candidate areas considered.

The areas finally settled upon were the Greater Pittsburgh, Greater St. Louis, and Greater San Jose areas. Specific hospitals in each area were selected with the advice and counsel of hospital associations or councils in those areas. (See Acknowledgements.) Nine hospitals were chosen, and the selection was such that all major services and specializations typically found in general hospitals (e.g., medical, surgery, psychiatric, intensive care, and long-term chronic disease) were included. The number of nursing stations observed totaled 160. Detailed characteristics of the hospitals selected are presented in Appendix A.

2.2.2 Hospitals Selected for Survey of Computer-Assisted Hospital Information Systems

The criteria for selection of the computer-assisted hospital information systems to be surveyed were developed from a consensus based on the following considerations:

- Operational projects in use in a hospital for a minimum of 6 months
- Input/output devices in use based upon different viewpoints and requirements
- Limit of six hospitals under terms of the study contract

A review of projects around the country, conducted by means of a literature search and telephone verifications, resulted in selection of 10 candidate hospitals. From this group, six hospitals were selected for the survey. They represented several different systems which were considered as demonstrating the characteristic computer-provided assistance at nursing stations. Since the six selected hospitals reflected a broad coverage of applications and were quite different in terms of the hardware employed, and in the contractor-hospital relationships involved, they appeared to

Table 2-1

CRITERIA FOR AREA SELECTION

Site Selection Criteria

1. Large, medium, and small hospital in close proximity
2. Presence or absence of medical school in the community
3. Size of poverty pool
4. Resources per capita (physicians, registered nurses, beds)

Data on Selected Metropolitan Areas

Area	Nursing School	Medical School	Beds/ 100,000 Population	RN's/ 100,000 Pop'n.	MD's/ 100,000 Pop'n.	Poverty-%<$3,000/ yr	Population Density (millions)	Census Region
Year Data Gathered	1967	1967	1962	1962	1962	1966	1960	
Boston, Mass.	Yes	Yes	4.5	514	245	10	2,632	1
Pittsburg, Pa.	Yes	Yes	4.3	373	131	15	789	2
San Jose, Calif.	Yes	No	3.4	327	240	12	491	9
St. Louis, Mo.	Yes	Yes	5.0	222	156	15	511	4
Mobile, Ala.	Yes	No	3.0	158	91	27	129	5

provide a cross section of current "experiments" under way in 1968. Profiles for these hospitals are presented in Appendix A.

2.2.3 Solicitations and Approvals

After the selections were made, approval for participation of each hospital in the survey was sought from each hospital administrator. Upon receipt of such approval, subsequent arrangements and details were worked out with the Nursing Service Director. Significantly, of all hospitals queried, only one was not in a position to cooperate. This refusal was due, however, to an unusual heavy loading on the staff at the time because of the opening of a new extension at the hospital.

2.3 OBSERVATION OF NURSING STATIONS

A complete listing of the nursing stations observed is given in Appendix C, which shows the designated type of service provided at each station such as medical, pediatric, and obstetric services. A total of 160 nursing stations were observed at 9 different hospitals. In addition, a recently opened facility, which had in operation two nursing stations providing extended, continuing, and long-term psychiatric care was observed. Data from this facility are considered as supplementary material since the contract terms did not include coverage of extended-care facilities. The mix of stations, and the mix within stations in this listing, suggests that very few stations are identical.

Essentially, two basic categories of observation were made. One was a random sampling of the total information processing activity at the nursing station. These observations served to determine the nature and extent of the information processed and the skill levels of the persons doing the processing. The other type of observation involved collection of forms used at the nursing station and flow-charting the activity involved in processing the forms.

2.3.1 Random Sampling

The random-sampling technique employed to observe and document the total information-processing activity assured minimization of bias in the observation. The validity of the observation was based upon the adequacy of the sample size, i.e., the number of observations made.

The selection of sample size is basically a function of the binomial theorem defined, in this case, by the following equation:

$$Sp = C\left[\frac{p(1-p)}{N}\right]^{1/2}$$

where

S = the desired accuracy

p = the percentage of occurrence of the activity being measured, expressed as a decimal

N = the number of observations

C = the confidence interval or standard deviations

For working convenience, this equation can be rephrased as follows:

$$N = \frac{C^2(1-p)}{S^2 p}$$

The number of observations made were controlled so as to produce a 95-percent confidence level, with the tolerance limit averaging 4 percent but never greater than 7 percent.

The few occasions where the tolerance limit approached 7 percent was because of the relative lack of activity at those stations as compared with the other stations in the hospital or, in the case of a very small hospital, where the activity level was lower than at others. In these cases, the cost of continuing the observations in order to obtain a lower tolerance was not warranted. (Altogether, 90,130 random observations were made during the survey.)

2.3.2 Forms Analysis

Forms used at nursing stations were collected, and interviews were held with nursing station personnel to ascertain usage rate and procedural details. The forms used more than once daily were analyzed in detail and, from these, a representative selection of these forms were flow-charted, showing the processing time for each form. (See Appendix D.) The flow process charts, processing time, and usage rates constitute factors, among others, which were used in the development of the models discussed in Section 4 of this report. All told, 1,040 forms were collected, of which 95 were selected for flow charting.

2.4 SURVEY OF COMPUTER-ASSISTED HOSPITAL INFORMATION SYSTEMS

At the six hospitals surveyed, interviews were conducted with nursing service personnel and with data processing personnel. The 66 persons interviewed as shown below comprised personnel in the following categories:

Nursing	Physician	Data Processing	Administration
12	1	1	2
8	–	1	1
14	1	2	–
4	–	2	–
7	1	–	1
4	1	3	–
49	4	9	4

One specific format was used for interviewing nursing personnel, and another for querying the data processing personnel. The formats were structured in an attempt to elicit, as efficiently as possible, subjective information (e.g., nurse's opinions, attitudes, and recommendations about the system at the nursing stations) and objective factual data about the computer installation (e.g., regarding equipment, software applications, terminals, operation, and organization). Nursing station interfaces between computer systems and the manual systems were observed at each of the hospitals during a portion of the day set aside for the visit.

2.5 MODELS

Pictorial and dynamic models of the information processing requirements at nursing stations were developed through analysis of the observations made and the data collected. The models centered primarily, on the information processing aspects attendant to three variables implicit in nursing unit activity; namely, the degree of nursing care, the basic functions of the nursing unit, and the interface requirements with other organizational units of the hospital.

The information needs represented by the model were compared with the accommodations of these needs made by the hospital systems surveyed and with an improved system postulated by LMSC. (See Section 7.)

Section 3
INFORMATION PROCESSED AT NURSING STATIONS

This section presents the information processing data derived from observations at nine different hospitals – three large, three medium, and three small.

3.1 INFORMATION COMMERCE – ALL STATIONS

To gather data on hospital information commerce, nursing station sites in each hospital were identified and work sampled. Personnel at the stations were classified as either processing or not processing information. Of those who were processing, the skill level and the type of processing were noted. Observations were made covering all 24 hours of the day and all 7 days of the week. Data from the nursing stations were summarized and consolidated into totals for each hospital. These summarized data were then processed by computer and computer-generated plots were made showing the magnitude of each information processing activity versus time of day. The preliminary plots showed that the information commence from 7 p.m. to 7 a.m. was negligible compared with the 7 a.m. to 7 p.m. time period. This indicated that the daytime load could properly represent the hospital's normal operating conditions; therefore, final computer plots were made to show only the hours 7 a.m. through 7 p.m. (7 through 19 on the charts).

Seven separate plots were made for each of the nine hospitals. These are shown in Appendix B, Figs. B-1 through B-63. The charts in the Appendix are presented in sequence according to the size of the hospital. Results from observations of a small extended- and continuing-care facility, which is operated as a satellite of one of the medium-size hospitals studied, are shown in Figs. B-64 through B-70.

Average and representative trends for large, medium, and small hospitals have been obtained by consolidating and averaging the data given in Appendix B. Thus, representative data for a large-size hospital are shown in Figs. 3-1 through 3-7; for a medium-size hospital in Figs. 3-8 through 3-14; and for a small-size hospital in Figs. 3-15 through 3-21.

A discussion of the figures representative of a large-size hospital (Figs. 3-1 through 3-7) will suffice for all three groups because the treatment is the same and only the quantities differ. For example, Figs. 3-1 through 3-5 all have an upper curve depicting the total number of people processing information throughout the hospital during each hour of the day from 7 a.m. to 7 p.m. These information processing operations include form processing, chart processing, work-related conversations, and other work-associated activities.

The lower curve on Fig. 3-1, therefore, depicts the number of people who are engaged in form-processing operations during each hour of the day. Form-processing operations are defined as either reading or writing on a form of any nature. The lower curve of Fig. 3-2 shows the number of people involved in chart-processing operations, which are also defined as either reading or writing on a patient chart. Figure 3-3 gives the number of people involved in work-related conversations such as those related to patient admittance or discharge, visitors, preps, X-rays, or patient transport. And the lower curve on Fig. 3-4 shows the number of people engaged in other types of work-associated information processing. These include telephone conversations, letters, and reading (other than forms or patient charts) such as professional journals, formulary, and data on new drugs.

Figure 3-5, which also has an upper curve depicting the total number of information processing operations, shows five distinct skill levels. The curve for each of these five skill levels represents the number of persons in that skill category who are engaged in information processing during each hour of the day.

Figure 3-6 shows the percent of the nursing staff who are engaged in information processing versus the time of day.

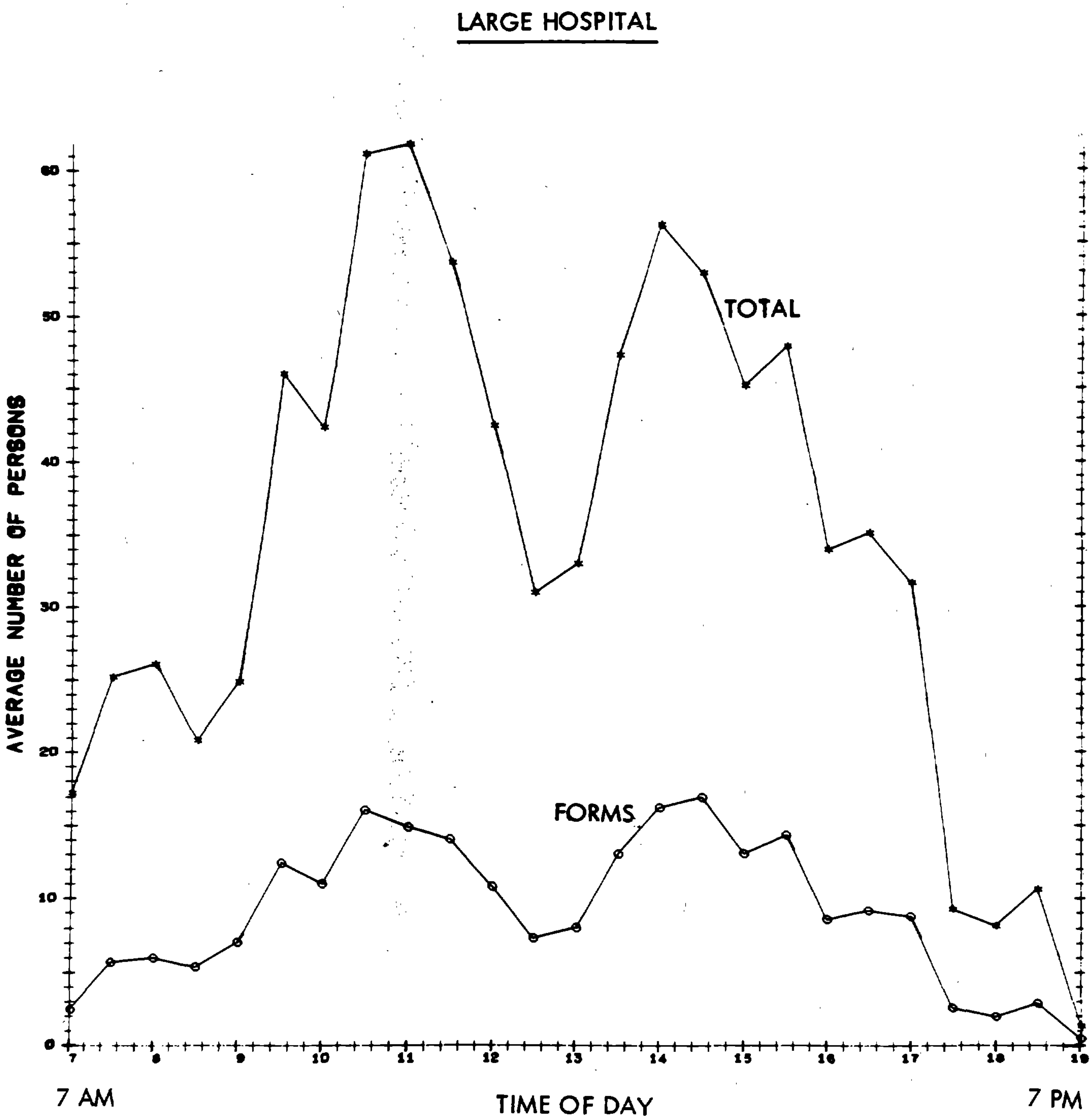

Fig. 3-1 Ratio of Forms Processing to Total Information Processing – Representative Large Hospital

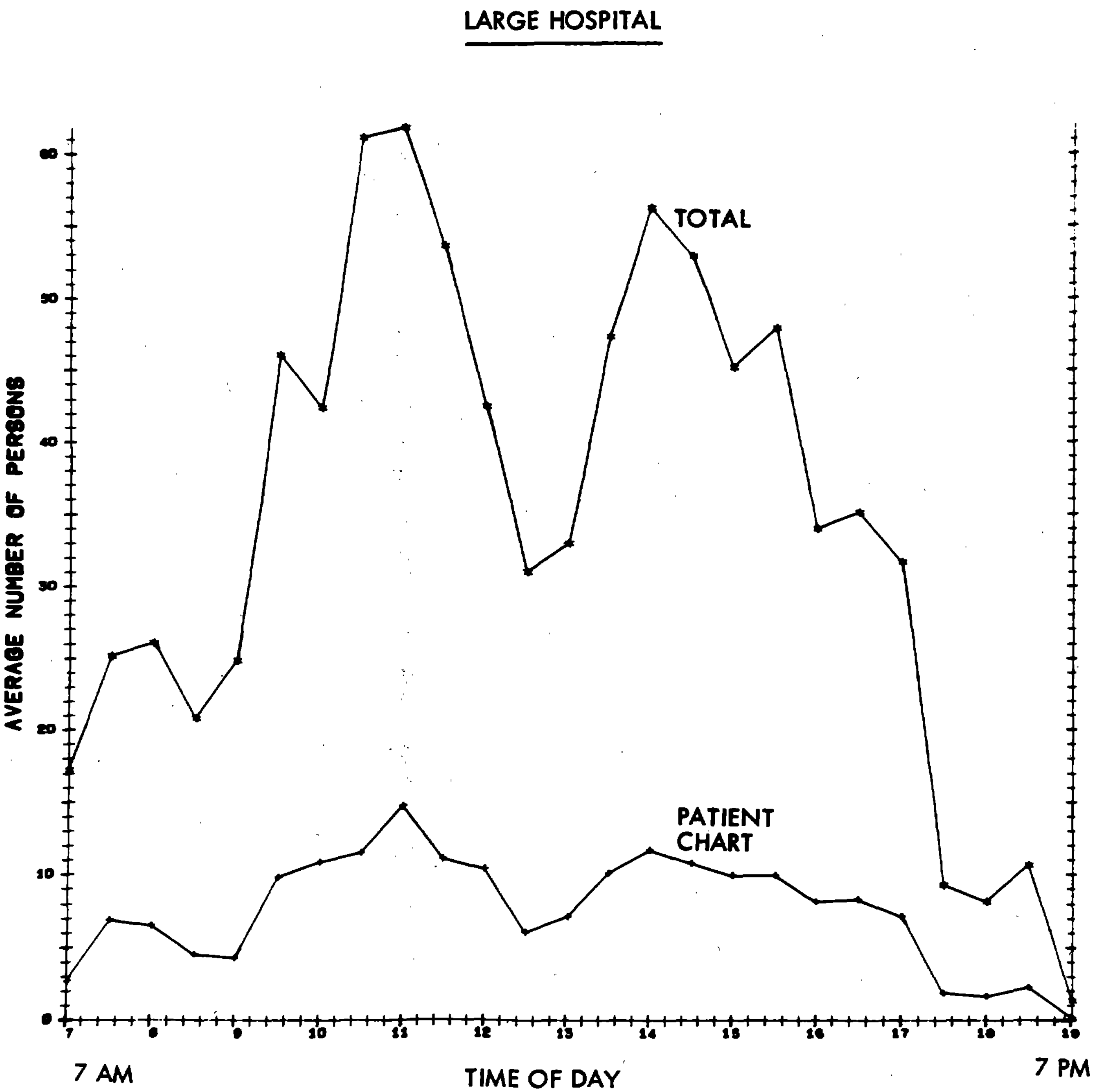

Fig. 3-2 Ratio of Chart Processing to Total Information Processing – Representative Large Hospital

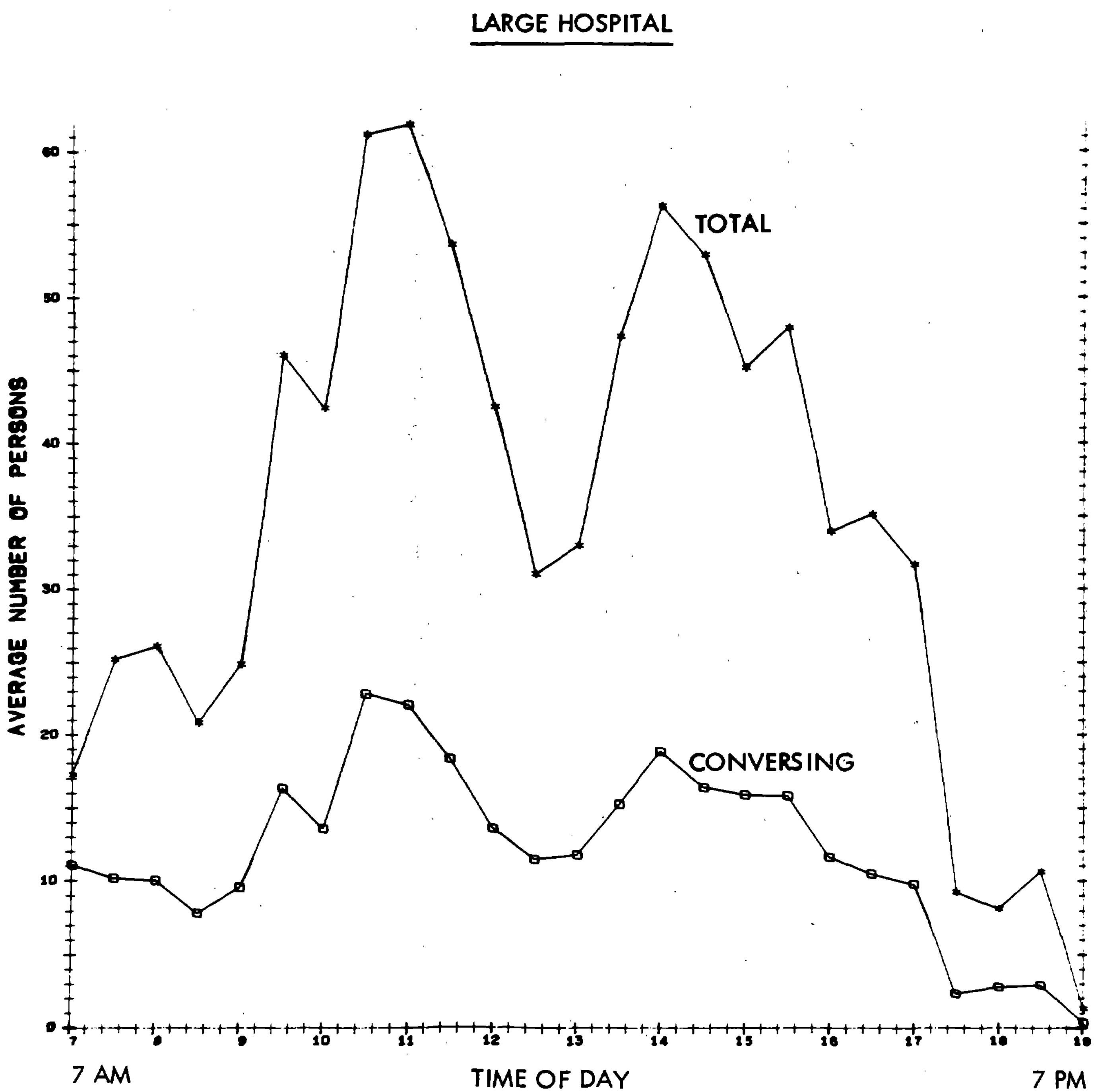

Fig. 3-3 Ratio of Conversing to Total Information Processing – Representative Large Hospital

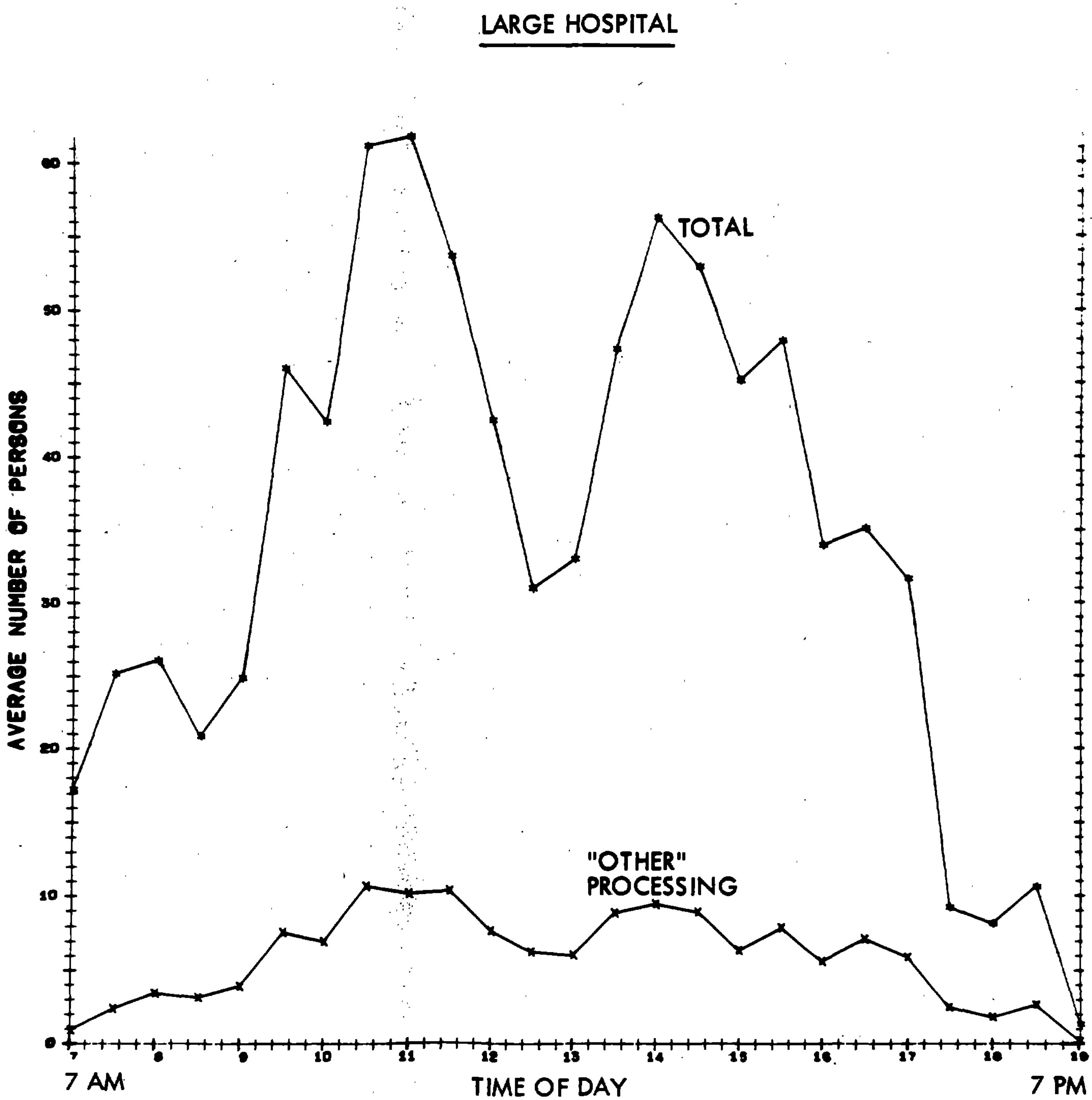

Fig. 3-4 Ratio of "Other" Processing to Total Information Processing – Representative Large Hospital

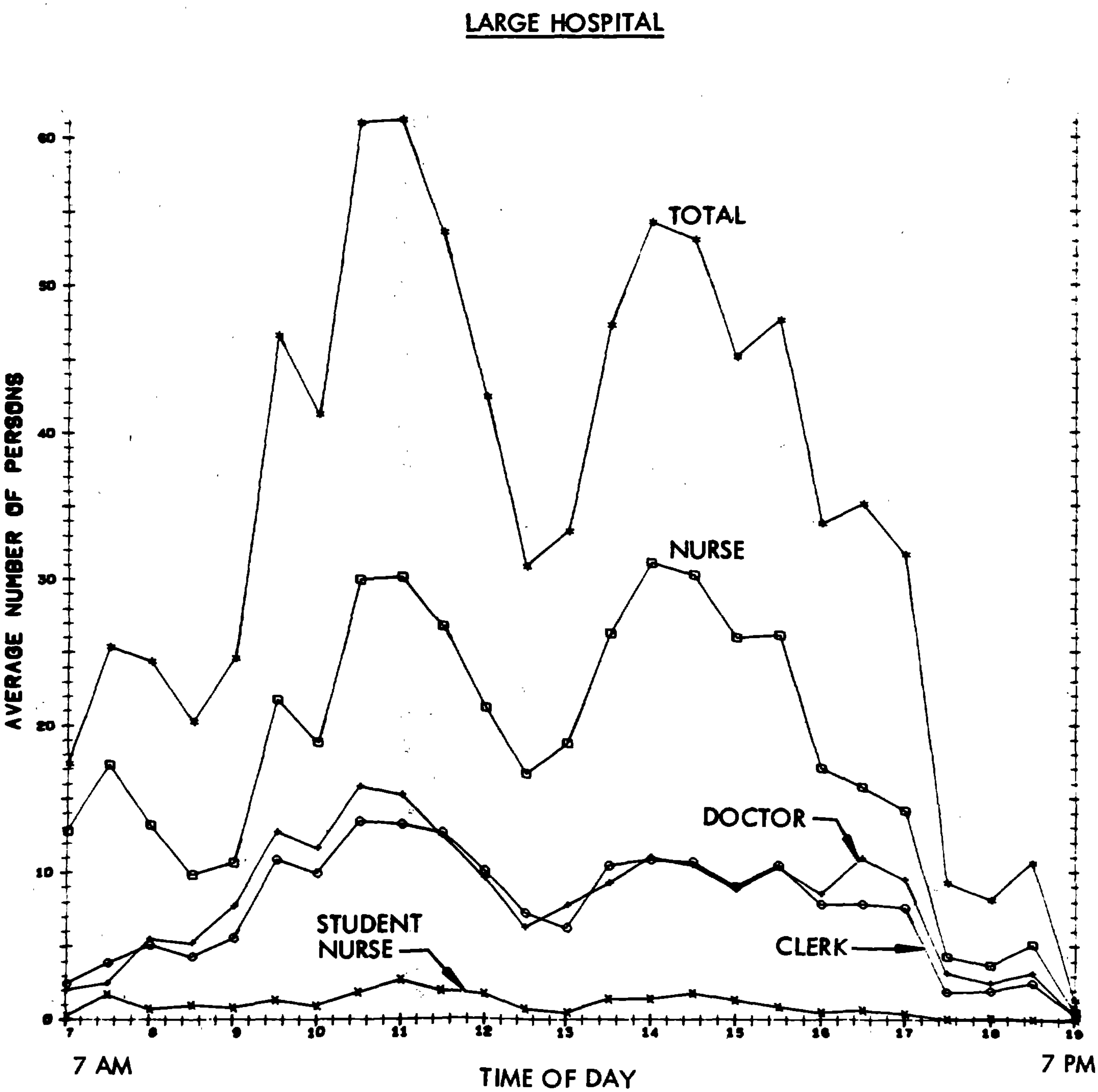

Fig. 3-5 Comparison by Skill Levels of Personnel Processing to Total Information Being Processed – Representative Large Hospital

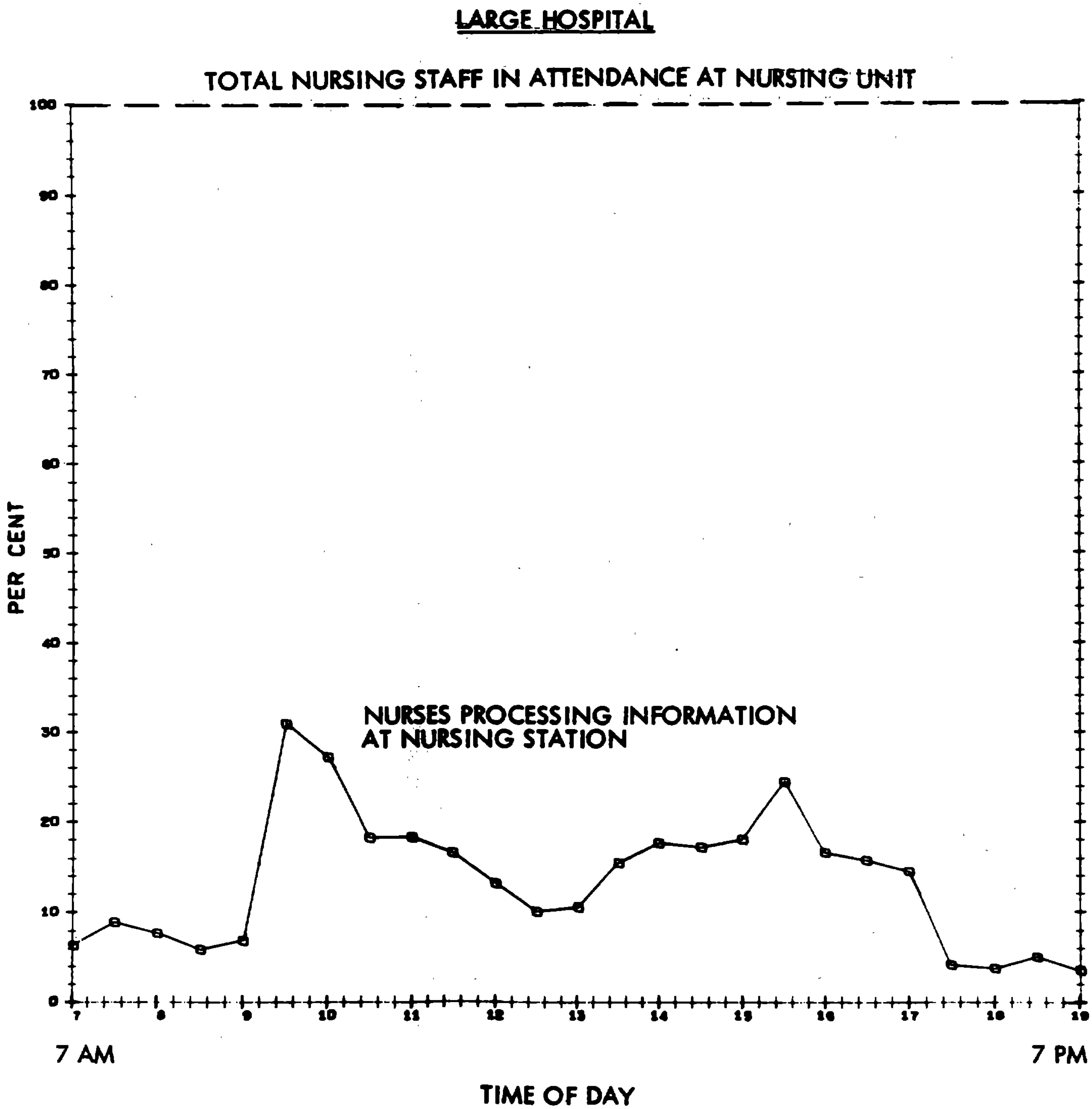

Fig. 3-6 **Percentage of Nursing Staff Processing Information – Representative Large Hospital**

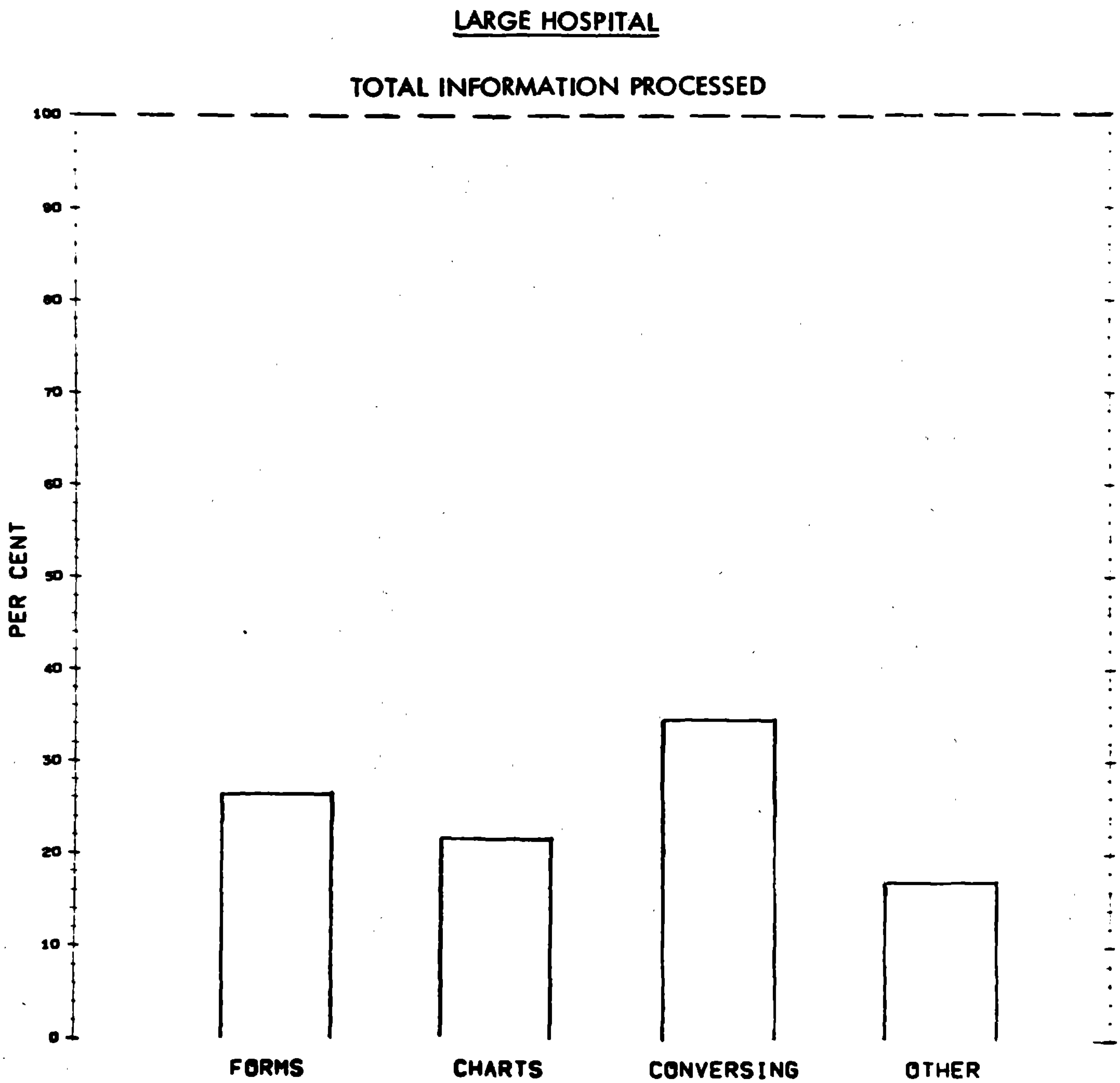

Fig. 3-7 Relative Percentages of Types of Information Processed – Representative Large Hospital

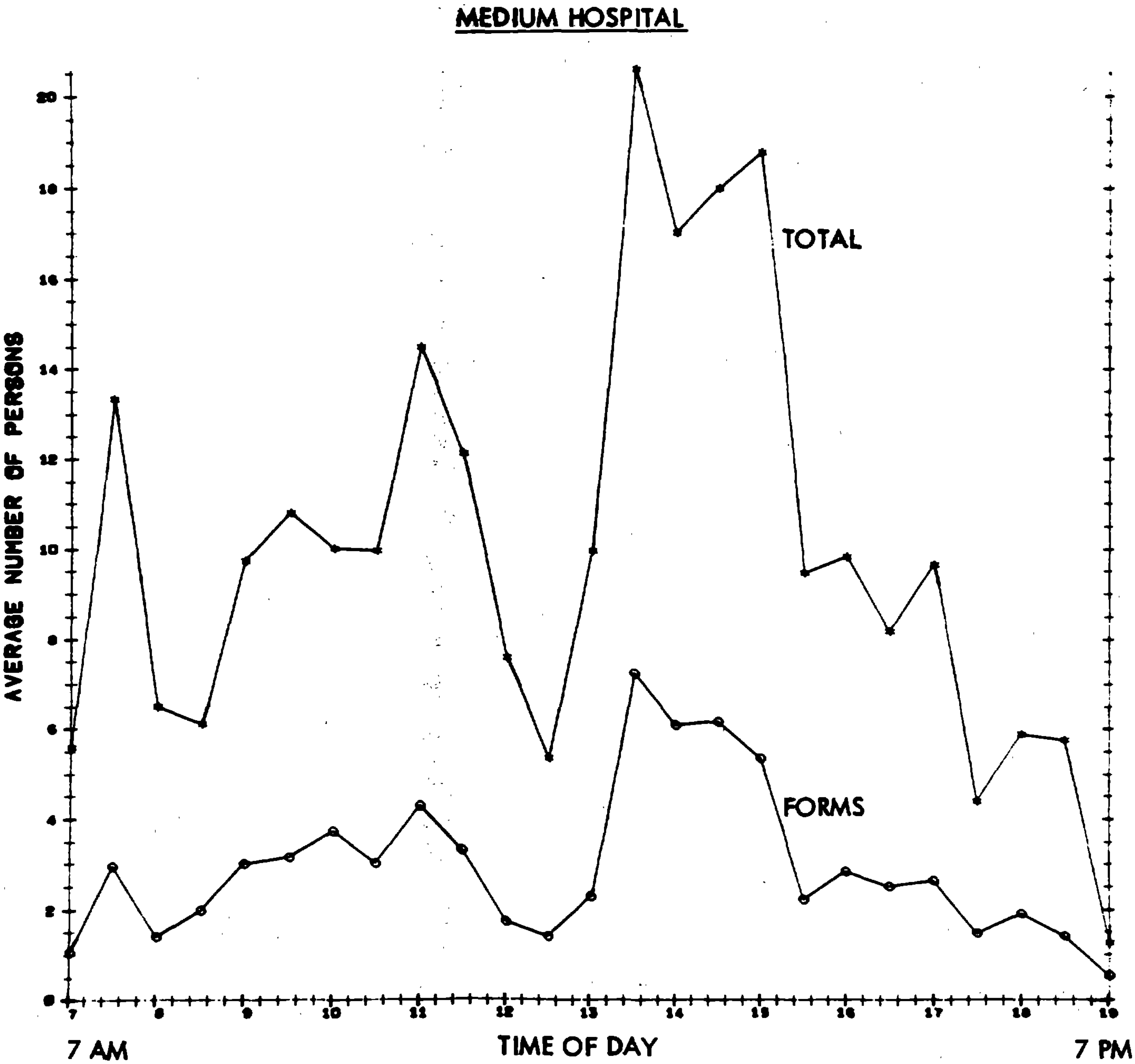

Fig. 3-8 Ratio of Forms Processing to Total Information Processing – Representative Medium Hospital

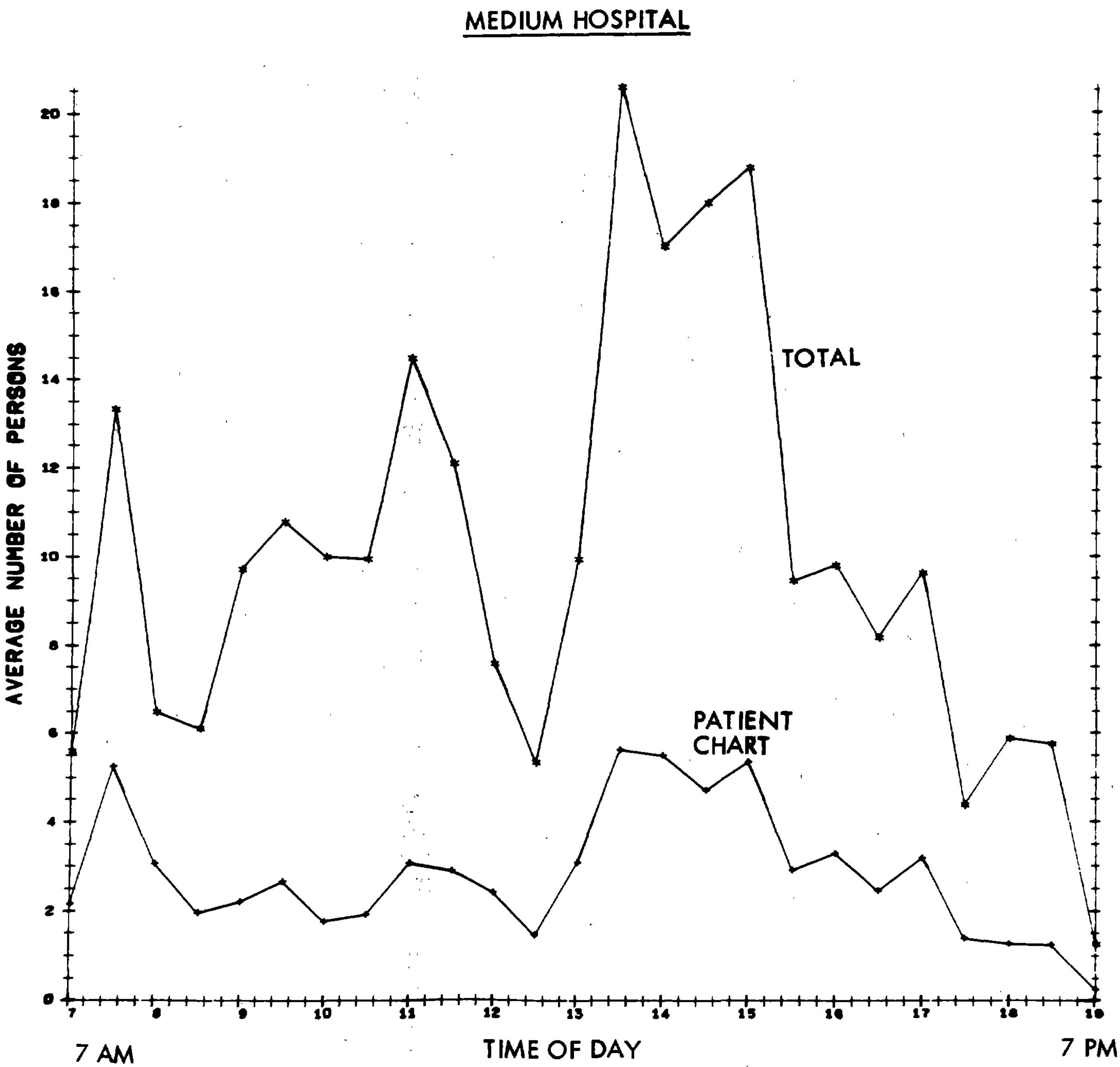

Fig. 3-9 Ratio of Chart Processing to Total Information Processing – Representative Medium Hospital

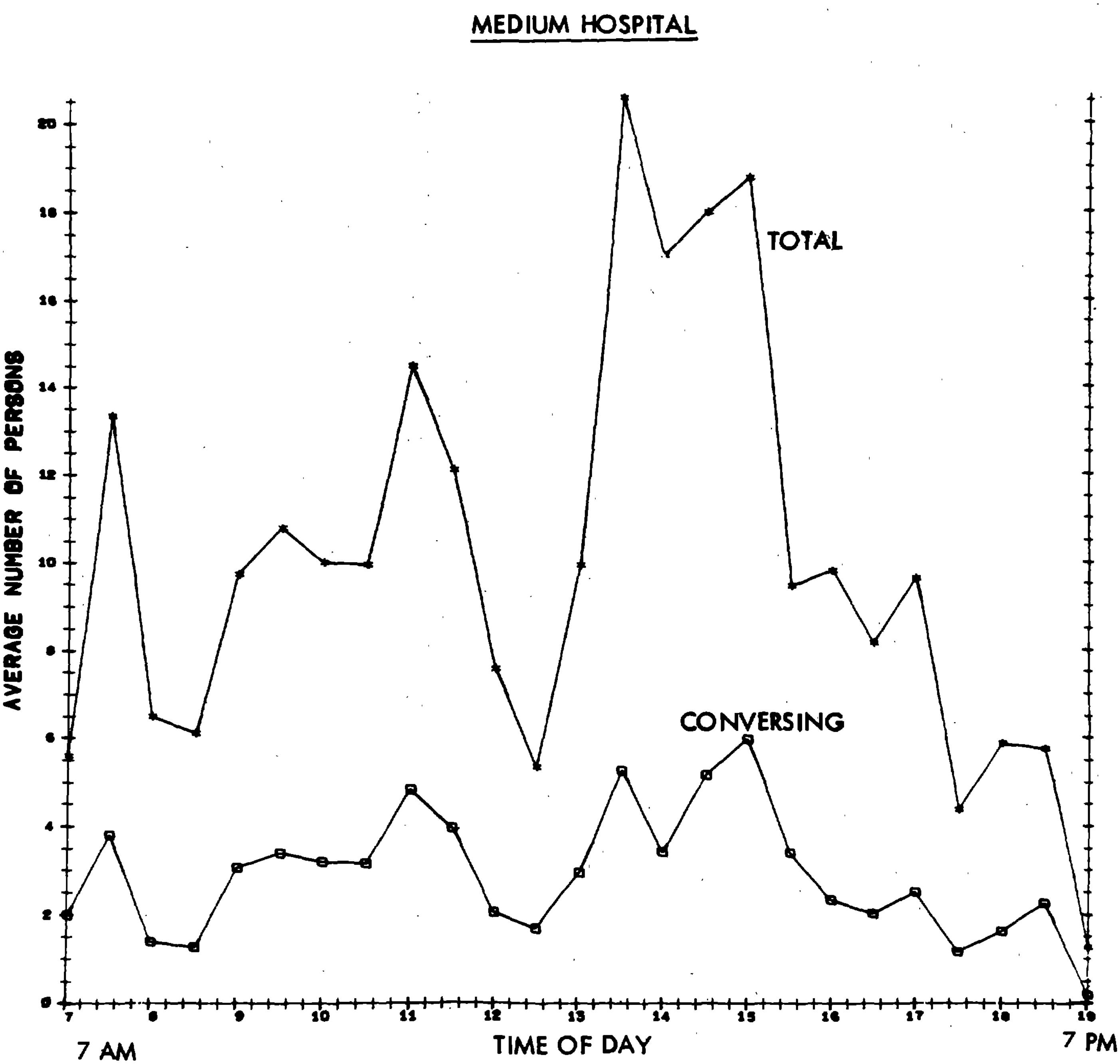

Fig. 3-10 Ratio of Conversing to Total Information Processing – Representative Medium Hospital

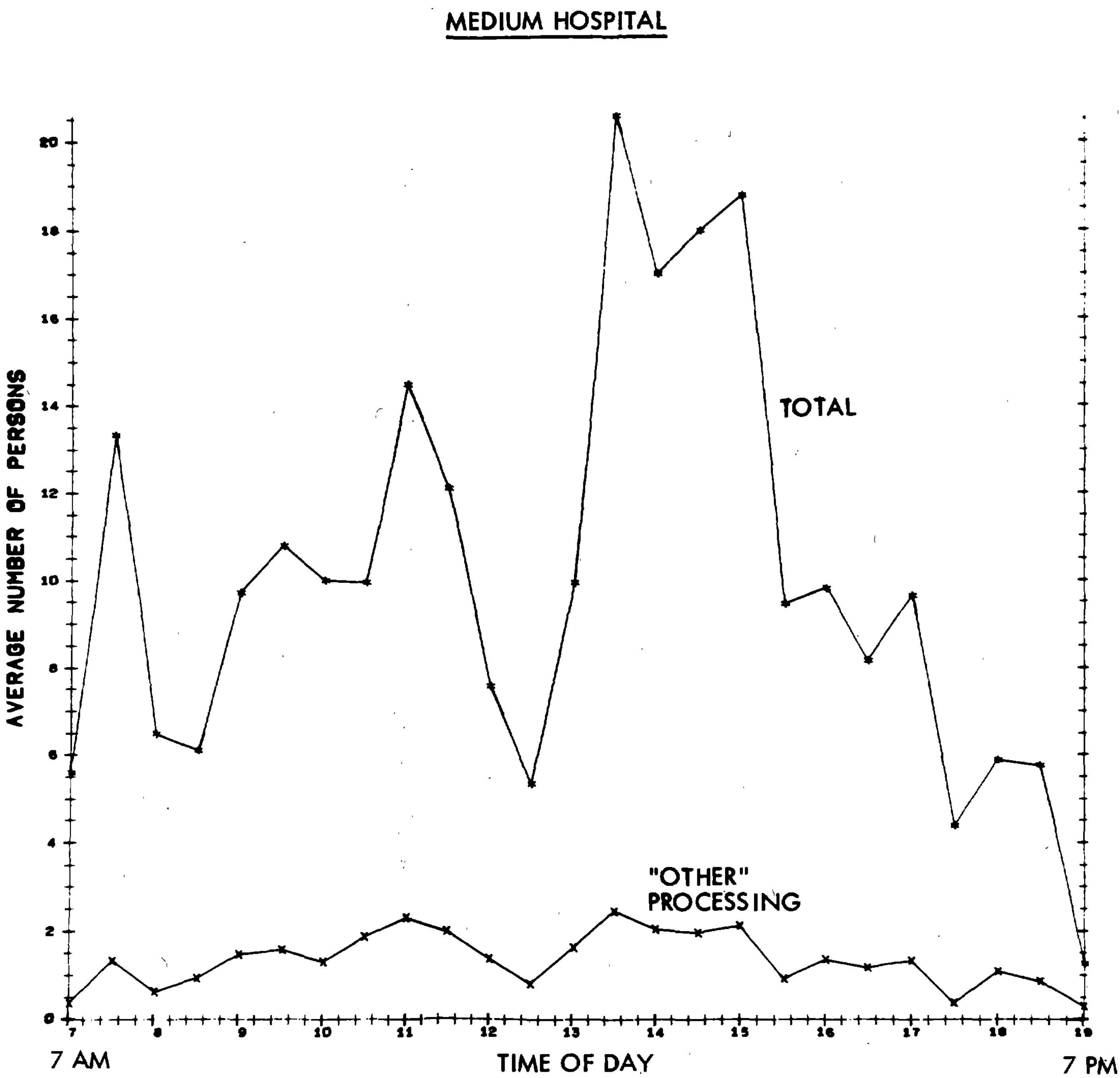

Fig. 3-11 Ratio of "Other" Processing to Total Information Processing – Representative Medium Hospital

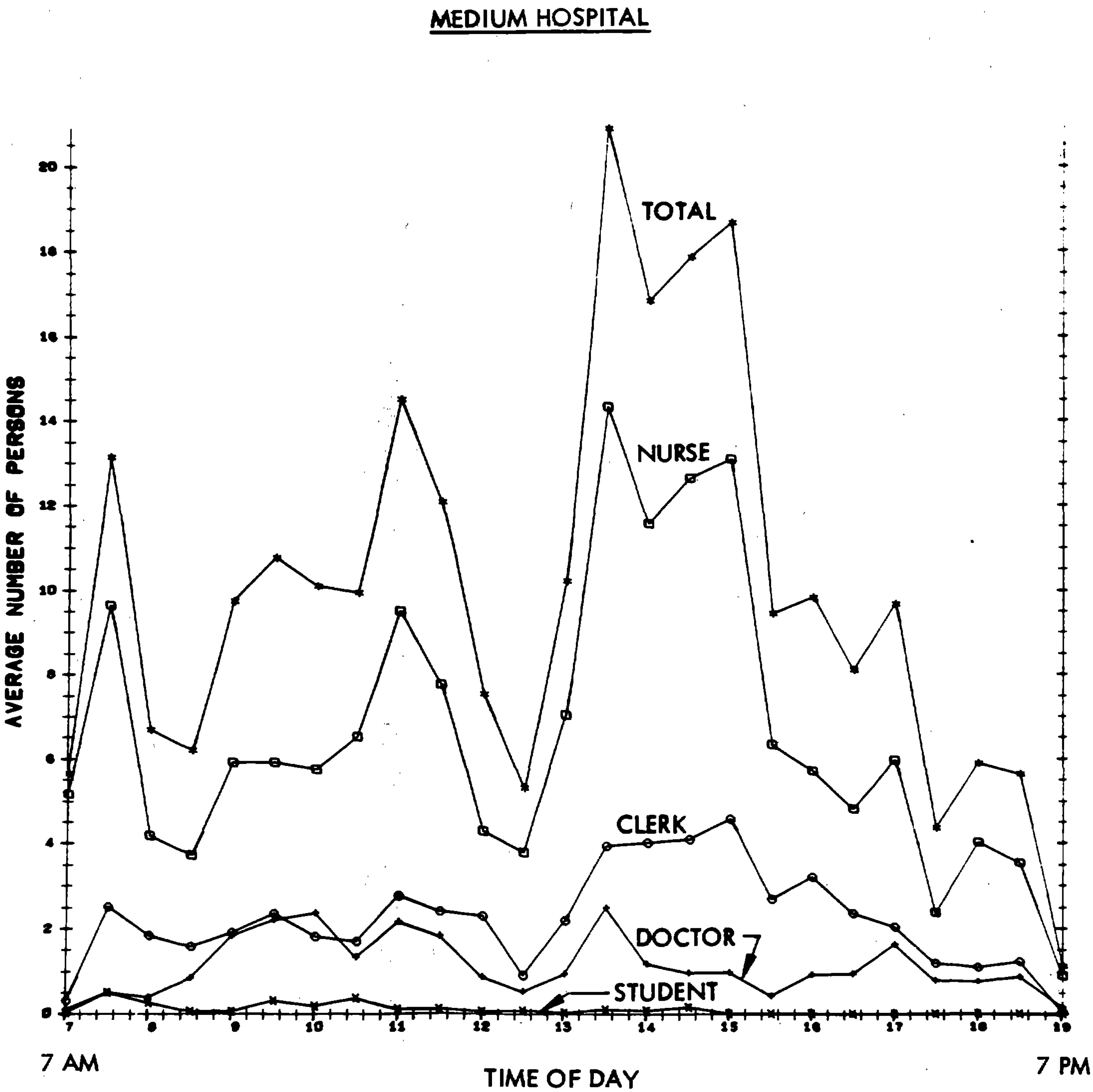

Fig. 3-12 Comparison by Skill Levels of Personnel Processing to Total Information Being Processed – Representative Medium Hospital

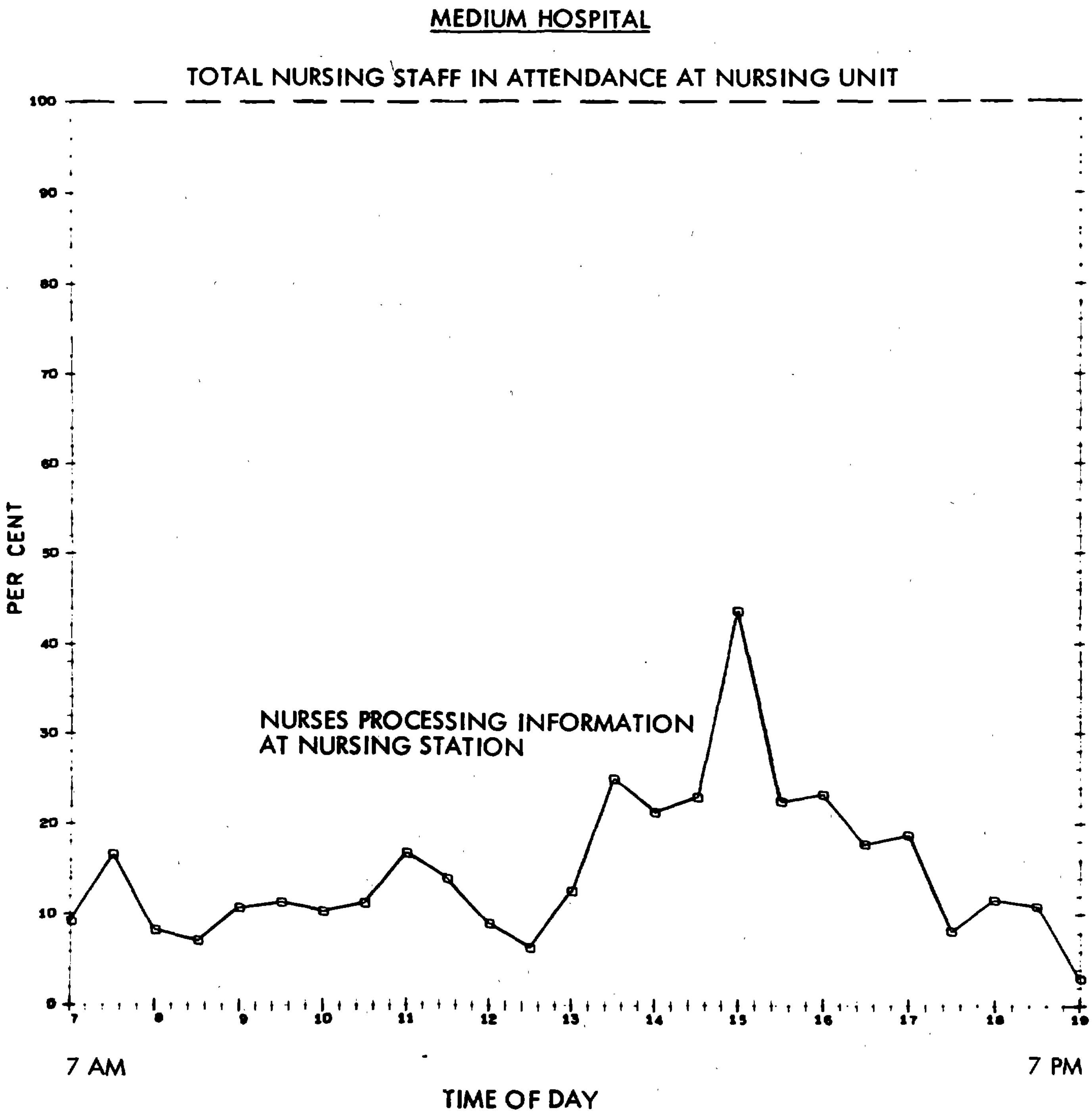

Fig. 3-13 Percentage of Nursing Staff Processing Information – Representative Medium Hospital

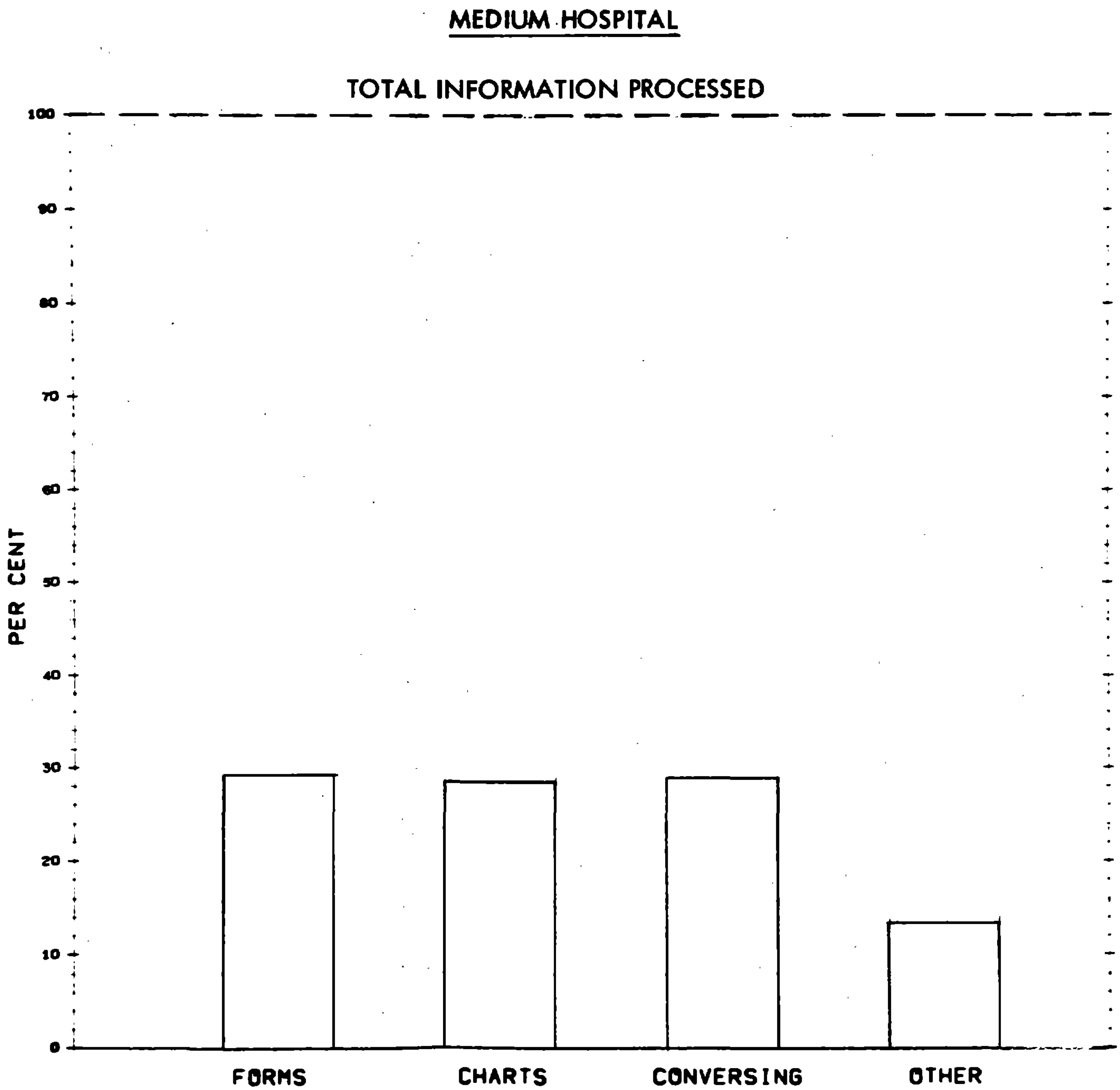

Fig. 3-14 Relative Percentages of Types of Information Processed – Representative Medium Hospital

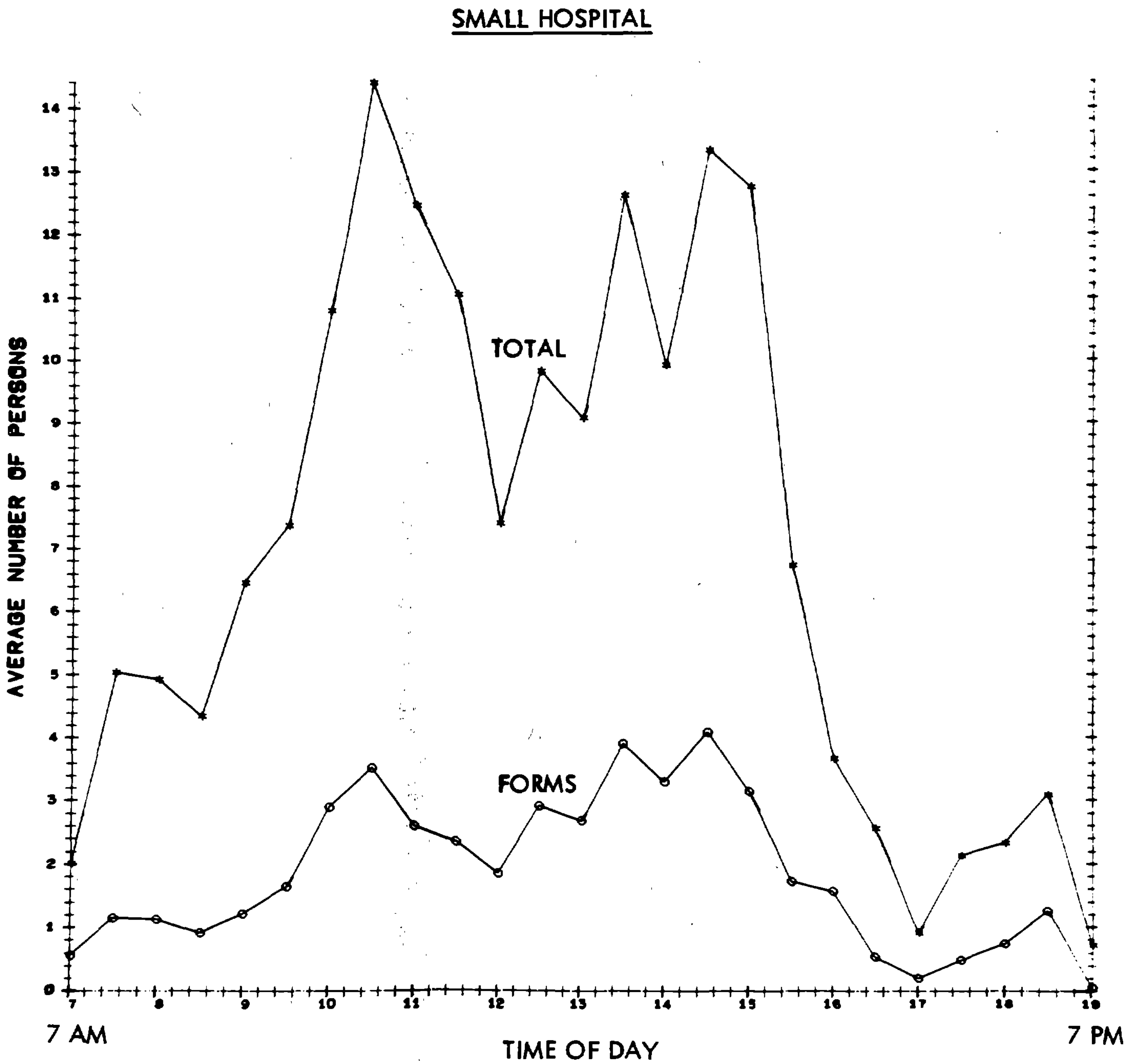

Fig. 3-15 Ratio of Forms Processing to Total Information Processing – Representative Small Hospital

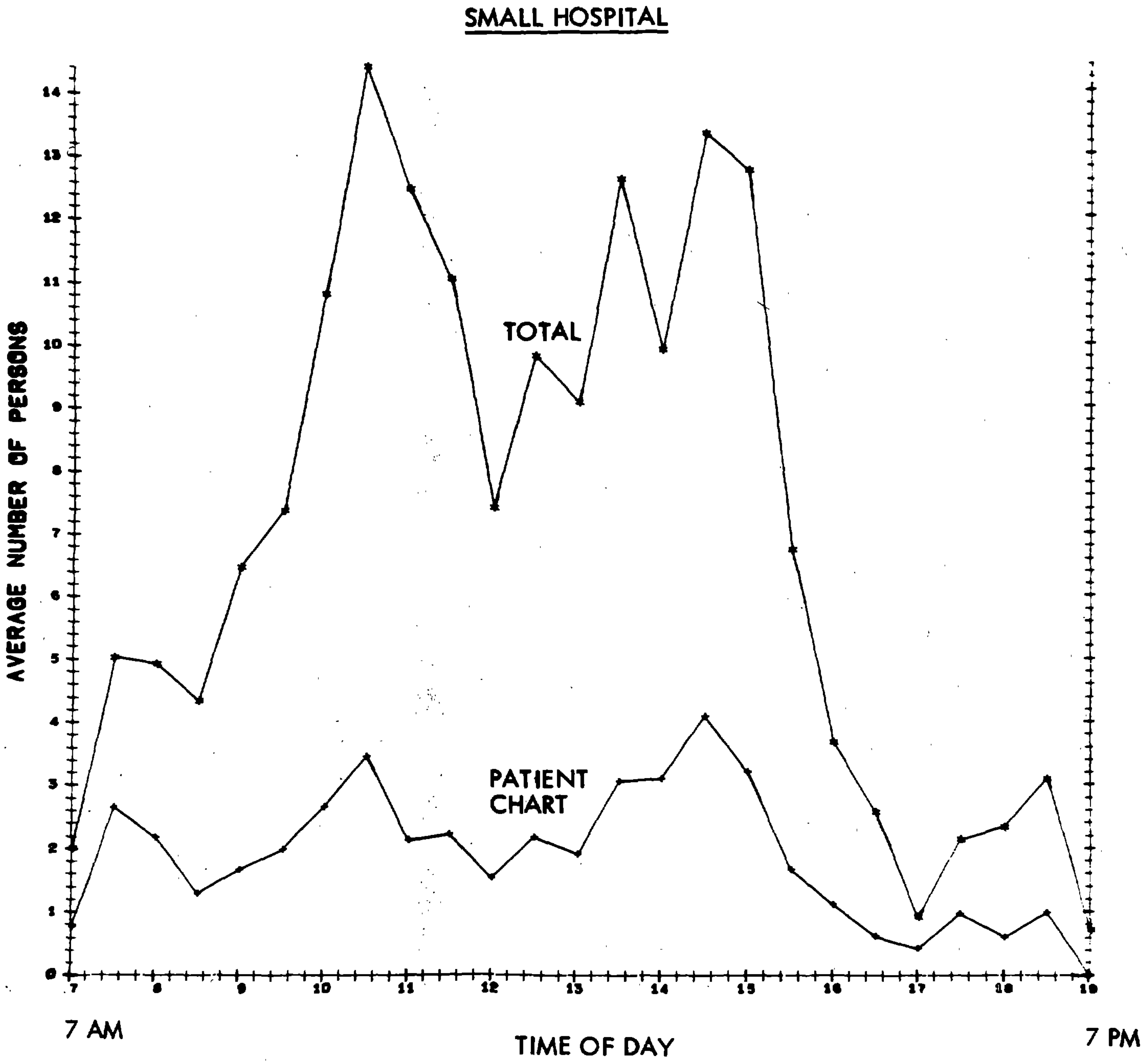

Fig. 3-16 Ratio of Chart Processing to Total Information Processing – Representative Small Hospital

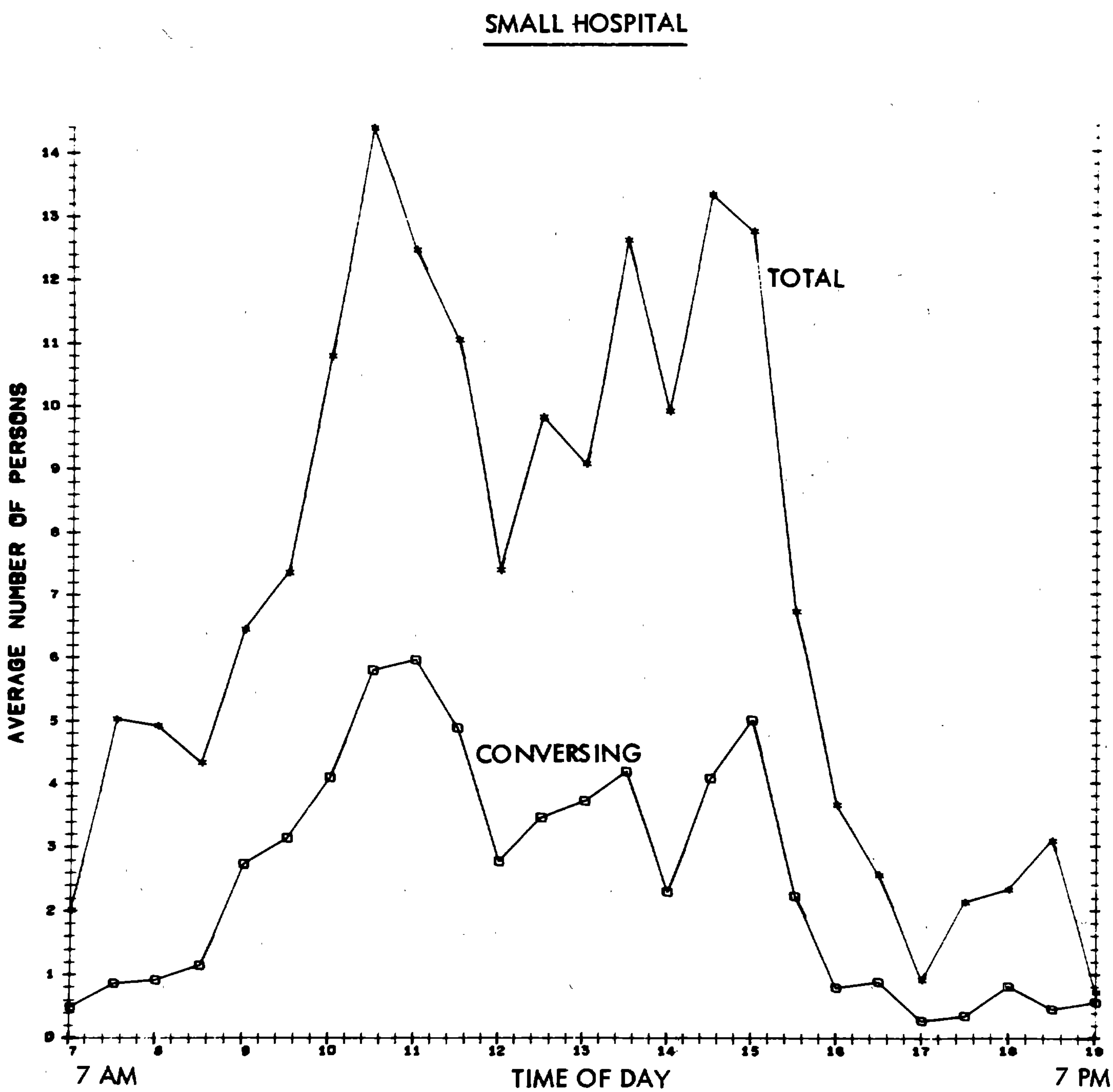

Fig. 3-17 Ratio of Conversing to Total Information Processing – Representative Small Hospital

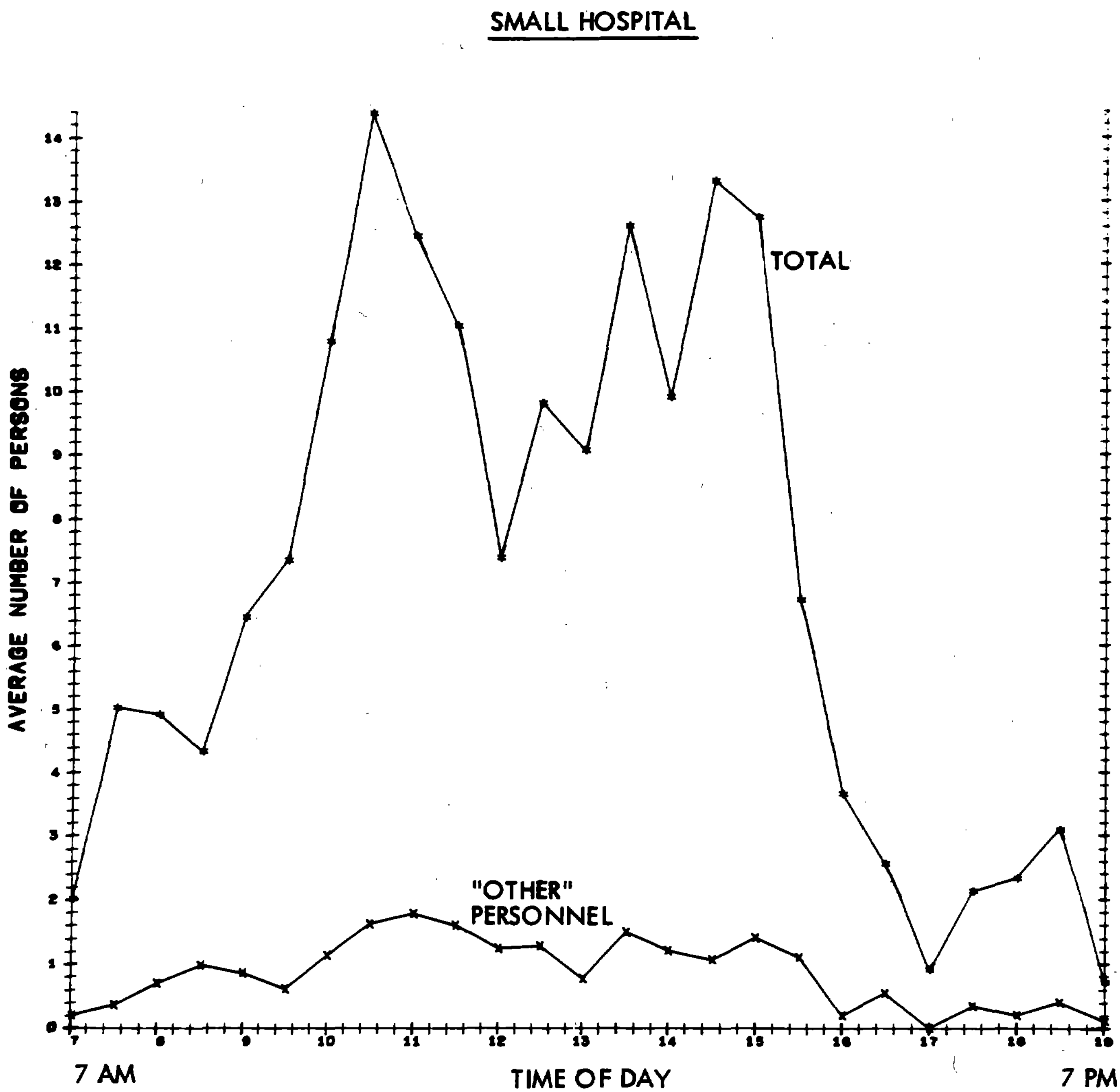

Fig. 3-18 Ratio of "Other" Processing to Total Information Processing – Representative Small Hospital

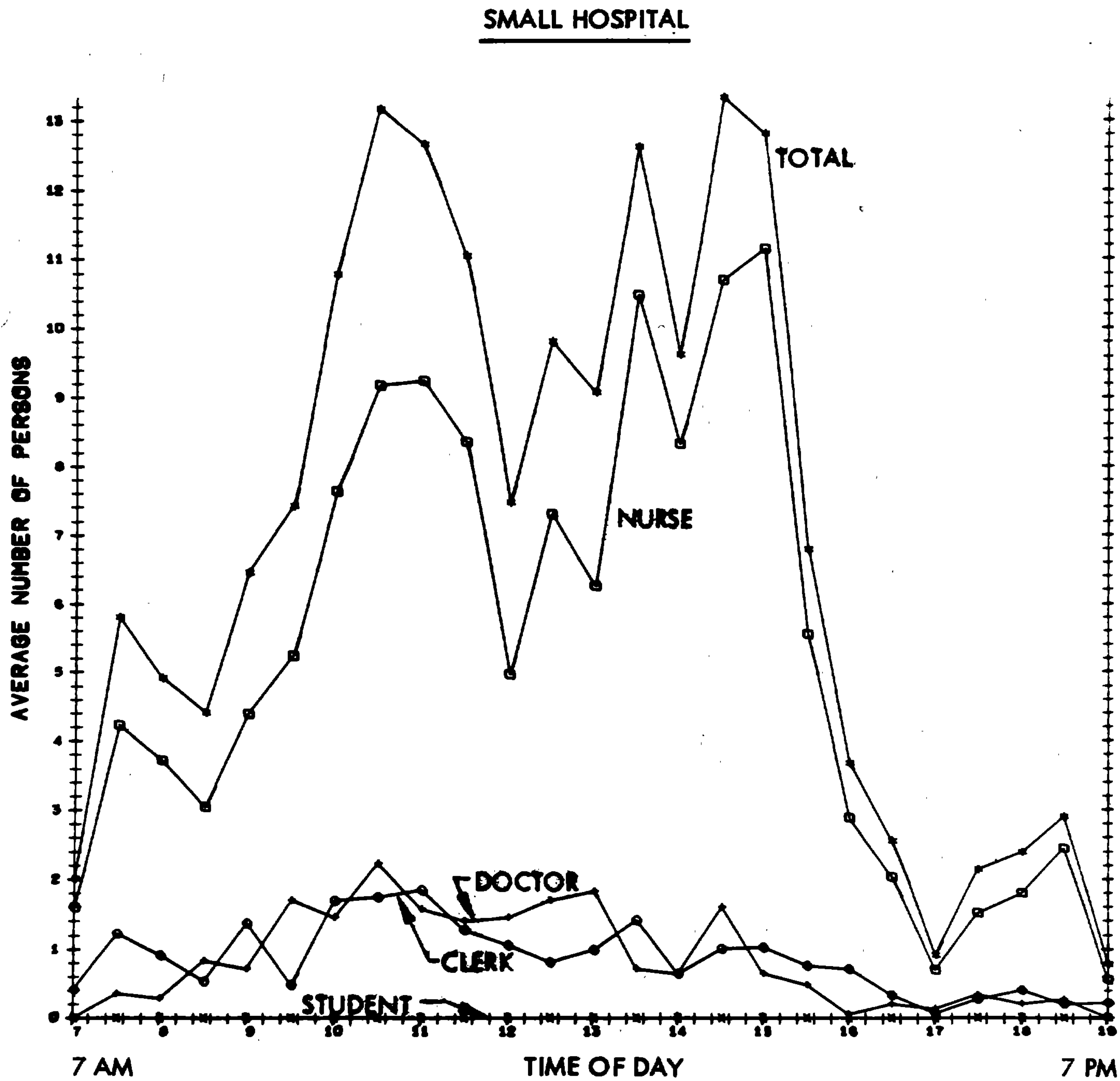

Fig. 3-19 **Comparison by Skill Levels of Personnel Processing to Total Information Being Processed – Representative Small Hospital**

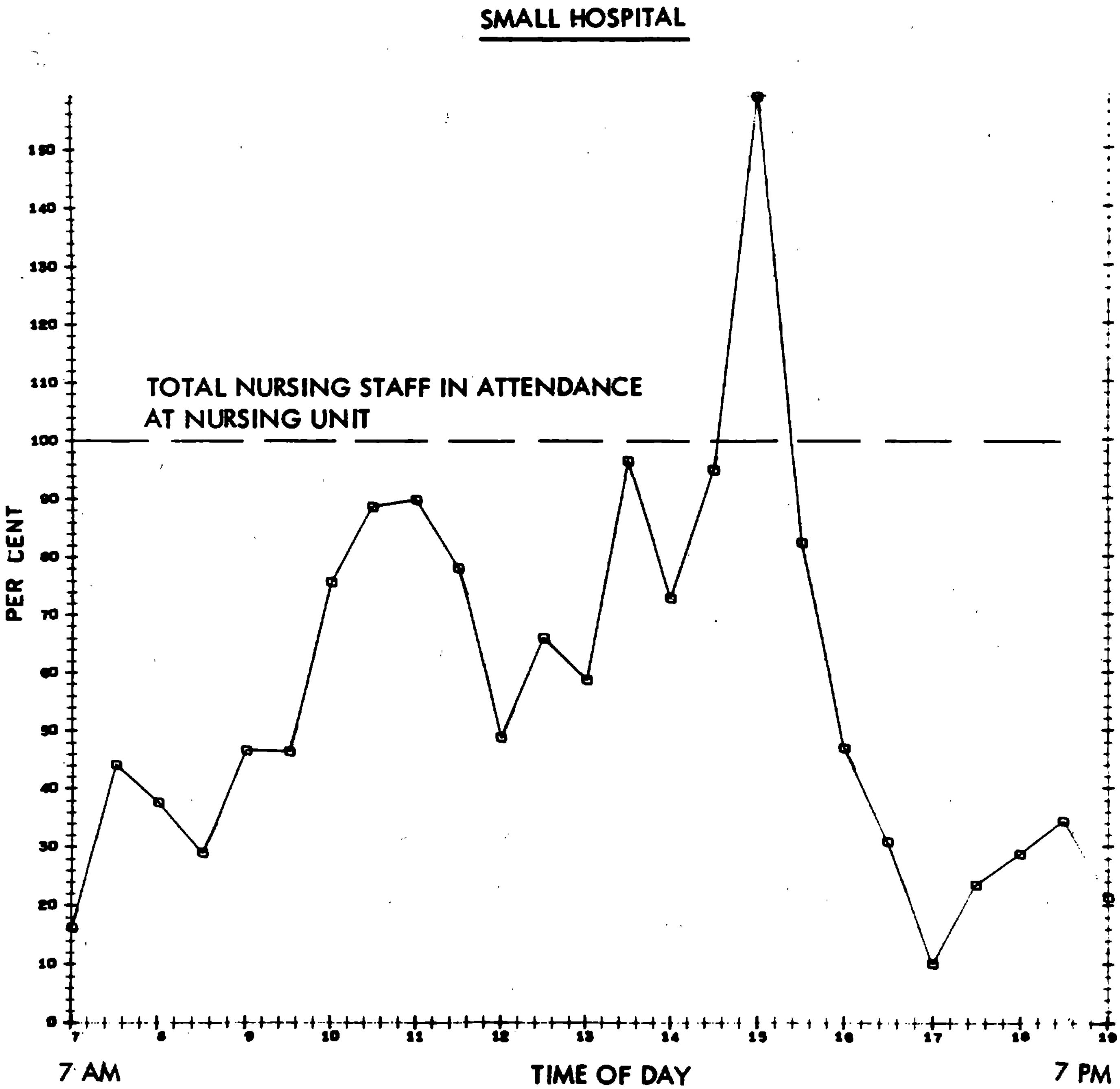

Fig. 3-20 Percentage of Nursing Staff Processing Information – Representative Small Hospital

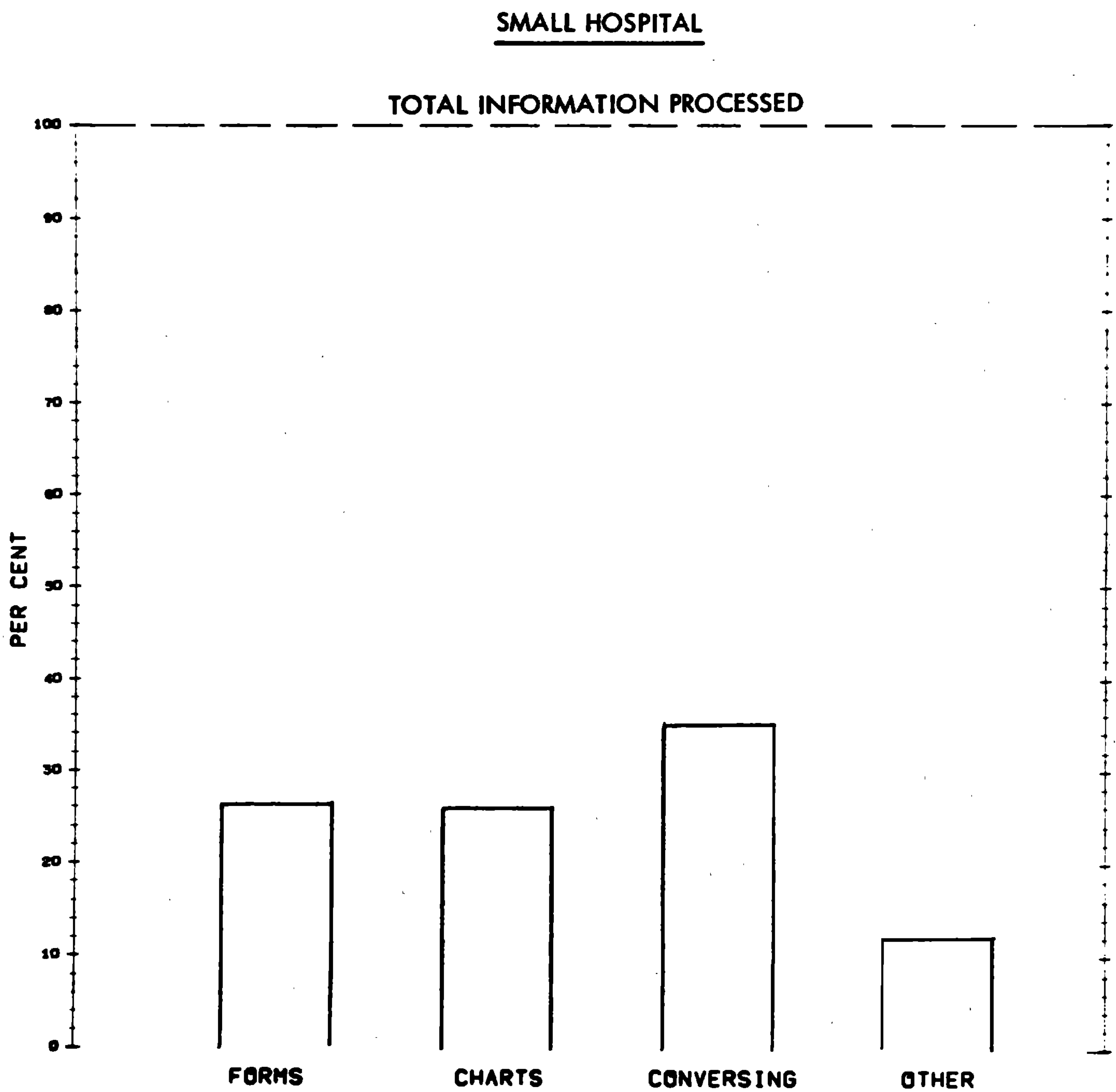

Fig. 3-21 Relative Percentages of Types of Information Processed – Representative Small Hospital

The last figure in this group, Fig. 3-7, shows the relative percentage of the type of information of each of the four major categories of information processing. From this figure it can be seen that forms processing together with chart processing accounts for nearly half of the total information processing activity. This factor is significant since it gives direction and emphasis to the study of the forms (including patient's chart) used for processing information at the nursing station. This is taken up again later in this section and subsequently in the modeling scheme in Section 4.

3.2 INFORMATION COMMERCE – INDIVIDUAL NURSING STATIONS

From the data collected it is possible to prepare similar charts for each nursing station studied, which would amount to 7 charts for each of the 160 stations. While such information would be of interest to the respective hospitals, or for comparing in detail various types of nursing stations, such an effort was outside the scope of this study. It should be noted, however, that the computer program written to process the total hospital data can with slight modification also be used to process individual station data. In fact, plots of activities for each of a few nursing stations were produced by computer to determine the feasibility of the application. These plots are presented in Appendix C, together with other data for the individual nursing stations.

For gross comparative purposes some detailed analysis was performed on each of the 160 stations studied. This is given in Appendix C. The cornerstone upon which individual stations analysis is built is the gross observations concerning whether a person was "processing" or "not processing." It can be seen from the analysis in Appendix C that lower-level details, such as the type of information processed and the particular skill levels involved (as given in Figs. 3-1 through 3-21), are not included. The analysis given in Appendix C is therefore "representative and average," but none the less useful for comparing various stations. The last two columns on the right are perhaps of most interest. In the first of these two columns the total staff in attendance at the ward (unit) is compared with the number of people working at the station. The second then gives the percentage of those at the station who are actually processing information.

Because nursing station designations vary between hospitals and because of the mixture of services, no two stations are exactly alike, thereby making direct comparisons extremely tenuous.

3.3 FUNCTIONAL GROUPING COMPARISONS

Although it can be seen from Appendix C that designations indicating type of service do not reveal consistent commonality among stations, there is a factor that can be applied to classify common information characteristics among certain types or groups of nursing stations. Basically this factor has to do with degree of patient care required. This notion is developed more fully in Section 4, but let it suffice here to say that functional groupings can be made along the following lines:

- Intensive care (long term)
- Intensive care (short term)
- Intermediate care (special)
- Intermediate care (general)
- Self care

With this notion of functional grouping established, it now becomes possible to make some gross comparisons. Table 3-1 shows comparisons taken from the data in Appendix C. Naturally the comparison can be attempted only where the station designation clearly fits the functional grouping; however, this does not necessarily mean that the stations are identical. On the other hand, if some types of service appear to be missing in the comparisons, it does not mean that the service is not provided at the hospital. It may mean that the nomenclature is not precisely the same, or that a particular station was not included in the observations for some reason. It must be emphasized that the listing of stations in Table 3-1 is for illustrative purposes only, and not a complete functional grouping of all stations studied.

3.4 FORMS PROCESSING

Forms and patient-chart processing were found to be the predominant type of information processing, and, furthermore, it was found that a great deal of the observed

Table 3-1

EXAMPLE OF NURSING STATION COMPARISONS BY FUNCTIONAL GROUPINGS

Nursing Stations by Functional Groupings	Percentage of Combined Staff at Nursing Station Who Are Processing Information[a]								
	Large Hospitals			Medium Hospitals			Small Hospitals		
	L-1	L-2	L-3	M-1	M-2	M-3	S-1	S-2	S-3
Intensive Care (Long Term)									
• ICU	63	63	78	50	–	64	–	–	–
• CCU	59	–	73	68	–	–	–	–	–
• Burn	53	–	–	–	–	–	–	–	–
• ICU/CCU	–	–	–	–	41	–	–	–	55
Intensive Care (Short Term)									
• OR	63	45	87	70	44	63	–	–	20
• Delivery	64	44	73	37	39	39	–	–	–
• Recovery	44	46	–	44	28	–	–	–	–
• ER	64	60	80	74	52	40	–	25	51
Intermediate Care (Special)									
• Psych.	79	–	–	64	–	–	–	–	–
• Ob.	89	–	80	–	–	–	–	41	–
• Neuro./Surg.	71	56	–	–	–	–	–	–	–
• ENT	66	–	–	–	–	–	–	–	–
• Gyn.	64	–	81	–	–	–	–	–	–
• Ob./Gyn.	–	70	–	–	–	–	–	–	–
Intermediate Care (General)									
• Medical	87	–	80	75	–	70	–	–	60
• Surgical	85	–	81	78	67	72	–	–	80
• Med./Surg.	–	67	74	–	65	–	62	71	–
Self Care									
• Psych.	(b)	–	–	(b)	(b)	(b)	(b)	(b)	(b)
• Self Care	(b)	–	–	(b)	(b)	(b)	(b)	(b)	(b)

(a) A dash (–) means "not applicable," no separate station so designated
(b) Number of nursing stations surveyed insufficient to permit comparison

conversation related to forms. The conversation usually concerned either what was already entered on or what was about to be entered on a form or patient chart.

Forms were collected at all nine hospitals, and of course a certain amount of duplication ensued. All told, 1040 forms were collected. These were immediately screened to determine those used one or more times a day and those used less than once a day.

Those used one or more times a day were analyzed as to which nursing unit function they served. More will be said later in Section 4 about nursing unit functions, but let it suffice here to say that eight different major functions were defined – admitting, examination, diagnosis, treatment, patient maintenance, supply, control, and disposition. Forms collected are described in Table 3-2. The table shows the number of different forms used in each hospital and groups them by function served and daily usage classification, i.e., one or more/day, less than one/day.

The 573 different forms used one or more times a day were analyzed for commonalities and it was found that a representative selection of 95 different forms served to cover all the applications in all nine hospitals. This selection, then, was deemed to be "average and representative." Procedural details on the processing of these forms within the nursing station are depicted in the process flow charts given in Appendix D. Processing time (in minutes) is indicated on the flow charts for each form. These flow charts contribute to the development of the models discussed in Section 4.

Table 3-2

GROUPINGS OF FORMS COLLECTED

Nursing Unit Function	Large Hospitals						Medium Hospitals						Small Hospitals						Total	
	L1		L2		L3		M-1		M-2		M-3		S-1		S-2		S-3			
	≥1	<1	≥1	<1	≥1	<1	≥1	<1	≥1	<1	≥1	<1	≥1	<1	≥1	<1	≥1	<1	≥1	<1
Admitting	3	1	5	4	5	2	8	2	2	2	1	1	0	0	1	0	4	1	29	13
Examination	13	10	15	9	24	21	18	16	19	11	8	6	4	3	3	2	7	6	111	84
Diagnosis	10	9	23	9	16	14	14	17	13	1	18	4	6	1	10	4	7	1	117	60
Treatment	11	7	22	28	25	21	21	10	18	16	10	16	3	2	11	0	9	2	130	102
Patient Maintenance	2	1	5	4	2	1	3	4	1	2	0	3	0	1	1	0	5	2	19	18
Supply	12	6	27	12	5	9	3	5	6	9	6	5	7	1	6	1	6	1	78	49
Control	6	4	7	25	9	10	11	11	8	10	7	13	4	0	4	2	7	2	63	77
Disposition	3	7	2	5	7	13	6	10	2	15	2	4	1	2	0	1	3	7	26	64
Subtotal	60	45	106	96	93	91	84	75	69	66	52	52	25	10	36	10	48	22	573	467
Total	105		202		184		159		135		104		35		46		70		1,040	

"≥1" refers to forms of which one or more are used per day; "<1" refers to forms of which fewer than one per day are used.

Section 4
INFORMATION PROCESSING MODELS

4.1 HOSPITAL ORGANIZATIONAL ELEMENTS

General short term hospitals exist to bring together three elements: the individual who is ill, the physician with his skill and knowledge, and the facilities and services the physician needs in treating the patient. The first step in development of an information processing model is to consider the manner in which the hospital is organized to provide facilities and services for patients and medical staff.

Most hospitals employ the classical hierarchy system with the hospital administrator as the chief executive and several department heads reporting to him, directly or through one or more assistant directors. However well such a structure may function administratively, it is not suitable for use in analyzing information processing because of overlapping departmental information requirements.

A logical division of the hospital's functional elements from the standpoint of information flow can be derived from the forms used at nursing stations. During this study, a total of 1,040 different hospital forms which passed through the various nursing stations were reviewed. Although these forms were related specifically to the stations, they can be used to reflect the general hospital information requirements as well – since in each case the reviewer noted the source of information arriving at the station (input) and the destination of the outgoing information (output). Analysis of these input/output factors indicated that, in terms of the kinds of facilities and services the hospital provides, a logical division of the hospital organizational elements is as follows:

- <u>Nursing Units.</u> Inpatient domicile areas including the patient rooms, nursing stations, supply rooms, work rooms, and examination rooms which are adjacent to and under the control of the head nurse.

- Medical Staff. Practicing physicians, residents, and interns who have been granted the privilege of practicing medicine in the hospital according to established regulations stipulated in the hospital Medical Staff By-laws
- Ancillary Service — Diagnosis. Skilled personnel, material, and equipment provided in support of the physician and used in accordance with his medical orders to evaluate a patient's condition to determine the existence of disease and its type, status, and rate of progress
- Ancillary Service — Treatment. Skilled personnel, material, and equipment provided to carry out medical orders whose purpose is to impede, arrest, reverse, diminish, or eliminate disease or abnormal patient conditions
- Admitting. Admission of a patient into the hospital, transfer of an inpatient between nursing units, and discharge of a patient from the hospital
- Administration/Business Office. Management of the hospital, its personnel, supplies, facilities, and patients
- Hospital Service Operations. Supply and maintenance activities necessary to support the hospital's medical and hotel operational capability
- Medical Records. Controlled library storage of all past inpatient information, medical and administrative, in the form of discharged patient's charts, x-rays, and business folders for some designated period of time
- Community Interface. Establishment, maintenance, and exercise of specific methods and procedures of communication between the hospital and the community it serves, various governmental agencies, professional groups, insurance agencies, and other hospital and medical groups

Characterization of the hospital's information processing requirements in terms of these nine organizational elements (Fig. 4-1) permits logical treatment of information flow separately by categories or as a whole. Information related to treatment,

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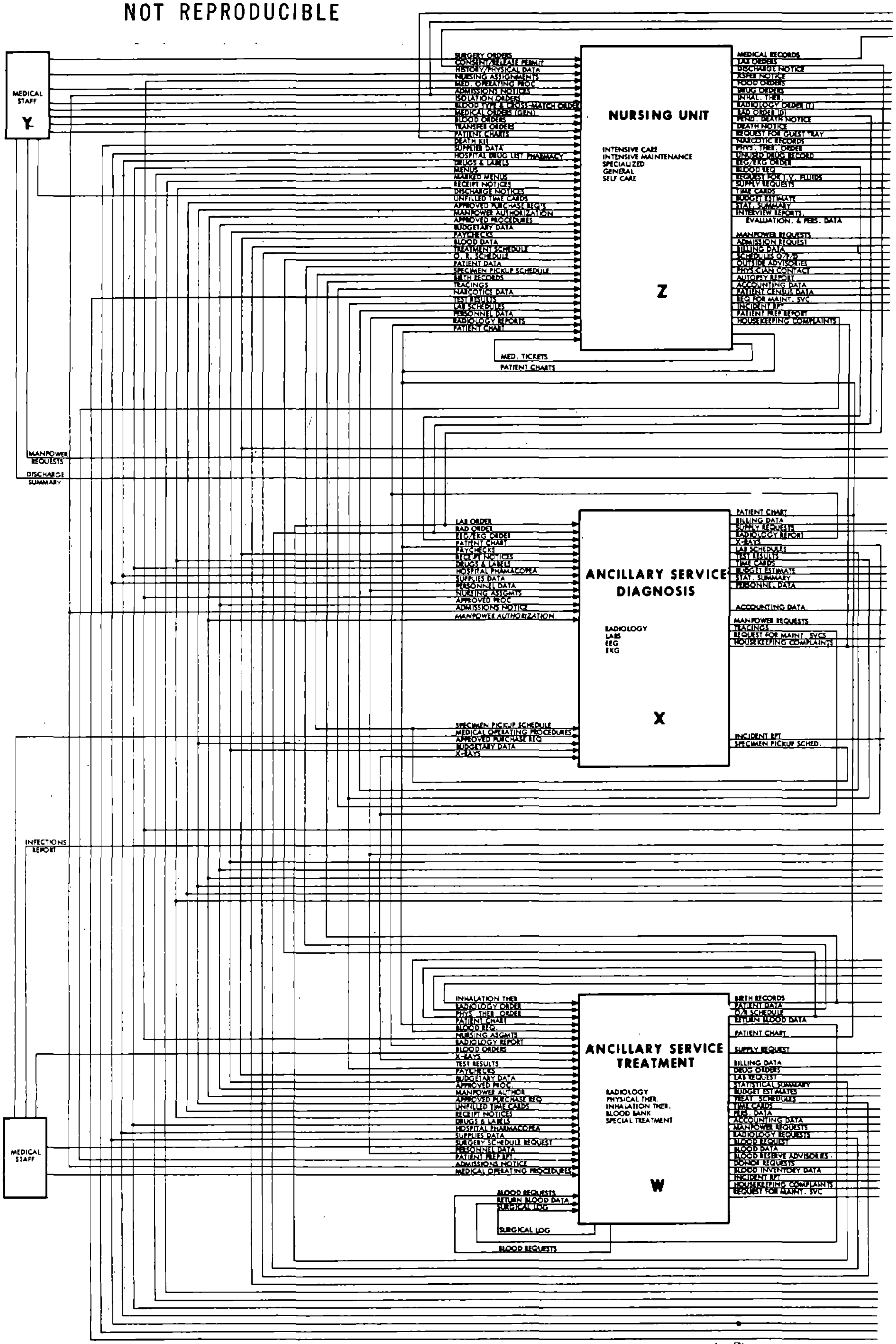
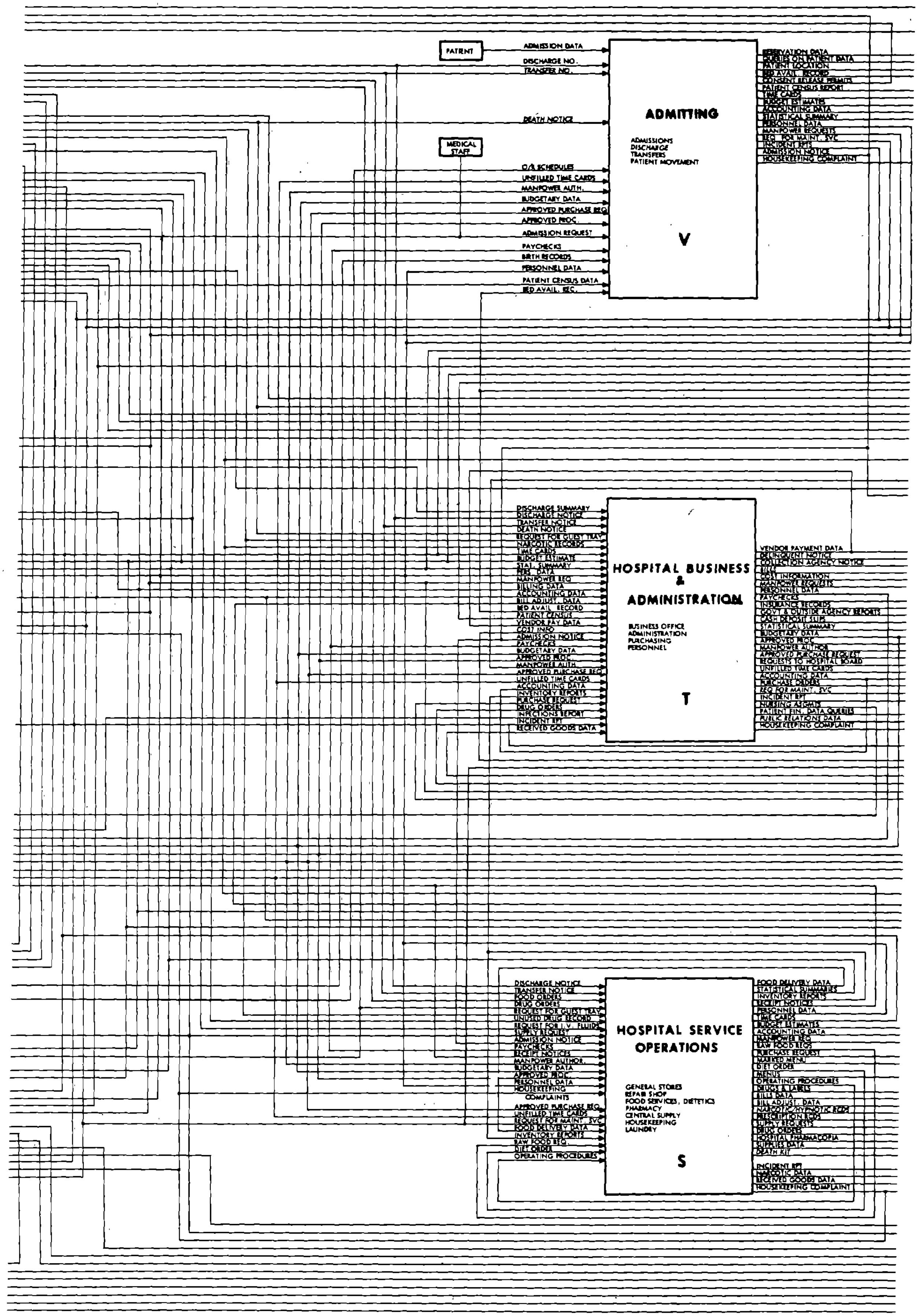


(A)

GENERALIZED - TOTAL HOSPITAL INFORMATION PROCESSING REQUIREMENTS



(B)

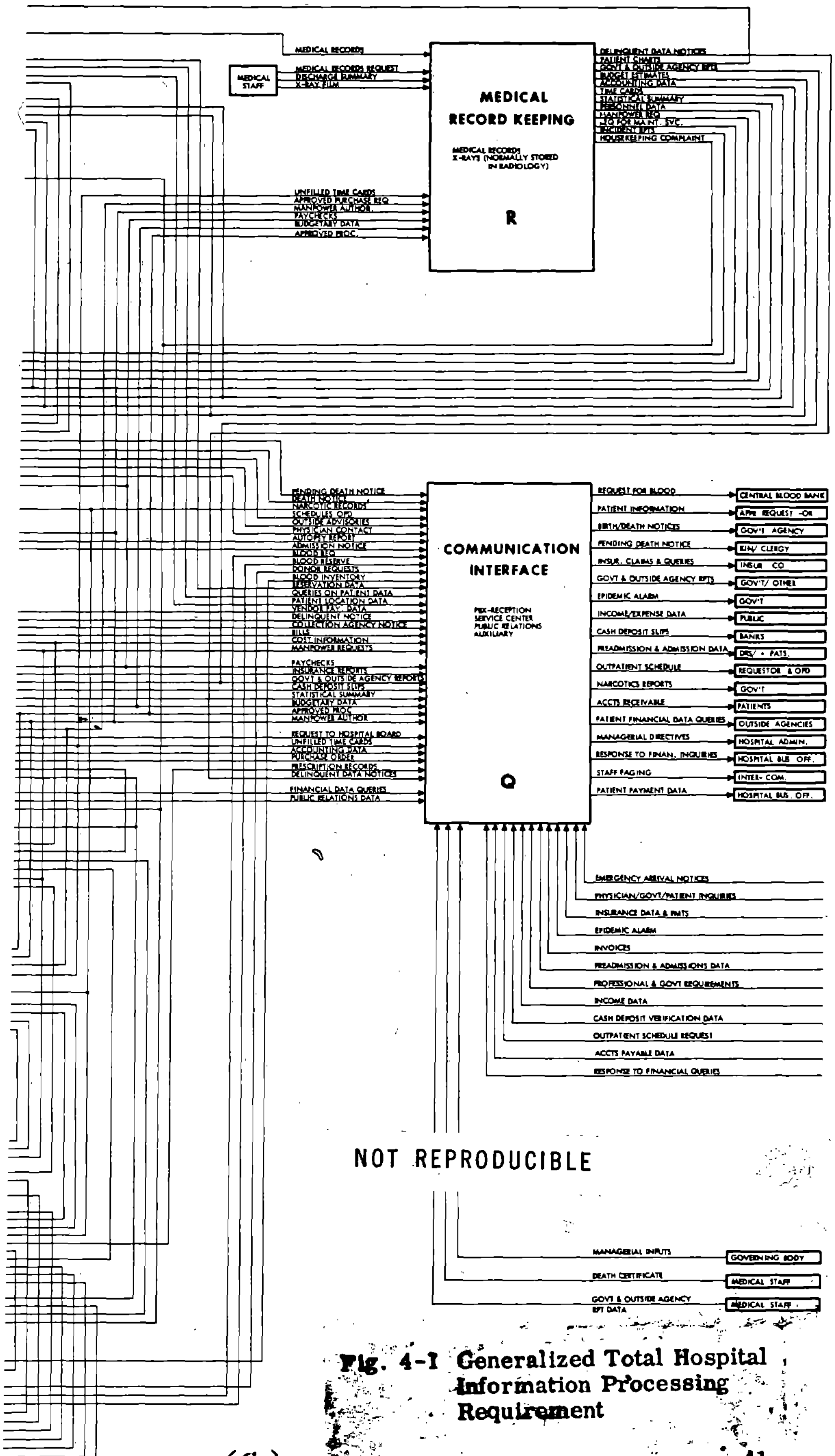


Fig. 4-1 Generalized Total Hospital Information Processing Requirement

(C.)

information related to admission, information related to supply, and so on can be examined as separate entities, if desired, in terms of rate, volume, input and output. At the same time, the relationship of each major element to all other elements from an information processing point of view can be shown, and it then becomes possible to indicate diagramatically the total hospital information processing requirements in terms of all nine organizational elements. Figure 4-1 also shows the relationship among the nine organizational elements from the standpoint of information processing – illustrating the broad areas of common information flow that each organizational element shares with the others. This pictorial representation also shows the information requirements which are unique to each element, and permits information commerce to be traced from point of initiation to final disposition. The information elements depicted were derived from this study. No single hospital is likely to exhibit exactly the catalog of elements nor the exact network of communication illustrated; Fig. 4-1 represents a typical hospital's total information processing requirements.

The nursing unit, as one of nine elements of the hospital, has a network of communication links connecting and interconnecting it with the others. Focusing on the nursing unit and eliminating from consideration the lines of the communication network connecting other elements with each other, attention is concentrated on those links between the nursing unit and the other eight elements. The nursing unit becomes the center of the system with spokes radiating outward to each of the other organizational elements. Thus in Fig. 4-2 the communication lines are limited to the interface of the nursing unit with each of the other elements.

A study of the information needs of nursing stations requires analysis of the exchange between the nursing station and each of the other elements. Such study and analysis is conducted from the standpoint of the nursing station – the focal point of all activity in the nursing unit.

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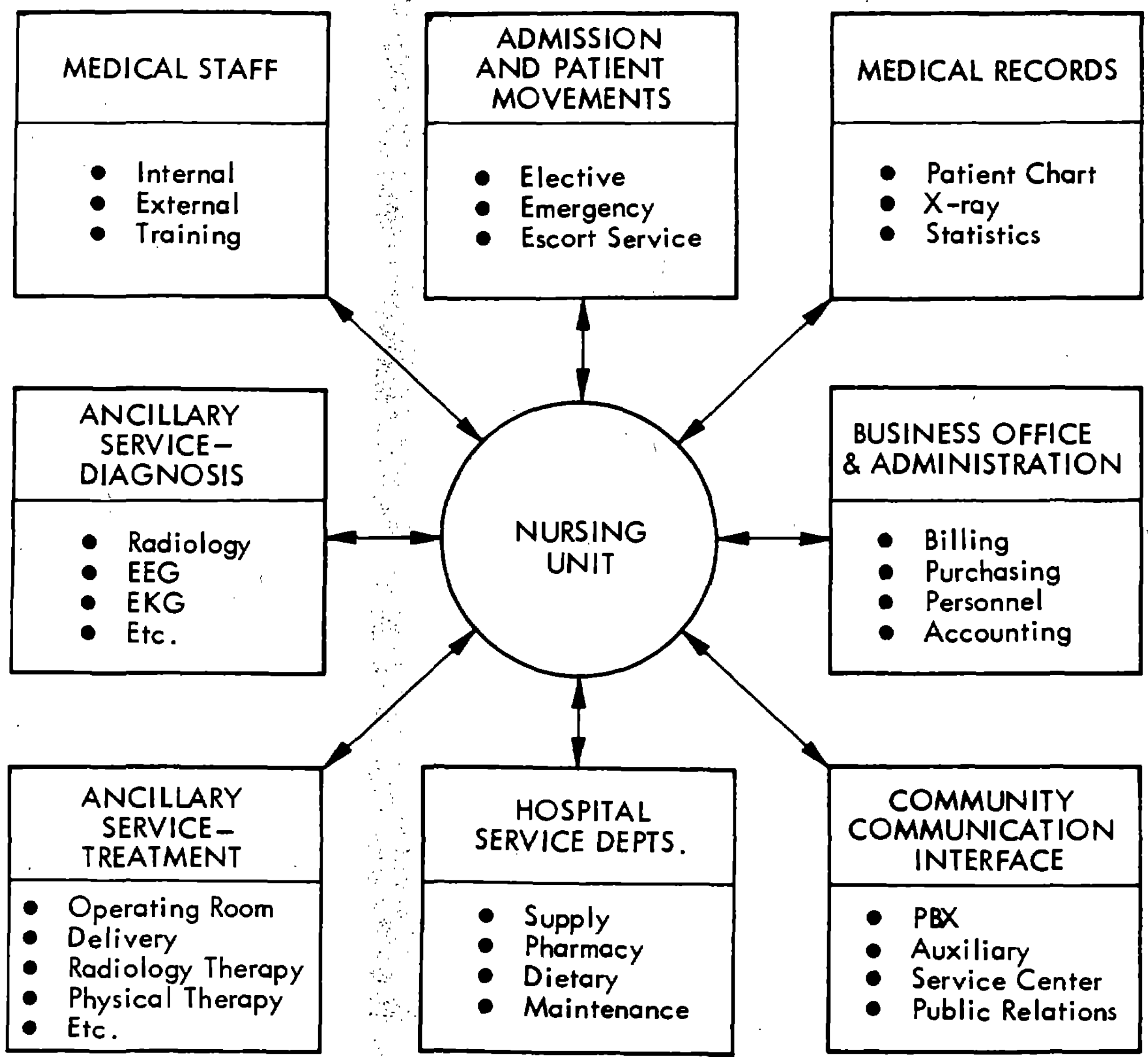

Fig. 4-2 Relationship of Nursing Unit to Total Hospital Functions

4.2 NURSING STATION FUNCTIONAL GROUPS

In the early stages of the study, customer and contractor personnel agreed upon the following preliminary definition of the nursing station:

> " A Nursing Station is a functional unit used by health care delivery personnel in providing services to patients. Health care delivery personnel are defined as those who participate in providing care and service to patients located in beds assigned specifically to that unit."

As the study progressed, it became apparent that this definition was not adequate; it does not take into account the multitude of activities that occur at nursing stations. Even within one hospital, the configuration, layout, functions, duties, and events of the nursing stations vary widely. A useful definition (Section 4.2.2) was derived through consideration of physical and functional factors.

4.2.1 Nursing Station Physical Characteristics

During the course of the on-site data collection, 160 different nursing stations were observed. The layouts and configurations of these stations covered an exceedingly wide range. Some were essentially the same as when the hospitals were built in the middle 1800's; others were so new they had been occupied only a few weeks. Some stations consisted of wall desks in halls with patient charts in portable racks and medicine rooms, sterile and linen supply, soiled storage and housekeeping equipment stored in alcoves, closets, and small rooms throughout the nursing unit. Others had roomy, well ventilated and lighted areas set off from the aisle traffic and containing all essential requirements within a single enclosed area. Since the hospitals studied were selected with some care, and the 160 stations observed did represent a population of nursing stations, it can be stated that a standard nursing station for a specific medical service does not exist. Indeed, a standard nursing station for a specific medical service did not exist within a single medium or large hospital among those studied.

The major functions of the nursing unit are defined as follows:

1. Nursing Unit Admitting Function. Receiving patient from Admitting or from other nursing units, assigning patient to bed, notifying physician (intern, resident, or staff) of patient's arrival, and arranging for patient history (Hx) and physical examination (Px).
2. Examination Function. Gathering of medical information concerning a patient's illness, progress of the illness, and effect of treatment, and recording of patient status – such as vital signs, graphic recording, and general appearance and condition.
3. Diagnosis Function. Evaluating patient's condition to determine the existence of an illness, as well as its type, status, and rate of progress. Evaluating recovery progress to specify treatment. Evaluating special tests, studies, data, and consultant reports to confirm or define a particular illness or disease level.
4. Treatment Function. Carrying out medical orders or actions whose purpose is to prevent, impede, arrest, reverse, diminish, or eliminate disease or abnormal conditions. Recording patient's reaction to treatment. Preparing patient for off-unit treatment, such as surgery, X-ray therapy, physical therapy, etc.
5. Patient Maintenance. Performing nonmedical activities concerned with patient care, such as bed linen change, food distribution, personal hygiene and related needs, and patient handling.
6. Supply Function. Ordering, receiving, maintaining, and issuing standard and patient-peculiar items (e.g., medications, sterile supply, treatment kits, laundry, solutions, nursing station administrative supplies, diagnostic-treatment supplies, and food).
7. Control Function. Directing and coordinating unit activities, including planning and actions necessary to effect examination, treatment or maintenance activities ordered by the physician so they will be accomplished at the proper time with the proper supporting supplies and equipment on hand. Ensuring accomplishment of the routine or special patient-care tasks related to examination, treatment, and maintenance that are performed without direct physician orders. Providing

4.2.2 Basic Nursing Functions

Although the configurations and layouts of nursing stations vary, their basic functions are the same from one station to another and from one hospital to another. Each of the nine hospitals studied used some sort of nursing policies and procedures – ranging from formal, published documents to typed sheets and varying with hospital size and variety of service offered. All nursing personnel were strongly concerned with methods of nursing care and continuity of patient treatment.

Continuity of treatment is ensured by recording everything that is done to or for a patient or is in any way patient-related. All nursing activity can be inventoried by examining all forms used in the nursing station and relating them to the source of their data, the processing of these data required at the station, and the destination of the processed data. This technique was employed at the nine hospitals studied; the forms analyzed were limited to those used at the station one or more times a day. (This limitation provided the data sought without burdening the study with obsolete, redundant, or rarely used pieces of paper). Over 1,000 forms were collected and reviewed; from these, a master list of 95 subfunctions were identified and shown on flow charts.

The list of 95 subfunctions was still too cumbersome for meaningful analysis. A relatively short list of major functions was required. Some of these major functions were readily apparent; for example, such activities as requests for diagnostic data, therapeutic treatment requests, and the transfer of a patient from one unit to another can be grouped easily. Some were not so apparent. On the basis of experience on related projects, the data analysis conducted for this study, and the work performed by others in this area,* the nursing station mission is defined as follows:

> "A nursing station is a control point for the nursing unit system whose function is to determine and/or execute the necessary care and treatment and appropriate disposition of hospital inpatients. This includes the collection and distribution of medical information in a controlled environment designed to sustain the patient's life."

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* Thomas, Kurucz, Smith, and Kelly, A Model of a Hospital Information System, NIH Grant #0306-993-A-50-642B, Department of Industrial Engineering and the Computing Center, State University of New York at Buffalo, Sep 1965.

general and specific information concerning the unit, its patients, and the hospital for the general public. Collecting, retaining, and disseminating unit status information in terms of personnel, facilities, and equipment.

8. Disposition Function. Executing the final movement or disposition of patients and related material as prescribed in medical orders or in administrative policies and procedures.

With these major functions identified and defined, the information processing that occurs within the nursing station can be characterized in terms similar to those of the input/output relationships shown in Fig. 4-2. Figure 4-3 represents this internal processing in terms of the major functions identified.

4.3 FUNCTIONAL NURSING STATION GROUPS

While vast differences were observed among nursing station configurations, the basic nursing functions were found in all the stations observed. However, the stations lend themselves to functional groupings in terms of the degree of care afforded. This grouping was accomplished on the basis of observation, work sampling data, census and attendance data, and the rate, volume, and use of the major forms examined. Parameters used included the following:

- Special patient support equipment in the unit
- Special patient monitoring equipment
- Ratio of RN's to patient census
- Ratio of RN's to those with other nursing skills in the unit
- Type and frequency of procedures performed
- Ratio of information processing to other activity

The first two of these factors are easily observed; the last four were quantified in considerable detail during the course of the study, as reported in Section 3 and the

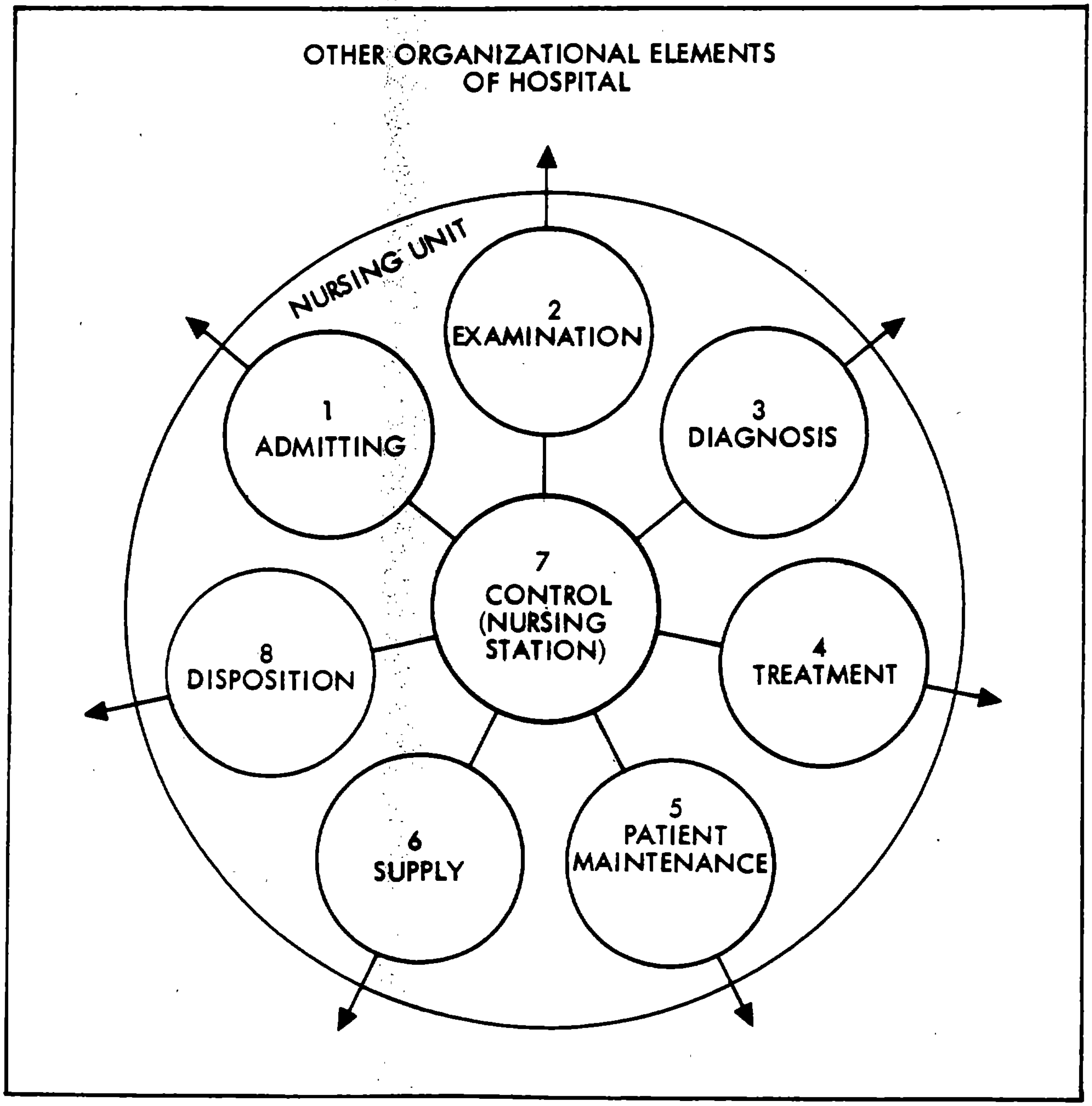

Fig. 4-3 Nursing Unit Functions

appendixes. Based on the special equipment required and on the study results, the following functional unit groupings were defined, tested, and used:

- Intensive Care (Long-Term) – e.g., coronary care, care for burns, craniotomy, prematures
- Intensive Care (Short-Term) – e.g., care in operating room, recovery room, emergency room
- Intermediate Care (General) – e.g., cardiovascular rehabilitation, care of infectious hepatitis
- Intermediate Care (Special) – e.g., post operative, maternity, neonatal care
- Self-Care – e.g., diagnostic work-up, radiotherapy

Resources and characteristics of these functional groupings are as follows:

- Intensive Care (Long-Term)
  - Special patient support equipment
  - Special patient monitoring equipment
  - High ratio of RN's to patients
  - High ratio of RN's to those with other nursing skills
  - Fewer procedures performed
  - Lower ratio of information processing to other activity
  - Special training required
- Intensive Care (Short-Term)
  - Same as Intensive Care (Long-Term)
  - No patients permanently assigned
- Intermediate Care (Special)
  - Special patient support equipment
  - Some special patient monitoring equipment
  - Average ratio of RN's to patients
  - Average ratio of RN's to those with other nursing skills
  - Average number of procedures performed

- Average ratio of information processing to other activity
- Some special training required

- Intermediate Care (General)
  - Average patient support equipment
  - Average patient monitoring equipment
  - Average ratio of RN's to patients
  - Average ratio of RN's to those with other nursing skills
  - Average number of procedures performed
  - Average ratio of information processing to other activity
  - Average training required

- Self Care
  - Little patient support equipment
  - Little patient monitoring equipment
  - Low ratio of RN's to patients
  - Low ratio of RN's to those with other nursing skills
  - Small number of procedures performed
  - Average ratio of information processing to other activity
  - Average training required

4.4 DEVELOPING THE MODEL COMPONENTS

With the identification and definition of the five functional groups of nursing stations, the components of a model are available, namely:

- Hospital organizational elements
- Basic nursing functions
- Nursing station functional groups

A model can be constructed by relating these components to each other on the basis of data flow characteristics observed during the study. However, some arbitrary means of identification of components is first required.

4.4.1 Model Coding and Components

For the eight hospital organizational elements, the following alpha code using capital letters will be employed, beginning with the end of the alphabet (omitting the letter "U" to avoid possible confusion with "V"):

- Z Nursing Units
- Y Medical Staff
- X Ancillary Service – Diagnosis
- W Ancillary Service – Treatment
- V Admitting
- T Administration/Business Office
- S Hospital Service Operations
- R Medical Records
- Q Community Interface

For the functional nursing unit, an alpha code is again used, employing capital letters from the beginning of the alphabet:

- A Intensive Care (Long-Term)
- B Intensive Care (Short-Term)
- C Intermediate Care (Special)
- D Intermediate Care (General)
- E Self Care

The final component is the basic information processing function. Encompassed by the eight basic nursing functions identified in Fig. 4-3 are 95 subfunctions constituting the bulk of the information processing activity. Coding here is accomplished by assigning a number to each major function and a lower-case alpha character to each subfunction, as shown in Table 4-1, where subfunctions are listed in terms of the forms employed.

Table 4-1

CODING FOR PROCESSING SUBFUNCTIONS

1. NURSING UNIT ADMITTING
   - 1a Admitting Form
   - 1b Admission Worksheet
   - 1c Emergency Admission
   - 1d OB Admission
   - 1e Nursery Admission
   - 1f Patient Transfer
   - 1g Newborn ID & Birth Cert.
   - 1h Emergency Admitting Record
   - 1k Birth Notice
2. PATIENT EXAMINATION
   - 2a Laboratory Report
   - 2b X-ray Request
   - 2c PKU/Cord Clot
   - 2d Sleep Chart
   - 2e Input/Output, 8-hr Record
   - 2f Input/Output, 24-hr Record
   - 2g Vital Signs
   - 2h ICU/CCU Record
   - 2k Recovery Room Record
   - 2l Blood Pressure Chart
   - 2m Medical Records Note
   - 2n Graphic Sheet – Routine
   - 2o Graphic Sheet – Intensive
   - 2p Diabetic Record
   - 2r Bedside Record
   - 2s Hx & Px (Nursing)
   - 2t Progress Notes
   - 2u OR Prep. Sheet
   - 2w Infant HX & Px
   - 2x Surgery Check List
   - 2y Professional Consult. Request
3. DIAGNOSIS
   - 3a Professional Consult. Report
   - 3b Prothrombin Time
   - 3c Lab. Report
   - 3d EKG Report
   - 3e EEG Report
   - 3f X-ray Report
   - 3g Path. Report (non-surg.)
   - 3h Path. Report (surg.)
   - 3k PKU/Cord Clot Results
4. TREATMENT
   - 4a MD Order Sheet
   - 4b Emerg. Rm. Report
   - 4d Medication Ticket
   - 4e Nursing Care Plan
   - 4f Blood Transfusion (Request)
   - 4g Anesthesia Record
   - 4i Med./Treatment Record
   - 4k I/V Feeding-Infusion Record
   - 4m Parenteral Fluid Sheet
   - 4o Anticoagulant Chart
   - 4r Delivery Room Record
   - 4t Delivery Room Record
   - 4u ICU/CCU Record
   - 4x Labor Record
   - 4y Record of Procedure

Table 4-1 (Cont.)

5. PATIENT MAINTENANCE	7. CONTROL
5a Patient Daily Care Routine	7a Nursing Assign. Sheet (Patients)
5b Routine Nursing Notes	7b ICU/CCU Log
5d Daily Nursing Care Report	7c Nursing Assign. (Unit)
5e Incident Report	7d Seriously Ill Slip
5g Patient Clothing & Valuables List	7e Daily Floor Census
6. SUPPLY	7f Nursing Unit Report
6a Central Supply Requests	7g Condition Report
6b Ward Nourishment List	7h Emergency Room Log
6c Floor Central Supply	7i Minor Surgery Log
6d Pharmacy Request	7k OR Log
6e Pharmacy Floor Supply	7l Emergency Case Report
6f Diet Order	7m Sponge Count
6g Diet Change	7n Delivery Room Record
6i Linen Request	7o OR Patient Call Slip
6l General Stores Request	7r OR Schedule
6m Diet Card	7s Recovery Room Log
6n Unit Dietary Schedule	8. DISPOSITION
6o Narcotic/Hypnotic Record	8a Discharge Summary
6p Daily Antibiotic Record	8b Discharge Log
	8c Unclaimed Items Report
	8d Take Home Rx
	8e Take Home CSR
	8f Patient Chart (To Med. Record)
	8g Newborn Release

4.4.2 Relating the Model Components

For the model to be an effective tool, the relationships among the components must be well understood. The purpose of the model is to depict the information processing needs of the nursing station; therefore, the model must show source (termed input); and disposition (output) of information. Input and output involve the organizational elements of the hospital (including the nursing station) that generate, transmit, receive, or store information. The processing of information involves the activities that occur with the receipt of information until an output transmission or file storage terminates that transaction as far as the nursing station is concerned.

Processing is described as one of the subfunctions in terms of form used, the time necessary to complete the subfunction, and its rate or frequency of occurrence. Table 4-2 illustrates the input/output relationships among the nursing station functional groups, the basic nursing functions, and the hospital elements. Table 4-3 illustrates the specific subfunctions that occur in each type of functional group.

With respect to subfunction 1a, for example, (Admitting Form, Table 4-1), every patient appears at the nursing unit with admission data which originated at the admitting office. These data generally require additional processing and ultimately are made available to the attending physician, the admitting office, the business office, and nursing personnel in the station. Table 4-2 shows this input/output relationship, and Table 4-3 shows that the subfunction is performed by all the functional groups of stations except (B) Intensive Care (Short-Term). The total activity at the nursing station can be described symbolically as follows:

V > — Input from the admitting office

T1a — Standard time to process the Admitting Form 1a, at the nursing station

RA1a — Rate of occurrence of the Admitting Form 1a at Intensive Care (Long-Term) (A)

RC1a — Rate of occurrence of Admitting Form 1a at Intermediate Care (Special) (C)

Table 4-2

INPUT/OUTPUT RELATIONSHIPS*

Nursing Unit Functions \ Functional Groups	A. Intensive Care (Long-Term)		B. Intensive Care (Short-Term)		C. Intermediate Care (Special)		D. Intermediate Care (General)		E. Self Care	
	Input	Output	Input	Output	Input	Output	Input	Output	Input	Output
1. Nursing Unit Admitting	VZ	YVZT	VZ	YVZTQ	VZ	YVZT	VZ	YVZT	VZ	YVZT
2. Examination	Z	XTYZ	Z	XTYZ	Z	XTYZR	Z	XTYZR	Z	XTYZR
3. Diagnosis	X	Z	X	Z	X	Z	X	Z	X	Z
4. Treatment	YZW	ZSWYT	YZ	ZSWYT	YZW	ZSWY	YZW	ZSWY	YZW	ZY
5. Patient Maintenance	Z	ZTY	Z	ZTY	Z	ZTY	Z	ZTY	Z	ZTY
6. Supply	ZS	SZT	Z	SZT	ZS	SZT	ZS	SZT	Z	SZT
7. Control	ZT	ZTYQ	Z	ZTY	Z	ZTQ	Z	ZTQ	Z	ZT
8. Disposition	YZ	ZRTS	–	–	YZ	ZRTS	YZ	ZRTS	YZ	ZRTS

*Hospital Organizational Elements:

Z. Nursing Units
Y. Medical Staff
X. Ancillary Service – Diagnosis
W. Ancillary Service – Treatment
V. Admitting
T. Administration/Business Office
S. Hospital Service Operations
R. Medical Records
Q. Community Interface

Table 4-3

SUBFUNCTIONS BY NURSING STATION FUNCTIONAL GROUPS*

A. Intensive Care (Long-Term)							
1a	2a	3a	4a	5a	6a	7a	8a
1b	2b	3b	4c	5b	6c	7b	8b
1c	2d	3c	4d	5d	6d	7c	8c
1f	2e	3d	4e	5e	6e	7d	8d
	2f	3e	4f	5f	6f	7e	8e
	2g	3f	4i	5g	6g	7f	8f
	2h	3g	4j	5h	6i	7g	
	2l	3h	4k		6l	7o	
	2o		4m		6n		
	2v		4n		6o		
	2s		4o		6p		
	2t		4p				
	2u		4w				
	2y						

B. Intensive Care (Short-Term)						
1c	2a	3b	4a	5b	6a	7a
1d	2g	3c	4b	5d	6c	7c
1e	2k	3d	4c	5e	6e	7f
1g	2l	3f	4f		6i	7h
1h	2o	3g	4g		6l	7i
	2r	3h	4i		6o	7k
	2t		4j		6p	7l
	2u		4k			7m
	2x		4m			7n
			4p			7p
			4r			7v
			4t			7s
			4w			
			4x			
			4y			

C. Intermediate Care (Special)							
1a	2a	3a	4a	5a	6a	7a	8a
1b	2b	3b	4c	5b	6b	7c	8b
1c	2c	3c	4d	5d	6c	7d	8c
1d	2d	3d	4e	5e	6d	7e	8e
1f	2e	3e	4f	5f	6e	7f	8f
1h	2f	3f	4h	5g	6f	7g	8g
	2g	3g	4i	5h	6g	7o	
	2l	3h	4j		6i		
	2m	3k	4k		6l		
	2n		4m		6m		
	2o		4n		6n		
	2p		4o		6o		
	2r		4p		6p		
	2s						
	2t						
	2u						
	2w						
	2x						
	2y						

D. Intermediate Care (General)							
1a	2a	3a	4a	5a	6a	7a	8a
1b	2b	3b	4c	5b	6b	7c	8b
1c	2d	3c	4d	5d	6c	7d	8c
1f	2e	3d	4e	5e	6d	7e	8d
1h	2f	3e	4f	5f	6e	7f	8e
	2g	3f	4h	5g	6f	7g	8f
	2l	3g	4i	5h	6g	7o	
	2m	3h	4j		6i		
	2n		4k		6l		
	2o		4m		6m		
	2p		4n		6n		
	2r		4o		6o		
	2s		4p		6p		
	2t						
	2u						
	2x						
	2y						

E. Self Care							
1a	2a	3a	4a	5b	6a	7a	8a
1b	2b	3b	4d	5d	6c	7c	8b
1c	2g	3d	4e	5e	6d	7e	8c
1f	2l	3e	4h	5f	6i	7f	8d
	2m	3f	4i		6l		8e
	2n	3g	4m		6o		8f
	2s	3h	4n		6p		
	2t		4o				
	2y		4p				

*The subfunctions are defined in Table 4-1.

RD1a – Rate of occurrence of Admitting Form 1a at Intermediate Care (General) (D)

RE1a – Rate of occurrence of Admitting Form 1a at Self Care (E)

> YVZT – Output to the medical staff, admitting office, business office, and receiving nursing unit

A convenient notation can be used to express requirements generated by each subfunction; for example:

$$V > T1a \left| \begin{array}{c} RA1a \\ RC1a \\ RD1a \\ RE1a \end{array} \right| > YVZT$$

This symbology states that for subfunction 1a input comes from the admitting office, V ; the time required to process the data received at the nursing units is T1a, and the functional groupings A, C, D, and E all receive the data. The rates at which each functional group receives the data are expressed as RA1a, RC1a, RD1a, and RE1a. The product of (T1a) and (RA1a + RC1a + RD1a + RE1a) gives the total processing load of subfunction 1a in terms of applicable functional groups.

The processed data are shown as output from each functional group to the medical staff Y; admitting office, V; the nursing unit itself, Z; and the business office T.

This kind of logic can be employed in a mathematical expression to symbolize the total impact of each subfunction relevant to a particular nursing unit function involving all applicable functional groups. In such a manner, the expression of Fig. 4-4 illustrates the information processing impact of the Examination function.

Similar expressions can be constructed to show total information requirements for the other functions, i.e., for Nursing Unit Admitting, Diagnosis, Treatment, Patient Maintenance, Supply, Control, and Disposition. They can be used to estimate the total

$$\mathrm{Z} > \mathrm{T2a} \left| \begin{matrix} \mathrm{RA2a} \\ \mathrm{RB2a} \\ \mathrm{RC2a} \\ \mathrm{RD2a} \\ \mathrm{RE2a} \end{matrix} \right| > \mathrm{XT} + \mathrm{Z} > \mathrm{T2b} \left| \begin{matrix} \mathrm{RA2b} \\ \mathrm{RC2b} \\ \mathrm{RD2b} \\ \mathrm{RE2b} \end{matrix} \right| > \mathrm{XT} + \mathrm{Z} > \mathrm{T2c} \left| \mathrm{RC2c} \right| > \mathrm{XT}$$

$$+ \mathrm{Z} > \mathrm{T2d} \left| \begin{matrix} \mathrm{RA2d} \\ \mathrm{RC2d} \\ \mathrm{RD2d} \end{matrix} \right| > \mathrm{YZ} + \mathrm{Z} > \mathrm{T2e} \left| \begin{matrix} \mathrm{RA2e} \\ \mathrm{RC2e} \\ \mathrm{RD2e} \end{matrix} \right| > \mathrm{YZ} + \mathrm{Z} > \mathrm{T2f} \left| \begin{matrix} \mathrm{RA2f} \\ \mathrm{RC2f} \\ \mathrm{RD2f} \end{matrix} \right| > \mathrm{YZ}$$

$$+ \mathrm{Z} > \mathrm{T2g} \left| \begin{matrix} \mathrm{RA2g} \\ \mathrm{RB2g} \\ \mathrm{RC2g} \\ \mathrm{RD2g} \\ \mathrm{RE2g} \end{matrix} \right| > \mathrm{YZ} + \mathrm{Z} > \mathrm{T2h} \left| \mathrm{RA2h} \right| > \mathrm{YTZ} + \mathrm{Z} > \mathrm{T2k} \left| \mathrm{RB2k} \right| > \mathrm{YTZ}$$

$$+ \mathrm{Z} > \mathrm{T2l} \left| \begin{matrix} \mathrm{RA2l} \\ \mathrm{RB2l} \\ \mathrm{RC2l} \\ \mathrm{RD2l} \\ \mathrm{RE2l} \end{matrix} \right| > \mathrm{YZ} + \mathrm{Z} > \mathrm{T2m} \left| \begin{matrix} \mathrm{RC2m} \\ \mathrm{RD2m} \\ \mathrm{RE2m} \end{matrix} \right| > \mathrm{R} + \mathrm{Z}\ \mathrm{T2n} \left| \begin{matrix} \mathrm{RC2n} \\ \mathrm{RD2n} \\ \mathrm{RE2n} \end{matrix} \right| > \mathrm{YZ}$$

$$+ \mathrm{Z} > \mathrm{T2o} \left| \begin{matrix} \mathrm{RA2o} \\ \mathrm{RB2o} \\ \mathrm{RC2o} \\ \mathrm{RD2o} \end{matrix} \right| > \mathrm{YZ} + \mathrm{Z} > \mathrm{T2p} \left| \begin{matrix} \mathrm{RC2p} \\ \mathrm{RD2p} \end{matrix} \right| > \mathrm{YZ} + \mathrm{Z} > \mathrm{T2r} \left| \begin{matrix} \mathrm{RA2r} \\ \mathrm{RB2r} \\ \mathrm{RC2r} \\ \mathrm{RD2r} \end{matrix} \right| > \mathrm{YZ}$$

$$+ \mathrm{Z} > \mathrm{T2s} \left| \begin{matrix} \mathrm{RA2s} \\ \mathrm{RC2s} \\ \mathrm{RD2s} \\ \mathrm{RE2s} \end{matrix} \right| > \mathrm{YZ} + \mathrm{Z} > \mathrm{T2t} \left| \begin{matrix} \mathrm{RA2t} \\ \mathrm{RB2t} \\ \mathrm{RC2t} \\ \mathrm{RD2t} \\ \mathrm{RE2t} \end{matrix} \right| > \mathrm{YZ} + \mathrm{Z} > \mathrm{T2u} \left| \begin{matrix} \mathrm{RA2u} \\ \mathrm{RB2u} \\ \mathrm{RC2u} \\ \mathrm{RD2u} \end{matrix} \right| > \mathrm{YZ}$$

$$+ \mathrm{Z} > \mathrm{T2w} \left| \mathrm{RC2w} \right| > \mathrm{YZ} + \mathrm{Z} > \mathrm{T2x} \left| \begin{matrix} \mathrm{RB2x} \\ \mathrm{RC2x} \\ \mathrm{RD2x} \end{matrix} \right| > \mathrm{YX} + \mathrm{Z} > \mathrm{T2y} \left| \begin{matrix} \mathrm{RA2y} \\ \mathrm{RC2y} \\ \mathrm{RD2y} \\ \mathrm{RE2y} \end{matrix} \right| > \mathrm{YXZ}$$

Fig. 4-4 Expression for Total Examination Function Involving all Functional Groups

information processing requirements of the nursing unit in terms of manhours by basic nursing function and by group of nursing units. These expressions are amenable to digital computer programming for specific analysis; however, they do not present a visual concept of the information processing activity.

Visual presentation of information processing should contain the same kind of data in a format that is more familiar to and more easily understood by individuals without technical backgrounds. It must show the data flow and the manhour requirements by basic nursing function and by functional nursing unit, structured in such a manner that it can be understood readily by nursing and administrative personnel. The objective of such a model is to provide these individuals with a tool which they can apply in evaluating their own information processing needs at the nursing stations and in evaluating the potential of computerized systems with respect to their own requirements. Figure 4-5 is a matrix that contains the same information as the mathematical expressions but displays it as a pictorial model which facilitates explanation and understanding.

Only the larger hospitals would be likely to be concerned with the entire model, yet it is just as effective for a small hospital with only a few nursing units. A professional individual at a hospital can easily relate the subfunction identification to the commerce of his own facility. The larger hospitals would include all or nearly all of the subfunctions while the small hospital would be concerned with fewer subfunctions.

To permit this model to function for an individual hospital requires the values to be substituted for T and R in determining the actual manhour requirements by subfunction, by basic nursing function, by nursing unit functional group, or for the total nursing division. Table 4-4 provides the means necessary to supply these data. Based on "standard" times (averages from the hospitals studied), the table shows the "standard" minutes of processing per occurrence of each subfunction and the rate of occurrence of each subfunction. An individual hospital can determine its own rates of occurrence of admissions, transfers, newborns, etc; the standard time values then will permit a general assessment of the nursing station needs for information processing at that hospital. Depending upon the results (or the degree of accuracy desired) subfunctions can be expanded or contracted so that they fit the individual hospital, and time values peculiar to that facility can be used instead of average values. These specific time and rate values could be refined further to specific kinds of skill categories on the nursing unit, i.e., RN, LPN, W/C, students, etc.

This pictorial model can be used to describe the information processing activity that occurs at the nursing station in as great detail as is desired. From a particular hospital's point of view, Fig. 4-6 is a representation of the data format that might be employed in collecting and arranging the particular data required by that hospital to evaluate its present requirements for information processing at the nursing station, and to compare the result with a proposed computer system.

(1) NURSING UNIT ADMISSION FUNCTION

	(A) INTENSIVE CARE (Long Term)			(B) INTENSIVE CARE (Short Term)			(C) INTERMEDIATE CARE (Special)			(D) INTERMEDIATE CARE (General)			(E) SELF CARE		
(a) Admitting Form	V	T1aRA1a	YVZ				V	T1aRC1a	VYZ	V	T1aRD1a	VYZ	V	T1aRE1a	VYZ
(b) Admission Worksheet	Z	T1bRA1b	VT				Z	T1bRC1b	VT	Z	T1bRD1b	VT	Z	T1bRE1b	VT
(c) Emergency Admission	Z	T1cRA1c	VY	Z	T1cRB1c	VY	Z	T1cRC1c	VY	Z	T1cRD1c	VY	Z	T1cRE1c	VY
(d) O.B. Admission				V	T1dRD1d	VY	V	T1dRC1d	VY						
(e) Nursery Admission				Z	T1eRB1e	VT									
(f) Patient Transfer	Z	T1fRA1f	VY				Z	T1fRC1f	VY	Z	T1fRD1f	VY	Z	T1fRE1f	VY
(g) Newborn I.D. &Birth Cert				Z	T1gRB1g	VTQ									
(h) Emergency Admit Record				Z	T1hRB1h	YZ	Z	T1hRC1h	YZ	Z	T1hRD1h	VZ			

A

B

Fig. 4-5 Pictorial Model of Hospital Information Processing Requirements

(2) EXAMINATION FUNCTION

	(A) INTENSIVE CARE (Long Term)			(B) INTENSIVE CARE (Short Term)			(C) INTERMEDIATE CARE (Special)			(D) INTERMEDIATE CARE (General)			(E) SELF CARE		
(a) Lab. Requests	Z	T2aRA2a	XT	Z	T2aRB2a	XT	Z	T2aRC2a	XT	Z	T2aRD2a	XT	Z	T2aRE2a	XT
(b) X-Ray Requests	Z	T2bRA2b	XT				Z	T2bRC2b	XT	Z	T2bRD2b	XT	Z	T2bRE2b	XT
(c) PKU/Clots Request							Z	T2cRC2c	XT						
(d) Sleep Chart	Z	T2dRA2d	YZ				Z	T2dRC2d	YZ	Z	T2dRD2d	YZ			
(e) I/O - 8 Hrs.	Z	T2eRA2e	YZ				Z	T2eRC2e	YZ	Z	T2eRD2e	YZ			
(f) I/O - 24 Hrs.	Z	T2fRA2f	YZ				Z	T2fRC2f	YZ	Z	T2fRD2f	YZ			
(g) Vital Signs	Z	T2gRA2g	YZ	Z	T2gRB2g	YZ	Z	T2gRC2g	YZ	Z	T2gRD2g	YZ	Z	T2gRE2g	YZ
(h) ICU/CCU Record	Z	T2hRA2h	YTZ												
(k) Recovery Room Record				Z	T2kRB2k	YTZ									
(l) Blood Pressure Chart	Z	T21RA21	YZ	Z	T21RB21	YZ	Z	T21RC21	YZ	Z	T21RD21	YZ	Z	T21RE21	YZ
(m) Medical Records Note							Z	T2mRC2m	R	Z	T2mRD2m	R	Z	T2mRE2m	R
(n) Graphic Sheet-Routine							Z	T2nRC2n	YZ	Z	T2nRD2n	YZ	Z	T2nRE2n	YZ
(o) Graphic Sheet-Intensive	Z	T2oRA2o	YZ	Z	T2oRB2o	YZ	Z	T2oRC2o	YZ	Z	T2ORD2O	YZ			
(p) Diabetic Record							Z	T2pRC2p	YZ	Z	T2pRD2p	YZ			
(r) Bedside Record	Z	T2rRA2r	YZ	Z	T2rRB2r	YZ	Z	T2rRC2r	YZ	Z	T2rRD2r	YZ			
(s) Hx/Px N/S Record	Z	T2sRA2s	YZ				Z	T2sRC2s	YZ	Z	T2sRD2s	YZ	Z	T2sRE2s	YZ
(t) Progress Notes	Z	T2tRA2t	YZ	Z	T2tRB2t	YZ	Z	T2tRC2t	YZ	Z	T2tRD2t	YZ	Z	T2tRE2t	YZ
(u) O.R. Prep. Sheet	Z	T2uRA2u	YZ	Z	T2uRB2u	YZ	Z	T2uRC2u	YZ	Z	T2uRD2u	YZ			
(w) Infant Hx/Px							Z	T2wRC2w	YZ						
(x) Surg. Check List				Z	T2xRB2x	YZ	Z	T2xRC2x	YZ	Z	T2xRD2x	YZ			
(y) Prof.Consult Req. (in-house)	Z	T2yRA2y	YXZ				Z	T2yRC2y	YXZ	Z	T2yRD2y	YXZ	Z	T2yRE2y	YXZ

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A

Fig. 4-5 (Cont.)

B

(3) DIAGNOSIS FUNCTION

	(A) INTENSIVE CARE (Long Term)			(B) INTENSIVE CARE (Short Term)			(C) INTERMEDIATE CARE (Special)			(D) INTERMEDIATE CARE (General)			(E) SELF CARE		
(a) Radiologist Report	X >	T3aRA3a >	Z				X >	T3aRC3a >	Z	X >	T3aRD3a >	Z	X >	T3aRE3a >	Z
(b) Prothrombin Time	X >	T3bRA3b >	Z	X >	T3bRB3b >	Z	X >	T3bRC3b >	Z	X >	T3bRD3b >	Z	X >	T3bRE3b >	Z
(c) Lab-Chem Results	X >	T3cRA3c >	Z	X >	T3cRB3c >	Z	X >	T3cRC3c >	Z	X >	T3cRD3c >	Z	X >	T3cRE3c >	Z
(d) EKG Report	X >	T3dRA3d >	Z	X >	T3dRB3d >	Z	X >	T3dRC3d >	Z	X >	T3dRD3d >	Z	X >	T3dRE3d >	Z
(e) EEG Report	X >	T3eRA3e >	Z				X >	T3eRC3e >	Z	X >	T3eRD3e >	Z	X >	T3eRE3e >	Z
(f) X-Ray Results	X >	T3fRA3f >	Z	X >	T3fRB3f >	Z	X >	T3fRC3f >	Z	X >	T3fRD3f >	Z	X >	T3fRE3f >	Z
(g) Path-Non Surg.	X >	T3gRA3g >	Z	X >	T3gRB3g >	Z	X >	T3gRC3g >	Z	X >	T3gRD3g >	Z	X >	T3gRE3g >	Z
(h) Path-Surg.	X >	T3hRA3h >	Z	X >	T3hRB3h >	Z	X >	T3hRC3h >	Z	X >	T3hRD3h >	Z	X >	T3hRE3h >	Z
(k) PKU/Clot Results							X >	T3kRC3k >	Z						

A

Fig. 4-5 (Cont.)

B

(4) TREATMENT FUNCTION

	(A) INTENSIVE CARE (Long Term)			(B) INTENSIVE CARE (Short Term)			(C) INTERMEDIATE CARE (Special)			(D) INTERMEDIATE CARE (General)			(E) SELF CARE		
(a) M.D. Order Sheets	Y	T4aRA4a	Z	Y	T4aRB4a	Z	Y	T4aRC4a	Z	Y	T4aRD4a	Z	Y	T4aRE4a	Z
(b) Emer. Rm. Report				Z	T4bRB4b	YTZ									
(c) Oxygen Request	Z	T4cRA4c	S	Z	T4cRB4c	S	Z	T4cRC4c	S	Z	T4cRD4c	S			
(d) Medication Ticket	Z	T4dRA4d	Z				Z	T4dRC4d	Z	Z	T4dRD4d	Z	Z	T4dRE4d	Z
(e) Nursing Care Plan (K)	Z	T4eRA4e	Z				Z	T4eRC4e	Z	Z	T4eRD4e	Z	Z	T4eRE4e	Z
(f) Transfusion Req. for blood	Z	T4fRA4f	W	Z	T4fRB4f	W	Z	T4fRC4f	W	Z	T4fRD4f	W			
(g) Anesthesia Record				Y	T4gRB4g	ZT									
(h) Physican/Occup. Ther. Record							W	T4hRC4h	Z	W	T4hRD4h	Z	W	T4hRE4h	Z
(i) Medical & Treat. Record	Z	T4iRA4i	Z	Z	T4iRB4i	Z	Z	T4iRC4i	Z	Z	T4iRD4i	Z	Z	T4iRE4i	Z
(j) Meds Added to I/V	Z	T4jRA4j	Z	Z	T4jRB4j	Z	Z	T4jRC4j	Z	Z	T4jRD4j	Z			
(k) I/V Feeding/Infusion Record	Z	T4kRA4k	Z	Z	T4kRB4k	Z	Z	T4kRC4k	Z	Z	T4kRD4k	Z			
(m) Parenteral Fluid Record	Z	T4mRA4m	Z	Z	T4mRB4m	Z	Z	T4mRC4m	Z	Z	T4mRD4m	Z	Z	T4mRE4m	Z
(n) Inhalation Therapy	W	T4nRA4n	Z				W	T4nRC4n	Z	W	T4mRD4m	Z	W	T4mRE4m	Z
(o) Anti Coagulant Chart	Z	T4oRA4o	Z				Z	T4oRC4o	Z	Z	T4oRD4o	Z	Z	T4oRE4o	Z
(p) Allergy Condition	Z	T4pRA4p	Z	Z	T4pRB4p	YZ	Z	T4pRC4p	YZ	Z	T4pRD4p	YZ	Z	T4pRE4p	YZ
(r) Delivery Room Record				Z	T4rRB4r	ZT									
(t) O.R. Record				Z	T4tRB4t	ZT									
(u) ICU/CCC Record	Z	T4uRA4u	ZT												
(w) Newborn Record				Z	T4wRB4w	Z									
(x) Labor Record				Z	T4xRB4x	Z									
(y) Record of Procedure				Y	T4yRB4y	Z									

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A

Fig. 4-5 (Cont.)

B

(5) PATIENT MAINTENANCE FUNCTION

	(A) INTENSIVE CARE (Long Term)			(B) INTENSIVE CARE (Short Term)			(C) INTERMEDIATE CARE (Special)			(D) INTERMEDIATE CARE (General)			(E) SELF CARE		
(a) $P_a$tient Daily Care (K)	Z	T5aRA5a	Z				Z	T5aRC5a	Z	Z	T5aRD5a	Z			
(b) Routine Nursing Notes	Z	T5bRA5b	Z	Z	T5bRB5b	Z	Z	T5bRC5b	Z	Z	T5bRD5b	Z	Z	T5bRE5b	Z
(d) Daily NUrsing Care Report	Z	T5dRA5d	T	Z	T5dRB5d	T	Z	T5dRC5d	T	Z	T5dRD5d	T	Z	T5dRE5d	T
(e) Incident Report	Z	T5eRA5e	YT	Z	T5eRB5e	YT	Z	T5eRC5e	YT	Z	T5eRD5e	YT	Z	T5eRE5e	YT
(f) Chaplain's Report	Z	T5fRA5f	T				Z	T5fRC5f	T	Z	T5fRD5f	T	Z	T5fRE5f	T
(g) Patient Clothing Record	Z	T5gRA5g	ZT				Z	T5gRC5g	ZT	Z	T5gRD5g	ZT			
(h) Patient Valuables Pouch	Z	T5hRA5h	T				Z	T5hRC5h	T	Z	T5hRD5h	T			

A

B

Fig. 4-5 (Cont.)

(5) SUPPLY FUNCTION

	(A) INTENSIVE CARE (Long Term)			(B) INTENSIVE CARE (Short Term)			(C) INTERMEDIATE CARE (Special)			(D) INTERMEDIATE CARE (General)			(E) SELF CARE		
(a) Central Supply Requisition	Z	T6aRA6a	SZ	Z	T6aRB6a	SZ	Z	T6aRC6a	SZ	Z	T6aRD6a	SZ	Z	T6aRE6a	SZ
(b) Ward Nourishment List							Z	T6bRC6b	SZ	Z	T6bRD6b	SZ			
(c) Floor Control Supply Req	Z	T6cRA6c	STZ	Z	T6cRB6c	STZ	Z	T6cRC6c	STZ	Z	T6cRD6c	STZ	Z	T6cRE6c	STZ
(d) Pharmacy Supply Req.	Z	T6dRA6d	SZ				Z	T6dRC6d	SZ	Z	T6dRD6d	SZ	Z	T6dRE6d	SZ
(e) Pharmacy Floor Supply Req.	Z	T6eRA6e	STZ	Z	T6eRB6e	STZ	Z	T6eRC6e	STZ	Z	T6eRD6e	STZ			
(f) Diet Order	Z	T6fRA6f	SZ				Z	T6fRC6f	SZ	Z	T6fRD6f	SZ			
(g) Diet Changes	Z	T6gRA6g	SZ				Z	T6gRC6g	SZ	Z	T6gRD6g	SZ			
(i) Linen Request	Z	T6iRA6i	SZT	Z	T6iRB6i	SZT	Z	T6iRC6i	SZT	Z	T6iRD6i	SZT	Z	T6iRE6i	SZT
(l) General Stores Req.	Z	T61RA61	SZT	Z	T61RB61	SZT	Z	T61RC61	SZT	Z	T61RD61	SZT	Z	T61RE61	SZT
(m) Diet Cards (Menus)							Z	T6mRC6m	Z	Z	T6mRD6m	Z			
(n) Unit Dietary Schedule	S	T6nRA6n	Z				S	T6nRC6n	Z	S	T6nRD6n	Z			
(o) Narcotic/Hypnotic Daily Record	Z	T6oRA6o	TS	Z	T6oRB6o	TS	Z	T6oRC6o	TS	Z	T6oRD6o	TS	Z	T6oRE6o	TS
(p) Daily Antibiotic Report	Z	T6pRA6p	TS	Z	T6pRB6p	TS	Z	T6pRC6p	TS	Z	T6pRD6p	TS	Z	T6pRE6p	TS

A

B

Fig. 4-5 (Cont.)

(7) CONTROL FUNCTION

	(A) INTENSIVE CARE (Long Term)	(B) INTENSIVE CARE (Short Term)	(C) INTERMEDIATE CARE (Special)	(D) INTERMEDIATE CARE (General	(E) SELF CARE
(a) Nursing Assgn. Sheets (Pats)	Z > T7aRA7a > TZ	Z > T7aRB7a > TZ	Z > T7aRC7a > TZ	Z > T7aRD7a > TZ	Z > T7aRE7a > TZ
(b) ICU/CCU Log	Z > T7bRA7b > TY				
(c) Nursing Assgn. (Unit)	T > T7cRA7c > Z	Z > T7cRB7c > Z	Z > T7cRC7c > Z	Z > T7cRD7c > Z	Z > T7cRE7c > Z
(d) Seriously Ill Slip	Z > T7dRA7d > TQ		Z > T7dRC7d > TQ	Z > T7dRD7d > TQ	
(e) Daily Floor Census	Z > T7eRA7e > T		Z > T7eRC7e > T	Z > T7eRD7e > T	Z > T7eRE7e > T
(f) Nursing Unit Report	Z > T7fRA7f > T	Z > T7fRB7f > T	Z > T7fRC7f > T	Z > T7fRD7f > T	Z > T7fRE7f > T
(g) Condition Report	Z > T7gRA7g > TQ		Z > T7gRC7g > TQ	Z > T7gRD7g > TQ	
(h) Emergency Rm. Log		Z > T7hRB7h > T			
(i) Minor Surgery Log		Z > T7iRB7i > TY			
(k) O.R. Log		Z > T7kRB7k > TY			
(l) E.R. Case Report		Z > T7lRB7l > ZT			
(m) Sponge Count		Z > T7mRB7m > ZT			
(n) Delivery Room Log		Z > T7nRB7n > TY			
(o) O.R. Patient Call Slip	Z > T7oRA7o > ZT		Z > T7oRC7o > ZT	Z > T7oRD7o > TZ	
(p) Daily Del.Rm. Check List		Z > T7pRB7p > ZTY			
(r) O.R. Schedule		Z > T7rRB7r > ZYT			
(s) Recovery Room Log		Z > T7sRB7s > ZY			

A

B

Fig. 4-5 (Cont.)

(8) DISPOSITION FUNCTION

	(A) INTENSIVE CARE (Long Term)			(B) INTENSIVE CARE (Short Term)			(C) INTERMEDIATE CARE (Special)			(D) INTERMEDIATE CARE (General)			(E) SELF CARE		
(a) Discharge Summary	Y	T8aRA8a	ZR				Y	T8aRC8a	ZR	Y	T8aRD8a	ZR	Y	T8aRE8a	ZR
(b) Discharge Log	Z	T8bRA8b	TR				Z	T8bRC8b	TR	Z	T8bRD8b	TR	Z	T8bRE8b	TR
(c) Unclaimed Items Report	Z	T8cRA8c	T				Z	T8cRC8c	T	Z	T8cRD8c	T	Z	T8cRE8c	T
(d) Take Home Rx	Z	T8dRA8d	S				Z	T8dRC8d	S	Z	T8dRD8d	S	Z	T8cRE8c	S
(e) Take Home CSR	Z	T8eRA8e	S				Z	T8eRC8e	S	Z	T8eRD8e	S	Z	T8eRE8e	S
(f) Patient Chart-Med Record	Z	T8fRA8f	R				Z	T8fRC8f	R	Z	T8fRD8f	R	Z	T8fRE8f	R
(g) Newborn Release							Z	T8gRC8g	R						

A

Fig. 4-5 (Cont.)

B

Table 4-4

NURSING UNIT SUBFUNCTIONS – TIME REQUIRED AND RATE OF OCCURRENCE

1. NURSING UNIT ADMITTING FUNCTION

Receiving patient from Admitting or from other nursing units, assigning patient to bed, notifying physician (intern, resident, or staff) of patient's arrival, and arranging for Hx and Px

Code	Subfunction (Form)	Time Required Per Occurrence (min)	Rate of Occurrence
1a	Admitting Form	14.2	1/pat. admitted
1b	Admission Worksheet	4.8	1/unit/day
1c	Emergency Admission	10.2	1/emerg. admit
1d	OB Admission	14.8	1/OB admit
1e	Nursery Admission	13.6	1/newborn
1f	Patient Transfer	2.9	1/pat. transfer
1g	Newborn ID and Birth Certificate	29.8	1/newborn
1h	Emergency Admitting Record	8.0	1/emerg. pat.
1k	Birth Notices	15.0	1/birth

Table 4-4 (Cont.)

2. EXAMINATION FUNCTION

Gathering of medical information concerning a patient's illness, progress of the illness, and the effect of treatment, and recording of patient status, such as vital signs, graphic recording, and general appearance and condition

Code	Subfunction (Form)	Time Required Per Occurrence (min)	Rate of Occurrence
2a	Laboratory Requests	3.9	4/pat. admitted
2b	X-Ray Requests	6.2	1.25/pat. admitted
2c	PKU/Clots Requests	4.6	1/newborn
2d	Sleep Chart	22.1	1/unit/day
2e	Input/Output, 8-hr record	11.7	1/4 med.pats./day
2f	Input/Output, 24-hr record	27.3	1/10 med.pats./day
2g	Vital Signs	1.5	3/pat./day
2h	ICU/CCU Record	18.9	1/ICU-CCU pat./day
2k	Recovery Room Record	13.6	1/surg. pat.
2l	Blood Pressure Chart	4.7	1/15 med. pats./day
2m	Medical Records Note	5.2	1/10 pats. admitted
2n	Graphic Sheet — Routine	4.7	1/pat/day
2o	Graphic Sheet — Intensive	4.7	1.25/med. pat./day
2p	Diabetic Record	11.1	1/5 med. pats./day
2r	Bedside Record	1.5	1/pat. admitted
2s	Hx/Px N/S Record	9.5	1/pat. admitted
2t	Progress Notes	2.0	4/pat./day
2u	O.R. Prep Sheet	4.6	1/surg. pat.
2w	Infant Hx/Px	9.5	3/newborn/day
2x	Surgery Check List	5.3	1/surg. Pat.
2y	Professional Consulting Request (In-House)	6.4	0.5/pat. admitted

Table 4-4 (Cont.)

3. DIAGNOSIS FUNCTION

Evaluating patient's condition to determine the existence of an illness, as well as its type, status, and rate of progress. Evaluating recovery progress to specify treatment. Evaluating special tests, studies, data, and consultant reports to confirm or define a particular illness or disease level

Code	Subfunction (Form)	Time Required Per Occurrence (min)	Rate of Occurrence
3a	Radiologist Report	7.5	1/5 med. pats./day
3b	Prothrombin Time	1.5	1/pat. admitted
3c	Results	1.5	4/pat. admitted
3d	EKG Report	4.39	1/5 med. pat.
3e	EEG Report	4.39	1/15 med. pat.
3f	X-Ray Report Results	3.3	1.5/pat. admitted
3g	Pathology Report – Non-Surgical	2.1	1/10 med. pats.
3h	Pathology Report – Surgical	5.2	1/surg. proced.
3k	PKU/Clot Results	1.1	1/newborn

Table 4-4 (Cont.)

4. TREATMENT FUNCTION

Carrying out medical orders or actions whose purpose is to prevent, impede, arrest, reverse, diminish, or eliminate disease or abnormal conditions. Recording patient's reaction to treatment. Preparing patient for off-unit treatment, such as surgery, X-ray therapy, physical therapy, etc.

Code	Subfunction (Form)	Time Required Per Occurrence (min)	Rate of occurrence
4a	M. D. Order Sheet	3.1	1/pat. admitted
4b	Emergency Room Report	2.2	1/Emer. Rm. Pat.
4d	Medication Ticket	9.6	3/pat. admitted
4e	Nursing Care Plan (Kardex)	16.5	1/pat. admitted
4f	Blood Transfusion Request	14.5	1/2 surg. pats.
4g	Anesthesia Record	4.5	1/surg. proced.
4i	Medication and Treatment Record	5.2	3/pat./day
4k	I/V Feeding/Infusion Record	18.6	1/10 pat. admitted
4m	Parenteral Fluid Sheet	5.7	1/unit/day
4o	Anticoagulant Chart	16.2	1/med.unit/day
4r	Delivery Room Record	12.1	1/mat. pat.
4t	O. R. Record	17.3	1/surg. pat.
4u	ICU/CCU Record	17.3	1/ICU-CCU pat.
4x	Labor Record	19.2	1/mat. pat.
4y	Record of Procedure	3.7	1/surg. pat.

Table 4-4 (Cont.)

5. PATIENT MAINTENANCE

Performing nonmedical activities concerned with patient care – such as bed linen change, food distribution, personal hygiene and related needs, and patient handling.

Code	Subfunction (Form)	Time Required Per Occurrence (min)	Rate of Occurrence
5a	Patient Daily Care Routine (Kardex)	3.1	1/pat. admitted
5b	Routine Nursing Notes	2.0	3/pat. /day
5d	Daily Nursing Care Report	83.1	3/unit/day
5e	Incident Report	4.9	0.5/unit/day
5g	Patient Clothing Record	4.5	1/pat. admitted

Table 4-4 (Cont.)

6. SUPPLY FUNCTION

Ordering, receiving, maintaining, and issuing standard and patient-peculiar items, e.g., medications, sterile supply, treatment kits, laundry, solutions, nursing station administrative supplies, diagnostic-treatment supplies, and food.

Code	Subfunction (Form)	Time Required Per Occurrence (min)	Rate of Occurrence
6a	Central Supply Requisitions	5.7	1/pat. admitted
6b	Ward Nourishment List	3.1	1/unit/day
6c	Floor Central Supply Requisition	8.8	2/unit/day
6d	Pharmacy Supply Requisition	5.7	2/pat. admitted
6e	Pharmacy Floor Supply Requisition	24.5	1/unit/day
6f	Diet Order	5.7	1/pat. admitted
6g	Diet Changes	5.7	1/2 pat. admitted
6i	Linen Requisition	9.4	1/unit/day
6l	General Stores Requisition	14.2	1/unit/day
6m	Diet Cards (Menus)	1.0	1/day/pat.
6n	Unit Dietary Schedule	8.8	3/unit/day
6o	Narcotic/Hypnotic Daily Record	11.3	3/unit/day
6p	Daily Antibiotic Report	11.3	1/unit/day

Table 4-4 (Cont.)

7. CONTROL FUNCTION

Directing and coordinating unit activities, including planning and actions necessary to effect examination, treatment, or maintenance activities ordered by the physician so they will be accomplished at the proper time with the proper supporting supplies and equipment on-hand. Ensuring accomplishment of those routine or special patient-care tasks, related to examination, treatment, and maintenance, that are performed without direct physician orders. Providing general and specific information concerning the unit, its patients, and the hospital for the general public. Collecting, retaining, and disseminating unit status information in terms of personnel, facilities, and equipment.

Code	Subfunction (Form)	Time Required Per Occurrence (min)	Rate of Occurrence
7a	Nursing Assignment Sheet (Pats.)	20.0	1/unit/day
7b	ICU/CCU Log	7.7	1/unit/day
7c	Nursing Assignment (Unit)	14.0	1/unit/day
7d	Seriously Ill Slip	4.7	1.25/IC pats./day
7e	Daily Floor Census	14.0	3/unit/day
7f	Nursing Unit Report	6.0	1/unit/day
7g	Condition Report	11.2	3/unit/day
7h	Emergency Room Log	7.7	1/unit/day
7i	Minor Surgery Log	7.2	3/day
7k	O.R. Log	7.7	1/shift/day
7l	Emergency Room Case Report	7.6	1/ER pat.
7m	Sponge Count	6.3	1/surg. proced.
7n	Delivery Room Log	7.7	3/unit/day
7o	O.R. Patient Call Slip	21.0	1/surg. unit/day
7r	O.R. Schedule	34.1	1/surg. unit/day
7s	Recovery Room Log	7.7	3/R.R./day

Table 4-4 (Cont.)

8. DISPOSITION FUNCTION

Executing the final movement or disposition of patients and related material as prescribed in medical orders or in administrative policies and procedures

Code	Subfunction (Form)	Time Required Per Occurrence (min)	Rate of Occurrence
8a	Discharge Summary	6.5	1/pat.
8b	Discharge Log	4.4	1/pat./unit
8c	Unclaimed Items Report	6.2	1/unit/day
8d	Take Home Rx	7.1	0.25/pat.
8e	Take Home CSR	7.1	0.1/pat.
8f	Patient Chart (To Medical Record)	13.2	1/pat.
8g	Newborn Release	7.0	1/newborn

No. of Beds ______

No. of Bassinets ______

Admissions per Year ______

Average Daily Census ______

Births ______

Total Nursing Attendance ______

Admin./Super. ______

Central Supply ______

Nursing Units ______

Other ______

Nursing Unit Description

Nursing Unit ID No.	Type of Service	Beds on Unit	Av. Daily Census	Patient Flow		Attendance		
				Admit.	Trans-fer	RN	LVN	C

Hospital Facilities and Services

Facility or Service	Procedures per year	Requesting Form	Reporting Form

Fig. 4-6 Hospital Data Sheets

Section 5
HOSPITAL COMPUTER SYSTEMS SURVEY

5.1 FOCUS

As an adjunct to hospital communications, computer systems will rapidly become controversial unless a high degree of user acceptance is achieved. This is particularly true of services and functions provided at the communications center of patient care units. In the typical hospital, for example, the transcription of orders is a tedious task which could be simplified with or without computer assistance. This aspect of the system design is often overlooked.

It was clear during this survey that computer applications to patient-care data continue to suffer from lack of insight into or consensus on an effective and appropriate communication system. Although the use of remote terminals throughout the hospital was central to the preoccupation of the designers, little had yet been accomplished in terms of providing practical and meaningful services related to patient-care data. In the relative absence of interest and concern on the part of health care providers, service bureaus and computer manufacturers were offering software based upon their concepts of simply automating the existing manual system. Varieties of input/output devices were in use and time sharing was increasingly viewed as a cost-saving factor.

In general, computer services appeared to be a mixed blessing, for neither accuracy nor time savings could be demonstrated in any one system. The phase of user involvement in systems design seemed to be just starting.

The survey of computer systems at hospital nursing stations included a review of the state-of-the-art in both teleprocessing and batch processing of patient-care information at nursing stations in six hospitals (see Tables 5-1 and 5-2). A more detailed summary of the commitments of these hospitals may be found in Appendix E.

Table 5-1

HOSPITAL COMPUTER SETTING

Item	Hospital Code					
	A	B	C	D	E	F
Computer Location						
• Within hospital	X		X	X	X	
• Outside hospital		X				X
Computer Personnel						
• Full time	8	16	12		1	15
• Part time			71			
Computer System Status						
• Shared						X
• Rented		X	X	X		
• Owned	X					
• On R&D project		X	X	X	X	X

Table 5-2

HOSPITAL COMPUTER EQUIPMENT

Item	Hospital Code					
	A	B	C	D	E	F
Computer Model	IBM 1710 1620	IBM 1440 (To be replaced by shared UNIVAC 494)	IBM(a) 360/40 360/40	Medelco T*H*I*S (SCAM)	CDC 160A	IBM 360/50 (shared)
Core Storage (characters x1000)	60	16	128 (+data cells)	(b)	16	256
Random Access Storage (1 million characters)	8		45			45
Random Access Devices	4		6			6
Magnetic Tape Units			1	1		2
Communication Links:						
Cable	X	X	X	X	X	X
Telephone		X	X			X
I/O Terminals at Nursing Stations	IBM 1793 KB; 1053 1092 Printer	BKR 204 Video terminal Off-line optical scanner printer	IBM 1092 1093 Exper. IBM CRT 2260 Printer 2740	Card readers + teletype model 33 TTY	CDC Digi-Scribe CRT Printer	IBM 2260 Scope CRT Printer 2740

(a) Two systems.
(b) Solid-state central processor unit.

Historically, computer systems in the hospital environment have evolved with the following goals:

- Expediting the flow of information between the patient and the providers of care
- Providing a more efficient administrative and cost accounting system

Differences in the approaches to these broad problems varied in several ways. Some started with a clearly stated design and methodology. Others conducted a work sampling, then modified information handling practices at nursing stations and stations and elsewhere, and proceeded to introduce teleprocessing or batch processing on a trial basis. In general, remnants of a manual system were found to be needed in order to protect the patient-care data both in terms of accuracy and in terms of confidentiality.

Most of the projects received additional monies not provided for in their annual budgets. The principal source of funding has been the Federal Government (Department of Health, Education, and Welfare), although some hospitals have been supported by computer manufacturers and interested philanthropical groups.

In this report, specific attention is given to input/output devices in use at nursing stations and interfaces between the printouts and/or displays being obtained, the patient's chart and other information processing requirements, impact of the system on the nursing care function, and training programs established in relation to the use of the computer.

5.2 SUMMARY OF HOSPITAL COMPUTER SYSTEMS SURVEY

Two of the hospitals visited were using keyboard/printer devices. One had "keymats" specifically scored and designed for requesting and reporting selected hospital services; the other employed a "message-coded keyboard" which essentially served the same purpose. Both of these hospitals had the terminals in use for providing data on admissions, transfers, discharges, bed vacancies, and diet listings, as well as a listing of patients according to type of service and physician.

One of the hospitals received an on-line printout of the admitting laboratory work performed by an autoanalyzer. The report was provided on gummed-back paper at the nursing station and subsequently affixed to the laboratory sheet. All other laboratory work was manually transcribed from the worksheet by the laboratory technicians who made rounds to the nursing stations at periodic intervals for this purpose. Most of the printout material found at nursing stations in this survey was either a worksheet, a schedule, or other temporary document. These were to be discarded either daily, weekly, or, in some hospitals, every four hours. They provided the users with accurate, concise, and easily read information needed for use in a few functions which are part of the total patient-care requirement.

Four of the hospitals visited were introducing cathode ray tube (CRT) terminals for input/output use in a variety of experimental modules. One hospital used a small CRT to provide a nursing graph of patient behaviors. At this institution, the computer was programmed to sort and process data originating from source documents called Automated Nursing Notes. It was possible to retrieve a display based on a statistical analysis of the behaviors observed over an extended time period, usually seven days.

Another hospital was working on the problem-oriented patient chart. Here the major focus was upon the development of a chronological reporting scheme based upon tracking problems found by both physicians and nurses at the time of the patient's admission to the hospital, and thereafter during the period of hospitalization. Each problem was given a number and referred to by a name and number when reported on subsequent days. General problems such as pain were outlined on the displays in terms of location, severity, etc. Thus, the cathode ray tube was providing the user a wide variety of descriptive terminology which would serve to compose a significant message about a given patient.

Another institution had a cathode ray tube terminal at the nursing station for the purpose of providing the users a review of orders and the capability of entering vital signs. Calculations of fluid balance could be performed and a recommended daily input retrieved through specific programs.

The last of the institutions visited was experimenting with a cathode ray tube and was transmitting data to the patient's record based upon the administration of medications. Here the attention of the system designers and the users was directed toward accuracy of input. Retrieval of displays was in process of assessment by a team of users who were specifically concerned with the content of the message (i.e., name of drug, dose, route, frequency, and warnings related to maximum daily dosages as well as reminders for renewals).

Input devices themselves were viewed for the most part as limited by technical features such as coding necessitated for access, ribbons on keyboards needing frequent changing, and delays in obtaining certain kinds of feedback such as bed vacancy corrections.

All of the systems using input/output devices were experiencing problems that held significant implications for those involved in developing and implementing future systems. The simplest input was found to be through the edge-punched card which was entered at the nursing station into a central processor. A rather minimal problem was associated with this system in that a "wait" light flashed if a series of cards were being entered too rapidly of if another unit was busy at the time an order was being processed. These cards served as a much needed link between both nursing and physicians and other hospital departments. There was a high degree of user acceptance of this total hospital information system, the only one known to provide such extensive service through teleprocessing.

Batch processing of the Automated Nursing Notes was the only off-line system visited which was initiated at the nursing station. Since this provided the basis for the teleprocessing of the nursing graph, the mark-sense form was performing a reliable service as an input device.

Printing devices, providing on-line typed copies on various sizes of paper, were in use in all but one of the institutions visited. Although originally designed for business or industrial environments, they had been modified for use in hospitals. In general, soundproofing was the chief factor needing attention, although modification of the size of the output (i.e., medication cards vis-a-vis schedules or other listing) was also undergoing considerable experimentation. Off-line batch processing through optical scanning of reports involved delays of 24 hours between the data input and the availability of the hard copy printout.

Most of the institutions visited had begun to reevaluate the present system of personnel allocation to the information handling requirement. Those having input/output devices linked to the computer had, without exception, employed nonnursing personnel to operate the terminals in addition to other clerical duties. This was true of several other computer-assisted hospital systems which, though not actually visited, were described over the telephone.

On-line nursing station information processing requirements necessitated the employment of nonnursing personnel to maintain constant surveillance of the equipment. Many application programs in either operational or development mode were planned to provide on-line responses to queries, and cathode ray tube displays were entering the field (see Table 5-3).

Modular components were found to be widely used. User representatives and programmers were beginning to work on specific segments of data to define and test parameters of selected subsystems. The interrelationships among these various modules and their subsequent bearing upon the hospital operation were ultimately to be tested in all cases. Some institutions were more specific than others in stating their purposes and rationale for selecting a given module. It was not always clear why certain decisions had been made to use a given approach. Although all were prepared to describe the flow of data through the use of remote terminals, remnants of the manual system were retained and were often redundant.

Table 5-3

SUMMARY OF APPLICATIONS[a]

Application	On-Line	Batch	Hard Copy	Display	In Dev.	Operating
Vital Signs	1-2-6	1-2-6	1-2-6	2-6	1-2-6	
Fluid Balance	1-2-6		1-2-6	2-6	1-2	6
Treatments	1-2-6		1-2-6	2-6	2-6	
Unit Clinical Tests	1-2-6		1-2-6		1-2-6	
Shift Summary	1-2-6		1-2-6	2-6	1-2-6	
Patient-Care Plan	2-6		2-6	2	2	6
Laboratory Test Orders	1-4-6		1-4-6	2	2	1-4-6
Medication Orders	1-3-4-6		2		1-3-4-6	2
Patient-Care Report	2-3	3	2-3	2-3	1-2-3	2-3-4
Laboratory Test Report	1[b]		1			1
Medication Report	6		6	6	6	
Diet Order	1-4		1-4			
Patient List	1-6		1-6			6
Patient List by Doctor	2		2	2	2	2
Patient List With Diagnosis	1-4		1-4			1-4
Diet List	1-4		1-4			
Admission Notice	1-4-5		1-5			1-4-5
Bed Vacancy Notice	6		6			6
Housekeeping Request	5		5			5

[a] Legend:

1 = Hospital A
2 = Hospital E
3 = Hospital B
4 = Hospital C
5 = Hospital D
6 = Hospital F

[b] Admission only.

In 1968, the items from a patient's record which were being transformed either in whole or in part by computer application were:

- Admission data
  - Name
  - Age
  - Sex
  - Race
  - Diagnosis
  - Service
  - Physician
- Initial history (and/or physical examination)
- Observations
  - Vital signs
  - Fluid balance
  - Medication administration
  - Signs, symptons, complaints
  - Patient-care summaries
- Activity regimens or care plans including therapeutic intervention by physiotherapists, nurses, occupational therapists
- Laboratory requests, reports, schedules (specimen pickup lists)
- Discharge summaries

Care assistance was viewed by some as a potential product of two computer systems. The problem-oriented patient chart and the automated nursing notes represented the effect of recognition of this computer potential by user populations. They appeared to be the most sophisticated conceptual approaches to the care function. In another system project, activity schedules for individual patients were the result of viewing the computer as a tool for comprehensive health care delivery within a hospital.

Entering data into an on-line nursing station terminal eliminated for the most part the intermediate steps of keypunching and clerical transcription. In one project, query sets required that terminal operators respond to a separate group of questions for each data type. In another, the terminal was activated by a simple code and the displays did not depend upon this query technique for functionally activating a message.

In two hospital systems, the data could be processed by statistical formulas (sometimes referred to as advice rules):

- Calculations of fluid and electrolyte needs are established according to specific urinary output. Gastrointestinal losses, and other fluid loss, are determined, with a report indicating amount of water and electrolytes required by the patient for a 24-hour period. In addition, the number of bottles, composition of standard solutions of fluids to be used, and rate of administration in milliliters per hour and drops per minute are prescribed.
- Conversions of weights from pounds to kilograms for use in calculating children's dosages can be activated by a simple input of body weight.

Reports on the care function were planned for several systems. In general, these were to be available every eight hours, although one planned to have a monthly summary as well. Formats were slightly different, but essentially represented an attempt to build on the progress of the patient during hospitalization. Users of the automated nursing notes reported that as a result of the project the nurses were more astute in observing patient behavior. In addition, they felt that having the tool improves the communications between team members as they carry out the treatment program.

There was a variation in the perceived requirement for on-going education and training for users. Some of the personnel interviewed had attended courses offered by computer manufacturers. Only one institution was conducting a short course for nursing service personnel on a regular basis.

In most instances, a brief orientation was provided for the personnel assigned to the projects. This was unfortunate in that major problems associated with implementation were identified as "incorrect manner of entry by users" and "incorrect data."

The state-of-the-art in 1968 for computer usage in hospital nursing stations in the United States appeared to fall into two categories.

- Administration or nonnursing programs
- Patient-care problems, which are dealt with by varieties of care providers and may be teleprocessed in real time on request, or batch processed

For the long-term patient an off-line batch process using a mark-sense form was seen to provide a satisfactory method of data gathering not only for chronological use but also for summarization and analysis of data. On the other hand, in cases of acute illness or injury, computer applications may range from the analog to digital conversion of parameters (such as the electrocardiogram) to displays of terminology related to the entire patient-care spectrum. Recommendations for changes in systems were elicited from nurse users and are summarized in Table 5-4. Details of visits to each hospital may be found in Appendix E.

5.3 SUMMARY OF USER OPINIONS AND RECOMMENDATIONS

Each selected hospital presented a different picture of computer usage and development. Of the personnel interviewed, there were wide variations in positions, ages and professional experience. Similarly, there was a marked difference in their preparation for using the computer system. The data collected are depicted in Tables 5-5, 5-6, 5-7, and 5-8.

The involvement of nursing personnel in system operations was also somewhat different among hospitals. In general, the equipment maintenance associated with terminal handling was referred to the EDP departments. Down time was not viewed as a problem, although scheduled down time occurred daily in the five hospitals not using a solid-state computer. None of the systems were operating on a 24-hour basis.

Nurse systems requirements were incorporated in a variety of ways, chiefly through head nurses and supervisors, but also through committees.

Table 5-4

RECOMMENDATIONS

Item	Hospital Code					
	A	B	C	D	E	F
Improve Maintenance	X					
High Speed Printer	X		X	X		
Clerks as Terminal Operators Around-the-Clock	X					
Total On-Line System	X	X			X	
Staffing Schedules by Computer	X				X	
All Nurse Inputs via Computer Terminal	X	X			X	
Committees of Users Development Requirements		X			X	X
More Terminals for Nurses and Physicians on Each Unit	X	X			X	
On-Going Revision Involving Nurses	X	X	X		X	X
EDP Training Program and Education Use of Terminals	X	X	X		X	
Developments of Patient Profile q8H q24H	X	X			X	
Use of Dictaphone for Communicating Observations, Reports				X		
Experimentation on more extensive use of computer directly to physicians,offices (ICU, CCU, esp)				X		

Table 5-5

NURSING PERSONNEL PROVIDING OPINIONS*

Hospital Surveyed	Nursing Personnel
Hospital A	12
Hospital B	13
Hospital C	4
Hospital D	7
Hospital E	8
Hospital F	4
Total	48

*Of the 48 nursing personnel interviewed concerning the use of the computer system, their status ranged from clerk to nursing director. Their ages ranged from 20 to 36 years. Twenty-five of the 48 persons who participated reported that they were married. All were full-time employees. Three were male nurses. Their assignments included all patient-care categories. Just as variations in years of hospital experience were evident (6 months to 30 years) so the professional preparation of the individuals interviewed was also quite different; however, there was a predominance of diploma graduates in the survey.

Table 5-6

TRAINING PROGRAM FOR COMPUTER PROJECT [a]

Item	Hospital Code					
	A	B	C	D	E	F
1. Training Program						
Yes			X			
No	X	X		X	X	X
2. Training Guide						
Yes			X	X		X
No	X	X			X	
3. User Guide at Nursing Station						
Yes	X		X	X		X
No		X			X	
4. Pre-Test for Project						
Yes						
No	X	X	X	X	X	X
5. Post-Test for Project						
Yes						
No	X	X	X	X	X	X
6. Evaluation of Training Program						
Yes			X			
No	X	X		X	X	X

[a] Although only one of the hospitals in the survey reported that it had an on-going training program (Hospital C), some of the nursing personnel in the other hospitals included in the sample reported that they had received some form of specialized training for the computer project. None indicated the need to learn programming, but felt that some understanding of systems analysis and coding was helpful. Inconsistencies in responses to questions related to training within and among hospitals may be further examined by referring to the unpublished documentation of this report. (See footnote, p. 1-1.)

Table 5-7

IMPACT OF COMPUTER SYSTEM ON SPECIFIC DUTIES AND JOB SATISFACTION[a]

Hospitals Surveyed	Impact on Specific Duties					Impact on Job Satisfaction				
	1[b]	2	3	4	5	1	2	3	4	5
Hospital A	X	X	X	X	X		X	X	X	
Hospital B	X	X	X	X		X	X	X		
Hospital C	X	X	X		X			X	X	
Hospital D	X	X	X			X	X	X		
Hospital E	X	X	X	X		X	X	X	X	
Hospital F	X	X	X	X			X	X		

[a] A review of responses to questions relative to the impact of the hospital computer system on specific duties and job satisfaction suggests that there are inconsistencies in the perception of the systems. This table includes a summary of those responses and reveals the spread of attitudes both within and among the selected institutions.

[b] Legend:

1 = Marked Improvement
2 = Some Improvement
3 = No Change
4 = Some Interference
5 = Marked Interference

Table 5-8

IMPACT OF COMPUTER SYSTEM ON OLD MANUAL SYSTEM[a]

Hospital Surveyed	Yes	No
Hospital A	X	X
Hospital B	X	X
Hospital C	X	X
Hospital D	X	X
Hospital E	X	X
Hospital F	X	X

(a) As depicted here, there was no consensus on the impact of the computer systems in the manual systems in the sample hospitals. In the categories selected, it was evident, if the hospital was working on a specific application program, that the personnel recognized this and indicated their reactions to it. In the case of a hospital which was not working on "Vital Signs," for example there were consistently negative responses.

Assessment of the experiences with the systems indicates no reduction of paper work, but some changes in staffing (clerks for terminal operation and supervisors eliminated in one).

Override capability as a means of maintaining continuing communication through the system was not consistently defined by the users interviewed. Some were clearly utilizing the technique of responding to queries by verifying the accuracy of information, while in another system an override button served to release data sought. In each institution, the term "override" was discussed by the investigator with various staff members in relation to what such a service could mean since in three cases the override was "in development" in the system, in one the override was contracted by EDP, and in another override represented "correction."

The systems had provided assistance to the nursing station function in terms of stimulation to achieve:

- More complete information on the patients
- More accurate and relevant patient data
- Better organization of charting through the use of guidelines either on mark-sense forms or cathode ray tubes
- Increased awareness of the patient's progress through the potential of on-line reporting
- Revision of staffing patterns through elimination of redundant schedules and provision of updated assignment sheets
- More useful worksheets for use by individual nursing staff members
- Elimination of manually prepared requisitions

The systems had interfered with work at some nursing stations due to the problems associated with initiating a new method, the need to instruct all personnel on new tasks expected of them, lack of coordination in terms of a complete information system, and the varying subjective perceptions of employee/employer relationships.

The impact of the computer systems was not consistent in terms of either improving or interfering with job satisfaction. Tables 5-7 and 5-8 depict the variations found. It should be noticed, too, that some of the hospitals visited had not conducted appraisals of their systems; thus, a true evaluation of system effectiveness could not be measured.

5.3.1 Hospital A

Nurses interviewed indicated that much of the manual system remains in use at this hospital. There were feelings expressed that the system could do more for them. They presently duplicate work related to the programs available through the terminals. The majority expressed positive opinions regarding the clerk manager, an innovation in the nursing service, and an interface between patient care and physicians' orders.

One of the significant factors in the revision of the system was that q hour printouts of formulas due was not useful; after a trial period of about three months, a change was made to a q4 hourly printout. The opinions that the operation of the terminal took nurses away from patient care was consistently expressed by all nursing service personnel who were interviewed.

5.3.2 Hospital B

In general, nurses stated that the system of Automated Nursing Notes (off-line) and Nursing Graphs (on-line displays) were of real value to them. The comments elicited were as follows:

- Charting is more readable.
- Charting is more organized.
- Increased awareness of specific aspects of patient behavior has resulted.
- More accurate reports are provided.
- There has been a significant reduction in time spent charting.
- The form provided excellent guidelines for charting.
- The physician receives a more meaningful description of behavior.
- Nurses have become more aware of the progress of the patients through the Automated Nursing Notes and the Nursing Graphs.
- Nurses are functioning with a more patient-centered approach.

One nurse felt that more time was needed to chart, using the mark-sense automated note. In general, the attitude was that they wanted more on-line communications, with more cathode ray terminals on more units throughout the hospital, operating on a 24-hour basis.

Once again the concept of readiness for change was brought into the discussion with the comment that this should be part of everyone's attitude.

5.3.3 Hospital C

The nurses expressed the feeling that the variety of worksheets provided are easier to read and more accurate. They stated that they were gradually becoming more involved in patient care.

Attitudes expressed by the nurses were that cooperation, thoughtfulness, creativity, and a feeling of accomplishment and learning had been an outcome of the approach taken.

There was a comment expressed that although a course in data processing is provided for nursing, more time should be provided to allow for increased participation by nurses in the system development. It was evident that the project is too new to be evaluated, particularly since they have not had sufficient opportunity to use many aspects of it.

5.3.4 Hospital D

The opinions of the nurses using the Medelco system reflect success. They report the following:

- Minimal savings have resulted in relation to verification of orders and requisitioning (transactions).
- Errors are more promptly noted since the printouts of transactions occur in less than 25 seconds.

One member of the nursing staff indicated that updating of the available new items (on cards) should be more prompt. One suggested that a more comprehensive view of nursing could be achieved through this card system. Clerks were quite capably using the system, as were some of the nurses. One of the most interesting comments was made by a nurse who had resisted the introduction of the system and who after several months of using it, found that "I wouldn't know how to get along without it."

5.3.5 Hospital E

The nurses surveyed at Hospital E appeared to have responded to the opportunity to work with the physicians and to revise the manual system. This effort at using computer capabilities in a hospital started with a research approach. The nurses have since adopted the attitude that research implies change and are enthusiastically reorganizing the patient-care record system.

One individual indicated that charting through the use of sequential displays will result in more complete and accurate reports. Although much of the work is developmental at Hospital E, the nurses were pleased with the Digiscribe ability to sort data and to send messages. There was general consensus that they would ultimately be returning to the bedside and leave clerical tasks to be performed by a unit clerk at the nursing station. Minimal involvement of the in-service educator had occurred at this hospital. Finally, the stimulation to consider the problem-oriented patient chart has resulted in the nurses' application of criteria or logical thinking. The research and educational orientation of the project suggests that the impact of this system will be far reaching.

5.3.6 Hospital F

The evaluation of a system was seen to "progress in and out of helpfulness" in the Hospital F setting. With the focus on spinal cord injury documentation, nurses had contributed many helpful suggestions. A computer printout for each patient was inserted in the Kardex and gave a ready review of all of the care requirement on a time-scheduled basis. Nurses expressed the view that joint participation of pharmacy, nursing, physiotherapists, occupational therapists, and radiology personnel would be desirable. The present method of having external coordination between EDP and nursing was viewed as necessary during the initial developmental phase of the project.

5.4 INPUT/OUTPUT DEVICES

Since the survey of hospital computer systems was limited to a selection of six hospitals, the terminals surveyed do not reflect all currently available terminals feasible for applications at the nursing station.

For completeness, a survey of state-of-the-art terminal applications is presented in Tables 5-9 and 5-10. These tables do not attempt to relate the terminals to any particular system. Rather, as is shown, the charts reflect suggested relationships bearing upon human factors and the processing of patient-care data using computer assistance.

The selection of terminals for a specific site involves evaluation of the user's skills, information commerce, regulatory constraints, station time utilization, and cost-effectiveness of the device. In general, the simplest skill-level classification is between those with and those without typing skills. A large number of clerical personnel for hospitals are hired on the basis of typing skills whereas, for hospital professionals, typing skills are of no consequence.

Information commerce must be analyzed in terms of word volume, vocabulary, and other characteristics such as signal or image data. The information commerce must be carefully specified in terms of rates per hour and per minute as a means of analyzing queueing problems (i.e., the number of individuals who are likely to be lined up waiting for terminal service at a given time) and in order to determine the maximum communication and processing rate required of the computer. The information commerce should further be categorized in terms of priority so that economies may be achieved during the design process by suggesting that some information be set aside in preference to priority data, thus leveling the peaks of information flow.

Terminals must further satisfy some significant real and implied regulatory constraints. Access and utilization by unauthorized individuals must be limited or

Table 5-9

INPUT/OUTPUT TERMINALS – COMMENTS

Input/Output Terminals	User					Comments
	MD	RN	LVN	Ward Clerk	Tech-nician	
Video/Light Pen/Keyboard	P	P	P	P	P	Minimum training for information input and review; minimum papers
Video/Keyboard		T	T	P	T	Requires typist training; minimum paper
Message-Coded Keyboard		T	T	P	P	Requires format training; requires output response device
Identity Card Reader (attached to input devices above)	P	P	P	P	P	Reduces transcription and errors
Typewriter Input/Output Response		T	T	P	T	Requires typist; noise critical
Mark Sense Page (Page reader – batch)	P	P	P	P	P	Form design and form selection critical (paper system)
Mark Sense Card (Card reader – small batch)	P	P	P	P	P	Form design and form selection critical (paper system)
Edge-punched Card/ Addressograph/Multilith Imprint		P	P	P	P	Form selection and manual manipulations
Printer – Report		T	T	P	P	Noise critical

Note: P = Primary
T = With Training

Table 5-10

INPUT/OUTPUT TERMINALS – ON-LINE INFORMATION

Terminal Application: Video/Light Pen/KB (Cathode Ray Tube)	Video/Keyboard (CRT)	Key Console Message-Coded Keyboard	Mark – Sense Page (Page Reader – Batch)	Mark – Sense Card (Card Reader – Small Batch)	Typewriter Input/Output	Identity Card Reader Attached to Input Devices	Printer	On-Line Terminal Information	Information Source: MD	RN	LVN	Ward Clerk	Technician
								Inputs					
								Measurements					
P	P	P	P		P	P		Orders	P				
P	P	P	P		P	P		Performance		P			
								Treatment					
P	P		P		P	P		Orders	P				
P	P		P		P	P		Performance		P			
P	P		P	P	P	P		Progress Notes		P			
P	P	P	P	P	P	P		Laboratory Test Orders	P				
P	P	P/T	P/T	P/T	P	P		X-Ray Orders	P				
P	P	P	P	P	P	P		Diet Orders	P				
P	P	P	P	P	P	P		Ambulatory Status					
								Supply Orders					
P	P	P	P	P	P	P		Special Treatment		P			
P	P	P	P	P	P	P		General Stores			P	P	
P	P				P	P		Calculations (Intake, Etc.)		P			
P	P	P	P	P	P	P		Housekeeping			P	P	
P	P	P	P	P	P	P		Census and Bed Vacancy			P	P	
								Outputs					
P	P				P		P	Measurements (Vital Signs, Etc.)					
P	P				P		P	Treatments (Completion Notice)					
P	P				P		P	Progress Notes					
P	P				P		P	Laboratory Test Results					P
P	P				P		P	X-Ray Reports	P				
P	P				P		P	Nursing Care Plan					
P	P				P		P	Bed Assignment Notice					
P	P				P		P	Medication List					
P	P				P		P	Shift Summary					

Note: P = Primary
T = With training

prevented. Certain reports must be carefully formatted, some on specific forms such as Federal Narcotics forms, and means must be provided to validate the entries. In addition to having limited access to the system, means must be provided to positively identify the author of any transaction.

The information must further be analyzed in terms of timeliness of response. For example, the routine radiological examinations scheduled on one day will probably not be done until the next; however, it may represent a significant time savings for the physician or patient to have the information on the result available as soon as it is generated. This constitutes an output load on the station and should be considered along with the input load in the analysis of station time utilization.

Finally, system cost-effectiveness must be considered. The selection of terminals has a profound effect on information processing methods, so that time savings of revised or supplanted processes must be considered in addition to the times involved in direct dialogue with equipment in the determination of overall cost-effectiveness. Choice of an input/output terminal at a given worksite determines the scope of the information that can pass that point; this too has extensive implications in potential costs and benefits.

5.5 RECOMMENDATIONS FOR FURTHER STUDY

Examination of the hospital communication system suggests that at least the following areas should be explored:

- Analysis of content of telephone messages
- Experimentation with predictability of nursing observations as a guide for preparation of staff assignments
- An investigation of the relationships between the admission, transfer, and disposition functions superimposed upon the examination, diagnosis, treatment, and maintenance functions as these occur at the patient care unit (communication station) with a view to differentiating these from the supply and control function

Section 6
COMPARISON OF COMPUTER SYSTEMS WITH MODEL

In this section, a gross type comparison is made between the model developed, as described in Section 4, and the computer systems surveyed, which are reported in Section 5. The model represents operational logic covering functions which are performed by a hospital communication system. As previously stated, the model is rather broad since it is based upon the study of hospitals ranging in size from 30 to 1,100 beds. The selected hospitals in the computer systems survey ranged in size from 58 to 3,000 beds; however, none of the systems surveyed was installed throughout the hospital.

The model components were compared with the applications programs, and the system design identified in the computer systems surveyed. The analysis was not sufficiently detailed to establish that equivalent functions had, in fact, been developed in the computer systems surveyed; however, similarities were evident. Table 6-1 is a matrix that shows, for the hospitals surveyed, the types of information presently processed by computer at those hospitals relative to the major nursing station functions postulated by the LMSC model.

In Fig. 6-1,* all the identified functions of the six hospitals surveyed are superimposed upon the model. Each such function is shown by means of a heavy circle drawn around the components on the model. A gross comparison is thus achieved. This technique suggests the means for comparing almost any system under consideration with the now known total requirements identified by the model.

It is considered significant to this report to point out that incompatibilities between an operational construct of a manual system and the designs for computer systems may be anticipated. This survey is a case in point.

*See p. 6-5.

Table 6-1

FUNCTIONS OF NURSING STATION INFORMATION SYSTEM MODEL UNDER DEVELOPMENT FOR SIX COMPUTER-ASSISTED HOSPITAL SYSTEMS (1968)

Hospital	Model-Postulated Functions							
	Nursing Unit Admitting	Examination	Diagnosis	Treatment	Patient Maintenance	Supply	Control	Disposition
Hospital A	Admitting	Laboratory	Lab/chem test results	Medication ticket			Nursing assignments Daily census	Discharge log
Hospital B					Routine nursing notes			
Hospital C	Admitting	Laboratory	Lab/chem test results	Medication ticket Medications added to intravenous		Unit dietary schedule Ward nourishment list Pharmacy supply Diet order		Discharge log
Hospital D	Admitting	Laboratory				Central supply requisition		Discharge log
Hospital E						Pharmacy supply		
Hospital F		Laboratory I/O, 8 hr I/O, 24 hr Vital signs Blood pressure Graphic sheet	Lab/chem test results	Nursing care plan	Daily nursing care report			Discharge summary

By definition, a function is a broad general term which pertains to characteristics and actions. Thus, the service provided to assist in carrying out a function may be regarded as the general purpose of the communication system. If there is general agreement on the design of the hospital communication system, there could be a minimal incompatibility between the function performed to support manual and computer systems.

In view of this, interface areas require definition to determine distinction between discrete data sets for processing and for retention in the record of each hospitalized patient. Again, the type of data required for documentation of hospital services should be identified and utilized consistently so that communications between hospitals and community agencies could be strengthened. In addition, the numerous worksheets cited as products of some computer systems could be scrutinized for utility when the cost of producing them is considered.

(1) NURSING UNIT ADMISSION FUNCTION

	(A) INTENSIVE CARE (Long Term)			(B) INTENSIVE CARE (Short Term)			(C) INTERMEDIATE CARE (Special)			(D) INTERMEDIATE CARE (General)			(E) SELF CARE		
(a) Admitting Form	V	T1aRA1a	YVZ				V	T1aRC1a	VYZ	V	T1aRD1a	VYZ	V	T1aRE1a	VYZ
(b) Admission Worksheet	Z	T1bRA1b	VT				Z	T1bRC1b	VT	Z	T1bRD1b	VT	Z	T1bRE1b	VT
(c) Emergency Admission	Z	T1cRA1c	VY	Z	T1cRB1c	VY	Z	T1cRC1c	VY	Z	T1cRD1c	VY	Z	T1cRE1c	VY
(d) O.B. Admission				V	T1dRD1d	VY	V	T1dRC1d	VY						
(e) Nursery Admission				Z	T1eRB1e	VT									
(f) Patient Transfer	Z	T1fRA1f	VY				Z	T1fRC1f	VY	Z	T1fRD1f	VY	Z	T1fRE1f	VY
(g) Newborn I.D. &Birth Cert				Z	T1gRB1g	VTQ									
(h) Emergency Admit Record				Z	T1hRB1h	YZ	Z	T1hRC1h	YZ	Z	T1hRD1h	VZ			

A

B

Fig. 6-1 Comparison of Model With Systems Surveyed

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(2) EXAMINATION FUNCTION

	(A) INTENSIVE CARE (Long Term)			(B) INTENSIVE CARE (Short Term)			(C) INTERMEDIATE CARE (Special)			(D) INTERMEDIATE CARE (General)			(E) SELF CARE		
(a) Lab. Requests	Z	T2aRA2a	XT	Z	T2aRB2a	XT	Z	T2aRC2a	XT	Z	T2aRD2a	XT	Z	T2aRE2a	XT
(b) X-Ray Requests	Z	T2bRA2b	XT				Z	T2bRC2b	XT	Z	T2bRD2b	XT	Z	T2bRE2b	XT
(c) PKU/Clots Request							Z	T2cRC2c	XT						
(d) Sleep Chart	Z	T2dRA2d	YZ				Z	T2dRC2d	YZ	Z	T2dRD2d	YZ			
(e) I/O - 8 Hrs.	Z	T2eRA2e	YZ				Z	T2cRC2c	YZ	Z	T2cRD2c	YZ			
(f) I/O - 24 Hrs.	Z	T2fRA2f	YZ				Z	T2fRC2f	YZ	Z	T2fRD2f	YZ			
(g) Vital Signs	Z	T2gRA2g	YZ	Z	T2gRB2g	YZ	Z	T2gRC2g	YZ	Z	T2gRD2g	YZ	Z	T2gRE2g	YZ
(h) ICU/CCU Record	Z	T2hRA2h	YTZ												
(k) Recovery Room Record				Z	T2kRB2k	YTZ									
(l) Blood Pressure Chart	Z	T2lRA2l	YZ	Z	T2lRB2l	YZ	Z	T2lRC2l	YZ	Z	T2lRD2l	YZ	Z	T2lRE2l	YZ
(m) Medical Records Note							Z	T2mRC2m	R	Z	T2mRD2m	R	Z	T2mRE2m	R
(n) Graphic Sheet-Routine							Z	T2nRC2n	YZ	Z	T2nRD2n	YZ	Z	T2nRE2n	YZ
(o) Graphic Sheet-Intensive	Z	T2oRA2o	YZ	Z	T2oRB2o	YZ	Z	T2oRC2o	YZ	Z	T2ORD2O	YZ			
(p) Diabetic Record							Z	T2pRC2p	YZ	Z	T2pRD2p	YZ			
(r) Bedside Record	Z	T2rRA2r	YZ	Z	T2rRB2r	YZ	Z	T2rRC2r	YZ	Z	T2rRD2r	YZ			
(s) Hx/Px N/S Record	Z	T2sRA2s	YZ				Z	T2sRC2s	YZ	Z	T2sRD2s	YZ	Z	T2sRE2s	YZ
(t) Progress Notes	Z	T2tRA2t	YZ	Z	T2tRB2t	YZ	Z	T2tRC2t	YZ	Z	T2tRD2t	YZ	Z	T2tRE2t	YZ
(u) O.R. Prep. Sheet	Z	T2uRA2u	YZ	Z	T2uRB2u	YZ	Z	T2uRC2u	YZ	Z	T2uRD2u	YZ			
(w) Infant Hx/Px							Z	T2wRC2w	YZ						
(x) Surg. Check List				Z	T2xRB2x	YZ	Z	T2xRC2x	YZ	Z	T2xRD2x	YZ			
(y) Prof.Consult Req. (in-house)	Z	T2yRA2y	YXZ				Z	T2yRC2y	YXZ	Z	T2yRD2y	YXZ	Z	T2yRE2y	YXZ

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Fig. 6-1 (Cont.)

A

B

(3) DIAGNOSIS FUNCTION

	(A) INTENSIVE CARE (Long Term)			(B) INTENSIVE CARE (Short Term)			(C) INTERMEDIATE CARE (Special)			(D) INTERMEDIATE CARE (General)			(E) SELF CARE		
(a) Radiologist Report	X	T3aRA3a	Z				X	T3aRC3a	Z	X	T3aRD3a	Z	X	T3aRE3a	Z
(b) Prothrombin Time	X	T3bRA3b	Z	X	T3bRB3b	Z	X	T3bRC3b	Z	X	T3bRD3b	Z	X	T3bRE3b	Z
(c) Lab-Chem Results	X	T3cRA3c	Z	X	T3cRB3c	Z	X	T3cRC3c	Z	X	T3cRD3c	Z	X	T3cRE3c	Z
(d) EKG Report	X	T3dRA3d	Z	X	T3dRB3d	Z	X	T3dRC3d	Z	X	T3dRD3d	Z	X	T3dRE3d	Z
(e) EEG Report	X	T3eRA3e	Z				X	T3eRC3e	Z	X	T3eRD3e	Z	X	T3eRE3e	Z
(f) X-Ray Results	X	T3fRA3f	Z	X	T3fRB3f	Z	X	T3fRC3f	Z	X	T3fRD3f	Z	X	T3fRE3f	Z
(g) Path-Non Surg.	X	T3gRA3g	Z	X	T3gRB3g	Z	X	T3gRC3g	Z	X	T3gRD3g	Z	X	T3gRE3g	Z
(h) Path-Surg.	X	T3hRA3h	Z	X	T3hRB3h	Z	X	T3hRC3h	Z	X	T3hRD3h	Z	X	T3hRE3h	Z
(k) PKU/Clot Results							X	T3kRC3k	Z						

B

A

Fig. 6-1 (Cont.)

(4) TREATMENT FUNCTION

	(A) INTENSIVE CARE (Long Term)			(B) INTENSIVE CARE (Short Term)			(C) INTERMEDIATE CARE (Special)			(D) INTERMEDIATE CARE (General)			(E) SELF CARE		
(a) M.D. Order Sheets	Y	T4aRA4a	Z	Y	T4aRB4a	Z	Y	T4aRC4a	Z	Y	T4aRD4a	Z	Y	T4aRE4a	Z
(b) Emer. Rm. Report				Z	T4bRB4b	YTZ									
(c) Oxygen Request	Z	T4cRA4c	S	Z	T4cRB4c	S	Z	T4cRC4c	S	Z	T4cRD4c	S			
(d) Medication Ticket	Z	T4dRA4d	Z				Z	T4dRC4d	Z	Z	T4dRD4d	Z	Z	T4dRE4d	Z
(e) Nursing Care Plan (K)	Z	T4eRA4e	Z				Z	T4eRC4e	Z	Z	T4eRD4e	Z	Z	T4eRE4e	Z
(f) Transfusion Req. for blood	Z	T4fRA4f	W	Z	T4fRB4f	W	Z	T4fRC4f	W	Z	T4fRD4f	W			
(g) Anesthesia Record				Y	T4gRB4g	ZT									
(h) Physican/Occup.Ther.Record							W	T4hRC4h	Z	W	T4hRD4h	Z	W	T4hRE4h	Z
(i) Medical & Treat.Record	Z	T4iRA4i	Z	Z	T4iRB4i	Z	Z	T4iRC4i	Z	Z	T4iRD4i	Z	Z	T4iRE4i	Z
(j) Meds Added to I/V	Z	T4jRA4j	Z	Z	T4jRB4j	Z	Z	T4jRC4j	Z	Z	T4jRD4j	Z			
(k) I/V Feeding/Infusion Record	Z	T4kRA4k	Z	Z	T4kRB4k	Z	Z	T4kRC4k	Z	Z	T4kRD4k	Z			
(m) Parenteral Fluid Record	Z	T4mRA4m	Z	Z	T4mRB4m	Z	Z	T4mRC4m	Z	Z	T4mRD4m	Z	Z	T4mRE4m	Z
(n) Inhalation Therapy	W	T4nRA4n	Z				W	T4nRC4n	Z	W	T4mRD4m	Z	W	T4mRE4m	Z
(o) Anti Coagulant Chart	Z	T4oRA4o	Z				Z	T4oRC4o	Z	Z	T4oRD4o	Z	Z	T4oRE4o	Z
(p) Allergy Condition	Z	T4pRA4p	Z	Z	T4pRB4p	YZ	Z	T4pRC4p	YZ	Z	T4pRD4p	YZ	Z	T4pRE4p	YZ
(r) Delivery Room Record				Z	T4rRB4r	ZT									
(t) O.R. Record				Z	T4tRB4t	ZT									
(u) ICU/CCC Record	Z	T4uRA4u	ZT												
(w) Newborn Record				Z	T4wRB4w	Z									
(x) Labor Record				Z	T4xRB4x	Z									
(y) Record of Procedure				Y	T4yRB4y	Z									

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Fig. 6-1 (Cont.)

A

B

(5) PATIENT MAINTENANCE FUNCTION

	(A) INTENSIVE CARE (Long Term)			(B) INTENSIVE CARE (Short Term)			(C) INTERMEDIATE CARE (Special)			(D) INTERMEDIATE CARE (General)			(E) SELF CARE		
(a) Patient Daily Care (K)	Z	T5aRA5a	Z				Z	T5aRC5a	Z	Z	T5aRD5a	Z			
(b) Routine Nursing Notes	Z	T5bRA5b	Z	Z	T5bRB5b	Z	Z	T5bRC5b	Z	Z	T5bRD5b	Z	Z	T5bRE5b	Z
(d) Daily NUrsing Care Report	Z	T5dRA5d	T	Z	T5dRB5d	T	Z	T5dRC5d	T	Z	T5dRD5d	T	Z	T5dRE5d	T
(e) Incident Report	Z	T5eRA5e	YT	Z	T5eRB5e	YT	Z	T5eRC5e	YT	Z	T5eRD5e	YT	Z	T5eRE5e	YT
(f) Chaplain's Report	Z	T5fRA5f	T				Z	T5fRC5f	T	Z	T5fRD5f	T	Z	T5fRE5f	T
(g) Patie: : Clothing Record	Z	T5gRA5g	ZT				Z	T5gRC5g	ZT	Z	T5gRD5g	ZT			
(h) Patient Valuables Pouch	Z	T5hRA5h	T				Z	T5hRC5h	T	Z	T5hRD5h	T			

A

B

Fig. 6-1 (Cont.)

(6) SUPPLY FUNCTION

	(A) INTENSIVE CARE (Long Term)			(B) INTENSIVE CARE (Short Term)			(C) INTERMEDIATE CARE (Special)			(D) INTERMEDIATE CARE (General)			(E) SELF CARE		
(a) Central Supply Requisition	Z	T6aRA6a	SZ	Z	T6aRB6a	SZ	Z	T6aRC6a	SZ	Z	T6aRD6a	SZ	Z	T6aRE6a	SZ
(b) Ward Nourishment List							Z	T6bRC6b	SZ	Z	T6bRD6b	SZ			
(c) Floor Control Supply Req	Z	T6cRA6c	STZ	Z	T6cRB6c	STZ	Z	T6cRC6c	STZ	Z	T6cRD6c	STZ	Z	T6cRE6c	STZ
(d) Pharmacy Supply Req.	Z	T6dRA6d	SZ				Z	T6dRC6d	SZ	Z	T6dRD6d	SZ	Z	T6dRE6d	SZ
(e) Pharmacy Floor Supply Req.	Z	T6eRA6e	STZ	Z	T6eRB6e	STZ	Z	T6eRC6e	STZ	Z	T6eRD6e	STZ			
(f) Diet Order	Z	T6fRA6f	SZ				Z	T6fRC6f	SZ	Z	T6fRD6f	SZ			
(g) Diet Changes	Z	T6gRA6g	SZ				Z	T6gRC6g	SZ	Z	T6gRD6g	SZ			
(i) Linen Request	Z	T6iRA6i	SZT	Z	T6iRB6i	SZT	Z	T6iRC6i	SZT	Z	T6iRD6i	SZT	Z	T6iRE6i	SZT
(l) General Stores Req.	Z	T6lRA6l	SZT	Z	T6lRB6l	SZT	Z	T6lRC6l	SZT	Z	T6lRD6l	SZT	Z	T6lRE6l	SZT
(m) Diet Cards (Menus)							Z	T6mRC6m	Z	Z	T6mRD6m	Z			
(n) Unit Dietary Schedule	S	T6nRA6n	Z				S	T6nRC6n	Z	S	T6nRD6n	Z			
(o) Narcotic/Hypnotic Daily Record	Z	T6oRA6o	TS	Z	T6oRB6o	TS	Z	T6oRC6o	TS	Z	T6oRD6o	TS	Z	T6oRE6o	TS
(p) Daily Antibiotic Report	Z	T6pRA6p	TS	Z	T6pRB6p	TS	Z	T6pRC6p	TS	Z	T6pRD6p	TS	Z	T6pRE6p	TS

A

B

Fig. 6-1 (Cont.)

(7) CONTROL FUNCTION

	(A) INTENSIVE CARE (Long Term)			(B) INTENSIVE CARE (Short Term)			(C) INTERMEDIATE CARE (Special)			(D) INTERMEDIATE CARE (General			(E) SELF CARE		
(a) Nursing Assgn. Sheets (Pats)	Z	T7aRA7a	TZ	Z	T7aRB7a	TZ	Z	T7aRC7a	TZ	Z	T7aRD7a	TZ	Z	T7aRE7a	TZ
(b) ICU/CCU Log	Z	T7bRA7b	TY												
(c) Nursing Assgn. (Unit)	T	T7cRA7c	Z	Z	T7cRB7c	Z	Z	T7cRC7c	Z	Z	T7cRD7c	Z	Z	T7cRE7c	Z
(d) Seriously Ill Slip	Z	T7dRA7d	TQ				Z	T7dRC7d	TQ	Z	T7dRD7d	TQ			
(e) Daily Floor Census	Z	T7eRA7e	T				Z	T7eRC7e	T	Z	T7eRD7e	T	Z	T7eRE7e	T
(f) Nursing Unit Report	Z	T7fRA7f	T	Z	T7fRB7f	T	Z	T7fRC7f	T	Z	T7fRD7f	T	Z	T7fRE7f	T
(g) Condition Report	Z	T7gRA7g	TQ				Z	T7gRC7g	TQ	Z	T7gRD7g	TQ			
(h) Emergency Rm. Log				Z	T7hRB7h	T									
(i) Minor Surgery Log				Z	T7iRB7i	TY									
(k) O.R. Log				Z	T7kRB7k	TY									
(l) E.R. Case Report				Z	T7lRB7l	ZT									
(m) Sponge Count				Z	T7mRB7m	ZT									
(n) Delivery Room Log				Z	T7nRB7n	TY									
(o) O.R. Patient Call Slip	Z	T7oRA7o	ZT				Z	T7oRC7o	ZT	Z	T7oRD7o	TZ			
(p) Daily Del.Rm. Check List				Z	T7pRB7p	ZTY									
(r) O.R. Schedule				Z	T7rRB7r	ZYT									
(s) Recovery Room Log				Z	T7sRB7s	ZY									

Fig. 6-1 (Cont.)

A

B

(8) DISPOSITION FUNCTION

	(A) INTENSIVE CARE (Long Term)			(B) INTENSIVE CARE (Short Term)			(C) INTERMEDIATE CARE (Special)			(D) INTERMEDIATE CARE (General)			(E) SELF CARE		
(a) Discharge Summary	Y	T8aRA8a	ZR				Y	T8aRC8a	ZR	Y	T8aRD8a	ZR	Y	T8aRE8a	ZR
(b) Discharge Log	Z	T8bRA8b	TR				Z	T8bRC8b	TR	Z	T8bRD8b	TR	Z	T8bRE8b	TR
(c) Unclaimed Items Report	Z	T8cRA8c	T				Z	T8cRC8c	T	Z	T8cRD8c	T	Z	T8cRE8c	T
(d) Take Home Rx	Z	T8dRA8d	S				Z	T8dRC8d	S	Z	T8dRD8d	S	Z	T8cRE8c	S
(e) Take Home CSR	Z	T8eRA8e	S				Z	T8eRC8e	S	Z	T8eRD8e	S	Z	T8eRE8e	S
(f) Patient Chart-Med Record	Z	T8fRA8f	R				Z	T8fRC8f	R	Z	T8fRD8f	R	Z	T8fRE8f	R
(g) Newborn Release							Z	T8gRC8g	R						

A

B

Fig. 6-1 (Cont.)

Section 7
IMPROVED SYSTEMS

7.1 GENERAL CONSIDERATIONS

It is important to re-emphasize that the survey of computer-assisted hospital information systems (Section 5) was limited by terms of the Nursing Station Information Needs contract and therefore does not constitute a complete survey of all existing computer applications in hospitals. As described in Section 2, the criteria for selection of the computer-assisted hospital information systems to be surveyed were developed on the basis of a consensus drawn from the following considerations:

- Operational projects in use in a hospital for a minimum of six months
- Input/output devices in use based upon different viewpoints and requirements
- Limit of six hospitals to be surveyed

In relating the model presented in Section 4 to the computer systems surveyed in Section 5 (and compared in Section 6), it becomes clear that computer-assisted nursing station information processing exists for limited subfunctions only. It is therefore necessary to describe a system which provides for more nursing station functions and its interfaces with a total hospital information system.

It is likely that such systems are now undergoing development by various interested organizations in the United States and that they may offer the capability necessary to accommodate all the needs indicated by the model. Sufficient information on these systems is not available within the framework of this analysis, however, and it therefore appears appropriate and useful to describe a pertinent LMSC-developed system concept. This system is in the final development stage, and a test demonstration of on-line operation will be accomplished by the end of 1969.

7.2 STATE-OF-THE-ART HOSPITAL INFORMATION SYSTEM

This hospital information system concept is based upon actual experiments and data derived from extensive studies of information flow in hospitals. The system differs from other proposed uses of the computer in the hospital environment in the following manner:

- Provides a unified approach to the handling of all combinations of hospital information
- Utilizes computers located remotely from the hospital which are capable of serving a number of hospitals concurrently
- Provides highly reliable service through the use of redundant equipment and spare remote terminals
- Utilizes the LMSC video matrix terminal (VMT), which facilitates natural language communication between the user and the computer

The overall development plan encompasses evolution from a prototype system identified as Medical Information System – I (MIS-I), to an even more comprehensive system identified as Medical Information System – II (MIS-II).

The MIS-II system extends the MIS-I concept, which was set at the medical-orders level, to include direct entry of narrative information, beginning with nursing notes and extending through physicians progress notes to the recording of history and physical examination data. The system will include interfaces with automated laboratory testing and reporting equipment and with physiologic monitoring data. It will involve extensive manipulation of processing control information in the hospital, including laboratory, dietary, radiology, and patient scheduling. It is intended that the MIS-II system will continue to evolve beyond the inclusion of diagnostic and therapeutic reference guides to the actual provision of mathematical support to diagnostic and and therapeutic decisions.

The first problem in the system development sequence is to define an adequate interface between (1) the originators and the users of medical information and (2) the computer systems. As previously indicated, this system employs the video matrix terminal for this interface. This approach is based upon the fundamental concept that it is possible to define and structure the information content of medicine, and that with suitable tools – a cathode ray tube and light pen – medical personnel can use this type of computer interface device with nominal training and without the use of intermediary steps or devices. (See Fig. 7-1.)

7.3 VIDEO MATRIX TERMINAL (VMT)

The implications of input/output (I/O) device selection are crucial for system acceptance and system economic viability. In Fig. 7-2, a simple process-flow diagram for the generation of laboratory test data is suggested. Beginning with origination of the order by the physician, the order is progressively processed by the nurse, laboratory clerk, and laboratory technician; recorded in a number of places by the laboratory clerk; and returned to the nurse who charts the result for the physician. In terms of information processing, this procedure is very costly because the information processing activities of nurse and clerk are redundant. The effects of utilizing different types of I/O device for automation of this process-flow loop are presented in Fig. 7-3. In this illustration, the process-flow loop has been opened up and laid flat at the top of the figure. Here again, the flow direction is from the physician to nurse to clerk, etc. The time investment for each step in the process is identified for manual processing, typewriter, message-coded keyboard, video output or video display with keyboard, and the video matrix terminal. At the right of the graph, the time investment in the process for each of the methods of implementation is shown. This time requirement ranges from 18.2 min for the manual method to 3.5 min for the video matrix method (based on data from LMSC Hospital Information System studies). Although the video matrix terminal is the most expensive of these I/O devices, in terms of cost effectiveness, the extensive simplification of information processing procedures offered by its use leads to the greatest potential cost savings.

Additional considerations relevant to terminal selection are presented in Appendix F.

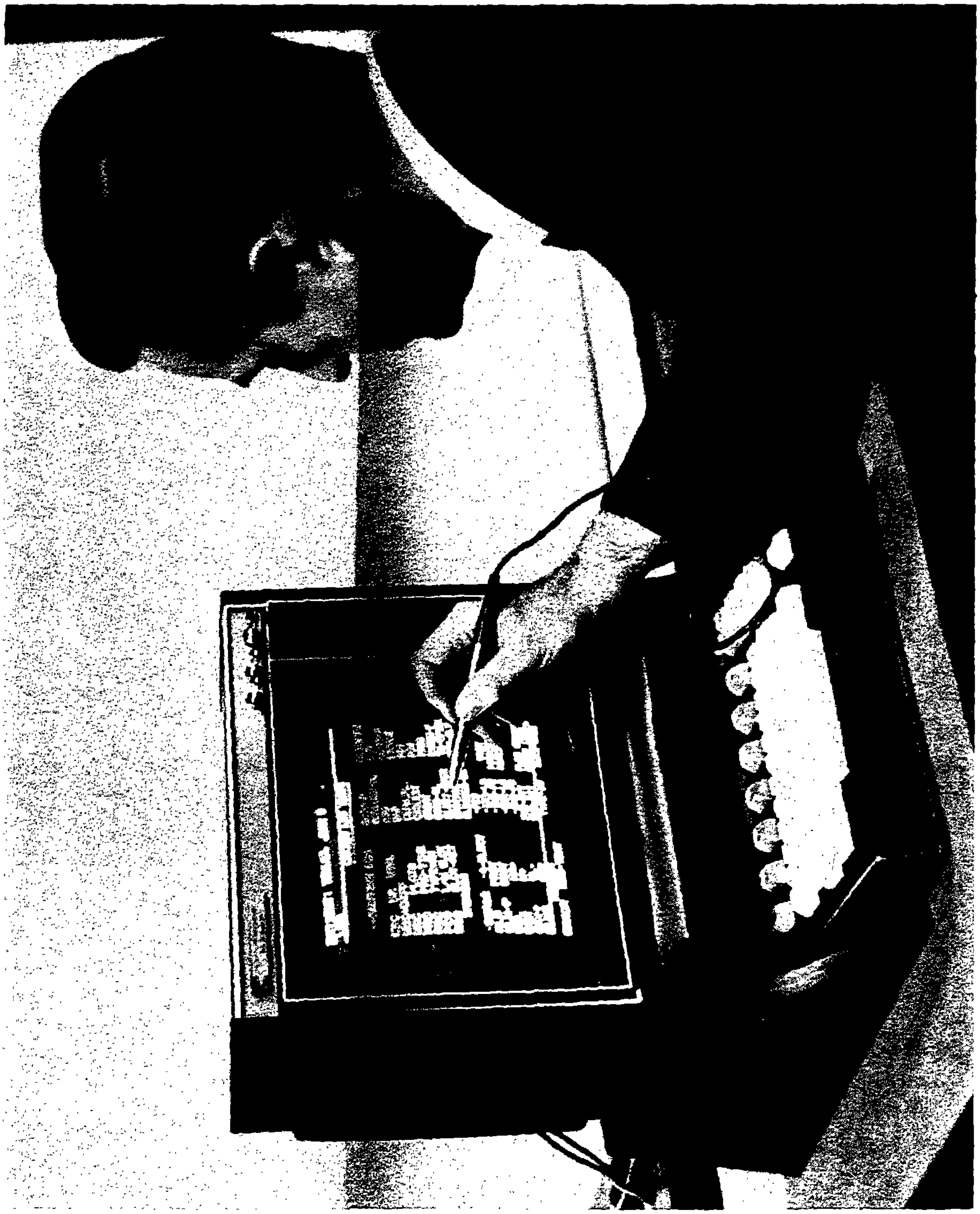

Fig. 7-1 Video Matrix Terminal

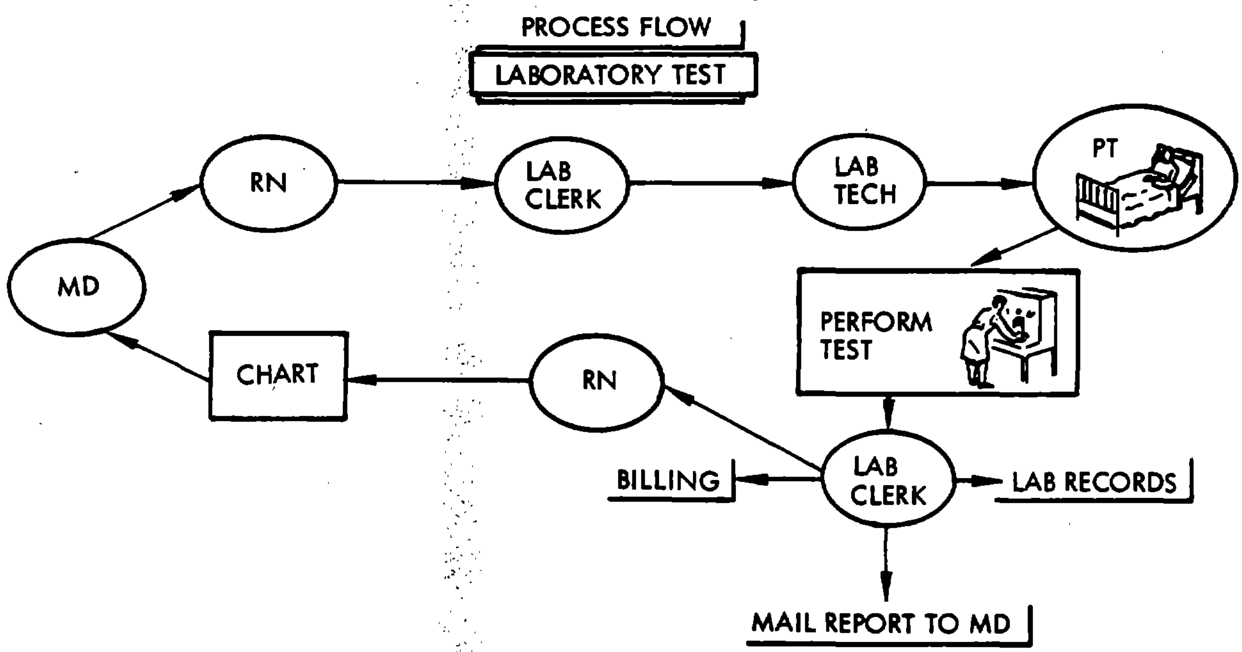

Fig. 7-2 Simplified Process Flow for Generation of Laboratory Data

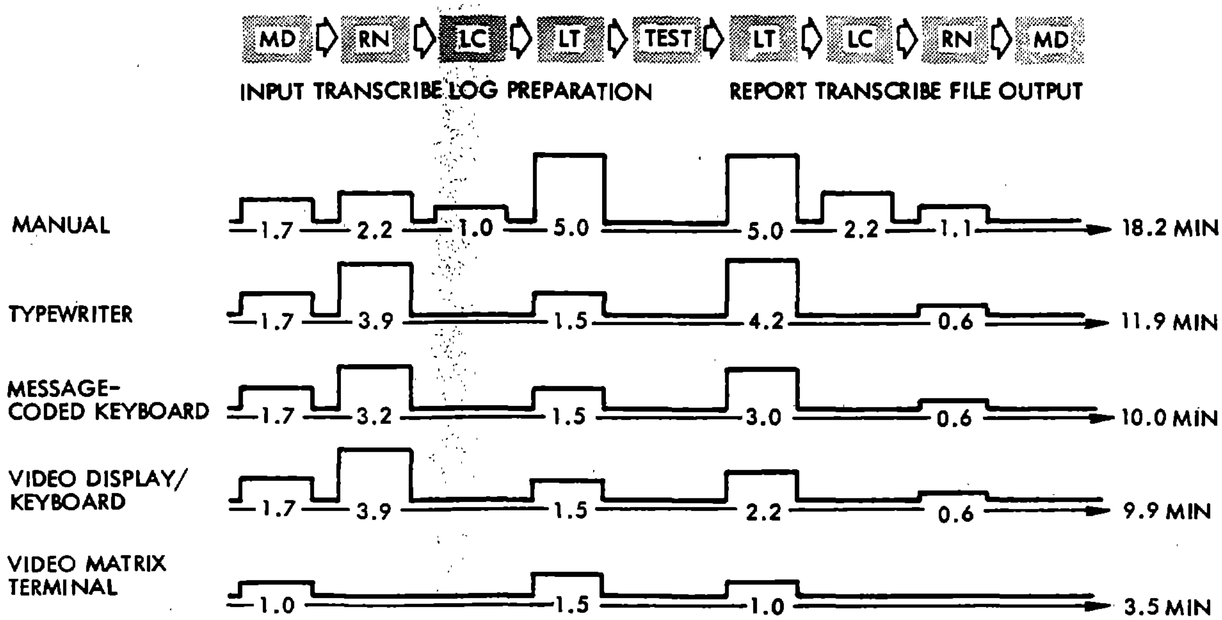

Fig. 7-3 Effect of Input/Output Terminal Selection on Process Flow

7.3.1 User Acceptance

As indicated in Section 5, acceptance by the hospital users of the computer-aided information system is all-important to the success of the system operation. Users of the nursing station communication terminal are the physician, the nurse, and the laboratory clerk.

The physician is a prime information originator whose information requirements scope is vastly greater than that of any other user in the medical environment. The volume of his on-line information input/output is also very large, although some of it may be entered off-line, in the case of dictated correspondence and procedural notes. The physician may be further characterized as relatively independent, concerned with maintaining his freedom and flexibility in medical and other activities, inclined to be critical and impatient, and a user whose time is costly. Obtaining his acceptance of a computer-assisted information system may be difficult and involve a prolonged effort.

The nurse is the prime information user in the hospital environment. Although the information she originates may be secondary in importance to that originated by the physician, and lesser in scope, the volume of her output is often greater. Since she is an employee, she can be constrained to some degree to accept or reject specific information processing equipment. Her tasks are fixed; i.e., she must complete a certain level of charting per day on each patient. If a machine system should therefore cause a slowdown in her work, she would probably reject it.

The ward clerk also is a secondary user of the system but has a lower priority than the other users. The clerk originates very little information and is an employee whose tasks are flexible; i.e., work that can be performed within 8 hr (although varying in volume) is accepted and accomplished.

7.3.2 Interaction With Computer System

The technique providing professional personnel with convenient direct interaction with the computer system is based on the grouping and storage of information in the computer in a logical hierarchy that closely parallels the information structure instilled by his training and practice in the professional's memory. Figure 7-4 shows, in simplified form a portion of that hierarchy; in this case the particular structure for issuing a medical order.

The elements of various types of medical orders – general care, medications, and laboratory tests – are stored in the computer. Using the light pen, the physician "writes" a prescription by selecting the elements of the prescription in the hierarchy (from top to bottom and from general to specific), as illustrated in Fig. 7-4. This sequence, in the case of the physician's medical orders, is based on the sequence that he normally follows for writing orders. Thus, a drug order may be completed in six steps by the use of six different displays that are called up from the computer.

(1) The physician, after properly identifying himself to the system, is presented with a list of his current hospital patients.
(2) After he makes a selection (e.g., Margaret Dean), the display advances automatically to a master guide which suggests various types of medical orders that he might wish to select – general care, medications, laboratory test, and others.
(3) The physician selects "medications" and the next matrix appears – displaying five criteria for selecting medications.
(4) The physician then selects "organ systems."
(5) Similarly, the physician selects a specific drug, dose, route, and frequency.
(6) The physician can then return to other medical order displays to prepare further orders for this patient or he can return to the patient list display and begin the procedure again for another patient.

Hierarchical systems such as the one just described seem to convey an intrinsic feeling of rigidity since they are based on a logical progression defined by one or more

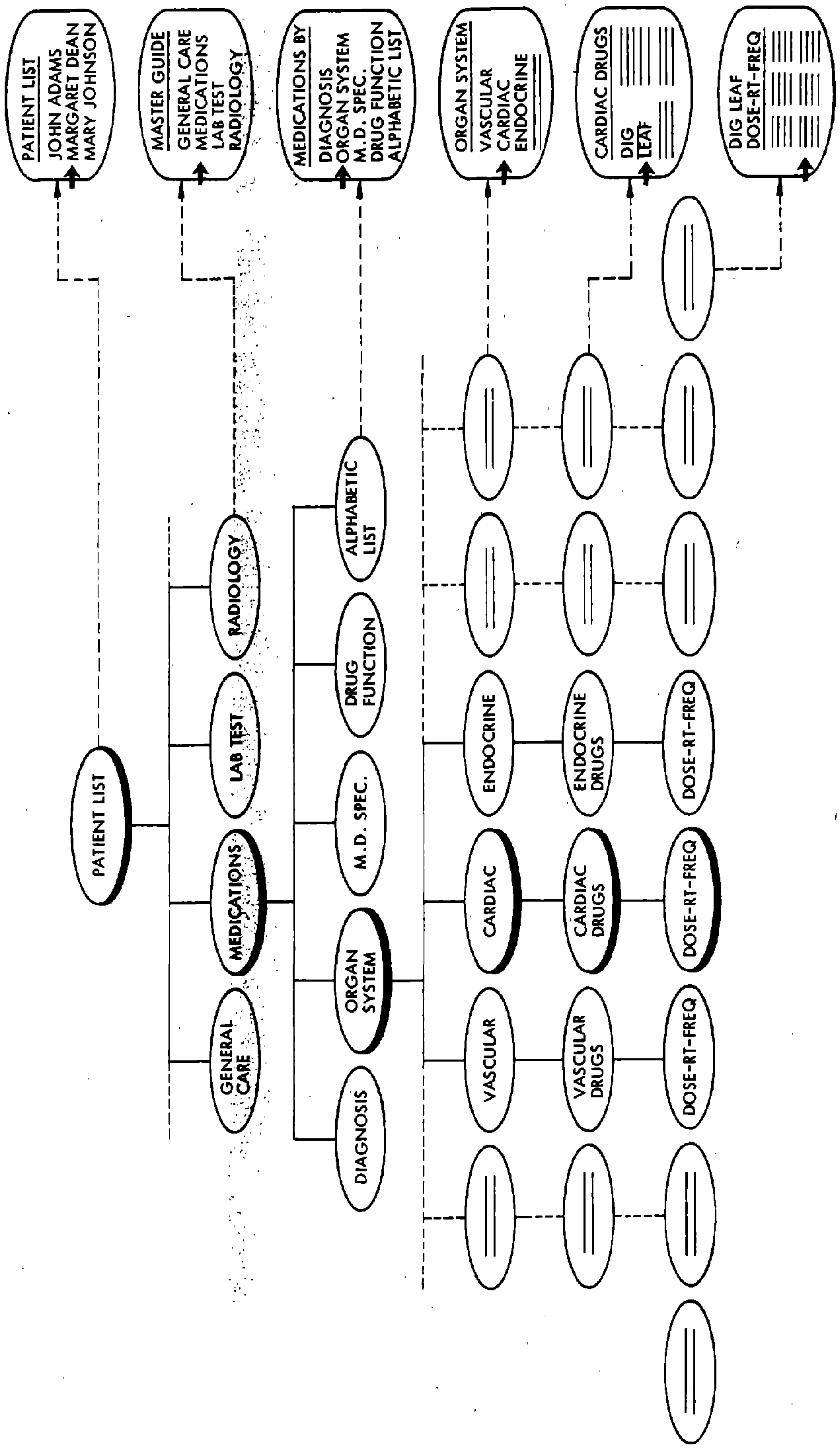

Fig. 7-4 Information Storage Hierarchy

individuals and offered to others for use. It is unlikely that all concerned parties will, however, concur fully on which form of logic structure is completely essential or desirable. Nevertheless, the number of possibilities and paths is not infinite. Consideration of all aspects involved usually reveals only three or four sequential procedures for approching a given point in the hierarchy. In this system, there are several ways to approach almost every point, and the criterion for inclusion of these routes is only that they be reasonable; for example, in a laboratory guide (Fig. 7-5), there are three entry paths offered, all at the same level. These are,

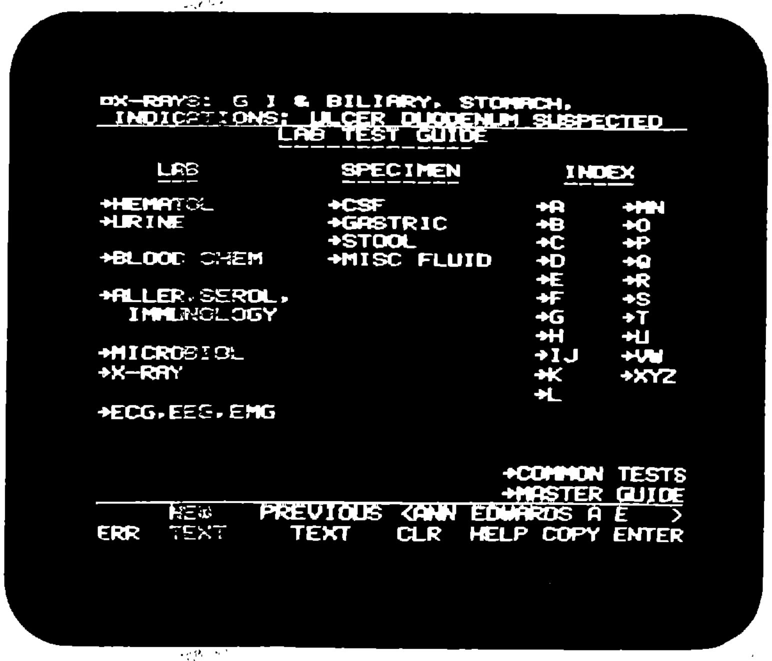

Fig. 7-5 Guide Display for Laboratory Tests

respectively, entry by laboratory division (e.g., hematology, urinanalysis, or blood chemistry), by specimen samples that cut across several laboratories (e.g., pleural fluid or cerebrospinal fluid) or by index designation. Selection of the appropriate entry will lead to a single matrix that covers all of these possibilities. In cases where the associations or classifications for a particular entry path are unclear, an alphabetic listing is provided. Even within this list there may be multiple paths; for example, blood urea nitrogen may be found either under BUN or urea nitrogen. The use of these multiport/multipath approaches leads to a system that is regarded by most operators as quite flexible and without the sense of constraint usually associated with closely structured systems.

A few examples of the video displays which the physician uses for entering medical orders are presented in Figs. 7-6 through 7-9.

An example of the manner in which the nursing staff interacts with the system is presented in the following discussion of a selected sequence of patient-care data. The sequence begins with the Patient-Care Plan for a particular patient at the beginning of the shift and ends with the 24-Hour Summary on that patient. A representative patient, Hector C. Gomez, is admitted, for example, to the hospital with a diagnosis of possible myocardial infarction. At 6:30 a.m. on the morning of the next day a Patient-Care Plan (Fig. 7-10) based upon doctor's orders is printed out at the terminal.

The nurse responsible for the care of this patient makes her rounds in accordance with the orders on the Patient-Care Plan and makes annotations on it of the applicable information she has collected. At intervals, she goes to the video matrix terminal and enters this information, together with information pertaining to other patients under her care.

To handle the next step, concerning vital signs, the nurse first calls for a listing of all the patients under care (Fig. 7-11). Using a light pen, she selects the entry, Routine Vital Sign. This selection causes the next display to appear (Fig. 7-12). This display provides for the entry of all numerical temperature, pulse, and respiration data for every patient listed. The nurse then enters the data (e.g., the patient's temperature, 99.2 deg, and pulse, 110, which she had obtained on her rounds at 7 a.m.

To enter observations about the pulse condition, the nurse calls for the next display by selecting the word PULSE listed under OBSV. This display (Fig. 7-13) provides for light-pen entry of any of the formatted conditions listed on the display. Other observations may be made by keyboard entry.

The nurse then calls back the Routine Vital Signs display (Fig. 7-12) and enters the the respiration (20) which she has also obtained during her 7 a.m. rounds.

She is now ready to review and confirm. The next display (Fig. 7-14) shows all the data the nurse has entered. If she is satisfied that the data are complete and accurate, she then selects the function code ENTER.

About 6 a.m. the following morning, a 24-Hour Summary is printed out containing all the data about this patient entered into the system during the preceding 24 hours, including the vital sign entries just discussed. (Fig. 7-15). This 24-Hour Summary is reviewed by the attending physician on his next visit, signed, and inserted in the patient's chart. It includes the new orders the physician wrote during the day (after the Patient-Care Plan was printed out) as well as nursing entries made on the evening and night shifts.

7.4 INFORMATION SYSTEM CONTENT (MIS-I)

The MIS-I prototype when fully implemented will involve all nursing station medical orders, nurses' reports, and work sheets. It will also include linkages to Admitting, Business Office, Food Service, Pharmacy, Pathology, and Radiology functions. Both inputs and printed outputs are described. It can be surmized from the following tables and discussion that although the automated system reduces paperwork, the amount of paper processed will probably stay the same or may even increase.

7.4.1 Nursing Unit Functions

In general, the system will permit the assembly of more than 90 percent of physician orders by light-pen selection. Instructions covering the other 10 percent or less are entered through a conventional typewriter keyboard. Categories of orders are the same as those currently in use. They include laboratory tests, radiology tests, EKG, EEG, pulmonary function tests, medications, infusions, inhalation therapy, physical therapy, diets, nursing care, ambulatory status, vital signs, treatment, and restrictive

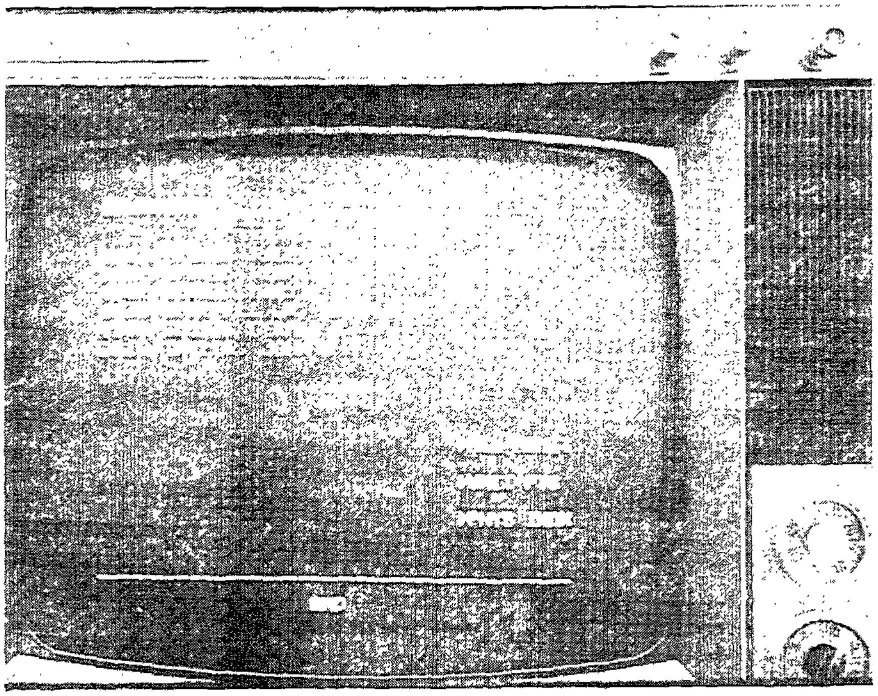

Fig. 7-6 Physician's Patient List

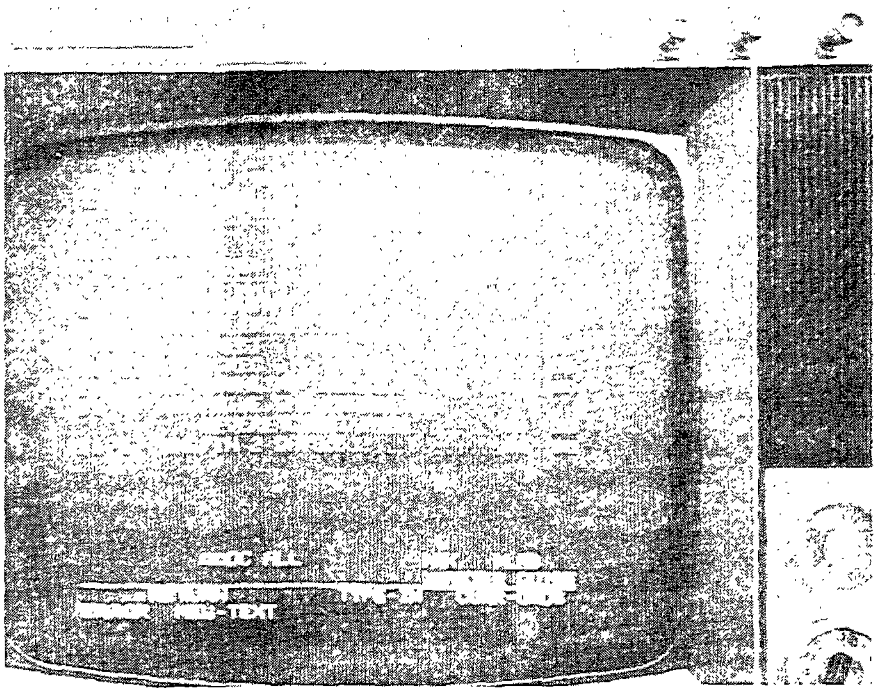

Fig. 7-7 Current Orders

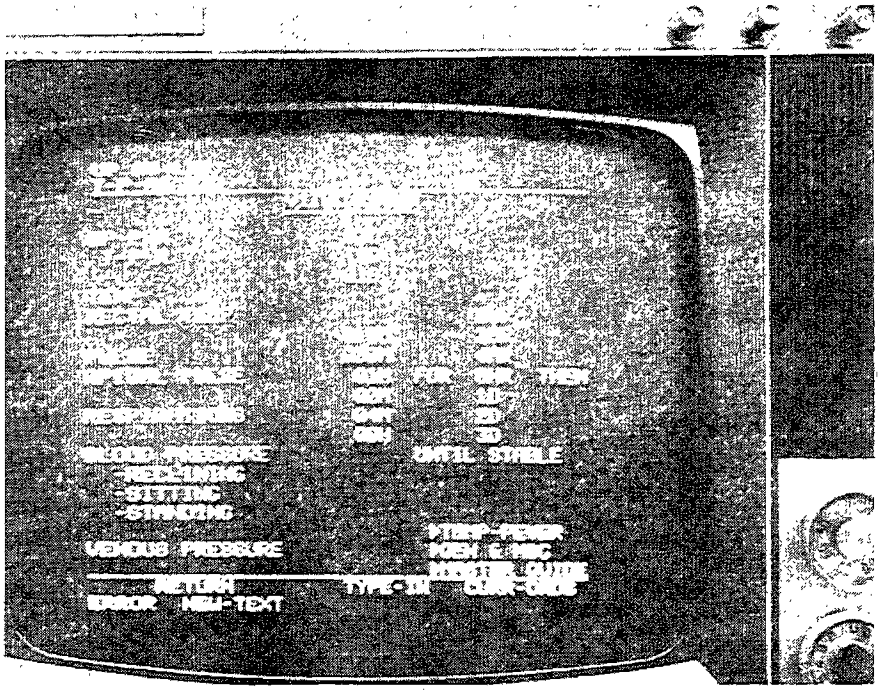

Fig. 7-8 Physician's Master Guide

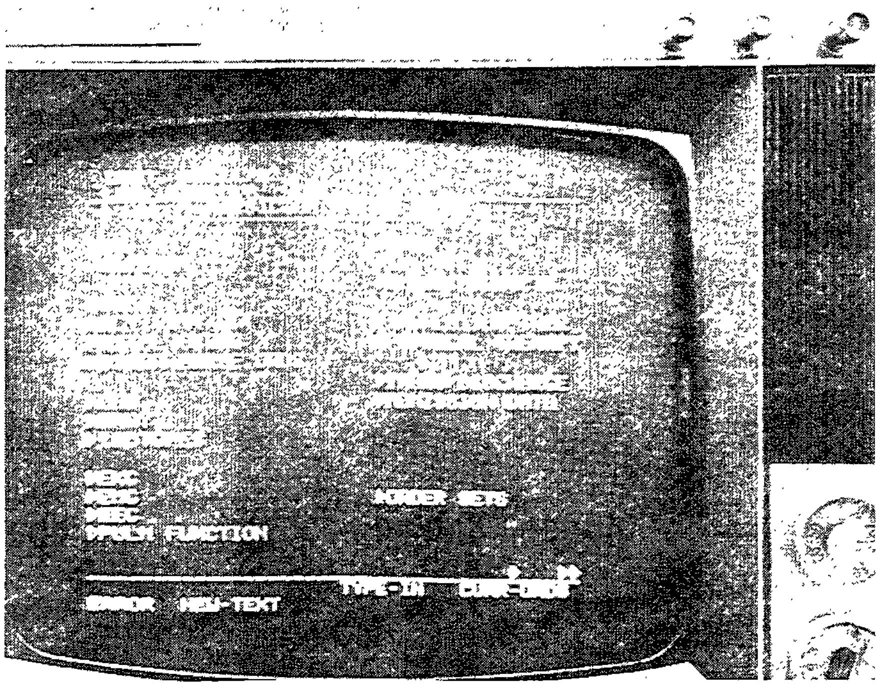

Fig. 7-9 Vital Signs

PATIENT-CARE PLAN 7:00AM-3:00PM SHIFT 03-03-69 4WEST

403 A GOMEZ, HECTOR C M 53 CATH DR. MOORE, E.M.
POSSIBLE MYOCARDIAL INFARCT

MEDICAL ORDERS:	7	8	9	10	11	12	2
VITAL SIGNS:							
3. TEMP, PULSE, RESP, QID	99 2/10-110-20				99 4/10-112-22		
11. BP QID					77/66		
FLUID BALANCE:							
5. REG DIET		✓ Reg [illegible]				✓ Low Sodium [illegible]	
10. Soft, Low Sodium							
REST/ACTIVITY/SAFETY:							
4. BEDREST-BRP							
UNSCHEDULED MEDS:							
6. ASPIRIN, TAB-30, #2, PO, Q4H, PRN							
8. MORPHINE-INJ, 5MG, IM, Q2H, PRN PAIN			10:00 - L.U.O.Q. - [illegible]				
			2:00 - R.U.O.Q. - " "				
OTHER DEPT'S:							
7. EKG-STANDARD, SUSPECT RECENT M.I.			✓ done				

NURSING ORDERS:

NURSE INFORMATION:
PT. CANT SPEAK ENGLISH

NOTES, OBSERVATIONS:

#3 Pulse - Reg [illegible], weak

J. Smith, RN

Fig. 7-10 Typical Patient-Care Plan

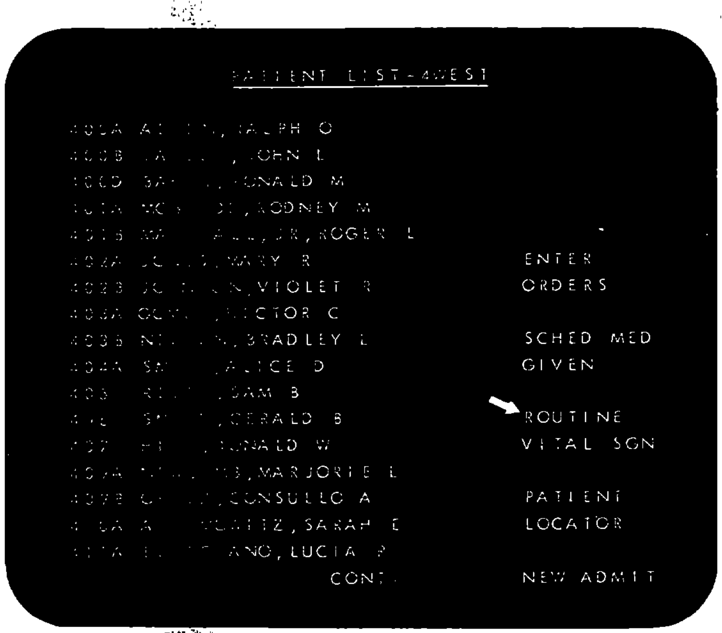

Fig. 7-11 Patient List – 4West

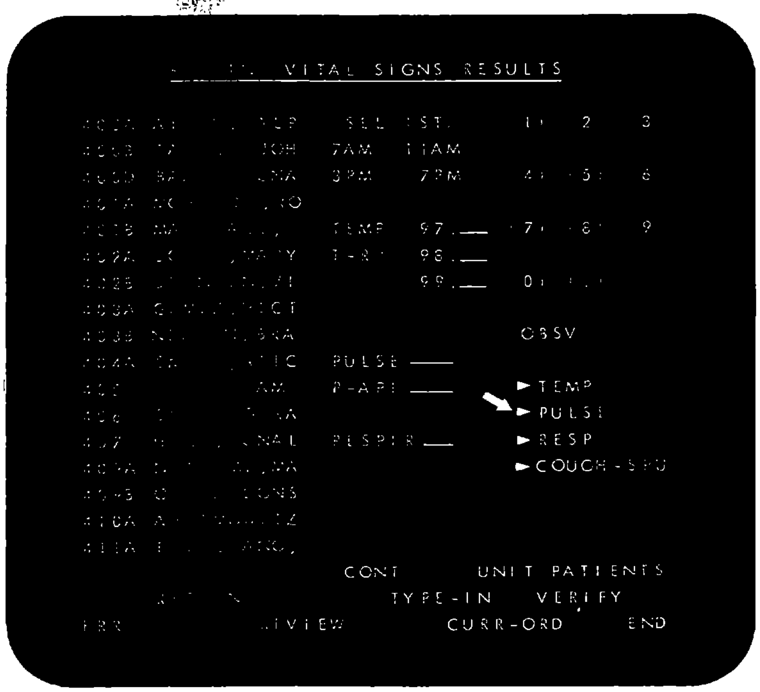

Fig. 7-12 Routine Vital Signs Results

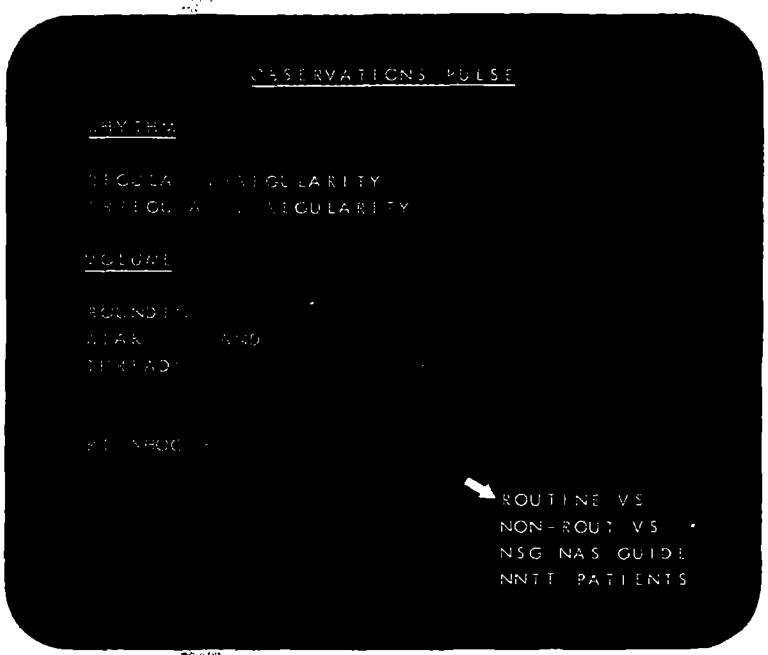

Fig. 7-13 Observations Pulse

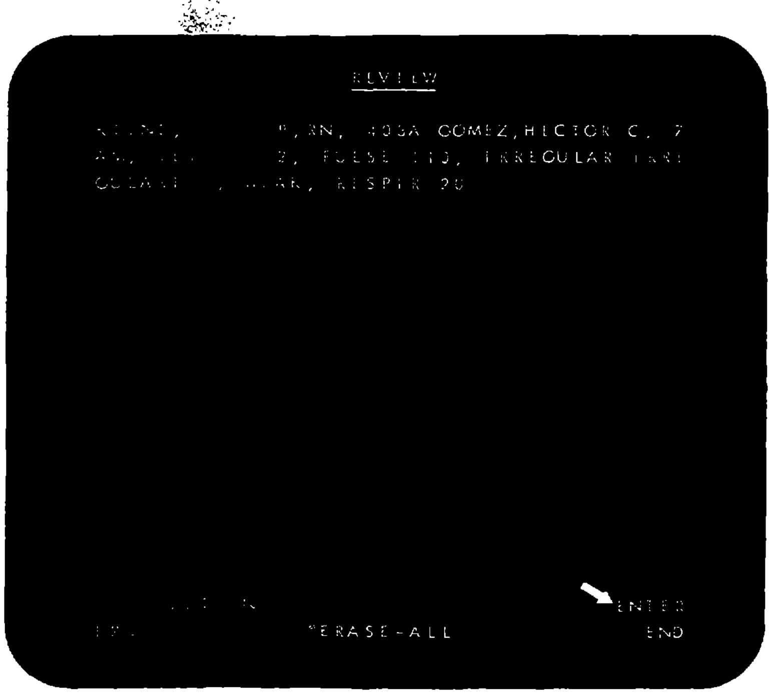

Fig. 7-14 Review

GOMEZ, HECTOR C 53 M 24-HOUR SUMMARY....ENDING 6:00AM, 03-04-69
035130
4 WEST: 403A....MED....DR. MOORE, E. M.

NEW ORDERS

9. 10:00AM, 03-03-69, DC REGULAR DIET
10. 10:00AM, 03-03-69, SOFT, LOW SODIUM DIET
11. 10:00AM, 03-03-69, BP,QID
12. 2:15PM, 03-03-69, SECONAL,CAP-250,#1,PO,HS,PRN SLEEP
13. 2:15PM, 03-03-69, SMA-12 IN AM
14. 3:00AM, 03-04-69, MORPHINE-INJ,10MG,IM,STAT
15. 3:00AM, 03-04-69, EKG,STAT

MEDICATIONS GIVEN

MORPHINE	5MG,	IM	10:00AM	LUOQ,FOR PAIN IN CHEST
MORPHINE	5MG,	IM	2:00PM	RUOQ,FOR PAIN IN CHEST
MORPHINE	5MG,	IM	7:00PM	RMDELT,FOR PAIN IN CHEST
SECONAL	250MG,	PO	9:00PM	FOR SLEEP
MORPHINE	10MG,	IM	3:00AM	LUOQ,FOR PAIN IN CHEST

VITAL SIGNS	TEMP	PULSE	RESP	BP	
7:00AM	99.2	110	20		PULSE REG IRREG,WEAK
11:00AM	99.4	112	22	90/66	
3:00PM	100.00	120	24	100/60	SKIN WARM
7:00PM	99.2	112	20	104/64	
3:00AM		140	28	88/50	PT SHOCKY

FLUID BALANCE

REGULAR DIET	8:00AM	TAKEN WELL
SOFT,LOW SODIUM	12:30PM	TAKEN FAIR
SOFT,LOW SODIUM	5:00PM	REFUSED

E. M. Moore M.D.

Fig. 7-15 24-Hour Summary

orders. Further, the video matrixes are designed to facilitate rapid entry of standard orders for routine cases such as general medical admits, tonsils/adenoids (T/A's), and routine obstetrical cases.

The system provides for registered nurses and other physicians to enter medical orders for the attending physician at his request or in emergencies. At the change of shift, the computer will provide a printed Patient-Care Plan containing all current orders for each patient. Those orders requiring subsequent nursing action and system inputs will be arranged by time for the oncoming nursing personnel. The nurse will annotate this plan as required during the shift and make her nursing report entries by means of the video matrix terminal (VMT). Nursing entries and laboratory and radiology test results will be printed out on Shift Summaries before the end of each shift, for the use of the incoming shift and the attending physician.

Table 7-1 summarizes the information processing effort performed by means of the video matrix terminal and a printer.

Following are short summaries of the Nursing Unit functions.

System Inputs. System inputs for the functions are as follows:

- User Identification. The user (doctor, nurse, etc.) of a video terminal must identify himself to the computer before he can enter or retrieve information. The computer will check his typed-in identification code for validity, and then present an appropriate first display for the particular type of user identified.
- Patient Identification. The user (doctor, nurse, admitting clerk) will enter into the system basic data that identify the patient (name, sex, etc.), his physician, and his location (nursing unit, bed number). These data are entered by keyboard entry onto a form displayed on the video matrix terminal. Once entered, these data may be retrieved and revised through keyboard entry at any time during the patient's stay.

Table 7-1

NURSING UNIT FUNCTIONS

Input	Printed Output	Video Display	Description
X			User Identification
X			Patient Identification
X			Medical Orders
X			Bed Vacate or Occupancy
X			Inhalation Therapy Treatments Given
X			Nursing Reports
X			Central Supply Requests
	X		New Medical Orders
	X		Scheduled Medications Due
	X		Bed Vacate or Occupancy Notice
	X		Cancellation Notice
	X		Laboratory Test Results
	X		Patient-Care Plan
	X		Shift Summary
	X		24-Hour Summary
	X		Transfer/Discharge Order
	X		Stat Test Results
	X		Test Result Correction Notice
	X		Patient Chart
	X		Medications Order Notice
		X	Patient List by Nursing Station
		X	Patient List by M.D.
		X	Current Orders
		X	New Order Review
		X	M.D. List
		X	Medical Orders
		X	Current Medications
		X	Patient Chart Review
		X	Patient Locator
		X	Scheduled Medications Given
		X	Unscheduled Medications Given
		X	Nursing Reports
		X	Central Supply Requests

- Medical Orders. Authorized users (doctors, nurses) may enter medical orders into the system by retrieving the required video displays and making light-pen selections from them to assemble each order, proceeding from the general to the specific in each instance. Unusual orders, special instructions, etc., may be entered by means of the keyboard.
- Bed Vacate or Occupancy. When a patient vacates a bed because of a transfer or discharge, the nurse will make an entry through the video matrix terminal. If the patient is being transferred, the nurse will also enter the new bed number.
- Inhalation Therapy Treatments Given. The inhalation therapist will enter information regarding treatments given or not given and observations data through the video matrix terminal at the nursing station where the patient is located. (Other details of this function are still to be determined.)
- Nursing Reports. Nursing station personnel will enter medications given, vital signs, fluid balance, treatments given, unit clinical test results, diet, and special observation data by making light-pen selections from video displays, and as necessary, keyboard entries. Entries will update patient files and be included in subsequent Shift Summaries and 24-Hour Summaries.
- Central Supply Requests. Nursing station personnel will enter Central Supply Requests for all supplies and equipment stocked in Central Services, and chargeable floor-stocked items, based on interpretation of medical orders. Inputs will be made by light-pen selections from video displays, and keyboard entries for items not listed on displays. The billing file will be automatically updated when chargeable items are ordered.

System Printed Outputs. The system provides the following printed outputs:

- New Medical Orders. After the user has completed entry of his orders for a given patient, the computer will print out a copy of these new orders at the patient's nursing station, in the same sequence in which the orders were entered. The doctor will sign each order set, which will then be filed in the patient's chart. All medical orders will be printed at the nursing station, both those for execution by nursing service personnel and those for execution by ancillary services.

- Scheduled Medications Due. This is a periodic printout provided at each affected nursing station, listing the scheduled medications due during the next time period for all patients at the nursing stations for whom at least one medication is scheduled. For each nursing station, the list will be in bed number sequence for those patients having scheduled medications due. The listing will be printed out 10 to 20 min before the first hour of the time period covered by the listing. The list will be in worksheet format to facilitate subsequent entry of medication-given data.
- Bed Vacate or Occupancy Notice. This is a printout issued at appropriate hospital locations, containing notification of the bed number of patients that have been admitted (including newborn) and discharged (including deaths), and the old and new bed numbers of patients that have been transferred.
- Cancellation Notice. Upon cancellation of certain types of medical orders this printout is issued at the appropriate hospital department. It serves to notify the department that the previously ordered test, treatment, or service is not to be performed.
- Laboratory Test Results. This is a periodic printout at each nursing station of laboratory test results that have been completed for patients at that ward since the previous printout. Each printout consists of a listing in patient name, followed by the data in laboratory department sequence. It provides doctors with a quick reference in determining those laboratory tests that are still pending.
- Patient-Care Plan. This is a printout, one for each patient, which is issued shortly before the beginning of a shift, containing (1) the current orders, (2) a list of any specimens to be collected by nursing station personnel, and (3) a schedule of patient-care functions to be performed for each patient during the shift. It will be printed (1) at each nursing station or (2) on the line printer in the Business Office for distribution to each nursing station. It will contain a schedule of the times at which the following classes of doctor's orders are to be executed: vital signs, fluid balance, medications, treatments, unit clinical tests, and diet. The Patient-Care Plan is in worksheet format to facilitate annotation by nursing station personnel as the patient-care functions are performed.

- Shift Summary. This is a printout, one for each patient, provided shortly before the beginning of a shift, of all the nursing reports entered into the system during the shift just ending and since the previous Shift Summary was printed. It will be printed either at each nursing station or on the line printer in the Business Office and distributed to each nursing station. It will contain the following nursing entries, as applicable: vital signs, fluid balance totals, medications given, treatments given, unit clinical test results, diet, and special observations. It is available for reference by the patient's physician until the data are incorporated into the next 24-Hour Summary.
- 24-Hour Summary. This printout, one for each patient, summarizes the data entered into the system during the previous 24 hours. It will be printed about 5:00 a.m. or 6:00 a.m., either at each nursing station or on the line printer in the Business Office for distribution to each nursing station. It will include a list of recent orders, all nursing report entries into the system, laboratory and radiology test results, and bed changes. This printout provides for signature of orders by the physician, and, by its organization, simplifies review of the patient's chart each day. The 24-Hour Summary will be retained as a permanent portion of the patient's chart.
- Transfer/Discharge Order. This printout is made at appropriate areas of the hospital, such as the nursing station, Food Services, Admitting, etc., and notifies such area that a transfer or discharge order has been entered into the patient's record. It serves to alert these areas to pending census and patient location changes.
- Stat Test Results. This is an immediate printout at the nursing station of test results entered as a result of a stat laboratory or radiology order. Each printout will be for one patient and the results for one order. This printout will be filed in the patient's chart until replaced by the 24-Hour Summary.
- Test Result Correction Notice. This is an immediate printout of corrected laboratory and radiology test results which is issued whenever erroneous test results were previously entered into the system and subsequent correction entries made. It identifies the patient, test, entry dates and times, and corrected test results.

- Patient Chart. This is a printout, provided at the option of an authorized user, of any part of a patient's record residing in the computer file, as of the time the printout is requested. Request is made by light-pen selection when the desired portion of the patient's record is displayed on the video matrix terminal.
- Medication Order Notice. This printout will be made at any nursing station at which scheduled medications have not been reported to the system as having been given or not given. Medications which have not been reported upon by 50 min after the hour are logged as overdue. This printout is a "canned" message, and the user must retrieve the Schedule Medications Given video display to determine the specific medication orders that are overdue.

Video Display. The following information is supplied by video display.

- Patient List by Nursing Station. This is a video display listing the names of all patients in a particular ward. Each nursing station requesting this list will automatically receive its own patient list. The display is in bed number sequence for all beds in the ward, occupied and unoccupied with reserved beds identified as such. The list will include patients assigned to the nursing station but not yet given a bed assignment. The primary user of this display will be nursing station personnel for making nursing entries (e.g., medications given, vital sign data, etc.).
- Patient List by M.D.. All patients currently in the hospital who are the patients of a given doctor will be listed on this new output display. It will contain the patients' names and bed numbers, and will be in bed number sequence. It will be available to doctors and registered nurses but not to other system users. This display will be the first one presented to the physician after input of his user identification code. He may then make a light-pen selection of the patient for whom he wishes to enter orders.
- Current Orders. This is a video display of those medical orders for a given patient which are currently in effect as being neither cancelled nor completed. The date, type of order, and description of each order are included. Light-pen selections may be made to discontinue or review orders on this display.

- New Order Review. All medical orders in the order set that have just been assembled by the user are shown in this video display. The user will be required to retrieve this display and review the assembled orders for accuracy before he can enter them into the system.
- M.D. List. This is a video display of all physicians on the Hospital medical staff and the services to which they admit patients. The list is in alphabetical sequence, and the proper "page" in the list is reached by use of an M.D. List Index. The M.D. List is used to enter the physicians name in the patient identification or admitting record by light-pen selection rather than keyboard input so as to preclude typing errors. This display will also be used by nurses, or by a physician when entering orders as an agent for another doctor, by light-pen selection of the substituting doctor's name from the M.D. List.
- Medical Orders. These are a large number of video displays used for entering medical orders into the system. They are "fixed" displays in the sense that their contents do not vary from day to day because of changes to patient census, current orders, or medical staff. There are displays for all classes of medical orders, diagnoses and allergies, accessible for assembling of medical orders by successively retrieving the physician's Master Guide, major test/treatment/service order classes, then subtest/treatment/service order classes, using primarily light pen selections supplemented as necessary by keyboard entries.
- Current Medications. This video display contains a list of all current medication orders for a given patient. It is used in conjunction with the Current Orders display. It provides a means for the physician to enter a hold or restart of any medication order on the display, and for the nurse to enter a hold or restart of a medication order as part of a preparation for a test, or for her to enter a supply re-order for a Pharmacy-stocked medication.
- Patient Chart Review. This video display permits authorized users to view a patient's "chart" (i.e., a patient record in the computer file). Each record will contain the patient's identification, admitting data, current orders,

nursing report data test results, narrative reports, and DC'd orders. Each of these sections of the chart may be individually selected by light pen for review. Authorized personnel will include attending physicians, nurses, pathologists, and radiologists.

- Patient Locator. All patients currently in the hospital and their bed numbers are listed alphabetically by last name on this video display. An index on each display permits transferring to the desired section of the alphabet to view that section of the list; alternately, the user may page through the list, display by display. The Patient Locator will be useful to Admitting, Business Office, etc., and to similar departments when they are equipped with a video matrix terminal.
- Scheduled Medications Given. This video display contains a list of current scheduled medications due to be administered to affected patients in the ward where displayed, and of medications overdue for previous time periods. The display is in bed number sequence, listing the medications due and overdue under each patient name. Provision is made for entry by means of the light pen whether or not the medication was given. The display will indicate medications due for a specified time period, and its contents therefore will vary for different times of the day.
- Unscheduled Medications Given. In this video display, a list of all current unscheduled medication orders, for affected patients in the ward where displayed, is provided. The display is in bed number sequence, listing the unscheduled medication orders under each patient's name. The display includes, for each medication order, the time the last dose was given. The user will select by light pen any medications given since the last dose.
- Nursing Reports. These reports are a set of video displays for vital signs, fluid balance, unit clinical tests, diet, and special observations. They provide for entry by light pen of numerical data and descriptive words and phrases, and for entry by keyboard as required, in the above categories. Displays will provide for entry of data in one category for one patient on one display. In some cases, entry may be made in one category for all patients in the ward, using one or two displays.

- Central Supply Requests. These video displays will be used by nursing station personnel to enter Central Supply Requests into the system. Most entries will be made by light-pen selections from lists of Central Supply supplies and equipment, and by keyboard entry for less commonly requested items. This function will be defined in greater detail at a later date.

7.4.2 Admitting Functions

Brief summaries of the Admitting functions listed in Table 7-2 are presented in this subsection.

Table 7-2

ADMITTING FUNCTIONS

Input	Printed Output	Video Display	Description
X			User Identification [a]
X			Patient Identification[a]
	X		Bed Vacate or Occupancy Notice[a]
	X		Transfer/Discharge Order[a]
		X	Patient Locator[a]
		X	M.D. List[a]
X	X	X	Admitting Data
X		X	Insurance Data

(a) Previously presented.

Admitting Data. Three aspects of this data function are as follows:

- Admitting Data Input. Admitting personnel will make keyboard entries to input pre-admitting data. These data will be an amplification of the patient identification data used in the Nursing Unit functions and may be used in place of patient identification. Entry of pre-admitting or admitting data will initiate the patient record in the computer file, and permit subsequent entry of medical orders.

- Admitting Data Printout. This is a printout at the Admitting office of the pre-admitting or admitting data entered for a given patient, including changes or cancellations. There will be one printout for each original, changed, or cancelled output. Printouts will be on multiple-part paper for distribution to the nursing station, Business Office, etc.
- Admitting Data Display. This video display contains the name of each admitting data element, with space adjacent to each name for entry of the required data. Admitting data previously entered into the patient's record can be retrieved, displayed, and subsequently added to or changed (e.g., pre-admitting data supplemented by additional data when the patient is admitted to the hospital. Admitting data may also be cancelled when pre-admitting data have been previously entered, and the pending admit cancelled.

Insurance Data. This aspect of the Admitting function includes the following:

- Insurance Data Input. Entries of insurance data will be made by means of typewriter keyboard during the admitting process and supplemented as necessary by entries at the Business Office. Inputs will include Medicare and Medi-Cal as well as commercial insurance. Once entered, these data may be retreived and revised or supplemented by keyboard entry at any time during the patient's stay.
- Insurance Data Display. The admitting clerk will enter insurance data, by means of keyboard entry, on a series of video forms. Each form will contain the required data element names, with space adjacent to each for entering the required data. When the initial form processing is finished (although the form is usually incomplete at this point) and entered into the computer file by the admitting clerk, these data may subsequently be retrieved for video display by the insurance clerk in the Business Office corrected as necessary, and the missing data elements entered, until the insurance data is complete for each patient. These data are then transferred to the Business Office System (BOS) Patient Billing/Accounts Receivable program.

7.4.3 Business Office Functions

Summaries for the Business Office functions listed in Table 7-3 are provided in this subsection.

Table 7-3

BUSINESS OFFICE FUNCTIONS

Input	Printed Output	Video Display	Description
X			User Identification[a]
X		X	Insurance Data[a]
X		X	Cash Payments, Credits and Adjustments, and Miscellaneous charges
	X		Bed Occupancy Report
	X		Physician's Patient Locator
	X	X	Patient Locator
	X		Statistical Management Reports
	X		Patient Billing Data
	X		Discharged Patient Medical Data
		X	Billing Transactions

(a) Previously presented.

Input and Display. Cash payments, credits and adjustments, and miscellaneous charges entries will be made at the Business Office, identifying the patient, the type of transaction, the charge code involved, and, as necessary, the amount of the charge or credit. The method of entry – keyboard and/or light-pen selection from video displays – is yet to be determined. Entries will result in updating of the billing transaction file.

Printed Outputs. The following outputs will be provided:

- Bed Occupancy Report. This is a printout listing all beds in the hospital and, for each occupied bed, the patient identification (e.g., name, case number), bed number, physician's name, etc. The report will be in nursing station sequence and in bed-number sequence within each nursing station. It will be printed on the line printer in the Business Office when an authorized user enters a printout request at the video matrix terminal and will be current as of that moment.

- Physician's Patient Locator. This printout will list the names of all physicians with patients currently in the hospital. For each such physician, it will provide the name, case number, bed number, etc. for each of his patients. The report will list the data by physician name sequence, and by bed-number sequence under each physician's name. It will be printed on the line printer in the Business Office when an authorized user enters a printout request at the video matrix terminal and will be current as of that moment.
- Patient Locator. For all patients currently in the hospital, this printout lists the names, case numbers, bed numbers, physician's names, etc. Patient names will be grouped by category (adult, pediatric, etc.), and listed alphabetically by patient name within each category. The report will be printed on the line printer in the Business Office when an authorized user enters a printout request at the video matrix terminal and will be current as of that moment.
- Other Statistical and Management Reports. These printouts will be periodic (daily, weekly, or monthly). The specific reports and their formats, frequencies, etc., are yet to be determined. These reports will not include financial data.
- Patient Billing Data. This printout is a list of all billing transactions generated within the system since the last billing printout. It will contain, for each billing transaction, the patient identification, date and time, and charge code. This listing will probably be run daily, in accordance with the input schedule for the BOS* Patient Billing/Accounts Receivable program.
- Discharged Patient Medical Data. This printout will abstract, chiefly for mailing to the patient's physician, selected data from the patient's record

*Business Office System

(e.g., laboratory and radiology test results) as accumulated during the patient's hospitalization. It will be printed daily, with each daily printout covering all patients who were discharged or who expired during the previous day. It will be printed on the line printer in the Business Office.

Video Display (Billing Transaction File). This display covers the contents of the billing transaction file, for those transactions contained in the file since the most recent transfer of file contents to the BOS Patient Billing/Accounts Receivable program. It is for use by Business Office personnel in crediting and adjusting previously entered charges, retrieving charge codes for discharge day billing, etc. The clerk will identify the patient to the system by use of the Patient Locator display, then retrieve the charge codes for each transaction in the file for that patient for viewing and/or changing purposes.

7.4.4 Food Service Functions

These functions are listed in Table 7-4 and summarized in this subsection.

Table 7-4

FOOD SERVICE FUNCTIONS

Input	Printed Output	Video Display	Description
	X		Diet Order
	X		Cancellation Notice[(a)]
	X		Bed Vacate or Occupancy Notice [(a)]
	X		Transfer/Discharge Order[(a)]
	X		Diets Ordered List
	X		Patient Meal Count Summary

(a) Previously presented.

Printed Output. Major aspects of the Food Service functions are as follows:

- Diet Order. This is a printout of each diet order at the Food Services Department immediately after the diet order has been entered at the nursing station. The printout is used by the dietitian and other Department personnel to determine the need for consultation with the patient (and/or doctor or nurses) and for meal planning.

- <u>Diets Ordered List.</u> This printout is provided to Food Services three times per day, prior to each meal, and lists the current diet order for each patient in the hospital. Each list is in nursing station sequence, with the patients and their diet orders listed in bed-number sequence under each nursing station. The list is used in preparing and routing patient meal trays.
- <u>Patient Meal Count Summary.</u> Three times per day, prior to each meal, a printout is provided to Food Services to indicate the total number of current diet orders by category. These categories are regular, liquid, soft, bland, low-fat, low-calorie, low-sodium, low-residue, diabetic, and other miscellaneous. These data are used in preparing food for patients.

7.4.5 Pathology Functions

Summaries for the Pathology functions as listed in Table 7-3 are presented in this subsection.

Table 7-5

PATHOLOGY FUNCTIONS

Input	Printed Output	Video Display	Description
X			User Identification[a]
X			Laboratory Results
	X		Daily Laboratory Summary
	X		Patient Chart[a]
	X		Laboratory Test Requisition
	X		Cancellation Notice[a]
	X		Specimen Pick-up List
	X		Bacteriology Log
	X		Laboratory Worksheet
	X		Reminder Notice
		X	Patient Chart Review[a]
		X	Patient Selector
		X	Laboratory Results (by Patient)
		X	Laboratory Results (by Test)
		X	Unreleased Laboratory Orders

[a] Previously presented

Inputs. Laboratory test results are entered by the laboratory technician or clerk by making light-pen selections of numeric values and descriptor words. These entries are supplemented as necessary by keyboard entries. The test results may be entered either by patient or by test type.

Printed Outputs. Six categories of printed outputs are provided, as follows:

- Daily Laboratory Summary. This is a printout at the laboratory, or on a line printer in the Business Office, of all test results completed by the end of the laboratory work day. The data are sequenced first by laboratory department, and then by patient name. This summary may be used as a ready reference by the laboratory for answering telephone inquiries and will provide the laboratory with a permanent hard copy of all test results.
- Laboratory Test Requisition. In this printout, the laboratory tests to be performed on a patient's specimen are listed. Each requisition is on a separate page, and is applicable to one patient and one laboratory department. Requisitions requiring nonblood specimens are printed at the patient's nursing station. After specimen collection, each requisition is sent with the specimen to the laboratory. Requisitions requiring blood specimens are printed at the laboratory. This requisition is in worksheet format for the recording of test results. Routine requisitions will be batch-printed at scheduled times, and stat requisitions will be printed immediately.
- Specimen Pick-Up List. This is a printout at the laboratory of laboratory orders involving pick-up of blood specimens for those orders held in suspense for batch release. There is a separate list for each nursing station with the patients listed in bed number sequence within each nursing station. The list will be printed once or twice per day. Each list will be annotated as specimens are collected, and one copy will be left at the nursing station.
- Bacteriology Log. Cultures on patient specimens that were begun the previous day are listed on this printout at the laboratory. It is printed each morning in test category sequence, with each affected patient's name listed alphabetically under each test category. Space is provided on the Log for the entry of periodic notes related to such items as culture growth or reagents added, and for the laboratory technologist's initials after preliminary or final test results are entered into the system.

- Laboratory Worksheet. This is a printout at the laboratory of those tests which have been held in suspense for batch printout one or more times per day. A worksheet is printed for certain high volume subtests (e.g., WBC), for which all specimens in the batch are given the same subtest at the same time. Each test with a worksheet will also be included on the laboratory test requisition for that patient.

  Each worksheet is in patient-name alphabetical sequence. Test results are annotated on the worksheet, then entered into the system by means of the Laboratory Results by Test display.
- Reminder Notice. This printout will be made at the laboratory or the Radiology Department whenever a test result has not been entered within a specified time period after printout of the laboratory test or radiology requisition. Reminder notices will be batch-printed in a laboratory or Radiology Department sequence, with affected requisitions in patient-name sequence within each department.

Video Displays. Four Pathology functions utilize video displays as follows:

- Laboratory Patient Selector. This video display lists the names of patients for whom laboratory orders have been entered but for whom laboratory test results have not been entered. There will be a separate display for each laboratory department with each display in patient-name alphabetical sequence. The user will select, by light pen, the name of the patient for whom he wishes to enter results in order to obtain the appropriate Laboratory Results by Patient display.
- Laboratory Results by Patient. These are a group of video displays, each for a different laboratory department. Each display indicates the subtests performed by a given department, and provides a means for light-pen selection of numeric and word descriptor test results, and for keyboard entry of short, narrative, test-result data. The format will be similar to that of the Laboratory Test Requisition, to facilitate entry of the test results annotated on the requisition. These displays are utilized after the user identifies the patient and laboratory department to the system.

- Laboratory Results by Test. These are a group of video displays, each for a different laboratory subtest. Each display contains the names of patients for whom that subtest has been ordered and provides for light-pen selection of numeric and word descriptor test results and keyboard entry of short, narrative, test-result data. Each display presents the data by patient name in alphabetical sequence. These displays are utilized after the user selects the laboratory department and subtest type from the preceding displays.
- Unreleased Laboratory Orders. This video display permits laboratory personnel to view and, if desired, to release (or print) one or more Laboratory Test Requisitions that are contained in the suspense file awaiting the next scheduled batch-release time. These displays list for each nursing station the name of each patient for whom laboratory tests have been performed, and the laboratory tests ordered for each patient.

7.4.6 Radiology Functions

Table 7-6 presents all of the radiology functions available with the Medical Information System and categorizes them as either input, printed output, or video display.

Inputs. Following are descriptions of the types of input available for the Radiology function:

- Verified Radiology Test Results. When this function is called, inpatient and and outpatient radiology test results, which were previously entered into the system on a preliminary basis, are permanently entered into the patient's files when the medical secretary, using a light pen, changes the status of the test results from preliminary to verified. Verified test results that are entered into the patient's files will be reflected in subsequent reports.
- Radiology Outpatient Identification and Order. When this input function is called, data elements identifying the patient (name, birth date, physician's name, etc.), the responsible party (name and address, etc.), and the code numbers of the radiology procedures to be performed are entered into the

Table 7-6

RADIOLOGY FUNCTIONS

Input	Printed Output	Video Display	Description
X			User Identification[a]
X			Verified Radiology Test Results
X			Radiology Outpatient Identification and Order
	X		Radiology Requisition
	X		Cancellation Notice[a]
	X		Reminder Notice[a]
	X		Radiology Test Report
	X		Radiology Daily Summary Report
	X		Test Result Correction Notice
	X		Patient Chart[a]
		X	Patient Chart Review[a]
		X	Radiology Patient Selector
		X	Radiology Results (Preliminary)
		X	Select Radiology Results
		X	Review Preliminary Radiology Results

[a] Previously presented

system by the medical secretary. A keyboard is used for this purpose. These patient-information elements are retained in the system for a specified period following the entry of verified test results and following the updating of the billing transaction file, and then they are deleted.

Printed Output. Three types of printed output are provided, as follows:

- Radiology Requisition. The Radiology Requisition is a printout, generated on the printer at the Radiology station, which lists the radiology procedures to be performed for a given patient, including the isotope tests and the radiotherapy treatments that are required. All procedures for a patient bearing the same schedule are printed on one requisition, immediately after entry of the radiology orders. Requisitions are generated for both inpatients and outpatients, and are in worksheet format to facilitate the recording of test results. Each requisition includes the current diagnosis as well as any clinical indications entered as part of the radiology order.

- Radiology Test Report. A Radiology Test Report is generated on the printer at the Radiology station whenever test results are verified and permanently entered into the patient's file. Each report is for one patient and for one radiologist, which the radiologist signs and retains in the files of the Radiology Department. Whenever new or changed test results are entered at the Radiology video matrix terminal, all previous results (for that one patient and that one radiologist) are included on the report.
- Radiology Daily Summary Report. The Radiology Daily Summary Report is a printout on the line printer in the Business Office of all verified inpatient and outpatient radiology test results completed during the previous day, and all radiology orders for which no verified test results have been entered (i.e., orders pending). The printout is sequenced by patient name within each of these two categories. Thus it can serve as a quick reference by Radiology Department personnel to determine workload status and to answer telephone inquiries.

Video Displays. The following functions involve the provisions of video displays:

- Radiology Patient Selector. The Radiology Patient Selector displays in alphabetical sequence the names of the radiology patients for whom test results have not yet been verified and permanently entered. This display appears only after the user has positively identified himself to the system. When the display appears, the user then can light-pen select the patient whose file he wishes to view or change.
- Preliminary Radiology Results. For the patient selected from the Radiology Patient Selector display, the Preliminary Radiology Results display presents,

in procedure number sequence, the radiology procedures that have been ordered for that patient. Test results are entered into the system, or preliminary results changed, by light-pen selection of the word "normal" or keyboard entry of test results. All entries are placed in a suspense file until retrieved for verification or change.

- Select Radiology Results. For the patient selected from the Radiology Patient Selector display, Select Radiology Results displays a list of the radiology procedures that have had preliminary test results entered and are awaiting verification. The user may light-pen select and view any one of the procedures listed on the display.
- Review Preliminary Radiology Results. For the procedure selected from the Select Radiology Results display, this video display will show the preliminary test results that were previously entered into the system and stored in a suspense file. The test results shown on the display may consist of the built-in "normal" statement, the radiologist's narrative statement entered via the keyboard, or both. After reviewing these test results, the user may make additions or changes and then, if desired, enter them into the patient's file as verified test results.

7.4.7 Pharmacy Functions

Table 7-7
PHARMACY FUNCTIONS

Input	Printed Output	Video Display	Description
	X		Pharmacy Order and Label
	X		Cancellation Notice[a]

[a] Previously presented

Pharmacy Label and Order. This is a printout at the Pharmacy station of medication orders and medication supply reorders for Pharmacy-stocked medications, each printed immediately after entry of the order at the nursing station. (Orders for floor-stocked medications will be printed at the nursing station only.) Printout at the

Pharmacy station consists of a two-part label, one for affixing to the medication container and the other for affixing to the patient's record in Pharmacy. Medication supply reorders cause printout in the Pharmacy of only the container label.

7.4.8 EEG-EKG Functions

Table 7-8

EEG-EKG FUNCTIONS

Input	Printed Output	Video Display	Description
	X		EKG Department Requisition
	X		Cancellation Notice[a]

[a] Previously presented

EKG Department Requisition. At the EKG Department, the following kinds of requisitions are included in this printout, which will be printed immediately after entry of the medical order at the nursing station:

- Electrocardiograms
- Electroencephalograms
- Phonocardiograms
- Vectorcardiograms
- Pulmonary function tests
- Vital capacity tests
- Basal metabolism rate tests

Each requisition will be for a separate test and will contain the patient's current diagnosis.

7.4.9 Physical Medicine Functions

Table 7-9

PHYSICAL MEDICINE FUNCTIONS

Input	Printed Output	Video Display	Description
	X		Physical Therapy Requisition
	X		Cancellation Notice[a]

[a]Previously presented

Physical Therapy Department Requisition. This is a printout of requests for physical therapy treatments, electromyogram examinations, and evaluations, each printed immediately after entry of the medical order at the nursing station. Requisitions will be printed on the printer in the EKG Department and hand-carried to the Physical Medicine Department. Each requisition is initiated by a separate medical order and will include the patient's current diagnosis.

7.4.10 Inhalation Therapy Functions

Table 7-10

INHALATION THERAPY FUNCTIONS

Input	Printed Output	Video Display	Description
	X		Inhalation Therapy Requisition
	X		Cancellation Notice[a]

[a]Previously presented

Inhalation Therapy Requisition. This is a printout of requests for inhalation therapy treatments, each printed immediately after entry of the medical order at the nursing station. Each requisition is initiated by a separate medical order and will include the patient's current diagnosis.

7.4.11 Central Service Functions

Table 7-11

CENTRAL SERVICE FUNCTIONS

Input	Printed Output	Video Display	Description
	X		Central Supply Requisition

Central Supply Requisition. This is a printout at Central Services of supplies or equipment requested by nursing station personnel, including both chargeable and non-chargeable items. A printout of the request will also be made at the nursing station as a confirmation and, as applicable, as a request for chargeable floor-stocked items. One or more items for a given patient may be included on one requisition.

7.5 MEDICAL INFORMATION SYSTEM (MIS-II)

The evolutionary increase in the scope of services will continue during the development of MIS-I. The following functions, some of which have been previously mentioned, are being considered for incorporation into MIS-II:

- Nursing Notes
- Physician's Progress Notes
- History and Physical
- Laboratory Automation
- Diagnostic and Therapeutic Guides
- Physiologic Monitoring
- Dietary Planning
- Patient Scheduling
- Personnel Schedules
- Work Measurements
- Outpatient Department Scheduling
- Administrative Statistics

- Personnel Records
- Personnel Locator
- Poison Control
- Library Retrieval
- Preventive Maintenance
- Prognostic Calculation

7.6 MIS-I SYSTEM BENEFITS

A variety of benefits will be derived from the MIS-I System. Additional advantages will result upon implementation of MIS-II.

7.6.1 Hospital Staff Benefits

Various staff benefits from the improved systems are as follows:

Physician. Following are benefits to the physician:

- Physician orders will be accomplished more quickly and accurately.
- The physician's records will be more legible.
- More efficient chart organization will be available for faster reading.
- Current test data and laboratory reports can be called up on demand.
- Duplicate record generation can be eliminated.
- Batching of orders can be implemented where desirable.

Nurse. Potential benefits to the nurse are as follows:

- Legibility of orders will result since printouts will eliminate handwritten orders. Order transcription will be substantially eliminated.
- Summaries of entries to the patient's chart will be provided at the end of each shift.
- At the beginning of each shift, Patient-Care Plans will be provided and will include accurate, up-to-date orders for the new shift.

- Errors in order transcription will be reduced.
- Overdue test result reminders and medications-given entries will be handled by the computer.
- Cancellation of orders (such as "72 hours only") will be automatically processed by the computer.
- Loss of requisitions will be reduced.
- Improved charting may be anticipated through increased use of displayed data elements related to patient-care observations.

Ancillary Services. Professional and technical personnel in the ancillary services will benefit from the system in the following areas:

- Routine paperwork will be reduced.
- Medical records will be more accessible.
- Work scheduling and assignments will be facilitated.
- Medication labels and laboratory and Radiology worksheets will be generated automatically.
- Processing of charge slips for patient billing will be greatly reduced.

Hospital Administrator. The administrator will receive reports enabling him to increase the efficiency of personnel and facility utilization, and providing previously unavailable management controls. Management information available from the system will include the following:

- Financial management
- Statistical reports
- Medical audit reports
- Trend reports
- Medical staff review

7.6.2 Patient Benefits

Patients will benefit since hospital facilities (beds, drugs, and staff) will be more readily available. Errors will be reduced and routine service and emergency responses will be more timely. Transfer of vital records and billing insurance records will be handled more expeditiously.

7.6.3 Potential Cost Reduction Benefits

The Medical Information System will provide direct cost-reduction benefits in the following areas:

- Reduced manhours in processing doctor's orders by elimination of transcriptions, and other related clerical and physical transfer effort
- Almost complete elimination of manhours spent on patient charges by nursing and ancillary service personnel
- Elimination of manhours presently spent in manually compiling statistical summaries, census reports, diet lists, etc.
- More effective organization of patient-care status and planning

Appendix A
PROFILES OF PARTICIPATING HOSPITALS

This appendix presents the characteristics of the hospitals that participated in the Analysis of Information Needs of Nursing Stations. These characteristics are based on data from the Journal of the American Hospital Association, Guide Issue, 1968. (See Fig. A-1 and Table A-1)

As mentioned in the Introduction to this report (Section 1), a hospital identification code has been used to identify data obtained or developed for the various hospitals that participated in the study.

KEY LISTING OF REGISTERED HOSPITALS

Hospital, Address, Telephone, Administrator, Approval and Facility Codes	Classification Codes			Inpatient Data				Newborn Data		Expense (Thousands of Dollars)		Personnel
*Indicates membership in the American Hospital Association. Telephone area codes, when available, have been shown following the city and county. For definitions and explanation of other codes see page 10.	Control	Service	Stay	Beds	Admissions	Census	Occupancy (Per Cent)	Bassinets	Births	Total	Payroll	
ANYTOWN—Universal County —204—												
*COMMUNITY HOSPITAL-1st St and Main Ave-Zip 62835-Tel 391-2345-John Doe, Adm A-1-2-3-4-5-6-9-10 F-1-3-4-5-7-8-9-11-12-13-14-15-16	21	10	L	655	18982	595	90.8	45	2114	14135	9227	1782

APPROVALS

Reported by the approving bodies specified, as of the dates noted

1—Accreditation by Joint Commission on Accreditation of Hospitals (Dec. 31, 1966).

2—Cancer program approved by American College of Surgeons (Jan. 1, 1967).

3—Residency approved by American Medical Association (June 30, 1966).

4—Internship approved by American Medical Association (June 30, 1966).

5—Medical school affiliation, reported by American Medical Association (June 30, 1966).

6—Hospital-controlled professional nursing school, reported by National League for Nursing (Oct. 15, 1966).

7—Hospital-controlled practical nurse training program approved by state or equivalent governmental authority; reported by National League for Nursing (Oct. 15, 1966).

8—Member of Council of Teaching Hospitals of the Association of American Medical Colleges (July 1, 1966).

9—Hospital contracting or participating in Blue Cross Plan, reported by Blue Cross Association (Jan. 20, 1967).

10—Certified for participation in the Health Insurance for the Aged (Medicare) Program by the Department of Health, Education, and Welfare (Feb. 1967).

FACILITIES AND SERVICES

Actually available within, and reported by, the institution

1—Pathology laboratory (with pathologist)
2—Dental facilities
3—Pharmacy (with registered pharmacist)
4—Occupational therapy department
5—Physical therapy department
6—Premature nursery
7—Outpatient department
8—Emergency department
9—Psychiatric inpatient unit
10—Rehabilitation inpatient unit
11—Postoperative recovery room
12—Social work department
13—Hospital auxiliary
14—Radioisotope therapy
15—Cobalt therapy
16—Radium therapy

The designation (Nonreporting) following a hospital identification indicates that the 1966 annual survey questionnaire for the hospital had not been received by February 24, 1967, the cutoff date for statistical processing.

The designation (Newly Registered) indicates that the hospital was registered too late to receive and return a questionnaire.

CLASSIFICATION CODES

CONTROL

Governmental, nonfederal

12—State
13—County
14—City
15—City-county
16—Hospital district

Voluntary nonprofit

21—Church related or operated
23—Other nonprofit

Proprietary for-profit

31—Individual
32—Partnership
33—Corporation

Governmental, federal

41—Air Force
42—Army
43—Navy
44—Public Health Service other than 47
45—Veterans Administration
46—Federal other than 41-45, 47-48
47—Public Health Service Indian Service
48—Department of Justice

SERVICE

10—General
11—Hospital unit of an institution (prison hospital, college infirmary, etc.)
22—Psychiatric
33—Tuberculosis
44—Maternity
45—Eye, ear, nose, and throat
47—Orthopedic
48—Chronic and/or convalescent
49—Other specialty*
5-—Children's**
62—Institution for mental retardation
72—Epilepsy
82—Alcoholism and/or addictive diseases

*When a hospital restricts its service to a specialty not defined by a specific code, it is coded 49 and the specialty is indicated in parentheses following the name of the hospital.

**When service is restricted to children, the first digit is always "5," indicating "children's hospital," and the second digit indicates the specific type of service: children's general, 50; children's psychiatric, 52; and so forth.

STAY

S—Short-term—over 50 per cent of all patients admitted have a stay of less than 30 days.

L—Long-term—over 50 per cent of all patients admitted have a stay of 30 days or more.

DEFINITIONS OF TERMS IN HEADINGS*

INPATIENT DATA: Beds—Number of beds, cribs, and pediatric bassinets regularly maintained (set up and staffed for use) for inpatients as of the close of the reporting period; does not include bassinets for newborn infants. **Admissions**—Number of patients accepted for inpatient service during a 12-month period; does not include newborn. **Census**—Average number of inpatients receiving care each day during a 12-month period; does not include newborn. **Occupancy**—Ratio of average daily census to the average number of beds maintained during the 12-month reporting period. (Note that the number of these "statistical beds" may differ from the bed count at the close of the reporting period.)

NEWBORN DATA: Bassinets—Number of bassinets normally available for newborn infants. **Births**—Number of infants born in the hospital and accepted for service in a newborn infant bassinet during a 12-month period; excludes stillbirths.

EXPENSE: Expense for a 12-month period; both total expense and payroll component are shown.

PERSONNEL: Excludes trainees (student nurses, interns and residents, other), private duty nurses, and volunteers; includes full-time equivalents for part-time personnel.

*Definitions are based on the American Hospital Association's *Uniform Hospital Definitions.* Where a 12-month period is specified, hospitals were requested to report for the 12 months ending Sept. 30, 1966.

10 Listings of Health Care Institutions HOSPITALS, J.A.H.A.

Fig. A-1 **Key Listing of Registered Hospitals**

Table A-1

HOSPITAL CHARACTERISTICS PROFILE

Hospital Identification Approvals Facilities	Classification Codes			Inpatient Data				Newborn Data		Expense (Thousands of Dollars)		Personnel
	Control	Service	Stay	Beds	Admissions	Census	Occupancy (Per Cent)	Bassinets	Births	Total	Payroll	
Hospital L2 A-1-2-3-4-5-6-7-8-9-10 F-1-2-3-4-5-6-7-8-10-11-12-13-14	21	10	S	585	17160	538	91.5	37	1415	9395	5540	1365
Hospital L1 A-1-3-4-5-6-8-9-10 F-1-3-4-5-6-7-8-9-10-11-12-13-14-15	23	10	S	1063	31304	850	80.0	78	2055	21087	10868	2918
Hospital L3 A-1-2-3-4-5-8-9-10 F-1-3-4-5-6-7-8-9-10-11-12-13-14-15	23	10	S	574	21784	489	85.2	57	2286	17566	10804	1578
Hospital M2 A-1-10 F-1-3-5-6-8-11-13-15	23	10	S	268	7590	217	81.0	40	1349	4591	2873	608
Hospital M3 A-1-9-10 F-1-3-5-6-8-10-11-12-13-14-15	21	10	S	250	8896	209	83.6	31	1219	3693	2542	525

Table A-1 (Cont.)

Hospital Identification **Approvals** **Facilities**	Classification Codes			Inpatient Data				Newborn Data		Expense (Thousands of Dollars)		Personnel
	Control	Service	Stay	Beds	Admissions	Census	Occupancy (Per Cent)	Bassinets	Births	Total	Payroll	
<u>Hospital M1</u> A-1-6-9-10 F-1-2-3-5-6-8-9-11-13-14-15	23	10	S	346	14618	264	75.2	49	2857	8371	4962	823
<u>Hospital S2</u> A-9-10 F-1-3-5-6-7-8-11-13	29	10	S	77	2810	68	77.3	22	196	1017	781	167
<u>Hospital S1</u> A-9-10 F-1-3-11	33	10	S	82	1649	39	47.6	-	-	451	275	114
<u>Hospital S3</u> A-1-9-10 F-1-3-5-8-11-13-15	23	10	S	48	1994	30	62.5	-	55	1054	645	92
<u>**Hospital A**</u> A-1-3-4-10 F-1-3-4-5-6-7-8-11-12-13-14	23	50	S	247	14081	207	83.8	-	-	4781	2604	596

Table A-1 (Cont.)

Hospital Identification **Approvals** **Facilities**	Classification Codes			Inpatient Data				Newborn Data		Expense (Thousands of dollars)		Personnel
	Control	Service	Stay	Beds	Admissions	Census	Occupancy (Per Cent)	Bassinets	Births	Total	Payroll	
Hospital B A-1-3-10 F-2-3-4-5-7-9-10-11-12-13	23	22	L	404	545	456	1129	-	-	6557	-	691
Hospital C A-1-2-3-4-5-6-8-9-10 F-1-2-3-4-5-6-7-8-9-11-12-13-14-15-16	13	10	S	2248	90959	2066	73.9	283	11293	67275	41599	5984
Hospital D A-1-9-10 F-1-2-3-5-6-7-8-9-11-13-14-15	21	10	S	190	7857	152	78.8	19	491	2117	1149	325
Hospital E A-1-3-6-9-10 F-1-3-4-5-6-7-8-9-11-12-13-15	21	10	S	346	12158	265	80.5	47	1780	5393	3367	756
Hospital F A-1-3-5-10	23	49	L	55	-	-	-	-	-	-	-	-

Appendix B
HOSPITAL COMMITMENT TO INFORMATION PROCESSING

In this appendix, the information commerce at each hospital is presented in seven separate computer-generated plots for each hospital, as shown in Figs. B-1 through B-63.

The relationship of the hospital identification code to hospital size (as used for these graphs) is as follows:

Code	Number of Beds
Large Hospitals	
L1	1,063
L2	585
L3	574
Medium Hospitals	
M1	346
M2	268
M3	250
Small Hospitals	
S1	82
S2	77
S3	48

Figures B-64 through B-70 show the information commerce observed at an extended-care facility which had been recently opened and which was operating as a satellite facility for one of the medium-size hospitals. At the time the study was made, this extended-care facility had only two nursing units in operation. One was a psychiatric unit, and the other provided a combination of extended and continuing care.

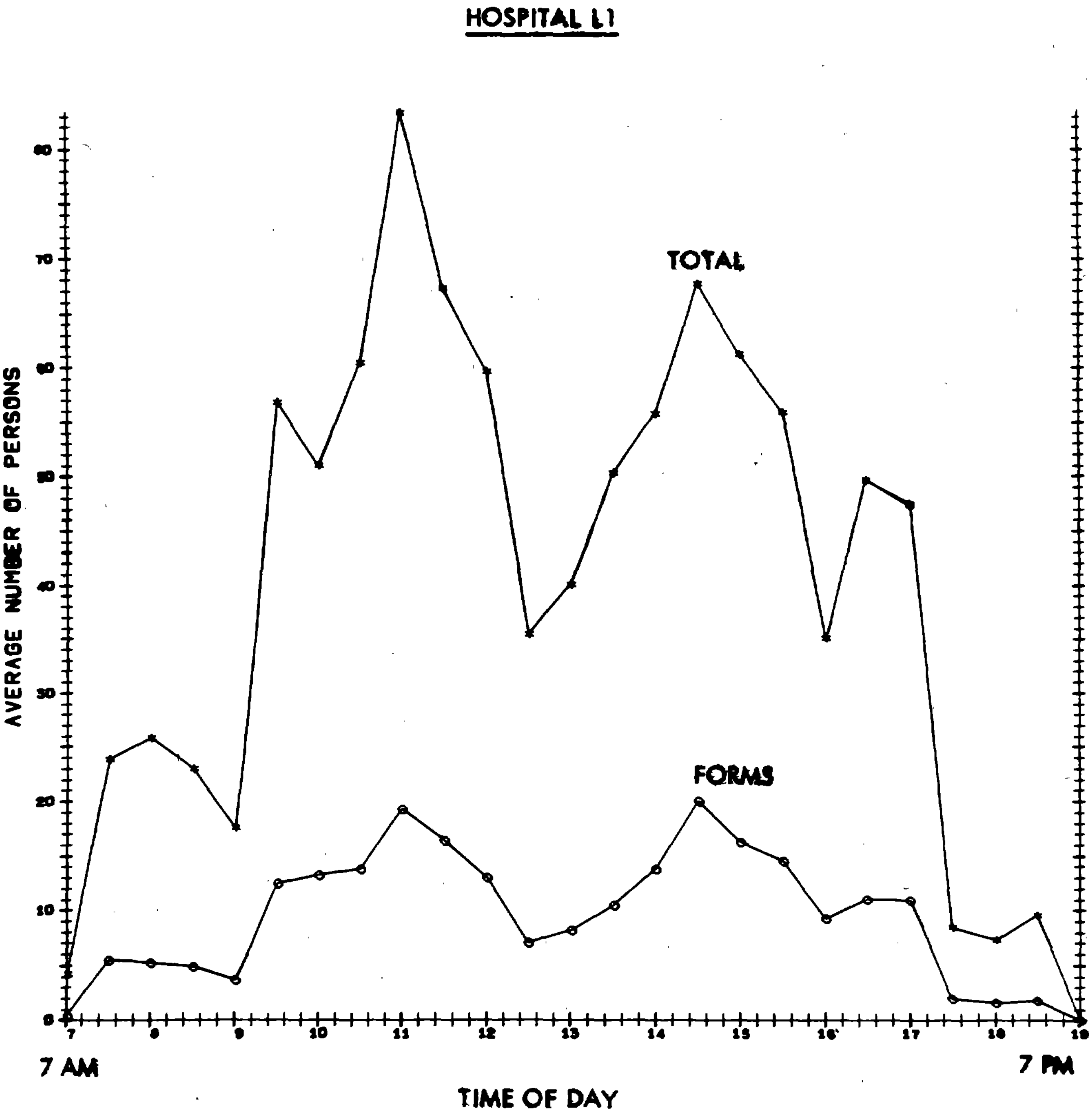

Fig. B-1 Ratio of Forms Processing to Total Information Processing – Hospital L1

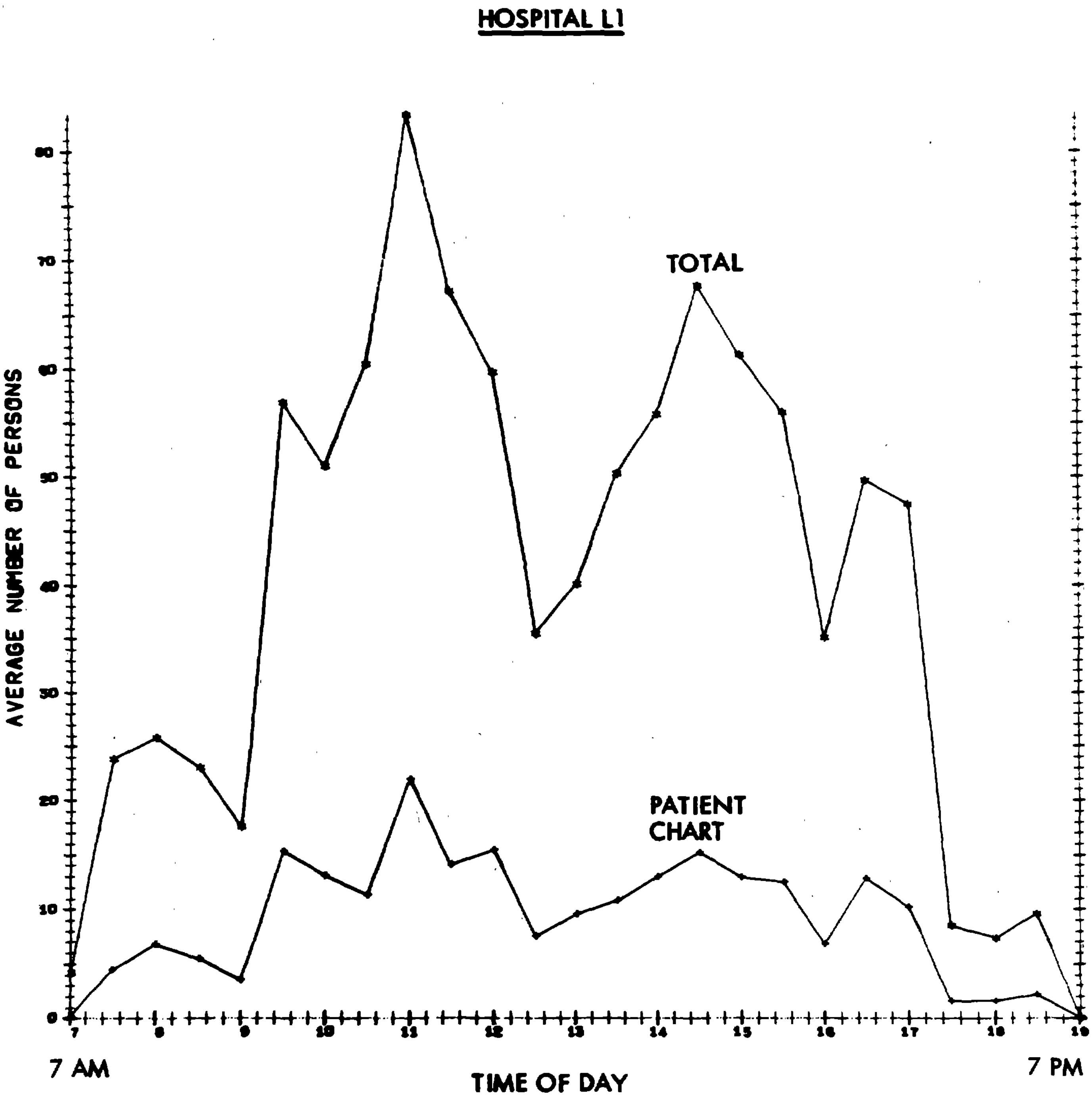

Fig. B-2 Ratio of Chart Processing to Total Information Processing – Hospital L1

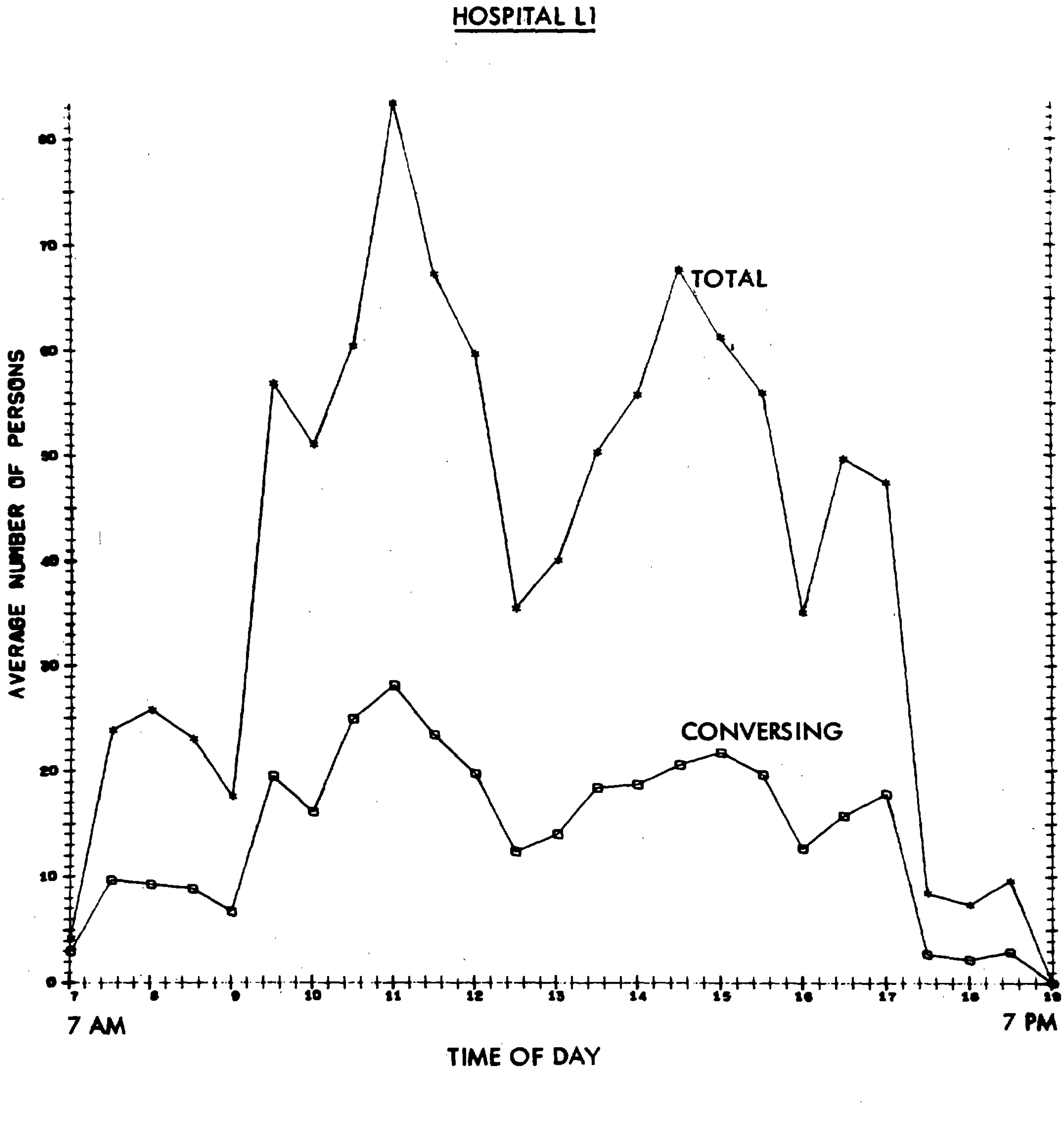

Fig. B-3 Ratio of Conversing to Total Information Processing – Hospital L1

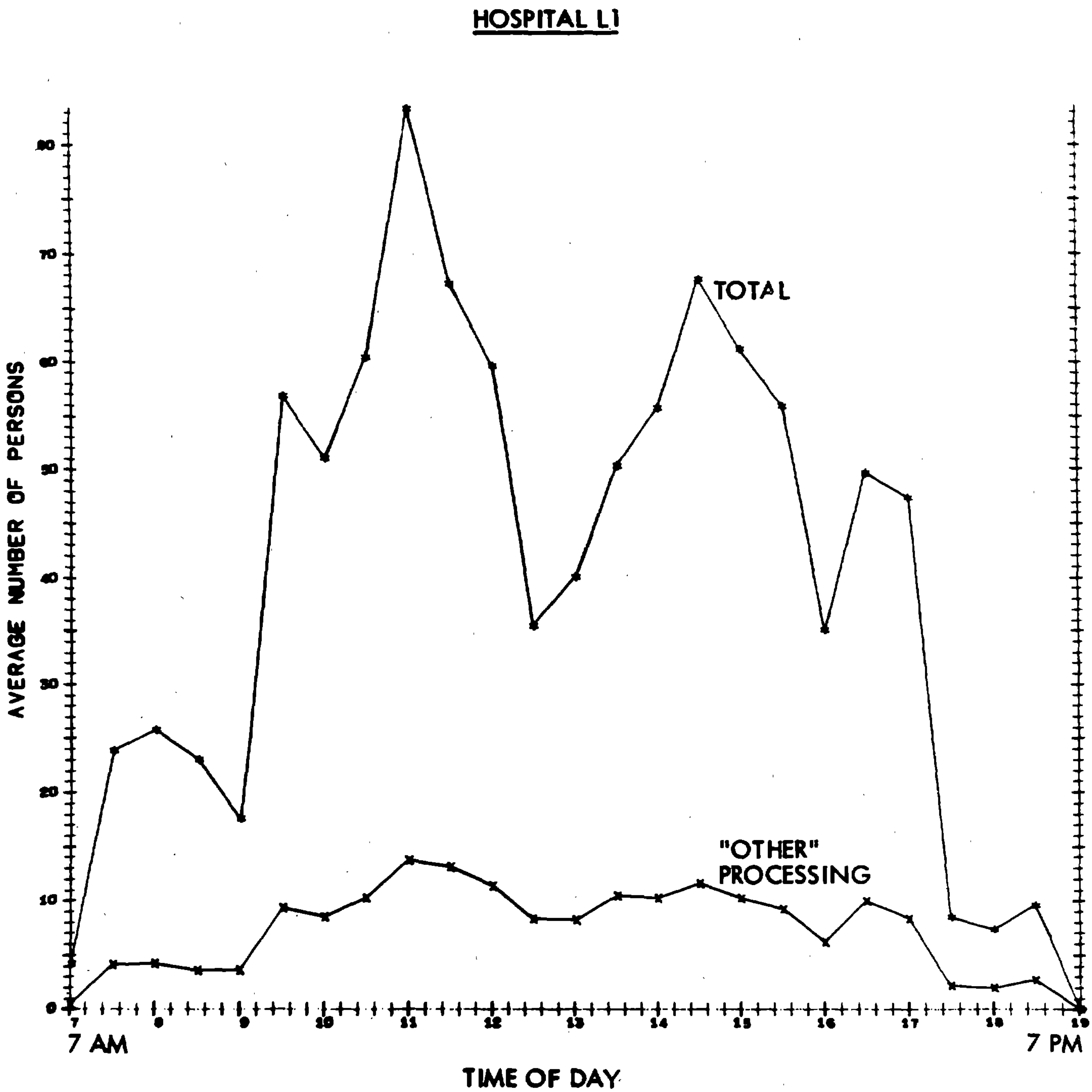

Fig. B-4 Ratio of "Other" Processing to Total Information Processing – Hospital L1

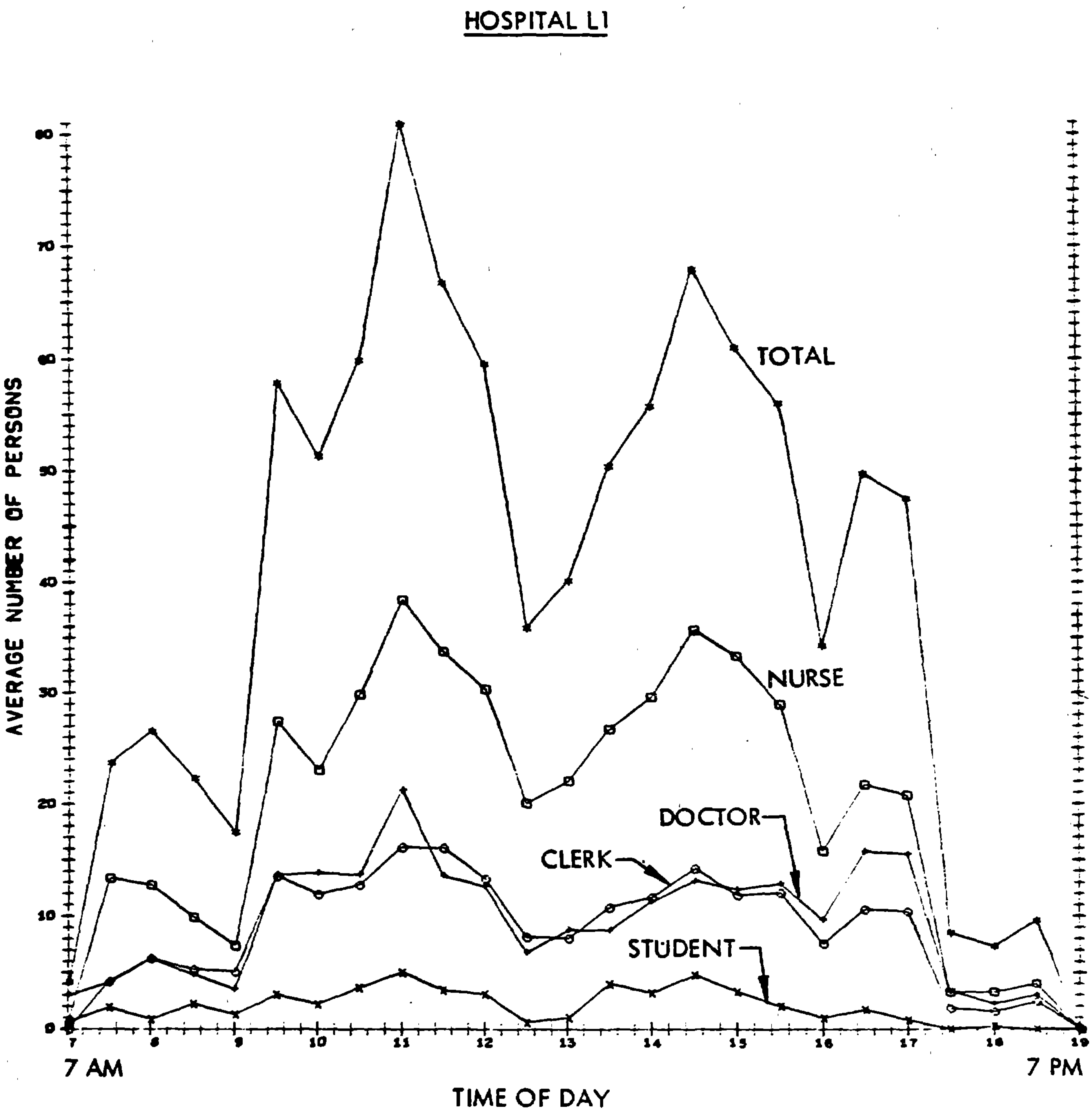

Fig. B-5 Comparison by Skill Levels of Personnel Processing to Total Information Being Processed – Hospital L1

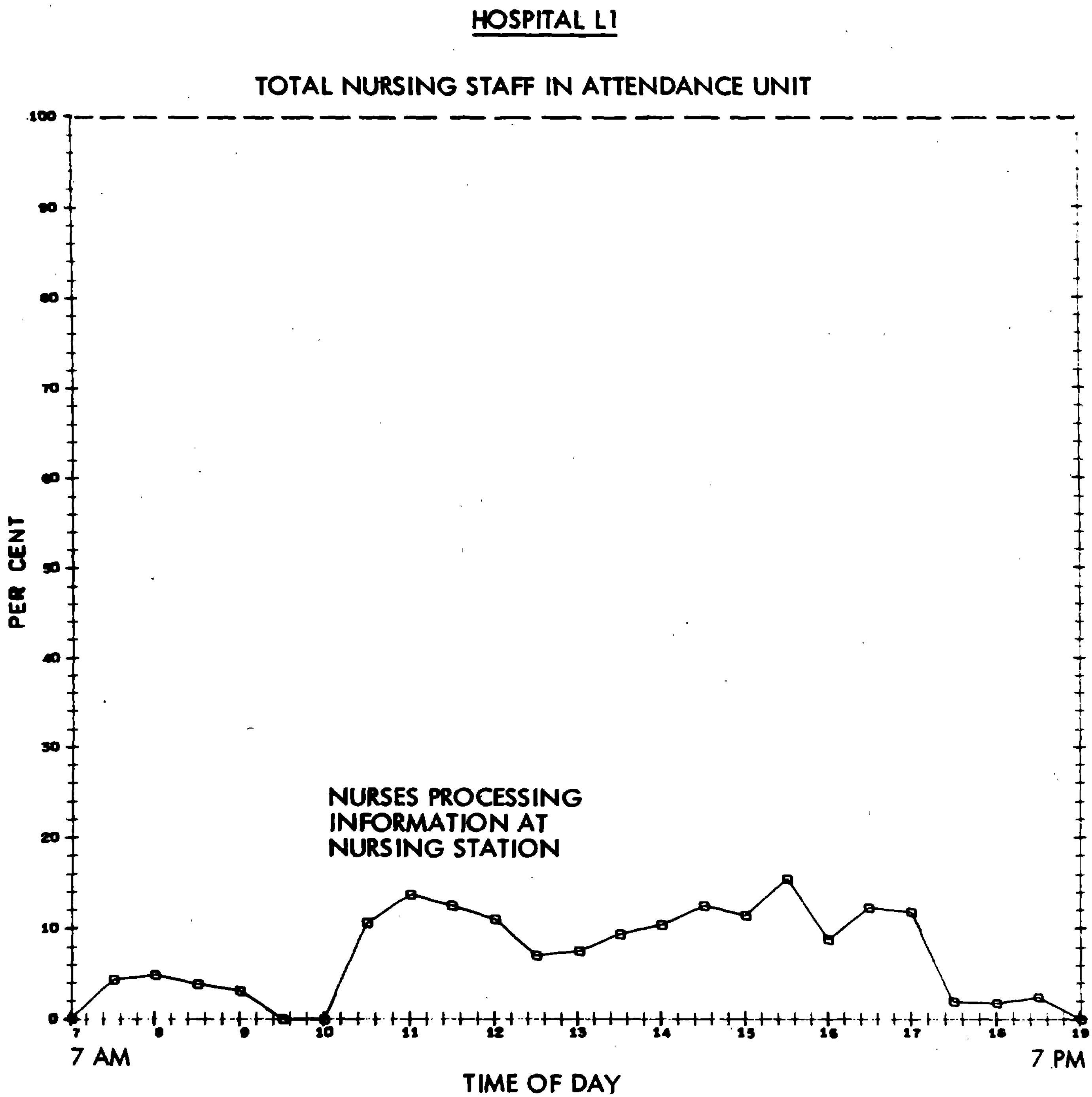

Fig. B-6 Percentage of Nursing Staff Processing Information – Hospital L1

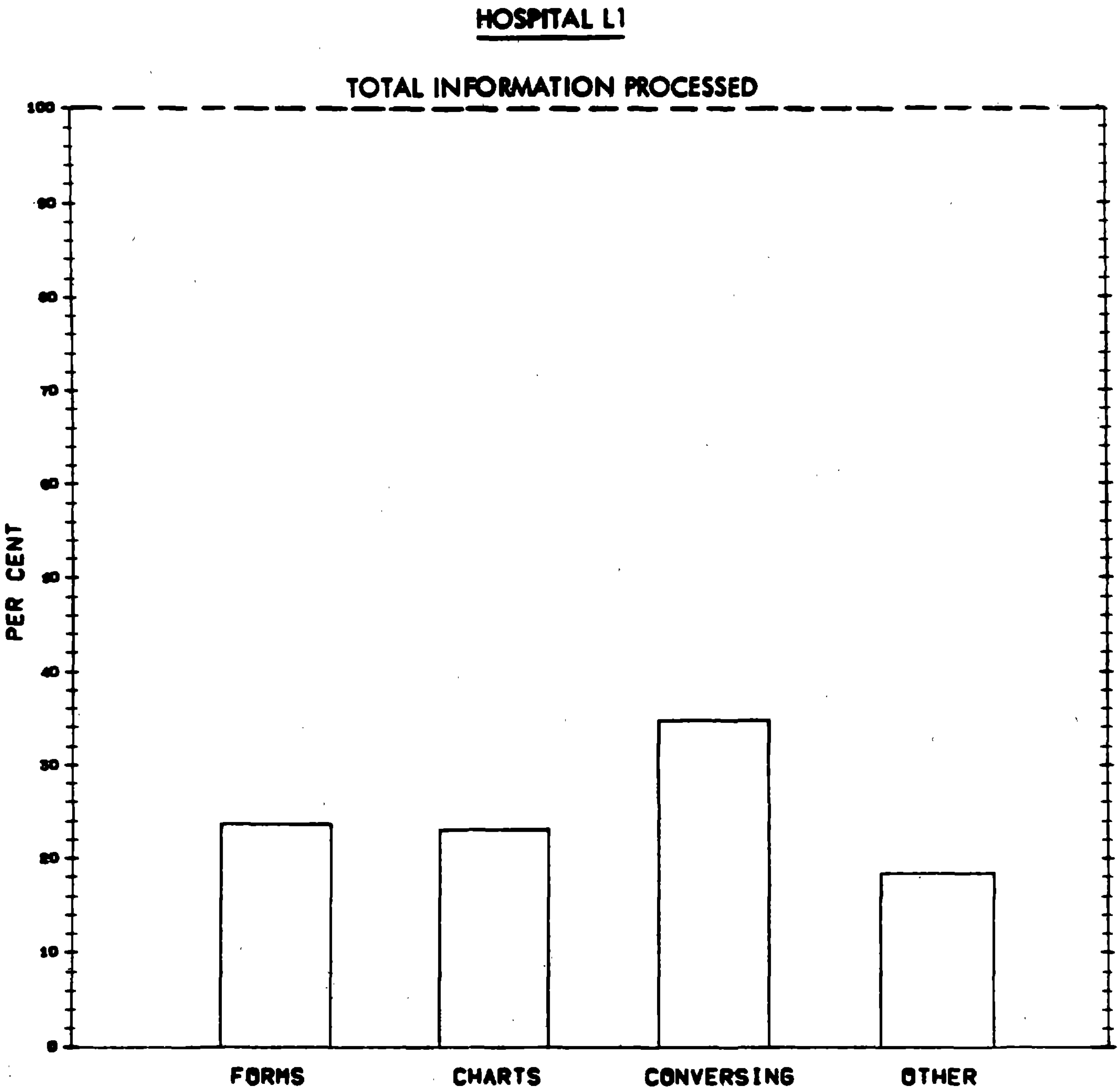

Fig. B-7 Relative Percentages of Types of Information Processed – Hospital L1

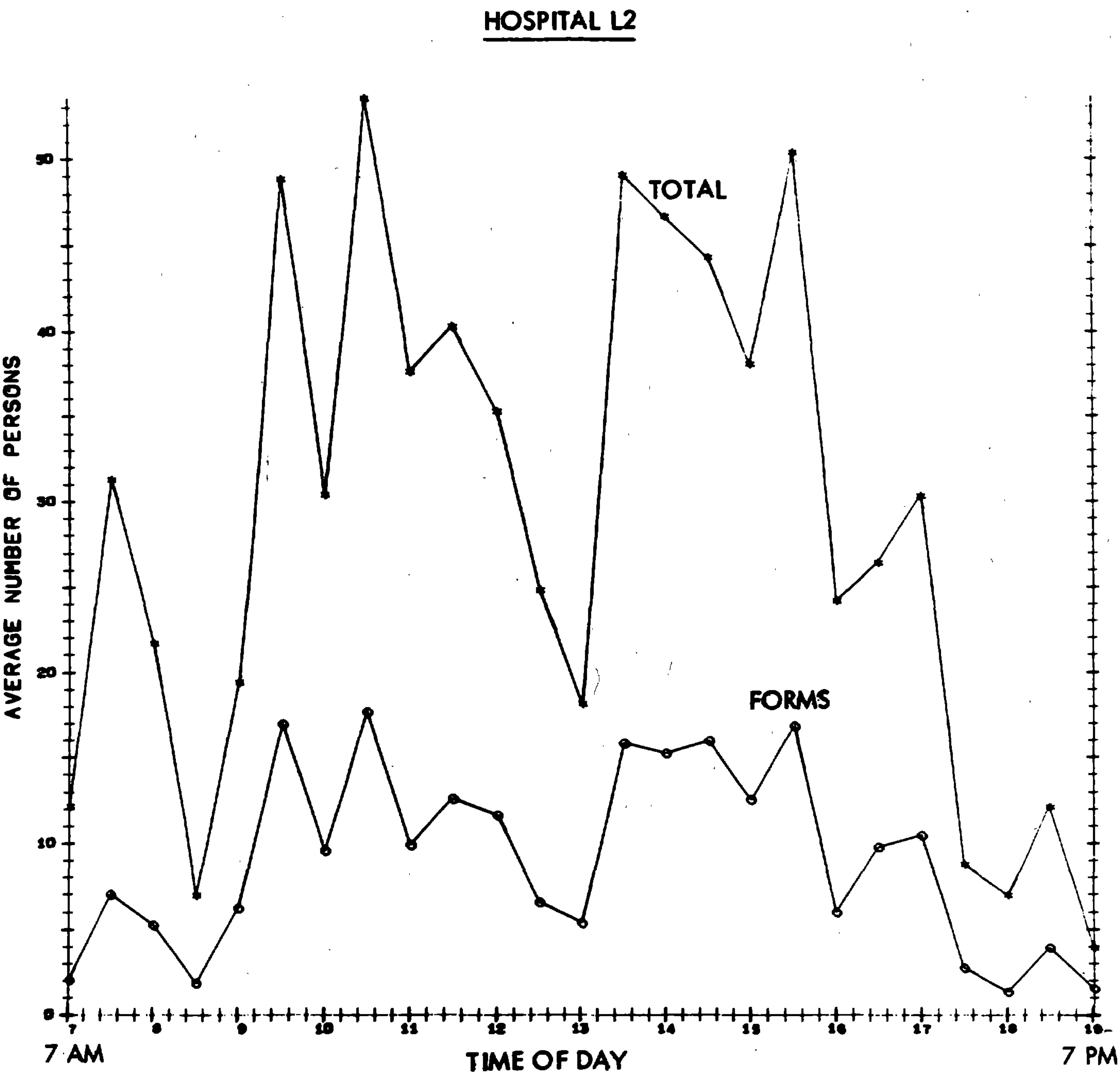

Fig. B-8 Ratio of Forms Processing to Total Information Processing – Hospital L2

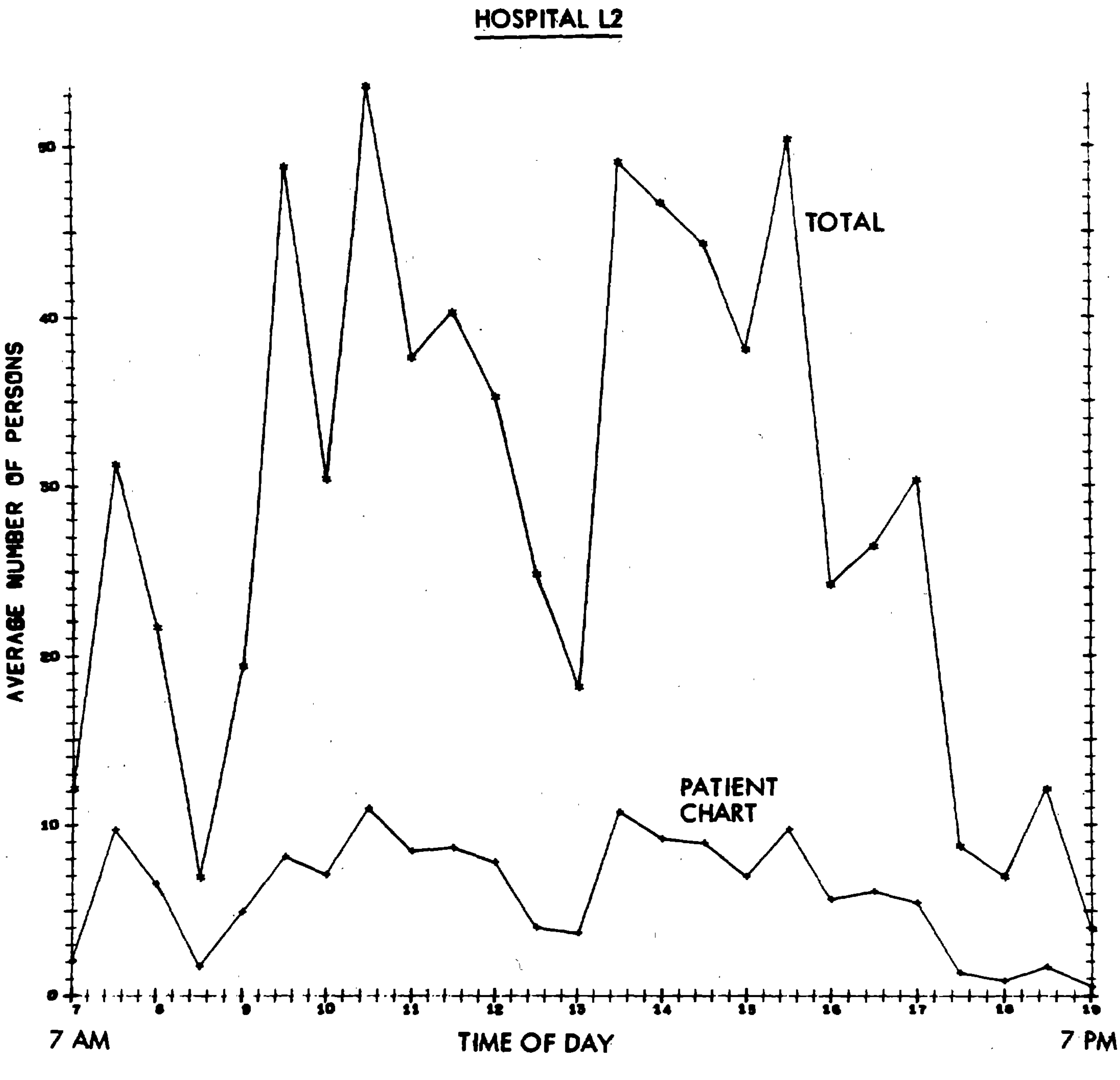

Fig. B-9 Ratio of Chart Processing to Total Information Processing – Hospital L2

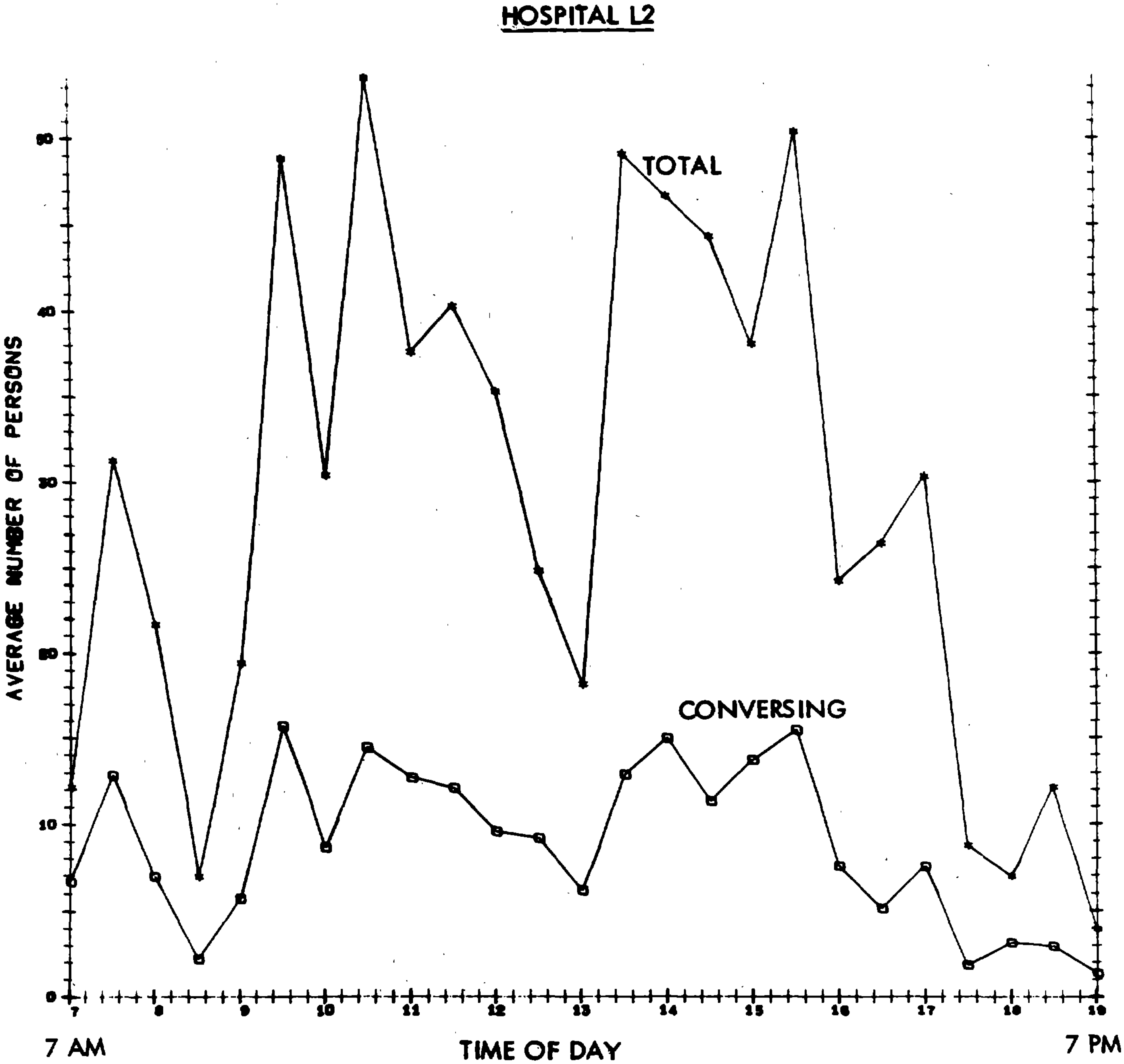

Fig. B-10 Ratio of Conversing to Total Information Processing – Hospital L2

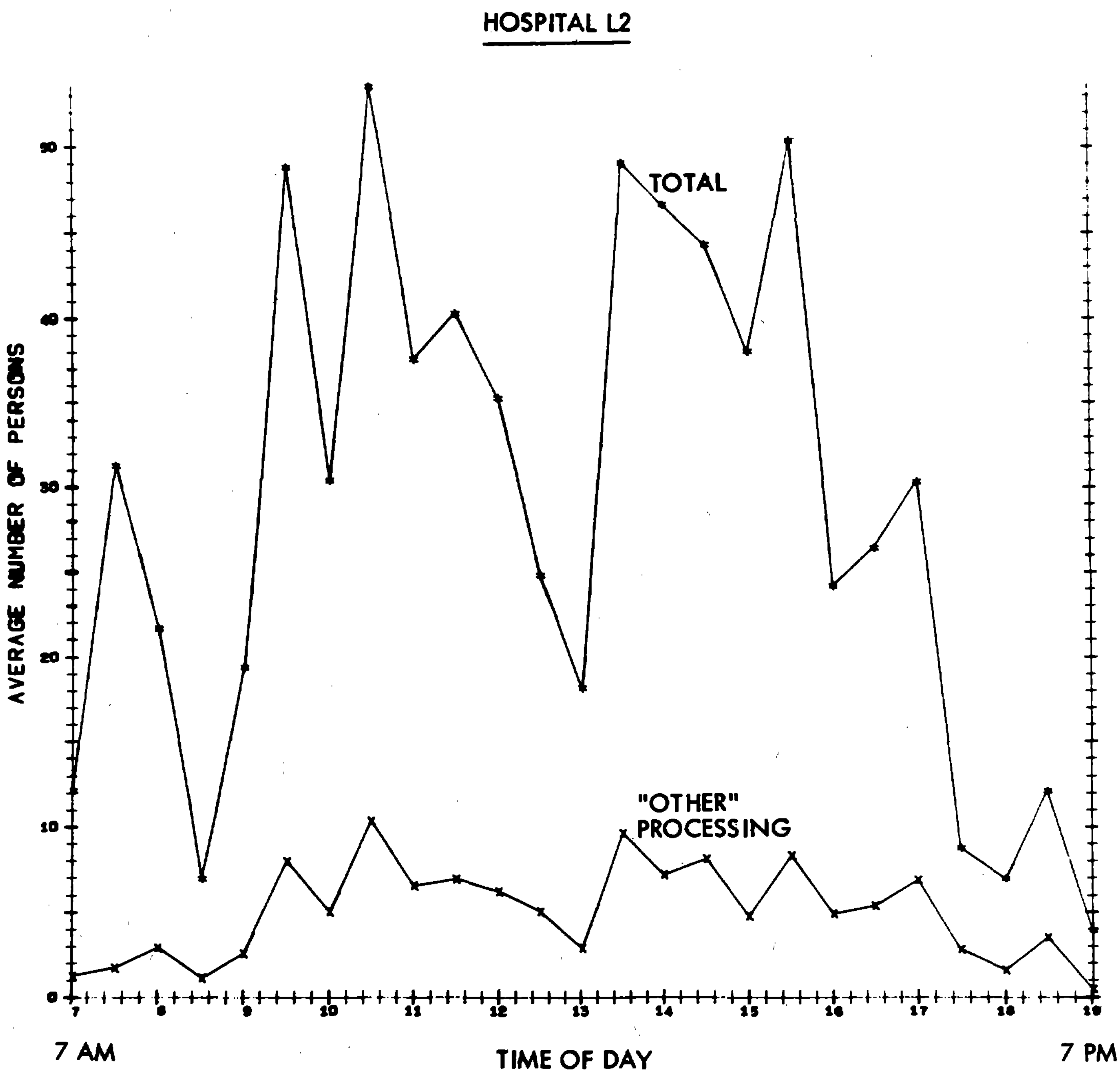

Fig. B-11 Ratio of "Other" Processing to Total Information Processing – Hospital L2

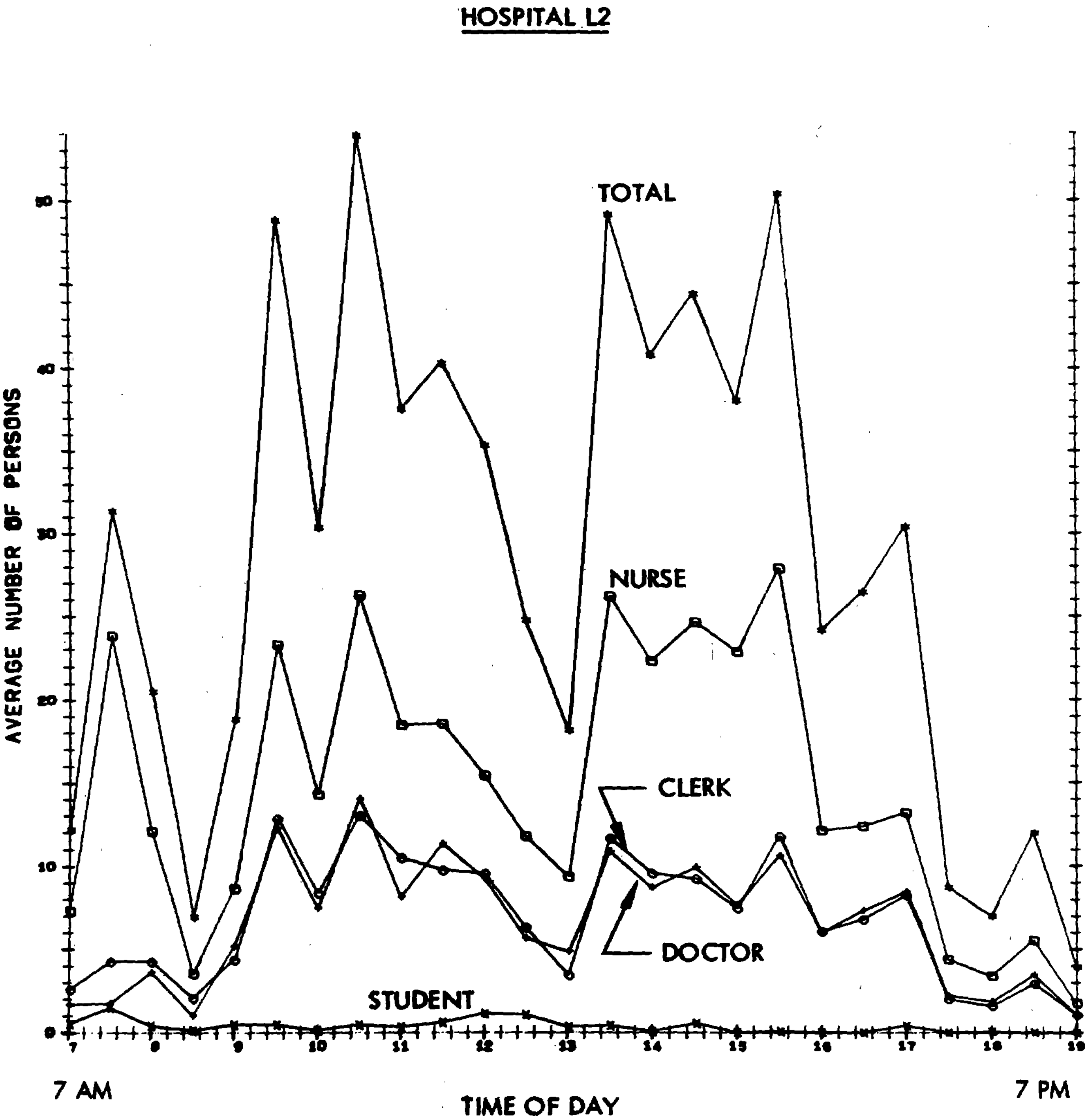

Fig. B-12 Comparison by Skill Levels of Personnel Processing to Total Information Being Processed — Hospital L2

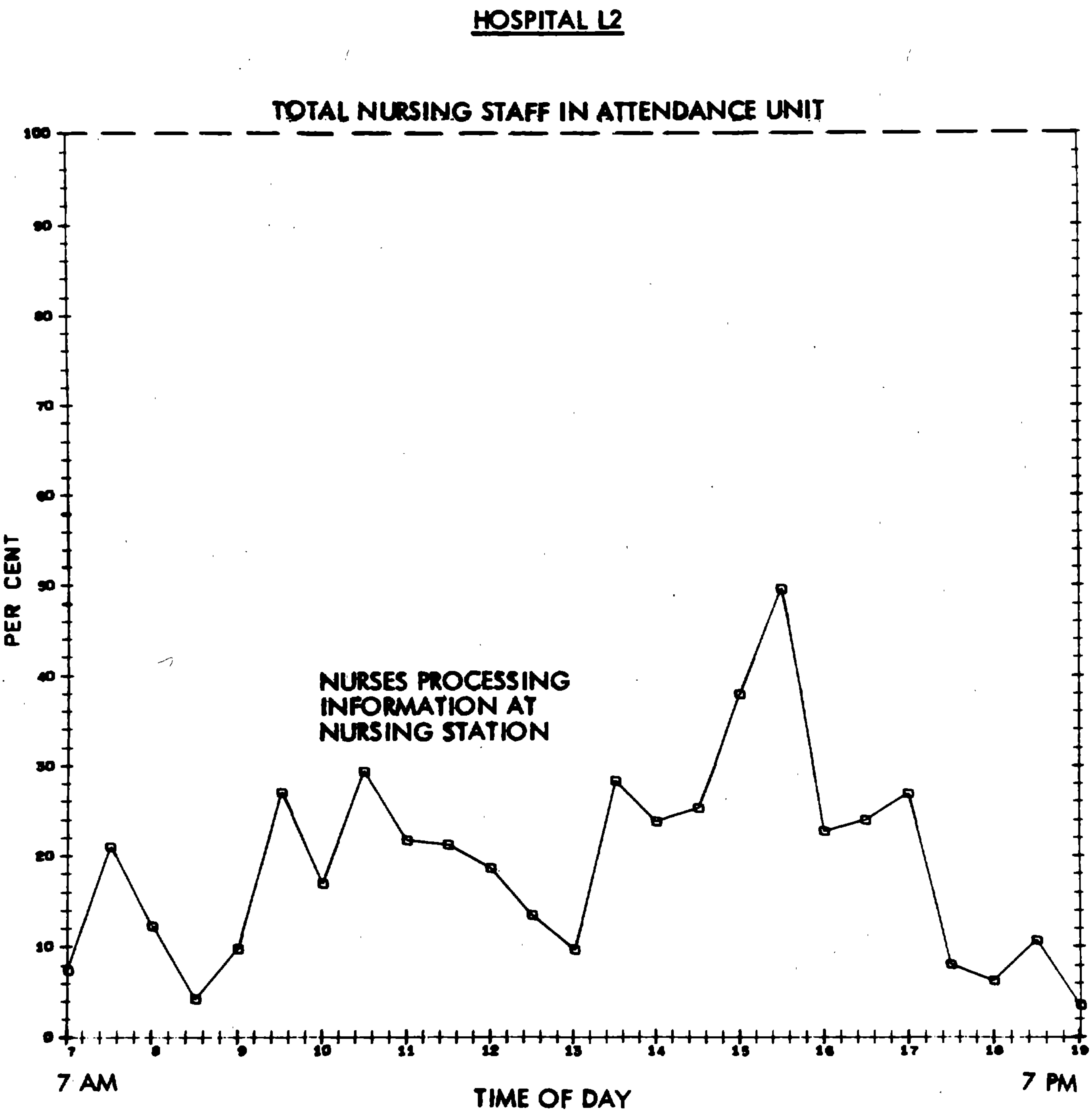

Fig. B-13 Percentage of Nursing Staff Processing Information – Hospital L2

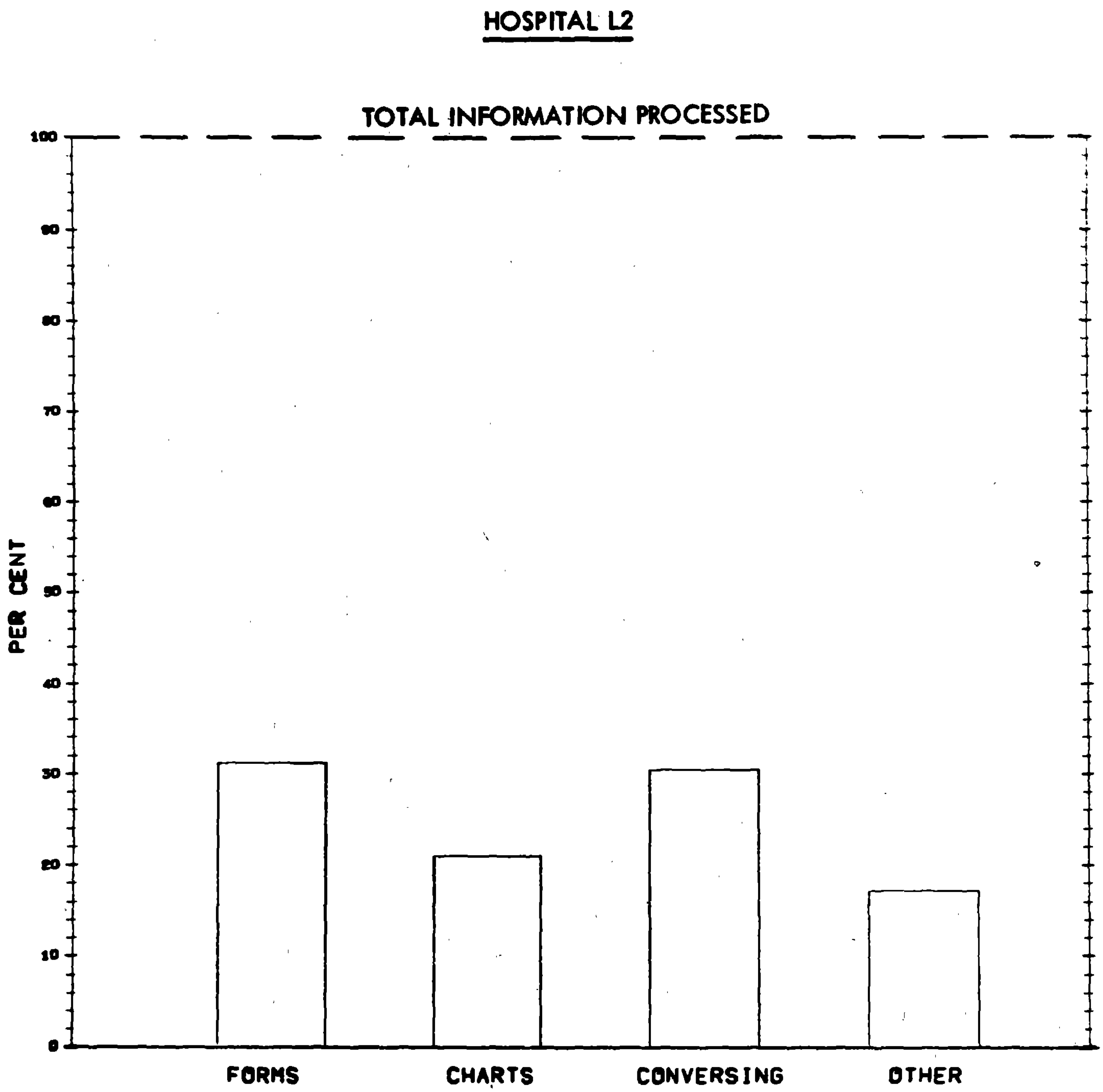

Fig. B-14 Relative Percentages of Types of Information Processed – Hospital L2

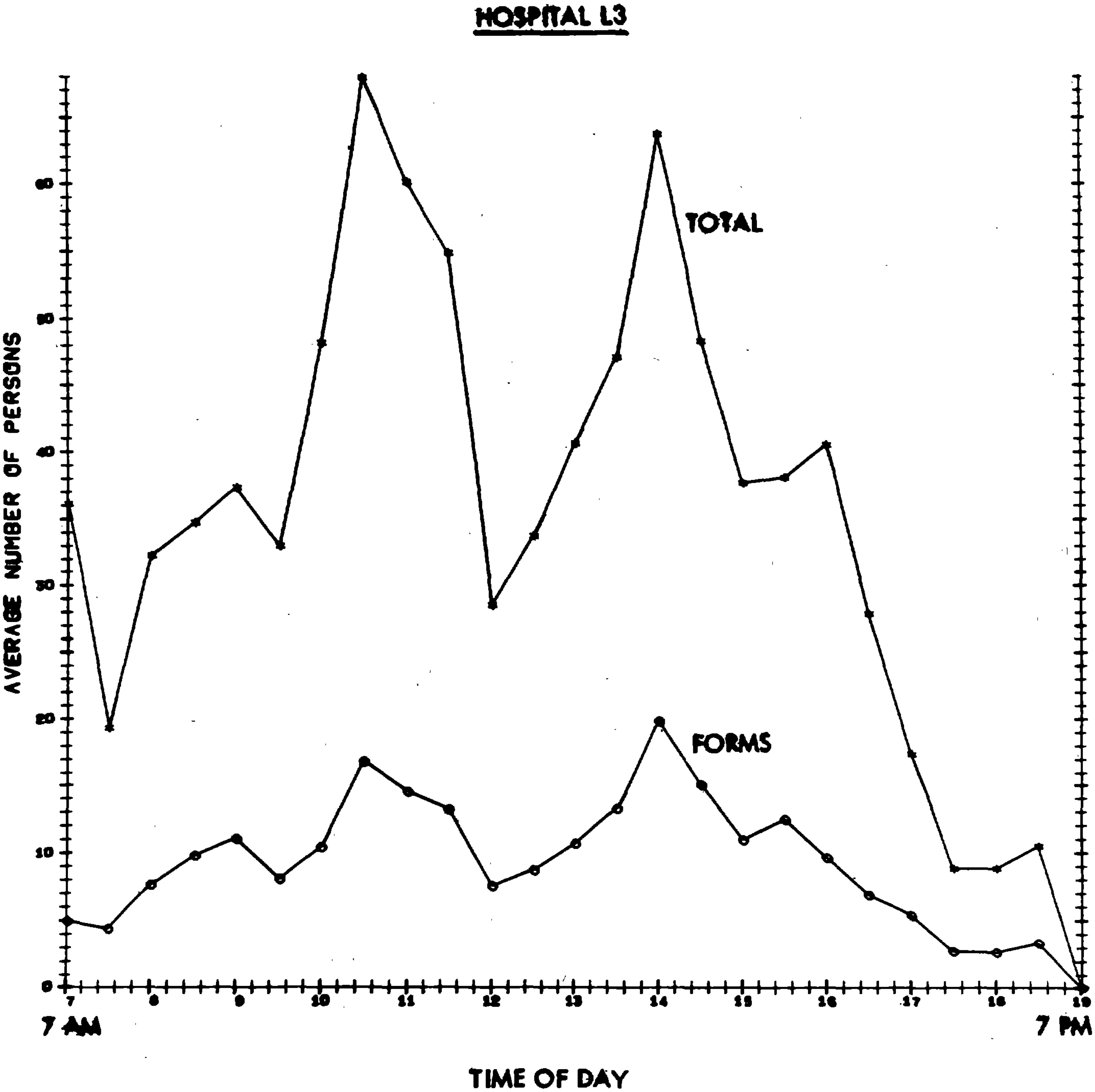

Fig. B-15 Ratio of Forms Processing to Total Information Processing – Hospital L3

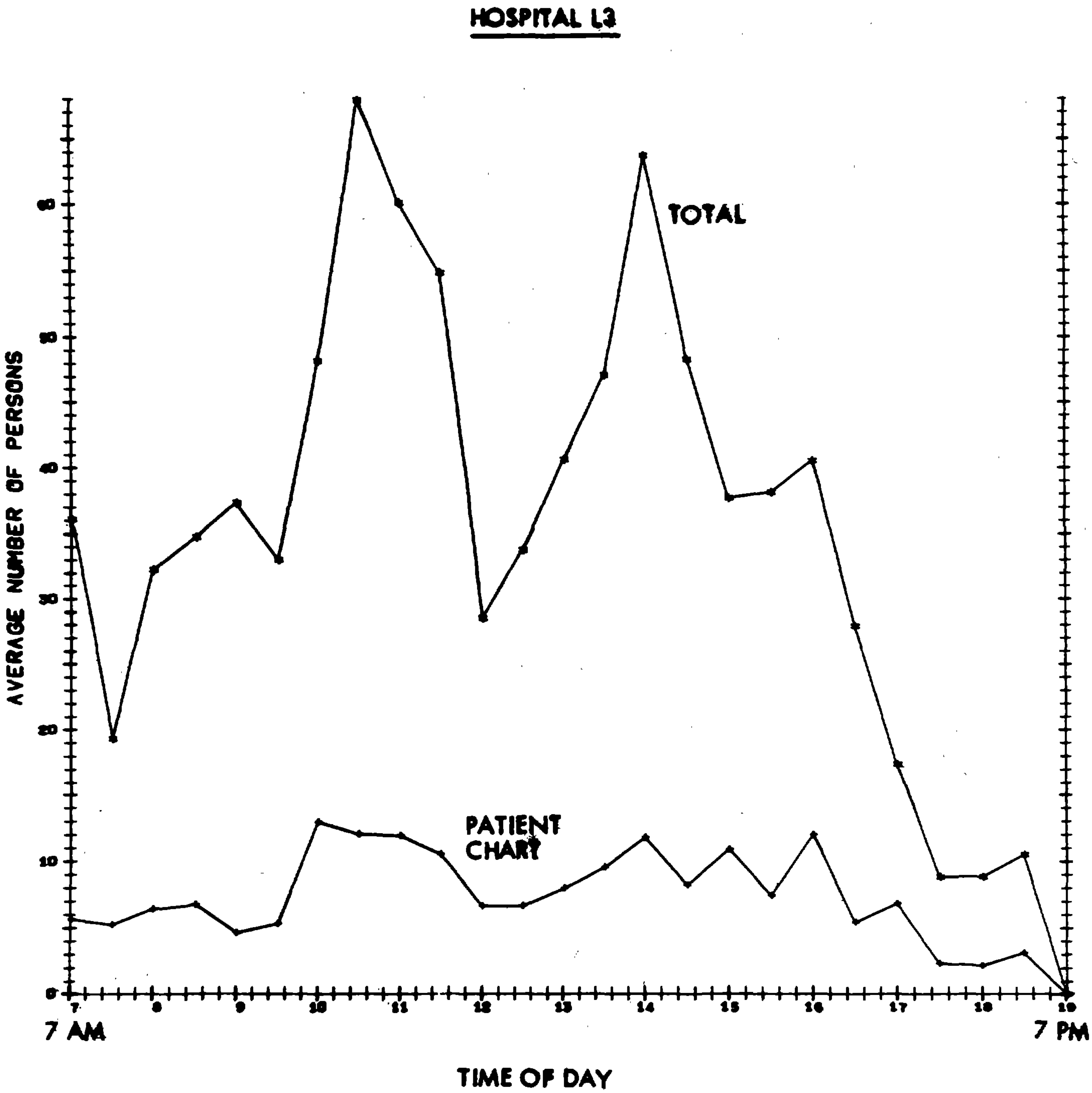

Fig. B-16 Ratio of Chart Processing to Total Information Processing – Hospital L3

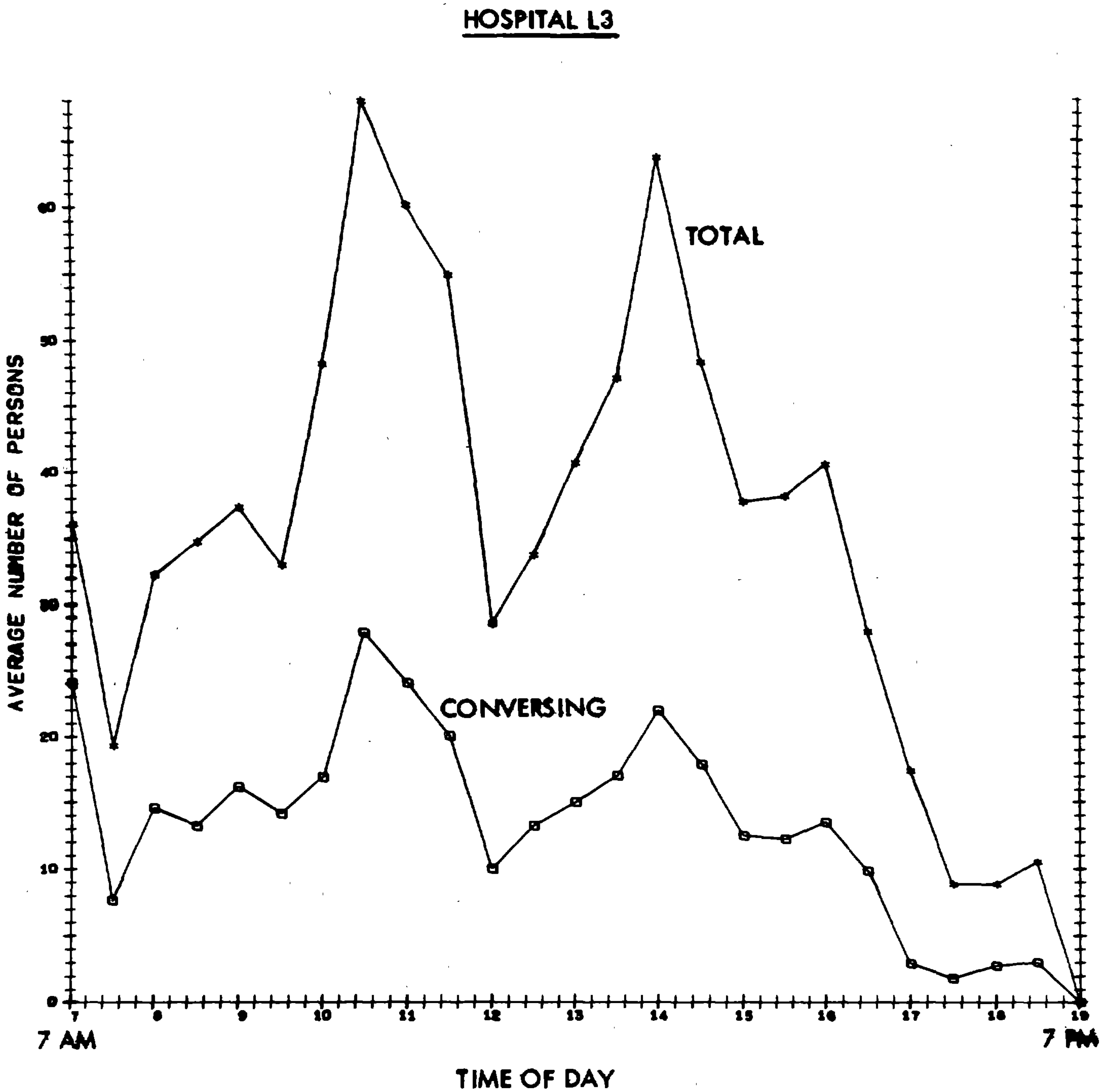

Fig. B-17 Ratio of Conversing to Total Information Processing – Hospital L3

HOSPITAL L3

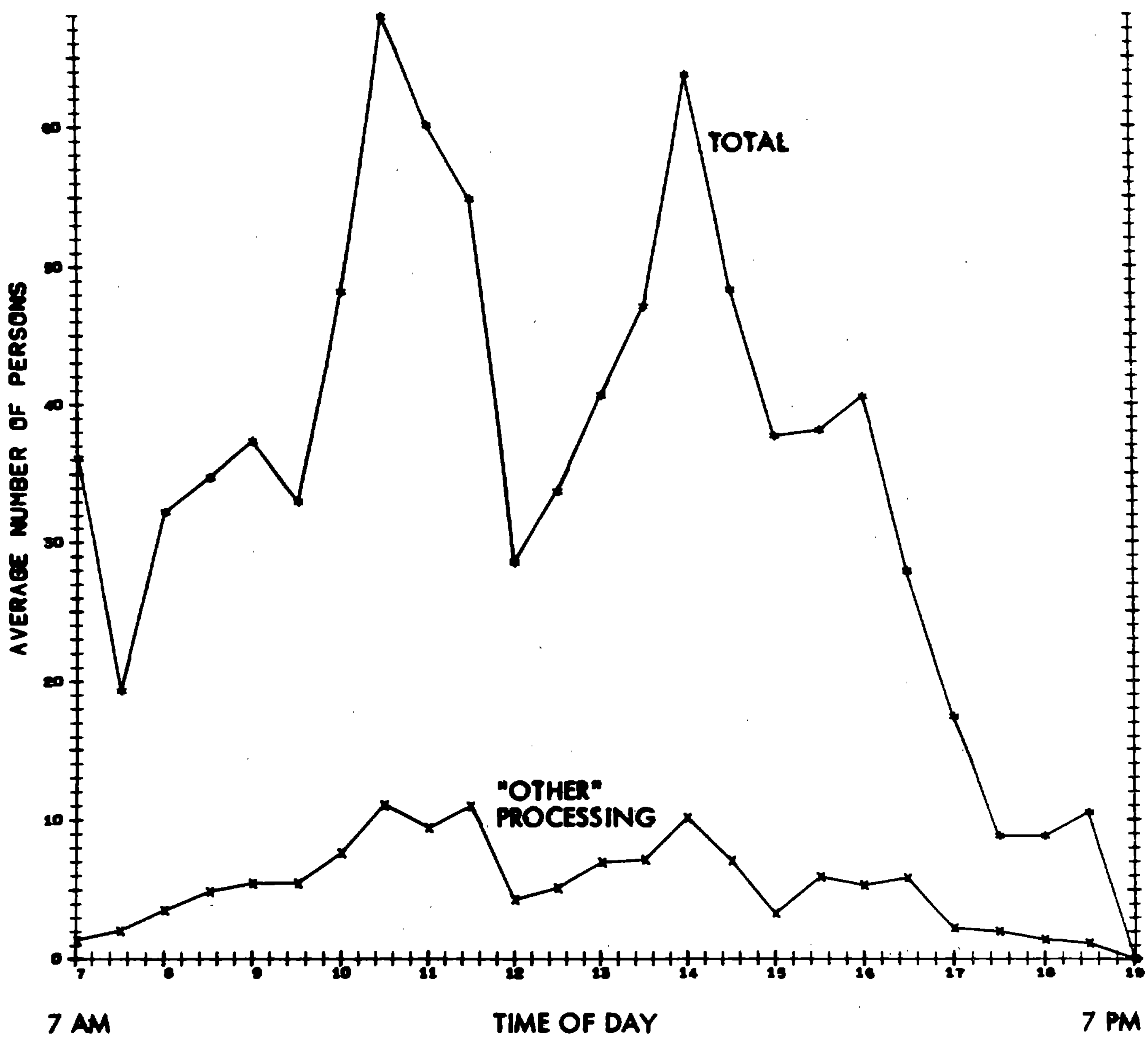

Fig. B-18 Ratio of "Other" Processing to Total Information Processing – Hospital L3

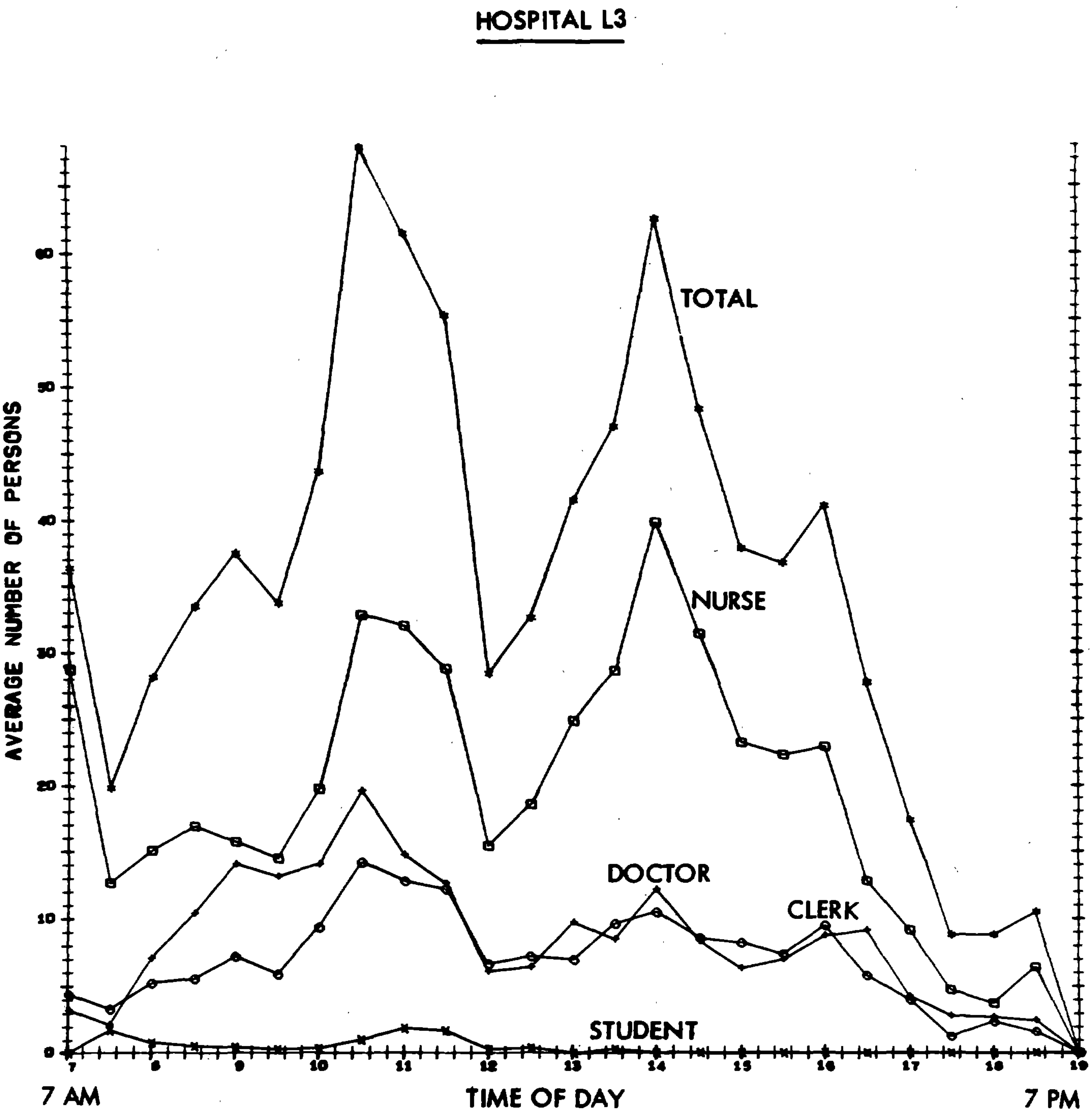

Fig. B-19 Comparison by Skill Levels of Personnel Processing to Total Information Being Processed – Hospital L3

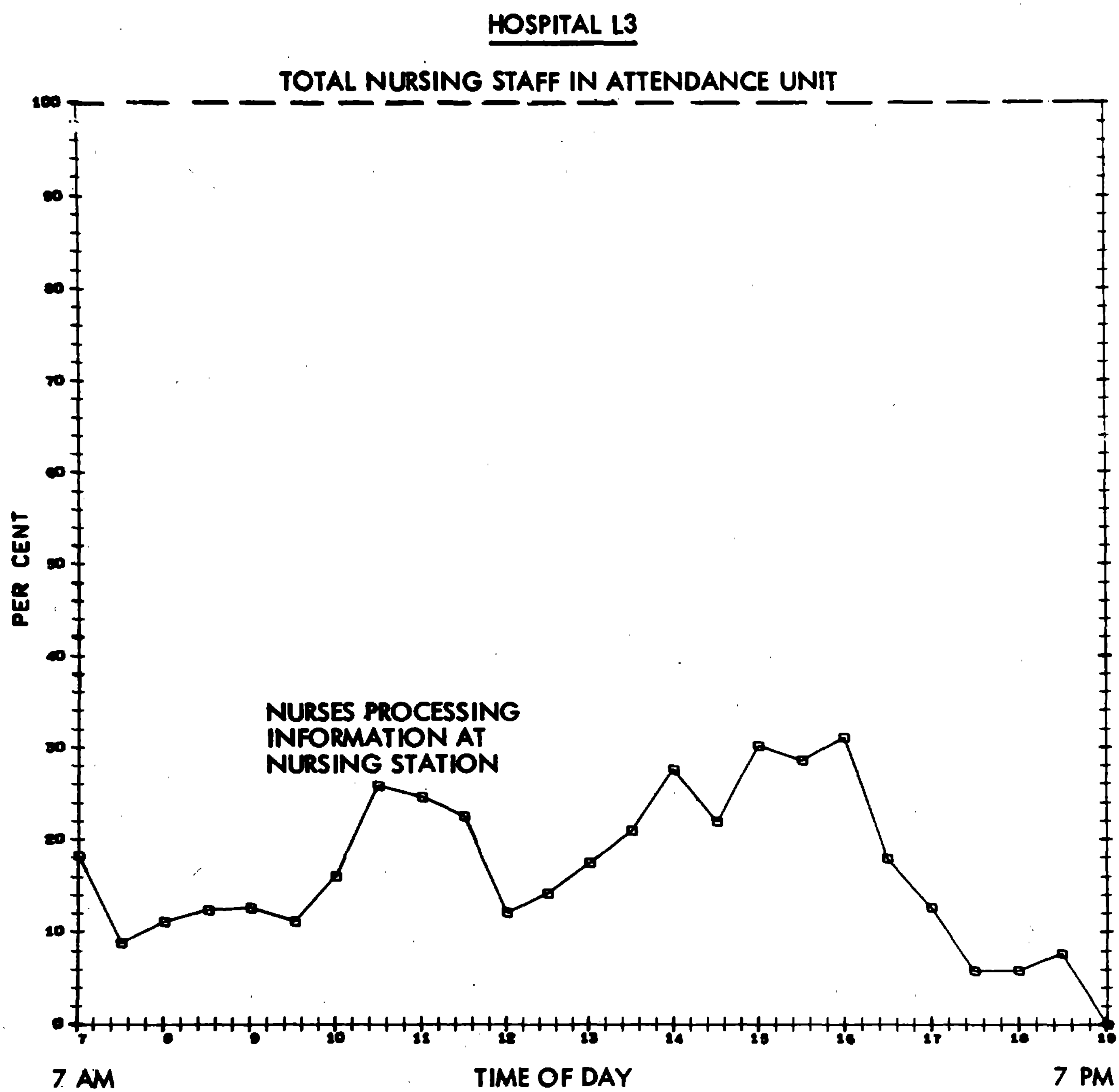

Fig. B-20 Percentage of Nursing Staff Processing Information – Hospital L3

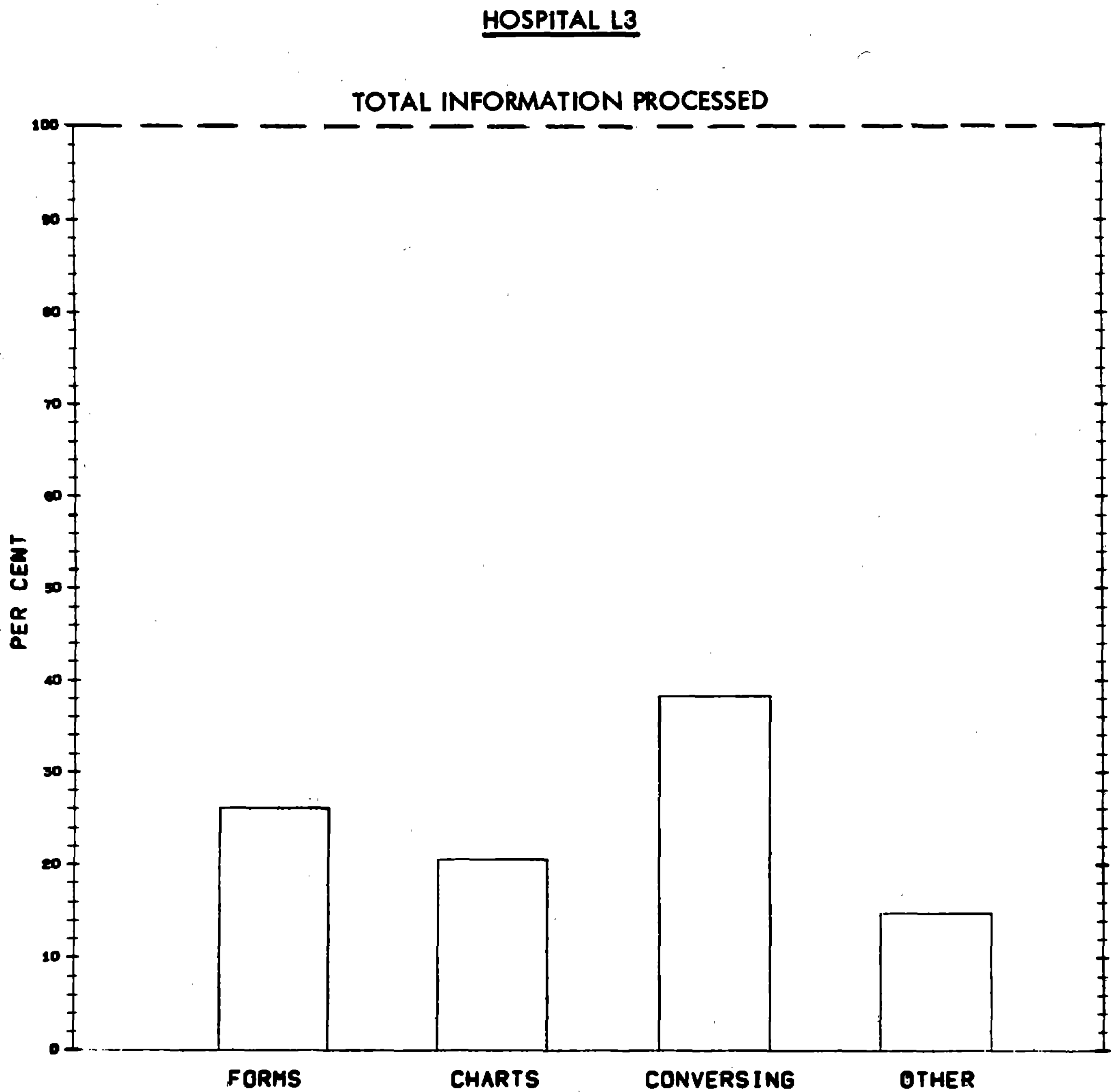

Fig. B-21 Relative Percentages of Types of Information Processed – Hospital L3

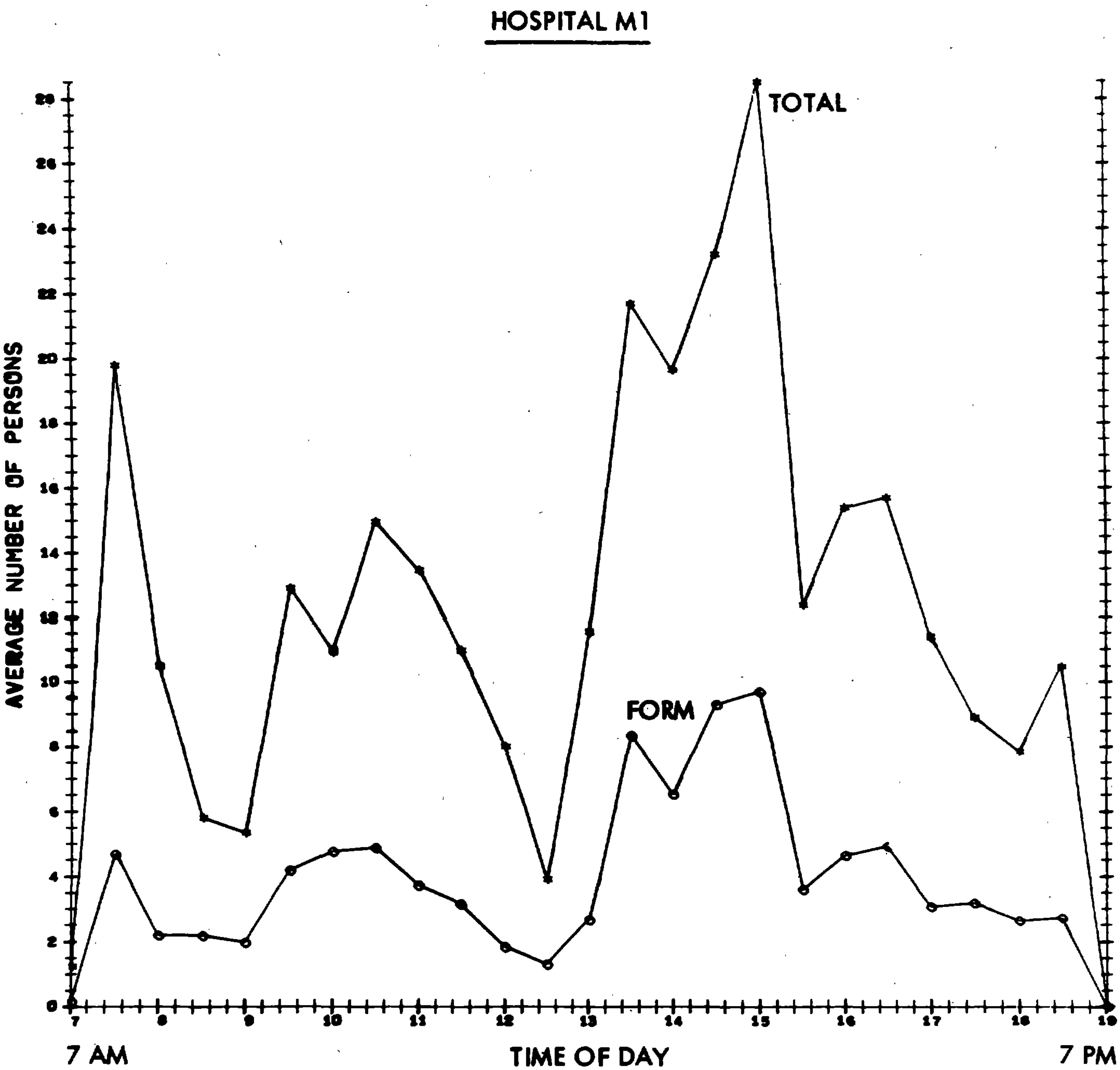

Fig. B-22 Ratio of Forms Processing to Total Information Processing – Hospital M1

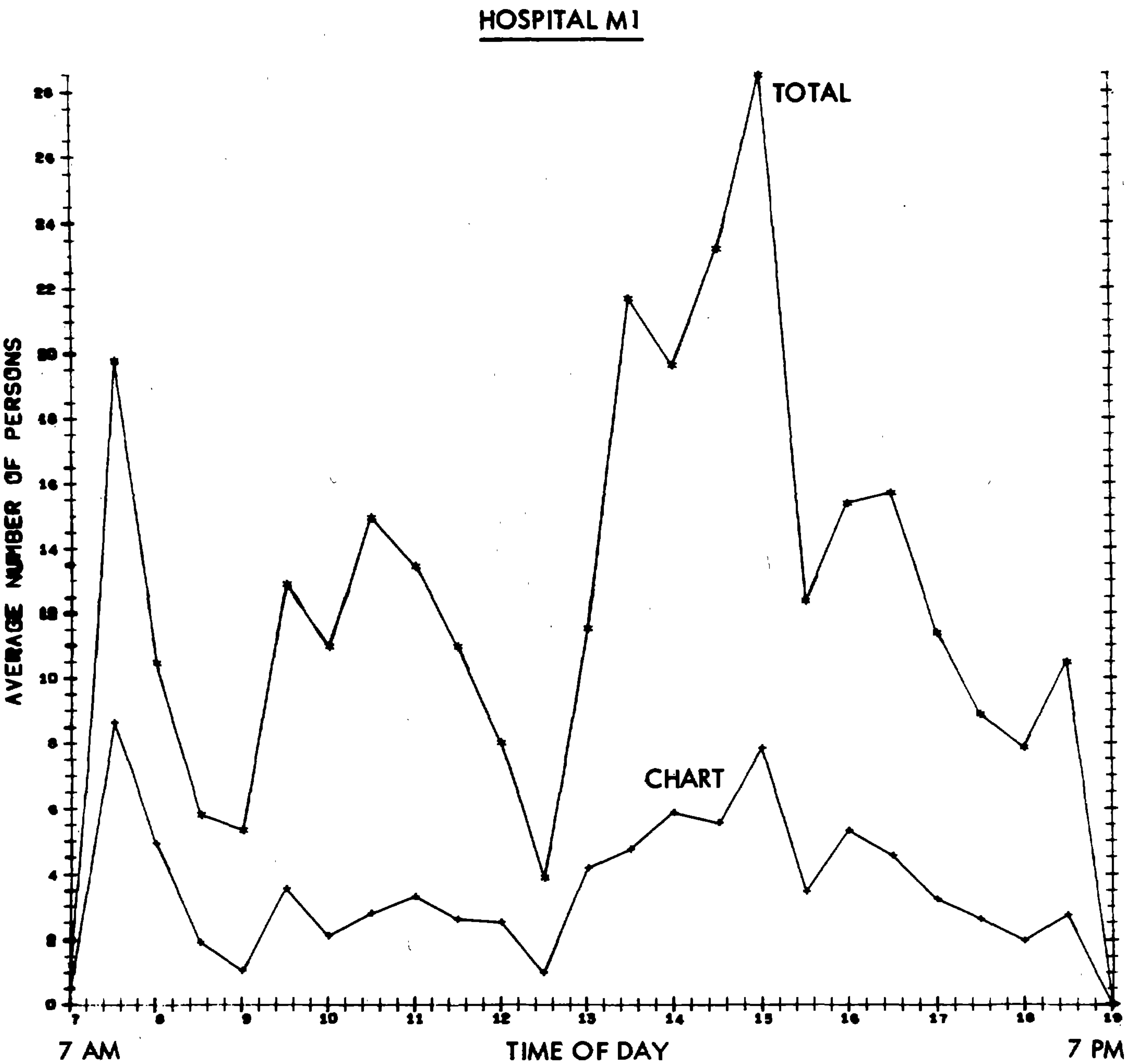

Fig. B-23 Ratio of Chart Processing to Total Information Processing – Hospital M1

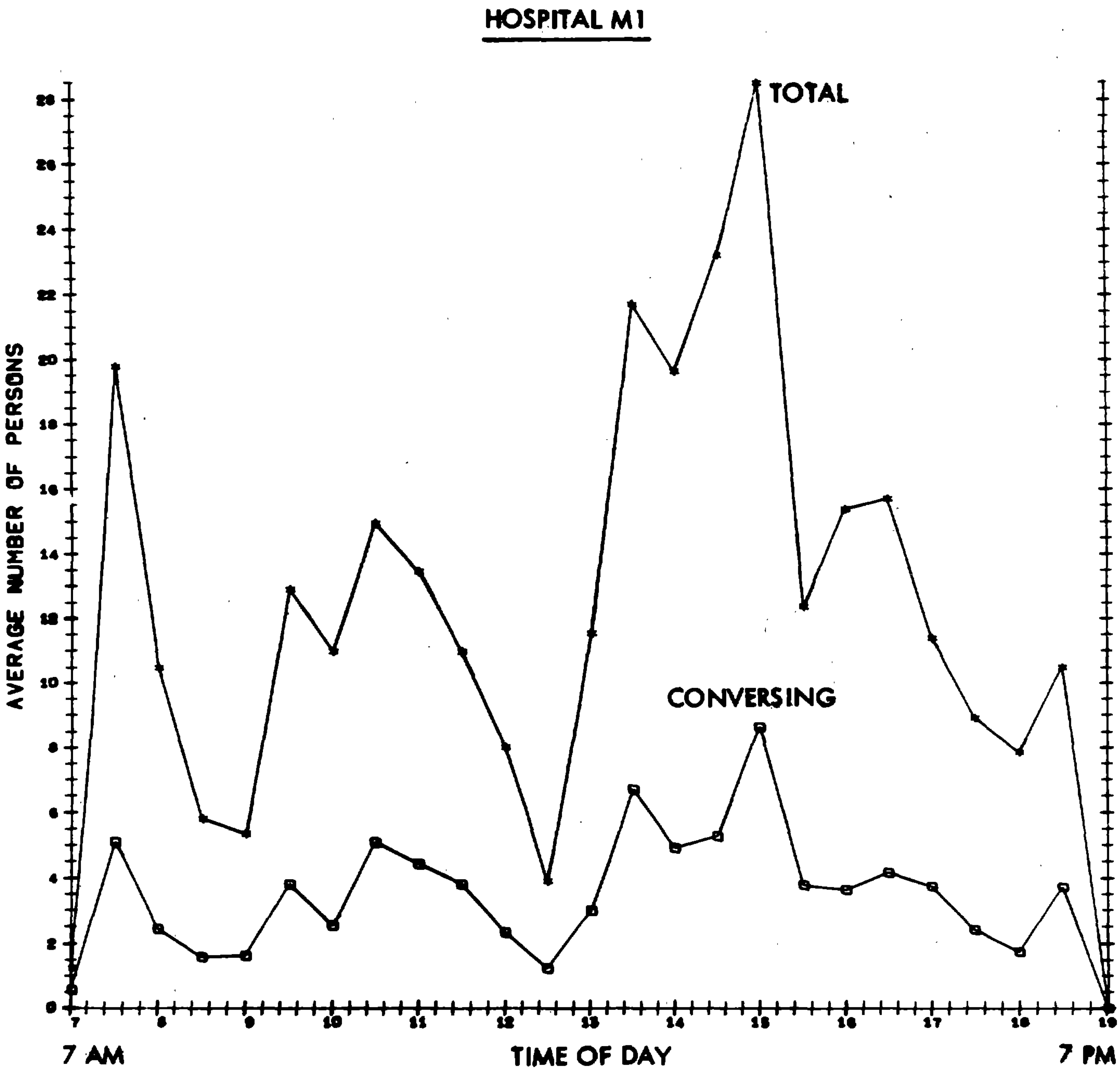

Fig. B-24 Ratio of Conversing to Total Information Processing – Hospital M1

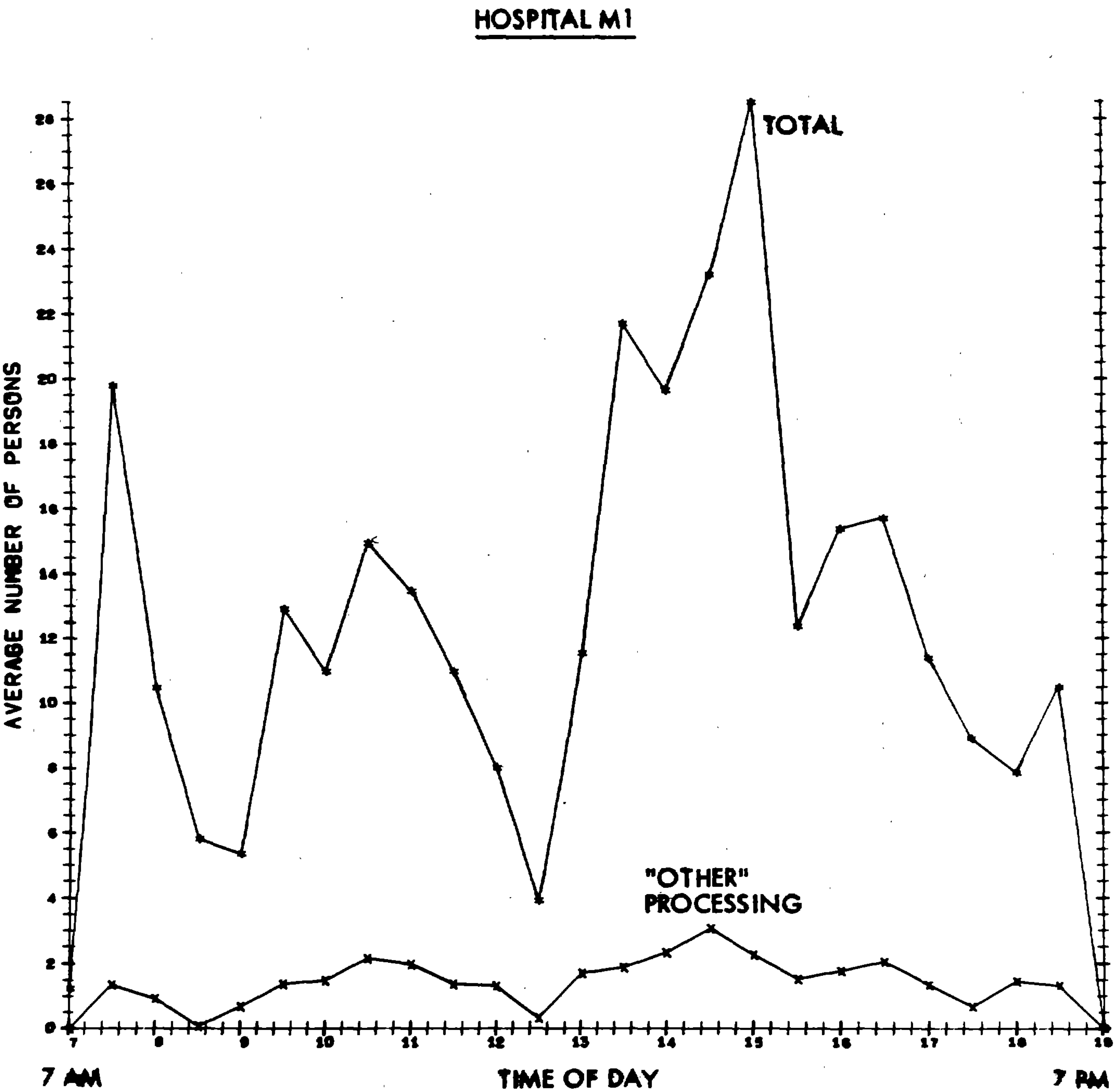

Fig. B-25 Ratio of "Other" Processing to Total Information Processing – Hospital M1

HOSPITAL M1

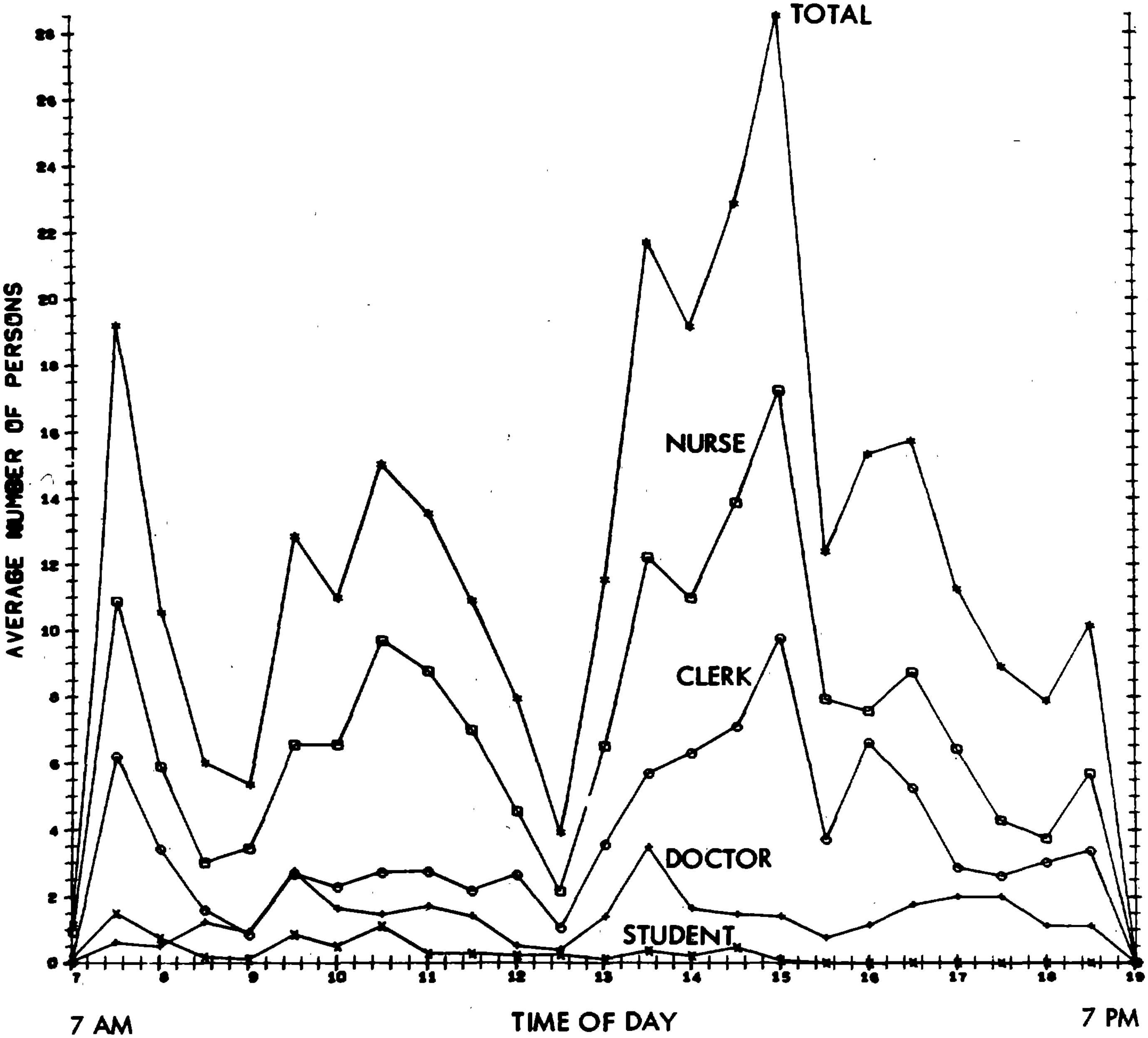

Fig. B-26 **Comparison by Skill Levels of Personnel Processing to Total Information Being Processed – Hospital M1**

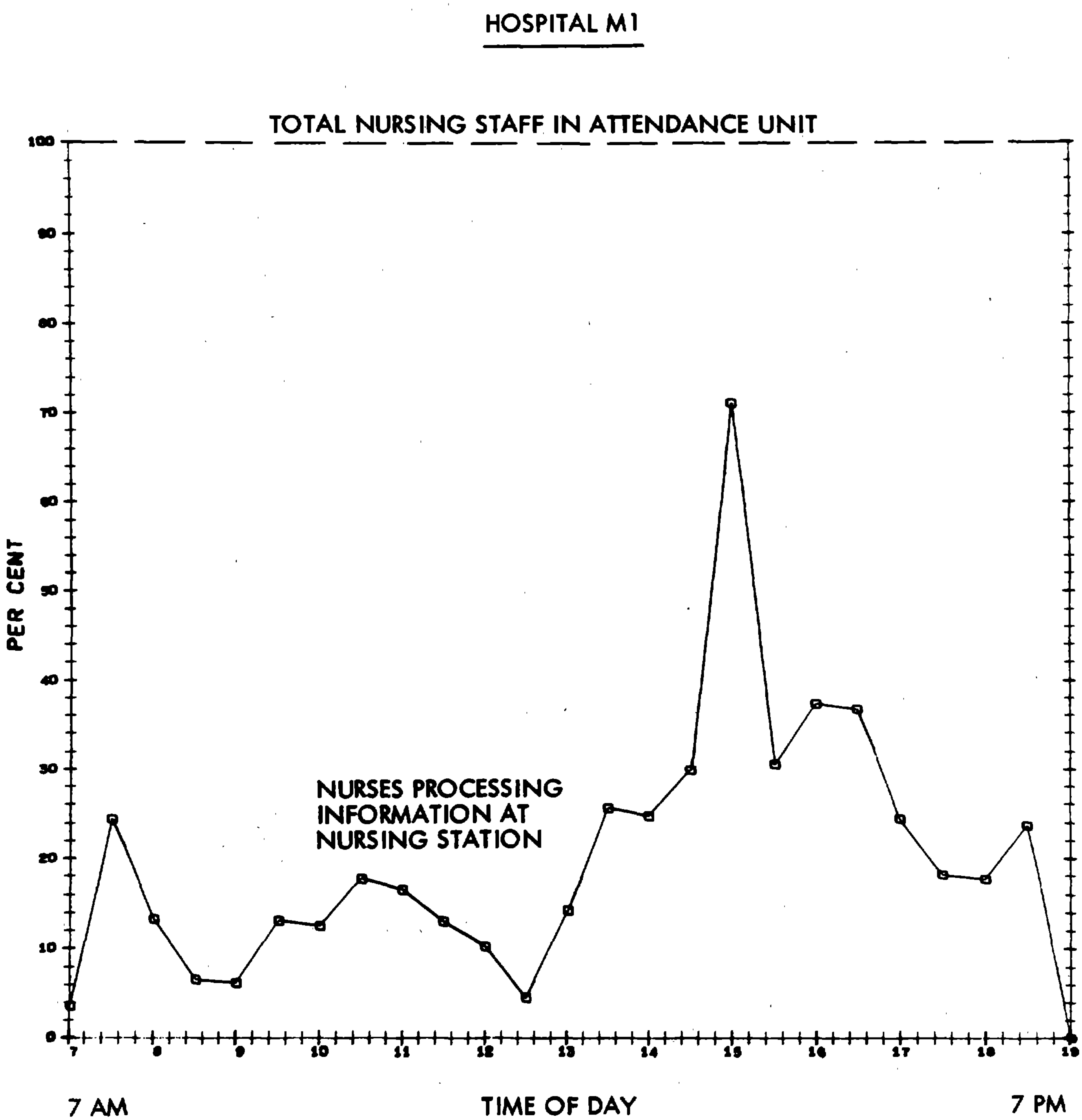

Fig. B-27 Percentage of Nursing Staff Processing Information – Hospital M1

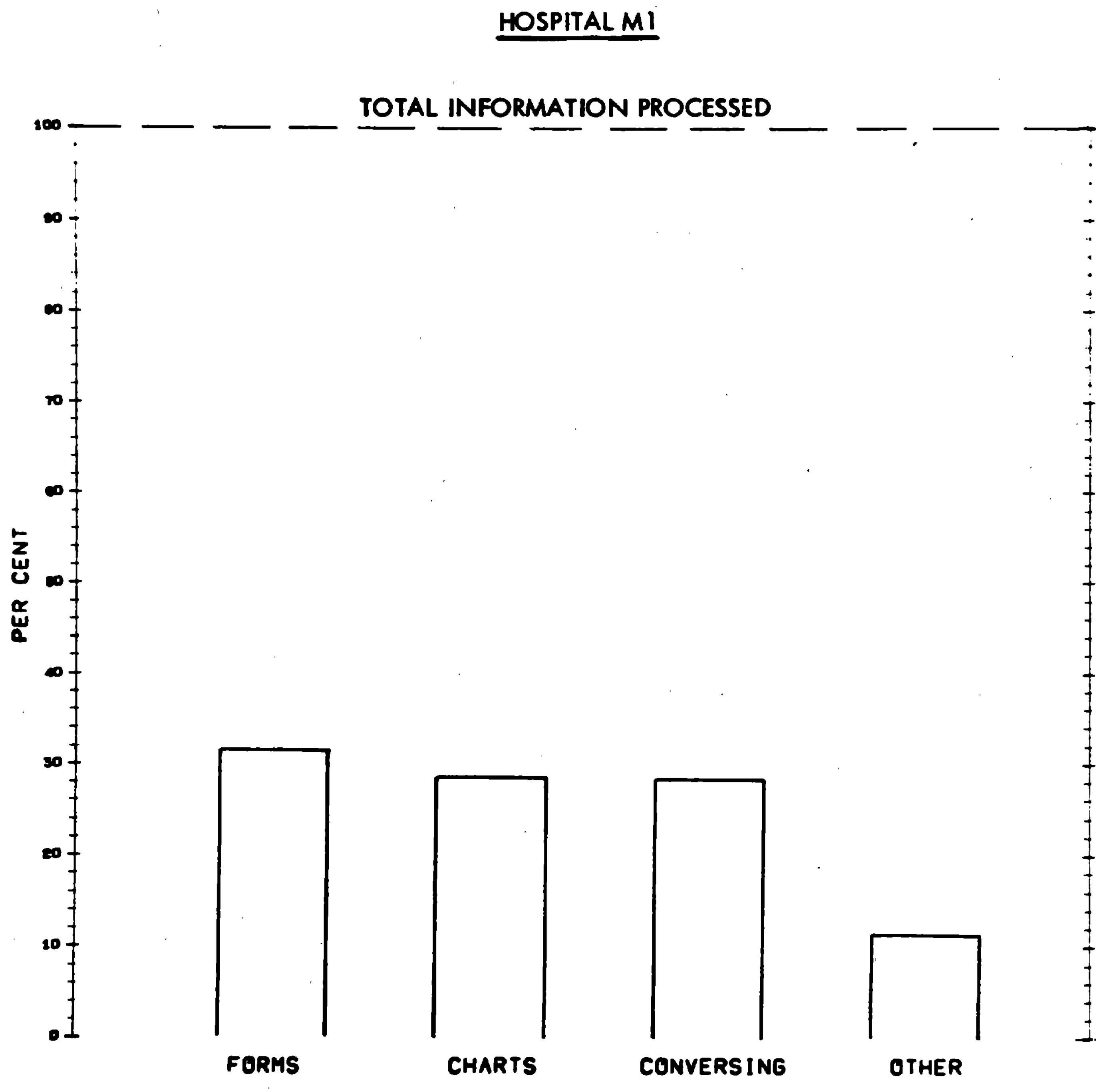

Fig. B-28 Relative Percentages of Types of Information Processed – Hospital M1

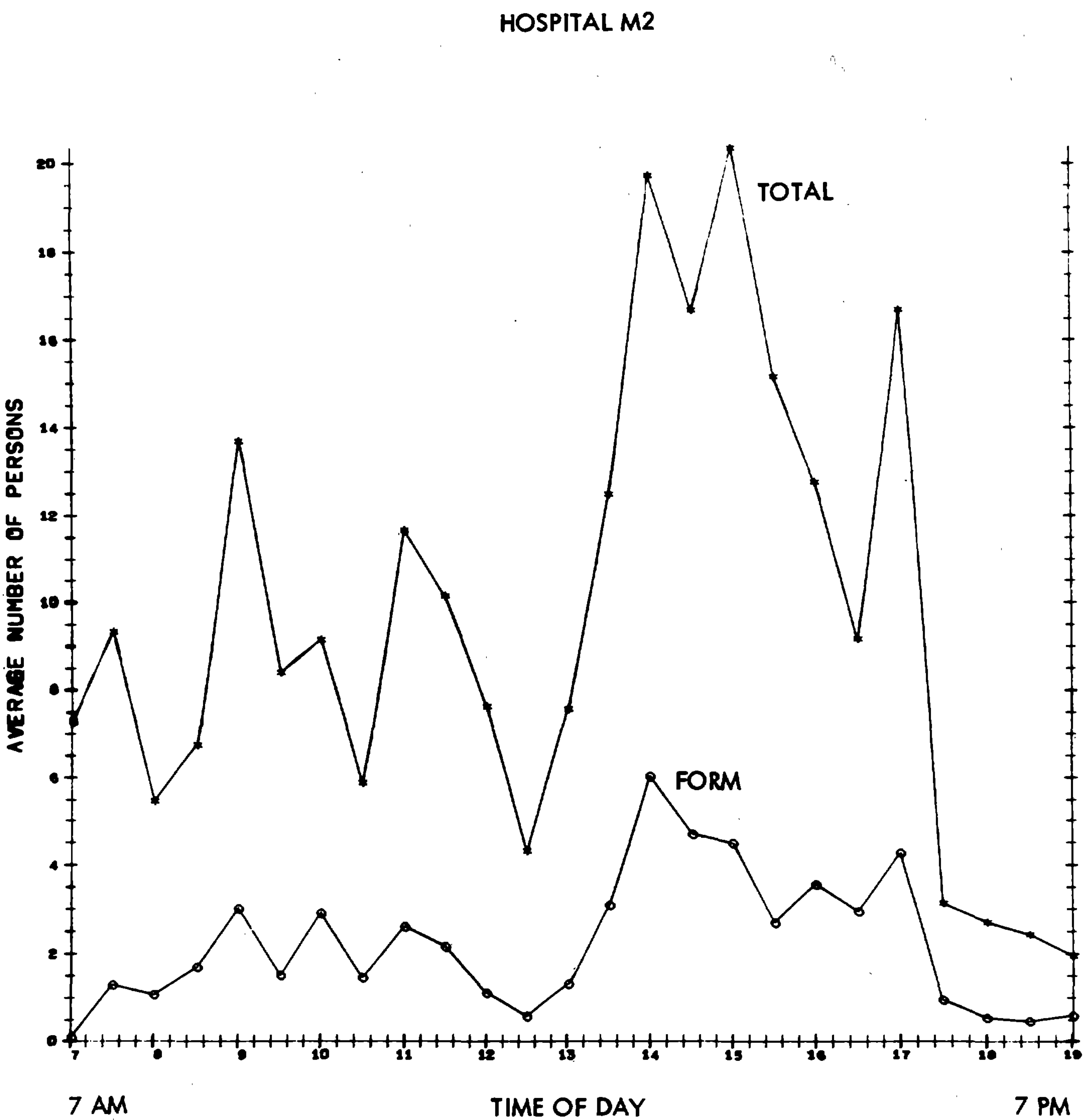

Fig. B-29 Ratio of Forms Processing to Total Information Processing – Hospital M2

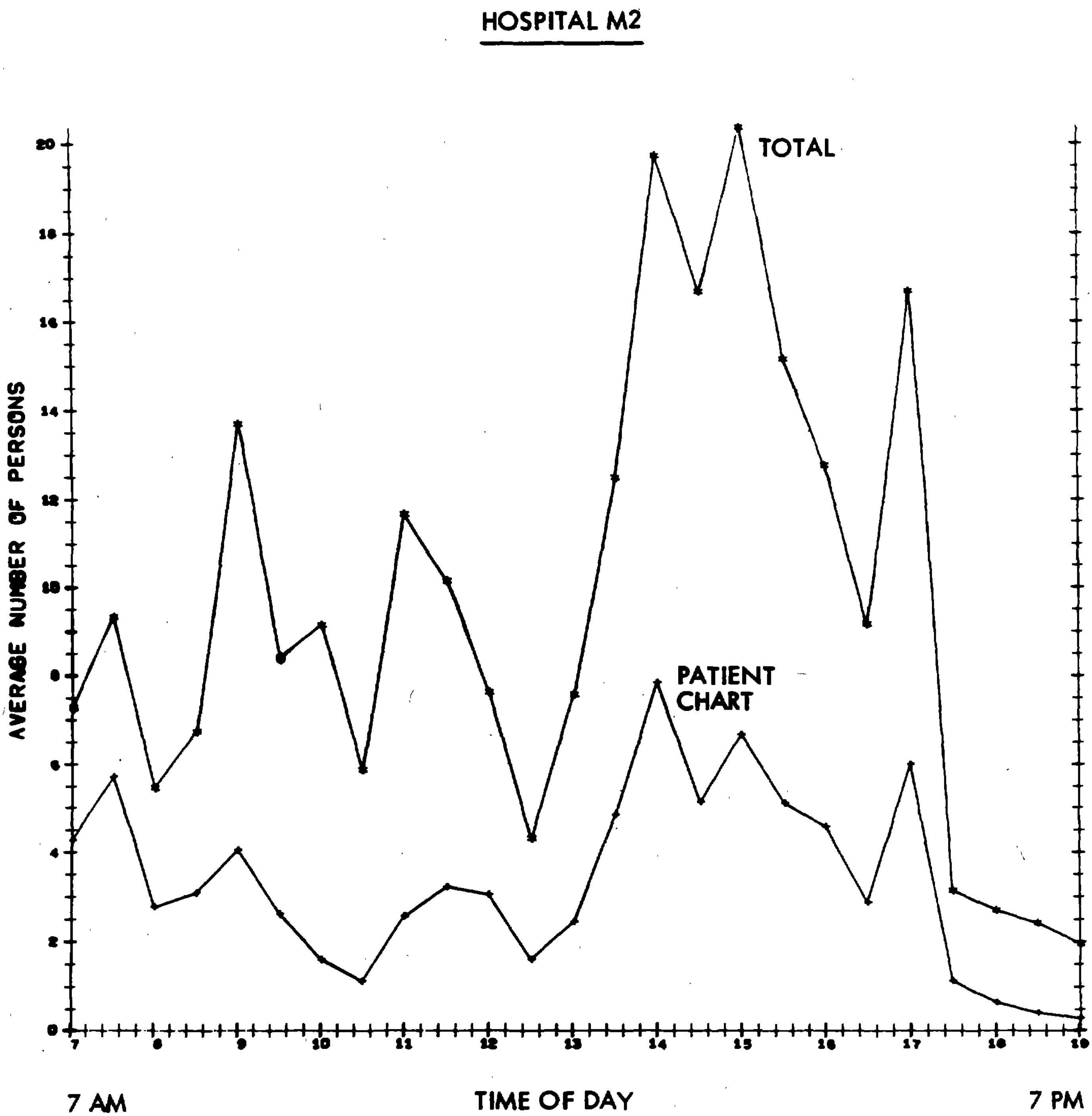

Fig. B-30 Ratio of Chart Processing to Total Information Processing – Hospital M2

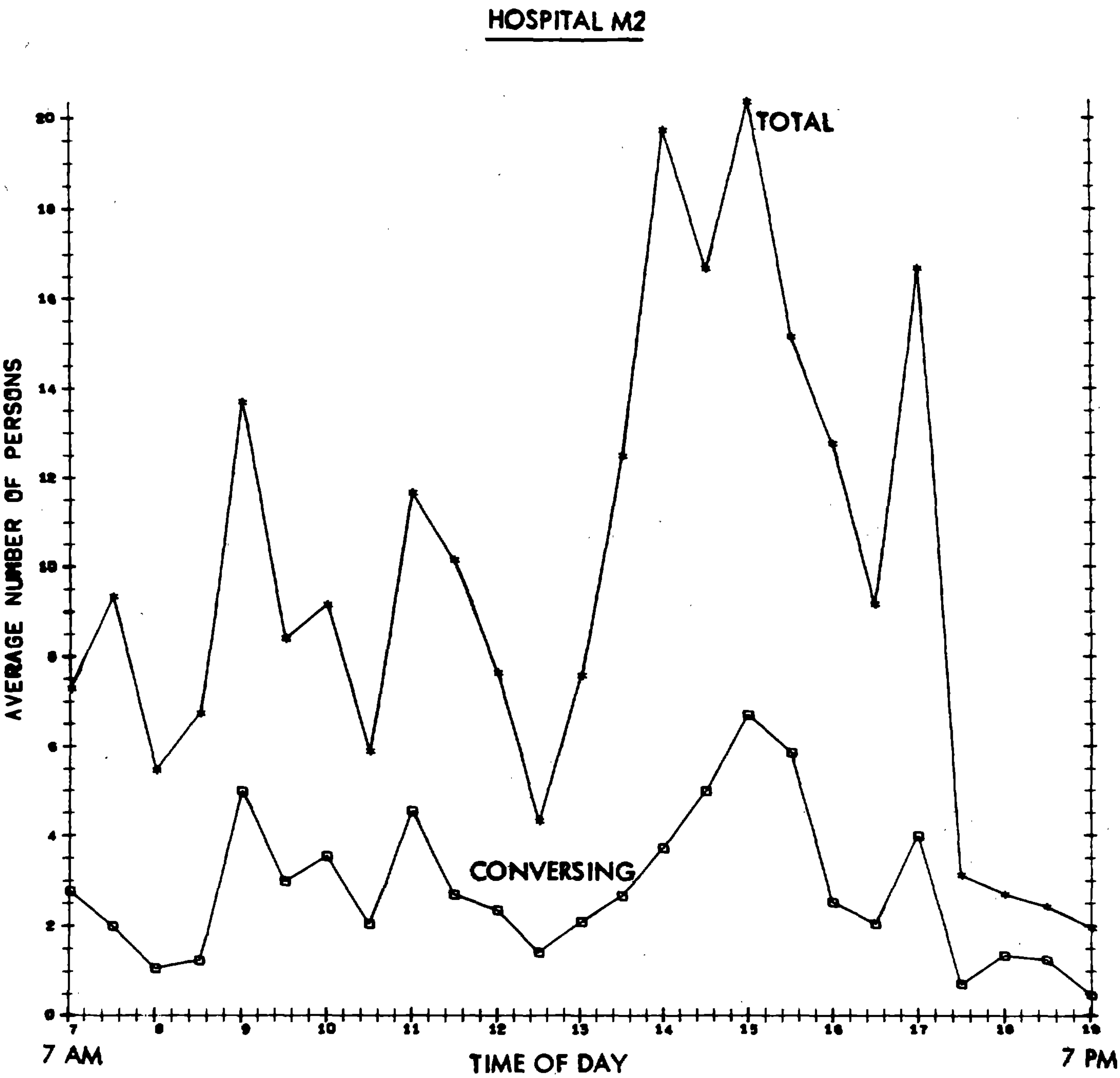

Fig. B-31 Ratio of Conversing to Total Information Processing – Hospital M2

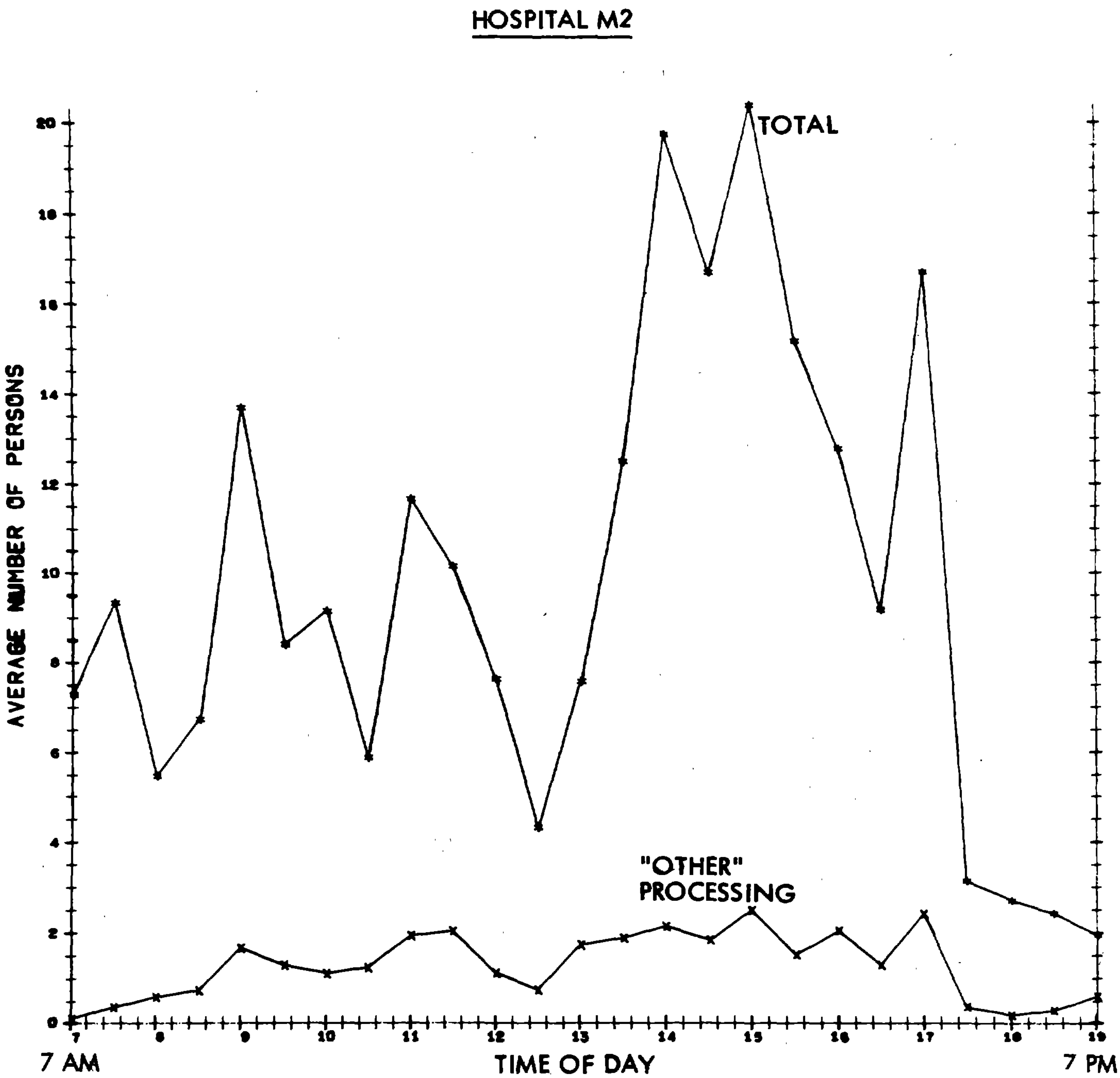

Fig. B-32 Ratio of "Other" Processing to Total Information Processing – Hospital M2

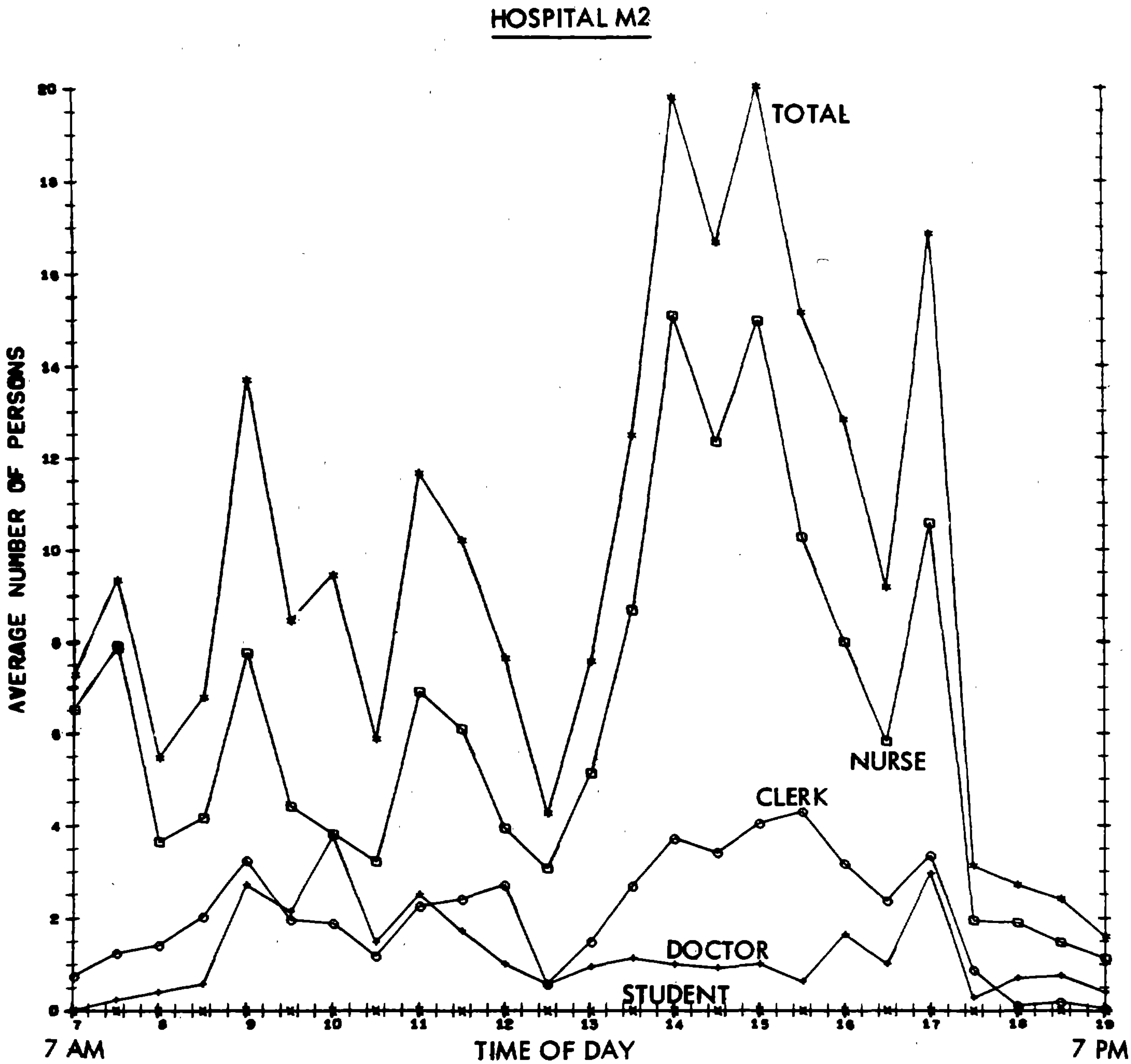

Fig. B-33 Comparison by Skill Levels of Personnel Processing to Total Information Being Processed – Hospital M2

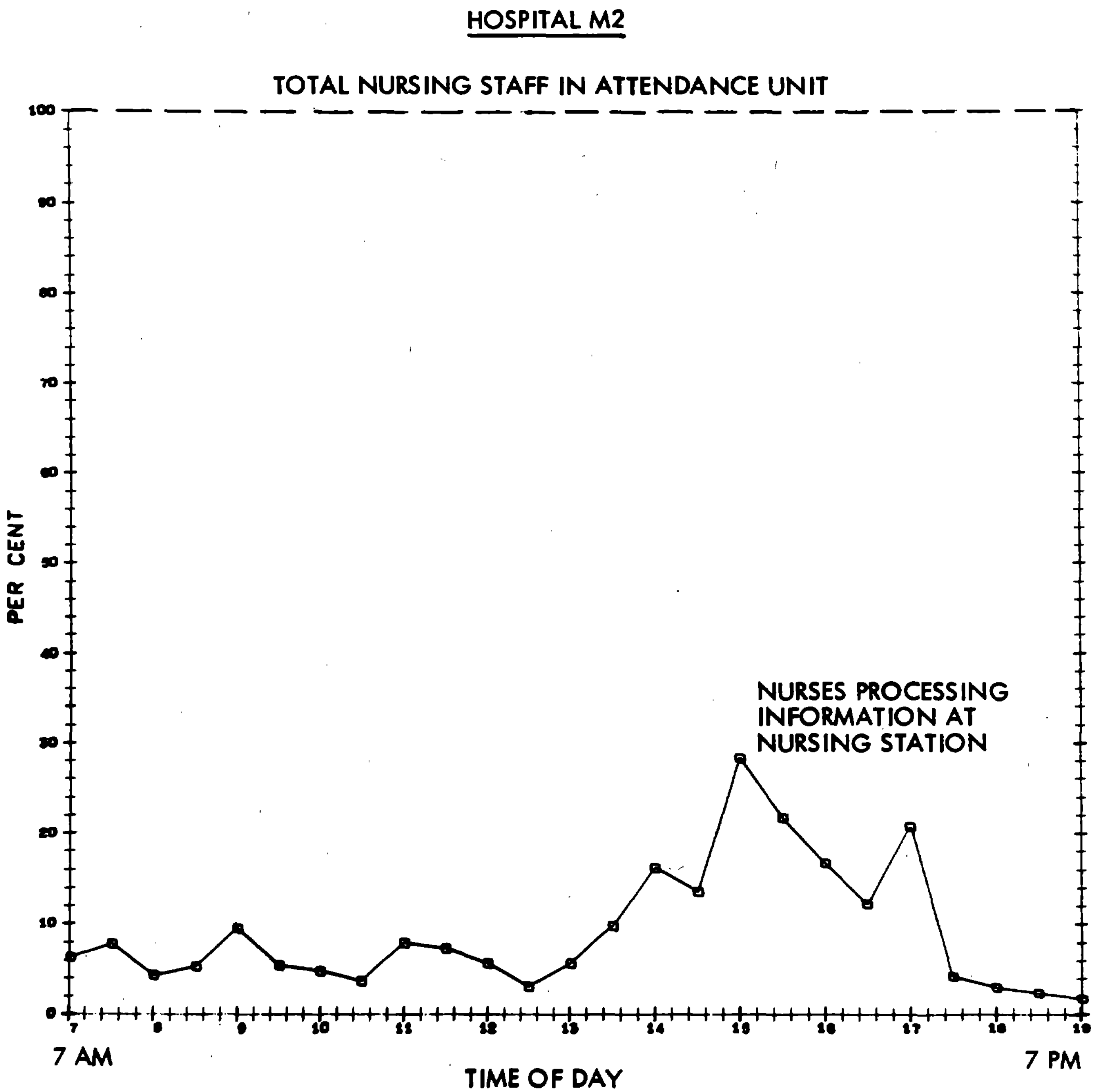

Fig. B-34 Percentage of Nursing Staff Processing Information – Hospital M2

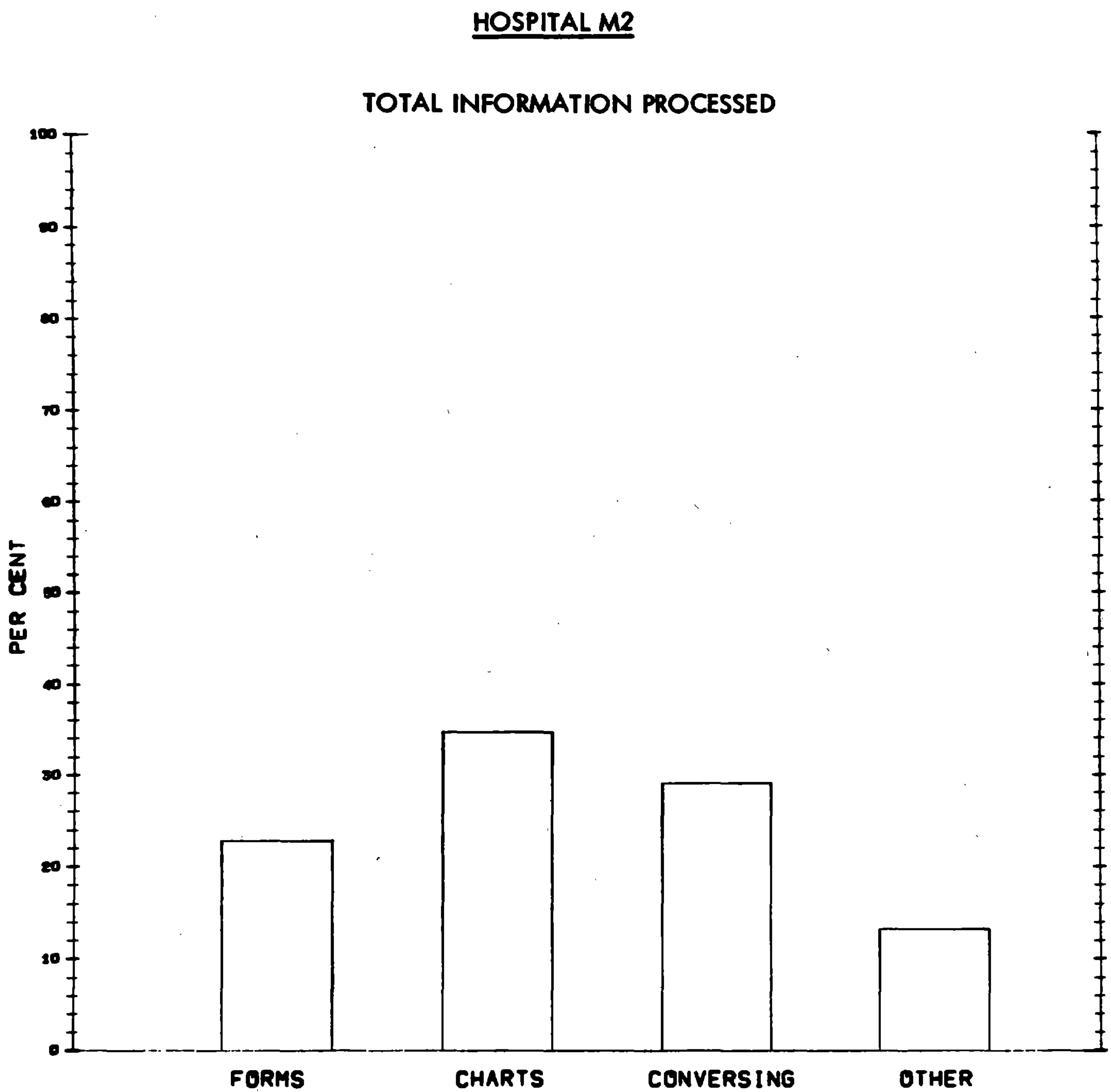

Fig. B-35 Relative Percentages of Types of Information Processed – Hospital M2

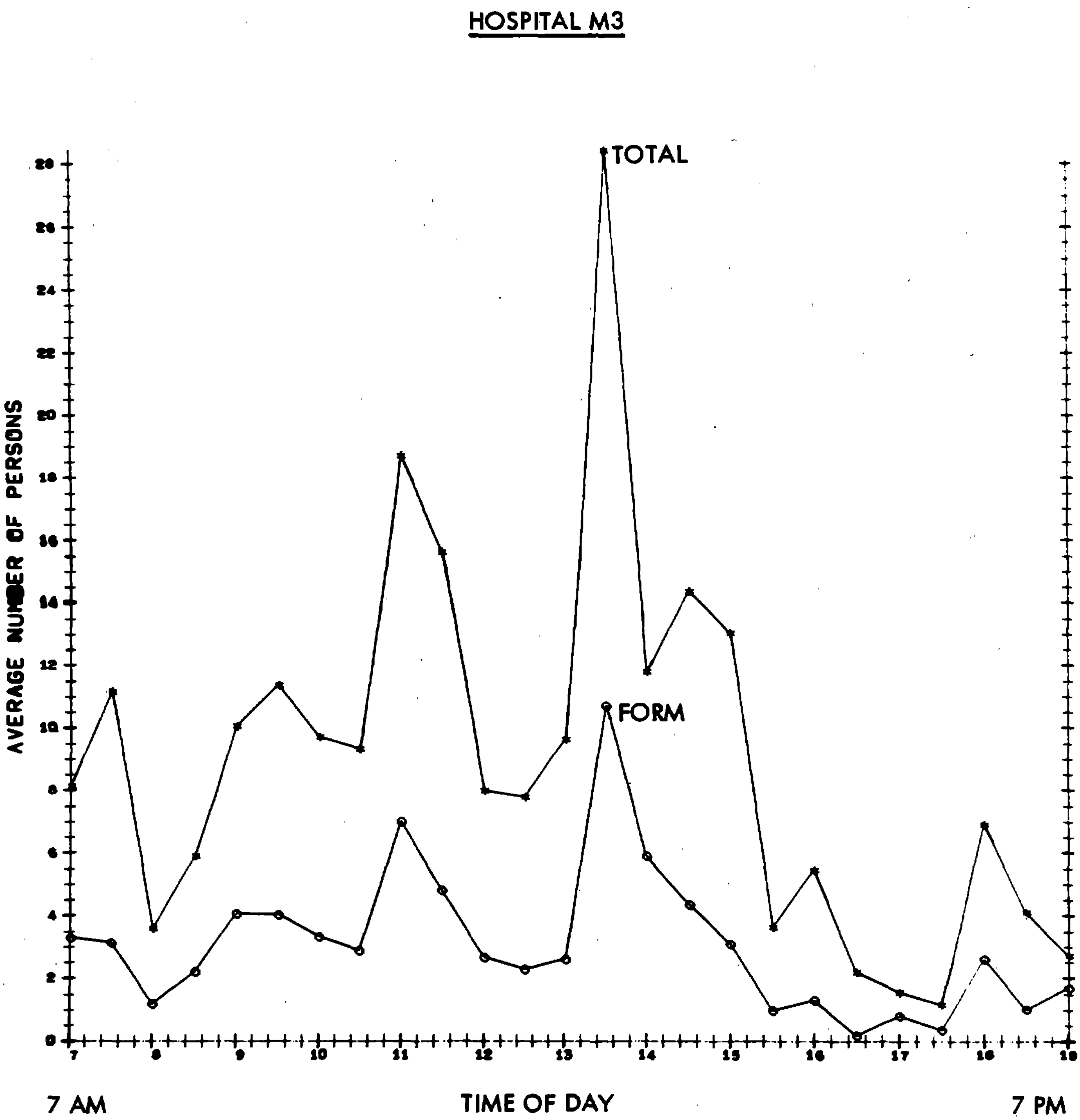

Fig. B-36 Ratio of Forms Processing to Total Information Processing – Hospital M3

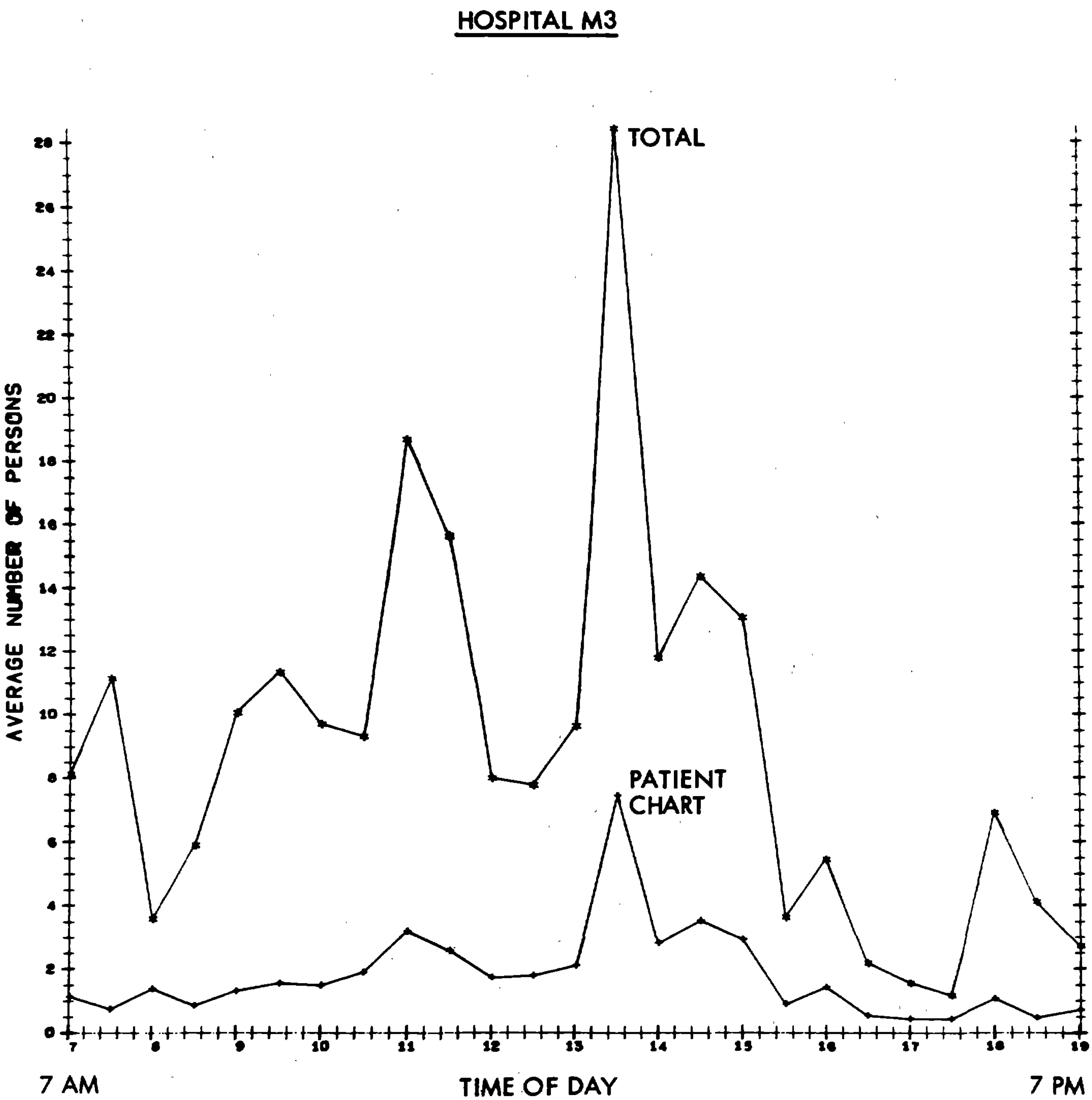

Fig. B-37 Ratio of Chart Processing to Total Information Processing – Hospital M3

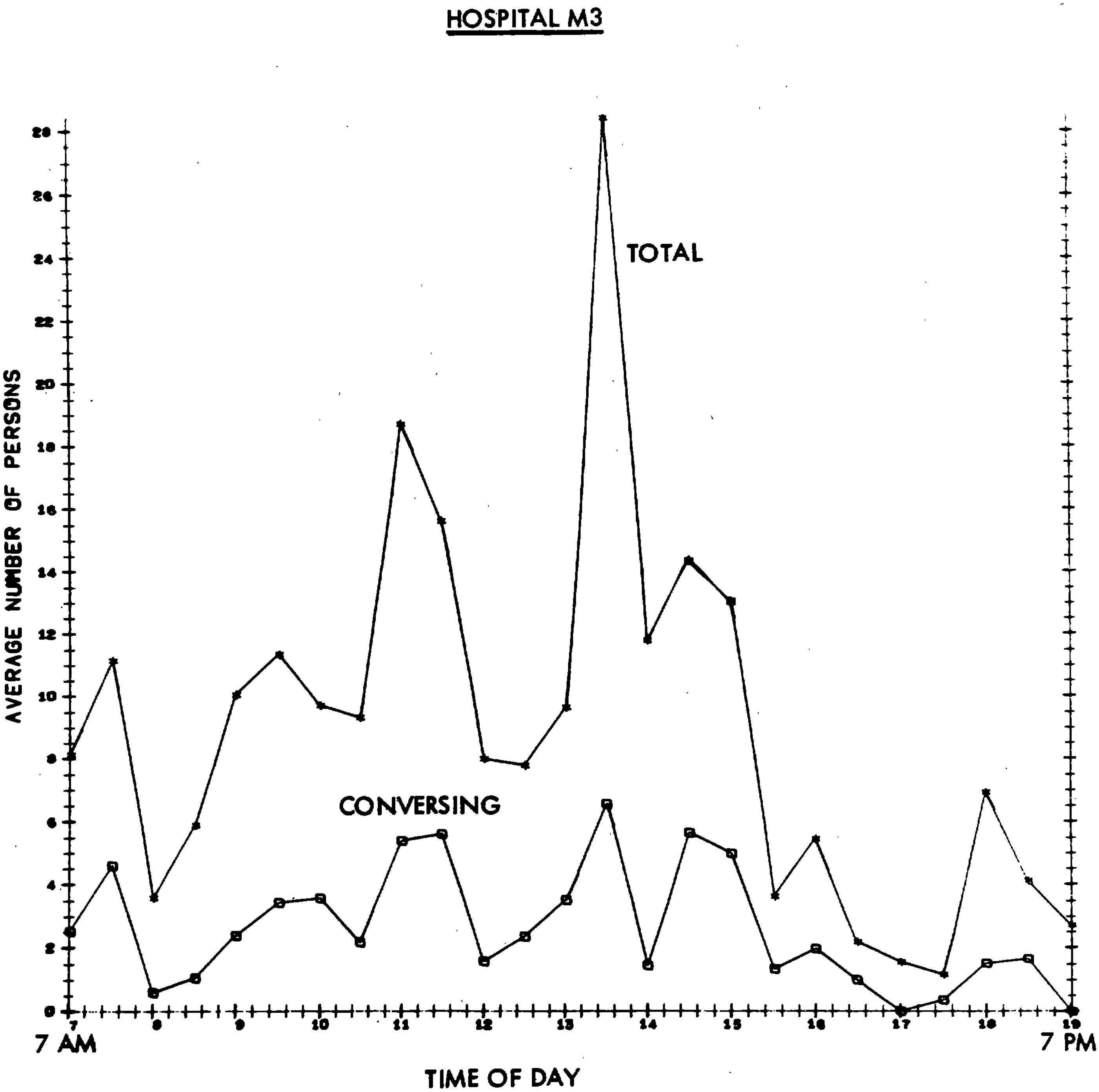

Fig. B-38 Ratio of Conversing to Total Information Processing – Hospital M3

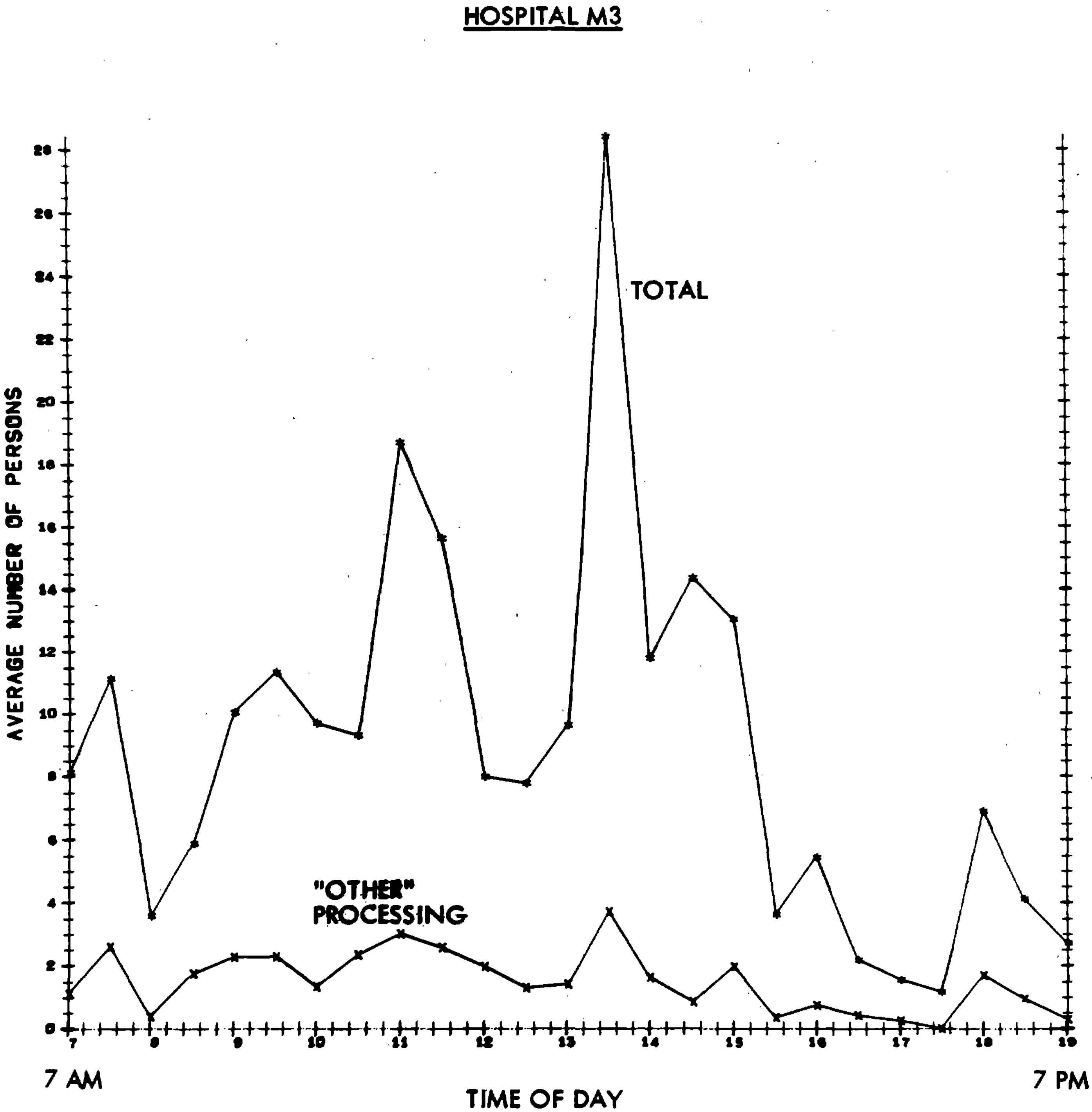

Fig. B-39 Ratio of "Other" Processing to Total Information Processing – Hospital M3

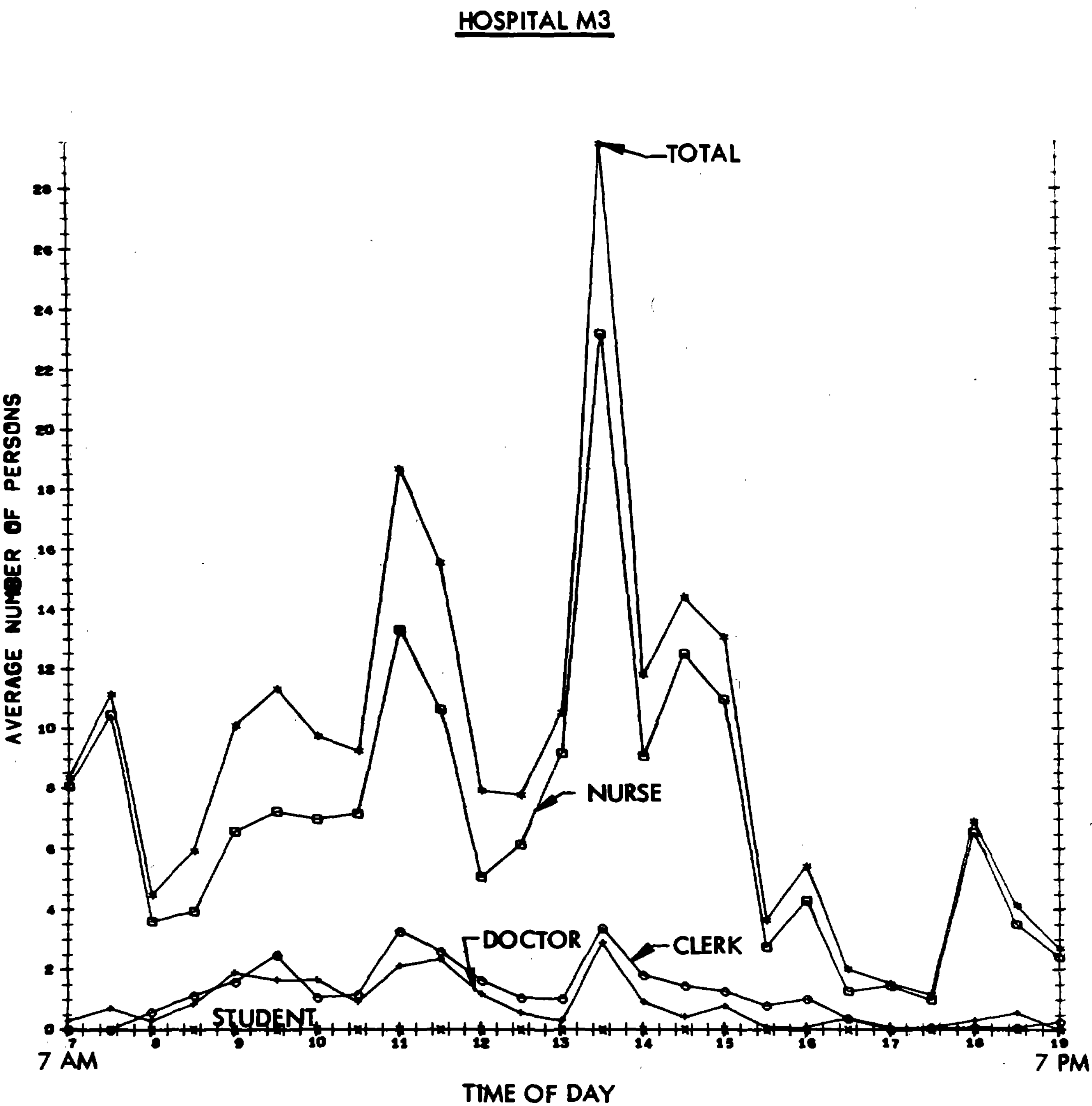

Fig. B-40 Comparison by Skill Levels of Personnel Processing to Total Information Processing – Hospital M3

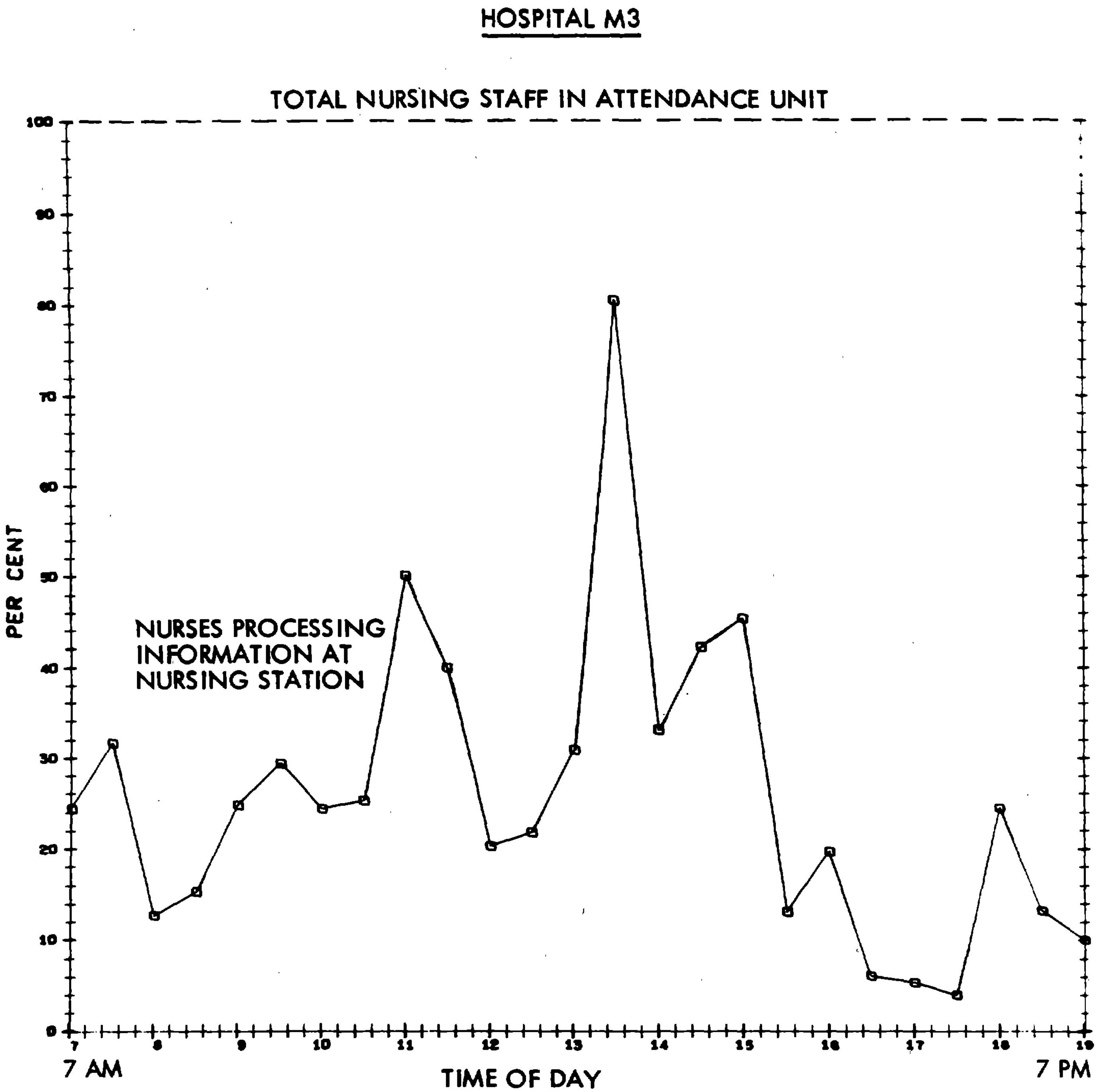

Fig. B-41 Percentage of Nursing Staff Processing Information – Hospital M3

HOSPITAL M3

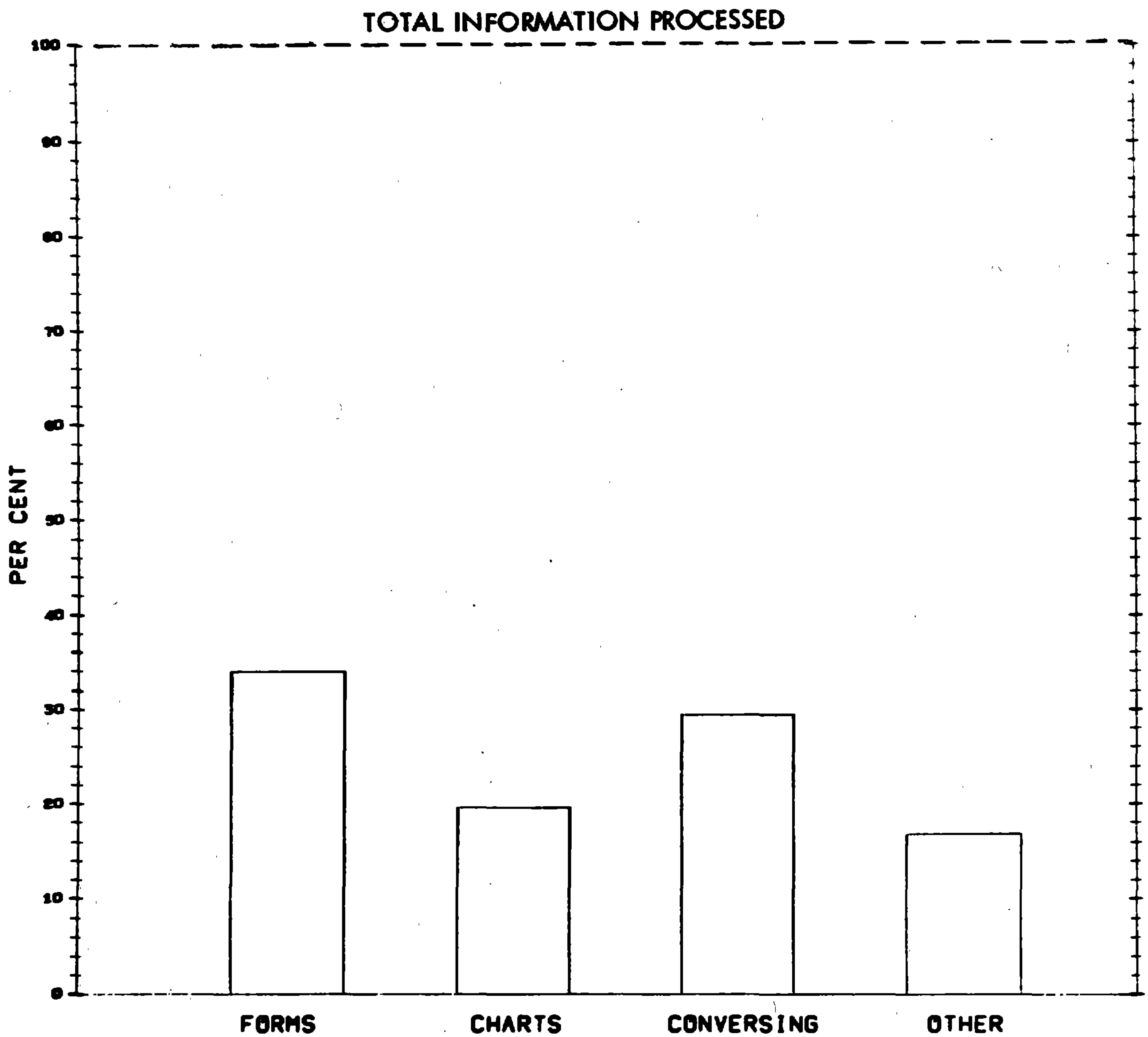

Fig. B-42 Relative Percentages of Types of Information Processed – Hospital M3

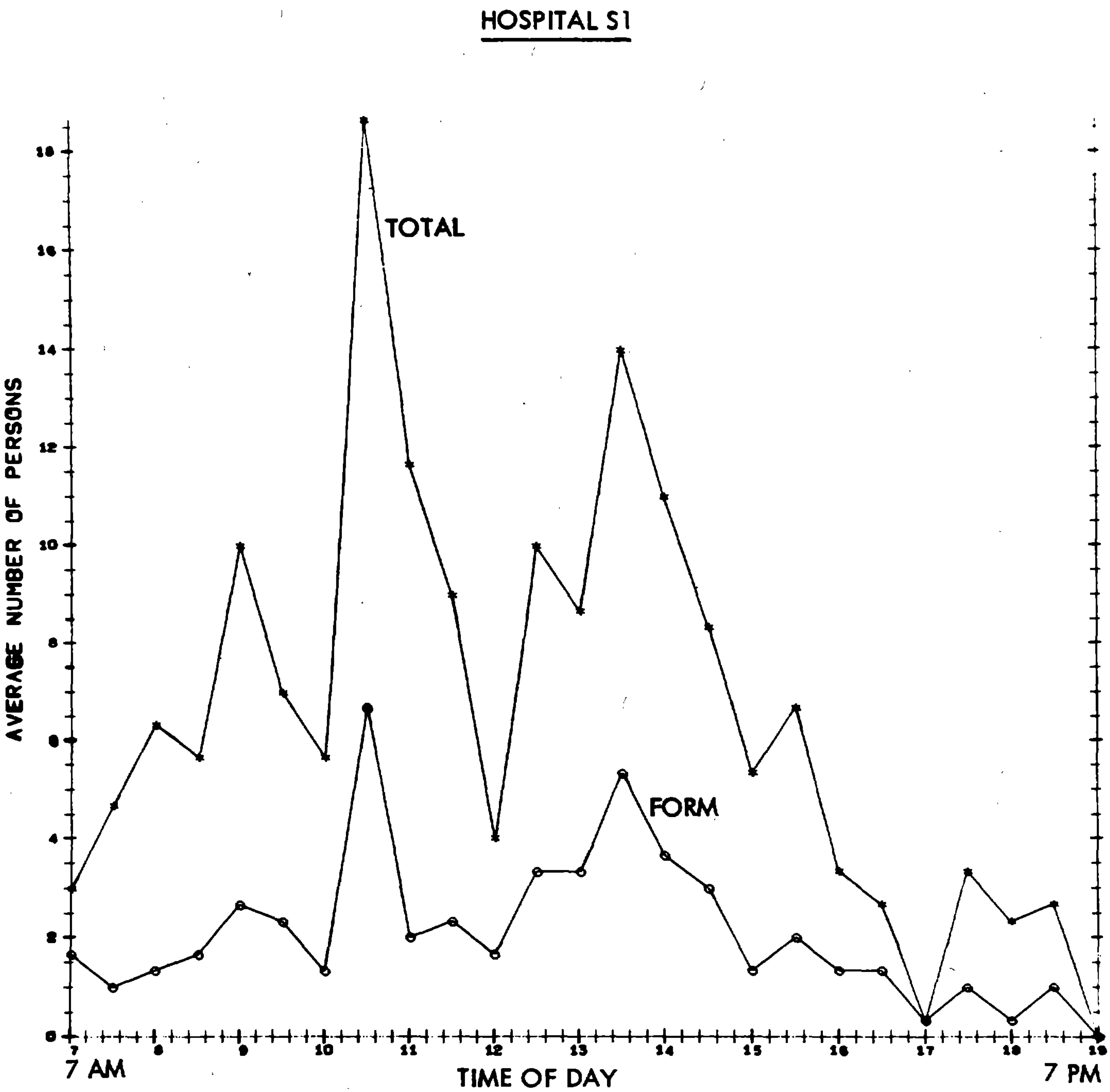

Fig. B-43 Ratio of Forms Processing to Total Information Processing – Hospital S1

HOSPITAL S1

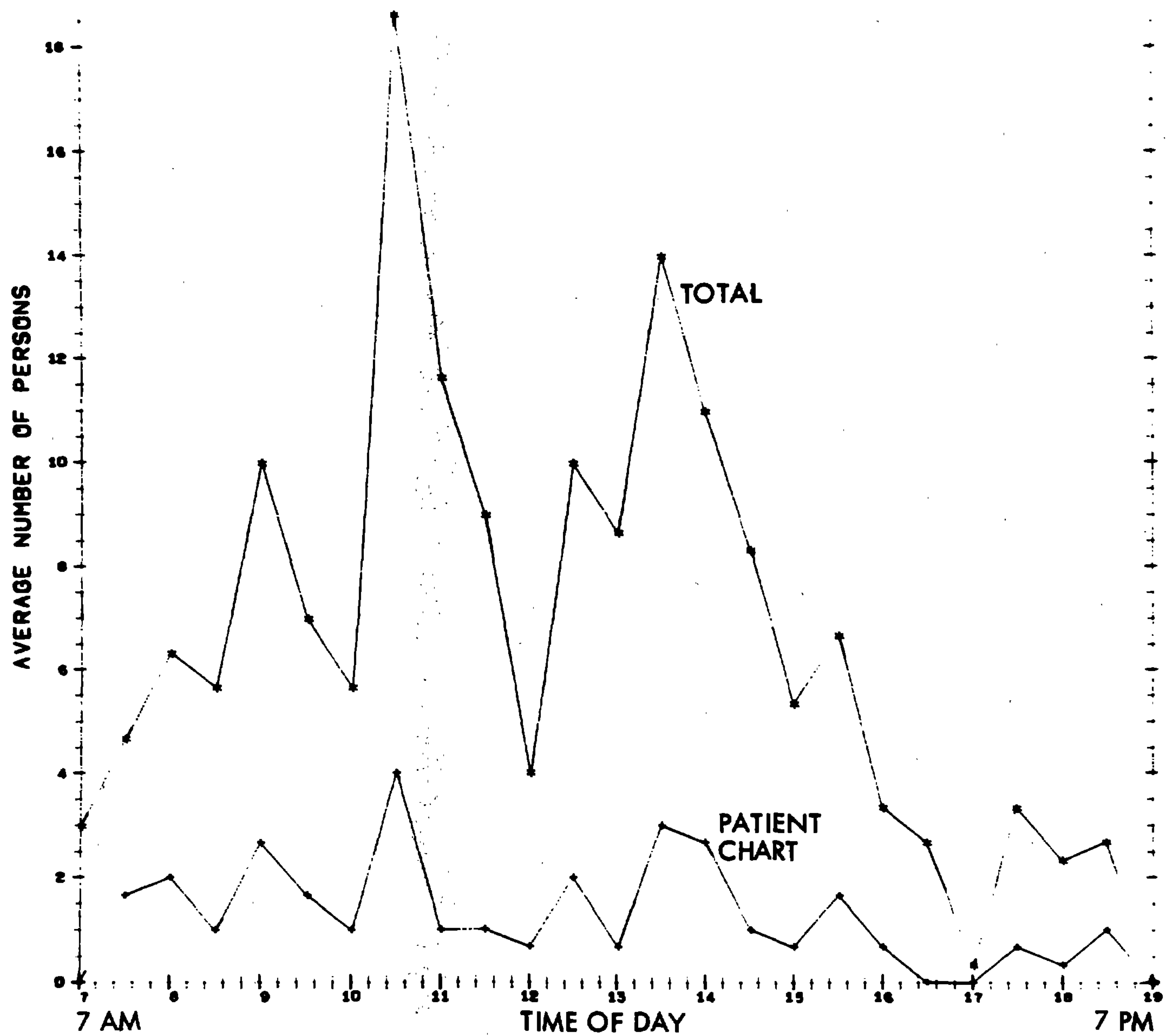

Fig. B-44 Ratio of Chart Processing to Total Information Processing – Hospital S1

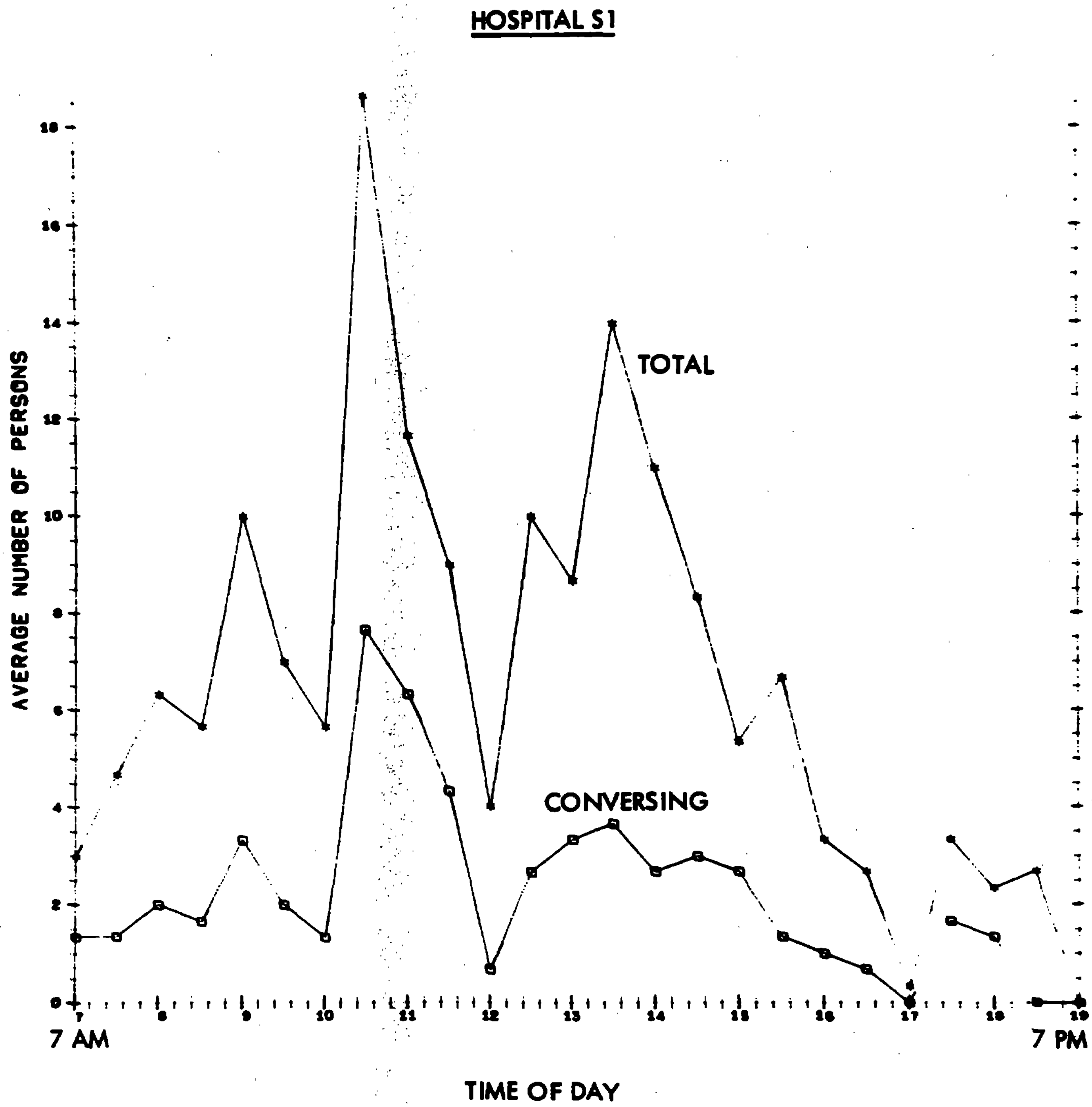

Fig. B-45 Ratio of Conversing to Total Information Processing – Hospital S1

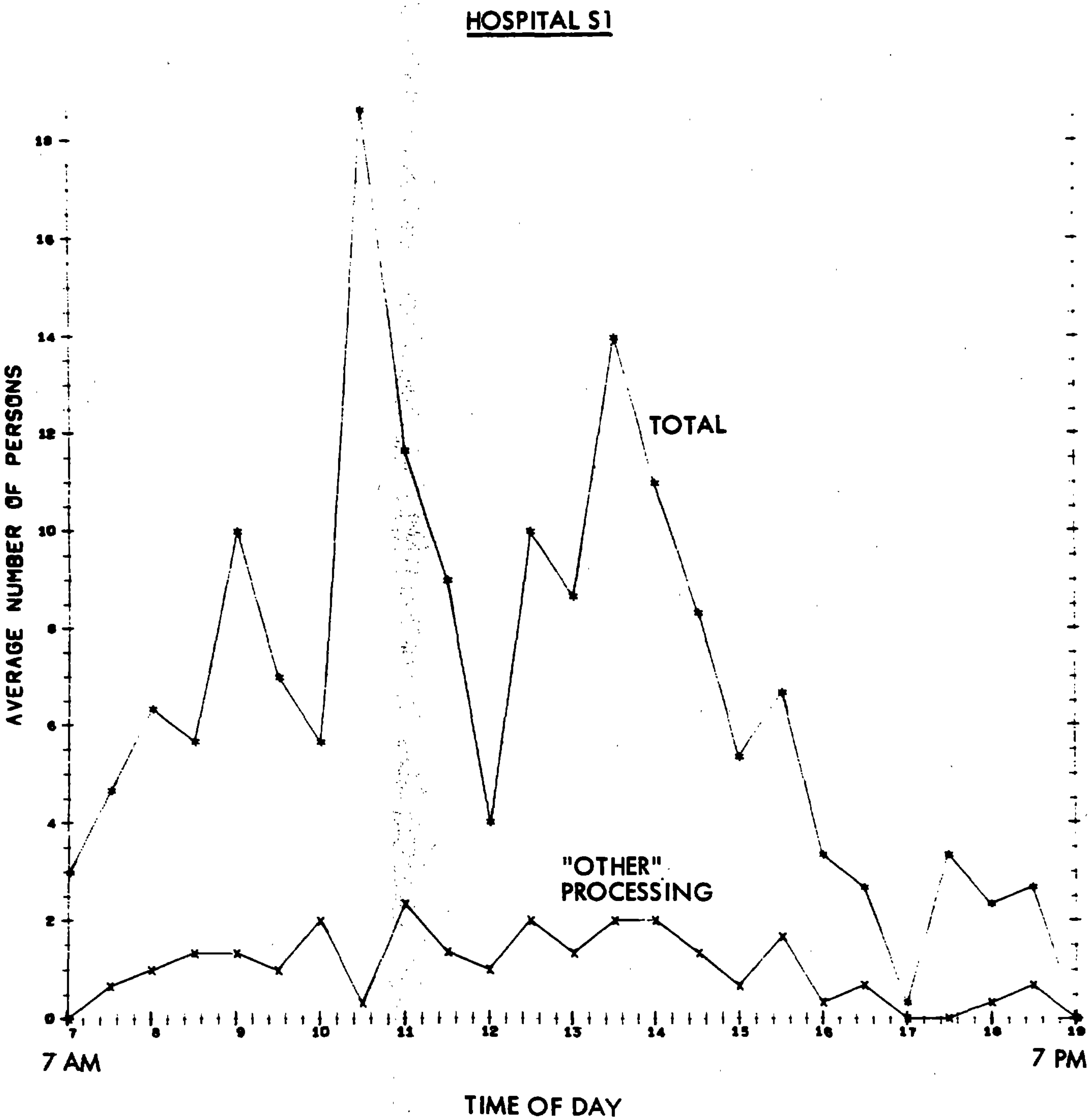

Fig. B-46 Ratio of "Other" Processing to Total Information Processing – Hospital S1

HOSPITAL S1

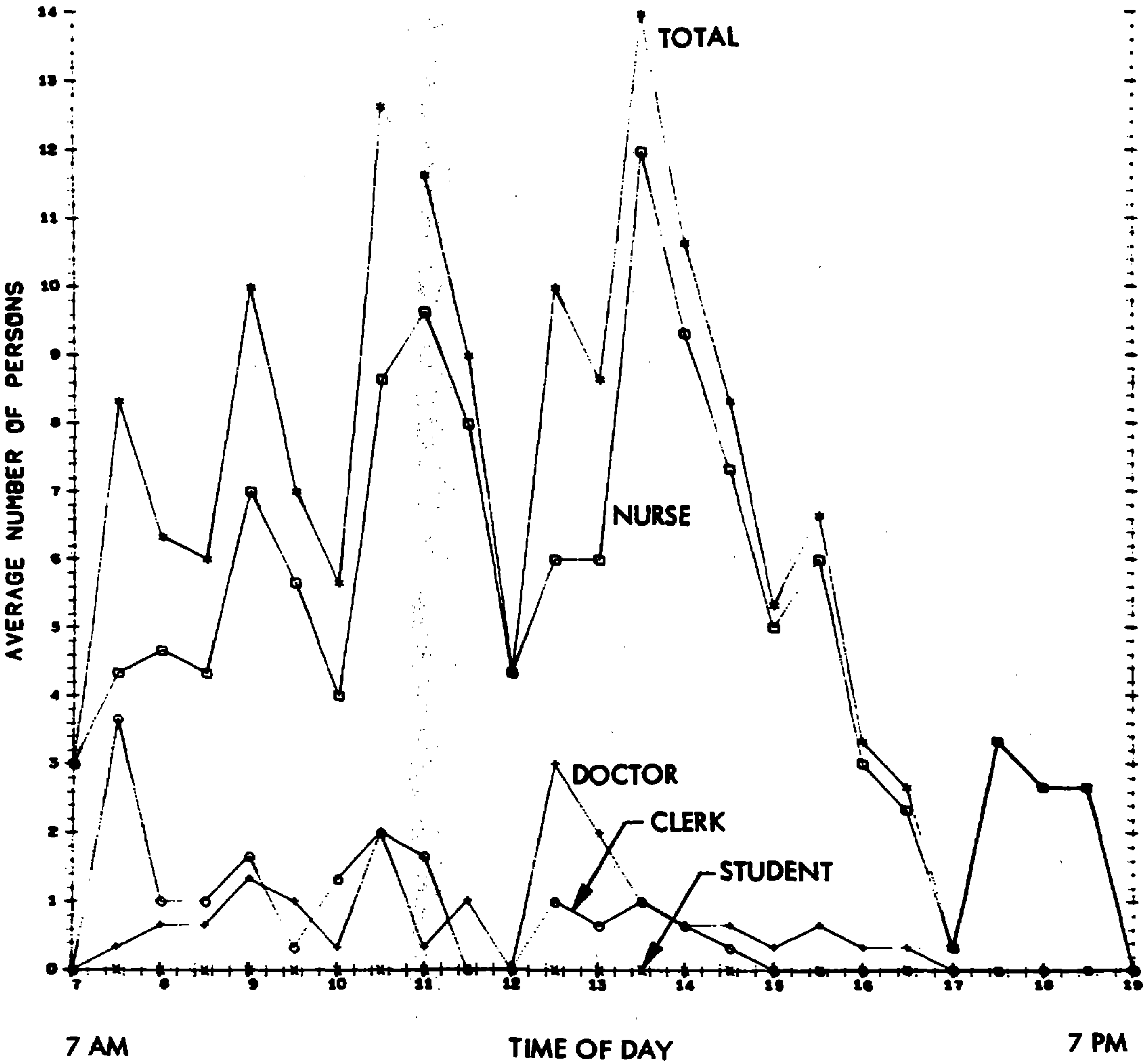

Fig. B-47 Comparison by Skill Levels of Personnel Processing to Total Information Being Processed – Hospital S1

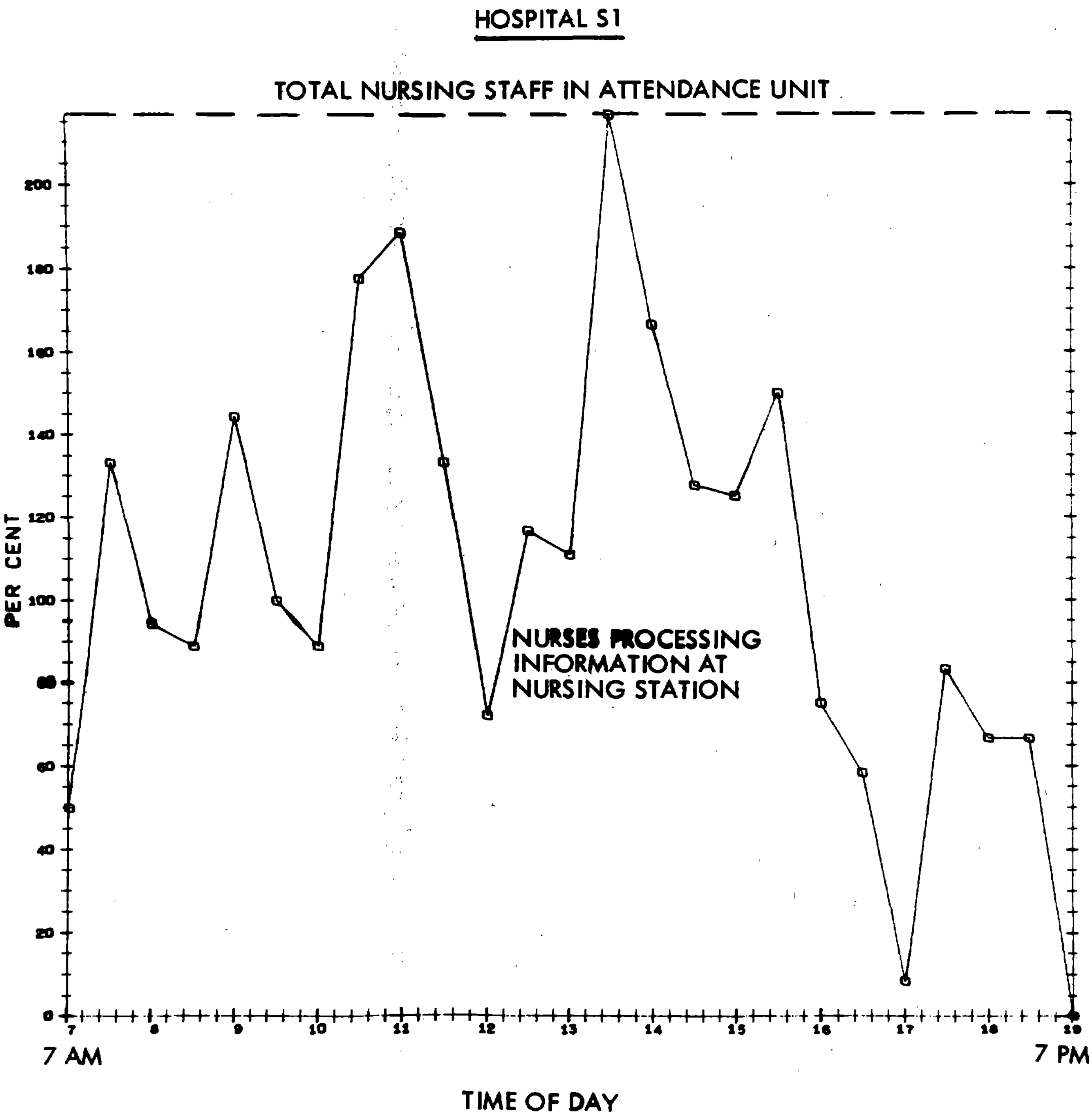

Fig. B-48 Percentage of Nursing Staff Processing Information – Hospital S1

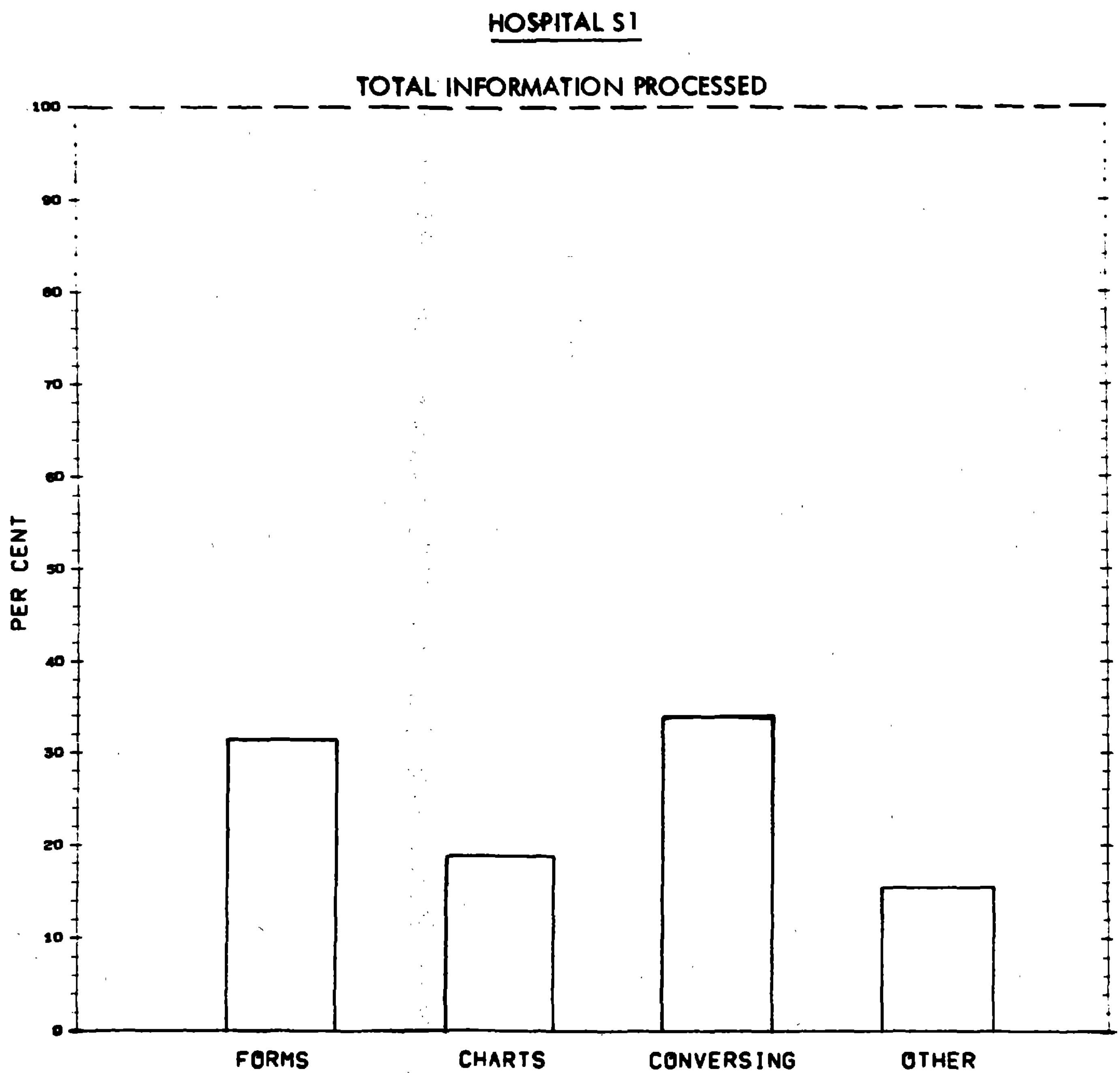

Fig. B-49 Relative Percentages of Types of Information Processed — Hospital S1

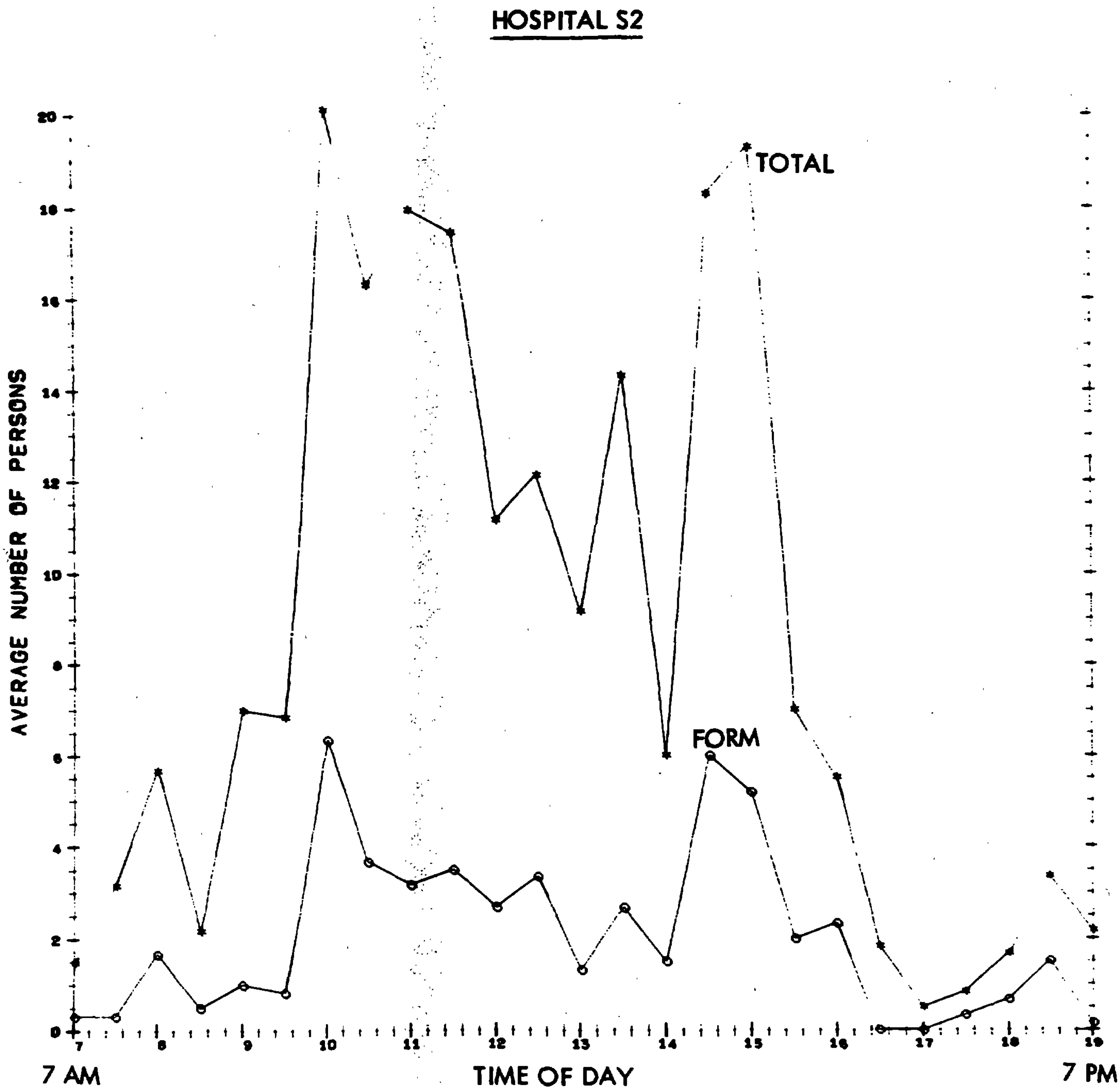

Fig. B-50 Ratio of Forms Processing to Total Information Processing – Hospital S2

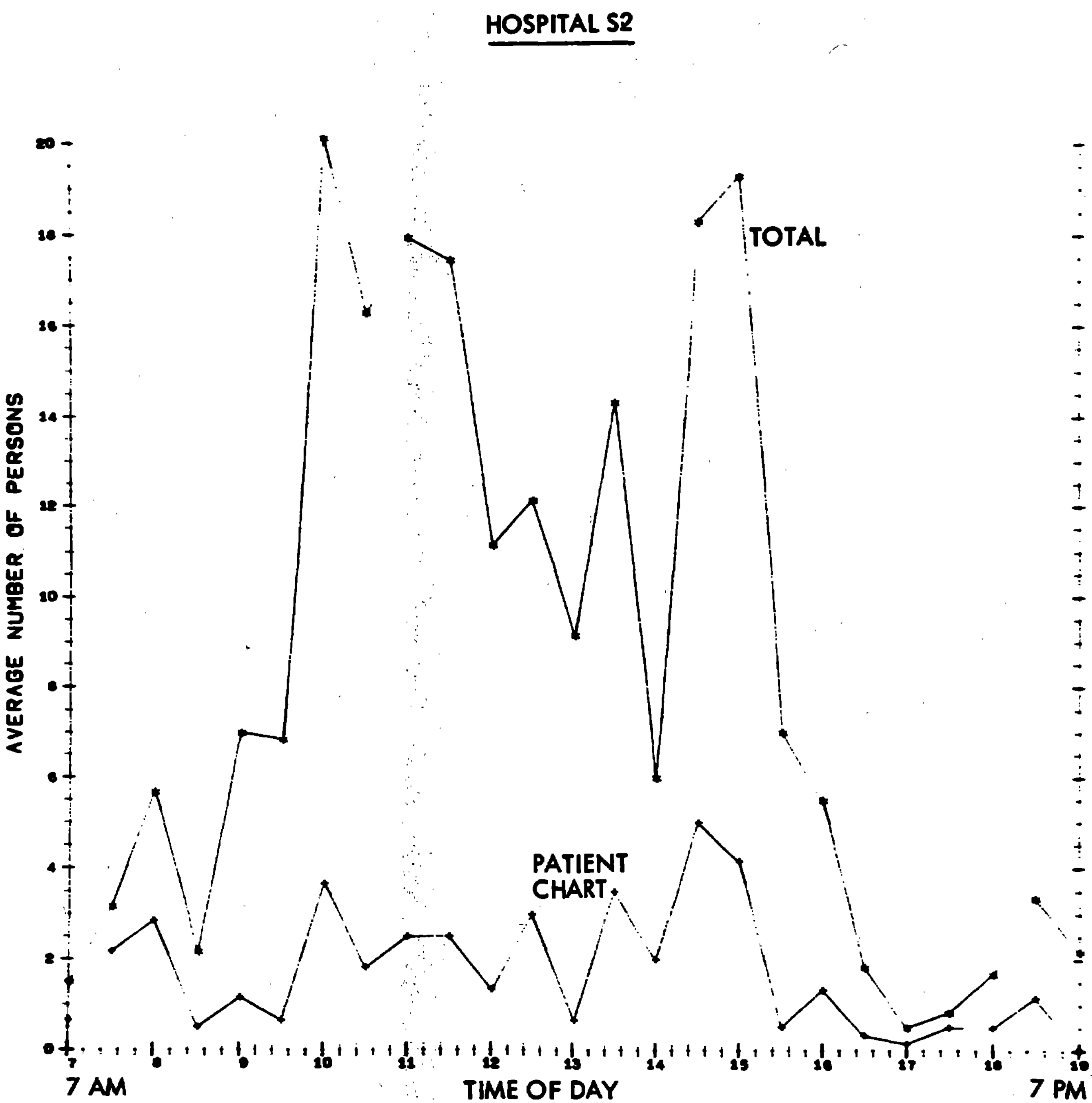

Fig. B-51 Ratio of Chart Processing to Total Information Processing – Hospital S2

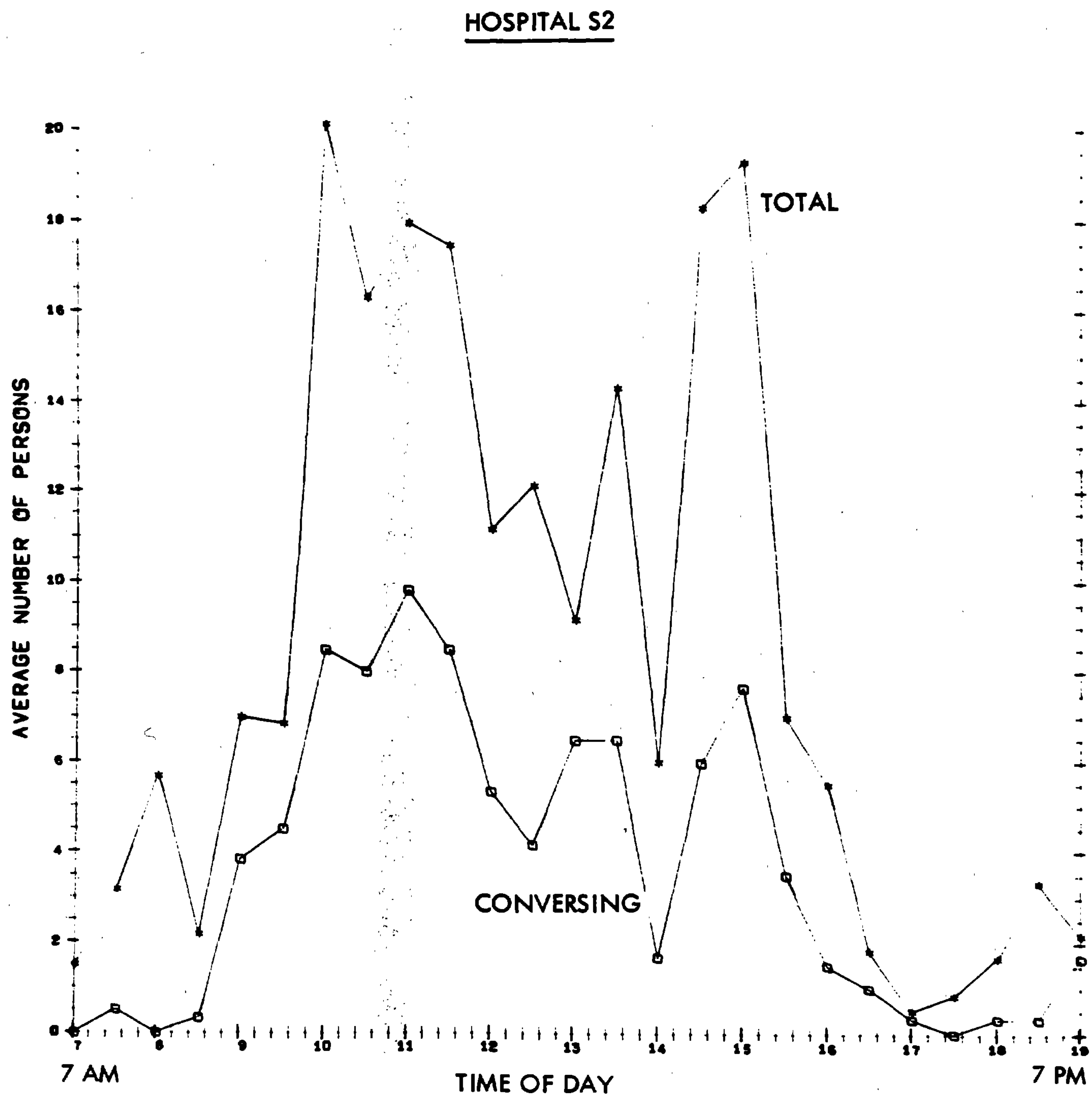

Fig. B-52 Ratio of Conversing to Total Information Processing – Hospital S2

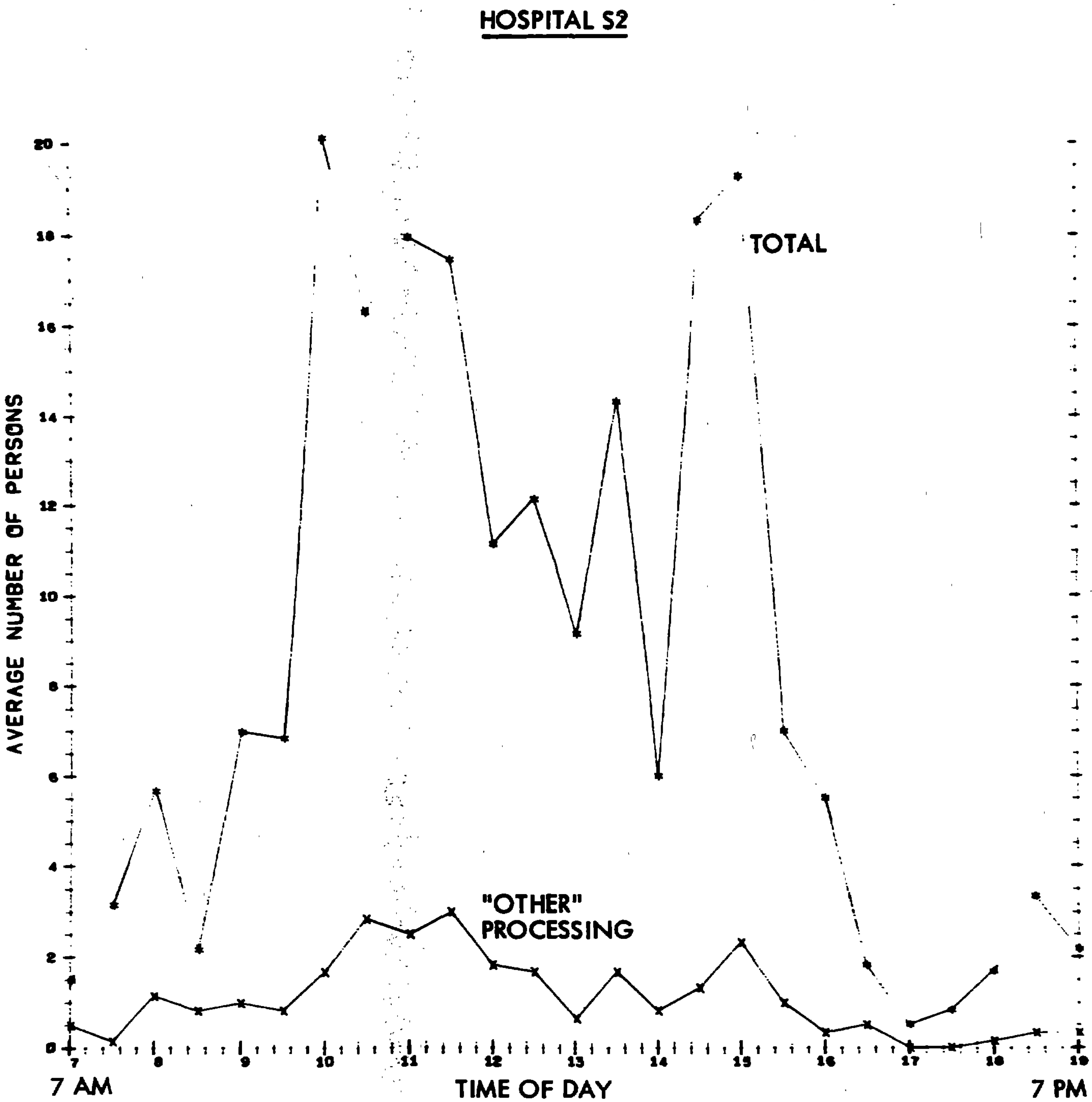

Fig. B-53 Ratio of "Other" Processing to Total Information Processing – Hospital S2

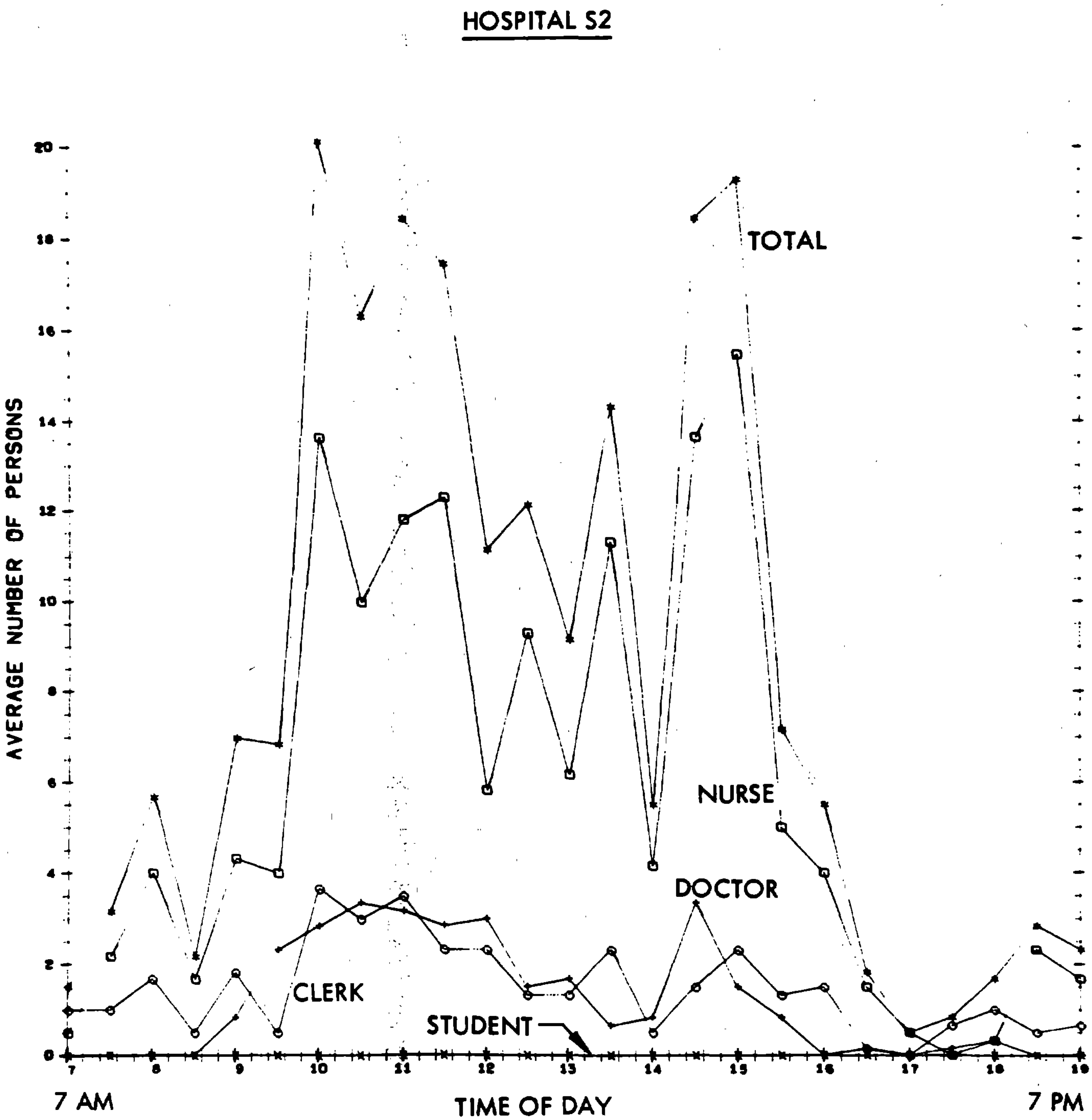

Fig. B-54 Comparison by Skill Levels of Personnel Processing to Total Information Being Processed – Hospital S2

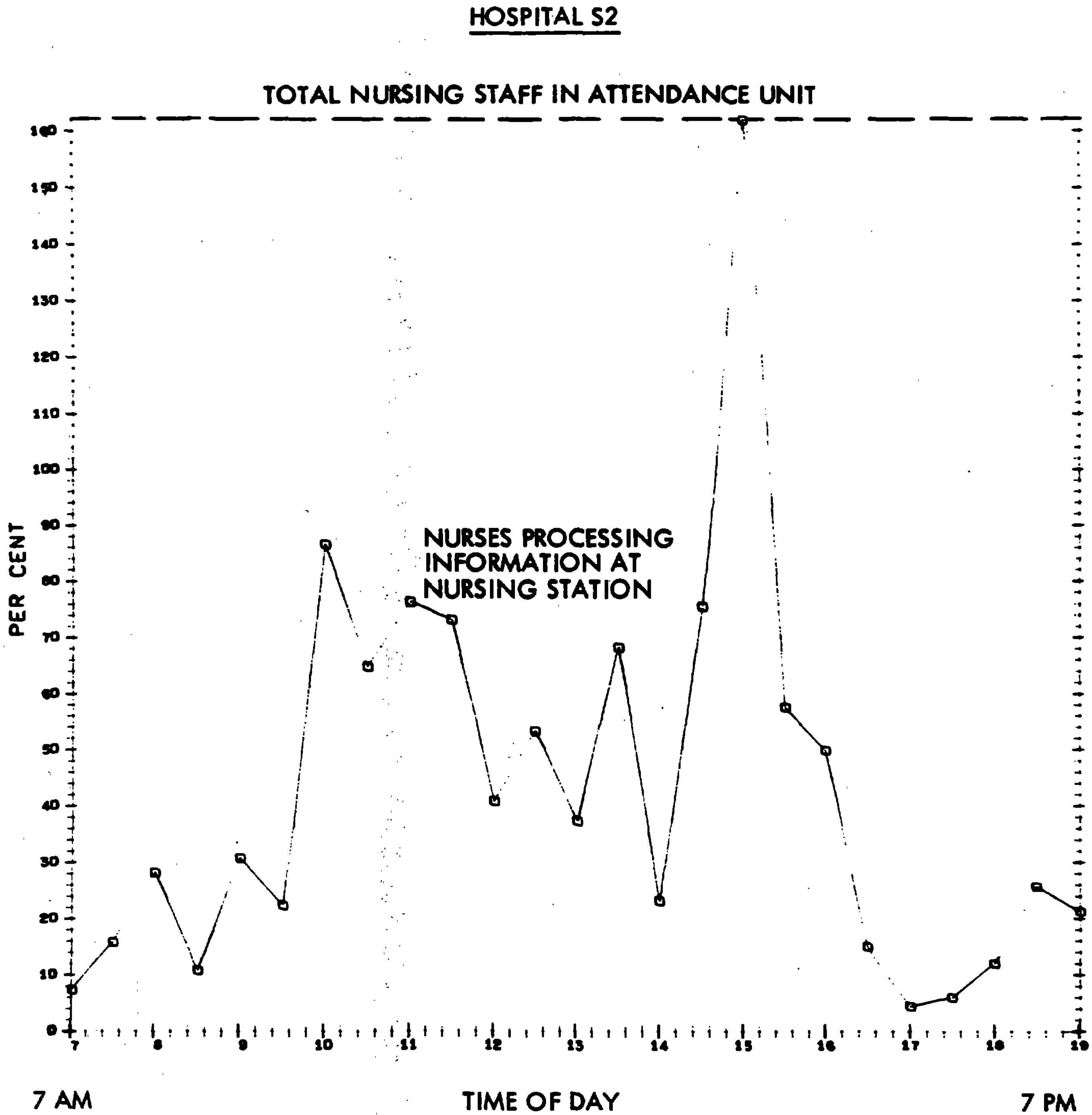

Fig. B-55 Percentage of Nursing Staff Processing Information – Hospital S2

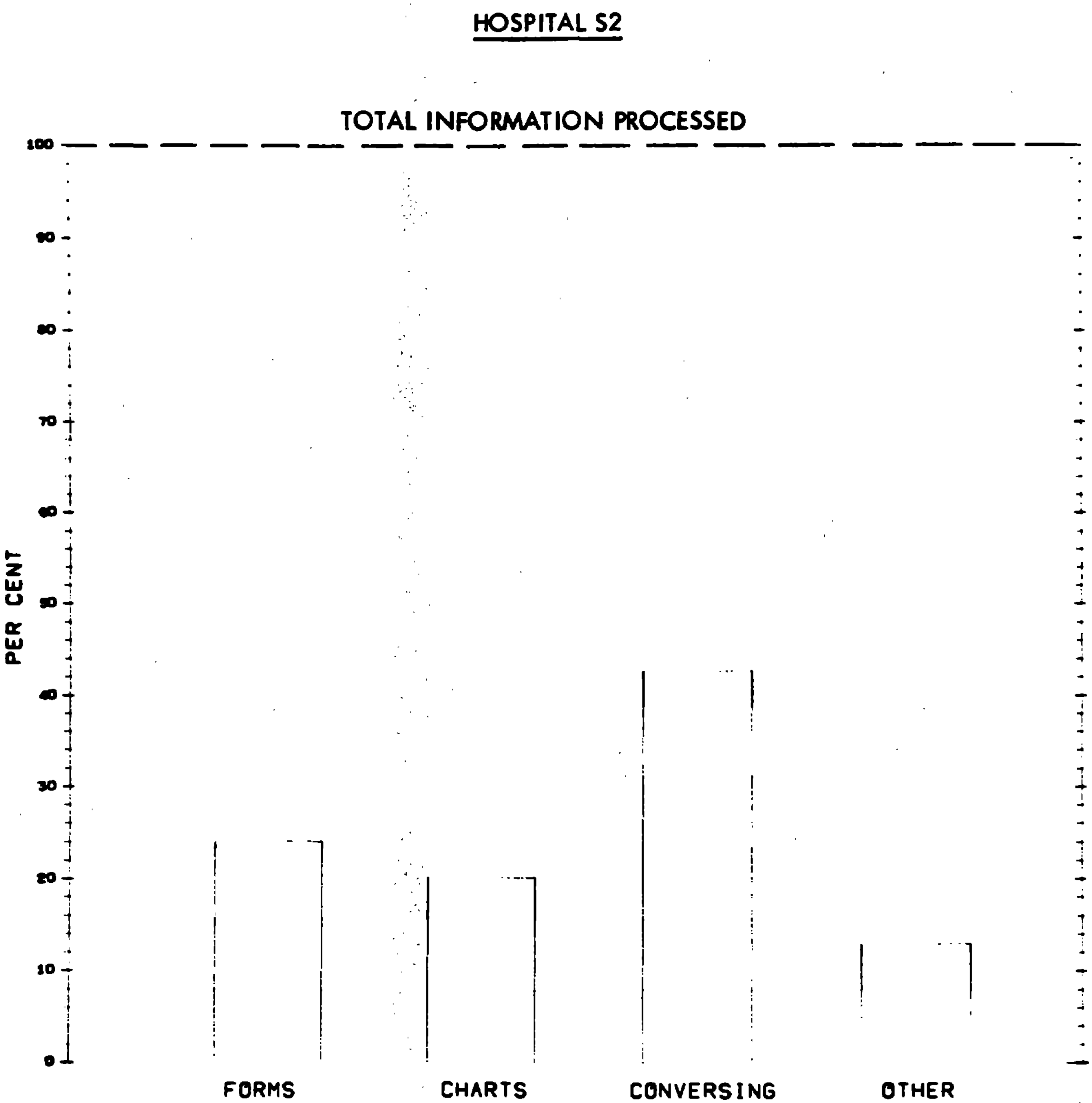

Fig. B-56 Relative Percentages of Types of Information Processed — Hospital S2

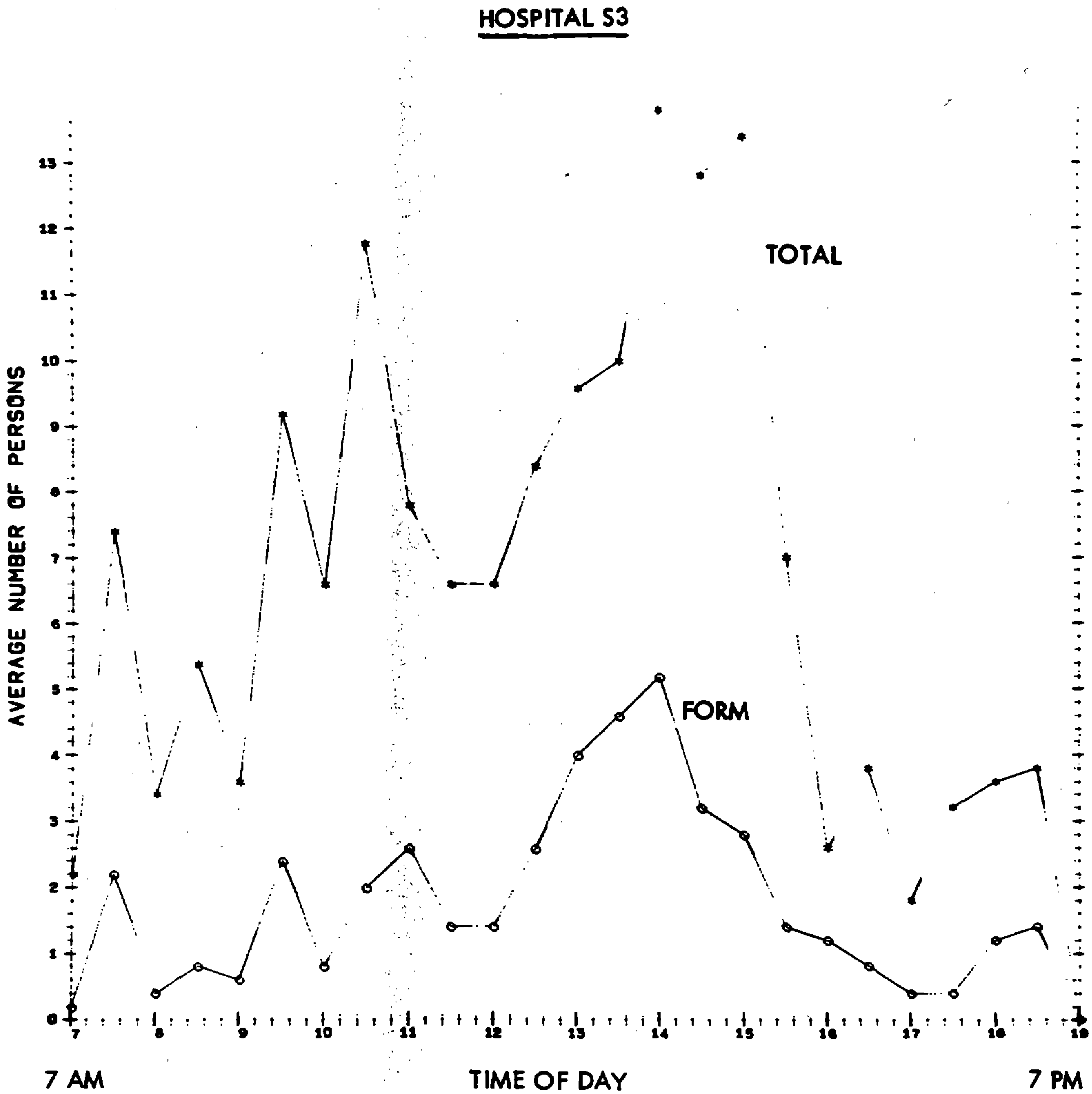

Fig. B-57 Ratio of Forms Processing to Total Information Processing – Hospital S3

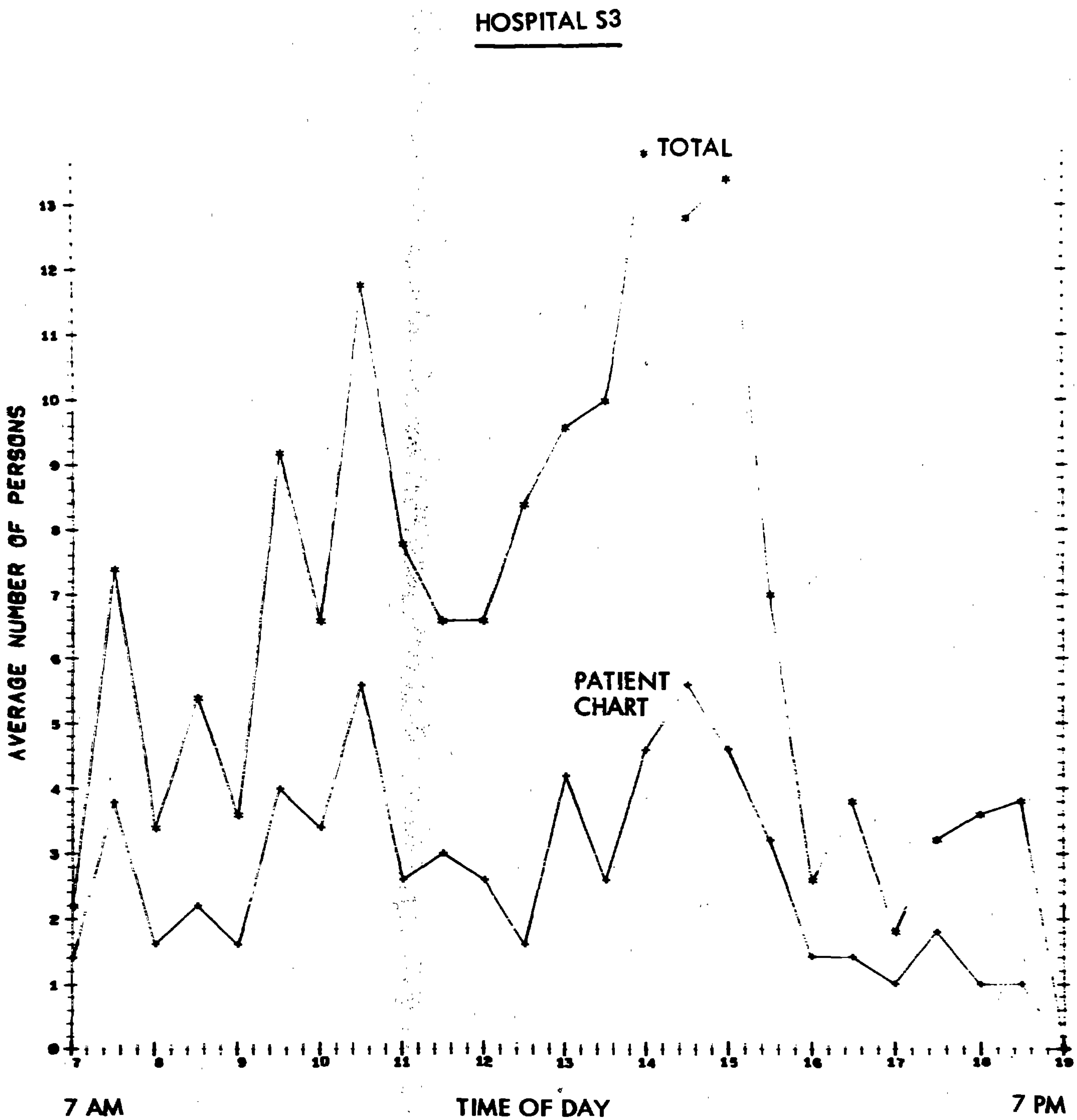

Fig. B-58 Ratio of Chart Processing to Total Information Processing – Hospital S3

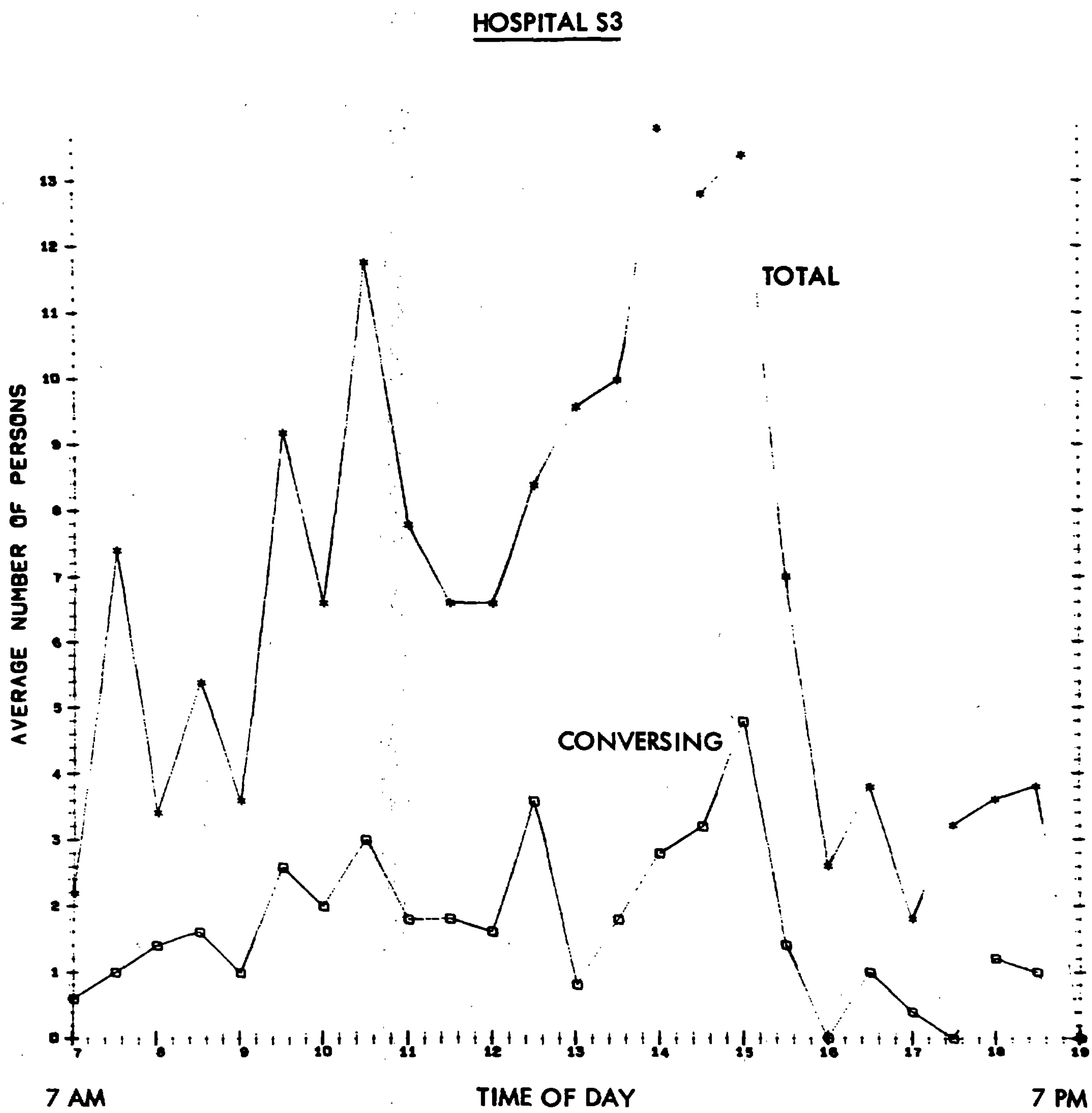

Fig. B-59 Ratio of Conversing to Total Information Processing – Hospital S3

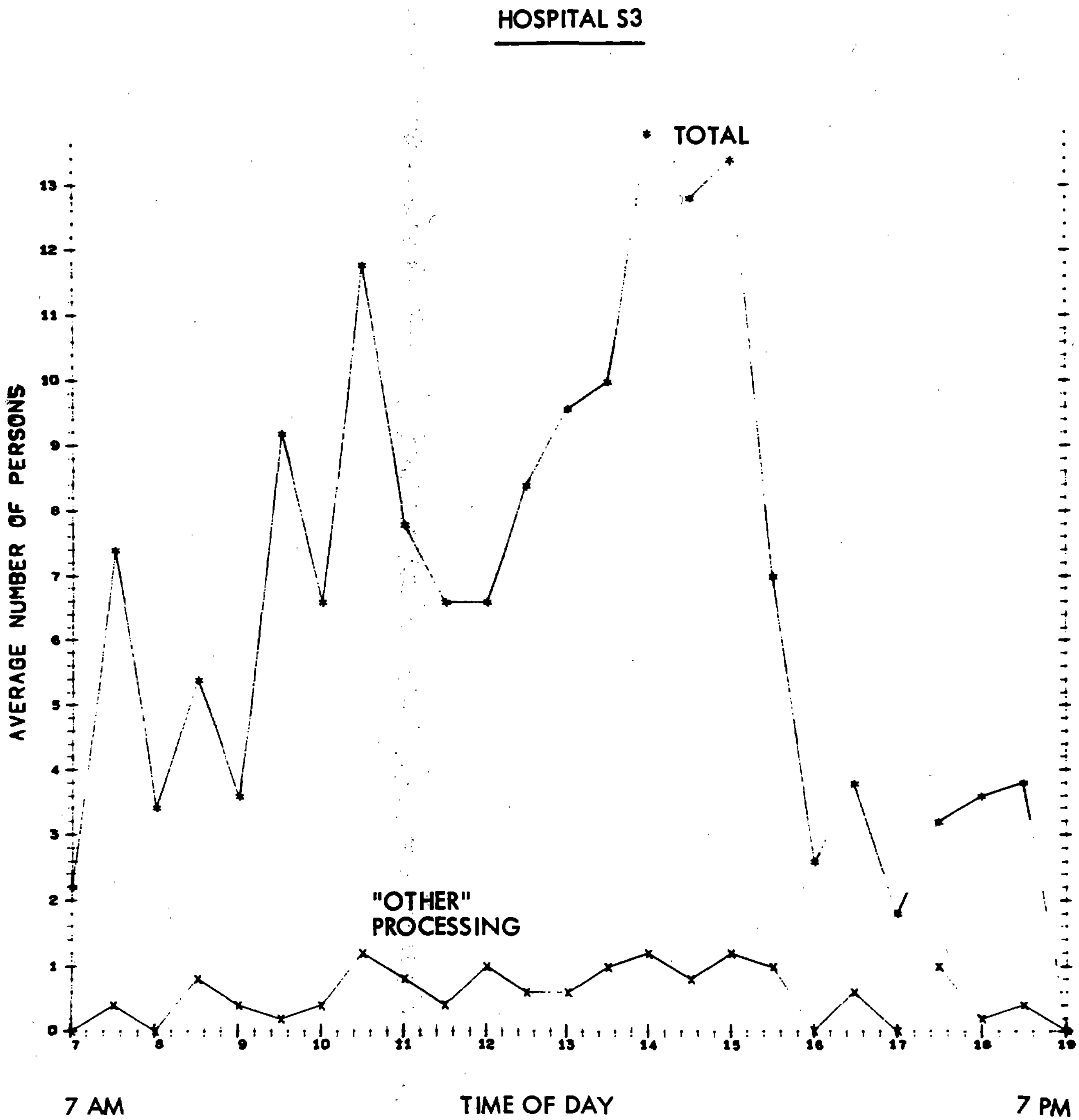

Fig. B-60 Ratio of "Other" Processing to Total Information Processing – Hospital S3

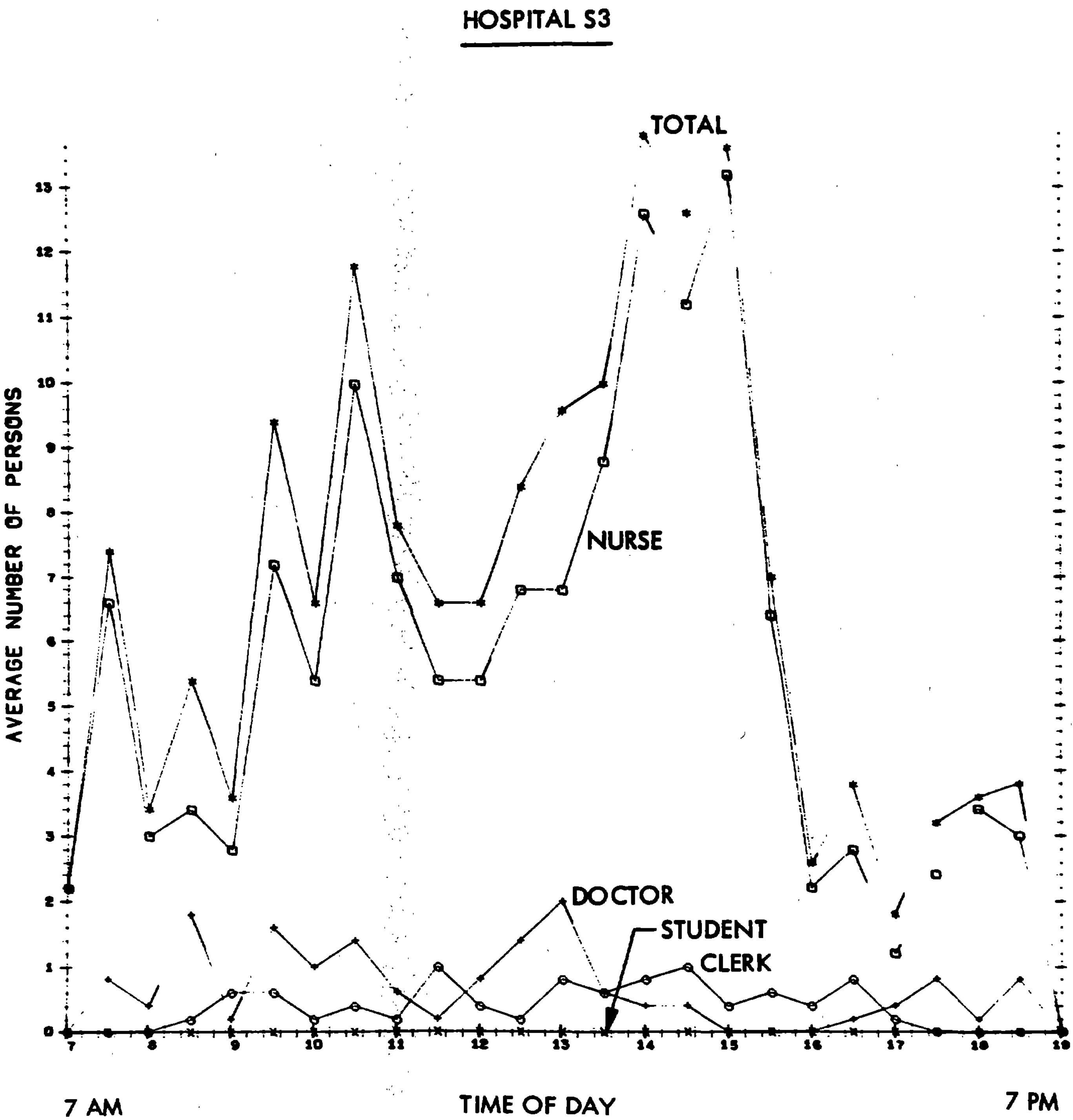

Fig. B-61 Comparison by Skill Levels of Personnel Processing to Total Information Being Processed – Hospital S3

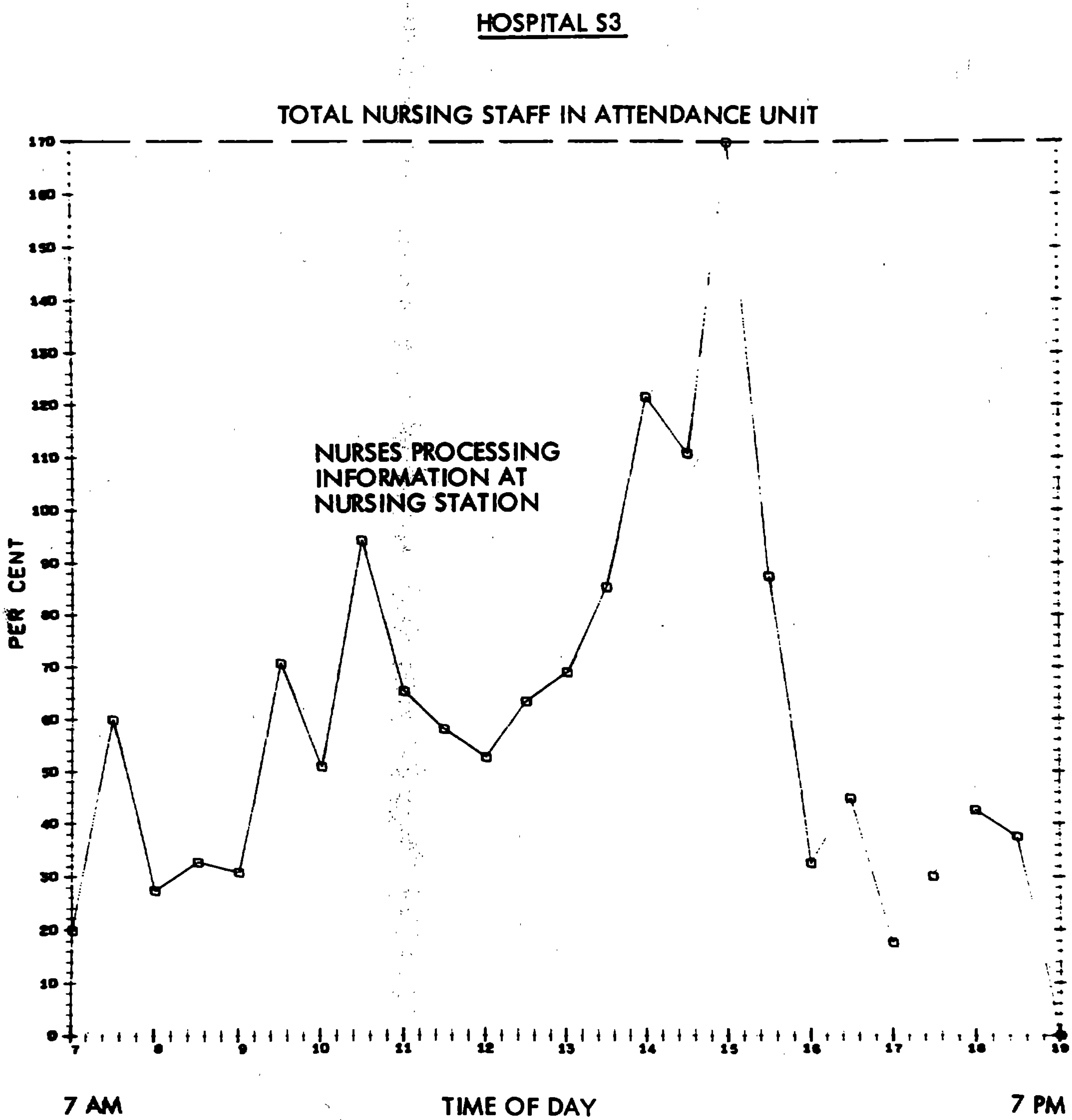

Fig. B-62 Percentage of Nursing Staff Processing Information – Hospital S3

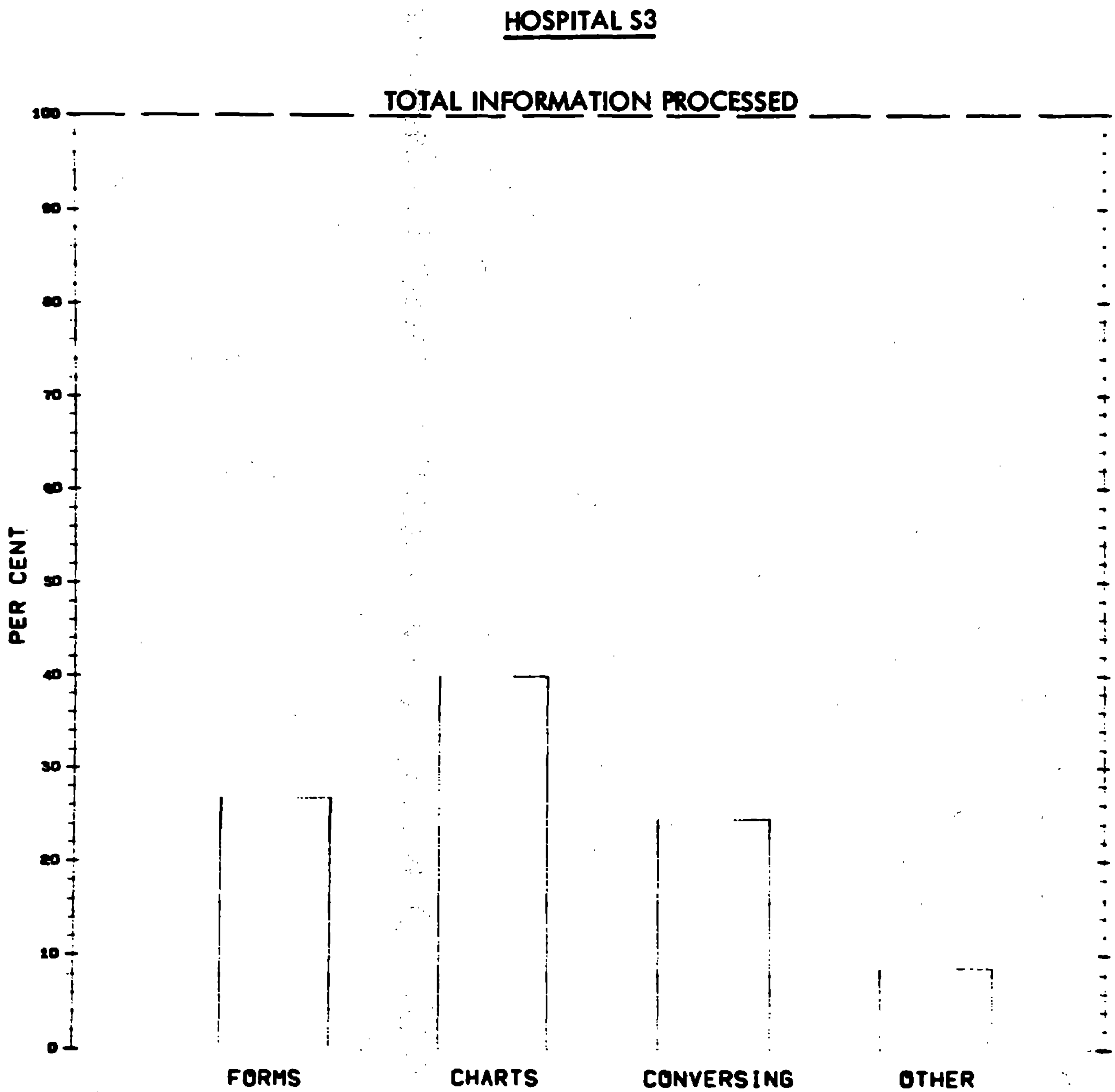

Fig. B-63 Relative Percentages of Types of Information Processed – Hospital S3

EXTENDED-CARE FACILITY

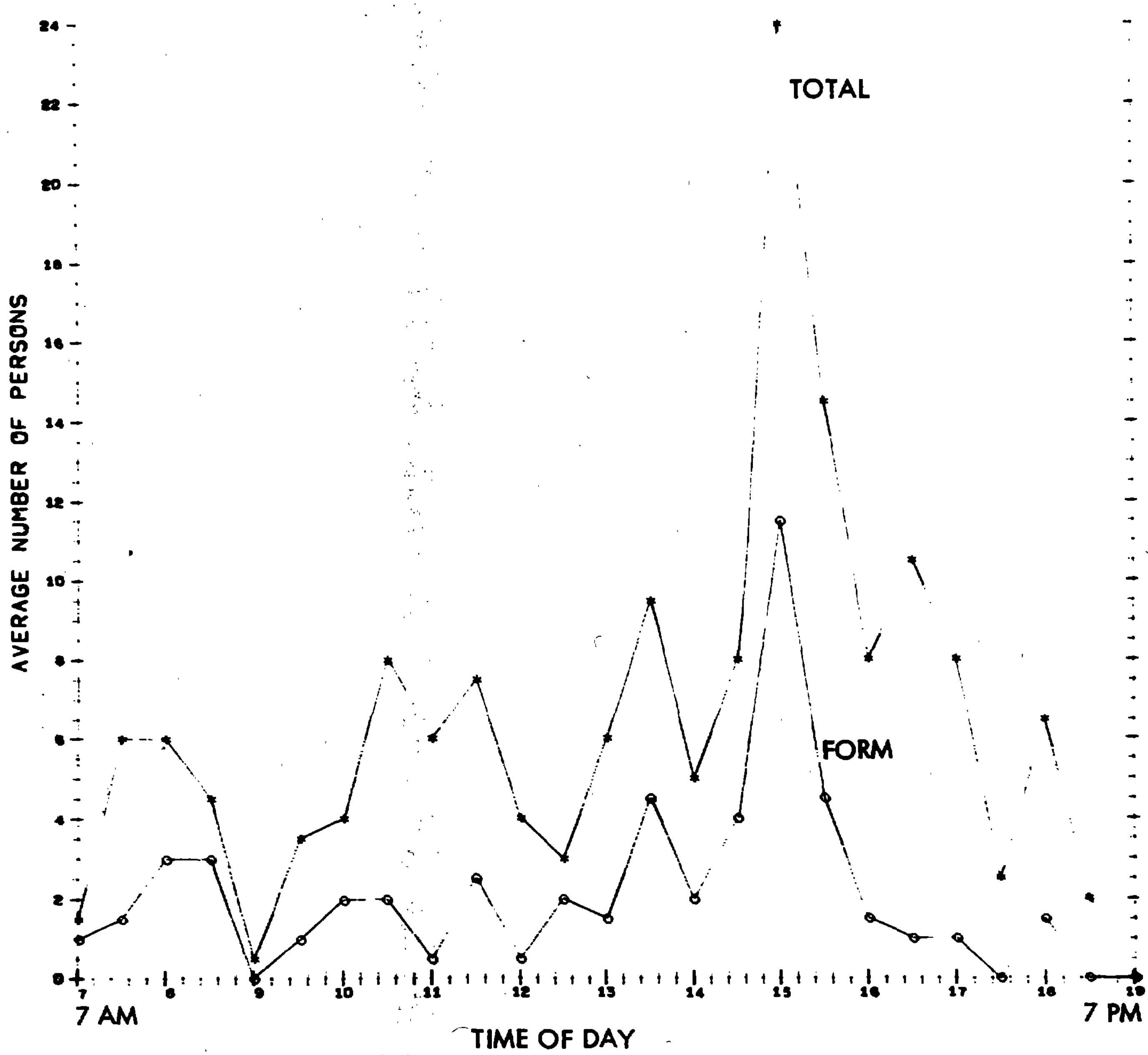

Fig. B-64 Ratio of Forms Processing to Total Information Processing – Extended-Care Facility

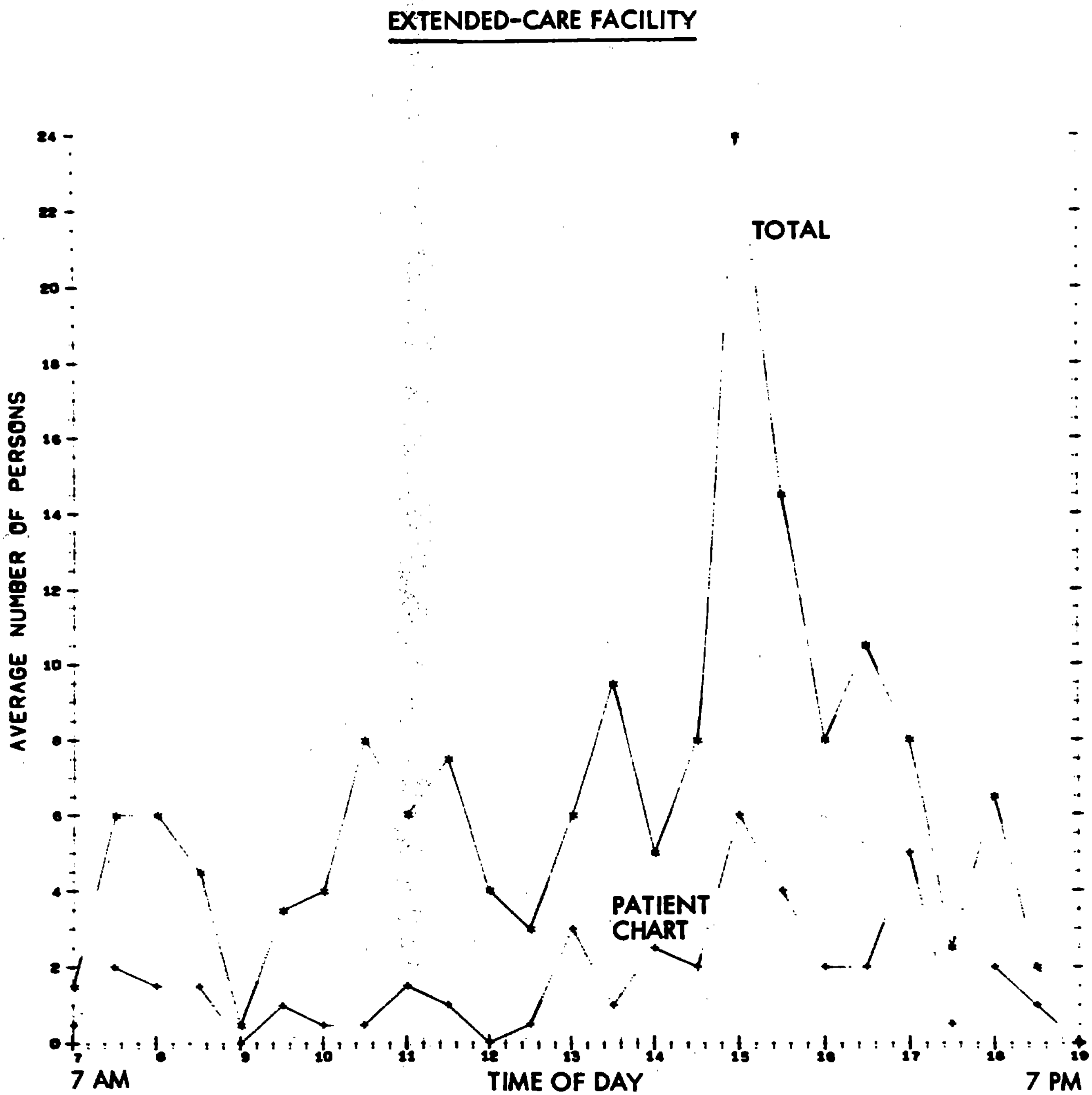

Fig. B-65 Ratio of Chart Processing to Total Information Processing – Extended-Care Facility

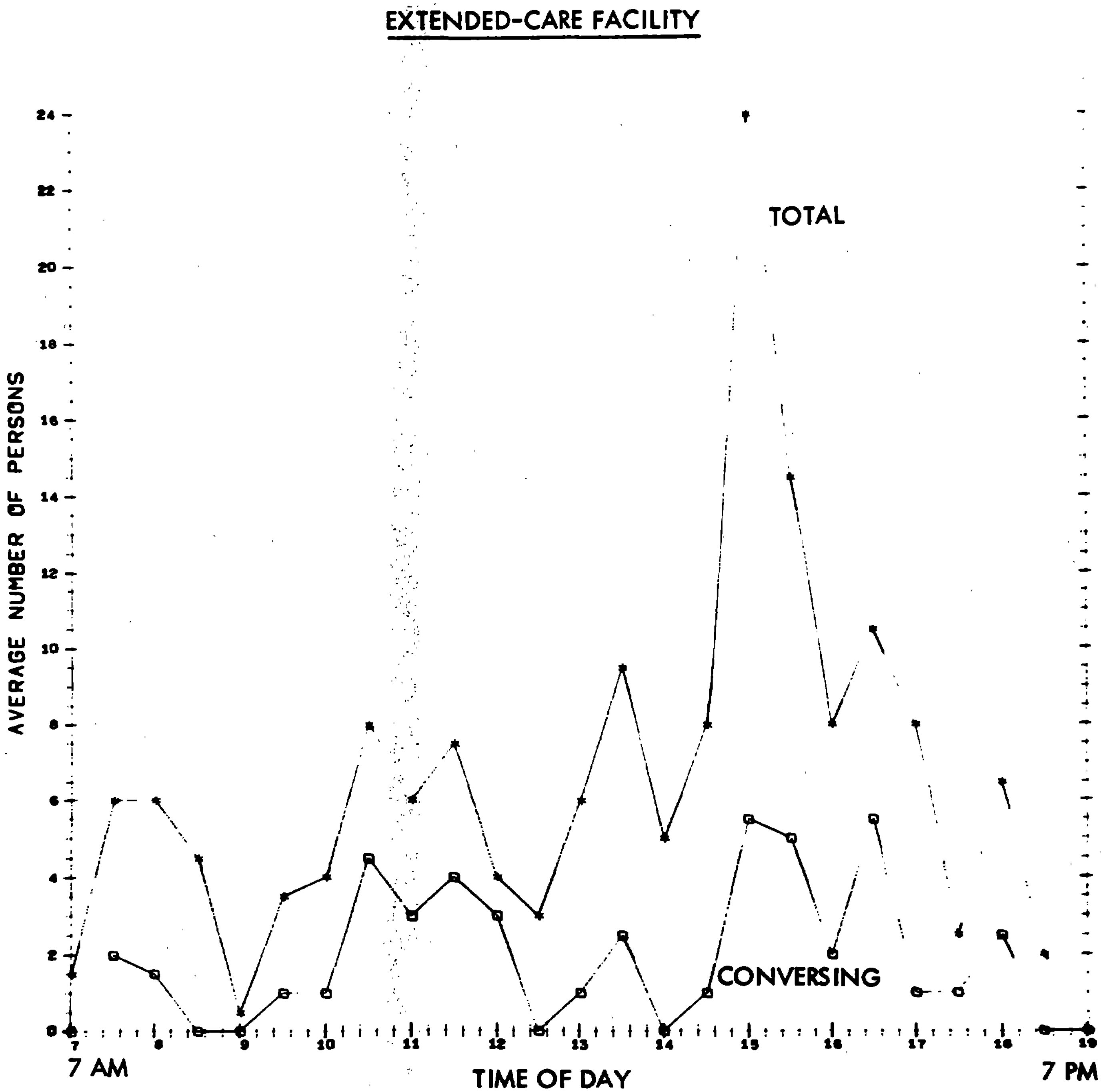

Fig. B-66 Ratio of Conversing to Total Information Processing – Extended-Care Facility

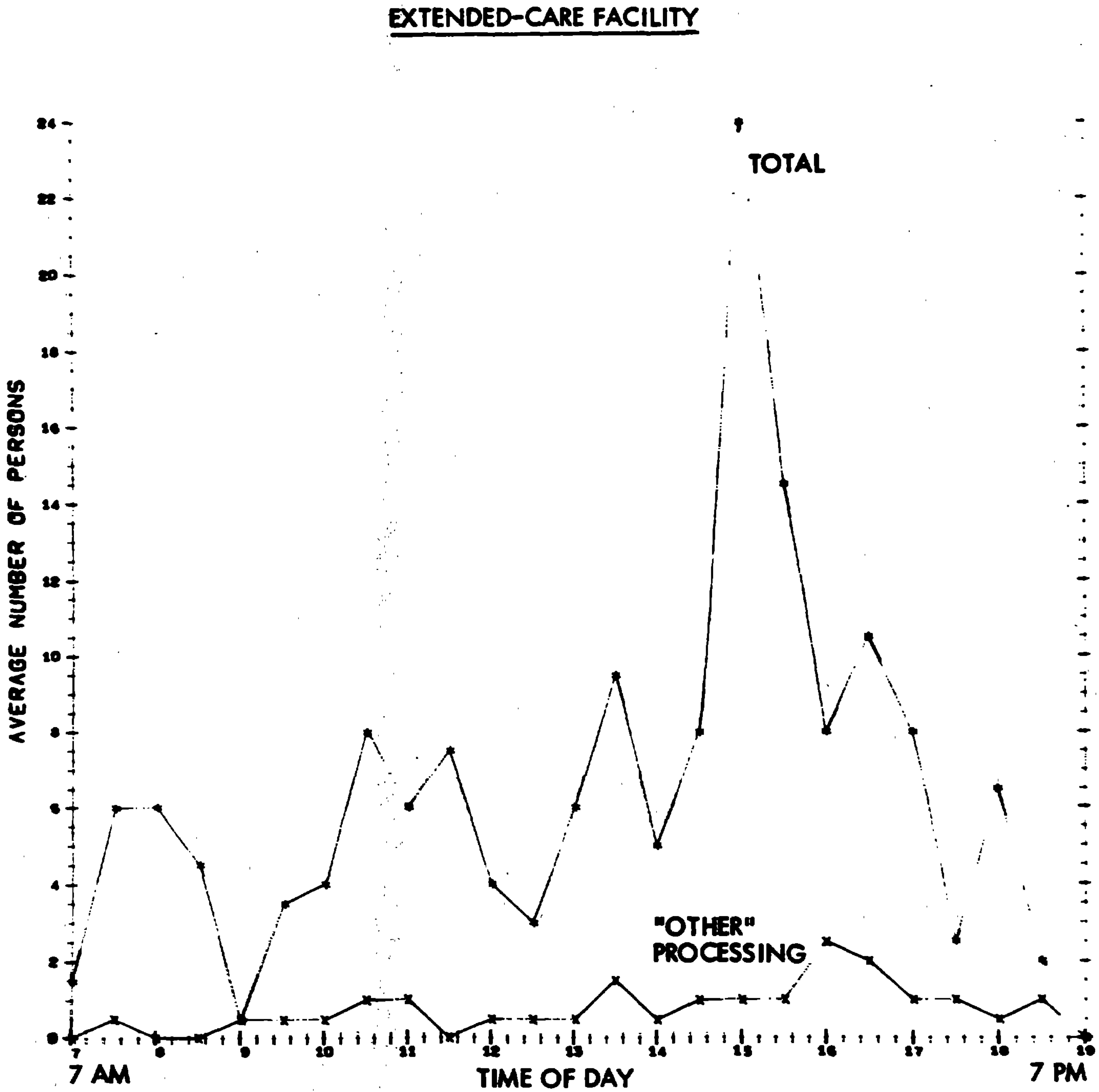

Fig. B-67 Ratio of "Other" processing to Total Information Processing – Extended-Care Facility

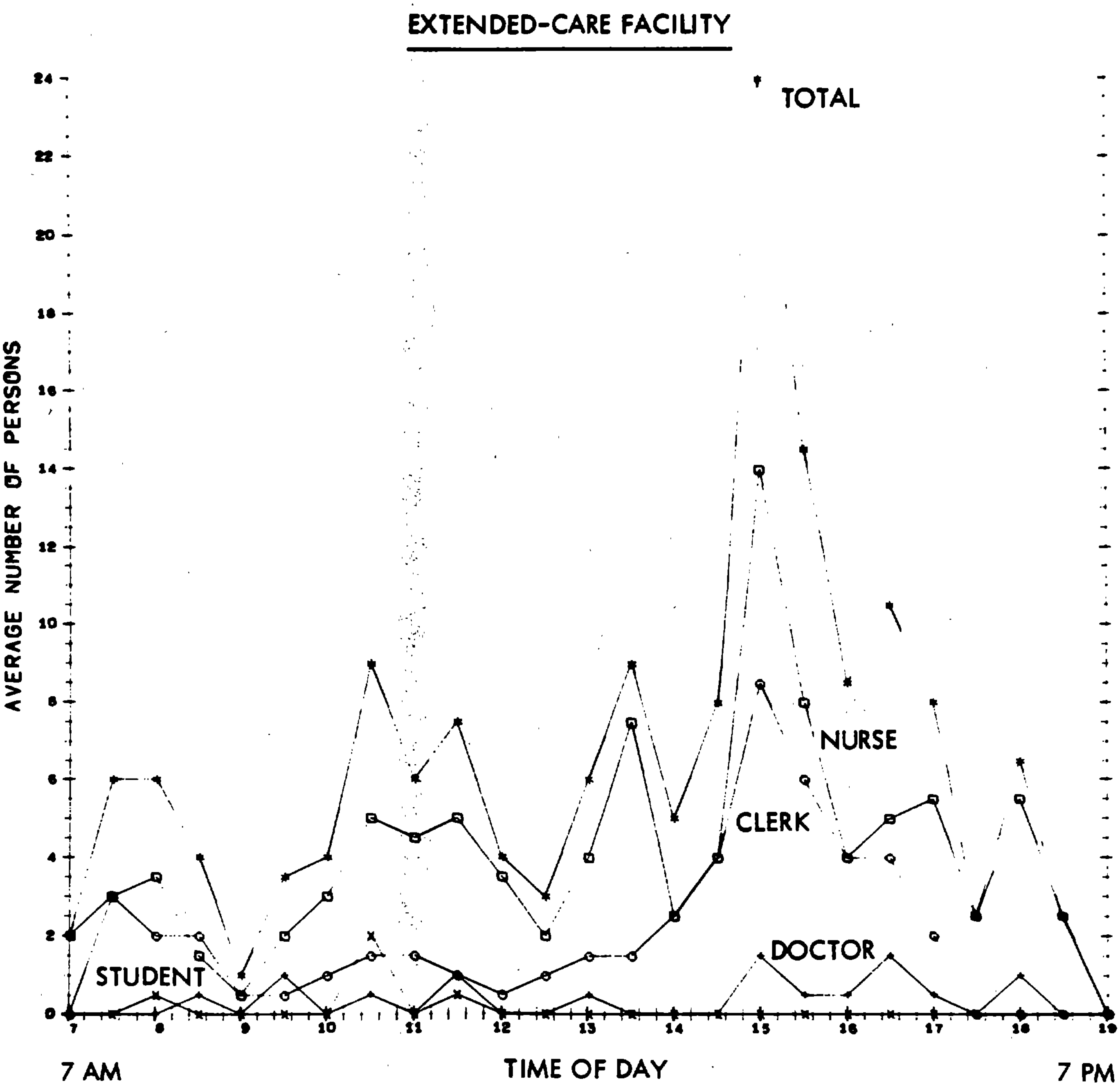

Fig. B-68 Comparison by Skill Levels of Personnel Processing to Total Information Being Processed – Extended-Care Facility

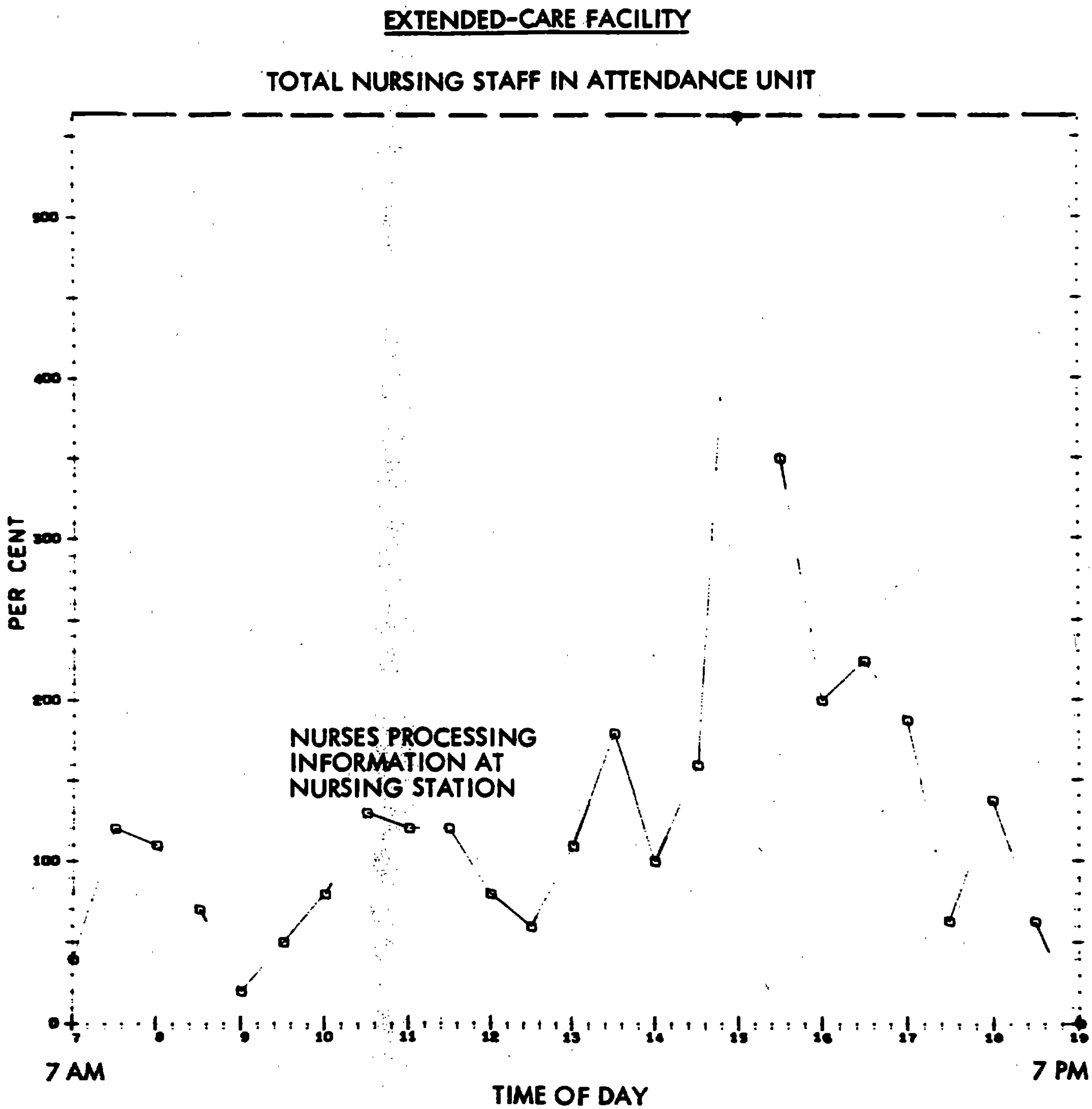

Fig. B-69 Percentage of Nursing Staff Processing Information – Extended-Care Facility

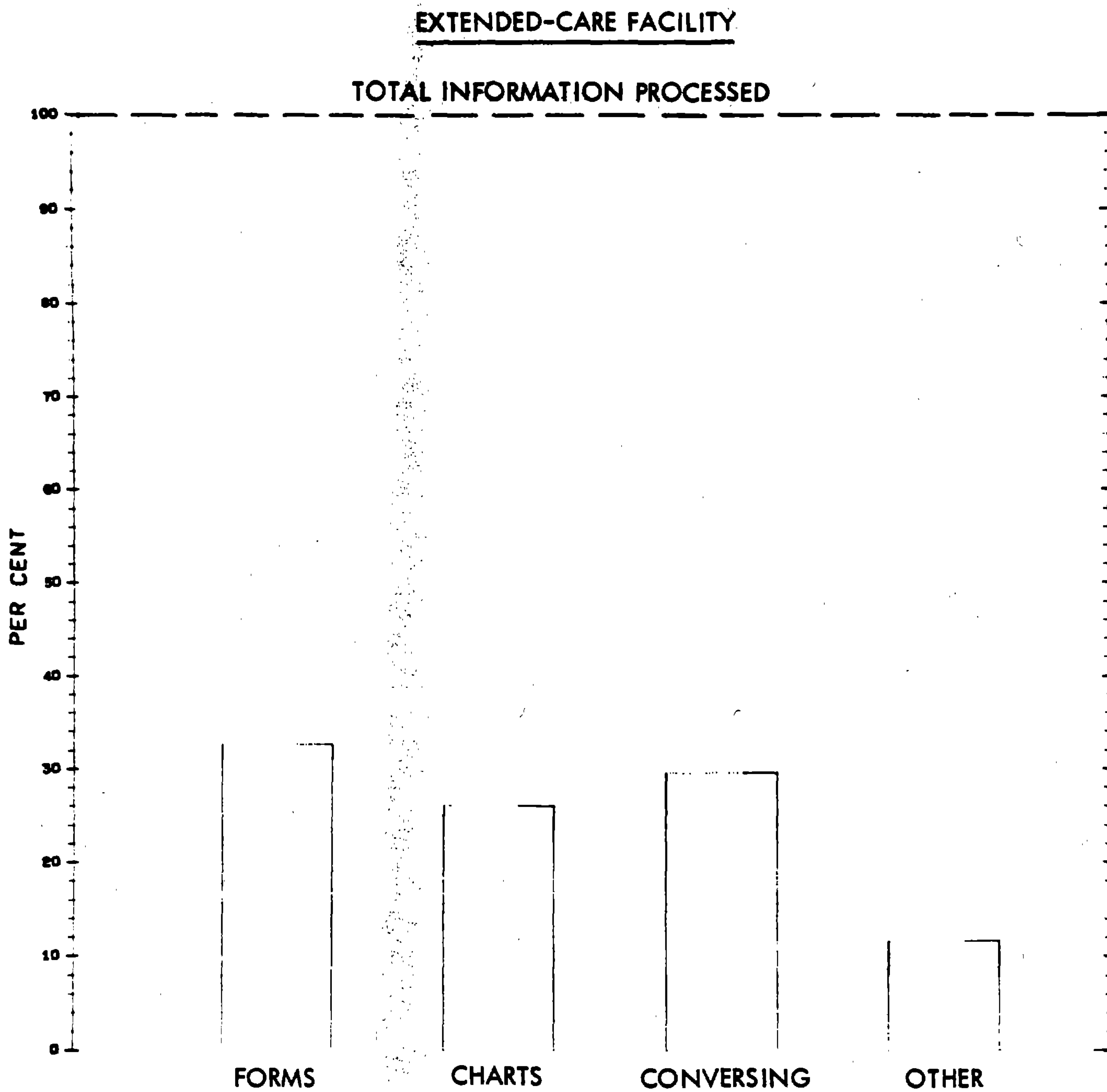

Fig. B-70 Relative Percentages of Types of Information Processed – Extended-Care Facility

Appendix C
NURSING STATION COMMITMENT TO INFORMATION PROCESSING

This appendix serves several purposes. It identifies all the nursing stations observed and presents basic work sampling data collected at those stations. These data are shown by respective hospitals in Tables C-1 through C-9. The last two columns at the right side of the tables show ratios calculated from the data which can be used for gross comparisons among and between nursing stations, either within a given hospital or among hospitals.

It is possible to produce computer plots of the information commerce at each nursing station just as they were produced for the total hospital (See Section 3 and Appendix B of this report). However, computer plots for all 160 nursing stations are not included in this study, although, for illustrative purposes, seven plots were made of the information commerce at each of two stations. These plots are presented in Figs. C-1 through C-14. Figures C-1 through C-7 show the information commerce at a Medical Unit in a medium size hospital, and Figs. C-8 through C-14 show plots for an Intensive-Care Unit at the same hospital.

Nursing Unit	Hospital Station Identification	Lockheed Ref. No.	Unit Patient Census	Observations: No. Persons Observed At Stations: Processing (P)	Not Proc. (NP)	Times Unoccupied (A)	Total (P+NP+A)	Ratios Observed at Stations: P	NP	A	Number of Times Station Observed	Staffing*: Nursing Staff Attendance at Unit (Av. 1st and 2nd Shifts): N	C	Doctors at Unit-Est. from D/N Ratio (D)	Est. Combined Staff (D+N+C) at Unit	Combined Staff (D+N+C) at Station	Combined Staff Proc. at Station	Percent Combined Staff at Station	Combined Staff at Station-Percent Processing
TOUR 1																			
Recovery Room	Barnes Par	101	--	277	311	27	615	.45	.51	.04	281	3.95	.46	1.54	5.95	2.09	.94	35	44
Burn Unit	BHTP	102	7	259	146	72	477	.54	.31	.15	281	4.41	0	1.71	6.12	1.44	.77	23	53
Eye - Private	7 McM	103	30	360	94	33	487	.73	.193	.067	208	4.37	.83	1.70	6.90	2.18	1.58	31	72
Ent - Private	6 McM	104	28	400	178	12	590	.67	.30	.02	192	6.03	.83	2.35	9.21	3.01	2.01	32	66
Eye - Ward	5N McM	105	28	396	189	13	598	.66	.316	.021	215	5.14	.83	2.00	7.97	2.72	1.79	34	65
Ent - Ward	5S McM	106	22	342	202	25	569	.60	.355	.043	231	5.41	1.25	2.10	8.76	2.35	1.41	26	60
Eye - Private	4 McM	107	33	434	124	5	563	.77	.22	.009	192	5.38	1.25	2.09	8.72	2.89	2.22	33	76
Gyn - Private	3 McM	108	20	329	153	18	500	.65	.306	.036	231	5.62	1.25	2.19	9.06	2.08	1.35	22	64
Operating Room	McM OR	110	--	365	164	35	564	.64	.29	.062	231	13.74	.83	5.35	19.92	2.29	1.46	11	63
Gyn - Ward	8 Mat	120	31	402	110	18	530	.75	.207	.034	215	5.17	1.55	2.01	8.73	2.38	1.78	27	74
Gynecology - Private	7 Mat	130	28	418	91	18	527	.79	.172	.034	192	4.78	.83	1.86	7.47	2.65	2.09	35	78
Obstetrical - Private	6 Mat	201	23	399	34	16	449	.88	.075	.035	192	4.13	1.25	1.61	6.99	2.25	1.98	32	89
Nursery	5 Mat	202	47	256	71	111	438	.58	.162	.253	231	12.49	.83	4.87	18.19	1.41	.25	07	17
Delivery	4 Mat	203	--	288	111	50	449	.64	.247	.111	231	6.87	1.25	2.69	10.81	1.72	1.10	15	64
Obstetrical - Ward	2 Mat	204	32	376	107	21	504	.74	.212	.041	192	3.95	.83	1.54	6.32	2.51	1.85	39	73
Male Ward	1418	205	34	654	162	5	821	.79	.197	.006	136	9.58	1.25	3.73	14.56	6.00	4.74	41	79
Emergency Room	Wohl First	206	--	497	243	5	745	.66	.339	.006	192	4.37	0	1.70	6.07	3.85	2.47	63	64
Psych- Private & Ward	5 Ren	301	31	550	192	4	746	.73	.257	.005	192	5.62	.83	2.18	8.63	3.86	.71	44	18
Psych - Private	4 Ren	302	19	394	93	20	507	.77	.183	.039	242	3.95	1.25	1.54	6.74	2.01	1.54	29	76
Psych - Private & Ward	3 Ren	303	31	480	116	9	605	.79	.189	.014	192	4.75	.83	1.95	7.53	3.10	2.44	41	79
CCU	CCU	304	8	273	104	77	454	.60	.229	.169	281	4.16	0	1.62	5.78	1.34	.80	22	59
Female - Ward	2418	305 A & B	38	850	165	28	1043	.81	.158	.027	136	12.28	1.66	4.78	18.72	7.45	6.03	34	80
Private Medicine	3400	307 A & B	33	557	152	64	773	.72	.196	.082	136	8.12	1.25	3.16	12.53	5.21	3.75	41	71

*D = doctor, N = nurse, C = clerk

A

B

Table C-1 Work Sampling Summary – Hospital L1

Nursing Unit	Hospital Station Identi-fication	Lockheed Ref. No.	Unit Patient Census	Observations: No. Persons Observed At Stations				Ratios Observed at Stations			Number of Times Station Observed	Staffing*: Nursing Staff Attendance at Unit (Av. 1st and 2nd Shifts)		Doctors at Unit-Est. from D/N Ratio (D)	Est. Combined Staff (D+N+C) at Unit	Combined Staff (D+N+C) at Station	Combined Staff Proc. at Station	Percent Combined Staff at Station	Combined Staff at Station-Percent Processing
				Proc-essing (P)	Not Proc. (NP)	Times Unoccu-pied (A)	Total (P+NP+A)	P	NP	A		N	C						
TOUR 2																			
Surgical - Private	12200	401	33	534	86	5	625	.85	.137	.008	172	7.49	1.25	4.26	13.00	3.60	3.06	27	85
Self Care	12100	402	54	312	109	47	468	.66	.23	.10	191	0	0	0	0	0	0	0	0
Medical - Private	11100	403	24	446	52	8	506	.88	.102	.015	172	6.66	1.45	3.79	11.90	2.89	2.54	24	87
Private - Surgical	11200	404	33	479	96	6	581	.82	.163	.013	172	7.28	1.25	4.14	12.67	3.34	2.74	26	82
Private - Medicine	10200	405	33	656	104	2	762	.86	.136	.002	172	9.78	1.25	5.57	16.60	4.41	3.79	26	86
Medical - Private	10100	406	24	508	79	3	590	.86	.134	.005	172	9.13	1.25	5.20	15.58	3.41	2.93	21	86
Medical - Private	9100	501	23	519	74	4	597	.86	.124	.006	172	6.03	1.25	3.43	10.71	3.44	2.95	32	85
Private - Medical	9200	502	27	698	95	2	795	.87	.119	.002	172	7.08	1.25	4.03	12.36	4.61	4.01	37	87
Uncovered Medicine	8200	503	33	514	90	13	617	.83	.145	.021	172	11.65	1.66	6.64	19.95	3.51	2.91	17	82
Medical - Private	8100	504	27	413	95	17	525	.78	.18	.032	191	4.16	1.25	2.37	7.78	2.66	2.07	34	77
Surgical - Private	7100	505	23	435	71	9	515	.84	.137	.017	172	6.03	1.25	3.43	10.71	2.94	2.46	27	83
Surgical - Private	7200	601	33	482	124	9	615	.78	.201	.014	191	5.14	1.25	2.92	9.31	3.17	2.47	34	78
Surgical - Private	6200	602	27	429	102	4	535	.80	.19	.007	191	4.37	1.25	2.49	8.11	2.78	2.22	34	79
Chest Surg./Pri.&Ward	2200	603	36	440	69	11	520	.85	.132	.021	172	6.66	1.25	3.79	11.70	2.96	2.51	25	84
ICU	2200/ICU	604	5	392	146	72	610	.64	.239	.117	261	4.79	0	2.73	7.52	2.06	1.31	27	.63
Surgical - Male Ward	1200	605 - 606	41	794	199	80	1073	.74	.185	.074	433	9.99	1.25	5.69	16.93	2.29	1.69	13	.73
Neuro Med.-Private	5 Wohl	607	25	450	99	11	560	.80	.176	.018	172	6.03	1.25	3.43	10.71	3.19	2.55	29	.80
Neuro Med & Surg. PM	4 Wohl	608	23	465	137	5	607	.77	.225	.008	191	5.20	1.25	2.96	9.41	3.15	2.42	33	76
ICU	Stroke Unit	609	8	330	138	82	550	.60	.25	.15	261	3.95	0	2.25	6.20	1.79	1.07	28	60
Neuro/Surg./Pri.&Ward	3 Wohl	610	25	399	134	21	554	.72	.24	.037	191	8.53	1.66	4.86	15.05	2.79	2.00	18	71
ICU	3 Wohl ICU	701	8	256	87	85	428	.60	.203	.198	261	9.99	0	5.69	15.86	1.31	.78	08	59
Surgical-Private &Ward	3 Bar	702	19	390	86	15	491	.79	.175	.03	191	4.78	1.62	2.72	9.12	2.48	1.95	27	78

*D = doctor, N = nurse, C = clerk

A

Table C-1 (Cont.)

B

Nursing Unit	Hospital Station Identi-fication	Lockheed Ref. No.	Unit Patient Census	Observations: No. Persons Observed At Stations: Proc-essing (P)	Not Proc. (NP)	Times Unoccu-pied (A)	Total (P+NP+A)	Ratios Observed at Stations: P	NP	A	Number of Times Station Observed	Staffing*: Nursing Staff Attendance at Unit (Av. 1st and 2nd Shifts): N	C	Doctors at Unit-Est. from D/N Ratio (D)	Est. Combined Staff (D+N+C) at Unit	Combined Staff (D+N+C) at Station	Combined Staff Proc. at Station	Percent Combined Staff at Station	Combined Staff at Station-Percent Processing
Womens Med/Surg.	10 S.E.	101	15	494	197	179	870	.567	.226	.205	554	2.0	0	.86	2.86	1.23	.69	43	56
Pediatric	9 S.E.	102	38	399	183	89	671	.594	.272	.133	364	3.0	.50	1.29	4.79	1.59	.89	33	56
Pediatric	9 S.O.	103	32	601	231	48	880	.683	.262	.054	364	3.0	1.00	1.29	5.29	2.28	1.55	42	68
Mixed	8th	104	53	686	187	32	905	.758	.206	.035	304	4.5	1.00	1.93	7.43	2.87	2.17	38	75
Womens Mixed	7th	105	44	715	242	27	984	.726	.245	.027	304	4.0	1.00	1.72	6.72	3.23	2.34	48	72
OB/Gyn	6 S.E.	106	30	542	213	46	801	.676	.265	.057	364	2.5	.50	1.07	4.07	2.07	1.39	50	67
Delivery	Del. Rm.	107	7	405	320	176	901	.449	.355	.195	554	2.0	0	.86	2.86	1.30	.58	45	44
Nursery	New Born	108	18	247	162	313	722	.342	.224	.433	554	1.49	0	.64	2.13	.74	.25	34	33
Nursery	New Born	110	18	232	130	301	663	.349	.196	.454	554	1.49	0	.64	2.13	.65	.22	30	33
OB/Gyn	6 S.O.	120	25	573	191	45	809	.708	.236	.055	384	2.0	1.0	.86	3.86	1.98	1.40	51	70
Premature Nursery	New Born	130	12	226	162	288	676	.334	.239	.426	554	1.49	0	.64	2.13	.70	.23	33	32
Womens Med/Surg.	5 W	201	32	546	179	30	755	.723	.237	.039	304	4.0	1.0	1.72	6.72	2.38	1.72	35	72
Mens Med/Surg.	5 E	202	36	526	152	242	920	.571	.165	.263	304	4.0	1.0	1.72	6.72	2.23	1.27	33	56
Womens Med/Surg..	5 S.O.	203	38	557	209	40	806	.691	.259	.049	304	5.0	1.0	2.15	8.15	2.52	1.74	30	69
Womens Med/Surg.	5 S.E.	204	34	556	204	33	793	.701	.257	.041	304	4.0	1.0	1.72	6.72	2.50	1.75	37	70
ICU	ICU	205	9	483	182	114	779	.620	.233	.146	304	3.5	0	1.50	5.00	2.18	1.35	43	63
Mens Med/Surg.	MP 5 NE	300	36	552	179	27	758	.728	.236	.035	322	4.5	1.0	1.93	7.43	2.27	1.65	30	72
Womens Med/Surg.	MP 5 N	301	34	672	205	29	906	.741	.226	.032	262	4.0	1.0	1.72	6.72	3.34	2.47	49	73
Operating Room	O R	302	--	322	230	148	700	.460	.328	.211	391	5.2	1.0	2.33	8.52	1.40	.64	16	45
Mens Med/Surg.	4th	303	39	614	200	41	855	.729	.233	.047	304	4.5	1.0	1.93	7.43	2.67	1.94	35	72
Neuro/Surg. Mixed	3 W	304	31	308	190	47	545	.565	.348	.086	304	4.0	1.0	1.72	6.72	1.63	.92	24	56
Med/Neuro Mixed	3 E	305	31	546	211	47	804	.679	.262	.058	304	4.0	1.0	1.72	6.72	2.49	1.70	37	68
Mens Med/Surg.	2 S.W..	306	29	514	152	50	716	.717	.212	.070	304	3.5	1.0	1.50	6.00	2.19	1.57	36	71
Mens Med/Surg.	2 W.	307	30	531	183	46	760	.698	.240	.061	304	3.5	1.0	1.50	6.00	2.34	1.63	39	67
Emergency	Emerg. Rm	308	--	551	318	35	904	.609	.351	.038	304	3.5	2.0	1.50	7.00	2.85	1.73	40	60
Recovery Room	Recovery	206	--	77	52	33	162	.475	.321	.203	329	2.0	.05	.86	2.91	.39	.18	17	46

*D = doctor, N = nurse, C = clerk

A

B

Table C-2 Work Sampling Summary – Hospital L2

Nursing Unit	Hospital Station Identification	Lockheed Ref. No.	Unit Patient Census	Observations: No. Persons Observed At Stations: Processing (P)	Not Proc. (NP)	Times Unoccupied (A)	Total (P+NP+A)	Ratios Observed at Stations: P	NP	A	Number of Times Station Observed	Staffing*: Nursing Staff Attendance at Unit (Av. 1st and 2nd Shifts): N	C	Doctors at Unit-Est. from D/N Ratio (D)	Est. Combined Staff (D+N+C) at Unit	Combined Staff (D+N+C) at Station	Combined Staff Proc. at Station	Percent Combined Staff at Station	Combined Staff at Station - Percent Processing
(CENTER)																			
Emergency Room	E R	101	--	511	125	3	639	.80	.195	.004	227	1.95	.74	.85	3.54	2.80	2.24	79	80
Medical	W1B	102	25.1	729	140	1	870	.83	.16	.001	227	4.51	.93	1.98	7.42	3.82	3.17	51	83
CCU	CCU	103	5.1	422	124	20	566	.74	.219	.034	227	3.28	0	1.44	4.72	2.40	1.77	50	73
Medical	W1A	104	32.0	749	174	1	924	.81	.188	.001	227	4.10	.96	1.80	6.86	4.06	3.28	59	80
Medical	E1A	105	45.0	968	195	6	1169	.82	.166	.005	227	7.19	.71	3.16	11.06	5.12	4.19	46	81
Medical	E1B	106	11.8	654	108	33	795	.82	.135	.041	227	2.74	.25	1.20	4.19	3.35	2.74	75	81
Surgical	W2B	107	31.1	743	155	3	901	.82	.172	.003	227	5.21	.64	2.29	8.14	3.95	3.23	48	81
O B	W2A	108	30.3	611	139	5	755	.80	.184	.006	227	4.49	.71	2.19	7.39	3.30	2.64	44	80
Operating Room	O R	110	--	339	45	3	387	.87	.116	.007	119	20.50	2.00	9.02	31.52	3.22	2.80	10	87
ICU	ICU	120	15.6	561	138	11	710	.79	.19	.015	227	14.03	.74	6.17	20.94	3.07	2.42	14	78
Surgical	E2B	130	12.3	485	116	18	619	.78	.187	.029	227	2.92	.71	1.30	4.93	2.64	2.05	53	77
Surgical	E2A	201	28.8	749	166	4	919	.81	.18	.004	227	6.10	.64	2.68	9.42	4.03	3.26	42	80
Pediatric	Peds A	202	16.1	685	157	11	853	.80	.184	.012	227	4.67	.71	2.05	7.43	3.70	2.96	49	80
Pediatric	Peds B	203	13.8	531	182	5	718	.73	.253	.007	227	3.74	.64	1.64	6.02	3.14	2.29	52	72
Clinical Research Center	CRC B	204	12.0	493	112	25	630	.78	.177	.039	227	2.99	.39	1.31	4.69	2.66	2.07	56	77
Clinical Research Center	CRC A	205	14.9	423	115	28	566	.74	.203	.049	227	3.27	0	1.43	4.70	2.36	1.74	50	73
Surgical	E3A	206	14.8	469	69	23	561	.83	.122	.041	227	2.88	.39	1.27	4.54	2.36	1.95	54	82
Intensive Nursery	E Nsy	301	8.7	437	98	33	568	.76	.172	.058	227	4.53	.43	1.99	6.95	2.35	1.78	33	76
Delivery Rooms	Del.	302	--	226	75	4	305	.74	.245	.013	119	4.00	.50	1.76	6.26	2.53	1.87	40	73
Gyn	W3B	303	24.5	777	135	2	914	.84	.148	.002	227	4.31	.64	1.89	6.84	4.02	3.37	58	81
Maternity	W3A	304	24.1	581	119	4	704	.82	.169	.006	227	3.12	.64	1.37	5.13	2.26	1.85	42	81
(PAVILION)																			
Medical/Surgical	N1A	401	20.7	291	78	15	384	.75	.203	.039	150	3.13	.35	.62	4.10	2.46	1.84	60	74
Medical/Surgical	N2A	402	21.9	389	89	5	483	.80	.184	.010	150	3.20	.57	.64	4.41	3.12	2.49	70	79
Medical/Surgical	N2B	403	30.0	388	100	5	493	.78	.202	.010	150	4.38	.46	.87	5.71	3.25	2.53	56	77
Medical/Surgical	N3A	404	13.0	319	70	8	397	.80	.176	.020	150	2.38	.32	.47	3.17	2.52	2.01	79	79
ICU	N3C	405	1.8	79	36	42	157	.50	.229	.267	104	.64	0	.12	.76	1.10	.55	1 44	50
Medical/Surgical	N3B	406	20.2	260	76	15	351	.74	.216	.042	150	3.14	.64	.62	4.40	2.24	1.65	50	73

*D = doctor, N = nurse, C = clerk

A

Table C-3 Work Sampling Summary – Hospital L3

B

Nursing Unit	Hospital Station Identi-fication	Lockheed Ref. No.	Unit Patient Census	Observations: No. Persons Observed At Stations				Ratios Observed at Stations			Number of Times Station Observed	Staffing*: Nursing Staff Attendance at Unit (Av. 1st and 2nd Shifts)		Doctors at Unit-Est. from D/N Ratio (D)	Est. Combined Staff (D+N+C) at Unit	Combined Staff (D+N+C) at Station	Combined Staff Proc. at Station	Percent Combined Staff at Station	Combined Staff at Station-Percent Processing
				Proc-essing (P)	Not Proc. (NP)	Times Unoccu-pied (A)	Total (P+NP+A)	P	NP	A		N	C						
(REDWOODS)																			
Emergency	Emerg.	401	--	283	62	28	373	.75	.166	.075	181	2.2	.90	.41	3.51	1.90	1.42	54	74
Recovery	Recovery	402	--	128	46	105	279	.45	.164	.376	204	2.0	0	.38	2.38	.85	.38	35	44
Operating Room	O R	403	--	250	48	50	348	.71	.137	.143	204	2.0	.50	1.71	11.21	1.46	1.03	13	70
Surgical	1-Surg.	404	36	495	122	4	621	.79	.196	.006	181	3.4	.77	.64	4.81	3.40	2.68	70	78
Orthopedic	Ortho	405	24	460	201	9	670	.68	.30	.013	181	2.2	.50	.41	3.11	3.65	2.48	1 17	68
Medical	1-Med	406	29	457	136	7	600	.76	.226	.011	181	2.7	.86	.51	4.07	3.27	2.48	80	75
Medical	2-Med	501	23	410	122	12	544	.75	.224	.022	181	2.3	.90	.43	3.63	2.93	2.19	80	74
CC Intensive Med.	CCl M	502	4.6	240	55	52	347	.69	.158	.15	181	2.0	0	.38	2.38	1.63	1.12	68	68
Medical	2 Center	503	17	254	108	15	377	.67	.286	.04	181	1.4	0	.26	1.66	2.00	1.34	1 20	66
Pediatric	Pedi	504	11.8	239	95	34	368	.65	.259	.092	181	2.0	.30	.38	2.68	1.84	1.19	68	63
ICU	ICU	505	5.3	156	41	115	312	.50	.131	.368	204	2.0	0	.38	2.38	.96	.48	40	50
Surgical	2 Surg.	601	29	566	92	8	666	.85	.138	.016	181	3.1	.90	.58	4.58	3.63	3.08	79	84
Surgical	3 Surg.	602	32	501	97	13	611	.82	.158	.021	181	3.2	.81	.60	4.61	3.30	2.70	71	81
Maternity	3 Mat	603	21	280	120	19	419	.66	.286	.045	181	2.4	.50	.45	3.35	2.21	1.45	65	65
Nursery	Nursery	604	22.3	147	137	47	331	.44	.413	.14	204	2.6	0	.49	3.09	1.39	.61	66	43
Labor & Delivery	Labor	605	2.3	141	194	28	363	.38	.534	.077	181	3.4	.50	.64	4.54	1.85	.70	40	37
(OAKS)																			
Extended Care	So. Sec.	101	40.3	246	49	5	300	.82	.163	.016	117	2.2	0	.26	2.46	2.52	2.06	1 02	81
Psychiatric	Psych.	102	22.3	147	58	21	226	.65	.255	.092	117	2.1	0	.40	2.50	1.75	1.13	70	64

*D = doctor, N = nurse, C = clerk

A

B

Table C-4 Work Sampling Summary – Hospital M1

Nursing Unit	Hospital Station Identification	Lockheed Ref. No.	Unit Patient Census	Observations: No. Persons Observed At Stations: Processing (P)	Not Proc. (NP)	Times Unoccupied (A)	Total (P+NP+A)	Ratios Observed at Stations: P	NP	A	Number of Times Station Observed	Staffing*: Nursing Staff Attendance at Unit (Av. 1st and 2nd Shifts): N	C	Doctors at Unit – Est. from D/N Ratio (D)	Est. Combined Staff (D+N+C) at Unit	Combined Staff (D+N+C) at Station	Combined Staff Proc. at Station	Percent Combined Staff at Station	Combined Staff at Station – Percent Processing
Delivery	Del. Rm.	401	--	143	150	64	357	.398	.418	.178	207	4.2	0	.79	4.99	1.41	.56	28	39
(		402		(								(							
(Nursery	Nsy	403		(202	134	348	684	.29	.19	.51	633	(3.5	0	.66	4.16	.53	.15	12	28
(		404		(								(							
Maternity	2 C	405	38	277	107	42	426	.650	.251	.098	171	4.2	1.4	.79	6.39	2.24	1.45	35	64
Medical/Surgical	2 A	406	42	375	159	28	562	.667	.282	.049	208	7.5	1.4	1.42	10.32	2.56	1.68	24	65
Geriatrics/Med/Surg.	2 B	501	34	353	180	32	565	.624	.318	.056	208	7.7	.7	1.46	9.86	2.56	1.58	26	62
Surgical	1 B	502	42	431	169	26	626	.688	.269	.041	208	6.3	1.4	1.19	8.89	2.88	1.95	32	67
~~(ICU-CCU~~	~~ICU-CCU~~	~~503 504~~	~~13~~	~~240~~	~~147~~	~~186~~	~~573~~	~~.42~~	~~.25~~	~~.32~~	~~442~~	~~(5.6~~	~~1.4~~	~~1.06~~	~~8.06~~	~~.87~~	~~.36~~	~~10~~	~~41~~
Medical/Surgical	1 A	505	30	312	144	53	509	.613	.282	.104	207	5.6	1.4	1.06	8.06	2.21	1.34	27	60
Medical/Surgical	1 C	601	38	353	134	33	520	.678	.257	.063	208	5.6	1.4	1.06	8.06	2.34	1.56	29	66
Pediatric	Peds	602	20	235	198	48	481	.488	.411	.099	208	5.6	.7	1.06	7.36	2.08	1.01	28	49
Medical/Surgical	G R	603	33	317	125	36	478	.663	.261	.075	208	6.3	1.4	1.19	8.89	2.12	1.39	23	65
Emergency	E R	604	--	234	155	47	436	.536	.355	.108	207	5.6	1.44	1.06	8.06	1.88	.99	22	52
Operating Room	O R	605	--	193	160	72	425	.454	.376	.169	233	9.5	.5	1.80	11.80	1.41	.63	11	44
Recovery Room	R R	606	--	85	69	125	279	.304	.247	.448	233	2.0	0	.38	2.38	.66	.19	27	28

*D = doctor, N = nurse, C = clerk

A

B

Table C-5 Work Sampling Summary – Hospital M2

Nursing Unit	Hospital Station Identi-fication	Lockheed Ref. No.	Unit Patient Census	Observations: No. Persons Observed At Stations				Ratios Observed at Stations			Number of Times Station Observed	Staffing*: Nursing Staff Attendance at Unit (Av. 1st and 2nd Shifts)		Doctors at Unit-Est. from D/N Ratio (D)	Est. Combined Staff (D+N+C) at Unit	Combined Staff (D+N+C) at Station	Combined Staff Proc. at Station	Percent Combined Staff at Station	Combined Staff at Station-Percent Processing
				Proc-essing (P)	Not Proc. (NP)	Times Unoccu-pied (A)	Total (P+NP+A)	P	NP	A		N	C						
Emergency	E R	401	--	111	29	128	268	.41	.108	.477	224	1.7	0	.19	1.89	.62	.25	32	40
Operating Room	O R	402	--	185	38	62	285	.64	.13	.23	224	4.2	.50	.50	5.20	.99	.63	19	63
Post Partum	P P	403	22	317	88	39	444	.713	.19	.089	224	3.4	.70	.40	4.50	1.80	1.27	40	70
Nursery	Nursery	404	37	158	70	100	328	.48	.213	.304	224	1.9	.50	.22	2.62	1.01	.48	38	47
Delivery Room	D R	405	--	106	45	118	269	.39	.167	.438	224	2.9	0	.34	3.24	.67	.26	20	39
Surgical	3 Annex	406	47	457	78	11	546	.83	.142	.020	177	8.1	.70	.97	9.77	3.02	2.50	30	81
Intensive Care Unit	ICU	501	12	381	185	19	585	.65	.316	.032	193	5.4	.70	.64	6.74	2.93	1.90	43	64
Surgical	2 Annex	502	31	395	123	20	538	.73	.228	.037	193	6.7	.70	.80	8.20	2.68	1.95	32	72
(Pediatrics	Pedi	503	12)	~~569~~	~~96~~	~~137~~	~~802~~	~~.71~~	~~.119~~	~~.17~~	~~417~~	~~7.5~~	~~.70~~	~~.90~~	~~9.10~~	~~1.59~~	~~1.12~~	~~18~~	~~70~~
(Medical	1 Annex	504	42)																
Medical	4 Main	505	29	329	140	29	498	.66	.28	.056	224	4.6	.70	.55	5.85	2.09	1.37	35	65
Medical/Ortho	3 Main	601	37	477	152	12	641	.74	.237	.018	177	3.3	.70	.39	4.39	5.37	3.86	1 22	70
Surgical	2 Main	602	35	411	107	20	538	.76	.197	.037	193	6.3	.70	.75	7.75	2.68	2.03	34	73

*D = doctor, N = nurse, C = clerk

A

B

Table C-6 Work Sampling Summary – Hospital M3

Nursing Unit	Hospital Station Identification	Lockheed Ref. No.	Unit Patient Census	Observations: No. Persons Observed At Stations: Processing (P)	Not Proc. (NP)	Times Unoccupied (A)	Total (P+NP+A)	Ratios Observed at Stations: P	NP	A	Number of Times Station Observed	Staffing*: Nursing Staff Attendance at Unit (Av. 1st and 2nd Shifts): N	C	Doctors at Unit-Est. from D/N Ratio (D)	Est. Combined Staff (D+N+C) at Unit	Combined Staff (D+N+C) at Station	Combined Staff Proc. at Station	Percent Combined Staff at Station	Combined Staff at Station-Percent Processing
Medical/Surgical	First	101	6	179	53	31	263	.68	.20	.118	160	1.0	.11	.13	1.24	1.45	.98	1 17	67
Medical/Surgical	Second	102	18	151	52	35	238	.63	.218	.147	160	1.59	.11	.20	1.90	1.26	.79	66	62
Medical/Surgical	Third	103	10	134	26	58	218	.61	.119	.266	160	1.73	.11	.22	2.06	1.00	.61	48	61

*D = doctor, N = nurse, C = clerk

A

B

Table C-7 Work Sampling Summary – Hospital S1

Nursing Unit	Hospital Station Identi-fication	Lockheed Ref. No.	Unit Patient Census	Observations: No. Persons Observed At Stations: Proc-essing (P)	Not Proc. (NP)	Times Unoccu-pied (A)	Total (P+NP+A)	Ratios Observed at Stations: P	NP	A	Number of Times Station Observed	Staffing*: Nursing Staff Attendance at Unit (Av. 1st and 2nd Shifts): N	C	Doctors at Unit-Est. from D/N Ratio (D)	Est. Combined Staff (D+N+C) at Unit	Combined Staff (D+N+C) at Station	Combined Staff Proc. at Station	Percent Combined Staff at Station	Combined Staff at Station-Percent Processing
Mens Med/Surg/Ped	Fourth Floor	608	32	521	115	111	747	.697	.153	.148	318	4.10	.74	.73	5.57	2.00	1.39	35	69
Womens Med/Surg	Third Floor	609	30	593	110	125	828	.716	.132	.151	318	4.47	.81	.80	6.08	2.21	1.58	36	71
(Obstetrics & Gyn	(Second	610	(5.8	210	72	232	514	.408	.140	.451	318	(2.08	0	.37	2.45	.94	.39	38	41
(Nursery	(Floor	701		5	14	369	388	.012	.036	.951	318								
Emergency & Central Sup	First Floor	702	-	38	8	343	389	.097	.021	.881	318	1.47	0	.26	1.73	.14	.01	08	25
Operating Rm. & Rec. Rm	First Floor	703	-	78	31	310	419	.186	.074	.740	318	2.07	0	.37	2.44	.34	.06	18	17

*D = doctor, N = nurse, C = clerk

A

B

Table C-8 Work Sampling Summary – Hospital S2

Nursing Unit	Hospital Station Identification	Lockheed Ref. No.	Unit Patient Census	Observations: No. Persons Observed At Stations: Processing (P)	Not Proc. (NP)	Times Unoccupied (A)	Total (P+NP+A)	Ratios Observed at Stations: P	NP	A	Number of Times Station Observed	Staffing*: Nursing Staff Attendance at Unit (Av. 1st and 2nd Shifts): N	C	Doctors at Unit–Est. from D/N Ratio (D)	Est. Combined Staff (D+N+C) at Unit	Combined Staff (D+N+C) at Station	Combined Staff Proc. at Station	Percent Combined Staff at Station	Combined Staff at Station–Percent Processing
Operating Room	O R	101	--	57	42	147	246	.23	.170	.597	252	2.63	.07	.34	3.04	.39	.08	12	20
Emergency	E R	102	--	160	50	90	300	.53	.166	.30	252	1.20	.07	.15	1.42	.83	.43	58	51
ICU/CCU	ACU	103	2	161	37	86	284	.56	.13	.30	252	1.26	.07	.16	1.49	.78	.43	52	55
Medical	S W	104	15	242	53	70	365	.66	.145	.19	252	1.76	.07	.22	2.05	1.17	.77	57	60
Surgical	N W	105	15	363	50	39	452	.80	.11	.086	252	2.26	.07	.29	2.62	1.24	.99	47	80

*D = doctor, N = nurse, C = clerk

B

A

Table C-9 Work Sampling Summary – Hospital S3

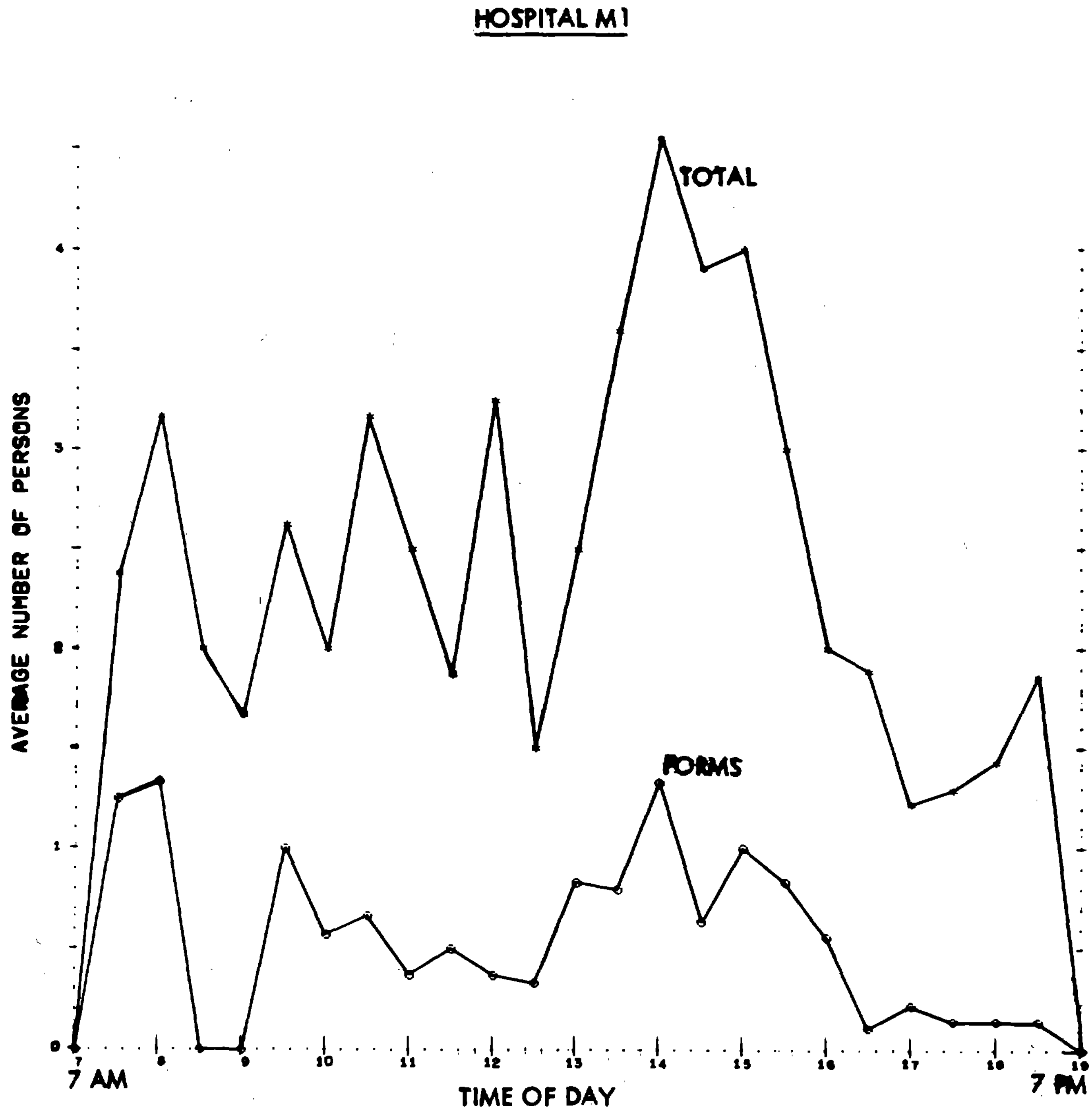

Fig. C-1 Ratio of Forms Processing to Total Information Processing – Medical Unit Nursing Station

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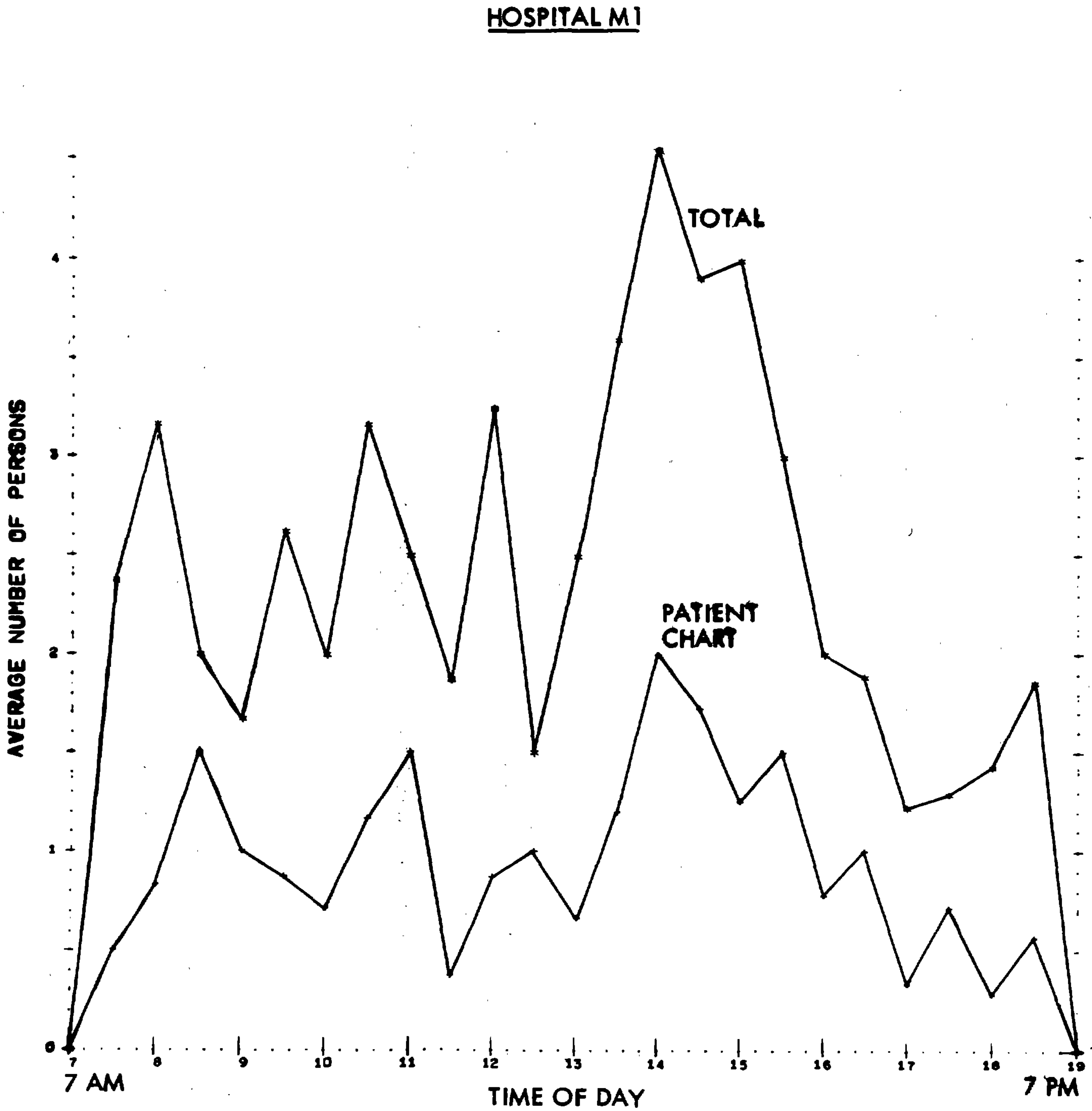

Fig. C-2 Ratio of Chart Processing to Total Information Processing – Medical Unit Nursing Station

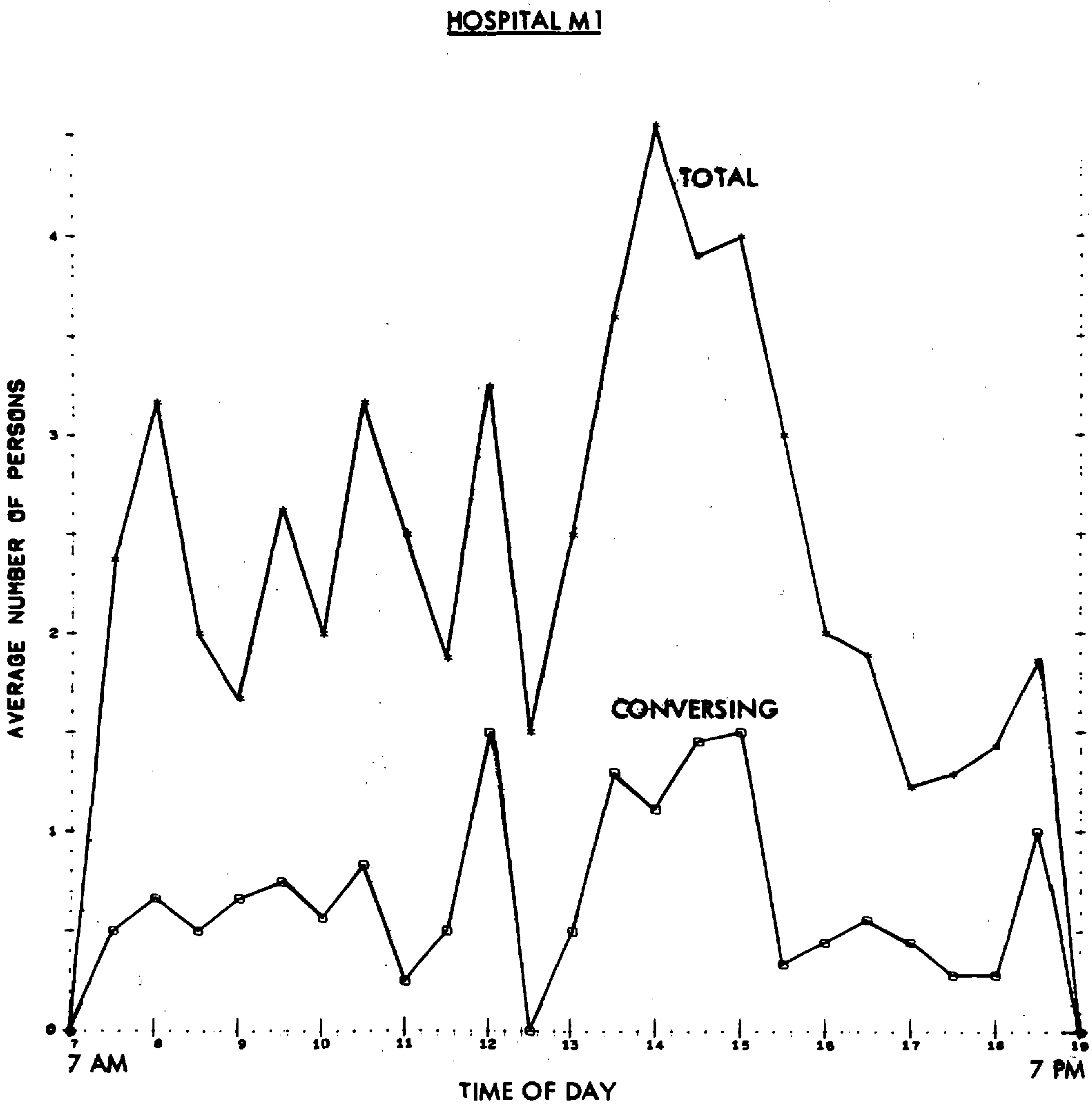

Fig. C-3 Ratio of Conversing to Total Information Processing – Medical Unit Nursing Station

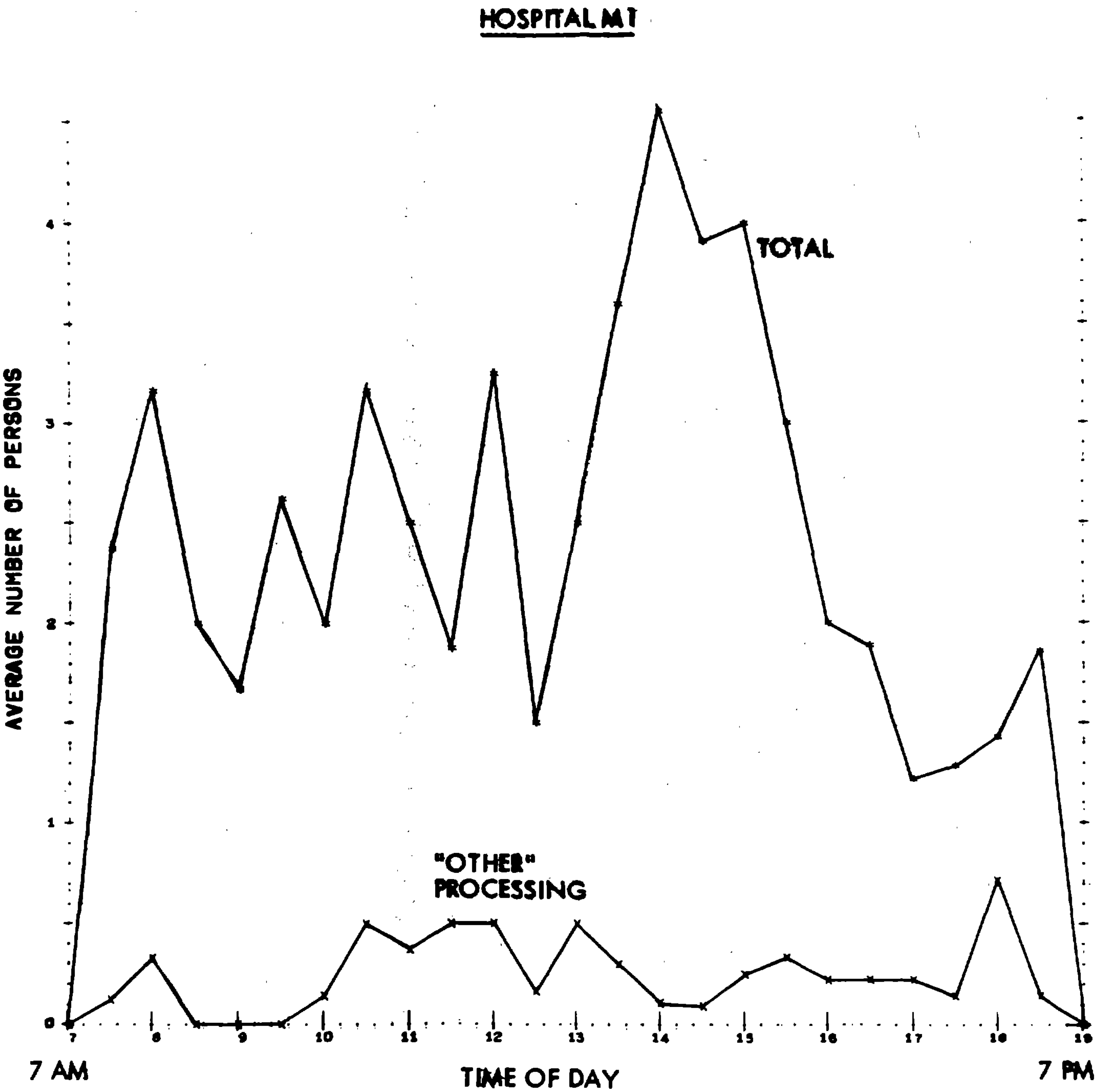

Fig. C-4 Ratio of "Other" Processing to Total Information Processing – Medical Unit Nursing Station

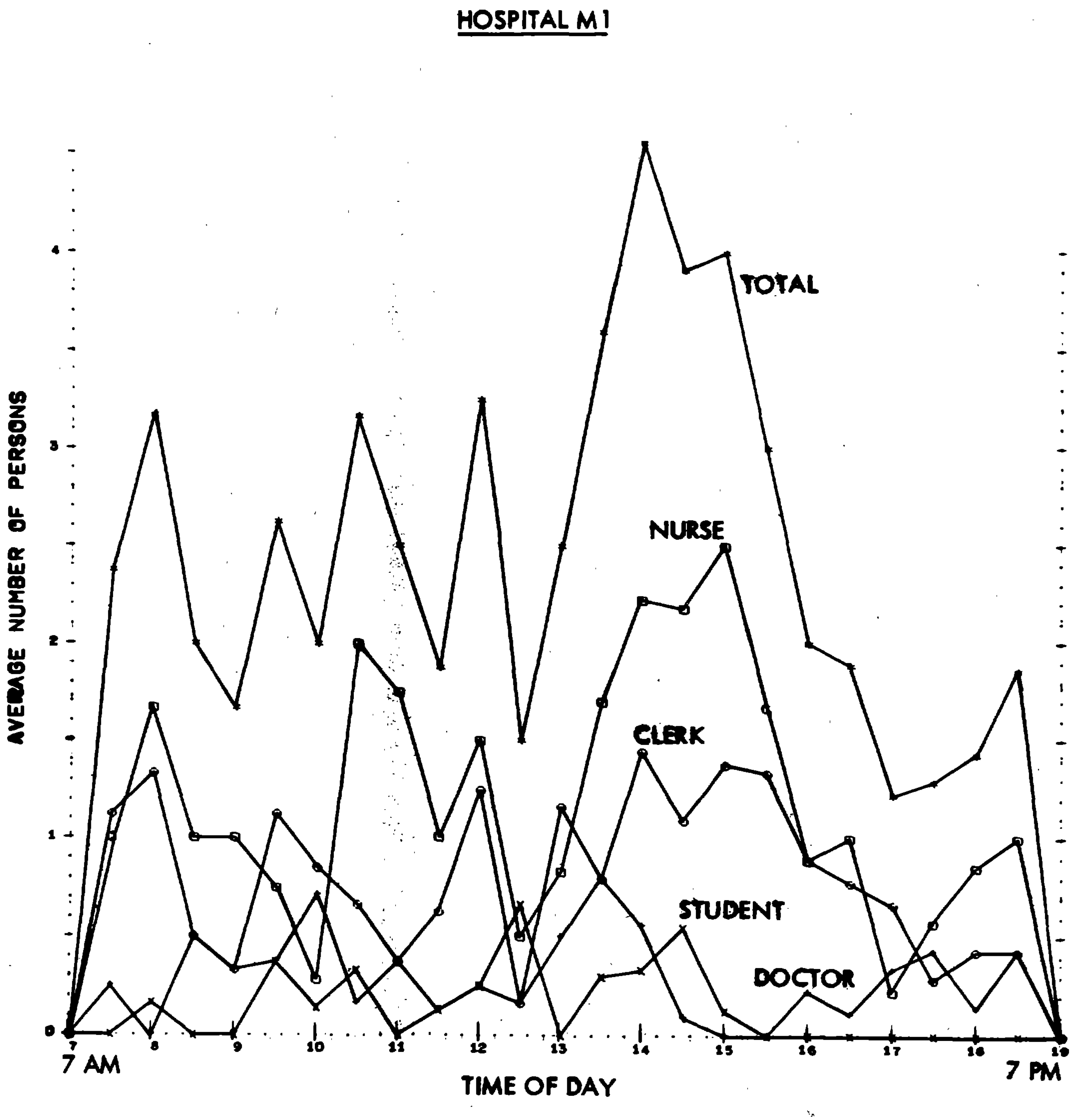

Fig. C-5 Comparison by Skill Levels of Personnel Processing to Total Information Being Processed – Medical Unit Nursing Station

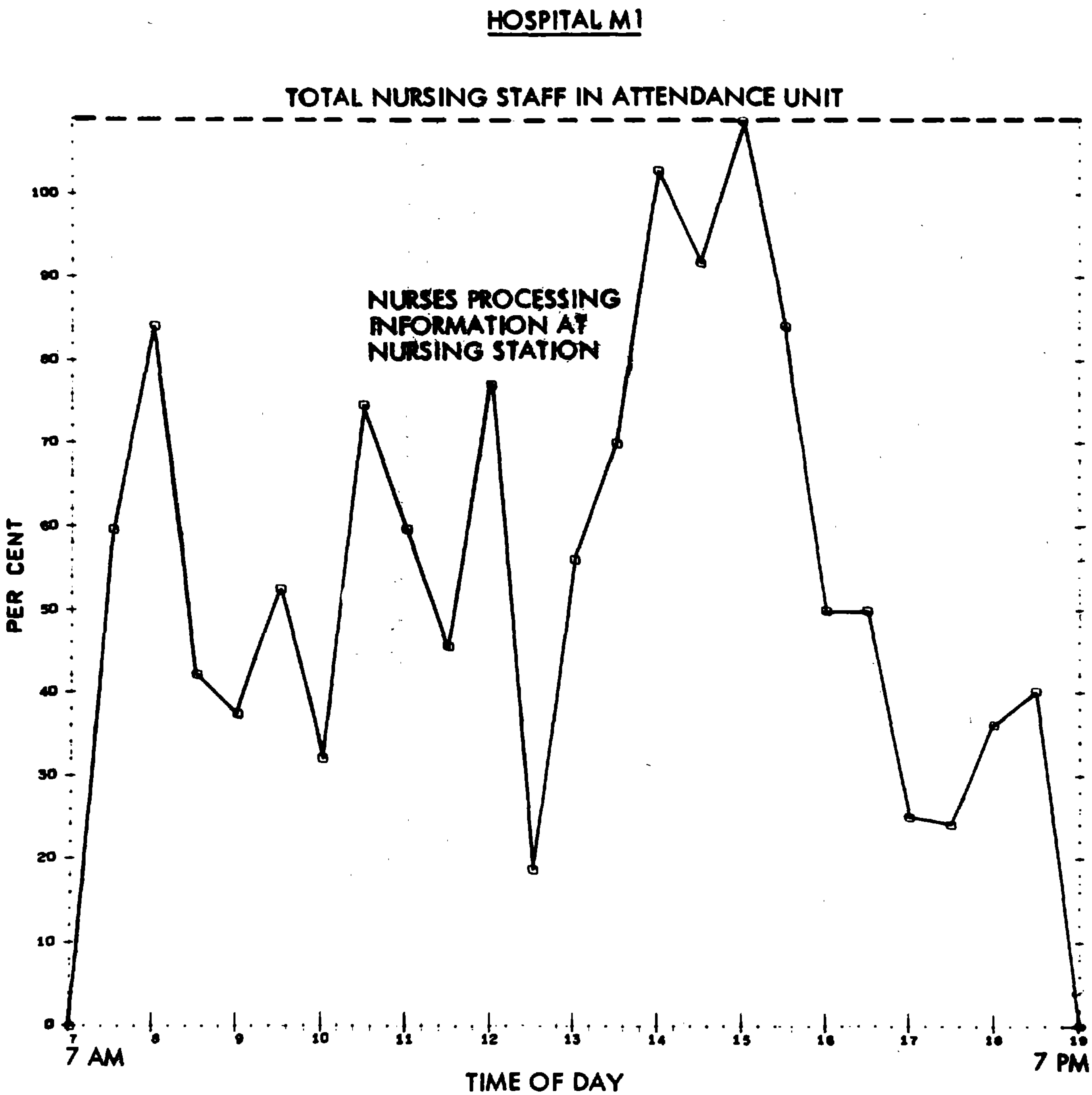

Fig. C-6 Percentage of Nursing Staff Processing Information – Medical Unit Nursing Station

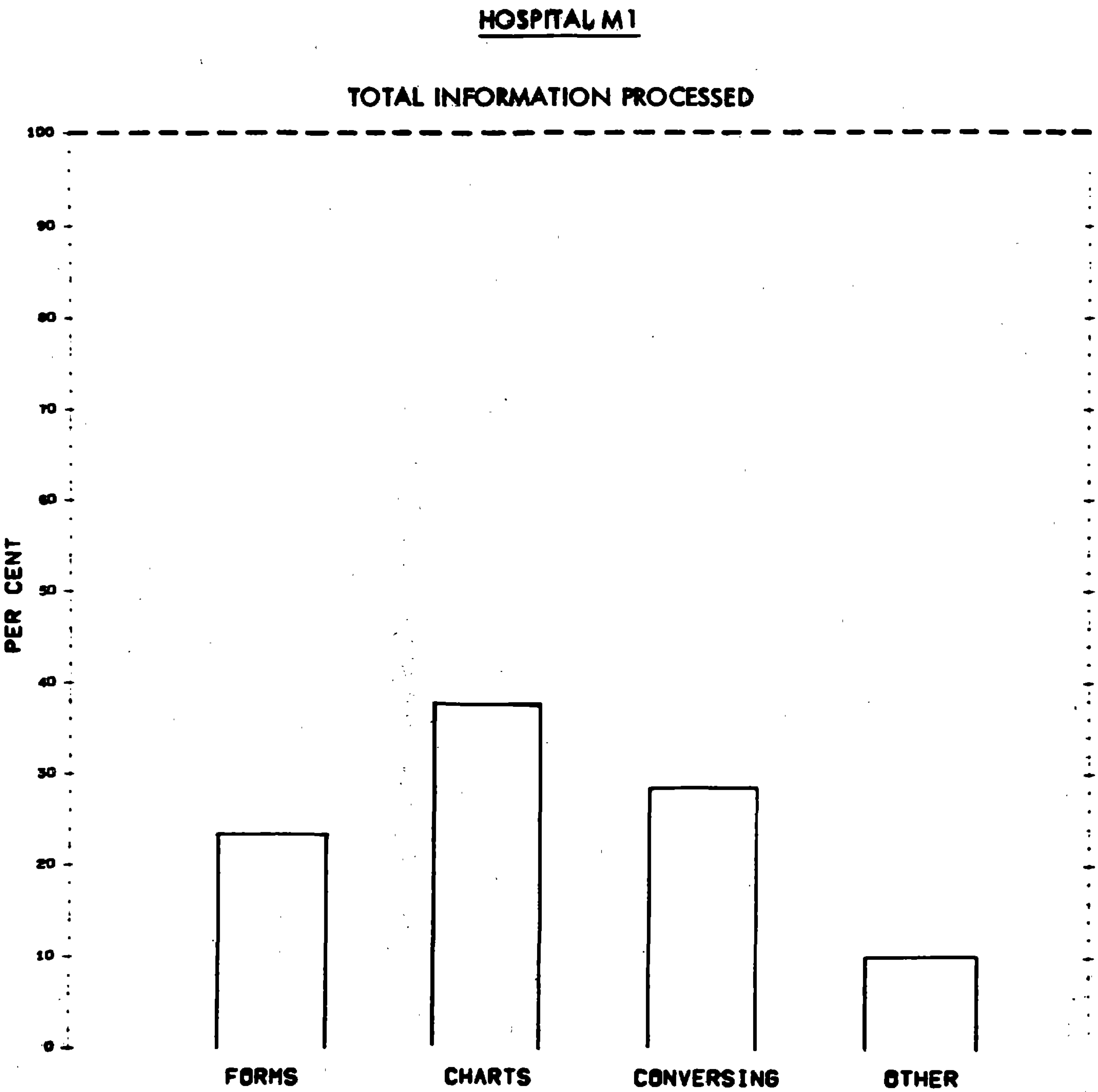

Fig. C-7 Relative Percentages of Types of Information Processed – Medical Unit Nursing Station

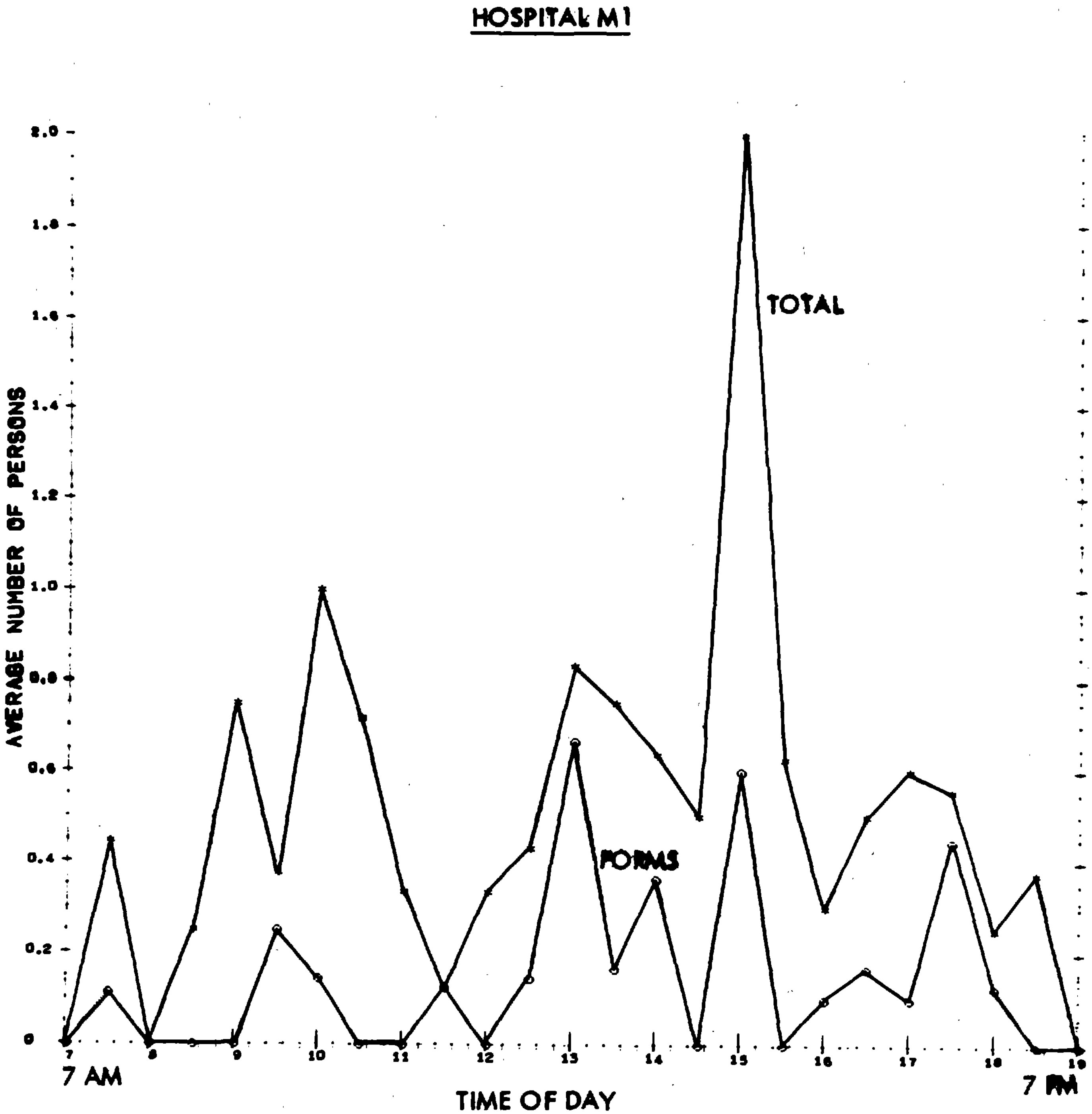

Fig. C-8 Ratio of Forms Processing to Total Information Processing – Intensive Care Unit Nursing Station

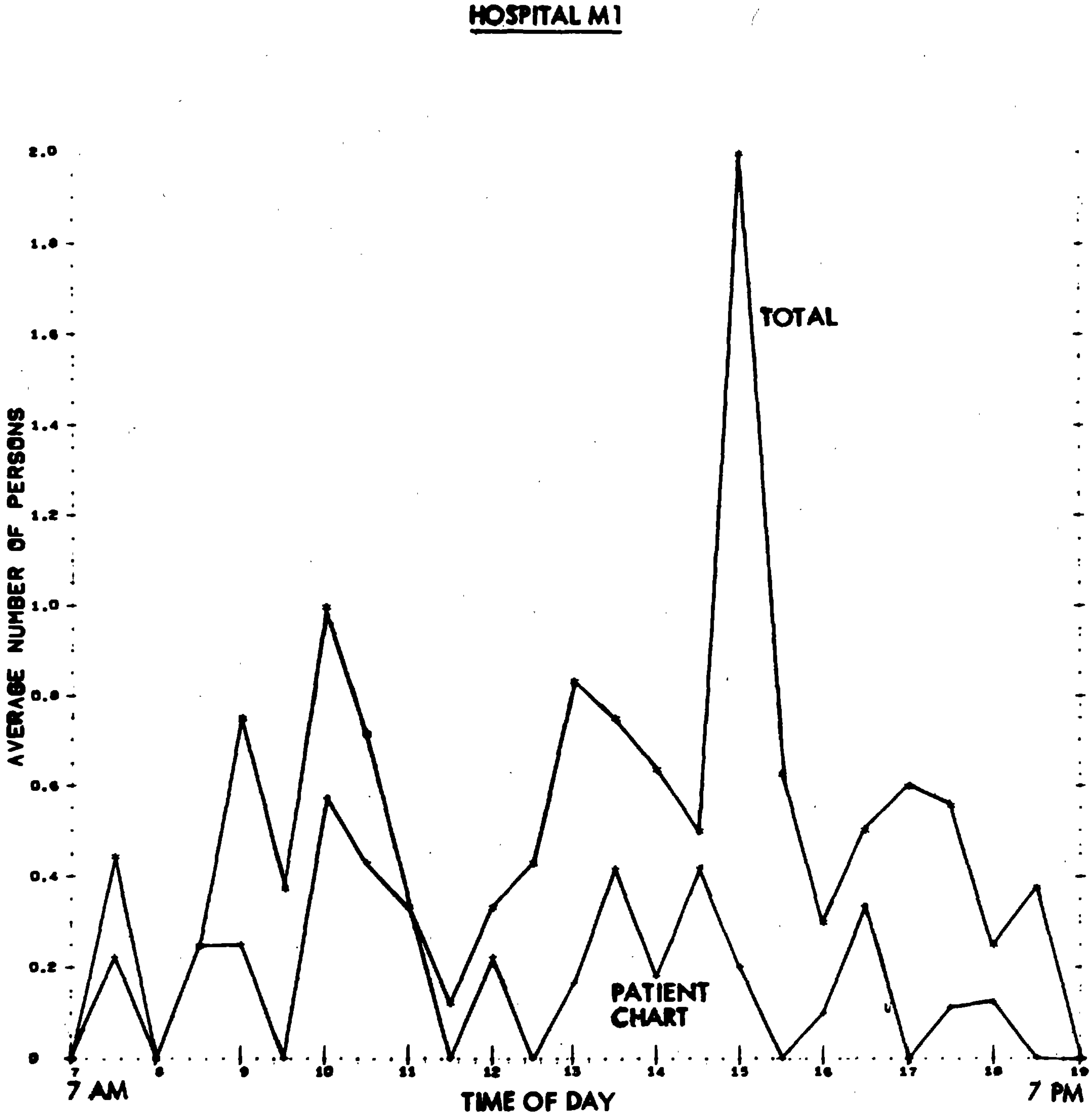

Fig. C-9 Ratio of Chart Processing to Total Information Processing – Intensive Care Unit Nursing Station

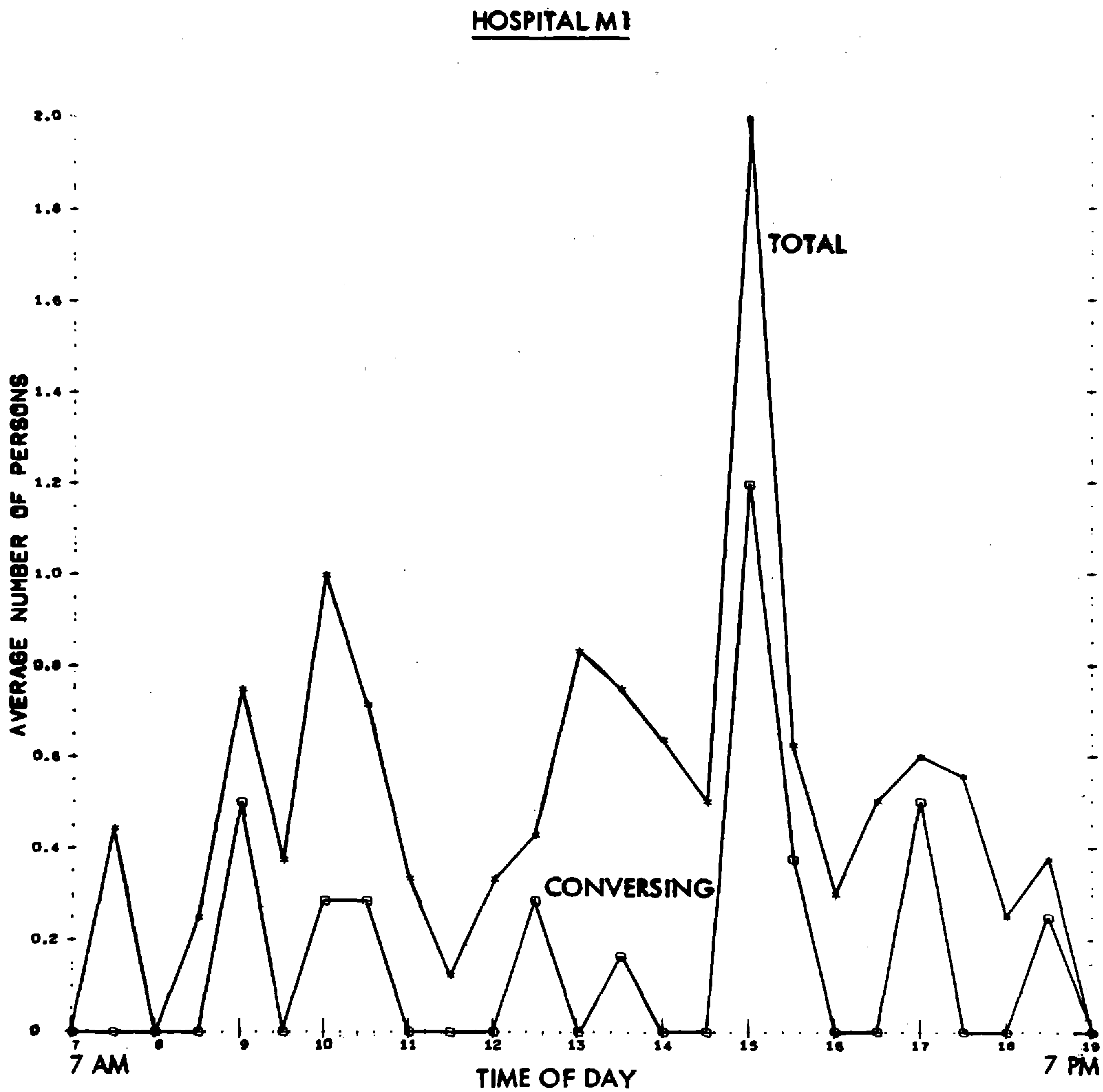

Fig. C-10 Ratio of Conversing to Total Information Processing – Intensive Care Unit Nursing Station

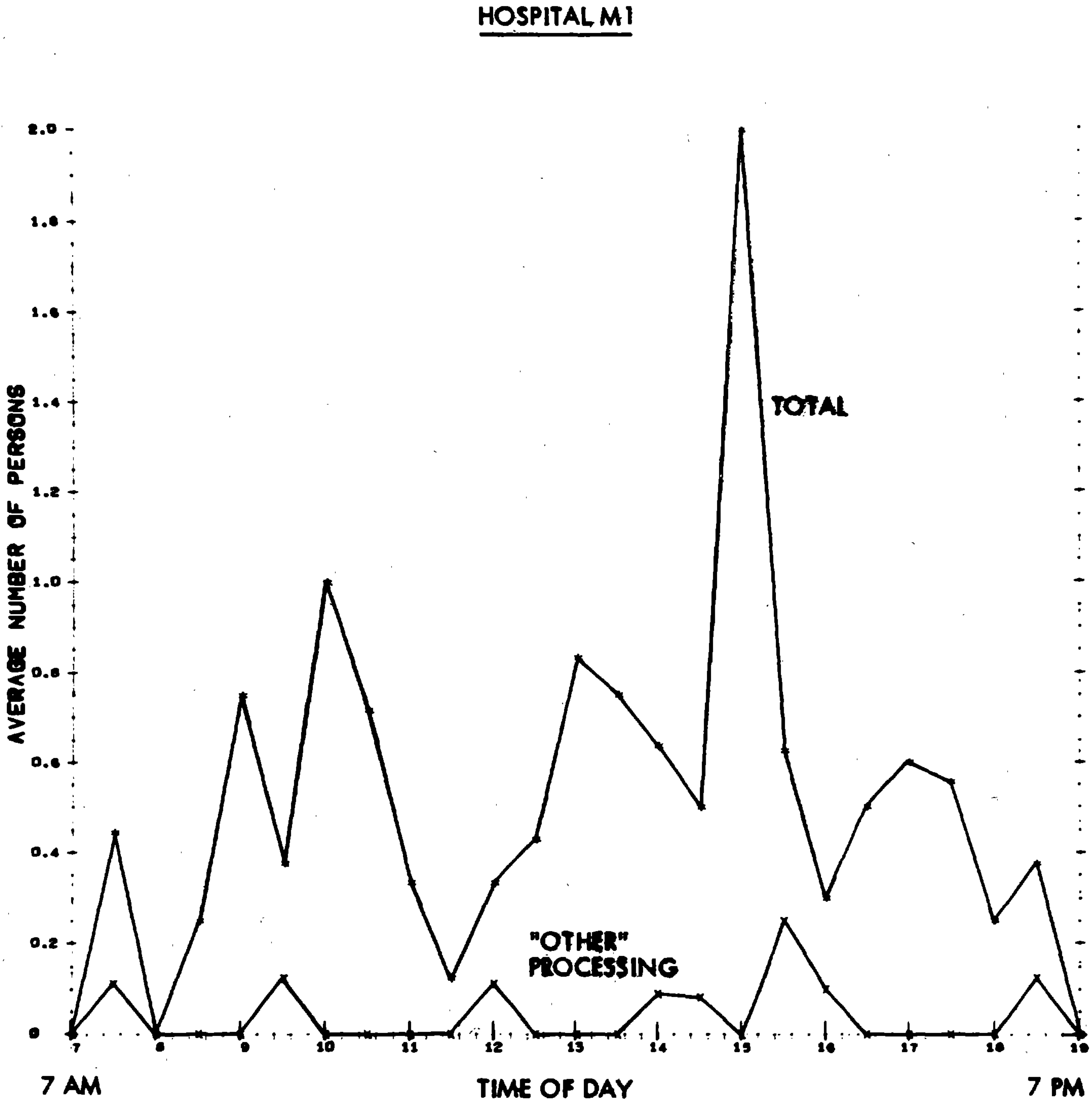

Fig. C-11 Ratio of "Other" Processing to Total Information Processing – Intensive Care Unit Nursing Station

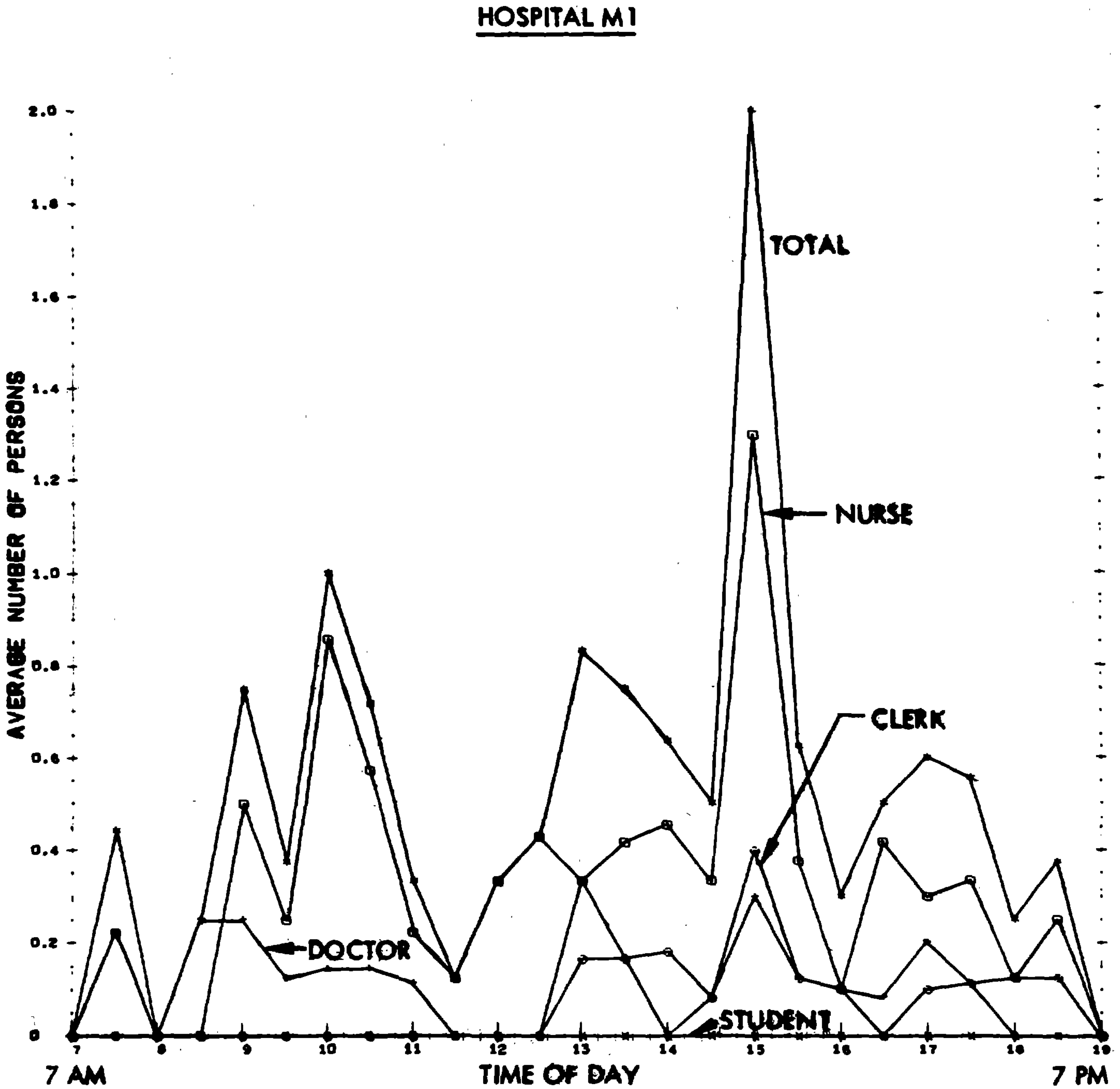

Fig. C-12 Comparison by Skill Levels of Personnel Processing to Total Information Being Processed – Intensive Care Unit Nursing Station

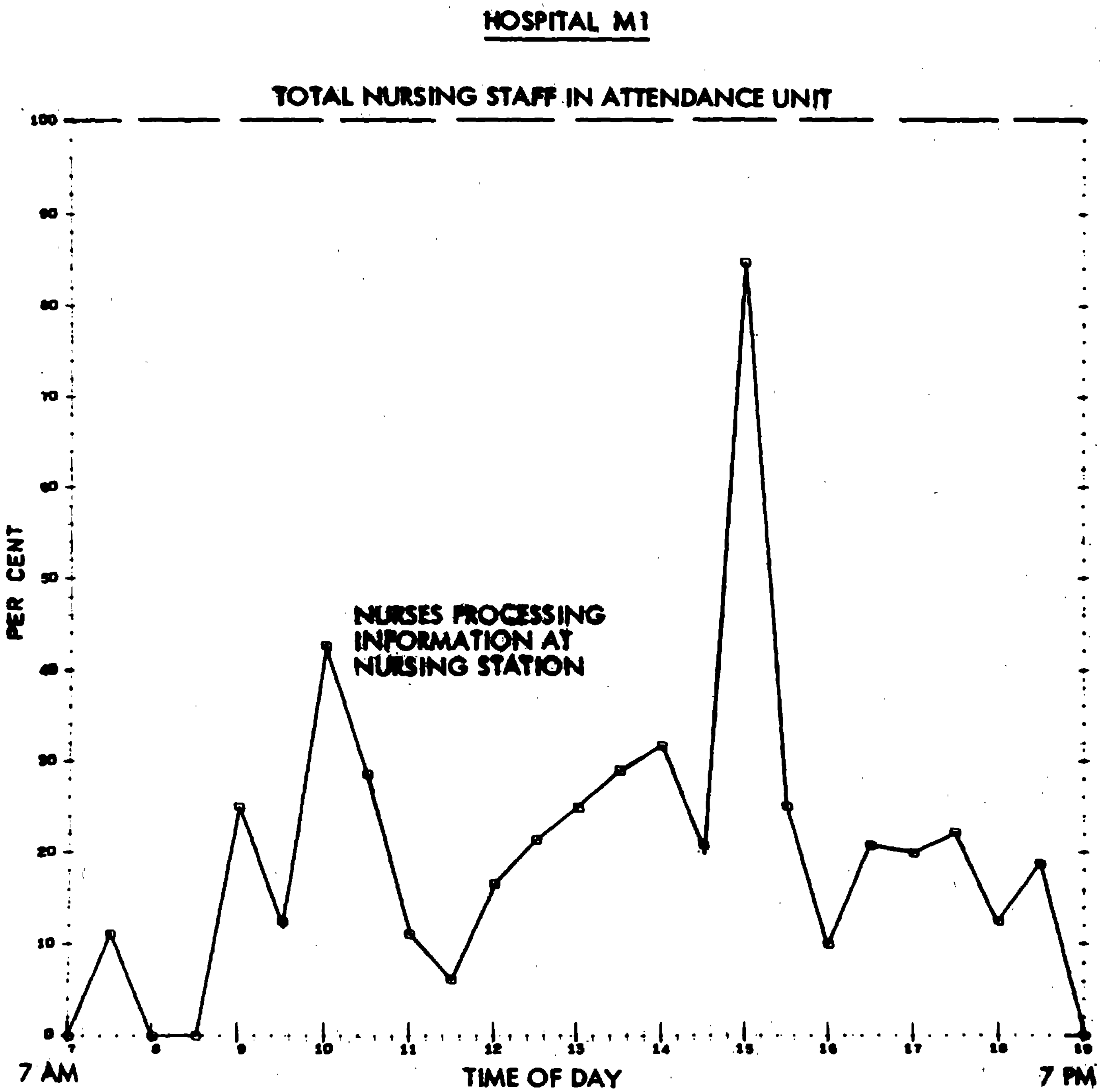

Fig. C-13 Percentage of Nursing Staff Processing Information – Intensive Care Unit Nursing Station

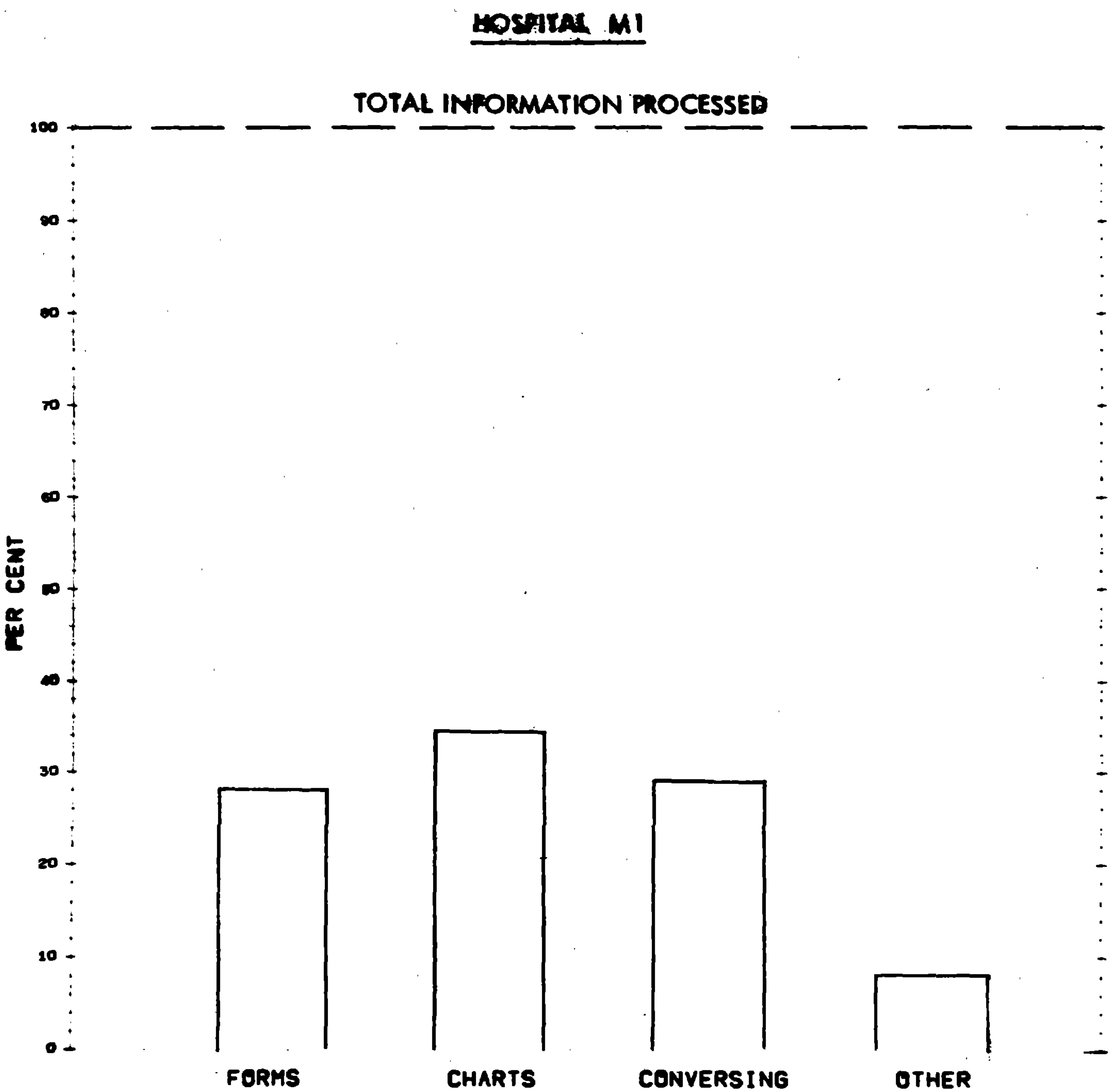

Fig. C-14 Relative Percentages of Types of Information Processed – Intensive Care Unit Nursing Station

Appendix D
FORMS PROCESSING FLOW CHARTS

The flow process charts in this appendix are representative for the forms used in the hospitals studied. All the forms are not necessarily used in any particular hospital; however, the needs of any hospital ranging in size from under 100 beds to over 300 beds can be accommodated by the forms represented here. These flow process charts indicate the handling of the form within the nursing station and the time required for such processing.

FORM LMSD [illegible] SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED	FT.		FT.		FT.	

LOCKHEED MISSILES & SPACE COMPANY

NO. ______ PAGE ___ OF ___

FLOW PROCESS CHART 1a, 1b, 2s, 2w, 5g

JOB Admit Patient to Unit

☐ MAN OR ☐ MATERIAL

CHART BEGINS At Nursing Station

CHART ENDS At Nursing Station

CHARTED BY ______ DATE ______

No.	DETAILS OF (PRESENT / PROPOSED) METHOD	DISTANCE IN FEET	TIME IN MINUTES	No.	DETAILS OF (PRESENT / PROPOSED) METHOD	DISTANCE IN FEET	TIME IN MINUTES
1	Review notification from Admitting		.5	1	Review Unit Routine with patient		
2				2			
3	Check Unit and Bed for proper supplies		-	3	Return to Station		
4				4			
5	Greet Patient and escort to bedside		-	5	Make up door card, bed card, patient chart and		10.6
6				6	Kardex		
7	Fill out Admission Sheet with Patient		3.1	7			
8				8	Place door card and bed card		-
9	Chief complaint		4.0	9			
10				10	Notify M.D. patient has been admitted		-
11	TPR & B/P		3.5	11			
12				12			
13	Height and Weight		2.0	13	1a-N 14.2		
14				14	1b-N 4.8		
15	Fill out Clothes List and sign off		3.0	15	5g-N 4.5		
16				16	2s-N 9.5		
17	Explain policy on valuables, place valuables		1.5	17	2w-N 9.5		
18	in pouch for relatives or storage			18			
19				19			
20	Collect Urine spec.		-	20			
21				21			
22	Collect meds patient has with him		-	22			
23				23			
24	Check allergies, skin, diet		-	24			
25				25			
26				26			

FORM LMSD 69260

NO. 1c

LOCKHEED MISSILES & SPACE COMPANY

PAGE ___ OF ___

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB: Emergency Room Record

☐ MAN OR ☐ MATERIAL

CHART BEGINS: Emergency Room

CHART ENDS: Emergency Room

CHARTED BY ______ DATE ______

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES		DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Get needed information and fill out upper	○ ⇨ □ D ▽		4.0	1		○ ⇨ □ D ▽		
2	portion of form	○ ⇨ □ D ▽			2		○ ⇨ □ D ▽		
3		○ ⇨ □ D ▽			3		○ ⇨ □ D ▽		
4	Have Patient or Guard-ian sign backside of	○ ⇨ □ D ▽		.5	4		○ ⇨ □ D ▽		
5	1st copy of form	○ ⇨ □ D ▽			5		○ ⇨ □ D ▽		
6		○ ⇨ □ D ▽			6		○ ⇨ □ D ▽		
7	Delay (While Doctor arrives and treats	○ ⇨ □ D ▽		-	7		○ ⇨ □ D ▽		
8	patient)	○ ⇨ □ D ▽			8		○ ⇨ □ D ▽		
9		○ ⇨ □ D ▽			9		○ ⇨ □ D ▽		
10	Doctor completes bottom portion of form	○ ⇨ □ D ▽		40	10		○ ⇨ □ D ▽		
11		○ ⇨ □ D ▽			11		○ ⇨ □ D ▽		
12	Post Patient information to Emergency Room Log	○ ⇨ □ D ▽		15	12		○ ⇨ □ D ▽		
13	Book	○ ⇨ □ D ▽			13		○ ⇨ □ D ▽		
14		○ ⇨ □ D ▽			14		○ ⇨ □ D ▽		
15	If an Out Patient - Deliver White copy to	○ ⇨ □ D ▽		20	15		○ ⇨ □ D ▽		
16	Medical Records	○ ⇨ □ D ▽			16		○ ⇨ □ D ▽		
17		○ ⇨ □ D ▽			17		○ ⇨ □ D ▽		
18	If Patient Admitted - Deliver White copy to	○ ⇨ □ D ▽			18		○ ⇨ □ D ▽		
19	Nursing Station	○ ⇨ □ D ▽			19		○ ⇨ □ D ▽		
20		○ ⇨ □ D ▽			20		○ ⇨ □ D ▽		
21	Deliver Yellow copy to	○ ⇨ □ D ▽		20	21		○ ⇨ □ D ▽		
22	the business office	○ ⇨ □ D ▽			22		○ ⇨ □ D ▽		
23	Doctor takes Pink copy	○ ⇨ □ D ▽		2	23		○ ⇨ □ D ▽		
24		○ ⇨ □ D ▽			24		○ ⇨ □ D ▽		
25		○ ⇨ □ D ▽			25		○ ⇨ □ D ▽		
26		○ ⇨ □ D ▽			26		○ ⇨ □ D ▽		

NO. 1d

LOCKHEED MISSILES & SPACE COMPANY PAGE __ OF __

FORM LMSD 8926B

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB O.B. Admission Sheet
Monthly Report

□ MAN OR □ MATERIAL

CHART BEGINS Maternity

CHART ENDS Maternity

CHARTED BY ______ DATE ______

	DETAILS OF (PRESENT/PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Note patient's name,	○ (marked)		1.5
2	date and doctor on sheet			
3				
4	Wait for birth of infant	D (marked)		
5				
6	Note delivery date time and room number	○ (marked)		1.5
7				
8	Wait for patient to be discharged	D (marked)		
9				
10	Note discharge date on form	○ (marked)		1.5
11				
12	Add new O.B. Admissions during the month	○ (marked)		1.5
13				
14	Hold until end of month	▽ (marked)		
15				
16	Transcribe incomplete info to new sheet	○ (marked)		88
17				↓
18	Transcribe to Form L-112	○ (marked)		
19				
20				
21				
22				
23				
24				
25				
26				

Right-hand column, line 4: N-14.8

FORM LMSD 8926B

NO. 1E

LOCKHEED MISSILES & SPACE COMPANY PAGE ___ OF ___

FLOW PROCESS CHART

JOB Documented Delivery of Newborn

☐ MAN OR ☐ MATERIAL

CHART BEGINS Start of Delivery Record

CHART ENDS Delivery - Delivery Filed

CHARTED BY ________ DATE ________

WHY WHAT WHO WHERE WHEN HOW SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

SUMMARY

	PRESENT		PROPOSED		DIFFERENCE	
	NO.	TIME	NO.	TIME	NO.	TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
☐ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Start of Delivery Rec-	○⇨☐D▽		.25
2	ord	○⇨☐D▽		
3	Multiple postings to	○⇨☐D▽		6.75
4	Delivery Record	○⇨☐D▽		
5	Sign and Post to	○⇨☐D▽		7.5
6	Delivery Record	○⇨☐D▽		
7	Separate 3 part form,	○⇨☐D▽		.50
8	(carbon sensitized)	○⇨☐D▽		
9	Deliver White copy to	○⇨☐D▽		1.20
10	Maternity	○⇨☐D▽		
11		○⇨☐D▽		
12	File White copy in	○⇨☐D▽		.25
13	Mother's Chart	○⇨☐D▽		
14	Deliver Pink copy to	○⇨☐D▽		1.70
15	Nursery	○⇨☐D▽		
16		○⇨☐D▽		
17	File Pink copy in	○⇨☐D▽		.25
18	Baby's Chart	○⇨☐D▽		
19		○⇨☐D▽		
20	File Yellow copy in	○⇨☐D▽		.25
21	Delivery Room Records	○⇨☐D▽		
22		○⇨☐D▽		
23		○⇨☐D▽		
24		○⇨☐D▽		
25		○⇨☐D▽		
26		○⇨☐D▽		

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1		○⇨☐D▽		
2		○⇨☐D▽		
3		○⇨☐D▽		
4		○⇨☐D▽		
5		○⇨☐D▽		
6		○⇨☐D▽		
7		○⇨☐D▽		
8		○⇨☐D▽		
9		○⇨☐D▽		
10		○⇨☐D▽		
11		○⇨☐D▽		
12		○⇨☐D▽		
13		○⇨☐D▽		
14		○⇨☐D▽		
15		○⇨☐D▽		
16		○⇨☐D▽		
17		○⇨☐D▽		
18		○⇨☐D▽		
19		○⇨☐D▽		
20		○⇨☐D▽		
21		○⇨☐D▽		
22		○⇨☐D▽		
23		○⇨☐D▽		
24		○⇨☐D▽		
25		○⇨☐D▽		
26		○⇨☐D▽		

FORM LMSD 8926B

NO. 1f

LOCKHEED MISSILES & SPACE COMPANY

PAGE ___ OF ___

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Notice of Patient Transfer

☐ MAN OR ☐ MATERIAL

CHART BEGINS At Nursing Station

CHART ENDS At Nursing Station

CHARTED BY ____________ DATE ________

WHY? WHAT? HOW? WHERE? WHEN? WHO? SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES		DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Receive Patient's	N ⇨ □ D ▽		.5	1		○ ⇨ □ D ▽		
2	transfer data from Doctor	○ ⇨ □ D ▽			2		○ ⇨ □ D ▽		
3		○ ⇨ □ D ▽			3	N - 29	○ ⇨ □ D ▽		
4	Nurse stamps form with	N ⇨ □ D ▽		.7	4		○ ⇨ □ D ▽		
5	addressograph plate	○ ⇨ □ D ▽			5		○ ⇨ □ D ▽		
6	Nurse completes balance	N ⇨ □ D ▽		1.7	6		○ ⇨ □ D ▽		
7	of form except information concerning "rates"	○ ⇨ □ D ▽			7		○ ⇨ □ D ▽		
8		○ ⇨ □ D ▽			8		○ ⇨ □ D ▽		
9	All copies of form	○ ⇨ □ D ▽			9		○ ⇨ □ D ▽		
10	sent to business office	○ ⇨ □ D ▽			10		○ ⇨ □ D ▽		
11		○ ⇨ □ D ▽			11		○ ⇨ □ D ▽		
12	Patient with Kardex	○ ⇨ □ D ▽			12		○ ⇨ □ D ▽		
13	Chart, Addressograph Plate, Medications and	○ ⇨ □ D ▽			13		○ ⇨ □ D ▽		
14	Cards taken to new Ward	○ ⇨ □ D ▽			14		○ ⇨ □ D ▽		
15		○ ⇨ □ D ▽			15		○ ⇨ □ D ▽		
16		○ ⇨ □ D ▽			16		○ ⇨ □ D ▽		
17		○ ⇨ □ D ▽			17		○ ⇨ □ D ▽		
18		○ ⇨ □ D ▽			18		○ ⇨ □ D ▽		
19		○ ⇨ □ D ▽			19		○ ⇨ □ D ▽		
20		○ ⇨ □ D ▽			20		○ ⇨ □ D ▽		
21		○ ⇨ □ D ▽			21		○ ⇨ □ D ▽		
22		○ ⇨ □ D ▽			22		○ ⇨ □ D ▽		
23		○ ⇨ □ D ▽			23		○ ⇨ □ D ▽		
24		○ ⇨ □ D ▽			24		○ ⇨ □ D ▽		
25		○ ⇨ □ D ▽			25		○ ⇨ □ D ▽		
26		○ ⇨ □ D ▽			26		○ ⇨ □ D ▽		

FORM LMSD 6926B

NO. 1g

LOCKHEED MISSILES & SPACE COMPANY PAGE ___ OF ___

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED	FT.		FT.		FT.	

JOB I.D. Rand Card & O.B. Card

☐ MAN OR ☐ MATERIAL

CHART BEGINS Nurses Station Maternity

CHART ENDS Nurses Station Maternity

CHARTED BY ______ DATE ______

WHY WHAT? WHO? WHERE? WHEN? HOW? SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES		DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Fill out top portion of I.D. Rand Card and	○⇨□D▽		3.0	1		○⇨□D▽		
2	O.B. Card	○⇨□D▽			2		○⇨□D▽		
3		○⇨□D▽			3		○⇨□D▽		
4	File I.D. Rand Card	○⇨□D▽		.6	4	N- 8.6	○⇨□D▽		
5		○⇨□D▽			5		○⇨□D▽		
6	Wait for birth of baby	○⇨□D▽			6		○⇨□D▽		
7		○⇨□D▽			7		○⇨□D▽		
8	Add birth information to I.D. Rand Card	○⇨□D▽		1.5	8		○⇨□D▽		
9		○⇨□D▽			9		○⇨□D▽		
10	Insert I.D.Rand & O.B. Card in Chart	○⇨□D▽		.6	10		○⇨□D▽		
11		○⇨□D▽			11		○⇨□D▽		
12	Treat patient per O.B. Card instructions	○⇨□D▽			12		○⇨□D▽		
13		○⇨□D▽			13		○⇨□D▽		
14	Retain cards until patient is discharged	○⇨□D▽			14		○⇨□D▽		
15		○⇨□D▽			15		○⇨□D▽		
16	Fill in discharge info on I.D. Rand Card	○⇨□D▽		1.5	16		○⇨□D▽		
17		○⇨□D▽			17		○⇨□D▽		
18	Staple I.D. Rand Card to O.B. Card	○⇨□D▽		.8	18		○⇨□D▽		
19		○⇨□D▽			19		○⇨□D▽		
20	File both cards at station	○⇨□D▽		.6	20		○⇨□D▽		
21		○⇨□D▽			21		○⇨□D▽		
22		○⇨□D▽			22		○⇨□D▽		
23		○⇨□D▽			23		○⇨□D▽		
24		○⇨□D▽			24		○⇨□D▽		
25		○⇨□D▽			25		○⇨□D▽		
26		○⇨□D▽			26		○⇨□D▽		

FORM LMSD 6026B

NO. 1h

LOCKHEED MISSILES & SPACE COMPANY PAGE ___ OF ___

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
O OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Emergency Room Record

□ MAN OR □ MATERIAL

CHART BEGINS ~~Emergency Room~~

CHART ENDS Emergency Room

CHARTED BY ______ DATE ______

WHY WHAT HOW WHERE WHEN WHO SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

No.	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION TRANSPORT INSPECTION DELAY STORAGE	DISTANCE IN FEET	TIME IN MINUTES	No.	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION TRANSPORT INSPECTION DELAY STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Get needed information	O⇨□D▽		4.0	1		O⇨□D▽		
2	and fill out upper portion of form	O⇨□D▽			2	D-4.0	O⇨□D▽		
3		O⇨□D▽			3	N-8.0	O⇨□D▽		
4	Have Patient or	O⇨□D▽		.5	4		O⇨□D▽		
5	Guardian sign back side of 1st copy of form	O⇨□D▽			5		O⇨□D▽		
6		O⇨□D▽			6		O⇨□D▽		
7	Delay (while Doctor	O⇨□D▽			7		O⇨□D▽		
8	arrives and treats patient)	O⇨□D▽			8		O⇨□D▽		
9		O⇨□D▽			9		O⇨□D▽		
10	Doctor completes	O⇨□D▽		4.0	10		O⇨□D▽		
11	bottom portion of form	O⇨□D▽			11		O⇨□D▽		
12	Post Patient informa-	O⇨□D▽		1.5	12		O⇨□D▽		
13	tion to Emergency Room Log book	O⇨□D▽			13		O⇨□D▽		
14		O⇨□D▽			14		O⇨□D▽		
15	If an Out Patient -	O⇨□D▽		20	15		O⇨□D▽		
16	deliver copy to Medical Records	O⇨□D▽			16		O⇨□D▽		
17		O⇨□D▽			17		O⇨□D▽		
18	If Patient admitted -	O⇨□D▽			18		O⇨□D▽		
19	Deliver copy to Nursing Station	O⇨□D▽			19		O⇨□D▽		
20		O⇨□D▽			20		O⇨□D▽		
21	Deliver copy to the	O⇨□D▽			21		O⇨□D▽		
22	Business Office	O⇨□D▽			22		O⇨□D▽		
23	Doctor takes copy	O⇨□D▽			23		O⇨□D▽		
24		O⇨□D▽			24		O⇨□D▽		
25		O⇨□D▽			25		O⇨□D▽		
26		O⇨□D▽			26		O⇨□D▽		

FORM LMSD 8926B

SUMMARY

	PRESENT		PROPOSED		DIFFERENCE	
	NO.	TIME	NO.	TIME	NO.	TIME
O OPERATIONS						
⇨ TRANSPORTATIONS						
☐ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

LOCKHEED MISSILES & SPACE COMPANY

FLOW PROCESS CHART

NO. 1k

PAGE 1 OF 3

JOB Birth Notices (Normal, Live)

☐ MAN OR ☐ MATERIAL

CHART BEGINS Maternity

CHART ENDS Maternity

CHARTED BY ______ DATE ______

WHY WHAT WHO WHERE WHEN HOW SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

No.	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Telephone call to	○⇨☐D▽		1.2
2	Admissions-Birth info.	○⇨☐D▽		
3	Prepare Admission	○⇨☐D▽		6.
4	Package & Charge Plates	○⇨☐D▽		
5	Prepare Daily List,	○⇨☐D▽		N A
6	Admissions & Dismissals	○⇨☐D▽		1
7	Mimeograph Admissions &	○⇨☐D▽		N A
8	Dismissals List	○⇨☐D▽		
9	Distribute Admissions	○⇨☐D▽		N A
10	& Dismissals Lists	○⇨☐D▽		
11	Review A & D List; Post	○⇨☐D▽		1.5
12	Newborn Mother's Name to Work Sheet #1	○⇨☐D▽		
13		○⇨☐D▽		
14	Review List of Patients	○⇨☐D▽		.24
15	Post Room #'s to Work Sheet	○⇨☐D▽		
16		○⇨☐D▽		
17	Tally Babies into six	○⇨☐D▽		.36
18	categories Hosp. records	○⇨☐D▽		
19	Tally Babies into seven	○⇨☐D▽		.36
20	weight categories and forward info to State	○⇨☐D▽		
21		○⇨☐D▽		
22	Start Work Sheet #2 -	○⇨☐D▽		1.6
23	Rough copy of State form "Certificate of	○⇨☐D▽		
24	Live Babies"	○⇨☐D▽		
25	Complete all but blocks	○⇨☐D▽		5.7
26	12-16 from Mother's Chart	○⇨☐D▽		

No.	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Interview Mother -	○⇨☐D▽		3.0
2	Verify correctness and obtain correct info for	○⇨☐D▽		
3	blocks 12-16	○⇨☐D▽		
4	Deliver Form to Mother	○⇨☐D▽		1.2
5	Leave for completion	○⇨☐D▽		
6	Complete rough copy of	○⇨☐D▽		1.5
7	certificate	○⇨☐D▽		
8	Type Legal copy of	○⇨☐D▽		5.0
9	Certificate of Live Birth	○⇨☐D▽		
10		○⇨☐D▽		
11	Have Mother (or Father)	○⇨☐D▽		1.2
12	sign	○⇨☐D▽		
13	Have Doctor sign	○⇨☐D▽		1.2
14		○⇨☐D▽		
15	Deliver Legal certificate to Outgoing Mail	○⇨☐D▽		.05
16	daily	○⇨☐D▽		
17		○⇨☐D▽		
18	File W.S.#2 in Monthly file (Rough drafts)	○⇨☐D▽		.05
19		○⇨☐D▽		
20	Send W.S.#2 to Central Med Records-Monthly	○⇨☐D▽		—
21		○⇨☐D▽		
22	File W.S.#2 in Central Med. Records	○⇨☐D▽		—
23		○⇨☐D▽		
24	Type Complementary	○⇨☐D▽		
25	Certificate of Birth (not legal)	○⇨☐D▽		
26		○⇨☐D▽		

FORM LMSD 6926B

NO. 1k

LOCKHEED MISSILES & SPACE COMPANY PAGE 7 OF 2

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Birth Notices (Normal, Live)

☐ MAN OR ☐ MATERIAL

CHART BEGINS Maternity

CHART ENDS Maternity

CHARTED BY ______ DATE ______

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION	TRANSPORT	INSPECTION	DELAY	STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Obtain Doctor's signature	●						
2								
3	Deliver Certificate to Mother		●					
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								

2a 3c

LOCKHEED MISSILES & SPACE COMPANY
FLOW PROCESS CHART

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FORM LMSD 6020B

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Requests for Laboratory Tests

☐ MAN OR ☐ MATERIAL

CHART BEGINS At Nursing Station

CHART ENDS At Nursing Station

CHARTED BY ____________ DATE ________

WHY WHAT WHEN WHERE WHO HOW SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION	TRANSPORT	INSPECTION	DELAY	STORAGE	DISTANCE IN FEET	TIME IN MINUTES		DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION	TRANSPORT	INSPECTION	DELAY	STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Write Medical Order	D						1.7	1								
2									2								
3	Nurse stamps appropriate	N						.7	3								
4	Laboratory test Form with patient's address-								4								
5	ograph plate								5								
6	Nurse prepares Form	N						1.7	6								
7									7								
8	Nurse pulls and retains	N						1.5	8								
9	copy of form at Nursing Station								9	D - 1.7							
10	Nurse takes remainder								10	N - 54							
11	of form to Laboratory								11	(<1.5)							
12	Delay while test is								12								
13	made and analyzed								13								
14	Receive copy of form	N						.5	14								
15	from Laboratory with test results								15								
16									16								
17	Affix copy of form to	N						.8	17								
18	page in patient's chart								18								
19	Delay during patient's								19								
20	stay								20								
21	Nurse discards copy of	N						.2	21								
22	form when patient leaves								22								
23	Copy of form with								23								
24	patient's chart sent to Medical Records after								24								
25	patient leaves								25								
26									26								

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FORM LMSD 8926B

LOCKHEED MISSILES & SPACE COMPANY PAGE ___ OF ___

FLOW PROCESS CHART

SUMMARY	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
O OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB In-Patient Radiograph Request

☐ MAN OR ☐ MATERIAL

CHART BEGINS At Nursing Station

CHART ENDS At Nursing Station

CHARTED BY ______________ DATE ______

	DETAILS OF (PRESENT / PROPOSED) METHOD	DISTANCE IN FEET	TIME IN MINUTES		DETAILS OF (PRESENT / PROPOSED) METHOD	DISTANCE IN FEET	TIME IN MINUTES
1	Write Medical Order		1.7	1	Std. Min allow		
2	Transcribe to Kardex		1.5	2	Dr. - 1.7		
3	Nurse stamps form with addressograph plate		.7	3	N. - 9.5		
4				4			
5	Nurse fills out parts of form not reserved for Radiology's use		4.0	5			
6				6			
7				7			
8	Forms delivered to Radiology			8			
9				9			
10				10			
11	Wait for Results			11			
12			.5	12			
13	Receive results from Radiology on copy of Radiology Report			13			
14				14			
15				15			
16	Nurse affixes results Form to X-ray report Form in Patient's chart		.8	16			
17				17			
18				18			
19	Delay during Patient's stay			19			
20				20			
21	Form with Patient's chart sent to Medical Records after patient is discharged		20	21			
22				22			
23				23			
24				24			
25				25			
26				26			

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LOCKHEED MISSILES & SPACE COMPANY

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB PKU Request Form

☐ MAN OR ☐ MATERIAL

CHART BEGINS Nursery

CHART ENDS Nursery

CHARTED BY ______ DATE ______

	DETAILS OF (PRESENT / PROPOSED) METHOD	SYMBOL	DISTANCE IN FEET	TIME IN MINUTES		DETAILS OF (PRESENT / PROPOSED) METHOD	DISTANCE IN FEET	TIME IN MINUTES
1	Fill out top portion of PKU Form (5 copies)	Operation		1.5	1			
2					2	11-5.7		
3	Insert in chart	Operation		.6	3			
4					4			
5	Wait for infant to be born	Delay			5			
6					6			
7	Add birth info to form	Operation		10	7			
8					8			
9	Wait for infant to be released from hospital	Delay			9			
10					10			
11	Complete form	Operation		1.5	11			
12					12			
13	Take form to Lab	Transport			13			
14					14			
15	Wait for Lab Tech to draw blood	Delay			15			
16					16			
17	Receive (1) copy back from Lab	Transport		.5	17			
18					18			
19	File copy	Storage		.6	19			
20					20			
21					21			
22					22			
23					23			
24					24			
25					25			
26					26			

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FORM LMSD 6026B

LOCKHEED MISSILES & SPACE COMPANY

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
O OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Sleep Chart

☐ MAN OR ☐ MATERIAL

CHART BEGINS Nursing Station

CHART ENDS Nursing Station

CHARTED BY ____________ DATE ______

WHY WHAT WHO WHERE WHEN HOW SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION	TRANSPORT	INSPECTION	DELAY	STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	3rd Shift starts basic	N						1.5
2	form for unit							
3								
4	Each half hour unit							
5	tour is made and patient							
6	observed							
7	Sleep codes are entered	N						8.8
8	on Chart for each patient							
9								
10	Initial entries			N				
11								
12	Additional observations	N						10.1
13	added via nursing notes							
14								
15	All "awake" patients are to be noted in	N						
16	nursing notes							
17								
18	At shift end form is	N						1.5
19	filed in unit							
20	Seven day old forms are discarded	N						.5
21								
22								
23								
24								
25								
26								

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION	TRANSPORT	INSPECTION	DELAY	STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1								
2								
3								
4	N - 22.1							
5–26								

FORM LMSD 8926B

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LOCKHEED MISSILES & SPACE COMPANY PAGE 1 OF 2

FLOW PROCESS CHART

JOB Eight Hour and Twenty-four Intake and Output Record

☐ MAN OR ☐ MATERIAL

CHART BEGINS At Nursing Station

CHART ENDS At Nursing Station

CHARTED BY ____ DATE ____

WHY WHAT WHO WHERE WHEN HOW SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
☐ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

No.	DETAILS OF (PRESENT/PROPOSED) METHOD	Time in Minutes
1	Write Medical Order	1.7
3	Eight hour intake and output record prepared by Nurse	.7
6	Form placed at Patient's bedside	20
8	Twenty-four hour intake and output record prepared by Nurse	.7
11	Form placed in Patient's chart	.6
13	Delay until events which require recording occur	
15	Nurse calculates amount of liquid patient takes in	
18	Nurse records on Form amount of liquid patient takes in	1.5
21	Nurse calculates amount of liquid patient emits	
23	Nurse records on Form amount of liquid patient emits	1.5

No.	DETAILS OF (PRESENT/PROPOSED) METHOD	Time in Minutes
1	Transcribe to Form additional events as they occur	1.5
4	Delay until end of eight hour shift	
7	Nurse totals columns on form at end of eight hour shift	1.5
10	Nurse transcribes eight hour totals to twenty-four hour record in patient's chart	1.5
13	Nurse discards Form after posting totals to Form in Chart	.2
16	Nurse prepares a new eight hour intake and output record	.7
19	New Form placed at Patient's bedside	2.0
21	Delay until events which require recording occur	
24	Nurse repeats steps 7 through 11 as described above	4.5

FORM LMSD 6826B

NO. 2e - 2f

LOCKHEED MISSILES & SPACE COMPANY PAGE 2 OF 2

FLOW PROCESS CHART

SUMMARY	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
O OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Eight Hour and Twenty-Four Intake and Output Record

☐ MAN OR ☐ MATERIAL

CHART BEGINS At Nursing Station

CHART ENDS At Nursing Station

CHARTED BY ______ DATE ______

	DETAILS OF (PRESENT/PROPOSED) METHOD	DISTANCE IN FEET	TIME IN MINUTES		DETAILS OF (PRESENT/PROPOSED) METHOD
1	Delay until end of			1	Delay during Patient's
2	Eight Hour Shift			2	stay
3	Nurse repeats Steps 13		5.9	3	Form with Patient's
4	through 17 as described above			4	Chart sent to Medical Records when patient
5				5	leaves
6	Delay until events which			6	
7	require recording occur			7	8 Hrs
8	Nurse repeats steps 7		4.5	8	D - 1.7
9	through 11 as described above			9	N - 11.7
10				10	24 Hrs
11	Delay until end of			11	D - 1.7
12	Eight Hour Shift			12	N - 27.3
13	Nurse totals columns on		1.5	13	
14	Form at end of eight hour shift			14	
15				15	
16	Nurse transcribes eight		1.5	16	
17	hour totals to twenty-four record in patient's			17	
18	chart			18	
19	Nurse discards Form		1.7	19	
20	after posting totals to Form in Patient's Chart			20	
21				21	
22	Nurse totals three		5.0	22	
23	columns of eight hour entries for a 24 hour			23	
24	total on Form			24	
25	Cycle repeated daily			25	
26	until Doctor cancels InTake and Output order			26	

FORM LMSD 8026B

NO. 2g - 2r
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LOCKHEED MISSILES & SPACE COMPANY

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
O OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Vital Signs

□ MAN OR □ MATERIAL ______

CHART BEGINS ______

CHART ENDS ______

CHARTED BY ______ DATE ______

WHY WHAT WHERE WHEN WHO HOW SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

No.	DETAILS OF (PRESENT / PROPOSED) METHOD	DISTANCE IN FEET	TIME IN MINUTES	No.	DETAILS OF (PRESENT / PROPOSED) METHOD	DISTANCE IN FEET	TIME IN MINUTES
1	Collect equipment and procede to patients		–	1			
2	bedside			2			
3				3			
4	Place thermometer as ordered		–	4			
5				5	N - 1.5 x Pats		
6	Take pulse and count respirations while		–	6			
7	thermometer is regis- tering			7			
8				8			
9				9			
10	Any irregular pulse to be counted a full			10			
11	minute			11			
12				12			
13	Record results on T.P.R. Board or Bed		1.5	13			
14	Record			14			
15				15			
16	Move to next bed		–	16			
17				17			
18	Repeat for all patients in unit		X	18			
19				19			
20	Return to Station			20			
21				21			
22				22			
23				23			
24				24			
25				25			
26				26			

NO. 2h

LOCKHEED MISSILES & SPACE COMPANY PAGE ___ OF ___

FORM LMSO 8926B

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Vital Signs & Fluid Intake

□ MAN OR □ MATERIAL

CHART BEGINS Nursing Station ICU

CHART ENDS Nursing Station ICU

CHARTED BY ________ DATE ________

WHY WHAT? WHO? WHERE? WHEN? HOW? SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

No.	DETAILS OF (PRESENT/PROPOSED) METHOD	Time in minutes	No.	DETAILS OF (PRESENT/PROPOSED) METHOD
1	Write Orders	1.7	1	
2			2	D - 1.7
3	Impress patient's name	.7	3	N - 18.9
4	and address on form		4	
5	Observe patient's out-		5	
6	put and intake		6	
7	Take patient's temper-		7	
8	ature, pulse, respir-ation and pressure		8	
9			9	
10	Note findings on form	17.6	10	
11	as often as required by Doctor		11	
12			12	
13	Retain form at bedside		13	
14	until next series of tests		14	
15			15	
16	Perform next series of		16	
17	tests as often as required by Doctor		17	
18			18	
19	Insert form in folder	.6	19	
20	when patient leaves I.C.U.		20	
21			21	
22	Forward Chart to		22	
23	Patient's new location		23	
24			24	
25			25	
26			26	

FORM LMSD 8026B

NO. 2k

LOCKHEED MISSILES & SPACE COMPANY PAGE ___ OF ___

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
O OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Recovery Room Record

☐ MAN OR ☐ MATERIAL

CHART BEGINS Surgery Scheduling Desk

CHART ENDS Surgery Scheduling Desk

CHARTED BY ____________ DATE ______

No.	DETAILS OF (PRESENT/PROPOSED) METHOD	DISTANCE IN FEET	TIME IN MINUTES	No.	DETAILS OF (PRESENT/PROPOSED) METHOD	DISTANCE IN FEET	TIME IN MINUTES
1	Stamp Patient's Name on Recovery Room Record		.7	1			
2	using addressograph plate			2	N-13.6		
3				3			
4	Put Record with other forms and Patient's			4			
5	Chart until case comes up			5			
6				6			
7	Take Record into Operating Room along with		1.4	7			
8	Chart and other forms			8			
9				9			
10	Delay (Until Surgery completed)			10			
11				11			
12	Take Record into Recovery Room with		1.0	12			
13	Patient's Chart			13			
14				14			
15	Fill out form as completely as possible		4.4	15			
16	upon arrival in Recovery Room			16			
17				17			
18	Post Vital Signs at various time intervals		1.5	18			
19				19			
20	Complete form when Patient ready to leave		4.4	20			
21				21			
22	File form in Patient's Chart (goes back to		.6	22			
23	Nursing Station)			23			
24				24			
25				25			
26				26			

NO. 2m

LOCKHEED MISSILES & SPACE COMPANY PAGE ___ OF ___

FORM LMSD 8925B

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
☐ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Medical Observation Notes

☐ MAN OR ☐ MATERIAL

CHART BEGINS

CHART ENDS

CHARTED BY ______ DATE ______

WHY WHAT WHERE WHEN WHO HOW SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

DETAILS OF (PRESENT/PROPOSED) METHOD	OPERATION TRANSPORT INSPECTION DELAY STORAGE	DISTANCE IN FEET	TIME IN MINUTES	DETAILS OF (PRESENT/PROPOSED) METHOD	OPERATION TRANSPORT INSPECTION DELAY STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1 Pull form and add patient I.D.	M ⇨ ☐ D ▽		1.5	1	○ ⇨ ☐ D ▽		
2	○ ⇨ ☐ D ▽			2	○ ⇨ ☐ D ▽		
3 Enter data as requested by M.D.	M ⇨ ☐ D ▽		1.7	3 N-5.2	○ ⇨ ☐ D ▽		
4	○ ⇨ ☐ D ▽			4	○ ⇨ ☐ D ▽		
5 Remove Patient's Chart	○ ⇨ ☐ D ▽		.5	5	○ ⇨ ☐ D ▽		
6	○ ⇨ ☐ D ▽			6	○ ⇨ ☐ D ▽		
7 Bind form into patient's chart	M ⇨ ☐ D ▽		1.0	7	○ ⇨ ☐ D ▽		
8	○ ⇨ ☐ D ▽			8	○ ⇨ ☐ D ▽		
9 Return Chart to rack	○ ⇨ ☐ D ▽		.5	9	○ ⇨ ☐ D ▽		
10	○ ⇨ ☐ D ▽			10	○ ⇨ ☐ D ▽		
11	○ ⇨ ☐ D ▽			11	○ ⇨ ☐ D ▽		
12	○ ⇨ ☐ D ▽			12	○ ⇨ ☐ D ▽		
13	○ ⇨ ☐ D ▽			13	○ ⇨ ☐ D ▽		
14	○ ⇨ ☐ D ▽			14	○ ⇨ ☐ D ▽		
15	○ ⇨ ☐ D ▽			15	○ ⇨ ☐ D ▽		
16	○ ⇨ ☐ D ▽			16	○ ⇨ ☐ D ▽		
17	○ ⇨ ☐ D ▽			17	○ ⇨ ☐ D ▽		
18	○ ⇨ ☐ D ▽			18	○ ⇨ ☐ D ▽		
19	○ ⇨ ☐ D ▽			19	○ ⇨ ☐ D ▽		
20	○ ⇨ ☐ D ▽			20	○ ⇨ ☐ D ▽		
21	○ ⇨ ☐ D ▽			21	○ ⇨ ☐ D ▽		
22	○ ⇨ ☐ D ▽			22	○ ⇨ ☐ D ▽		
23	○ ⇨ ☐ D ▽			23	○ ⇨ ☐ D ▽		
24	○ ⇨ ☐ D ▽			24	○ ⇨ ☐ D ▽		
25	○ ⇨ ☐ D ▽			25	○ ⇨ ☐ D ▽		
26	○ ⇨ ☐ D ▽			26	○ ⇨ ☐ D ▽		

NO. 21,2n,2o

FORM LMSD 8826B

LOCKHEED MISSILES & SPACE COMPANY PAGE ___ OF ___

FLOW PROCESS CHART

SUMMARY	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Graphic Charting - Vital Signs

□ MAN OR □ MATERIAL

CHART BEGINS Nursing Station

CHART ENDS Nursing Station

CHARTED BY ______ DATE ______

	DETAILS OF (PRESENT/PROPOSED) METHOD	Symbol	DISTANCE IN FEET	TIME IN MINUTES		DETAILS OF (PRESENT/PROPOSED) METHOD
1	Remove Patient Chart from rack	Operation		.5	1	
2					2	
3	Open to Graphic sheet data	Operation		.5	3	
4					4	4.5
5	Transcribe vital sign reading from TPR board	Operation		1.5	5	0.2
6					6	N - 4.7 Avg.
7	Observe color code for charting data	Inspection		-	7	
8					8	
9	Extend lines on graph to newest point	Operation		1.5	9	21 - 4.7
10					10	2n - 4.7
11	Observe trend of lines and data	Inspection			11	2o - 4.7
12					12	2r - 1.5
13	Enter any pertinent remarks in Nursing Notes	Operation		2.0	13	
14					14	
15					15	
16	Return Chart to rack	Operation		.5	16	
17					17	
18					18	
19					19	
20					20	
21					21	
22					22	
23					23	
24					24	
25					25	
26					26	

NO. 2D

FORM LMSD 8026B

LOCKHEED MISSILES & SPACE COMPANY PAGE ___ OF ___

FLOW PROCESS CHART

SUMMARY	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
O OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Diabetic Record (Unregulated)

☐ MAN OR ☐ MATERIAL

CHART BEGINS At Nursing Station

CHART ENDS At Nursing Station

CHARTED BY ________ DATE ________

WHY WHAT HOW WHERE WHEN WHO SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

No.	DETAILS OF (PRESENT/PROPOSED) METHOD	Symbol	TIME IN MINUTES
1	Write Medical Order	O (operation)	1.7
2			
3	Nurse prepares form	O (N)	1.5
4			
5	Nurse places form in Patients Chart	O (N)	.6
6			
7	Delay until urine test is required	D	
8			
9	Conduct test	O	
10			
11	Analyze Test	O	
12			
13	Record results of test under "Urine" column of form	O (N)	1.5
14			
15			
16	Record date and hour test was conducted under "Time" column of form	O (N)	1.5
17			
18			
19	Delay until insulin medication is required	D	
20			
21	Give medication	O	
22			
23	Record administration of medication under "Insulin" column of form	O (N)	1.5
24			
25			
26			

No.	DETAILS OF (PRESENT/PROPOSED) METHOD	Symbol	TIME IN MINUTES
1	Record date and hour medication was given under "Time" column of form	O (N)	1.5
2			
3			
4	Record additional events on Form as they occur with the time of occurrence	O (N)	1.5
5			
6			
7	Make entries in other columns if required	O (N)	1.5
8			
9	Nurse repeats cycle until Doctor cancels order	O (N)	X
10			
11			
12	Delay during patient's stay	D	
13			
14	Form with Patient's Chart sent to Medical Records when patient leaves	⇨	
15			
16			
17	D - 1.7		
18	N - 11.1/cycle		
19–26			

FORM LMSD 6926B

NO. 2t

LOCKHEED MISSILES & SPACE ~~COMPANY~~ PAGE ___ OF ___

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB ~~Progress $N_o$tes~~

☐ MAN OR ☐ MATERIAL

CHART BEGINS

CHART ENDS

CHARTED BY ______ DATE ______

WHY WHAT HOW WHERE WHEN WHO SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES		DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Conduct routine rounds	Ⓝ⇨□D▽		–	1		○⇨□D▽		
2		○⇨□D▽			2		○⇨□D▽		
3	Give treatment per M.D. instruction	Ⓝ⇨□D▽			3		○⇨□D▽		
4		○⇨□D▽			4		○⇨□D▽		
5	Answer Patient call bell	Ⓝ⇨□D▽			5		○⇨□D▽		
6		○⇨□D▽			6	N-20	○⇨□D▽		
7	Attend M.D. at Patients bedside	Ⓝ⇨□D▽			7		○⇨□D▽		
8		○⇨□D▽			8		○⇨□D▽		
9		○⇨□D▽			9		○⇨□D▽		
10	Conduct extra tour for special condition	Ⓝ⇨□D▽			10		○⇨□D▽		
11	patient	○⇨□D▽			11		○⇨□D▽		
12		○⇨□D▽			12		○⇨□D▽		
13	Enter observations,	Ⓝ⇨□D▽		20	13		○⇨□D▽		
14	patient condition, response, attitude,	○⇨□D▽			14		○⇨□D▽		
15	complaints or comments in patients chart	○⇨□D▽			15		○⇨□D▽		
16		○⇨□D▽			16		○⇨□D▽		
17		○⇨□D▽			17		○⇨□D▽		
18		○⇨□D▽			18		○⇨□D▽		
19		○⇨□D▽			19		○⇨□D▽		
20		○⇨□D▽			20		○⇨□D▽		
21		○⇨□D▽			21		○⇨□D▽		
22		○⇨□D▽			22		○⇨□D▽		
23		○⇨□D▽			23		○⇨□D▽		
24		○⇨□D▽			24		○⇨□D▽		
25		○⇨□D▽			25		○⇨□D▽		
26		○⇨□D▽			26		○⇨□D▽		

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FORM LMSD 6920B

LOCKHEED MISSILES & SPACE COMPANY

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED	FT.		FT.		FT.	

JOB Pre-Operative Check List

☐ MAN OR ☐ MATERIAL

CHART BEGINS At Nursing Station

CHART ENDS At Nursing Station

CHARTED BY __________ DATE __________

WHY WHAT WHO WHERE WHEN HOW SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES		DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Ward Clerk fills out	○ ⇨ □ D ▽		2.0	1		○ ⇨ □ D ▽		
2	bottom portion of pre-operative check list	○ ⇨ □ D ▽			2		○ ⇨ □ D ▽		
3		○ ⇨ □ D ▽			3	N - 4.6	○ ⇨ □ D ▽		
4	Ward Clerk affixes form	○ ⇨ □ D ▽		.6	4		○ ⇨ □ D ▽		
5	to outside cover of Patient's chart	○ ⇨ □ D ▽			5		○ ⇨ □ D ▽		
6		○ ⇨ □ D ▽			6		○ ⇨ □ D ▽		
7	Ward Clerk checks off	○ ⇨ □ D ▽		2.0	7		○ ⇨ □ D ▽		
8	pre-operative require-ments as they are com-	○ ⇨ □ D ▽			8		○ ⇨ □ D ▽		
9	pleted	○ ⇨ □ D ▽			9		○ ⇨ □ D ▽		
10	Patient and Chart with	○ ⇨ □ D ▽			10		○ ⇨ □ D ▽		
11	Form on Outside of Chart sent to Surgery	○ ⇨ □ D ▽			11		○ ⇨ □ D ▽		
12		○ ⇨ □ D ▽			12		○ ⇨ □ D ▽		
13	Delay during patient's	○ ⇨ □ D ▽			13		○ ⇨ □ D ▽		
14	operation	○ ⇨ □ D ▽			14		○ ⇨ □ D ▽		
15	Receive Patient and	○ ⇨ □ D ▽			15		○ ⇨ □ D ▽		
16	Chart with Form inside Chart from Surgery	○ ⇨ □ D ▽			16		○ ⇨ □ D ▽		
17		○ ⇨ □ D ▽			17		○ ⇨ □ D ▽		
18	Delay during patient's	○ ⇨ □ D ▽			18		○ ⇨ □ D ▽		
19	stay	○ ⇨ □ D ▽			19		○ ⇨ □ D ▽		
20	Form with Chart sent to	○ ⇨ □ D ▽			20		○ ⇨ □ D ▽		
21	Medical Records when patient leaves	○ ⇨ □ D ▽			21		○ ⇨ □ D ▽		
22		○ ⇨ □ D ▽			22		○ ⇨ □ D ▽		
23		○ ⇨ □ D ▽			23		○ ⇨ □ D ▽		
24		○ ⇨ □ D ▽			24		○ ⇨ □ D ▽		
25		○ ⇨ □ D ▽			25		○ ⇨ □ D ▽		
26		○ ⇨ □ D ▽			26		○ ⇨ □ D ▽		

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LOCKHEED MISSILES & SPACE COMPANY PAGE ___ OF ___

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED	FT.		FT.		FT.	

JOB Pre-Operative Check List

☐ MAN OR ☐ MATERIAL

CHART BEGINS Surgery Scheduling Desk

CHART ENDS Surgery Scheduling Desk

CHARTED BY ___ DATE ___

WHY WHAT? WHO? WHERE? WHEN? HOW? SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

No.	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Receive Pre-Op Check	○ (marked)		.5
2	List with Patient's Chart from Nursing			
3	Station			
4	Review Chart for com-	□ (marked)		1.0
5	pleteness of information			
6	If some information is	□ (marked)		2.0
7	missing refer to check list for further info.			
8				
9	Call proper Nursing	○ (marked)		1.2
10	Station to get error - if any - corrected			
11				
12	File Check List in	▽ (marked)		.6
13	Chart			
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				

No.	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1				
2	N - 5.3			
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				

NO. 2y

FORM LMSD 8926B

LOCKHEED MISSILES & SPACE COMPANY PAGE ___ OF ___

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED	FT.		FT.		FT.	

JOB Request for Professional Consulting

☐ MAN OR ☐ MATERIAL

CHART BEGINS

CHART ENDS

CHARTED BY ______ DATE ______

DETAILS OF (PRESENT/PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES	DETAILS OF (PRESENT/PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1 Write Med Order	○⇨□D▽		1.7	1	○⇨□D▽		
2	○⇨□D▽			2	○⇨□D▽		
3 Transcribe M/O to patients records	○⇨□D▽		1.5	3 N-6.4	○⇨□D▽		
4	○⇨□D▽			4	○⇨□D▽		
5 Stamp consulting form with patients ID	○⇨□D▽		.7	5	○⇨□D▽		
6	○⇨□D▽			6	○⇨□D▽		
7 Prepare form	○⇨□D▽		1.7	7	○⇨□D▽		
8	○⇨□D▽			8	○⇨□D▽		
9 Retain one copy, dispatch forms	○⇨□D▽		—	9	○⇨□D▽		
10	○⇨□D▽			10	○⇨□D▽		
11	○⇨□D▽			11	○⇨□D▽		
12 Wait for schedule	○⇨□D▽		—	12	○⇨□D▽		
13	○⇨□D▽			13	○⇨□D▽		
14 Enter schedule data on form	○⇨□D▽		.5	14	○⇨□D▽		
15	○⇨□D▽			15	○⇨□D▽		
16 Enter consulting data and future treatment schedules on form	○⇨□D▽		1.5	16	○⇨□D▽		
17	○⇨□D▽			17	○⇨□D▽		
18	○⇨□D▽			18	○⇨□D▽		
19 Post to Patient Chart	○⇨□D▽		.5	19	○⇨□D▽		
20	○⇨□D▽			20	○⇨□D▽		
21	○⇨□D▽			21	○⇨□D▽		
22	○⇨□D▽			22	○⇨□D▽		
23	○⇨□D▽			23	○⇨□D▽		
24	○⇨□D▽			24	○⇨□D▽		
25	○⇨□D▽			25	○⇨□D▽		
26	○⇨□D▽			26	○⇨□D▽		

FORM LMSD 8028B

NO. 3a

LOCKHEED MISSILES & SPACE COMPANY PAGE __ OF __

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
O OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Radiologist Consulting Report

☐ MAN OR ☐ MATERIAL

CHART BEGINS

CHART ENDS

CHARTED BY ______ DATE ______

WHY? WHAT? HOW? WHERE? WHEN? WHO? SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES		DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Receive Report	O ⇨ □ D ▽		.5	1		O ⇨ □ D ▽		
2		O ⇨ □ D ▽			2		O ⇨ □ D ▽		
3	Note receipt on patient monitoring forms-chart,	O ⇨ □ D ▽		2.7	3		O ⇨ □ D ▽		
4	kardex, Request	O ⇨ □ D ▽			4	N - 7.4	O ⇨ □ D ▽		
5		O ⇨ □ D ▽			5		O ⇨ □ D ▽		
6	Bind report in patient chart	O ⇨ □ D ▽		2.0	6		O ⇨ □ D ▽		
7		O ⇨ □ D ▽			7		O ⇨ □ D ▽		
8	Notify M.D. of receipt	O ⇨ □ D ▽		.5	8		O ⇨ □ D ▽		
9		O ⇨ □ D ▽			9		O ⇨ □ D ▽		
10	Note receipt in Nursing Notes	O ⇨ □ D ▽		1.7	10		O ⇨ □ D ▽		
11		O ⇨ □ D ▽			11		O ⇨ □ D ▽		
12		O ⇨ □ D ▽			12		O ⇨ □ D ▽		
13		O ⇨ □ D ▽			13		O ⇨ □ D ▽		
14		O ⇨ □ D ▽			14		O ⇨ □ D ▽		
15		O ⇨ □ D ▽			15		O ⇨ □ D ▽		
16		O ⇨ □ D ▽			16		O ⇨ □ D ▽		
17		O ⇨ □ D ▽			17		O ⇨ □ D ▽		
18		O ⇨ □ D ▽			18		O ⇨ □ D ▽		
19		O ⇨ □ D ▽			19		O ⇨ □ D ▽		
20		O ⇨ □ D ▽			20		O ⇨ □ D ▽		
21		O ⇨ □ D ▽			21		O ⇨ □ D ▽		
22		O ⇨ □ D ▽			22		O ⇨ □ D ▽		
23		O ⇨ □ D ▽			23		O ⇨ □ D ▽		
24		O ⇨ □ D ▽			24		O ⇨ □ D ▽		
25		O ⇨ □ D ▽			25		O ⇨ □ D ▽		
26		O ⇨ □ D ▽			26		O ⇨ □ D ▽		

NO. 3d-e

LOCKHEED MISSILES & SPACE COMPANY PAGE ___ OF ___

FORM LMSD 8024B

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
O OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB In-Patient EEG and EKG Order

□ MAN OR □ MATERIAL

CHART BEGINS At Nursing Station

CHART ENDS At Nursing Station

CHARTED BY ______ DATE ______

WHY WHAT? WHO? WHERE? WHEN? HOW? SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1 Write Medical Order	O ⇨ □ D ▽		1.17	1	O ⇨ □ D ▽		
2	O ⇨ □ D ▽			2	O ⇨ □ D ▽		
3 Transcribe to Kardex	O ⇨ □ D ▽		.42	3	O ⇨ □ D ▽		
4	O ⇨ □ D ▽			4	O ⇨ □ D ▽		
5 Prepare EEG Request or EKG Request	O ⇨ □ D ▽		1.37	5	O ⇨ □ D ▽		
6	O ⇨ □ D ▽			6	O ⇨ □ D ▽		
7 Prepare patient Charge Ticket	O ⇨ □ D ▽		1.75	7	O ⇨ □ D ▽		
8	O ⇨ □ D ▽			8	O ⇨ □ D ▽		
9 Stamp Charge Ticket Using Addressograph	O ⇨ □ D ▽			9	O ⇨ □ D ▽		
10 Plate	O ⇨ □ D ▽			10	O ⇨ □ D ▽		
11	O ⇨ □ D ▽			11	O ⇨ □ D ▽		
12 File one copy (organge) of Charge Ticket	O ⇨ □ D ▽			12	O ⇨ □ D ▽		
13	O ⇨ □ D ▽			13	O ⇨ □ D ▽		
14 Attach two copies of Charge Ticket to Request	O ⇨ □ D ▽		.10	14	O ⇨ □ D ▽		
15 Form	O ⇨ □ D ▽			15	O ⇨ □ D ▽		
16	O ⇨ □ D ▽			16	O ⇨ □ D ▽		
17 Transmit Charge Ticket and Request Form to	O ⇨ □ D ▽		.20	17	O ⇨ □ D ▽		
18 EKG Dept.	O ⇨ □ D ▽			18	O ⇨ □ D ▽		
19	O ⇨ □ D ▽			19	O ⇨ □ D ▽		
20 Wait for Results	O ⇨ □ D ▽		-	20	O ⇨ □ D ▽		
21	O ⇨ □ D ▽			21	O ⇨ □ D ▽		
22 Receive Results	O ⇨ □ D ▽		.30	22	O ⇨ □ D ▽		
23	O ⇨ □ D ▽			23	O ⇨ □ D ▽		
24 File Results - In Chart	O ⇨ □ D ▽		.15	24	O ⇨ □ D ▽		
25	O ⇨ □ D ▽			25	O ⇨ □ D ▽		
26	O ⇨ □ D ▽			26	O ⇨ □ D ▽		

NO. 3g - 3h

FORM LMSD 6926B

LOCKHEED MISSILES & SPACE COMPANY PAGE ___ OF ___

FLOW PROCESS CHART

SUMMARY	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
O OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Specimen for Pathologic Examination

□ MAN OR □ MATERIAL

CHART BEGINS Surgery Schedule Desk

CHART ENDS Surgery Schedule Desk

CHARTED BY ______________ DATE ______________

	DETAILS OF (PRESENT / PROPOSED) METHOD	DISTANCE IN FEET	TIME IN MINUTES		DETAILS OF (PRESENT / PROPOSED) METHOD	DISTANCE IN FEET	TIME IN MINUTES
1	Stamp Patient's name on form using addressograph		.7	1			
2	plate			2	N - 1.7 always		
3				3	N - 5.2 spec		
4	Put specimen form with other forms and chart			4	N - 2.1 no spec		
5	until case comes up			5			
6				6	N - 5.5 avg.		
7	Take form into Operat-ing Room along with		10	7			
8	Chart and other forms			8			
9				9			
10	Delay (until case is completed)			10			
11				11			
12	If a tissue specimen - Circulating fills out		4.0	12			
13	form			13			
14				14			
15	Accumulate forms and specimens		.6	15			
16				16			
17	Deliver accumulated forms and specimens			17			
18	to Laboratory			18			
19				19			
20	If no tissue specimen Nurse writes "None		1.5	20			
21	and signs form			21			
22				22			
23	File form with "None" on it in Patient's		.6	23			
24	Chart			24			
25				25			
26				26			

NO. 4b
PAGE ___ OF ___

LOCKHEED MISSILES & SPACE COMPANY

FLOW PROCESS CHART

FORM LMSD 6026B

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB: Permission Record

□ MAN OR □ MATERIAL

CHART BEGINS: Emergency Room

CHART ENDS: Emergency Room

CHARTED BY ________ DATE ________

WHY? WHAT? HOW? WHERE? WHEN? WHO? SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

#	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES	#	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Fill out Form for proper Permission -	○⇨□D▽		1.7	1		○⇨□D▽		
2	Date and Time prepared	○⇨□D▽			2		○⇨□D▽		
3		○⇨□D▽			3	N-2.2	○⇨□D▽		
4	Patient or Guardian signs form	○⇨□D▽		.5	4		○⇨□D▽		
5		○⇨□D▽			5		○⇨□D▽		
6	Form goes with Patient to be filed in Chart	○⇨□D▽			6		○⇨□D▽		
7		○⇨□D▽			7		○⇨□D▽		
8		○⇨□D▽			8		○⇨□D▽		
9		○⇨□D▽			9		○⇨□D▽		
10		○⇨□D▽			10		○⇨□D▽		
11		○⇨□D▽			11		○⇨□D▽		
12		○⇨□D▽			12		○⇨□D▽		
13		○⇨□D▽			13		○⇨□D▽		
14		○⇨□D▽			14		○⇨□D▽		
15		○⇨□D▽			15		○⇨□D▽		
16		○⇨□D▽			16		○⇨□D▽		
17		○⇨□D▽			17		○⇨□D▽		
18		○⇨□D▽			18		○⇨□D▽		
19		○⇨□D▽			19		○⇨□D▽		
20		○⇨□D▽			20		○⇨□D▽		
21		○⇨□D▽			21		○⇨□D▽		
22		○⇨□D▽			22		○⇨□D▽		
23		○⇨□D▽			23		○⇨□D▽		
24		○⇨□D▽			24		○⇨□D▽		
25		○⇨□D▽			25		○⇨□D▽		
26		○⇨□D▽			26		○⇨□D▽		

FORM LMSC 8829B

LOCKHEED MISSILES & SPACE COMPANY

FLOW PROCESS CHART

NO. 4a

PAGE 1 OF 2

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB: In-Patient Medication Cards

☐ MAN OR ☐ MATERIAL

CHART BEGINS: At Nursing Station

CHART ENDS: At Nursing Station

CHARTED BY ______ DATE ______

No.	DETAILS OF (PRESENT/PROPOSED) METHOD	DISTANCE IN FEET	TIME IN MINUTES
1	Write Medical Order		1.7
2			
3	Transcribe to Kardex		1.5
4			
5	Prepare Medication Card		1.7
6			
7	Stamp Charge Ticket		1.7
8	by filling in required Drug or Medicine		
9			
10	Pull and retain copy		.5
11	of Charge Ticket at Nursing Station		
12			
13	Take balance of Charge		
14	Ticket to Pharmacy		
15	Delay while order is		
16	filled		
17	Return to Nursing		
18	Station with drugs		
19	If STAT - Nurse takes		
20	medication card and medication to patient's		
21	room		
22	Medication administered		
23			
24	Nurse returns to Nurs-		
25	ing Station with form		
26			

No.	DETAILS OF (PRESENT/PROPOSED) METHOD	DISTANCE IN FEET	TIME IN MINUTES
1	Administration of med-		1.5
2	ication recorded in patient's chart & kardex		
3			
4	Medication Card		.2
5	destroyed		
6	If Pre-OP - Nurse		
7	places medication card in medication card rack		.6
8			
9	Delay until medication		
10	is required		
11	Nurse takes form and		1.0
12	medication to Patient's room		
13			
14	Medication administered		
15			
16	Nurse returns to		
17	Nursing Station with form		
18			
19	Administration of med-		1.5
20	ication recorded in patient's chart & kardex		
21			.2
22	Medication card des-		
23	troyed		
24	If PRN, Timed or Bedtime		
25	Nurse places forms 1		.6
26	2 or 3 in medication card rack		

NO. 4d
PAGE 2 OF 2

FORM LMSD 80268

LOCKHEED MISSILES & SPACE COMPANY

FLOW PROCESS CHART

SUMMARY	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED	FT.		FT.		FT.	

JOB In-Patient Medication Cards

☐ MAN OR ☐ MATERIAL

CHART BEGINS At Nursing Station

CHART ENDS At Nursing Station

CHARTED BY ____ DATE ____

	DETAILS OF (PRESENT/PROPOSED) METHOD	Symbol	DISTANCE IN FEET	TIME IN MINUTES		DETAILS OF (PRESENT/PROPOSED) METHOD
1	Delay until medication is required	D			1	All Meds
2					2	D - 1.7
3	Nurse takes form and medication to patient's room	○			3	N - 5.4
4					4	Stat
5					5	N - 1.7
6	Medication administered	○			6	Pre-Op
7					7	N - 3.3
8	Nurse returns to Nursing Station with Form 1, 2, or 3	⇨			8	PRN or Timed
9					9	N - 4.4
10					10	
11	Administration of medication recorded in patient's chart and kardex	N		3.0	11	
12					12	Avg - All Meds
13					13	D - 1.7
14	Medication cards 1, 2 or 3 replaced in Medication Card Rack	N		.6	14	N - 9.6
15					15	
16					16	
17	Delay during patient's stay	D			17	
18					18	
19	Nurse discards forms when medication is stopped or when patient leaves	N		.2	19	
20					20	
21					21	
22					22	
23					23	
24					24	
25					25	
26					26	

NO. 4e

FORM LMSD 6926B

LOCKHEED MISSILES & SPACE COMPANY PAGE ___ OF ___

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Nursing Care Plan

□ MAN OR □ MATERIAL

CHART BEGINS

CHART ENDS

CHARTED BY ______ DATE ______

WHY? WHAT? HOW? WHERE? WHEN? WHO? SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Return to N/S from admitting patient	○⇨□D▽		–
2		○⇨□D▽		
3	Review patient out-standing M/O and M.D.'s instruction	○⇨□D▽		3.2
4		○⇨□D▽		
5		○⇨□D▽		
6	Initiate care plan based on M.D. orders and associated nursing routines	○⇨□D▽		16.5
7		○⇨□D▽		
8		○⇨□D▽		
9		○⇨□D▽		
10	Formalize care plan on kardex	○⇨□D▽		3.0
11		○⇨□D▽		
12	Enter treatments, medications, tests and care ordered by physician	○⇨□D▽		–
13		○⇨□D▽		
14		○⇨□D▽		
15		○⇨□D▽		
16	Patient is discharged	○⇨□D▽		
17		○⇨□D▽		
18	Place Kardex with Patient Chart in Discharge envelope	○⇨□D▽		
19		○⇨□D▽		
20		○⇨□D▽		
21		○⇨□D▽		
22		○⇨□D▽		
23		○⇨□D▽		
24		○⇨□D▽		
25		○⇨□D▽		
26		○⇨□D▽		

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1		○⇨□D▽		
2		○⇨□D▽		
3		○⇨□D▽		
4		○⇨□D▽		
5	N-16.5	○⇨□D▽		
6		○⇨□D▽		
7		○⇨□D▽		
8		○⇨□D▽		
9		○⇨□D▽		
10		○⇨□D▽		
11		○⇨□D▽		
12		○⇨□D▽		
13		○⇨□D▽		
14		○⇨□D▽		
15		○⇨□D▽		
16		○⇨□D▽		
17		○⇨□D▽		
18		○⇨□D▽		
19		○⇨□D▽		
20		○⇨□D▽		
21		○⇨□D▽		
22		○⇨□D▽		
23		○⇨□D▽		
24		○⇨□D▽		
25		○⇨□D▽		
26		○⇨□D▽		

FORM LMSD 8024B

LOCKHEED MISSILES & SPACE COMPANY

FLOW PROCESS CHART

NO. 4f
PAGE 1 OF 3

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
O OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED	FT.		FT.		FT.	

JOB Request for Transfusion

□ MAN OR □ MATERIAL

CHART BEGINS At Nursing Station

CHART ENDS At Nursing Station

CHARTED BY ______ DATE ______

WHY WHAT WHEN WHERE WHO HOW SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION TRANSPORT INSPECTION DELAY STORAGE	DISTANCE IN FEET	TIME IN MINUTES		DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION TRANSPORT INSPECTION DELAY STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Write Medical Order	O ⇨ □ D ▽		1.7	1	Dr. - 1.7	O ⇨ □ D ▽		
2		O ⇨ □ D ▽			2	N - 10.5 to Xfusion	O ⇨ □ D ▽		
3	Transcribe to Kardex	O ⇨ □ D ▽		1.5	3	N - 11.5 Routine	O ⇨ □ D ▽		
4		O ⇨ □ D ▽			4	N - 4.3 Good Xfusion	O ⇨ □ D ▽		
5	Nurse stamps form with	O ⇨ □ D ▽		.7	5	Avg. N - 14.5	O ⇨ □ D ▽		
6	addressograph plate	O ⇨ □ D ▽			6		O ⇨ □ D ▽		
7	Nurse fills out form	O ⇨ □ D ▽		4.0	7		O ⇨ □ D ▽		
8	through History portion	O ⇨ □ D ▽			8		O ⇨ □ D ▽		
9		O ⇨ □ D ▽			9		O ⇨ □ D ▽		
10	Form delivered to	O ⇨ □ D ▽			10		O ⇨ □ D ▽		
11	Laboratory	O ⇨ □ D ▽			11		O ⇨ □ D ▽		
12	Delay while Laboratory	O ⇨ □ D ▽			12		O ⇨ □ D ▽		
13	checks the availability of the required blood	O ⇨ □ D ▽			13		O ⇨ □ D ▽		
14	type	O ⇨ □ D ▽			14		O ⇨ □ D ▽		
15	Receive copy of Form	O ⇨ □ D ▽		.5	15		O ⇨ □ D ▽		
16	from Laboratory when Blood is available	O ⇨ □ D ▽			16		O ⇨ □ D ▽		
17		O ⇨ □ D ▽			17		O ⇨ □ D ▽		
18	Copy of form is affixed	O ⇨ □ D ▽		.8	18		O ⇨ □ D ▽		
19	on page in patient's chart	O ⇨ □ D ▽			19		O ⇨ □ D ▽		
20		O ⇨ □ D ▽			20		O ⇨ □ D ▽		
21	Delay while Doctor	O ⇨ □ D ▽			21		O ⇨ □ D ▽		
22	checks and verifies blood type available	O ⇨ □ D ▽			22		O ⇨ □ D ▽		
23		O ⇨ □ D ▽			23		O ⇨ □ D ▽		
24	Nurse receives blood	O ⇨ □ D ▽		.5	24		O ⇨ □ D ▽		
25	and copies of form from Laboratory	O ⇨ □ D ▽			25		O ⇨ □ D ▽		
26		O ⇨ □ D ▽			26		O ⇨ □ D ▽		

FORM LMSD 8826B

NO. 4f

LOCKHEED MISSILES & SPACE COMPANY

PAGE 2 OF 3

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Request for Transfusion

☐ MAN OR ☐ MATERIAL

CHART BEGINS At Nursing Station

CHART ENDS At Nursing Station

CHARTED BY ____________ DATE ____________

WHY? WHAT? HOW? WHERE? WHEN? WHO? SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION TRANSPORT INSPECTION DELAY STORAGE	DISTANCE IN FEET	TIME IN MINUTES		DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION TRANSPORT INSPECTION DELAY STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Blood and forms are	○⇨□D▽		1.0	1		○⇨□D▽		
2	double checked and verified at bed-site	○⇨□D▽			2		○⇨□D▽		
3		○⇨□D▽			3		○⇨□D▽		
4	Nurse completes "Pre-	○⇨□D▽		1.5	4		○⇨□D▽		
5	transfusion" portion of form	○⇨□D▽			5		○⇨□D▽		
6		○⇨□D▽			6		○⇨□D▽		
7	Delay while transfusion	○⇨□D▽			7		○⇨□D▽		
8	is done	○⇨□D▽			8		○⇨□D▽		
9	If Tranfusion Reaction	○⇨□D▽			9		○⇨□D▽		
10	Occurs:	○⇨□D▽			10		○⇨□D▽		
11	Nurse stops transfusion	○⇨□D▽			11		○⇨□D▽		
12		○⇨□D▽			12		○⇨□D▽		
13	Nurse fills out Report	○⇨□D▽		38	13		○⇨□D▽		
14	of transfusion reaction	○⇨□D▽			14		○⇨□D▽		
15		○⇨□D▽			15		○⇨□D▽		
16	Nurse completes bottom	○⇨□D▽		1.5	16		○⇨□D▽		
17	secion of Request for Transfusion Form	○⇨□D▽			17		○⇨□D▽		
18		○⇨□D▽			18		○⇨□D▽		
19	Place copy of	○⇨□D▽		.8	19		○⇨□D▽		
20	in Patient's chart	○⇨□D▽			20		○⇨□D▽		
21	Form copy of	○⇨□D▽			21		○⇨□D▽		
22	and transfusion kit taken to Laboratory	○⇨□D▽			22		○⇨□D▽		
23		○⇨□D▽			23		○⇨□D▽		
24	If Transfusion is Good	○⇨□D▽			24		○⇨□D▽		
25	Nurse completes bottom	○⇨□D▽		1.5	25		○⇨□D▽		
26	portion of Form	○⇨□D▽			26		○⇨□D▽		

FORM LMSD 8920B

NO. 4f
PAGE 3 OF 3

LOCKHEED MISSILES & SPACE COMPANY

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Request for Transfusion

□ MAN OR □ MATERIAL

CHART BEGINS At Nursing Station

CHART ENDS At Nursing Station

CHARTED BY DATE

WHY WHAT? HOW? WHERE? WHEN? WHO? SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

	DETAILS OF (PRESENT / PROPOSED)	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Copy of Form placed in Patient's	○⇨□D▽		.8
2	Chart	○⇨□D▽		
3		○⇨□D▽		
4	Copy of Form and	○⇨□D▽		
5	empty blood container taken to Laboratory	○⇨□D▽		
6		○⇨□D▽		
7	Delay during Patient's	○⇨□D▽		
8	stay	○⇨□D▽		
9		○⇨□D▽		
10	Form with Patients	○⇨□D▽		2.0
11	Chart sent to Medical Records after Patient	○⇨□D▽		
12	leaves	○⇨□D▽		
13		○⇨□D▽		
14		○⇨□D▽		
15		○⇨□D▽		
16		○⇨□D▽		
17		○⇨□D▽		
18		○⇨□D▽		
19		○⇨□D▽		
20		○⇨□D▽		
21		○⇨□D▽		
22		○⇨□D▽		
23		○⇨□D▽		
24		○⇨□D▽		
25		○⇨□D▽		
26		○⇨□D▽		

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1		○⇨□D▽		
2		○⇨□D▽		
3		○⇨□D▽		
4		○⇨□D▽		
5		○⇨□D▽		
6		○⇨□D▽		
7		○⇨□D▽		
8		○⇨□D▽		
9		○⇨□D▽		
10		○⇨□D▽		
11		○⇨□D▽		
12		○⇨□D▽		
13		○⇨□D▽		
14		○⇨□D▽		
15		○⇨□D▽		
16		○⇨□D▽		
17		○⇨□D▽		
18		○⇨□D▽		
19		○⇨□D▽		
20		○⇨□D▽		
21		○⇨□D▽		
22		○⇨□D▽		
23		○⇨□D▽		
24		○⇨□D▽		
25		○⇨□D▽		
26		○⇨□D▽		

FORM LMSD 80260

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LOCKHEED MISSILES & SPACE COMPANY

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Anesthesia Drug and Supply List

□ MAN OR □ MATERIAL

CHART BEGINS Surgery Scheduling Desk

CHART ENDS Surgery Scheduling Desk

CHARTED BY ______ DATE ______

	DETAILS OF (PRESENT/PROPOSED) METHOD	Symbol	Distance in feet	Time in minutes		DETAILS OF (PRESENT/PROPOSED) METHOD	Symbol	Distance in feet	Time in minutes
1	Stamp Patient's Name on List using addressograph plate	Operation		.7	1	Delay (while Charge Ticket prepared)	Delay		
2		Transport			2		Inspection		
3		Inspection			3	Staple List to 1st copy of Data Sheet	Operation		.8
4	Put list with other forms and patient's chart until case comes up	Delay			4				
5		Inspection			5				
6		Transport			6				
7	Take list into Operating Room along with Chart and other forms	Transport		1.0	7				
8		Transport			8				
9		Operation			9	D- 9.8			
10	Anestheiologist fills out form all during case	Operation		8.8	10	N- 4.5			
11		Operation			11				
12		Operation			12				
13	After case is completed return list to Surgery Scheduling Desk	Transport		1.0	13				
14		Transport			14				
15		Inspection			15				
16	Delay (Working with Data Sheet and Charge Ticket)	Delay			16				
17		Delay			17				
18		Inspection			18				
19	Review List (along with Data Sheet) to prepare Charge Ticket for drugs used	Inspection		1.0	19				
20		Inspection			20				
21		Delay			21				
22	Delay (while Charge Ticket prepared)	Delay			22				
23		Inspection			23				
24	Review List (along with Data Sheets) to prepare Charge Ticket for supplies used	Inspection		1.0	24				
25		Inspection			25				
26		Delay			26				

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LOCKHEED MISSILES & SPACE COMPANY PAGE ___ OF ___

FLOW PROCESS CHART

FORM LMSD 8926B

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Medications & Treatment Record

□ MAN OR □ MATERIAL

CHART BEGINS Nursing Station

CHART ENDS Nursing Station

CHARTED BY ______ DATE ______

	DETAILS OF (PRESENT / PROPOSED) METHOD	DISTANCE IN FEET	TIME IN MINUTES		DETAILS OF (PRESENT / PROPOSED) METHOD	DISTANCE IN FEET	TIME IN MINUTES
1	M.D. writes order		1.7	1	Summarize treatment, patients reaction, and unusual event in nursing notes		3.4
2				2			
3	R.N. reviews M/O and signs off		.5	3			
4				4			
5	Collect equipment and supplies necessary for procedure		—	5			
6				6	MO - 1.7		
7				7	N - 5.2		
8	Move to patients bed		—	8			
9				9			
10	Administer treatment, therapy, procedure		—	10			
11				11			
12	Observe patients reaction and response			12			
13				13			
14	Conclude treatment and leave patient comfortable			14			
15				15			
16				16			
17	Return to N/S			17			
18				18			
19	Dispose of soiled or used material			19			
20				20			
21	Enter treatment in record per procedures		1.7	21			
22				22			
23	Note unusual event			23			
24				24			
25				25			
26				26			

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FORM LMSD 8920B

LOCKHEED MISSILES & SPACE COMPANY

NO. ______ PAGE 1 OF 2

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Intravenous Solution Record

☐ MAN OR ☐ MATERIAL

CHART BEGINS At Nursing Station

CHART ENDS At Nursing Station

CHARTED BY ______ DATE ______

WHY? WHAT? HOW? WHERE? WHEN? WHO? SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

	DETAILS OF (PRESENT / PROPOSED) METHOD	DISTANCE IN FEET	TIME IN MINUTES
1	Write Medical Order		1.7
2			
3	Transcribe order to		1.5
4	Kardex		
5	Stamp Intravenous Solu-		.7
6	tion record form with patient's addressograph		
7	plate		
8	Place form in Patient's		.6
9	Chart		
10	Stamp Charge Ticket		.7
11	with Patient's address- ograph plate		
12			
13	Fill out Charge Ticket		1.7
14	listing required type of intravenous solution		
15			
16	Pull and retain copy of		1.5
17	charge ticket at Nursing Station		
18			
19	Take remainder of		
20	Charge Ticket to Central Supply		
21			
22	Delay while order is		
23	filled		
24	Return to Nursing Sta-		
25	tion with I.V. solution ~~but not with Charge~~		
26	Ticket		

	DETAILS OF (PRESENT / PROPOSED) METHOD	DISTANCE IN FEET	TIME IN MINUTES
1	Take I.V. solution to		
2	Patient's room		
3	Administer solution		
4			
5	Nurse checks progress		
6	of I.V. solution each hour		
7			
8	Data recorded on form		8.8
9	hourly regarding solu- tion; amt. added; drops		
10	per minute; cc's absorb- ed; and running cc total		
11			
12	Nurse initials form		1.5
13	hourly and records any necessary comments		
14			
15	Cycle is continued until		X
16	Doctor cancels order		
17	Doctor cancels order		1.7
18			
19	Delay during patient's		
20	stay		
21	Form with Patient's		
22	Chart sent to Medical Records when patient		
23	leaves		
24	Patient's Kardex Card		.2
25	destroyed after patient leaves		
26			

FORM LMSD 6026D

LOCKHEED ~~MISSILES & SPACE~~ COMPANY

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NO. ______ PAGE 2 OF 2

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
O OPERATIONS						
⇨ TRANSPORTATIONS						
☐ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Intravenous Solution Record

☐ MAN OR ☐ MATERIAL

CHART BEGINS At Nursing Station

CHART ENDS At Nursing Station

CHARTED BY ______ DATE ______

DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1 Copies of Patient's Charge Tickets destroyed	○⇨☐D▽		.2
2 after patient leaves	○⇨☐D▽		
3	○⇨☐D▽		
4 Retain Patient's addressograph plate for 24	○⇨☐D▽		
5 hours after patient leaves	○⇨☐D▽		
6	○⇨☐D▽		
7 Patient's addressograph plate destroyed	○⇨☐D▽		.2
8	○⇨☐D▽		
9	○⇨☐D▽		
10	○⇨☐D▽		
11	○⇨☐D▽		
12	○⇨☐D▽		
13	○⇨☐D▽		
14	○⇨☐D▽		
15	○⇨☐D▽		
16	○⇨☐D▽		
17	○⇨☐D▽		
18	○⇨☐D▽		
19	○⇨☐D▽		
20	○⇨☐D▽		
21	○⇨☐D▽		
22	○⇨☐D▽		
23	○⇨☐D▽		
24	○⇨☐D▽		
25	○⇨☐D▽		
26	○⇨☐D▽		

DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1 D - 1.7(2) 3.4	○⇨☐D▽		
2 N - 18.6/cycle	○⇨☐D▽		
3	○⇨☐D▽		
4	○⇨☐D▽		
5	○⇨☐D▽		
6	○⇨☐D▽		
7	○⇨☐D▽		
8	○⇨☐D▽		
9	○⇨☐D▽		
10	○⇨☐D▽		
11	○⇨☐D▽		
12	○⇨☐D▽		
13	○⇨☐D▽		
14	○⇨☐D▽		
15	○⇨☐D▽		
16	○⇨☐D▽		
17	○⇨☐D▽		
18	○⇨☐D▽		
19	○⇨☐D▽		
20	○⇨☐D▽		
21	○⇨☐D▽		
22	○⇨☐D▽		
23	○⇨☐D▽		
24	○⇨☐D▽		
25	○⇨☐D▽		
26	○⇨☐D▽		

NO. 4m

FORM LMSD 69268

LOCKHEED MISSILES & SPACE COMPANY

PAGE ___ OF ___

FLOW PROCESS CHART

JOB Parenteral Fluid Sheet

☐ MAN OR ☐ MATERIAL

CHART BEGINS Nursing Unit

CHART ENDS Nursing Unit

CHARTED BY ______________ DATE ______

WHY WHAT WHERE WHEN WHO HOW — SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
O OPERATIONS						
⇨ TRANSPORTATIONS						
☐ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED	FT.		FT.		FT.	

DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1 Med Order written	O ⇨ ☐ D ▽		1.7	1	O ⇨ ☐ D ▽		
2	O ⇨ ☐ D ▽			2	O ⇨ ☐ D ▽		
3 Enter type of fluid, ~~amount, meds added,~~	O ⇨ ☐ D ▽		2.0	3 MD-1.7	O ⇨ ☐ D ▽		
4 date and hour started	O ⇨ ☐ D ▽			4 N-5.7	O ⇨ ☐ D ▽		
5	O ⇨ ☐ D ▽			5	O ⇨ ☐ D ▽		
6 Administer fluid	O ⇨ ☐ D ▽		—	6	O ⇨ ☐ D ▽		
7	O ⇨ ☐ D ▽			7	O ⇨ ☐ D ▽		
8 Enter amount infused, date and hour completed	O ⇨ ☐ D ▽		2.0	8	O ⇨ ☐ D ▽		
9	O ⇨ ☐ D ▽			9	O ⇨ ☐ D ▽		
10	O ⇨ ☐ D ▽			10	O ⇨ ☐ D ▽		
11 Bind into patient chart	O ⇨ ☐ D ▽		1.7	11	O ⇨ ☐ D ▽		
12	O ⇨ ☐ D ▽			12	O ⇨ ☐ D ▽		
13 Post to I/O Sheet	O ⇨ ☐ D ▽		—	13	O ⇨ ☐ D ▽		
14	O ⇨ ☐ D ▽			14	O ⇨ ☐ D ▽		
15 One sheet each infusion	O ⇨ ☐ D ▽		X	15	O ⇨ ☐ D ▽		
16	O ⇨ ☐ D ▽			16	O ⇨ ☐ D ▽		
17	O ⇨ ☐ D ▽			17	O ⇨ ☐ D ▽		
18	O ⇨ ☐ D ▽			18	O ⇨ ☐ D ▽		
19	O ⇨ ☐ D ▽			19	O ⇨ ☐ D ▽		
20	O ⇨ ☐ D ▽			20	O ⇨ ☐ D ▽		
21	O ⇨ ☐ D ▽			21	O ⇨ ☐ D ▽		
22	O ⇨ ☐ D ▽			22	O ⇨ ☐ D ▽		
23	O ⇨ ☐ D ▽			23	O ⇨ ☐ D ▽		
24	O ⇨ ☐ D ▽			24	O ⇨ ☐ D ▽		
25	O ⇨ ☐ D ▽			25	O ⇨ ☐ D ▽		
26	O ⇨ ☐ D ▽			26	O ⇨ ☐ D ▽		

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LOCKHEED MISSILES & SPACE COMPANY

PAGE 1 OF 2

FORM LMSD 80260

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
O OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Anti-Coagulant Sheet

□ MAN OR □ MATERIAL

CHART BEGINS At Nursing Station

CHART ENDS At Nursing Station

CHARTED BY ______ DATE ______

DETAILS OF (PRESENT / PROPOSED) METHOD	TIME IN MINUTES
1 Write Medical Order	1.7
2	
3 Write order for blood test	-
4	
5 Nurse prepares form	1.7
6	
7 Nurse places form in patient's chart	.5
8	
9 Transcribe Doctor's orders to kardex (Rand) card	1.7
10	
11	
12 Prepare medication cards	1.7
13	
14 Prepare patient charge ticket for medication	1.7
15	
16 Pull and retain copy of patient's charge ticket	.2
17	
18 Take remainder of charge ticket to Pharmacy	
19	
20 Delay while order is filled at Pharmacy	
21	
22 Return to Nursing Station with medication	
23	
24 Delay until medication is required	
25	
26	

DETAILS OF (PRESENT / PROPOSED) METHOD	TIME IN MINUTES
1 Take medication and medication card to patient's room	
2	
3	
4 Check medication to be given against medication card	
5	
6	
7 Administer medication	
8	
9 Return to Nursing Station with card	
10	
11	
12 Record administration of medication on right hand side of Form D-124	1.5
13	
14	
15 Replace medication card in Medication Time Rack	.5
16	
17 Delay until blood test is required	
18	
19 Prepare Laboratory Test Form	1.7
20	
21 Nurse pulls and retains copy of Laboratory Test Form	.2
22	
23	
24 Takes remainder of Test Form to Laboratory	
25	
26	

FORM LMSD 89260

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LOCKHEED MISSILES & SPACE COMPANY PAGE 2 OF 2

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Anti-Coagulant Sheet

☐ MAN OR ☐ MATERIAL

CHART BEGINS At Nursing Station

CHART ENDS At Nursing Station

CHARTED BY ____ DATE ____

	DETAILS OF (PRESENT/PROPOSED) METHOD	SYMBOL	DISTANCE IN FEET	TIME IN MINUTES		DETAILS OF (PRESENT/PROPOSED) METHOD
1	Delay while test is made and analyzed	D			1	D - 1.7
2		□			2	N - 16.2
3	Receives copy of form from Laboratory with	⇨			3	
4	test results				4	
5					5	
6	Record test results on left hand side of Form	○		15	6	
7					7	
8	Affix copy of Laboratory Test Form on a page in	○		.8	8	
9	patient's chart				9	
10					10	
11	Repeat cycle until Doctor cancels orders	○		X	11	
12					12	
13	Discard medication card	○		.2	13	
14		□			14	
15	Delay during patient's stay	D			15	
16		□			16	
17	Form with Patient's chart sent to Medical	⇨			17	
18	Records when patient leaves				18	
19					19	
20	Kardex (Rand) Card discarded	○		.2	20	
21					21	
22	Copies of patient charge tickets discarded	○		.2	22	
23					23	
24	Copies of Laboratory Test Forms discarded	○		.2	24	
25					25	
26					26	

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LOCKHEED MISSILES & SPACE COMPANY PAGE ___ OF ___

FORM LMSD 6020B

FLOW PROCESS CHART

SUMMARY	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Delivery Room Record

☐ MAN OR ☐ MATERIAL

CHART BEGINS Maternity

CHART ENDS Maternity

CHARTED BY ______________ DATE ______

WHY WHAT WHO WHERE WHEN HOW SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES		DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Fill in top (3) lines	○⇨□D▽		15	1		○⇨□D▽		
2		○⇨□D▽			2		○⇨□D▽		
3	Insert form in chart	○⇨□D▽		.6	3	N-12.1	○⇨□D▽		
4		○⇨□D▽			4		○⇨□D▽		
5	Keep in chart until	○⇨□D▽			5		○⇨□D▽		
6	baby is born	○⇨□D▽			6		○⇨□D▽		
7	Add delivery and baby	○⇨□D▽		8.4	7		○⇨□D▽		
8	info to form and sign	○⇨□D▽			8		○⇨□D▽		
9	Insert copies in	○⇨□D▽		.6	9		○⇨□D▽		
10	Mother's chart	○⇨□D▽			10		○⇨□D▽		
11	Forward copy and baby	○⇨□D▽			11		○⇨□D▽		
12	to nursery	○⇨□D▽			12		○⇨□D▽		
13	Insert copy in babies	○⇨□D▽		.6	13		○⇨□D▽		
14	chart	○⇨□D▽			14		○⇨□D▽		
15		○⇨□D▽			15		○⇨□D▽		
16		○⇨□D▽			16		○⇨□D▽		
17		○⇨□D▽			17		○⇨□D▽		
18		○⇨□D▽			18		○⇨□D▽		
19		○⇨□D▽			19		○⇨□D▽		
20		○⇨□D▽			20		○⇨□D▽		
21		○⇨□D▽			21		○⇨□D▽		
22		○⇨□D▽			22		○⇨□D▽		
23		○⇨□D▽			23		○⇨□D▽		
24		○⇨□D▽			24		○⇨□D▽		
25		○⇨□D▽			25		○⇨□D▽		
26		○⇨□D▽			26		○⇨□D▽		

NO. 4t - 4u

LOCKHEED MISSILES & SPACE COMPANY PAGE ___ OF ___

FLOW PROCESS CHART

FORM LMSD 8026B

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Surgery Data Sheet

□ MAN OR □ MATERIAL

CHART BEGINS Surgery Scheduling Desk

CHART ENDS Surgery Scheduling Desk

CHARTED BY ______ DATE ______

WHY WHAT WHERE WHEN WHO HOW SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

	DETAILS OF (PRESENT/PROPOSED) METHOD	TIME IN MINUTES		DETAILS OF (PRESENT/PROPOSED) METHOD	TIME IN MINUTES
1	Stamp Patient's Name	.7	1	Delay (While Charge	
2	on Data Sheets (in duplicate) using address-		2	Ticket Prepared)	
3	ograph plate		3	Review Data Sheets in	1.0
4	Put Data Sheets with		4	order to prepare Charge Ticket for supplies used	
5	other forms and Patient chart until case comes		5		
6	up		6	Delay (While Charge	
7	Take Data Sheets into	1.0	7	Ticket Prepared)	
8	Operating Room along with Chart and other		8	Separate Data Sheets -	.5
9	forms		9	Set 2nd copy in Accumulation Box for Med.	
10	Circulating Nurse fills	8.8	10	Records pickup	
11	out Data Sheets all during case		11	Hold 1st copy of Data	
12			12	Sheet until related forms stapled to it	
13	After case is completed	1.0	13		
14	return Data Sheets to Scheduling Desk		14	File 1st copy of Data	.6
15			15	Sheet with attached forms	
16	Review Data Sheets in	1.0	16		
17	order to prepare Operating Room Charge Ticket		17	Hold Data Sheet and	
18			18	attached forms for one month	
19	Delay (While Charge		19		
20	Ticket Prepared)		20	Discard Forms	.2
21	Transcribe Information	1.5	21		
22	on Data Sheet to permanent Surgery Log Book		22		
23			23		
24	Review Data Sheets in	1.0	24		
25	order to prepare Charge Ticket for drugs used		25	N-17.3	
26			26		

NO. 4x

FORM LMSD 88266

LOCKHEED MISSILES & SPACE COMPANY

PAGE ___ OF ___

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
O OPERATIONS						
⇨ TRANSPORTATIONS						
☐ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB O.B. Labor Record

☐ MAN OR ☐ MATERIAL

CHART BEGINS Maternity

CHART ENDS Maternity

CHARTED BY ______________ DATE ______

WHY WHAT HOW WHERE WHEN WHO SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

No.	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION TRANSPORT INSPECTION DELAY STORAGE	DISTANCE IN FEET	TIME IN MINUTES	No.	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION TRANSPORT INSPECTION DELAY STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Read Doctor's Pre-natal record	O ⇨ ☐ D ▽		10	1		O ⇨ ☐ D ▽		
2		O ⇨ ☐ D ▽			2		O ⇨ ☐ D ▽		
3	Fill out top of form from patient's info	O ⇨ ☐ D ▽		17.6	3	N-19.2	O ⇨ ☐ D ▽		
4	and prenatal record	O ⇨ ☐ D ▽			4		O ⇨ ☐ D ▽		
5		O ⇨ ☐ D ▽			5		O ⇨ ☐ D ▽		
6	Observe Patient	O ⇨ ☐ D ▽			6		O ⇨ ☐ D ▽		
7		O ⇨ ☐ D ▽			7		O ⇨ ☐ D ▽		
8	Note observations and time on form	O ⇨ ☐ D ▽			8		O ⇨ ☐ D ▽		
9		O ⇨ ☐ D ▽			9		O ⇨ ☐ D ▽		
10	Wait until next observation	O ⇨ ☐ D ▽			10		O ⇨ ☐ D ▽		
11		O ⇨ ☐ D ▽			11		O ⇨ ☐ D ▽		
12	Repeat Steps 3 & 4 until baby is born	O ⇨ ☐ D ▽			12		O ⇨ ☐ D ▽		
13		O ⇨ ☐ D ▽			13		O ⇨ ☐ D ▽		
14	Insert form in Patient Chart	O ⇨ ☐ D ▽		.6	14		O ⇨ ☐ D ▽		
15		O ⇨ ☐ D ▽			15		O ⇨ ☐ D ▽		
16		O ⇨ ☐ D ▽			16		O ⇨ ☐ D ▽		
17		O ⇨ ☐ D ▽			17		O ⇨ ☐ D ▽		
18		O ⇨ ☐ D ▽			18		O ⇨ ☐ D ▽		
19		O ⇨ ☐ D ▽			19		O ⇨ ☐ D ▽		
20		O ⇨ ☐ D ▽			20		O ⇨ ☐ D ▽		
21		O ⇨ ☐ D ▽			21		O ⇨ ☐ D ▽		
22		O ⇨ ☐ D ▽			22		O ⇨ ☐ D ▽		
23		O ⇨ ☐ D ▽			23		O ⇨ ☐ D ▽		
24		O ⇨ ☐ D ▽			24		O ⇨ ☐ D ▽		
25		O ⇨ ☐ D ▽			25		O ⇨ ☐ D ▽		
26		O ⇨ ☐ D ▽			26		O ⇨ ☐ D ▽		

NO. 4y

FORM LMSD 8926B

LOCKHEED MISSILES & SPACE COMPANY

PAGE ___ OF ___

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Record of Procedures

□ MAN OR □ MATERIAL

CHART BEGINS Nursing Station

CHART ENDS Nursing Station

CHARTED BY ___ DATE ___

WHY WHAT WHERE WHEN WHO HOW SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES		DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Physicians record of	○⇨□D▽			1		○⇨□D▽		
2	procedures sent to N/S	○⇨□D▽			2		○⇨□D▽		
3	Summary is reviewed for	○⇨□D▽		1.7	3		○⇨□D▽		
4	information	○⇨□D▽			4		○⇨□D▽		
5	Pull patient's chart	○⇨□D▽		.5	5	N - 3.7	○⇨□D▽		
6		○⇨□D▽			6		○⇨□D▽		
7	Bind report in Chart	○⇨□D▽		1.0	7		○⇨□D▽		
8		○⇨□D▽			8		○⇨□D▽		
9	Return Patient's chart	○⇨□D▽		.5	9		○⇨□D▽		
10		○⇨□D▽			10		○⇨□D▽		
11		○⇨□D▽			11		○⇨□D▽		
12		○⇨□D▽			12		○⇨□D▽		
13		○⇨□D▽			13		○⇨□D▽		
14		○⇨□D▽			14		○⇨□D▽		
15		○⇨□D▽			15		○⇨□D▽		
16		○⇨□D▽			16		○⇨□D▽		
17		○⇨□D▽			17		○⇨□D▽		
18		○⇨□D▽			18		○⇨□D▽		
19		○⇨□D▽			19		○⇨□D▽		
20		○⇨□D▽			20		○⇨□D▽		
21		○⇨□D▽			21		○⇨□D▽		
22		○⇨□D▽			22		○⇨□D▽		
23		○⇨□D▽			23		○⇨□D▽		
24		○⇨□D▽			24		○⇨□D▽		
25		○⇨□D▽			25		○⇨□D▽		
26		○⇨□D▽			26		○⇨□D▽		

NO. 5a

FORM LMSD 89266

LOCKHEED MISSILES & SPACE COMPANY PAGE ___ OF ___

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED	FT.		FT.		FT.	

JOB Kardex (Rand) Card

☐ MAN OR ☐ MATERIAL

CHART BEGINS At Nursing Station

CHART ENDS At Nursing Station

CHARTED BY ______ DATE ______

	DETAILS OF (PRESENT/PROPOSED) METHOD	SYMBOL	DISTANCE IN FEET	TIME IN MINUTES
1	Write Medical Order	D		1.7
2	in Patient's chart			
3	Nurse checks order	N		1.0
4				
5	Nurse transcribes order	N		1.5
6	to Kardex (Rand) Card			
7	Form placed in Kardex	N		.6
8				
9	Delay during patient's	D		
10	stay			
11	Transcribe additional	N		1.5 ea 11
12	orders as they occur to			
13	form			
14	Form destroyed after	N		.2
15	patient leaves			
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				

	DETAILS OF (PRESENT/PROPOSED) METHOD
1	(incl. in indiv. WO)
2	D - .0
3	N - 3.1
11	(included in flow of forms)

FORM LMSD 6926B

NO. 5b

LOCKHEED MISSILES & SPACE COMPANY PAGE ___ OF ___

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
O OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Routine Nursing Notes

☐ MAN OR ☐ MATERIAL

CHART BEGINS

CHART ENDS

CHARTED BY ______ DATE ______

WHY WHAT WHEN WHERE WHO HOW SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1 Return to station from patient's bedside	O⇨□D▽			1	O⇨□D▽		
2	O⇨□D▽			2	O⇨□D▽		
3 Pull patient's chart	O⇨□D▽		.5	3	O⇨□D▽		
4	O⇨□D▽			4 N-2.0	O⇨□D▽		
5 Enter pertinent data on observation, response, attitude, progress of patient	O⇨□D▽		1.5	5	O⇨□D▽		
6	O⇨□D▽			6	O⇨□D▽		
7	O⇨□D▽			7	O⇨□D▽		
8 Return chart to chart rack	O⇨□D▽		.5	8	O⇨□D▽		
9	O⇨□D▽			9	O⇨□D▽		
10	O⇨□D▽			10	O⇨□D▽		
11	O⇨□D▽			11	O⇨□D▽		
12	O⇨□D▽			12	O⇨□D▽		
13	O⇨□D▽			13	O⇨□D▽		
14	O⇨□D▽			14	O⇨□D▽		
15	O⇨□D▽			15	O⇨□D▽		
16	O⇨□D▽			16	O⇨□D▽		
17	O⇨□D▽			17	O⇨□D▽		
18	O⇨□D▽			18	O⇨□D▽		
19	O⇨□D▽			19	O⇨□D▽		
20	O⇨□D▽			20	O⇨□D▽		
21	O⇨□D▽			21	O⇨□D▽		
22	O⇨□D▽			22	O⇨□D▽		
23	O⇨□D▽			23	O⇨□D▽		
24	O⇨□D▽			24	O⇨□D▽		
25	O⇨□D▽			25	O⇨□D▽		
26	O⇨□D▽			26	O⇨□D▽		

NO. 5d

LOCKHEED MISSILES & SPACE COMPANY PAGE ___ OF ___

FLOW PROCESS CHART

FORM LMSD 0000 (form number partly illegible)

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Daily Nursing Care Report

☐ MAN OR ☐ MATERIAL

CHART BEGINS Nursing Unit

CHART ENDS Nursing Unit

CHARTED BY ______ DATE ______

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES		DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Head Nurse or Charge Nurse initiates form	○⇨□D▽		1.7	1		○⇨□D▽		
2		○⇨□D▽			2		○⇨□D▽		
3		○⇨□D▽			3		○⇨□D▽		
4	At 2 p.m., 10 p.m. and 4 a.m. RN's supply information	○⇨□D▽		33.3	4		○⇨□D▽		
5		○⇨□D▽			5	N - 83.1	○⇨□D▽		
6		○⇨□D▽			6		○⇨□D▽		
7	Each reported patient (per procedure) data entered	○⇨□D▽		45.7	7		○⇨□D▽		
8		○⇨□D▽			8		○⇨□D▽		
9		○⇨□D▽			9		○⇨□D▽		
10	Send to Nursing Office before shift change	○⇨□D▽		1.7	10		○⇨□D▽		
11		○⇨□D▽			11		○⇨□D▽		
12		○⇨□D▽			12		○⇨□D▽		
13		○⇨□D▽			13		○⇨□D▽		
14		○⇨□D▽			14		○⇨□D▽		
15		○⇨□D▽			15		○⇨□D▽		
16		○⇨□D▽			16		○⇨□D▽		
17		○⇨□D▽			17		○⇨□D▽		
18		○⇨□D▽			18		○⇨□D▽		
19		○⇨□D▽			19		○⇨□D▽		
20		○⇨□D▽			20		○⇨□D▽		
21		○⇨□D▽			21		○⇨□D▽		
22		○⇨□D▽			22		○⇨□D▽		
23		○⇨□D▽			23		○⇨□D▽		
24		○⇨□D▽			24		○⇨□D▽		
25		○⇨□D▽			25		○⇨□D▽		
26		○⇨□D▽			26		○⇨□D▽		

FORM LMSD 88260

LOCKHEED MISSILES & SPACE COMPANY

FLOW PROCESS CHART

NO. 5e

PAGE ___ OF ___

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
OPERATIONS						
TRANSPORTATIONS						
INSPECTIONS						
DELAYS						
STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Incident Report

☐ MAN OR ☐ MATERIAL

CHART BEGINS At Nursing Station

CHART ENDS At Nursing Station

CHARTED BY ______ DATE ______

	DETAILS OF (PRESENT/PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES		DETAILS OF (PRESENT/PROPOSED) METHOD
1	Nurse prepares form to "Doctor's Report section when incident occurs	Operation		44	1	
2					2	
3					3	
4	Doctor notified of incident	Operation			4	N - 4.9
5					5	
6	Delay while Doctor examines patient or visitor	Delay			6	
7					7	
8					8	
9	Delay while Doctor fills in Doctor's Report section of form	Delay			9	
10					10	
11					11	
12	Receive completed form from Doctor	Operation		.5	12	
13					13	
14	Send entire form (3) copies to Director of Nurses	Transport			14	
15					15	
16					16	
17					17	
18					18	
19					19	
20					20	
21					21	
22					22	
23					23	
24					24	
25					25	
26					26	

NO. 6b

LOCKHEED MISSILES & SPACE COMPANY PAGE __ OF __

FORM LMSC 88298

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
☐ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB In-Between Meal Nourishments

☐ MAN OR ☐ MATERIAL

CHART BEGINS At Nursing Station

CHART ENDS At Nursing Station

CHARTED BY ________ DATE ________

WHY? WHAT? HOW? WHERE? WHEN? WHO? SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Prepare Form (Duplicate)	○⇨☐D▽		1.5
2		○⇨☐D▽		
3	Stamp form using addressograph plate	○⇨☐D▽		.70
4		○⇨☐D▽		
5	Transmit one copy to Dietary Department	○⇨☐D▽		.55
6		○⇨☐D▽		
7	File one copy at Nursing Station	○⇨☐D▽		.26
8		○⇨☐D▽		
9		○⇨☐D▽		
10	Wait for Item	○⇨☐D▽		–
11		○⇨☐D▽		
12	Receive Notification	○⇨☐D▽		.24
13		○⇨☐D▽		
14	Delay	○⇨☐D▽		–
15		○⇨☐D▽		
16	Discard Form	○⇨☐D▽		.70
17		○⇨☐D▽		
18		○⇨☐D▽		
19		○⇨☐D▽		
20		○⇨☐D▽		
21		○⇨☐D▽		
22		○⇨☐D▽		
23		○⇨☐D▽		
24		○⇨☐D▽		
25		○⇨☐D▽		
26		○⇨☐D▽		

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1		○⇨☐D▽		
2		○⇨☐D▽		
3		○⇨☐D▽		
4		○⇨☐D▽		
5		○⇨☐D▽		
6		○⇨☐D▽		
7		○⇨☐D▽		
8		○⇨☐D▽		
9		○⇨☐D▽		
10		○⇨☐D▽		
11		○⇨☐D▽		
12		○⇨☐D▽		
13		○⇨☐D▽		
14		○⇨☐D▽		
15		○⇨☐D▽		
16		○⇨☐D▽		
17		○⇨☐D▽		
18		○⇨☐D▽		
19		○⇨☐D▽		
20		○⇨☐D▽		
21		○⇨☐D▽		
22		○⇨☐D▽		
23		○⇨☐D▽		
24		○⇨☐D▽		
25		○⇨☐D▽		
26		○⇨☐D▽		

FORM LMSD 8926B

NO. 6.c

PAGE ___ OF ___

LOCKHEED MISSILES & SPACE COMPANY

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Central Supply Daily Requisition

☐ MAN OR ☐ MATERIAL

CHART BEGINS At Nursing Station

CHART ENDS At Nursing Station

CHARTED BY ______________ DATE ______________

WHY? WHAT? WHERE? WHEN? WHO? HOW? SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES		DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Determine Supply Requirements	○⇨□D▽		9.8	1		○⇨□D▽		
2		○⇨□D▽			2	N-8.8	○⇨□D▽		
3	Date form and check off supply requirements	○⇨□D▽			3		○⇨□D▽		
4		○⇨□D▽			4		○⇨□D▽		
5	Sign Central Supply Daily Requirements Form	○⇨□D▽			5		○⇨□D▽		
6		○⇨□D▽			6		○⇨□D▽		
7		○⇨□D▽			7		○⇨□D▽		
8	Take completed form to Central Supply	○⇨□D▽			8		○⇨□D▽		
9		○⇨□D▽			9		○⇨□D▽		
10	Delay while order is filled	○⇨□D▽			10		○⇨□D▽		
11		○⇨□D▽			11		○⇨□D▽		
12	Receive supplies ordered from Central Supply	○⇨□D▽			12		○⇨□D▽		
13		○⇨□D▽			13		○⇨□D▽		
14	Return to Nursing Station with supplies but not with form	○⇨□D▽			14		○⇨□D▽		
15		○⇨□D▽			15		○⇨□D▽		
16		○⇨□D▽			16		○⇨□D▽		
17		○⇨□D▽			17		○⇨□D▽		
18		○⇨□D▽			18		○⇨□D▽		
19		○⇨□D▽			19		○⇨□D▽		
20		○⇨□D▽			20		○⇨□D▽		
21		○⇨□D▽			21		○⇨□D▽		
22		○⇨□D▽			22		○⇨□D▽		
23		○⇨□D▽			23		○⇨□D▽		
24		○⇨□D▽			24		○⇨□D▽		
25		○⇨□D▽			25		○⇨□D▽		
26		○⇨□D▽			26		○⇨□D▽		

FORM LMSD 4028B

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

NO. 6a,6d,6f,6g

PAGE ___ OF ___

LOCKHEED MISSILES & SPACE COMPANY

FLOW PROCESS CHART

JOB In-Patient Charge Ticket

□ MAN OR □ MATERIAL

CHART BEGINS At Nursing Station

CHART ENDS At Nursing Station

CHARTED BY ____________ DATE ________

DETAILS OF (PRESENT/PROPOSED) METHOD		DISTANCE IN FEET	TIME IN MINUTES	DETAILS OF (PRESENT/PROPOSED) METHOD		DISTANCE IN FEET	TIME IN MINUTES
1 Write order when required	○⇨□D▽		1.7	1 Delay during Patient's stay	○⇨□D▽		
2	○⇨□D▽			2	○⇨□D▽		
3 Nurse stamps form with addressograph plate	○⇨□D▽		.1	3 Discard copy of form when patient leaves	○⇨□D▽		.2
4	○⇨□D▽			4 D-1.1	○⇨□D▽		
5 Nurse completes form by listing required drugs, supplies or materials	○⇨□D▽		1.7	5 N-5.1	○⇨□D▽		
6	○⇨□D▽			6	○⇨□D▽		
7	○⇨□D▽			7	○⇨□D▽		
8 Nurse pulls and retains copy of form at Nursing Station	○⇨□D▽		1.1	8	○⇨□D▽		
9	○⇨□D▽			9	○⇨□D▽		
10	○⇨□D▽			10	○⇨□D▽		
11 If For Drugs - Copies of form taken to Pharmacy	○⇨□D▽			11	○⇨□D▽		
12	○⇨□D▽			12	○⇨□D▽		
13	○⇨□D▽			13	○⇨□D▽		
14 If For Supplies - Copies of form taken to Central Supply	○⇨□D▽			14	○⇨□D▽		
15	○⇨□D▽			15	○⇨□D▽		
16	○⇨□D▽			16	○⇨□D▽		
17 If For Dietary Materials Form taken to Dietary	○⇨□D▽			17	○⇨□D▽		
18	○⇨□D▽			18	○⇨□D▽		
19 Delay while order is filled	○⇨□D▽			19	○⇨□D▽		
20	○⇨□D▽			20	○⇨□D▽		
21 Return to Nursing Station with order but none of the form	○⇨□D▽			21	○⇨□D▽		
22	○⇨□D▽			22	○⇨□D▽		
23	○⇨□D▽			23	○⇨□D▽		
24 Use items ordered	○⇨□D▽			24	○⇨□D▽		
25	○⇨□D▽			25	○⇨□D▽		
26	○⇨□D▽			26	○⇨□D▽		

FORM LMSD 8028B

NO. 6e

LOCKHEED MISSILES & SPACE COMPANY PAGE __ OF __

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED	FT.		FT.		FT.	

JOB Stores Requisition For Departmental Supplies - to be filled from Pharmacy

☐ MAN OR ☐ MATERIAL

CHART BEGINS Surgery Scheduling Desk

CHART ENDS Surgery Scheduling Desk

CHARTED BY ____ DATE ____

WHY WHAT WHO WHERE WHEN HOW SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Take Daily Inventory	○⇨□D▽		60
2	of Drugs using a checklist	○⇨□D▽		
3		○⇨□D▽		
4	Fill out Requisition	○⇨□D▽		78
5	for needed drugs in duplicate	○⇨□D▽		
6	Deliver 1st copy of	○⇨□D▽		
7	requisition to Pharmacy	○⇨□D▽		
8	File 2nd copy at desk	○⇨□D▽		.6
9	awaiting supplies	○⇨□D▽		
10	Delay (until drugs	○⇨□D▽		
11	arrive)	○⇨□D▽		
12	Receive drugs - Pull	○⇨□D▽		.5
13	2nd copy of requisition from desk	○⇨□D▽		
14		○⇨□D▽		
15	Verify drugs received	○⇨□D▽		44
16	against drugs ordered	○⇨□D▽		
17	Discard Requisition	○⇨□D▽		.2
18	Copy	○⇨□D▽		
19		○⇨□D▽		
20		○⇨□D▽		
21		○⇨□D▽		
22		○⇨□D▽		
23		○⇨□D▽		
24		○⇨□D▽		
25		○⇨□D▽		
26		○⇨□D▽		

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1		○⇨□D▽		
2	N - 24.5	○⇨□D▽		
3		○⇨□D▽		
4		○⇨□D▽		
5		○⇨□D▽		
6		○⇨□D▽		
7		○⇨□D▽		
8		○⇨□D▽		
9		○⇨□D▽		
10		○⇨□D▽		
11		○⇨□D▽		
12		○⇨□D▽		
13		○⇨□D▽		
14		○⇨□D▽		
15		○⇨□D▽		
16		○⇨□D▽		
17		○⇨□D▽		
18		○⇨□D▽		
19		○⇨□D▽		
20		○⇨□D▽		
21		○⇨□D▽		
22		○⇨□D▽		
23		○⇨□D▽		
24		○⇨□D▽		
25		○⇨□D▽		
26		○⇨□D▽		

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LOCKHEED MISSILES & SPACE COMPANY
PAGE __ OF __

FORM LMSC 88200

FLOW PROCESS CHART

JOB Linen Report

SUMMARY	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

☐ MAN OR ☐ MATERIAL

CHART BEGINS Surgery Scheduling Desk

CHART ENDS Surgery Scheduling Desk

CHARTED BY ________ DATE ________

No.	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES	No.	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Daily prepare Linen	○⇨□D▽		88	1		○⇨□D▽		
2	Report - Estimate quantities needed	○⇨□D▽			2	N-9.4	○⇨□D▽		
3		○⇨□D▽			3		○⇨□D▽		
4	Set Form aside for	○⇨□D▽		6	4		○⇨□D▽		
5	Housekeeping to pickup	○⇨□D▽			5		○⇨□D▽		
6		○⇨□D▽			6		○⇨□D▽		
7		○⇨□D▽			7		○⇨□D▽		
8		○⇨□D▽			8		○⇨□D▽		
9		○⇨□D▽			9		○⇨□D▽		
10		○⇨□D▽			10		○⇨□D▽		
11		○⇨□D▽			11		○⇨□D▽		
12		○⇨□D▽			12		○⇨□D▽		
13		○⇨□D▽			13		○⇨□D▽		
14		○⇨□D▽			14		○⇨□D▽		
15		○⇨□D▽			15		○⇨□D▽		
16		○⇨□D▽			16		○⇨□D▽		
17		○⇨□D▽			17		○⇨□D▽		
18		○⇨□D▽			18		○⇨□D▽		
19		○⇨□D▽			19		○⇨□D▽		
20		○⇨□D▽			20		○⇨□D▽		
21		○⇨□D▽			21		○⇨□D▽		
22		○⇨□D▽			22		○⇨□D▽		
23		○⇨□D▽			23		○⇨□D▽		
24		○⇨□D▽			24		○⇨□D▽		
25		○⇨□D▽			25		○⇨□D▽		
26		○⇨□D▽			26		○⇨□D▽		

FORM LMSD 88268

NO. 6L

LOCKHEED MISSILES & SPACE COMPANY

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FLOW PROCESS CHART

JOB: Stores Requisition for Departmental Supplies

☐ MAN OR ☐ MATERIAL

CHART BEGINS: At Nursing Station

CHART ENDS: At Nursing Station

CHARTED BY ______________ DATE ______

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
☐ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

WHY? WHAT? WHERE? WHEN? WHO? HOW? SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

	DETAILS OF (PRESENT/PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES		DETAILS OF (PRESENT/PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Check area storeroom for quantity of supplies	○⇨☐D▽		88	1		○⇨☐D▽		
2		○⇨☐D▽			2	N-14.2	○⇨☐D▽		
3	Note requirements on form	○⇨☐D▽			3		○⇨☐D▽		
4		○⇨☐D▽			4		○⇨☐D▽		
5	Take form to Main Storeroom and leave	○⇨☐D▽			5		○⇨☐D▽		
6		○⇨☐D▽			6		○⇨☐D▽		
7	Wait for supplies to arrive	○⇨☐D▽			7		○⇨☐D▽		
8		○⇨☐D▽			8		○⇨☐D▽		
9	Receive supplies and form	○⇨☐D▽		.5	9		○⇨☐D▽		
10		○⇨☐D▽			10		○⇨☐D▽		
11	Check off supplies vs form while deliverer waits	○⇨☐D▽		44	11		○⇨☐D▽		
12		○⇨☐D▽			12		○⇨☐D▽		
13		○⇨☐D▽			13		○⇨☐D▽		
14	Return form to deliverer	○⇨☐D▽		.5	14		○⇨☐D▽		
15		○⇨☐D▽			15		○⇨☐D▽		
16	Store supplies in area storeroom	○⇨☐D▽			16		○⇨☐D▽		
17		○⇨☐D▽			17		○⇨☐D▽		
18		○⇨☐D▽			18		○⇨☐D▽		
19		○⇨☐D▽			19		○⇨☐D▽		
20		○⇨☐D▽			20		○⇨☐D▽		
21		○⇨☐D▽			21		○⇨☐D▽		
22		○⇨☐D▽			22		○⇨☐D▽		
23		○⇨☐D▽			23		○⇨☐D▽		
24		○⇨☐D▽			24		○⇨☐D▽		
25		○⇨☐D▽			25		○⇨☐D▽		
26		○⇨☐D▽			26		○⇨☐D▽		

NO. 6m

LOCKHEED MISSILES & SPACE COMPANY PAGE ___ OF ___

FLOW PROCESS CHART

FORM LMSD 8020B

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Diet Cards

☐ MAN OR ☐ MATERIAL

CHART BEGINS Nursing Unit

CHART ENDS Nursing Unit

CHARTED BY ____________ DATE ________

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Menus received from Dietary	○⇨□D▽		.5
2		○⇨□D▽		
3	Distribute Menus to patients	○⇨□D▽		10.1
4		○⇨□D▽		
5	Assist patients as required	○⇨□D▽		-
6		○⇨□D▽		
7	Delay while menus are marked	○⇨□D▽		-
8		○⇨□D▽		
9	Collect marked menus and check	○⇨□D▽		4.3
10		○⇨□D▽		
11	Send Menus to dietary with N/S identification	○⇨□D▽		1.7
12		○⇨□D▽		
13		○⇨□D▽		
14		○⇨□D▽		
15		○⇨□D▽		
16		○⇨□D▽		
17		○⇨□D▽		
18		○⇨□D▽		
19		○⇨□D▽		
20		○⇨□D▽		
21		○⇨□D▽		
22		○⇨□D▽		
23		○⇨□D▽		
24		○⇨□D▽		
25		○⇨□D▽		
26		○⇨□D▽		

N - 16.6

NO. 6n

LOCKHEED MISSILES & SPACE COMPANY PAGE ___ OF ___

FORM LMSD 6026D

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Diet Sheet

☐ MAN OR ☐ MATERIAL

CHART BEGINS At Nursing Station

CHART ENDS At Nursing Station

CHARTED BY ______ DATE ______

WHY? WHAT? HOW? WHERE? WHEN? WHO? SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

	DETAILS OF (PRESENT/PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES		DETAILS OF (PRESENT/PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Write Order	○⇨□D▽		1.7	1		○⇨□D▽		
2		○⇨□D▽			2	D - 1.7	○⇨□D▽		
3	Read Chart	○⇨□D▽		88	3	N - 88	○⇨□D▽		
4		○⇨□D▽			4		○⇨□D▽		
5	List Patient's Name, Diet Diagnosis and	○⇨□D▽			5		○⇨□D▽		
6	Doctor	○⇨□D▽			6		○⇨□D▽		
7		○⇨□D▽			7		○⇨□D▽		
8	Forward to Diet Kitchen daily	○⇨□D▽			8		○⇨□D▽		
9		○⇨□D▽			9		○⇨□D▽		
10		○⇨□D▽			10		○⇨□D▽		
11		○⇨□D▽			11		○⇨□D▽		
12		○⇨□D▽			12		○⇨□D▽		
13		○⇨□D▽			13		○⇨□D▽		
14		○⇨□D▽			14		○⇨□D▽		
15		○⇨□D▽			15		○⇨□D▽		
16		○⇨□D▽			16		○⇨□D▽		
17		○⇨□D▽			17		○⇨□D▽		
18		○⇨□D▽			18		○⇨□D▽		
19		○⇨□D▽			19		○⇨□D▽		
20		○⇨□D▽			20		○⇨□D▽		
21		○⇨□D▽			21		○⇨□D▽		
22		○⇨□D▽			22		○⇨□D▽		
23		○⇨□D▽			23		○⇨□D▽		
24		○⇨□D▽			24		○⇨□D▽		
25		○⇨□D▽			25		○⇨□D▽		
26		○⇨□D▽			26		○⇨□D▽		

FORM LMSD 8926B

NO. 6o, 6p

LOCKHEED MISSILES & SPACE COMPANY PAGE __ OF __

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
O OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Hypnotic Check List (Narcotic Check List)

☐ MAN OR ☐ MATERIAL

CHART BEGINS At Nursing Station

CHART ENDS At Nursing Station

CHARTED BY ______ DATE ______

WHY WHAT WHO WHERE WHEN HOW SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

No.	DETAILS OF (PRESENT) METHOD	Operation / Transport / Inspection / Delay / Storage	Distance in feet	Time in minutes	No.	DETAILS OF (PROPOSED) METHOD	Operation / Transport / Inspection / Delay / Storage	Distance in feet	Time in minutes
1	Nurse prepares form	O⇨□D▽		1.5	1	Nurse prepares new form	O⇨□D▽		
2		O⇨□D▽			2		O⇨□D▽		
3	Nurse going off duty conducts narcotic in-	O⇨□D▽			3	Steps 2 through 11 repeated continuously	O⇨□D▽		
4	ventory count with Nurse coming on duty	O⇨□D▽			4		O⇨□D▽		
5		O⇨□D▽			5		O⇨□D▽		
6	Nurses determine if count is correct based	O⇨□D▽			6	N-11.3 /shift	O⇨□D▽		
7	on usage since previous count	O⇨□D▽			7		O⇨□D▽		
8		O⇨□D▽			8		O⇨□D▽		
9	If count is not correct Nurses locate error by	O⇨□D▽			9		O⇨□D▽		
10	using various Ward Records	O⇨□D▽			10		O⇨□D▽		
11		O⇨□D▽			11		O⇨□D▽		
12	Correct amount of each Narcotic on hand at	O⇨□D▽		8.8	12		O⇨□D▽		
13	shift change is recorded on Form	O⇨□D▽			13		O⇨□D▽		
14		O⇨□D▽			14		O⇨□D▽		
15	Off-duty Nurse signs at bottom of Form	O⇨□D▽		.5	15		O⇨□D▽		
16		O⇨□D▽			16		O⇨□D▽		
17	On-Duty Nurse signs at bottom of Form	O⇨□D▽		.5	17		O⇨□D▽		
18		O⇨□D▽			18		O⇨□D▽		
19	Retain Form and delay until end of shift	O⇨□D▽			19		O⇨□D▽		
20		O⇨□D▽			20		O⇨□D▽		
21	Cycle repeated on each successive shift change	O⇨□D▽		X	21		O⇨□D▽		
22	until form is filled	O⇨□D▽			22		O⇨□D▽		
23		O⇨□D▽			23		O⇨□D▽		
24	Form sent to Pharmacy	O⇨□D▽			24		O⇨□D▽		
25		O⇨□D▽			25		O⇨□D▽		
26		O⇨□D▽			26		O⇨□D▽		

FORM LMSC 8924B

LOCKHEED MISSILES & SPACE COMPANY

NO. 7a

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FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
OPERATIONS						
TRANSPORTATIONS						
INSPECTIONS						
DELAYS						
STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Daily Report of Patients

☐ MAN OR ☐ MATERIAL

CHART BEGINS At Nursing Station

CHART ENDS At Nursing Station

CHARTED BY ______ DATE ______

DETAILS OF (PRESENT / PROPOSED) METHOD	DISTANCE IN FEET	TIME IN MINUTES
1 Nurse on Night Shift initiates form		1.5
2		
3 Delay until events which require recording occur		
4		
5 Night Nurse completes appropriate sections on back side of form		2.4
6		
7		
8 Transcribe additional events as they occur during the night shift		
9		
10		
11 Day Nurse receives form from night nurse at end of night shift		.5
12		
13		
14 Delay until events which require recording occur		
15		
16		
17 Day Nurse completes appropriate section on back side of form		2.4
18		
19		
20 Transcribe additional events as they occur during the day shift		
21		
22		
23 Evening Nurse receives form from Day Nurse at end of day shift.		.5
24		
25		
26		

DETAILS OF (PRESENT / PROPOSED) METHOD	DISTANCE IN FEET	TIME IN MINUTES
1 Delay until events which require recording occur		
2		
3		
4 Evening Nurse completes appropriate sections on back of form		2.9
5		
6		
7 Transcribe additional events as they occur during the evening shift		
8		
9		
10 Evening Nurse lists each patient and room number in Ward on front side of form		9.8
11		
12		
13 Form is sent to Business Office at end of evening shift with entries on both sides of form		
14		
15		
16		
17 N - 20.0		
18		
19		
20		
21		
22		
23		
24		
25		
26		

FORM LMSD 8926B

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED	FT.		FT.		FT.	

NO. ______

LOCKHEED MISSILES & SPACE COMPANY PAGE ___ OF ___

FLOW PROCESS CHART 7b-7h-7n-7k-7s

JOB ICU-CCU-[illegible]-DR-RR-Log

□ MAN OR □ MATERIAL

CHART BEGINS Nursing Unit

CHART ENDS Nursing Unit

CHARTED BY ______ DATE ______

WHY? WHAT? HOW? WHERE? WHEN? WHO? SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION TRANSPORT INSPECTION DELAY STORAGE	DISTANCE IN FEET	TIME IN MINUTES	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION TRANSPORT INSPECTION DELAY STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1 Receive and attend to	○ ⇨ □ D ▽		X	1	○ ⇨ □ D ▽		
patient 2	○ ⇨ □ D ▽			2	○ ⇨ □ D ▽		
3 Enter patient data	○ ⇨ □ D ▽		1.5	3	○ ⇨ □ D ▽		
in control lob 4	○ ⇨ □ D ▽			4 N-7.7	○ ⇨ □ D ▽		
5 Enter date and hour	○ ⇨ □ D ▽		.5	5	○ ⇨ □ D ▽		
entered 6	○ ⇨ □ D ▽			6	○ ⇨ □ D ▽		
7 Enter date and hour	○ ⇨ □ D ▽		.5	7	○ ⇨ □ D ▽		
discharged 8	○ ⇨ □ D ▽			8	○ ⇨ □ D ▽		
9 Summarize work preformed for patient	○ ⇨ □ D ▽		1.0	9	○ ⇨ □ D ▽		
10	○ ⇨ □ D ▽			10	○ ⇨ □ D ▽		
11 At shift end start	○ ⇨ □ D ▽		1.7	11	○ ⇨ □ D ▽		
new sheet 12	○ ⇨ □ D ▽			12	○ ⇨ □ D ▽		
13 Sign Sheet	○ ⇨ □ D ▽		.5	13	○ ⇨ □ D ▽		
14	○ ⇨ □ D ▽			14	○ ⇨ □ D ▽		
15 Transport to Office	○ ⇨ □ D ▽		2.0	15	○ ⇨ □ D ▽		
16	○ ⇨ □ D ▽			16	○ ⇨ □ D ▽		
17	○ ⇨ □ D ▽			17	○ ⇨ □ D ▽		
18	○ ⇨ □ D ▽			18	○ ⇨ □ D ▽		
19	○ ⇨ □ D ▽			19	○ ⇨ □ D ▽		
20	○ ⇨ □ D ▽			20	○ ⇨ □ D ▽		
21	○ ⇨ □ D ▽			21	○ ⇨ □ D ▽		
22	○ ⇨ □ D ▽			22	○ ⇨ □ D ▽		
23	○ ⇨ □ D ▽			23	○ ⇨ □ D ▽		
24	○ ⇨ □ D ▽			24	○ ⇨ □ D ▽		
25	○ ⇨ □ D ▽			25	○ ⇨ □ D ▽		
26	○ ⇨ □ D ▽			26	○ ⇨ □ D ▽		

NO. 7c

LOCKHEED MISSILES & SPACE COMPANY PAGE ___ OF ___

FLOW PROCESS CHART

FORM LMSC 8926B

SUMMARY

	PRESENT		PROPOSED		DIFFERENCE	
	NO.	TIME	NO.	TIME	NO.	TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Nurses and Aides Daily Reports

☐ MAN OR ☐ MATERIAL

CHART BEGINS At Nursing Station

CHART ENDS At Nursing Station

CHARTED BY ______________ DATE ______

WHY WHAT HOW WHERE WHEN WHO SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION	TRANSPORT	INSPECTION	DELAY	STORAGE	DISTANCE IN FEET	TIME IN MINUTES		DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION	TRANSPORT	INSPECTION	DELAY	STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Nurse prepares Form at	N						88	1								
2	beginning of shift	N							2								
3	Nurse lists Aide's	N							3	N - 14.0							
4	daily assignments on Form								4								
5									5								
6	Nurse gives Form with	N						.5	6								
7	assignments to Aide								7								
8	Aide reads Form and								8								
9	carries out assignments								9								
10	Aide records pertinent	N						1.5	10								
11	remarks on Form								11								
12	Form given to Nurse at	N						.5	12								
13	end of shift								13								
14	Nurse checks Form			N				1.0	14								
15	Nurse records any per-	N						1.5	15								
16	tinent remarks in Patient's chart								16								
17									17								
18	Nurse discards Form	N						.2	18								
19	after remarks are posted								19								
20									20								
21									21								
22									22								
23									23								
24									24								
25									25								
26									26								

FORM LMSD 8929B

NO. 7d

LOCKHEED MISSILES & SPACE COMPANY PAGE ___ OF ___

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED	FT.		FT.		FT.	

JOB Seriously Ill Slip

☐ MAN OR ☐ MATERIAL

CHART BEGINS Nursing Unit

CHART ENDS Nursing Unit

CHARTED BY ________ DATE ________

WHY WHAT WHO WHERE WHEN HOW SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

No.	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES	No.	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	M.D. Request Slip	○⇨□D▽		.5	1		○⇨□D▽		
2		○⇨□D▽			2		○⇨□D▽		
3	Pull Patient's chart	○⇨□D▽		.5	3		○⇨□D▽		
4		○⇨□D▽			4	N-4.7	○⇨□D▽		
5	Make out slip from chart & M.D. data	○⇨□D▽		1.7	5		○⇨□D▽		
6		○⇨□D▽			6		○⇨□D▽		
7	Affix one copy to chart	○⇨□D▽		.5	7		○⇨□D▽		
8		○⇨□D▽			8		○⇨□D▽		
9	Place one copy at Patient's door	○⇨□D▽		1.6	9		○⇨□D▽		
10		○⇨□D▽			10		○⇨□D▽		
11	Send copy to Nursing Office	○⇨□D▽		.5	11		○⇨□D▽		
12		○⇨□D▽			12		○⇨□D▽		
13	Send copy to Administration	○⇨□D▽		.5	13		○⇨□D▽		
14		○⇨□D▽			14		○⇨□D▽		
15		○⇨□D▽			15		○⇨□D▽		
16		○⇨□D▽			16		○⇨□D▽		
17		○⇨□D▽			17		○⇨□D▽		
18		○⇨□D▽			18		○⇨□D▽		
19		○⇨□D▽			19		○⇨□D▽		
20		○⇨□D▽			20		○⇨□D▽		
21		○⇨□D▽			21		○⇨□D▽		
22		○⇨□D▽			22		○⇨□D▽		
23		○⇨□D▽			23		○⇨□D▽		
24		○⇨□D▽			24		○⇨□D▽		
25		○⇨□D▽			25		○⇨□D▽		
26		○⇨□D▽			26		○⇨□D▽		

NO. 7e

LOCKHEED MISSILES & SPACE COMPANY PAGE ___ OF ___

FORM LMSD 8926B

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Daily Floor Census

□ MAN OR □ MATERIAL

CHART BEGINS

CHART ENDS

CHARTED BY ____ DATE ____

WHY WHAT WHO WHERE WHEN HOW SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES		DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Get forms once each	○⇨□D▽		.5	1		○⇨□D▽		
2	shift	○⇨□D▽			2		○⇨□D▽		
3	Place form on board	○⇨□D▽		.5	3		○⇨□D▽		
4		○⇨□D▽			4		○⇨□D▽		
5	With clipboard - tour	○⇨□D▽		8.8	5	N - 14.0	○⇨□D▽		
6	unit	○⇨□D▽			6		○⇨□D▽		
7	Enter Patient's name	○⇨□D▽			7		○⇨□D▽		
8	at bed number	○⇨□D▽			8		○⇨□D▽		
9	Determine location of	○⇨□D▽		2.0	9		○⇨□D▽		
10	each absent patient	○⇨□D▽			10		○⇨□D▽		
11		○⇨□D▽			11		○⇨□D▽		
12	Return to Nursing	○⇨□D▽		-	12		○⇨□D▽		
13	Station	○⇨□D▽			13		○⇨□D▽		
14	Summarize form	○⇨□D▽		1.7	14		○⇨□D▽		
15		○⇨□D▽			15		○⇨□D▽		
16	Send to Nursing Office	○⇨□D▽		.5	16		○⇨□D▽		
17	and Administration	○⇨□D▽			17		○⇨□D▽		
18		○⇨□D▽			18		○⇨□D▽		
19		○⇨□D▽			19		○⇨□D▽		
20		○⇨□D▽			20		○⇨□D▽		
21		○⇨□D▽			21		○⇨□D▽		
22		○⇨□D▽			22		○⇨□D▽		
23		○⇨□D▽			23		○⇨□D▽		
24		○⇨□D▽			24		○⇨□D▽		
25		○⇨□D▽			25		○⇨□D▽		
26		○⇨□D▽			26		○⇨□D▽		

FORM LMSC 0000 (form number illegible)

NO. 71
LOCKHEED MISSILES & SPACE COMPANY PAGE ___ OF ___

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Nursing Office Report (two pages)

☐ MAN OR ☐ MATERIAL

CHART BEGINS At Nursing Station

CHART ENDS At Nursing Station

CHARTED BY ______ DATE ______

	DETAILS OF (PRESENT / PROPOSED) METHOD	DISTANCE IN FEET	TIME IN MINUTES
1	Nurse on Day Shift		1.5
2	Heads two-page form		
3	Delay until events		
4	which require recording occur		
5			
6	Day Nurse completes		1.5
7	appropriate sections on both pages of form		
8			
9	Delay until end of day		
10	shift		
11	Both pages of form sent		
12	to Director of Nurses at end of day shift		
13			
14	Delay while Director of		
15	Nurses processes form		
16	Evening Shift Nurse		.5
17	receives both pages of form from Director of		
18	Nursing		
19	Delay until events which		
20	require recording occur		
21	Evening Nurse completes		.5
22	appropriate sections on both pages of form		
23			
24	Delay until end of		
25	evening shift		
26			

	DETAILS OF (PRESENT / PROPOSED) METHOD	DISTANCE IN FEET	TIME IN MINUTES
1	Both pages of form		
2	sent to Director of Nursing at end of		
3	evening shift		
4	Delay while Director		
5	of Nurses processes form		
6			
7	Night Shift Nurse		.5
8	receives both pages of form from Director of		
9	Nurses		
10	Delay until events		
11	which require recording occur		
12			
13	Night Nurse completes		1.5
14	appropriate sections on both pages of form		
15			
16	Delay until end of		
17	Night Shift		
18	Both pages of form		
19	sent to Director of Nurses at end of		
20	Night Shift		
21			
22	N-6.0		
23			
24			
25			
26			

FORM LMSD 8926B

LOCKHEED MISSILES & SPACE COMPANY

FLOW PROCESS CHART

NO. 76
PAGE ___ OF ___

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
O OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Patient Condition Sheet

□ MAN OR □ MATERIAL

CHART BEGINS At Nursing Station

CHART ENDS At Nursing Station

CHARTED BY ______ DATE ______

No.	DETAILS OF (PRESENT / PROPOSED) METHOD	TIME IN MINUTES
1	Nurse on Day Shift	.15
2	Heads Form	
3	Delay until events which	
4	require recording occur	
5	Day Nurse completes	2.9
6	applicable sections including a brief state-	
7	ment of patient condition	
8		
9	Transcribe additional	
10	events as they occur during the day shift	
11		
12	Delay until end of day shift	
13		
14	Evening Nurse receives	.5
15	form from day nurse at end of day shift	
16		
17	Delay until events	
18	which require recording occur	
19		
20	Evening Nurse completes	2.9
21	applicable sections including a brief state-	
22	ment of patient condition	
23		
24	Transcribe additional	
25	events as they occur during the evening shift	
26		

No.	DETAILS OF (PRESENT / PROPOSED) METHOD	TIME IN MINUTES
1	Delay until end of	
2	Evening Shift	
3	Night Nurse receives	.5
4	form from Evening Nurse at end of Evening Shift	
5		
6	Delay until events which	
7	require recording occur	
8	Night Nurse completes	2.9
9	applicable sections including a brief state-	
10	ment of patient condition	
11		
12	Transcribe additional	
13	events as they occur during the Night Shift	
14		
15	Delay until end of	
16	Night Shift	
17	Form sent to Switch-	
18	board at end of Night Shift	
19	N- 11.2	
20		
21		
22		
23		
24		
25		
26		

NO. 71

FORM LMSD 8020B — LOCKHEED MISSILES & SPACE COMPANY — PAGE ___ OF ___

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
O OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Minor Surgery Log

□ MAN OR □ MATERIAL

CHART BEGINS Nursing Unit

CHART ENDS Nursing Unit

CHARTED BY ________ DATE ________

	DETAILS OF (PRESENT/PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES		DETAILS OF (PRESENT/PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Make out new log	O		1.7	1				
2	sheet each a.m.				2				
3	Enter patient data	O		3.8	3	N-7.2			
4	time and date for each patient				4				
5					5				
6	Note procedure M.D.	O		1.5	6				
7	and support				7				
8	Send sheets to Office,	O		1.6	8				
9	at end of day				9				
10					10				
11					11				
12					12				
13					13				
14					14				
15					15				
16					16				
17					17				
18					18				
19					19				
20					20				
21					21				
22					22				
23					23				
24					24				
25					25				
26					26				

FORM LMSD 8824B

NO. 7L

LOCKHEED MISSILES & SPACE COMPANY

PAGE ___ OF ___

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Emergency Room Record

□ MAN OR □ MATERIAL

CHART BEGINS At Emergency

CHART ENDS At Emergency

CHARTED BY ______ DATE ______

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES		DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Prepare Emergency Room Record	○⇨□D▽		7.1	1		○⇨□D▽		
2		○⇨□D▽			2		○⇨□D▽		
3	Sign Record (Patient and Doctor)	○⇨□D▽			3		○⇨□D▽		
4		○⇨□D▽			4		○⇨□D▽		
5	Transmit one copy to Medical Records	○⇨□D▽			5		○⇨□D▽		
6		○⇨□D▽			6		○⇨□D▽		
7	Transmit one copy to Doctor	○⇨□D▽			7		○⇨□D▽		
8		○⇨□D▽			8		○⇨□D▽		
9	Transmit one copy to Out-Patient Desk	○⇨□D▽			9		○⇨□D▽		
10		○⇨□D▽			10		○⇨□D▽		
11	Post Patient's Name in Log Book	○⇨□D▽		.5	11		○⇨□D▽		
12		○⇨□D▽			12		○⇨□D▽		
13		○⇨□D▽			13		○⇨□D▽		
14		○⇨□D▽			14		○⇨□D▽		
15		○⇨□D▽			15		○⇨□D▽		
16		○⇨□D▽			16		○⇨□D▽		
17		○⇨□D▽			17		○⇨□D▽		
18		○⇨□D▽			18		○⇨□D▽		
19		○⇨□D▽			19		○⇨□D▽		
20		○⇨□D▽			20		○⇨□D▽		
21		○⇨□D▽			21		○⇨□D▽		
22		○⇨□D▽			22		○⇨□D▽		
23		○⇨□D▽			23		○⇨□D▽		
24		○⇨□D▽			24		○⇨□D▽		
25		○⇨□D▽			25		○⇨□D▽		
26		○⇨□D▽			26		○⇨□D▽		

FORM LMSD 6926B

LOCKHEED MISSILES & SPACE COMPANY

FLOW PROCESS CHART

NO. 7m

PAGE ___ OF ___

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Sponge Count

□ MAN OR □ MATERIAL

CHART BEGINS

CHART ENDS

CHARTED BY ______ DATE ______

WHY WHAT WHERE WHEN WHO HOW SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Form attached to	○⇨□D▽		1.5
2	patient's chart at surgery	○⇨□D▽		
3		○⇨□D▽		
4	Circulating Nurse	○⇨□D▽		—
5	counts sponges as used	○⇨□D▽		
6	Count entered on form	○⇨□D▽		3.3
7	as used	○⇨□D▽		
8	Count is audited	○⇨□D▽		1.5
9		○⇨□D▽		
10	Form is completed and	○⇨□D▽		1.6
11	stays with patient	○⇨□D▽		
12		○⇨□D▽		
13	Patient & Chart moved	○⇨□D▽		
14	to Nursing Unit	○⇨□D▽		
15	Patient Chart to	○⇨□D▽		
16	Chart Rack	○⇨□D▽		
17		○⇨□D▽		
18		○⇨□D▽		
19		○⇨□D▽		
20		○⇨□D▽		
21		○⇨□D▽		
22		○⇨□D▽		
23		○⇨□D▽		
24		○⇨□D▽		
25		○⇨□D▽		
26		○⇨□D▽		

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1		○⇨□D▽		
2	N-6.3	○⇨□D▽		
3		○⇨□D▽		
4		○⇨□D▽		
5		○⇨□D▽		
6		○⇨□D▽		
7		○⇨□D▽		
8		○⇨□D▽		
9		○⇨□D▽		
10		○⇨□D▽		
11		○⇨□D▽		
12		○⇨□D▽		
13		○⇨□D▽		
14		○⇨□D▽		
15		○⇨□D▽		
16		○⇨□D▽		
17		○⇨□D▽		
18		○⇨□D▽		
19		○⇨□D▽		
20		○⇨□D▽		
21		○⇨□D▽		
22		○⇨□D▽		
23		○⇨□D▽		
24		○⇨□D▽		
25		○⇨□D▽		
26		○⇨□D▽		

FORM LMSD 8926B

LOCKHEED MISSILES & SPACE COMPANY

NO. 7-0

PAGE ___ OF ___

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
O OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB O.R. Patient Call Slip

□ MAN OR □ MATERIAL

CHART BEGINS

CHART ENDS

CHARTED BY ______ DATE ______

WHY? WHAT? HOW? WHERE? WHEN? WHO? SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION TRANSPORT INSPECTION DELAY STORAGE	DISTANCE IN FEET	TIME IN MINUTES	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION TRANSPORT INSPECTION DELAY STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1 Check O.R. Schedule	O ⇨ □ D ▽		1.0	1	O ⇨ □ D ▽		
2	O ⇨ □ D ▽			2	O ⇨ □ D ▽		
3 Pull Patient's Charts	O ⇨ □ D ▽		1.0	3 N - 21.0	O ⇨ □ D ▽		
4	O ⇨ □ D ▽			4	O ⇨ □ D ▽		
5 Make out Call Slips for Patients scheduled	O ⇨ □ D ▽		15.0	5	O ⇨ □ D ▽		
6 for surgery	O ⇨ □ D ▽			6	O ⇨ □ D ▽		
7	O ⇨ □ D ▽			7	O ⇨ □ D ▽		
8 Hold till 6 a.m.	O ⇨ □ D ▽		—	8	O ⇨ □ D ▽		
9	O ⇨ □ D ▽			9	O ⇨ □ D ▽		
10 Place slips at Patients door	O ⇨ □ D ▽		4.0	10	O ⇨ □ D ▽		
11	O ⇨ □ D ▽			11	O ⇨ □ D ▽		
12	O ⇨ □ D ▽			12	O ⇨ □ D ▽		
13	O ⇨ □ D ▽			13	O ⇨ □ D ▽		
14	O ⇨ □ D ▽			14	O ⇨ □ D ▽		
15	O ⇨ □ D ▽			15	O ⇨ □ D ▽		
16	O ⇨ □ D ▽			16	O ⇨ □ D ▽		
17	O ⇨ □ D ▽			17	O ⇨ □ D ▽		
18	O ⇨ □ D ▽			18	O ⇨ □ D ▽		
19	O ⇨ □ D ▽			19	O ⇨ □ D ▽		
20	O ⇨ □ D ▽			20	O ⇨ □ D ▽		
21	O ⇨ □ D ▽			21	O ⇨ □ D ▽		
22	O ⇨ □ D ▽			22	O ⇨ □ D ▽		
23	O ⇨ □ D ▽			23	O ⇨ □ D ▽		
24	O ⇨ □ D ▽			24	O ⇨ □ D ▽		
25	O ⇨ □ D ▽			25	O ⇨ □ D ▽		
26	O ⇨ □ D ▽			26	O ⇨ □ D ▽		

NO. 7r

LOCKHEED MISSILES & SPACE COMPANY PAGE ___ OF ___

FORM LMSD 8026B

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED	FT.		FT.		FT.	

JOB Surgery Schedule Sheet

☐ MAN OR ☐ MATERIAL

CHART BEGINS Surgery Scheduling Desk

CHART ENDS Surgery Scheduling Desk

CHARTED BY ______ DATE ______

WHY WHAT WHO WHERE WHEN HOW SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

No.	DETAILS OF (PRESENT / PROPOSED) METHOD	DISTANCE IN FEET	TIME IN MINUTES	No.	DETAILS OF (PRESENT / PROPOSED) METHOD	DISTANCE IN FEET	TIME IN MINUTES
1	Block Out Schedule		88	1	Post (1) copy in		1.0
2	Book into sections - 1 for each Op Room			2	Utility Work Room		
3				3			
4	Receive calls from		1.2	4	Post (1) copy at Central		1.0
5	Doctors to set up Surgery Date and Time			5	Supply Pickup Station		
6				6	Post (1) copy in Doc-		1.0
7	Post information to		1.5	7	tor's Lounge		
8	schedule book (date, time, patient name, age			8	Post (1) copy in Nurses		1.0
9	procedure, surgeon, assist., anesthesist)			9	Lounge		
10				10	Post (1) copy in		1.0
11	Delay (until Evening)			11	Doctor's Dictation Room		
12				12	Post (1) copy at		1.0
13	Review Schedule Book			13	Scheduling Desk		
14				14	Cut up (1) copy for the		.5
15	Using Schedule Book -		9.1	15	Orderly to use as a patient pickup slip		
16	Type next day's surgery schedule			16			
17				17	Review schedule as		1.0
18	Delay (Until Admitting			18	required		
19	picks up schedule - duplicates it - and			19	Receive notification		1.5
20	distributes it)			20	and post changes to schedule		
21	Receive 12 copies of		.5	21			
22	schedule			22	Notify proper area by phone of the changes		1.2
23	Post 5 copies in Oper-		1.0	23			
24	ating Room and Recovery Room (4 O.R.'s - 1 R.R.)			24	Delay (until end of day)		
25				25	N- 34.1		
26				26	Discard Schedules		.2

FORM LMSD 89268

LOCKHEED MISSILES & SPACE ~~COMPANY~~

NO. 8a

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FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
O OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Patient Discharge Notice

☐ MAN OR ☐ MATERIAL

CHART BEGINS At Nursing Station

CHART ENDS At Nursing Station

CHARTED BY ______ DATE ______

WHY WHAT WHO WHERE WHEN HOW — SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Write Order	O⇨□D▽		1.1
2		O⇨□D▽		
3	Nurse stamps form with addressograph plate	N⇨□D▽		.7
4		O⇨□D▽		
5	Nurse completes balance of form	N⇨□D▽		1.7
6		O⇨□D▽		
7	Completed form given to Parent	N⇨□D▽		2.0
8		O⇨□D▽		
9	Parent with form sent to Business Office	O⇨□D▽		
10		O⇨□D▽		
11	Delay while Business Office processes form	O⇨□D▽		
12		O⇨□D▽		
13	Receive copy of form from parent	N⇨□D▽		.5
14		O⇨□D▽		
15	Copy of form checked by nurse	O⇨N D▽		1.0
16		O⇨□D▽		
17	Copy of form picked up by Housekeeping	O⇨□D▽		
18		O⇨□D▽		
19	Patient's Kardex Card destroyed after patient leaves	N⇨□D▽		.2
20		O⇨□D▽		
21		O⇨□D▽		
22	Patient's medication card destroyed after patient leaves	N⇨□D▽		.2
23		O⇨□D▽		
24		O⇨□D▽		
25	Retain Patient's addressograph plate for 24 hours after discharge	O⇨□D▽		
26		O⇨□D▽		

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Addressograph Plate destroyed	N⇨□D▽		.2
2		O⇨□D▽		
3	Patient's chart sent to Medical Records	O⇨□D▽		
4	D - 1.7	O⇨□D▽		
5	N - 6.5	O⇨□D▽		
6		O⇨□D▽		
7		O⇨□D▽		
8		O⇨□D▽		
9		O⇨□D▽		
10		O⇨□D▽		
11		O⇨□D▽		
12		O⇨□D▽		
13		O⇨□D▽		
14		O⇨□D▽		
15		O⇨□D▽		
16		O⇨□D▽		
17		O⇨□D▽		
18		O⇨□D▽		
19		O⇨□D▽		
20		O⇨□D▽		
21		O⇨□D▽		
22		O⇨□D▽		
23		O⇨□D▽		
24		O⇨□D▽		
25		O⇨□D▽		
26		O⇨□D▽		

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LOCKHEED MISSILES & SPACE COMPANY

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Patient Discharge Slip

☐ MAN OR ☐ MATERIAL

CHART BEGINS Maternity

CHART ENDS Maternity

CHARTED BY ______ DATE ______

DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1 Read Doctor's instruc-	○ (marked)		10
2 tions	○		
3 Prepare discharge slip	○ (marked)		1.7
4			
5 Take to Business Office	⇨ (marked)		
6			
7 Wait for copy to be	D (marked)		
8 returned			
9 Receive one copy	⇨ (marked)		.5
10 (brought by relative)			
11 Check for Cashier's	□ (marked)		10
12 signature			
13 Discard copy	○ (marked)		.2
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			

N-4.4

FORM LMSD 8026B

NO. 8c

LOCKHEED MISSILES & SPACE COMPANY PAGE ___ OF ___

FLOW PROCESS CHART

SUMMARY

	PRESENT		PROPOSED		DIFFERENCE	
	NO.	TIME	NO.	TIME	NO.	TIME
O OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Unclaimed Items Report

□ MAN OR □ MATERIAL

CHART BEGINS

CHART ENDS

CHARTED BY ________ DATE ________

WHY WHAT WHEN WHERE WHO HOW ELIMINATE COMBINE CHANGE SEQ. SIMPLIFY

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES		DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Receive items at	O ⇨ □ D ▽		–	1		O ⇨ □ D ▽		
2	Nursing Station	O ⇨ □ D ▽			2		O ⇨ □ D ▽		
3	Describe found item	O ⇨ □ D ▽		1.5	3		O ⇨ □ D ▽		
4	and location	O ⇨ □ D ▽			4		O ⇨ □ D ▽		
5	List patient(s) last	O ⇨ □ D ▽		3.0	5	N-6.2	O ⇨ □ D ▽		
6	occupying area	O ⇨ □ D ▽			6		O ⇨ □ D ▽		
7	Tag item and reference	O ⇨ □ D ▽		1.7	7		O ⇨ □ D ▽		
8	report	O ⇨ □ D ▽			8		O ⇨ □ D ▽		
9	Turn in items and	O ⇨ □ D ▽		–	9		O ⇨ □ D ▽		
10	report at shift end	O ⇨ □ D ▽			10		O ⇨ □ D ▽		
11		O ⇨ □ D ▽			11		O ⇨ □ D ▽		
12		O ⇨ □ D ▽			12		O ⇨ □ D ▽		
13		O ⇨ □ D ▽			13		O ⇨ □ D ▽		
14		O ⇨ □ D ▽			14		O ⇨ □ D ▽		
15		O ⇨ □ D ▽			15		O ⇨ □ D ▽		
16		O ⇨ □ D ▽			16		O ⇨ □ D ▽		
17		O ⇨ □ D ▽			17		O ⇨ □ D ▽		
18		O ⇨ □ D ▽			18		O ⇨ □ D ▽		
19		O ⇨ □ D ▽			19		O ⇨ □ D ▽		
20		O ⇨ □ D ▽			20		O ⇨ □ D ▽		
21		O ⇨ □ D ▽			21		O ⇨ □ D ▽		
22		O ⇨ □ D ▽			22		O ⇨ □ D ▽		
23		O ⇨ □ D ▽			23		O ⇨ □ D ▽		
24		O ⇨ □ D ▽			24		O ⇨ □ D ▽		
25		O ⇨ □ D ▽			25		O ⇨ □ D ▽		
26		O ⇨ □ D ▽			26		O ⇨ □ D ▽		

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FORM LMSD 6926D

LOCKHEED MISSILES & SPACE COMPANY PAGE ___ OF ___

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Prescription Form - Discharged Patient

☐ MAN OR ☐ MATERIAL

CHART BEGINS Nurses Station Maternity

CHART ENDS Nurses Station Maternity

CHARTED BY ________ DATE ________

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES		DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Read Doctor's order sheet	○⇨□D▽		1.0	1	Check chart vs copies to be sure all medication has been charged to patient	○⇨□D▽		1.0
2		○⇨□D▽			2		○⇨□D▽		
3	Write prescription form	○⇨□D▽		1.1	3		○⇨□D▽		
4		○⇨□D▽			4	Discard copy	○⇨□D▽		.2
5	Write charge slip	○⇨□D▽		1.7	5		○⇨□D▽		
6		○⇨□D▽			6		○⇨□D▽		
7	Remove copy	○⇨□D▽		.9	7	D - 1.5	○⇨□D▽		
8		○⇨□D▽			8	N - 7.1	○⇨□D▽		
9	Insert copy in chart	○⇨□D▽		.6	9		○⇨□D▽		
10		○⇨□D▽			10		○⇨□D▽		
11	Wait for Doctor	○⇨□D▽			11		○⇨□D▽		
12		○⇨□D▽			12		○⇨□D▽		
13	Sign prescription	○⇨□D▽		1.5	13		○⇨□D▽		
14		○⇨□D▽			14		○⇨□D▽		
15	Forward prescription and charge slip to Pharmacy	○⇨□D▽			15		○⇨□D▽		
16		○⇨□D▽			16		○⇨□D▽		
17		○⇨□D▽			17		○⇨□D▽		
18	Wait for medication	○⇨□D▽			18		○⇨□D▽		
19		○⇨□D▽			19		○⇨□D▽		
20	Receive medication	○⇨□D▽			20		○⇨□D▽		
21		○⇨□D▽			21		○⇨□D▽		
22	Wait for patient to be discharged	○⇨□D▽			22		○⇨□D▽		
23		○⇨□D▽			23		○⇨□D▽		
24	Give medication to patient to take home	○⇨□D▽			24		○⇨□D▽		
25		○⇨□D▽			25		○⇨□D▽		
26		○⇨□D▽			26		○⇨□D▽		

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LOCKHEED MISSILES & SPACE COMPANY PAGE___OF___

FLOW PROCESS CHART

SUMMARY

	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
O OPERATIONS						
⇨ TRANSPORTATIONS						
☐ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Patient Chart To Medical Records

☐ MAN OR ☐ MATERIAL

CHART BEGINS

CHART ENDS

CHARTED BY _____ DATE _____

WHY WHAT WHERE WHEN WHO HOW SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES		DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Audit Chart for	●⇨☐D▽		8.8	1		O⇨☐D▽		
2	Content:	O⇨☐D▽			2		O⇨☐D▽		
3	Summary Sheet	O⇨☐D▽			3	N-13.2	O⇨☐D▽		
4	Hx Sheet	O⇨☐D▽			4		O⇨☐D▽		
5	Progress Notes	O⇨☐D▽			5		O⇨☐D▽		
6	Order Sheets	O⇨☐D▽			6		O⇨☐D▽		
7	X-ray/Lab Sheets	O⇨☐D▽			7		O⇨☐D▽		
8	Consultation Reports	O⇨☐D▽			8		O⇨☐D▽		
9	O.R. Records	O⇨☐D▽			9		O⇨☐D▽		
10	Anesthesia Record	O⇨☐D▽			10		O⇨☐D▽		
11	Special Records	O⇨☐D▽			11		O⇨☐D▽		
12	Clinical Records	O⇨☐D▽			12		O⇨☐D▽		
13	Nurses Notes	O⇨☐D▽			13		O⇨☐D▽		
14	Chaplin's Record	O⇨☐D▽			14		O⇨☐D▽		
15	Addressograph Plate	O⇨☐D▽			15		O⇨☐D▽		
16		O⇨☐D▽			16		O⇨☐D▽		
17	Place closed Chart in	●⇨☐D▽		1.5	17		O⇨☐D▽		
18	discharge envelope	O⇨☐D▽			18		O⇨☐D▽		
19	Stamp envelope	●⇨☐D▽		.7	19		O⇨☐D▽		
20		O⇨☐D▽			20		O⇨☐D▽		
21	Make out Medical	●⇨☐D▽		1.7	21		O⇨☐D▽		
22	Records Slip	O⇨☐D▽			22		O⇨☐D▽		
23	Place in basket	●⇨☐D▽		.5	23		O⇨☐D▽		
24		O⇨☐D▽			24		O⇨☐D▽		
25		O⇨☐D▽			25		O⇨☐D▽		
26		O⇨☐D▽			26		O⇨☐D▽		

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LOCKHEED MISSILES & SPACE COMPANY

FLOW PROCESS CHART

SUMMARY	PRESENT NO.	PRESENT TIME	PROPOSED NO.	PROPOSED TIME	DIFFERENCE NO.	DIFFERENCE TIME
○ OPERATIONS						
⇨ TRANSPORTATIONS						
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELLED		FT.		FT.		FT.

JOB Infant Release Report (Release to person other than parent or relative)

☐ MAN OR ☐ MATERIAL

CHART BEGINS Maternity

CHART ENDS Maternity

CHARTED BY ________ DATE ________

WHY WHAT WHO WHERE WHEN HOW SIMPLIFY ELIMINATE COMBINE CHANGE SEQ.

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1	Receive partially completed form from Med. Records	○⇨□D▽		.5
2		○⇨□D▽		
3		○⇨□D▽		
4	Fill in Section II of form	○⇨□D▽		40
5		○⇨□D▽		
6	Obtain signature and ID of person receiving infant	○⇨□D▽		
7		○⇨□D▽		
8		○⇨□D▽		
9	Inspect and verify ID	○⇨□D▽		10
10		○⇨□D▽		
11	Note type of ID on form and sign as witness	○⇨□D▽		15
12		○⇨□D▽		
13		○⇨□D▽		
14	Hold form in area for Med. Records to pickup	○⇨□D▽		
15		○⇨□D▽		
16		○⇨□D▽		
17		○⇨□D▽		
18		○⇨□D▽		
19		○⇨□D▽		
20		○⇨□D▽		
21		○⇨□D▽		
22		○⇨□D▽		
23		○⇨□D▽		
24		○⇨□D▽		
25		○⇨□D▽		
26		○⇨□D▽		

	DETAILS OF (PRESENT / PROPOSED) METHOD	OPERATION / TRANSPORT / INSPECTION / DELAY / STORAGE	DISTANCE IN FEET	TIME IN MINUTES
1		○⇨□D▽		
2		○⇨□D▽		
3	N-7.C	○⇨□D▽		
4		○⇨□D▽		
5		○⇨□D▽		
6		○⇨□D▽		
7		○⇨□D▽		
8		○⇨□D▽		
9		○⇨□D▽		
10		○⇨□D▽		
11		○⇨□D▽		
12		○⇨□D▽		
13		○⇨□D▽		
14		○⇨□D▽		
15		○⇨□D▽		
16		○⇨□D▽		
17		○⇨□D▽		
18		○⇨□D▽		
19		○⇨□D▽		
20		○⇨□D▽		
21		○⇨□D▽		
22		○⇨□D▽		
23		○⇨□D▽		
24		○⇨□D▽		
25		○⇨□D▽		
26		○⇨□D▽		

Appendix E
HOSPITAL COMMITMENT TO COMPUTER USAGE

Details of the survey made of computer-assisted hospital information systems are given in this appendix. The survey covers installations at six different hospitals.

Appendix E
HOSPITAL COMMITMENTS TO COMPUTER USAGE

E.1 HOSPITAL A

E.1.1 Background

This short term 247-bed children's general hospital provides inpatient, outpatient, and emergency services for infants, children, and adolescents. It reports 14,501 admissions annually, an average census of 214 patients or approximately 86.6 percent occupancy. Of the 570 personnel employed, approximately 150 are assigned to the nursing service.

Since this is the only pediatric hospital in its city, it is involved in the provision of care to the majority of the sick or injured children. This is reflected in the high admission rate for a hospital of its size, and in the high utilization of the emergency room.

This hospital is approved by the Joint Commision on Accreditation of Hospitals, and a also for pediatric internships and residencies by the American Medical Association. It maintains a pathology laboratory, pharmacy, physical therapy service, premature nursery, outpatient department, emergency room, postoperative recovery room, social work department and auxiliary as adjuncts to the general medical and surgical services for all types of problems presented by infants through teenage.

E.1.2 Background of the System Development

In 1961, Hospital A and IBM Advanced Systems Development Division collaborated in a work sampling study of information processing by nurses. The outcome of this collaboration effort was an assumption that a significant portion of the nurses clerical activity* could be automated.

As a result of this study, an IBM Control System (1710) was installed in the lower floor of the hospital. This system consists of a 1711 Converter, a 1712 Multiplexer, and 1311 random access storage units linked to an IBM 1620 computer. The system operates from stored program control. Fifteen input devices (1053 and 1092) are in use at the present time.

E.1.3 Features of the System

A major feature of the system is the "audit trail," which prints out a daily program utilization list. This list provides the EDP department with a daily summary of the frequency that programs are requested. In addition, printouts of all admitting laboratory tests performed by the autoanalyzers are provided for all newly admitted patients. Other programs include input processing of admitting/census, laboratory tests, ordering, conversion tables (weights from pounds to kilograms), monthly scheduling of nursing personnel, bi-weekly scheduling of all student nurses from the six different diploma programs, a listing of patients by units and by physician, patient condition reports, and dietary lists from each floor kitchen.

Data processing personnel include two systems analysts, eight programmers, and two keypunch operators.

Nursing station features of the system include the following:

- Laboratory Test Requests, which include an identifying number for use in the manual reporting that completes the cycle, and the manual input of "hold meal" instructions during fasting tests.

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* The nursing staff was defined as inclusive of head nurses, registered nurses, ward secretary, licensed practical nurses, and students of professional and licensed practical nursing.
Clerical activities were considered as functions of "information acquisition, original recording, referencing, oral exchange, transmittal, and maintenance."

- Diet Kitchen Listings for the three meals served, including NPO, hold diets, and identification of isolation patients by "C" (contagious) and "I" (infectious).
- Admitting/Census for the entire hospital and for each floor. This includes condition reports (satisfactory, critical, poor, and serious) available by days, afternoons, or nights. Discharge reports automatically* cancel special diets.

E.1.4 Appraisal of the System

In view of the numerous system modifications resulting from programming constraints and hardware capabilities, this system is performing limited services for the information handling requirements. However, there are plans to implement a number of programs, particularly in the areas of staffing and patient master records.

Innovations. As a result of a recent evaluation of the system, staffing patterns will be changed. A new position has been created, that of clerk-manager, who essentially consolidates the functions previously performed by the ward secretary, unit manager, and other nonnurse concepts at the nursing station. In general, the clerk-manager processes information at the terminal and provides assistance to parents who require information about hospital policies. In addition, the clerk manager coordinates many of the interfaces between dietary, laboratory, radiology, and other departments.

Shift Differences. Descriptions of the on-going programs indicate that there are differences in information processing between the days, evening, and night shifts.

E.1.5 Perceived Advantages and Limitations of the System

Users who responded to questions related to the impact of the system indicated that they had adapted themselves to the available functions. Day staff nurses appeared to rely on the unit clerks and clerk-managers for assistance in the use of the terminals.

*Lockheed Missiles & Space Company, Documentation of Sample Observations, LMSC-689260, Sunnyvale, Calif., 18 Mar 1969 (Special report to Project Officer, National Center for Health Services Research and Development)

Their responses were less consistent in relation to involvement of the personnel in the operation. Most felt that there were no problems with maintenance of the equipment, although a clerk-manager stated she would call to tell the IBM maintenance man if machine ribbons required changing.

A significant comment related to state-of-the-art was elicited from a head nurse who stated that in the early stages the medication system was too complicated and thus discarded. Others referred to the medication system as a possible source of error that required more detailed programming than envisioned at the outset. A corollary to the medication system is the formula system for bottle-fed infants. This, too, appeared to have implementation problems, but an 8-hour printout of formulas due is being provided and used. Discarded from the formula system were printouts of formulas due for the next hour (due to lack of use of more frequent hard copy printout). The major value of the system at the present time is the patient locator service provided by the admitting/census report program. Slow response time, however, appears to be a major limitation of the system configuration.

Nurses interviewed indicated that the system has required duplication of laboratory test requests and dietary updating, and has thus required more time. Reduction of paperwork appears to have been minimal. "Stat" work must still be telephoned in, and hold diets must still be manually coded into the system by the night nurse. There may be a value in terms of locating laboratory orders, but in general the system does not reduce the information processing requirement at the nursing station.

An interesting comment related to the potential of the system was obtained from an interview. "A profile of the patient would be nice – using the machine completely instead of charting."

This, in summary, reflects the system potential which appears to be the outstanding feature of the existing service at Hospital A. With the exception of a printout of results obtained from the autoanalyzer, the entire patient's master record is in manual form.

E.2 HOSPITAL B

E.2.1 Background

This long-established hospital, founded in 1822, performs inpatient, outpatient, day care, educational, and research functions related to psychiatric patients. For the year 1966–67, it reported a total of 967 persons treated, averaged 545 admits, and 502 discharges. Forty-eight persons were identified as "stationary." The daily average in-residence population was reported as 391.1, and the maximum daily census for the year was 401 individuals. Approximately one-third of these patients are teen-age patients.

This hospital provides residency training for physicians specializing in general psychiatry, child psychiatry, and clinical neurology. In addition, special programs are provided for nursing supervisors, nursing instructors and charge nurses, and student nurses from 11 undergraduate programs. The 276 personnel of the nursing staff possess varying backgrounds, ranging from supervisor to psychiatric aides, and represents about one-half of the total hospital staff.

E.2.2 Background of the System Development

For the past three years (1965–68), Hospital B has achieved recognition through the development of its computer project. The National Institute of Mental Health funded the development of a "complete communication system" with the goal of utilizing a central computer with input/output terminals. Batch-processed nursing notes and other entries to the patient record were the main source of data during the early research phase.

At present, a million-dollar grant from Travelers Insurance Company is expected to assist in the provision of Bunker-Ramo terminals for on-line retrieval of logistic information and psychological evaluations of patient status. The off-line Automated Nursing Note is still in use and is also being tried at two state hospitals as well as the psychiatric floors of two general hospitals in the vicinity of Hospital B. Further plans include the use of the Automated Nursing Note by the U.S. Army at Walter Reed General Hospital. A factor which greatly assisted the increasing acceptance of the mark-sense form is the approval of the Joint Commission on Accreditation of the signed printout summary of patient behaviors, which is available every 24 hours through batch processing.

E.2.3 Appraisal of the System

For a period of almost a year, the users were required to perform double charting. During this period revisions were frequently accomplished in order to provide a form which ultimately employed a common terminology and approached the description of patient behavior. A detailed explanation of computers and data processing techniques were ultimately required for optimal system use by the staff.

Factors involved in development and use of the mark-sense forms were as follows:

- Observer reliability
- Length of time needed to complete the forms
- Development of a common data base
- Training and evaluation of the nursing staff

The optical scanning device, equipped with fiber optics and punch operation, will also accept addressograph and multigraph imprints. It is programmed to reject forms if they are incomplete in any way.

E.2.4 Perceived Advantages and Disadvantages of the System

Other than the automated notes, there are no other system requirements processed through the computer. Thus the test requests, medications, and census listing found in other systems are omitted at Hospital B.

On the other hand, the education of the personnel through this developmental system is providing users with a deeper understanding of the computer's potential.

The mark-sense form itself is considered to be an excellent means of achieving immediate recall of numerous categories of information often omitted from the record of a psychiatric patient. In a brief time period, one may review words and phrases* related to any of the following 15 representative parameters of behavior:

- Personal habits
- Social behavior
- Verbalization
- Appearance
- Social interaction
- Intellectual behavior
- Sleeping and eating habits
- Mood
- Unit relationship
- Attitude
- Vital signs
- Activities
- Privileges
- Treatments
- Somatic difficulties

Descriptions of miscellaneous behavior characteristics may also be provided.

*Lockheed Missiles & Space Company, Documentation of Sample Observations, LMSC-689260, Sunnyvale, Calif., 17 Mar 1969 (special report to Project Officer, National Center for Health Services Research and Development).

E.3 HOSPITAL C

E.3.1 Background

This short and long term 3,000-bed hospital provides inpatient, outpatient, and emergency service for citizens of a major city and any other individual requiring care. The annual admitting rate reported is 104,638 and there is an average occupancy of 2,224 (or about 78 percent). Of the 5,608 personnel employed, approximately 2,900 are assigned to nursing service.

Since the services of this hospital are provided for anyone who seeks care regardless of ability to pay, the problems of county responsibility for continuing care impinge upon the services provided. Tracking of the care provided to the patients followed by their referral to other agencies has significant implications for data processing of the hospital records.

The hospital is certified by the Joint Commission of Accreditation of Hospitals, and, in collaboration with a major university, conducts an internship and residency program approved by the American Medical Association. Clarification of the organizational structure of county health services may be found in previously supplied preliminary documentation.* It may be noted that these include an extensive rehabilitation program and will provide a modern, automated hospital information system when another hospital is constructed in a depressed region of the city about 1971.

E.3.2 Background of the System Development

In 1968, Hospital C conducted a nursing system feasibility study. Rules were established, as specified by the Hospital Computer Center, to designate the system and subsystems of the nursing department. The rules document the program, file, report, and procedures within the nursing system*.

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*See reference p. E-4.

At about the same time, two computer projects were in process of evolution: (1) A county hospital system using an IBM 360/40 on lease; (2) a university drug utilization study using an IBM 360/40 on a rental basis. Descriptions of the system designs* are to be completed.

This EDP system is being developed in three stages. The first stage, now in progress, is an on-line admitting program. At present, it contains two million names in patient files. A DOS/indexed sequential file retrieval system has been tested. Data cells and "Faster Coding" (Gentry) will be used. The hardware is IBM 360/40 with a 128K CPU and a series of remote terminals being installed in admitting and pharmacy. These terminals will be IBM 2260 CRT's and 2740 printers.

The concept of the data bank of patient files is evolving and both vertical and parallel modules will be used. Thus, not only will data abstracts be available at Hospital C, but also to other hospitals in the country.

In stage two, all service areas of Hospital C will be on-line with direct communication to a larger CPU with more random access storage.

The third stage will be the completion of the total system including all nine county hospitals.

E.3.3 Features of the System

Printouts. At the university pilot unit, printouts are generated on request for census, diet census by room, and medication cards, as follows:

- Census – Including identification data, admitting data, file number, age, sex, race, service, condition*.
- Diet Census by Room – Including color coding by service every four hours when meals are served between 7:00 a.m. and 7:00 p.m.*

*See reference p. E-4.

- <u>Medication Cards</u> – Including name of patient, patient file number, drug, dose, route, frequency and expiration date*. Kardex inserts are also provided for use of nurses.

  Also in process is an experimental development of gummed-back medication tickets to be used in liew of medication cards and provided with a printout of the order for the chart.

At Hospital C, printouts are generated for ward reports describing the movement of patients for a 24-hr period*. This is updated manually by clerk on nursing service (using red ballpoint pen) at any time of day. These are picked up periodically throughout the day for computer update.

<u>Nursing Systems Coordination.</u> A course is being conducted by the Nursing Systems Coordinator assigned by nursing service to the project. The curriculum includes basic terminology and discussion of approaches to computer usage appropriate to nursing.

In addition, the role is one of clarifying the decision-making responsibility of the RN* in relation to drug administration. In essence, the RN is serving as a resource person to other nursing team members, as well as to the data processing and research personnel.

E.3.4 Appraisal of the System

There are two distinct projects underway at Hospital C. On the 80-bed pilot unit, a clerk performs data processing inputs. This experimental project is being conducted on a Medical Surgical Unit under a Public Health Service Drug Study grant. There has been a reduction of paper handling in relation to the delivery of medications only – since hand copying of the Kardex and nurses notes relative to medications and medicine tickets are no long necessary. During the study phase, parallel record keeping has been required and increased staffing has been provided on the pilot ward

*See reference p. E-4.

only. The record keeping thus far appears to have affected only the functions of the ward clerk whose responsibilities are directed to terminal operations and processing of physicians medication and diet orders. According to the interviewees, the ward clerk (or terminal operator) is the primary interface for inputs and outputs on medications, diet lists, and end-of-shift reports. In general, information processing by nurses has not been affected markedly at this point.

The developing system is seen by all interviewees as one that all personnel are encouraged to become more accurate in reporting.

E.3.5 Perceived Advantages and Disadvantages of the System

Users who have been working with the system feel that they need a high-speed printer. In addition, some suggest that data processing background is important to participation in the project. In that nurses discuss problems directly with programmers, a system is developing which will have practical use and is presumably patient-care oriented. This factor was strongly emphasized by all interviewees at Hospital C ("Computer people and nursing staff worked together from the very beginning.").

In summary, attitudes of "cooperation, thoughtfulness, creativeness and feelings of accomplishment" have been developed and prevail on the pilot unit at the university and the data processing group at the county hospital.

E.4 HOSPITAL D

E.4.1 Background

This 200-bed hospital, opened in Mar 1968, admits approximately 8,933 patients annually. It reports an average daily census of 189 patients and an estimated 87.08 percent occupancy, with a large emergency outpatient service. Of the 466 personnel employed, 227 are assigned to nursing service.

E.4.2 Background of the System Development

In collaboration with the Medelco Company, Hospital D's staff began to test the system in 1964 while still in their old hospital. As the requirements were established, nurses, Flexowriter operators, and clerks were provided with information on the use of the system and were involved in its development. Thus, when the new hospital was opened with the terminals installed, all personnel were thoroughly familiar with its operation. The acceptance date of the system was July 1, 1968 (on a five year lease). Clerks were trained to perform the flexowriter function.

E.4.3 Features of the System

The Medelco system is a data collection system utilizing edge-punched cards, card readers, printers, and a solid state specially designed computer. Source cards contain patient identification data prepared by Flexowriter (one for every newly admitted patient), and requests for medications, laboratory tests, and other hospital services. These are all stored at the nursing station. As services are requested (by written request of the physician), cards are selected by the clerk who sequentially inserts them into the card reader. The message is disseminated to the receiving department and printed out within 25 seconds or less. An arrow on the cards indicates the correct position of the edge punch for its interpretation by the computer.

Although there are approximately 5,000 cards filed in logical sequence at each nursing station, the personnel appear to have adapted to this system quite comfortably. This is no doubt due to their involvement in its development. The cost figures are not available; however, when the interfacing device is perfected and a larger memory can be provided, it is felt that this will be an economical system.

An additional feature of the system as it was demonstrated at Hospital D was soundproofing of the printers accomplished by placing them in boxes lined with carpet material.

Telephone calls for service as well as messenger services have been markedly reduced. Plans for expansion include tying in a 100-bed extended-care facility to the memory.

E.4.4 Appraisal of the System

There are limitations to the flexibility of the system, particularly in relation to reporting on the patient's progress. Thus, it is management-oriented and as such has a definite value in reducing the tedious clerical activities associated with processing orders.

E.4.5 Perceived Advantages and Disadvantages of the System

The system is an attempt to minimize clerical activities (tests and supplies) at nursing stations. As such, it is successful. It is not directed to the problem of the patient's chart, and therefore is extremely limited in the service provided. There are plans to expand Medelco's system, but work in this area was not evident.

E.5 HOSPITAL E

E.5.1 Background

This 352-bed hospital provides impatient, outpatient, and emergency service. The annual admitting rate is 12,245 patients per year, an average census of 254, and an estimated 81.4 percent occupancy. Of the 686 personnel employed, 250 are assigned to nursing service.

E.5.2 Background of the System Development

The development of a computer system began as a joint research project with a major university and was ultimately to include five hospitals on a shared basis. Hypotheses were established in order to test the validity of the approach being used. The assumptions were that a base must be established with source data derived from the patient, thus necessitating a series of new formats for data collection.

A design for a proposed computer-assisted total hospital system was prepared in 1966*. The concept of the sequential doctor's and nurse's updates was feasible with the capability of the Control Data Corporation's Digiscribe. The formatting of displays was developed with committees of physicians and nurses working as teams.

E.5.3 Features of the System

The Digiscribe terminal was located at the center of a T-shaped desk, with peripheral equipment adjacent to the area in a completely separate room. The pilot unit is in the coronary care area and includes a panel of closed-circuit television screens and electrocardiograph oscilloscope monitors. Thus, a unique feature of the system was that it combined the capability of visual observation of all patients and their cardiac status with on-line reporting of specific observations about them through the use of the Digiscribe cathode ray tube terminal.

Significant to the Hospital E information system was the fact that hypotheses were being tested* and the user requirements were being established by the physicians and nurses on the pilot unit. These individuals met at weekly intervals with a view toward organizing displays of descriptive terminology as related to the functions identified in the preliminary documentation.* A problem orientation was being used, such as "pain," "anatomical location," "nature of," etc. Specifically, the groups were organized as committees identified as follows:

- Pilot Station Medical Research Committee
- Pilot Station Nursing Research Committee

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*See reference p. E-4.

The Medical Research Committees included both nurses and physicians, and were working on subtopics entitled:

- Research
- Observations
  - Progress notes
  - Nursing notes
  - History and physical
- Physician orders
- Problem-oriented chart
- Emergency room

The Nursing Research Committees worked on the following:

- Joint Hospital reporting requirements (another nearby hospital was also represented on this committee)
- Fluids and emotional problems
  - Input and output
  - Expectoration
  - Cough
  - Mental/emotional status
- Symptoms and medications

The pilot 26-bed unit on which the automation effort was developed included a number of other experimental features such as drapes, carpets, beds, and monitors.

A clerk was employed to perform the tasks of transcribing many of the manual requirements of the system. In addition, a pilot nursing notes form developed for ultimate computer application was in use in manual form.*

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*See reference p. E-4.

E.5.4 Appraisal of the System

The use of a research approach with problem orientation appeared to have provided a sound basis for the development of excellent working relationships between physicians and nurses. In this project, a realistic and practical concept for optimizing the computer capability had been partially implemented. Economic and other considerations severely limited those working on system development. As a result, the project was to be transferred to another area of the country.

E.5.5 Perceived Advantages and Disadvantages of the System

Users were attempting to resolve the problem of organizing data through a highly acceptable plan. Due to the lack of commitment at the administrative level, there were severe limitations placed upon the continuation and expansion of the system.

E.6 HOSPITAL F

E.6.1 Background

This 58-bed hospital provides comprehensive care and rehabilitation for patients whose mobility and respiratory state is impaired due to long term disabilities from injury or illness. The average length of stay is 30 days. Supported by a grant from the Public Health Service, the staff is involved in an evaluation of computer systems for hospital use. Despite obvious dissimilarities, there are similarities between the long and short term hospitals in relation to admitting, patient-care management, and discharge. Using this rationale, Hospital F is attempting to pursue system development in terms of the process of patient care, clinical research, and hospital management.

E.6.2 Features of the System

The Hospital F Information System is supported by batch programs which provide daily, weekly, and monthly reports. It is being used primarily to test hypotheses related to:

- Obtaining current patient information from a data bank
- Collecting data for shift reports
- Updating information
- Switching messages between terminals to log laboratory test requests and reports

The system is operating through a university teleprocessing facility. Terminals are operating in a conversational mode to enter, display, modify, or delete records in Hospital F subfiles. Using the query technique, calculations and reports are also provided as requested.

A user guide* and attention to the problem of reliability and/or system failure appeared to be significant features. Of particular interest is the fact that users are not required to enter data, since this activity was seen to be a frustrating factor. Terminal operators were involved in the evolutionary phase of this hospital information system.

There is a real awareness of the pitfall of becoming completely dependent upon the computer for patient-care data. For example, manual backup is continued until the printout of the shift report has been received.

The activity plan (printout) provided includes the time, location, comment, by whom, and position of the patient, and is a Kardex insert for patient care at the present time.*

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*See reference p. E-4.

Continuing research conducted by the system staff of Hospital F is directed toward the following:

- Collection of cost information
- Time involved in collecting test results
- Telephone calls
- Frequency of appointment cancellations

These data, collected before the system is operational, will be compared with the measurements performed after the system has been introduced. In general, the system is still developing. There is a realistic awareness that:

- Many seemingly small considerations may determine success or failure regardless of technical feasibility
- Customizing of the system to user requirements will forestall its rejection

E.6.3 Perceived Advantages and Disadvantages of the System

The activity plan printout appeared to have been well planned and adapted to the therapy program of individual patients. Other ongoing services were not as readily perceived as reducing information handling at the nursing station. This may be attributed to the developmental nature of the system at Hospital F.

Appendix F
COMPARATIVE ANALYSIS OF TERMINALS USED FOR LABORATORY TEST REPORTING

This appendix provides additional insight into the factors underlying selection of the Video Matrix Terminal for use in the total hospital information system described in Section 7 of the report.

Appendix F
COMPARATIVE ANALYSIS OF TERMINALS FOR LABORATORY TEST REPORTING

F.1 BACKGROUND

Laboratory test reporting is an important area for any hospital information system, although it is only peripherally associated with nursing station functions. The material presented here was extracted from an in-house analytical review of test reporting terminals. A terminal selection approach is presented in terms of a logical framework relating terminals to one another. Some familiarity with the types of terminals is assumed, and only brief descriptions of terminals and functions are included.

The selection of the optimum array of test reporting terminals should be the subject of a requirements study as detailed as this study of nursing stations. Therefore, the present analysis is limited – in scope and depth – to the experience and requirements of the medium-size short term hospital. The laboratories of such hospitals report some 100,000 tests per year or about 400 test results per working day. Reporting techniques, terminal selection, and terminal utility will be considered in the discussion which follows.

F.2 REPORTING TECHNIQUES

The purpose of any laboratory reporting technique is to present accurate information to the physician in a meaningful form. Two methods are commonly used to achieve this purpose:

- Reporting slips are completed in the laboratory and pasted in the patient's chart, usually in the order of receipt at the nursing division.
- Results of laboratory reports are transcribed into the patient's chart, either in the body of the progress narrative or on a consolidated laboratory sheet, by clerks, nurses, or house officers working at the nursing divisions.

In the first method, laboratory report sheets are not consistently posted in the chronological order of sample collection; both the incorrect sequences and physical separation render the slips difficult to interpret and correlate; further, the individual slips are subject to frequent loss. In many institutions, on completion of the patient's stay, the contents of the laboratory slips are transcribed onto a consolidated sheet and the original slips are discarded. In the second reporting method, the slips are transcribed to the chart on receipt at the nursing station. This transcription is performed in an uncontrolled environment, more often by clerks than by any other personnel, and transcriptions are subject to undetected error, primarily because of isolation from the information source.

It is presumed that in an automated hospital information system, the test reports will be computer-consolidated into a single laboratory report sheet or contiguous group of sheets so arranged as to facilitate comprehension.

One can make a good case for replacement of individual report slips with a computer-generated consolidated laboratory sheet. Even at the expense of an additional intra-laboratory transcription, the laboratory data transmission system via computer may represent net improvement in meaningful laboratory reporting. Concentrating all manual transcription in the laboratory is sure to improve accuracy relative to the second of the present methods because of proximity to the information source.

F.3 TERMINAL SELECTION

In the ensuing discussion several types of terminals will be considered as being representative of the variety of available devices. These are briefly defined here to avoid possible ambiguities.

teletypewriter – general purpose alphanumeric device with keyboard input and output via typescript at 100 to 180 words per minute. Examples include the Telex model 33 and IBM 1052.

video keyboard – a typewriter keyboard associated with a cathode ray tube display capable of presenting alphanumeric characters. Display rates are typically from 2,000 to 20,000 or more words per minute. Examples are the IBM 2260 and the CCI 300.

video matrix – a cathode ray tube display associated with a keyboard but usually operated directly by selection of words presented on the display screen, the selection mediated by any of several ways, including light pen, photoelectric beam interruption, or touch-sensing faceplates. Examples include the Lockheed Video Matrix and the CDC Digiscribe. This class specifically excludes the IBM Optical Image Terminal because of the limited branching capability associated with filmstrip display storage.

special keyboard – a mixed category, "special" indicating that these terminals are to be used for limited-scope reporting, as opposed to the teletype and video keyboard which can handle any scope of information. In general this class of terminal has three fields explicit or implicit (in addition to function controls) – patient identification, test identification, and reported values. Examples of this terminal include the BSL terminal and the IBM 1092.

mark-sense – recording using forms printed on paper or card stock with variable data entered by pencil or ink marking and interpretation by photo-optical or electroconductive sensing.

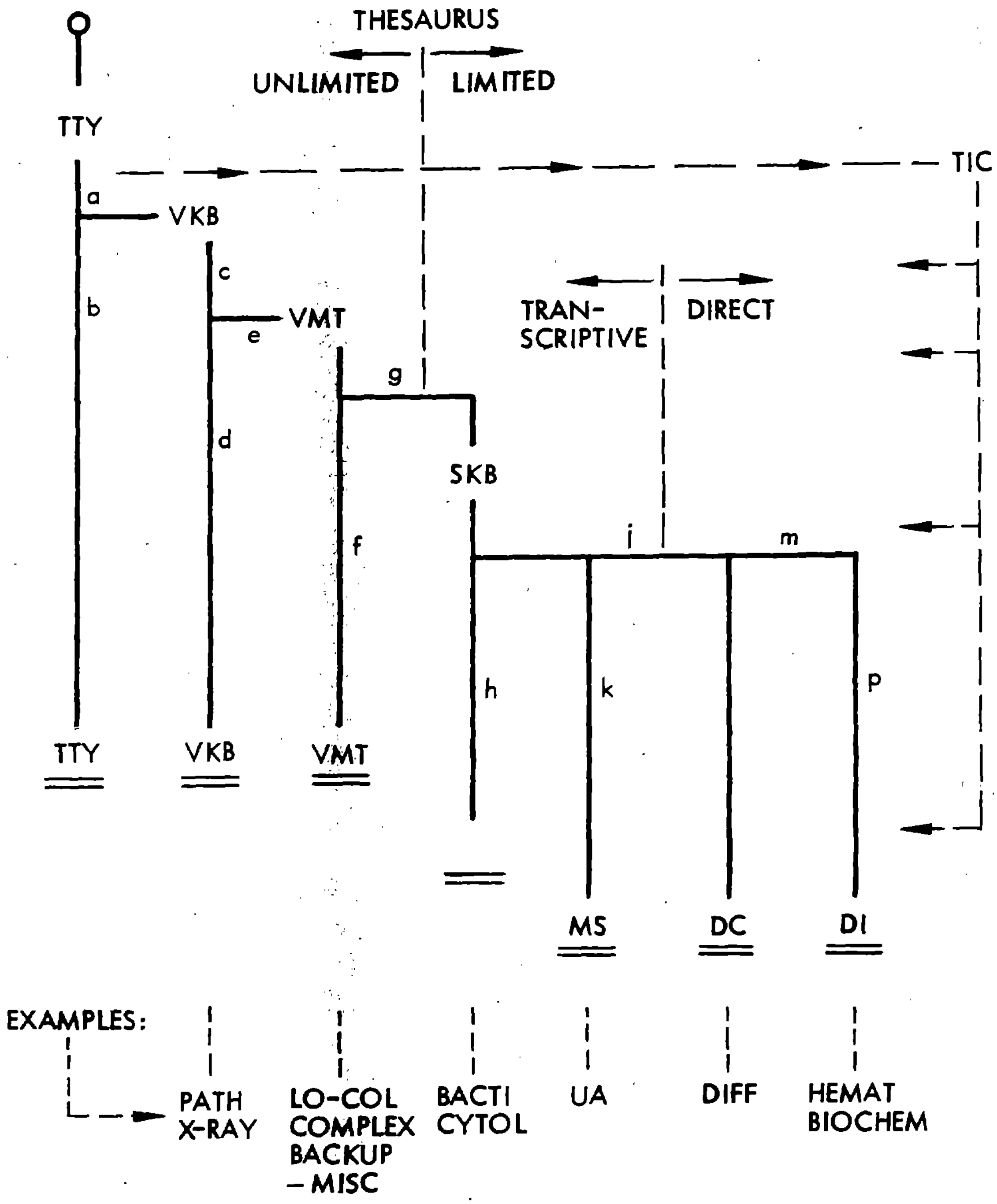
differential counter – representative of a class which might be called single-function keyboards, i.e., a keyboard designed for reporting of a single test. In addition to having single-key depressions enter a variable, a differential counter terminal may work in conjunction with the computer to accumulate and display totals from one or several keys.

direct interface – a terminal type that usually involves analog-to-digital or digital-to-digital conversion equipment and is used to interface equipment such as the Coulter counter or the Technicon autoanalyzer directly to the computer without intermediate recording or transcription.

Keypunch is not included among the above terminals inasmuch as its use in the laboratory would generally require two data transcriptions.

In Fig. F-1, these terminal classes are cast into a reporting hierarchy; the specific devices are indicated by capital letters and the paths linking them by lower case letters. Reading from left to right, there is a trend from general use to specific-application terminals, and any terminal shown may assume the functions of those below it and to the right. Examples of tests which might be efficiently reported using each terminal are suggested below the hierarchical structure. These devices fall clearly into two categories: broad aperture devices capable of reporting almost any kind of information, such as the teletypewriter, the video keyboard (VKB), and the video matrix (VMT); and narrow aperture devices, which are best adapted to reports requiring limited thesauri, such as the special keyboard (SKB), the mark-sense (MS), the differential counter (DC), and the direct interface (DI). The direct interface is an example of a terminal for which the thesaurus is in effect limited to preset or sequential test identification and digits reflecting the value of the test variable. Note also that reporting by the left side of the hierarchy is transcriptive and reporting by the right side is direct. In the differential counter the data are entered as generated and the reported information is developed by the computer; with the direct interface it is entered by direct conversion of test equipment readouts.

In Fig. F-1 the teletypewriter (TTY) is included both for historical completeness and because it is a highly useful device for generating test identity cards (TIC), a test request which includes identification. As is well-known, it is not a very good stand-alone reporting device. The prime criterion for a test identity card generator is that it must generate both man- and machine-readable documents, both in the laboratory and throughout the hospital. This criterion quickly narrows the selection of TIC generators to teletype devices. (Identity card readers eliminate manual transcription of repeated data, thus reducing errors.) The key relationships that establish



TTY – TELETYPEWRITER
VKB – VIDEO KEYBOARD
VMT – VIDEO MATRIX
SKB – SPECIAL KEYBOARD
MS – MARK-SENSE
DC – DIFFERENTIAL COUNTER
DI – DIRECT INTERFACE
TIC – TEST IDENTITY CARDS

Fig. F-1 Test Reporting Hierarchy

the hierarchical structure are as follows: the teletypewriter ($500 to $1,500) is a universal input/output device which generates hard-copy output in a relatively slow manner. This encourages replacement of its output with a soft display, as on the video keyboard ($4,000 to $7,000), achieving thereby a ten to one-hundredfold increase in output rate, operational silence, and simplicity of input verification and correction. The video matrix terminal ($10,000) has the attributes of the video keyboard but offers increased speed for reporting tests using limited reporting thesauri by operating in a word-selection mode. Many of the operator-training and computer-editing problems of the video keyboard and teletypewriters are minimized or eliminated. This is probably the most powerful terminal available. It is flexible, fast, accurate, easy to operate, and there must be a very good reason to justify branching along path g (Fig. F-1) to more specific terminals. The principal reasons for pursuing this path are not in the sphere of reporting speed or accuracy, at least for a small hospital. They are more in the sphere of economical physical dispersion of terminals, technician labor saving, and improved accuracy in test performance and result calculation.

The special keyboards may be produced for less than $2,000 and therefore may be deployed throught the laboratory to accept results close to the test-performance site. Probably the best of the special keyboards yet developed is the IBM 1092, the functions of which can be altered by the use of plastic overlays. The limitation of the 1092 is that the keys in a given column are disjunctive and the simultaneous entry of multiple key depressions in the same column is impossible, thereby seriously constraining entry from some sites, e.g., microbiology or urinalysis. A very useful input device would accept multikey depressions in at least one major field.

In reporting capability, the mark-sense system is much like a single keymat-operated 1092 with substitution of pencil or ink marks for key depressions. Mark-sense readers are now available for under $2,000. They are comparable to the special keyboard, but can use a single reader to handle data from widely scattered collection points merely by hand-carrying the cards. This is probably the least expensive method of data collection to be localized to the site of manually-performed tests. If mimeographed or printed cards are used for the mark-sense forms, the problem of changing card content is small and similar to that associated with altering the functions on special keyboard keymats. If the mark-sense forms are generated by teleprinter or computer printer, changes may be inserted by software revisions alone.

As noted before, the above methods are transcriptive. Path j. in the hierarchy leads to the nontranscriptive on-line devices – the differential counter and the direct interface. In the direct interface category, the best example of digital-to-digital conversion is the Coulter counter, in which individual cells are counted photoelectrically and totaled. In the analog-to-digital interface with the Technicon autoanalyzers, the computer reads successive analog values from the spectrophotometers, extracts the slopes, selects the peaks reached for each variable, and converts to digits; manual curve reading and/or transcription of developed digits are eliminated. In the differential counter and the digital-to-digital example of the direct interface, the summation of observed cells on electronic versions of Veeder-Root counters and subsequent manual transcription is supplanted by direct reporting to the computer file after review and acceptance by a technologist.

F.4 TERMINAL UTILITY

In the community hospital there is little labor saving to be gained by replacing the video matrix with the special keyboard, since in those tests for which the SKB seems best suited the test volumes reported are small. The mark-sense reader may be attractive (particularly if the MS reader is already available for sample identification) for reporting items such as urinalsis, since urinalysis is usually a multi-station procedure and the card can follow the sample, storing data as it is generated and recorded. For a typical medium-size hospital (e.g., where 30 to 50 differential counts are performed daily), savings from a differential counter may be limited, since its prime utility is in totaling the cells reported. This counting activity is now being performed satisfactorily by mechanical devices; only the transcription of results (30 to 60 minutes/day) will be supplanted. This may be a meaningful saving if it can be recovered and is generated at low cost.

The quantities of data to be transcribed and calculated in the current noncomputerized implementations of the test groups that are the most likely candidates for direct interface automation – hematology and biochemistry – are fairly significant. An hour would probably be required to transcribe by VMT the 100 biochemistry values per day from the autoanalyzer as raw data (eliminating manual calculation), review the computed results, and transmit the results to the patient record. In both test groups, automation reduces the opportunity for error. The more fundamental gain in the direct interface group is in the labor saving of actual test performance, but this gain is achieved by the autoanalyzers and Coulter counters without connection to an information system.