

Utilization of Facilities of a University Hospital: Length of Inpatient Stay in Various Hospital Departments

by Lois P. McCorkle

The lengths of hospital stay among adult inpatients discharged during 1962 from the medical and surgical specialty departments of a large urban university-affiliated general hospital have been examined. Data are shown comparing the durations of hospitalization of patients who had a private physician directly responsible for their hospital care (private patients) and of those who did not (staff patients). The relation between the lengths of stay of private patients and those of staff patients varied considerably from one hospital department to another. On the medical services, staff patients had longer hospital stays than did private patients, a discrepancy that could not be accounted for by differences between the two groups in age, race, sex, or source of payment for hospitalization and it is being studied further. A major cause of the apparent difference in lengths of hospitalization between private and staff surgical patients proved to be inconsistencies in the criteria used to define the terms "hospital admission" and "inpatient" among various patient groups. Some of the possible effects of variations in the definition of these terms and of the terms "medical patients" and "surgical patients" in hospital-use studies are discussed.

Introduction

Considerable attention has been given recently to the fact that medical advances, no matter how great their potential benefit, are effective only to the extent that they are made accessible to and utilized by the community. This has led to a growing interest in the organization, administration, and distribution of health care services and an increasing awareness that planning for more effective use of medical care facilities requires additional reliable and detailed data describing current practice. The need for further development of valid and reproducible techniques for measuring the amount, quality, and costs of health care has also been emphasized.

In 1964, the United States National Committee on Vital and Health Statistics published a review of the kinds of statistical data available dealing with medical economics, and noted the inadequacy of information on many aspects of medical care[1]. One of the recommendations made by this committee was that additional data, by department, be sought describing utilization of hospital facilities. The data presented here provide information about

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one aspect of hospital utilization, namely, the length of hospitalization of patients in the various medical and surgical specialty departments or services of University Hospitals of Cleveland during the calendar year 1962. The relation between the durations of hospitalization among patients who employed a private physician (private patients) and among those who did not (staff patients) varied considerably from one hospital department or service to another. The effect on this relation of the differences between private and staff patients with regard to age, race, sex, and method of paying for hospital care has also been examined. Data were not available to ascertain whether or not the types of illness for which private and staff patients were hospitalized were an important determinant of the differences in length of stay between the two groups. Diagnoses recorded for each patient are now being tabulated, and studies examining this question are under way.

The present position of medical care research with regard to experimental tools and methods has been likened to that of research in the biological sciences several decades ago[2]. The data presented here emphasize a fundamental research requirement still largely unmet in health care studies: consistency in definitions and methods of data collection. Though there may seem to be a large measure of agreement on terms basic to hospital inpatient statistics—as was concluded by the Expert Committee on Health Statistics of WHO[3]—important differences in the meaning assigned such fundamental words and phrases as “inpatient” and “hospital admission” occur. Differences in definition of terms, sufficient in magnitude to distort apparent patterns of hospital use, have been demonstrated among groups of patients treated in the same hospital during the same time period. It must be anticipated that the effects of such differences may be even greater when comparisons are made among several hospitals and several time periods.

Methodology

Data Collection

The data are derived principally from the Inpatient Discharge Statistics (IDS) program of Blue Cross of Northeast Ohio.¹ For the past several years, certain facts regarding the patient and the episode of hospitalization have been recorded on punched cards for each patient discharged from Cleveland hospitals, regardless of whether or not he was a Blue Cross sub-

¹The completeness and accuracy of the IDS punched cards have been examined in several ways. Counts derived from the cards have been compared by the University Hospitals' statistics section with counts of patients discharged each month. The Hospitals' statistics section tabulated 27,738 discharges, exclusive of stillborn infants, during 1962. This agreed exactly with the number obtained by machine tabulation from the punched cards. Moreover, print-out from the punched cards has been compared with patient records as a part of various special studies and, to a limited extent, by random spot-checking. The checking revealed very few errors of abstracting or punching, and the IDS punched cards appeared to provide an adequate record of patients discharged from University Hospitals.

scriber. The form used to abstract and code information in preparation for producing punched cards is shown in Figure 1. Punched cards pertaining to patients discharged from University Hospitals were made available by

INPATIENT DISCHARGE STATISTICS FACT SHEET						
INSTRUCTIONS: 1. Please print all information legibly. 2. Complete every item. 3. Fill in all blocks. Please use a dash (—) for those items that are not applicable.						
CARD COLUMN	ITEM	INFORMATION				
1-3	1. HOSPITAL CODE					
4-7	2. DOCUMENT NUMBER					
8-13	3. PATIENT NUMBER					
14-18	4. DATE ADMITTED	MONTH	DAY	YEAR		
19-23	5. DATE DISCHARGED	MONTH	DAY	YEAR		
24-25	6. DISCHARGE SERVICE	SEE SERVICE CLASSIFICATION CODE SHEETS				
26-27	7.*OTHER SERVICE	SEE SERVICE CLASSIFICATION CODE SHEETS				
28-30	8. DAYS ON OTHER SERVICE					
31-33	9. TOTAL DAYS OF STAY	COMPUTED				
34-36	10. PATIENT'S AGE	UNIT CODE	AGE	UNIT CODE 1. NEWBORN 2. YEARS	3. MONTHS (UNDER 12) 4. DAYS (UNDER 31)	
37	11. SEX AND RACE	MALE 1 2	RACE WHITE NEGRO	FEMALE 3 4	MALE 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 00	3. PROTESTANT 4. OTHER, NONE, UNKNOWN 5. SPECIFIC DENOMINATION
38	12. RELIGION	1. CATHOLIC 2. JEWISH		3. PROTESTANT 4. OTHER, NONE, UNKNOWN 5. SPECIFIC DENOMINATION		
39-40	13. FINANCIAL CLASS	SEE FINANCIAL CLASSIFICATION CODE SHEET				
41-43	14. POSTAL ZONE AREA CODE	SEE POSTAL ZONE-AREA CODE SHEETS				
44	15. DISCHARGE STATUS	1. DISCHARGED ALIVE 2. DEATH UNDER 48 HRS.—AUTOPSY 3. DEATH UNDER 48 HRS.—NO AUTOPSY		4. DEATH OVER 48 HRS.—AUTOPSY 5. DEATH OVER 48 HRS.—NO AUTOPSY		
45-46	16. SPECIAL STUDIES*	16a	16b	16c	16d	
47-50	17. ATTENDING PHYSICIAN	SEE LIST OF PHYSICIANS' CODE NUMBERS				
47-50 TRAILER CARD	18. *OTHER ATTENDING PHYSICIANS 18a SECOND ATTENDING PHYSICIAN 18b THIRD ATTENDING PHYSICIAN	18a. SECOND		18b. THIRD		SEE LIST OF PHYSICIANS' CODE NUMBERS
51-53	19. RESIDENT PHYSICIAN	CODE NUMBER ASSIGNED BY HOSPITAL				
54	20. TOTAL NUMBER OF WRITTEN CONSULTATIONS					
55-62	21. CONSULTATION: 21a SERVICE REQUESTING 21b SERVICE GIVING 21c PHYSICIAN GIVING	a. REQUESTING	b. GIVING	c. PHYSICIAN GIVING		FOR ITEMS 4 AND 5, SEE SERVICE CLASSIFICATION CODE SHEETS. FOR ITEM 6, SEE LIST OF PHYSICIANS' CODE NUMBERS.
55-62 TRAILER CARD	22. *OTHER CONSULTATION: 22a SERVICE REQUESTING 22b SERVICE GIVING 22c PHYSICIAN GIVING	a. REQUESTING	b. GIVING	c. PHYSICIAN GIVING		
*NOTE: If there are additional Services, Attending Physicians, or Consultations other than provided for above, see Manual of Instructions for completing a second fact sheet.						

Fig. 1. Form used for abstracting and coding information for the Inpatient Discharge Statistics program of Blue Cross of Northeast Ohio.

Blue Cross of Northeast Ohio and they form the basis of the studies reported here.

The Population

The studies reported here concern inpatients discharged during 1962 from the adult medical specialty services of general medicine, neurology, and dermatology and from the adult surgical specialty services of general surgery (including thoracic, cardiac, plastic, and vascular), neurosurgery, ophthalmology, orthopedics, otolaryngology, and urology. Patients discharged from other hospital services and from the pediatric division of the medical and surgical services have been excluded from the tabulations. The criteria for deciding whether a patient was to be admitted to an adult or to a pediatric division were not always clear-cut and depended upon the identity of the attending physician as well as upon the age, size, and maturity of the patient. Most of the patients included in this report, however, were more than 14 years of age.

All enumerations of patients were based on episodes of hospitalization, and each episode ending with a hospital discharge during 1962 was counted as a patient. Thus, a person discharged more than once during 1962 was counted as a patient at each discharge. Counts of patient-days of hospitalization included all days of hospital occupancy during the episodes tabulated, regardless of whether these days occurred during or before 1962.

Because a major purpose of this report is to compare duration of stay of private and staff patients on various hospital services, it is necessary to describe briefly the method of determining the service to which each patient was assigned. Private patients were those admitted to the hospital by a private physician who directed and was responsible for their medical care. All others were staff patients whose care was the responsibility of the hospital's resident staff under supervision of the physicians of the teaching staff. Private physicians on the staff of University Hospitals have, for the most part, admitting privileges to only one hospital service, e.g., general medicine, general surgery or orthopedics, and the hospital service to which each private patient was assigned was determined by the service privilege of his admitting physician and not necessarily by the nature of the illness. Staff patients were assigned to the hospital service deemed most appropriate by the member of the resident staff arranging their hospital admission. As the nature of the illness became apparent, some patients were transferred to another service and the care of another physician. Unless and until formally transferred, however, each patient, private or staff, remained on the service to which he was admitted, although sometimes he was seen in consultation by one or more physicians from other hospital services.

Patients transferred from one service to another during a single episode of hospitalization presented a special problem in comparing duration of stay on various hospital services. As would be expected, such patients had relatively long periods of hospitalization compared to those whose entire stay was on a

single service. Because the transferred patients, who made up about five percent of the total discharges, comprised a special group whose inclusion would tend to confuse rather than clarify patterns of use of the various hospital services, they were omitted from the tabulations presented here. There were 10,469 patients discharged during 1962 whose entire hospital stay was spent on one of the adult medical or surgical specialty services. These form the population whose duration of hospitalization has been examined in this study.

Methods of Analysis

Data have been summarized in a series of tables and graphs showing distributions of private and staff patients discharged from medical and surgical specialty services according to the durations of their hospital stays. Mean and median stays have been computed for patients on each service, and for certain demographic subgroups of patients discharged from the general medical service. Calculation of these statistics required a definition of the actual interval or time span represented by hospital stays tabulated as one day, two days, etc. Calculation of the duration of hospital stay for the Inpatient Discharge Statistics was performed by computer at the Blue Cross office and consisted of subtracting the date of admission from the date of discharge. This method entails counting either the day of admission or the day of discharge, but not both (plus, of course, each intervening day), as a day of hospitalization. The single exception to this mode of calculation was made for patients admitted and discharged on the same calendar day. Their stays were considered in the IDS tabulations and in the data presented here as one day, just as were hospital stays which began and ended on succeeding calendar days. Thus, the computed durations of stay represent overlapping intervals which center at 24 hours for stays of one day, 48 hours for stays of two days, and so on. In computing mean and median stays in this series of studies, the successive one-day periods were considered to center at 24, 48, 72 hours, and so on, and to encompass 12 hours on each side of this midpoint. Stays tabulated as one day, for example, were regarded as between one-half and one and one-half days in duration. Observations within each interval were treated as if spread uniformly over the period represented.

Results

Table 1 shows that the mean and median stays of patients hospitalized on the medical specialty services were somewhat longer than of those on the surgical services. Among private patients, however, this difference disappeared when age was taken into account: the median stay by decade of age was almost identical for private medical specialty and surgical specialty patients (Fig. 2a). Among staff patients, the median stay on the medical service exceeded that on the surgical service by three to five days at almost every decade of age (Fig. 2b). Moreover, staff medical patients had longer mean and median stays—by 2.4 and 3.5 days, respectively—than did private

Table 1. NUMBER OF PATIENTS, PATIENT-DAYS OF CARE, AND AVERAGE DURATION OF STAY PER PATIENT FOR PRIVATE AND STAFF PATIENTS ON THE MEDICAL AND SURGICAL SPECIALTY SERVICES, 1962.

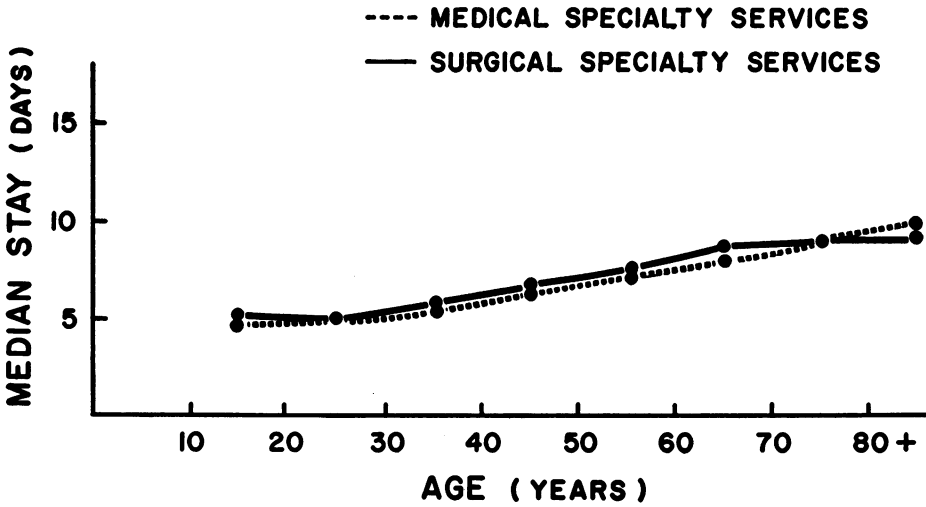
	Medical Specialties ²			Surgical Specialties ³		
	Private	Staff	Total	Private	Staff	Total
Number of patients ¹	2,510	1,678	4,188	3,960	2,321	6,281
Percentage distribution	59.9	40.1	100.0	63.0	37.0	100.0
Number of patient-days ¹	27,788	22,655	50,443	36,890	22,814	59,704
Percentage distribution	55.1	44.9	100.0	61.8	38.2	100.0
Mean stay (days)	11.1	13.5	12.0	9.3	9.8	9.5
Median stay (days)	7.4	10.9	8.7	6.8	6.0	6.5

¹Counts of both patients and patient-days include only those patients who spent their entire hospital stay on a single service. Patients transferred from one service to another have been excluded from these tabulations.

²Includes general medicine, neurology, and dermatology.

³Includes general surgery, neurosurgery, ophthalmology, orthopedic surgery, otolaryngology, and urology.

a. PRIVATE PATIENTS



b. STAFF PATIENTS

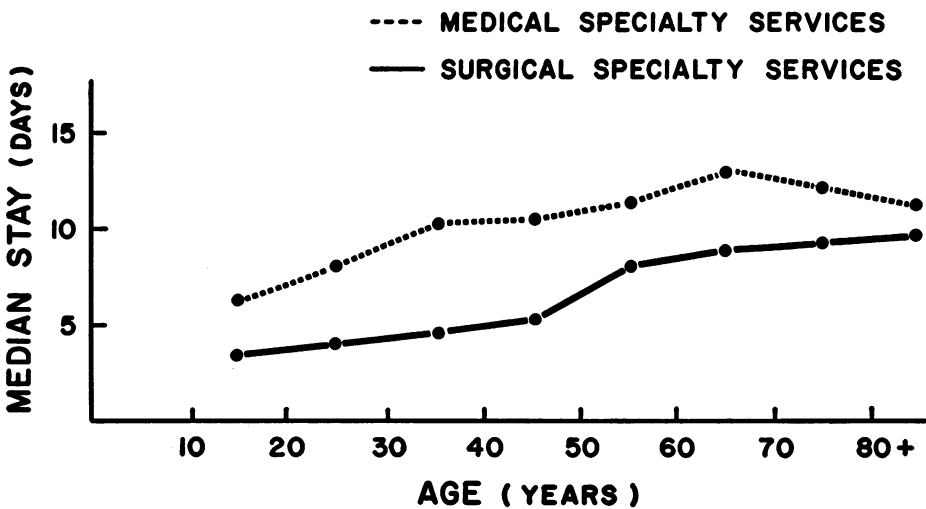


Fig. 2. Median length of hospital stay by decade of age among private and staff patients on adult medical and surgical specialty services.

medical patients. On the surgical services, however, staff patients had a mean stay only slightly longer than that of private patients (9.8 days as compared to 9.3 days). The median stay among private surgical patients (6.8 days) was a little longer than that among staff surgical patients (6.0 days).

Examination of distributions shown for the four classes of patients in Figures 3 and 4 reveals certain common features. The distributions are markedly asymmetric with many short and relatively few long stays. The modes, or most frequently occurring durations of stay among the four groups of patients are quite different, however, ranging from one day for staff surgical to eight or nine days for staff medical patients, with private medical and surgical patients intermediate between the two. Unlike the other three, the distribution of durations of stay of the staff medical patients shows no sharp, distinct peak.

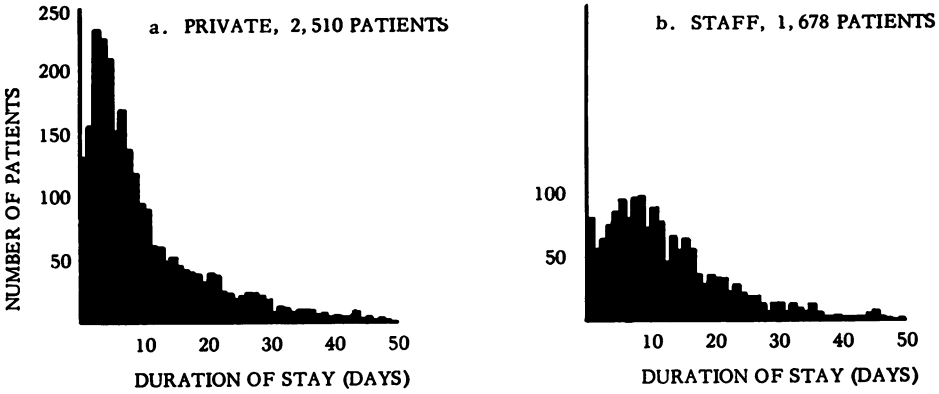
The distributions in Figures 3 and 4 amplify the differences observed between the mean and median stays of private and staff patients shown in Table 1. There is a great difference between the overall shapes of the distributions of hospital stays of private and staff medical patients. Private medical patients had many more stays of less than a week and fewer stays of one to four weeks than did staff patients. Among surgical patients, the major difference between the two groups was the great number of staff patients who remained in the hospital only one day. Except for the first day, distributions of stays among private and staff surgical patients were similar (Fig. 4), the excess of very short stays among staff patients being made up by slight excesses among private patients at various intervals over the next two weeks.

To examine these differences further, the distributions of hospital stays of patients on each individual medical and surgical specialty service were determined (Fig. 5). (It may be seen that the classification of medical cases into subspecialties was such that about 90 percent were under general medicine. The distributions of stays of medical patients in Figures 3 and 4, therefore, reflected largely the distributions of general medicine patients.) The pattern of hospital stay for patients discharged from the neurologic service, the second largest medical service, closely resembled that of general medical patients, whereas the number of patients discharged from the dermatology service was very small.

Among the surgical specialties, patients discharged from general surgery represented only about one half of the total number, and there was considerable variation in the distributions of duration of hospital stays from one service to another. (It is apparent that the curves representing surgical patients' stays in Figures 3 and 4 are composites of several very different distributions.) The large number of staff surgical patients with hospital stays of one day or less came principally from otolaryngology (ENT) and urology services.

Two aspects of the relations shown in Figure 5 were examined further. First, the finding that staff medical patients had a longer average stay than

MEDICAL SPECIALTY SERVICES



SURGICAL SPECIALTY SERVICES

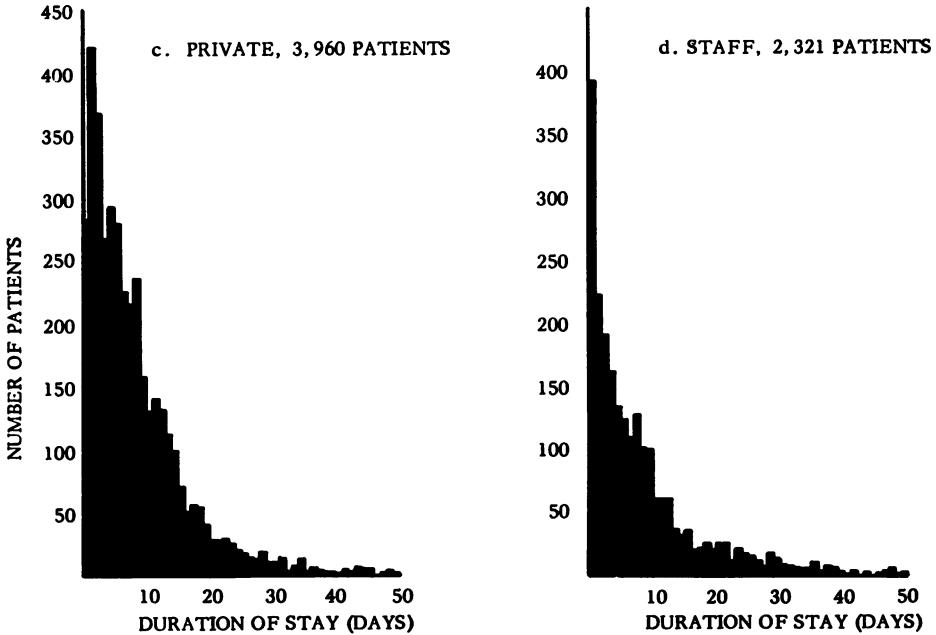


Fig. 3. Duration of hospital stay of private and staff patients on adult medical and surgical specialty services. Less than two percent of patients in any group were hospitalized longer than 50 days.

did private medical patients was scrutinized to see if it could be related to demographic differences between the two patient groups. The median duration of hospitalization was determined for various subgroups of private and staff

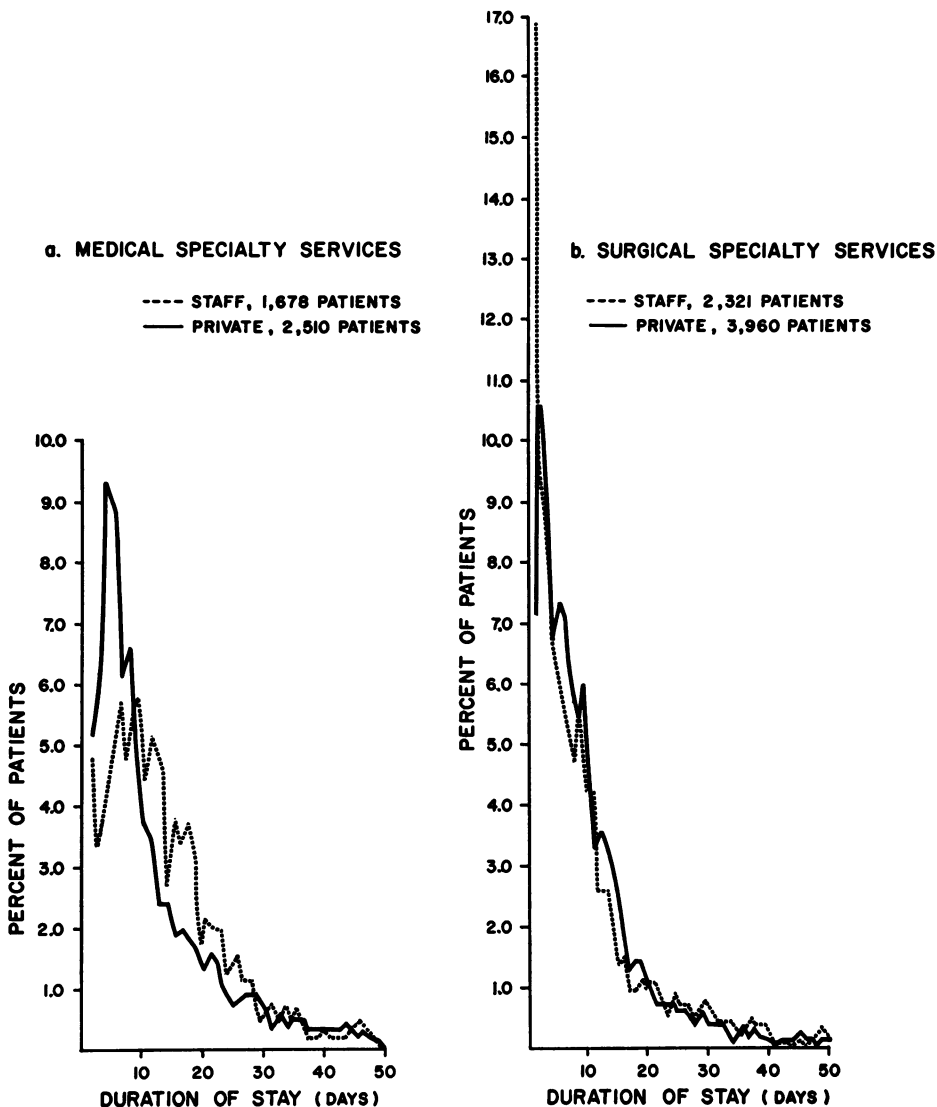


Fig. 4. Percentage distribution by duration of hospital stay of private and staff patients discharged from adult medical and surgical specialty services. Less than two percent of patients in any group were hospitalized longer than 50 days.

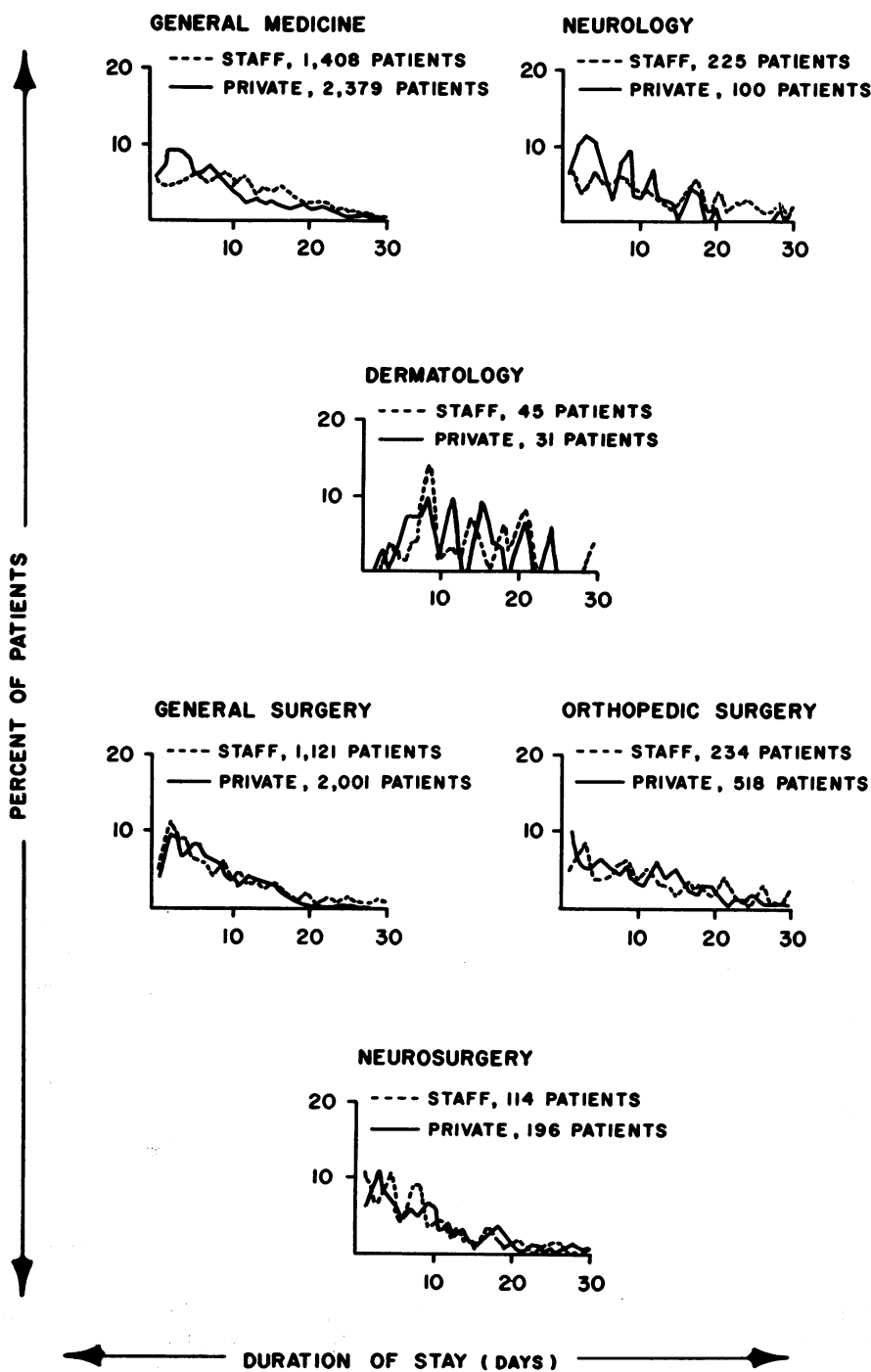
medical patients classified by age, race, sex, and method of payment for hospital care (Fig. 6). The increase in the duration of hospital stay with advancing age—observed also in other studies [4-7]—was found among each of the subgroups of private and staff patients, with the exception of a small number of private nonwhite medical patients. The other consistent pattern was the generally longer median stay among staff than among private

patients, and this obtained for almost every category distinguished by age, race, sex, and source of payment for medical care. Differences between private and staff patients based on these population characteristics, therefore, do not appear to have caused the longer hospital stays of staff medical patients.

Perhaps the most remarkable finding depicted in Figure 5 is that some 40 percent of the urology and 50 percent of the otolaryngology staff patients had hospital stays classified as one day. Among private patients with stays of one day, the proportion coming from those two services, although greater than from the other clinical services, was only about 15 percent. To discover the reason for this difference, individual hospital records were examined and hospital admitting office and record room personnel were queried. The findings explained the difference in frequency of one-day stays between private and staff patients on the urology but not on the otolaryngology service. The disparity in the proportion of one-day stays between the two groups of urology patients was found to be an artifact due to differences in administrative rules governing classification of patients rather than to any true difference in the hospital stays of the two groups. Staff patients who undergo certain minor surgical procedures (principally, but not exclusively, cystoscopic examination) on an ambulatory basis and who remain in the hospital only a few hours are considered in administrative tabulations as "temporary admissions," although they do not occupy a bed in an inpatient area. Such staff patients are classified as admissions, and therefore as inpatients, and consequently they are included in University Hospitals' statistics as well as in the Blue Cross Inpatient Discharge Statistics. (These staff patients are therefore included in tabulations in Table 1 and in Figures 2, 3, 4, and 5.) On the other hand, private patients undergoing identical procedures on an ambulatory basis and also remaining in the hospital for only a few hours are classified not as inpatients but as "private ambulatory patients." The private patients, therefore, are not included in the hospital or Blue Cross inpatient statistics or in the data reported on here.

There were 181 temporary admissions to adult divisions of the University Hospitals during 1962 and, as would be expected from classification practices just described, all were staff patients discharged from one of the surgical specialty services. The classification by service of the 181 temporary admissions was as follows: urology, 154; ophthalmology, 16; general surgery, 6; otolaryngology, 4; and orthopedics, 1. In each instance, the duration of stay was counted as one day, and none of the patients was transferred from one hospital service to another. (Each of the 181 patients, therefore, appears as a staff surgical patient with a one-day stay in Figures 3d and 4b and in the appropriate specialty service in Figure 5.)

The effect of the aforescribed semantic inconsistency on the distribution of patients by length of stay may be appreciated directly from Figure 3. If the staff temporary admissions had been considered as ambulatory patients rather than inpatients, thereby conforming with the method used to classify their private-patient counterparts, the peak of 393 staff surgical patients with



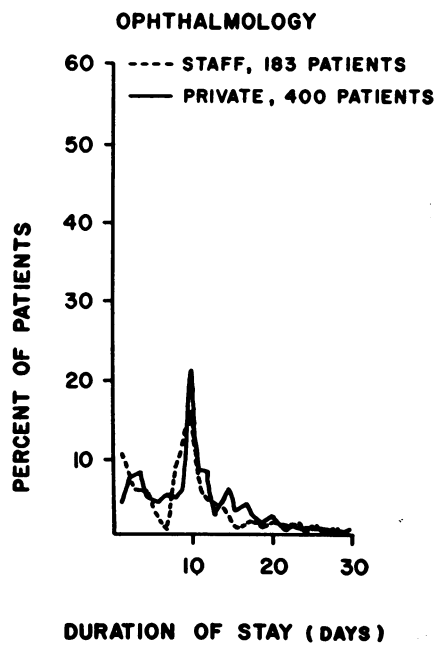
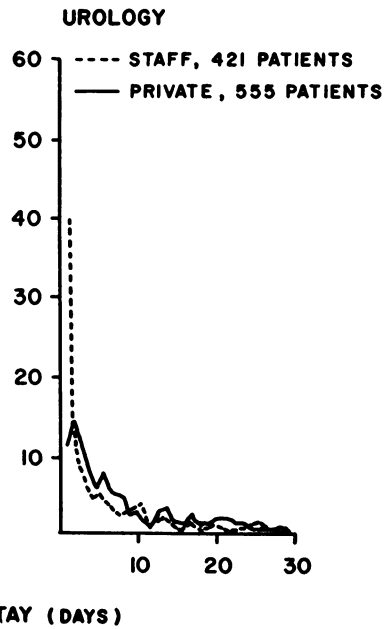
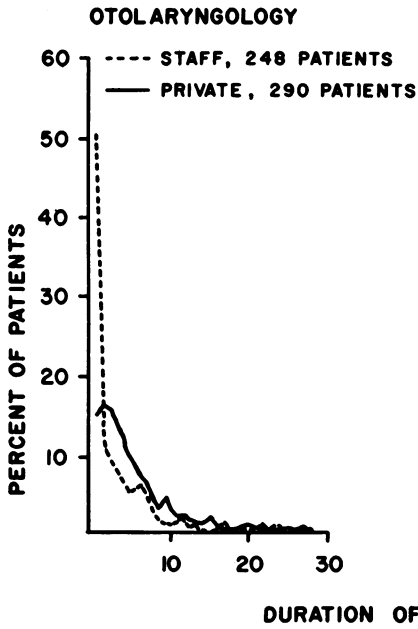


Fig. 5. Percentage distribution by duration of hospital stay of private and staff patients discharged from each individual adult medical and surgical specialty service.

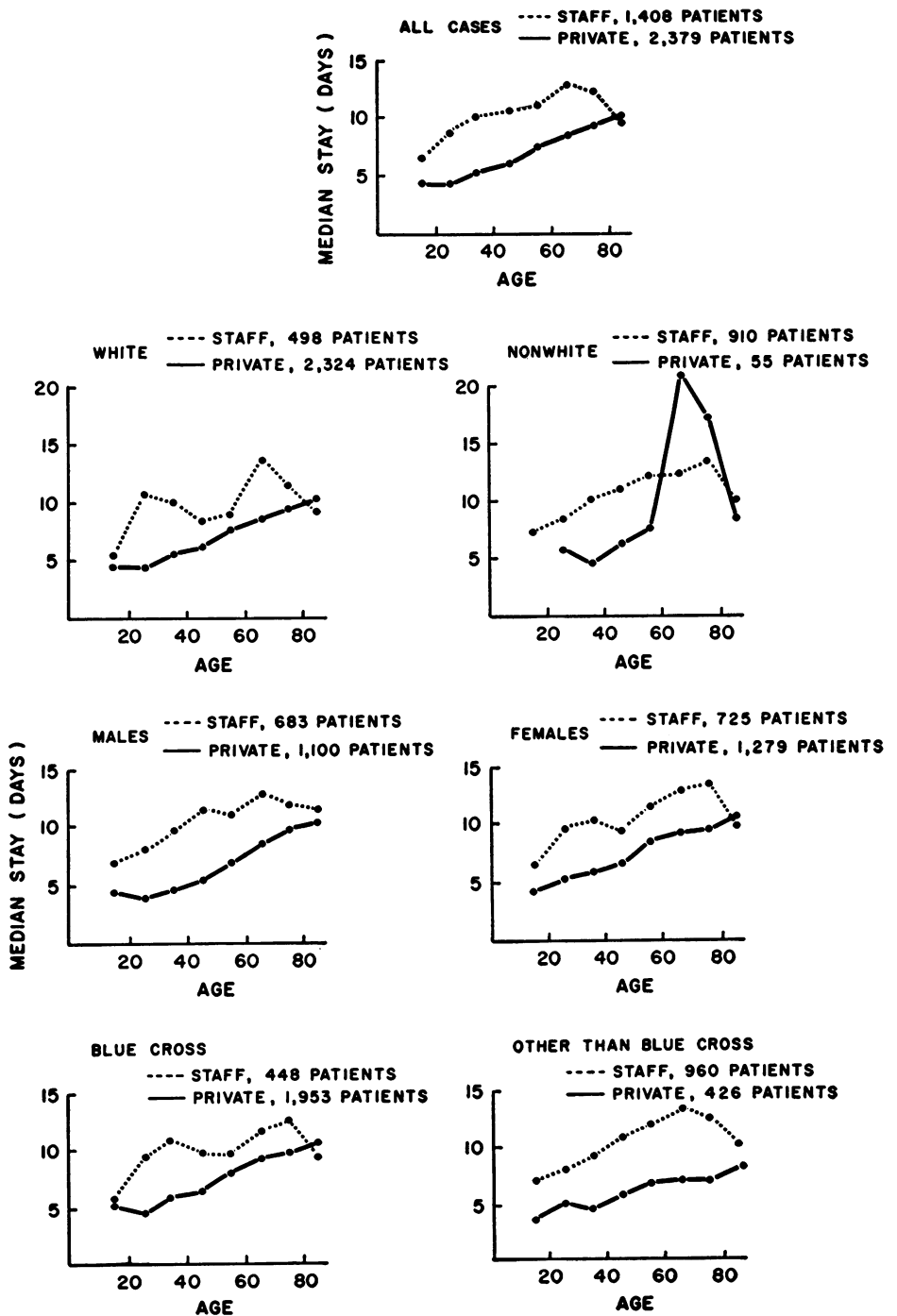


Fig. 6. Median length of hospital stay by decade of age among various subgroups of private and staff patients discharged from the general medical service.

stays of one day (Fig. 3d) would have been reduced to 212. As a result, the major difference in the appearance of the distributions of stays of private and staff surgical patients would have been greatly reduced, and the mean stay for all staff surgical patients increased from 9.8 days to 10.6 days and the median from 6.0 days to 6.7 days. When the percentage distribution of staff surgical patients by duration of hospital stay was recalculated after excluding the 181 temporary admissions (Fig. 7), slightly less than 10 percent of this group were found to have been discharged after one day as compared to 17 percent when the temporary admissions were included (Fig. 4). The percentage of staff patients discharged from the urology service after stays of one day or less was reduced from almost 40 percent (Fig. 5) to less than 5 percent after the temporary admissions were excluded (Fig. 8). Comparable percentages for staff ophthalmology patients fell from about 11 to 2 percent. The changes in the other surgical specialty services caused by reclassification of the staff temporary admissions, however, were only minor.

The marked disparity in the proportion of private and staff otolaryngology patients with one-day stays could not be explained by inconsistencies of terminology. A careful search failed to show that any practice of classification or tabulation was responsible for the differences in length of hospitalization between private and staff patients on that service, or on the medical service.

Discussion

The material reported here is part of a study undertaken to describe the use of facilities of a large, general, university-affiliated urban hospital for the care and treatment of acutely ill patients. The length of hospital stay was selected as an initial dimension for measuring hospital use—even though it was recognized to be the result of many complex forces—because it appeared to be an easily defined, readily made, and objective measurement concerning which reliable data were available. Furthermore, knowledge about the duration of stay seemed a logical framework on which to plan subsequent studies of hospital use. As illustrated by the findings presented here, the apparent ease of definition and measurement is, to a great extent, illusory.

Duration of hospitalization has been employed in many studies as a measure of the use of health care facilities. Riedel and Fitzpatrick, in reviewing methods for studying hospital use[8], considered average length of stay to be one of the indices of inpatient utilization most commonly used for analytical purposes. Many investigators[4-19, among others] have discussed the multiplicity and complexity of influences affecting duration of hospital stay. Some of the factors listed by various workers are: 1) characteristics of the patient, such as age, race, sex, marital status, and method of paying for care; 2) characteristics of the episode of illness, especially the diagnosis, the presence or absence of complications, and whether or not surgery is performed; 3) characteristics of the physician, including age, status with regard to specialty boards, and the type of practice in which he is engaged, e.g., solo or group; 4) characteristics of the hospital, such as size, association with graduate and

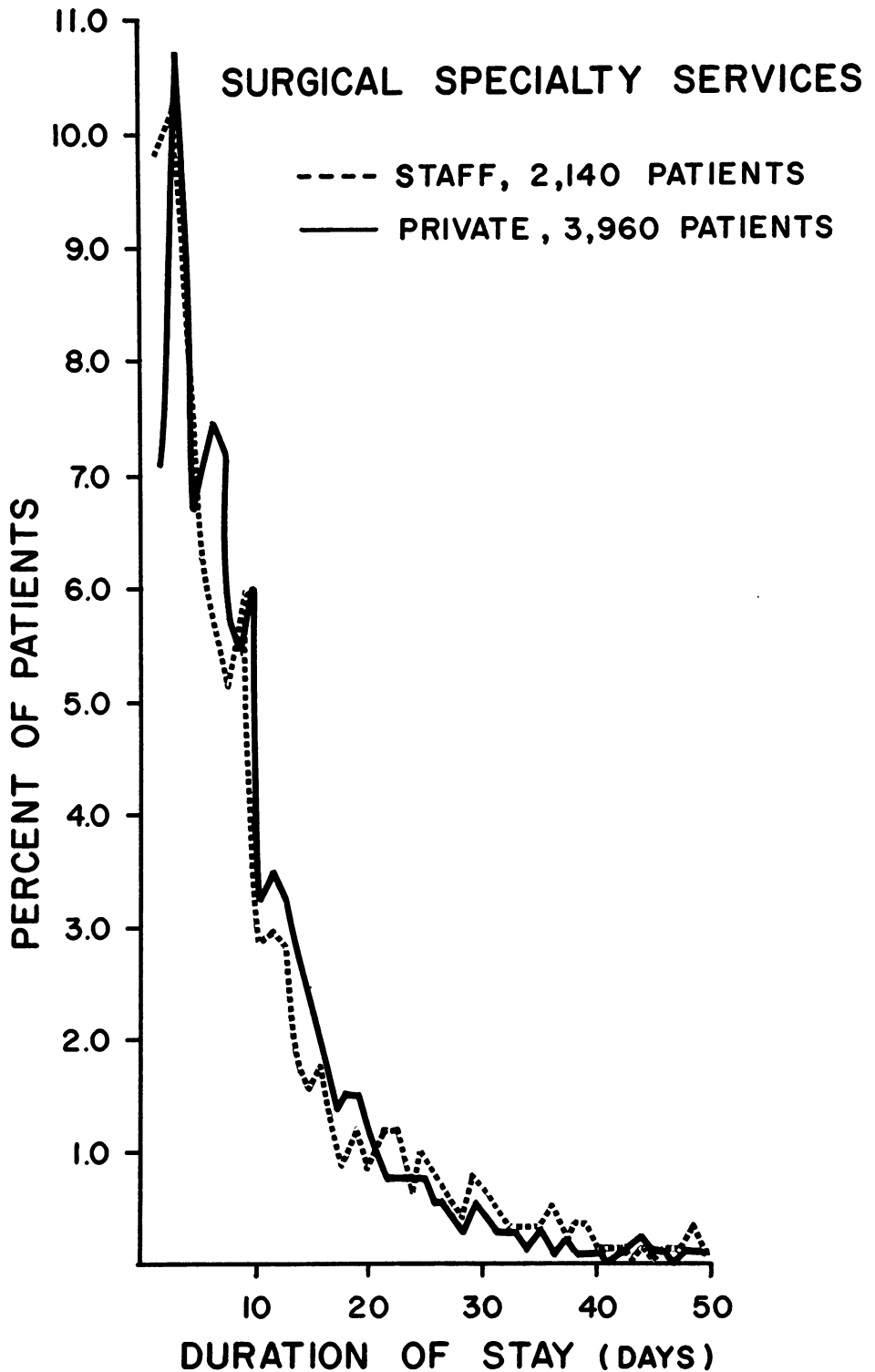


Fig. 7. Percentage distribution by duration of hospital stay of private and staff patients discharged from the adult surgical specialty services, after exclusion of 181 staff patients as temporary admissions.

undergraduate medical education, and the relation between supply of and demand for its beds; and 5) characteristics of the community, among which are the amount of urban development and availability of other health care facilities, as well as local customs regarding hospital use. As has been pointed out[8], the list of factors either identified or suggested as influencing length of hospital stay is extremely long and much more needs to be done to assess their interrelationships and to quantitate their effects.

Because the determinants of length of hospital stay are so intricate, several groups[10,12,14] have cautioned against equating shorter average hospital stays with efficient and economic hospital utilization, and longer average stays with inefficiency, overuse, or abuse. These warnings are not, unfortunately, always heeded by those attempting to interpret observed differences in average length of hospitalization between groups of patients. Of particular relevance to the problem of interpreting duration of hospitalization is the report of a task group appointed to study data concerning the average length of hospitalization in service hospitals for the Department of Defense[14]. That report discussed a wide variety of circumstances that influence duration of stay in military and other service-connected hospitals and make the interpretation of such measures as average length of hospital stay extremely complex. Many of the influences which are clear-cut in their effect on duration of stay

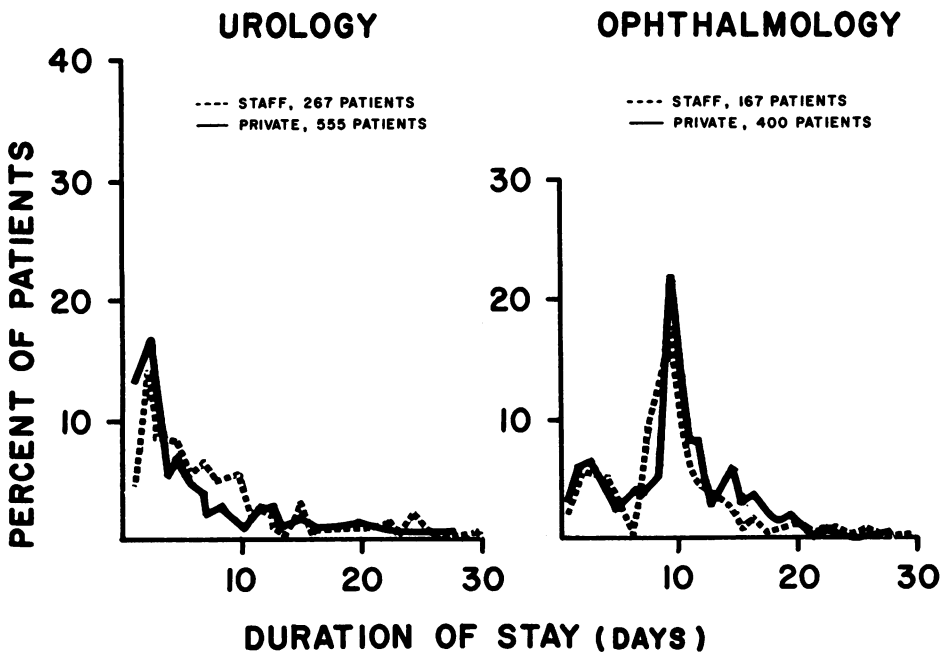


Fig. 8. Percentage distribution by duration of hospital stay of private and staff patients discharged from the adult urology and ophthalmology services, after exclusion of 154 staff urology and 16 staff ophthalmology patients classified as temporary admissions.

in service hospitals have easily identifiable analogies in nonmilitary hospitals, though their effect in these hospitals is less obvious. Differences in administrative policies of the Army, Navy, and Air Force, for example, concerning admission and discharge of patients and tabulation of hospital days, all of which affect the validity of interdepartmental comparisons, have their counterparts among and even within nonservice hospitals. Similarly, professional policies, such as the recommendation for conservative or radical treatment, which often vary in service hospitals by area or echelon, vary also among nonmilitary hospitals both individually and by community. In civilian hospitals, such differences in administrative and professional practices are often regulated by habit and custom rather than by well-formulated rules and thus are difficult to recognize and evaluate.

An example of a difference in the administrative rules for classifying and tabulating two groups of patients treated concurrently in the same hospital, and the effect of this difference on estimates of duration of patients' stay are shown in the present report. Inconsistencies in definitions of the terms "inpatient" and "hospital admission" led to the inclusion as inpatients of a group of persons undergoing certain minor operative procedures on the staff surgical service while comparable private patients were classified as ambulatory and thus excluded from inpatient tabulations. Not only the hospital area occupied but the description of the hospital stay suggested that the staff patients, too, were truly outpatients.

The total number of patients involved (181) was small, representing less than eight percent of all staff surgical patients discharged from University Hospitals during 1962. Nevertheless, because all 181 had one-day stays, the effect of their inclusion on the distribution of durations of hospital stay among all staff surgical patients was remarkable (cf. Figs. 3 and 6), and when calculations were made after they were excluded, the mean and median stays of the entire group of staff surgical patients were increased by 0.8 and 0.7 days, respectively. Because 154 of the patients were treated on the urology service, the result of their exclusion was to increase both the mean and median stay of staff patients on this service by more than three days and to alter markedly the distribution of urology inpatient stays (Fig. 7). Thus, although patients undergoing minor surgical procedures and in the hospital for only a few hours will usually make up only a small proportion of total hospital discharges, the fact that they tend to cluster on a few services, and within a few diagnostic groups, will mean that measures of hospital stay based on these services or diagnostic categories may be altered considerably by the inclusion or exclusion of such patients. For example, the diagnostic category "urinary tract infections" was among those examined in detail by a group of investigators studying patterns of patient care in Michigan[8]. Measures of duration of hospital stay, as well as other commonly used measures of hospital utilization, such as the admission rate or the patient-day rate (number of hospital days per 1,000 population), when determined for this

diagnostic category, would be greatly affected by inconsistencies in tabulation.

Differences in the definition of such terms as "hospital admission," "inpatient," and "outpatient," among others, appear to have received little attention as a possible cause for differences in duration of stay observed between groups of patients. In most of the reported hospital-use studies, these terms are not defined, presumably either because the investigators do not consider the definition to have significant bearing on the results or, as was true at the outset of the present study, because the investigators assume that a common definition applies to all patients included. The definitions provided by the American Hospital Association² do little either to clarify the distinction between inpatients and outpatients or to assure consistency in classification, as they depend in turn on the meaning given the word "lodging." The definitions of WHO Expert Committee on Health Statistics,³ though somewhat circular, do emphasize "maintenance for continuous use" as a characteristic of inpatient beds. Based on this definition, the 181 staff surgical patients under consideration here would not be classified as inpatients, while, so far as can be determined by a careful examination of admitting and tabulating policies at this hospital, all other patients included in the present report would be so classified.

One group that has given a great deal of attention to the effect of definitions and methods on hospital-use statistics is the National Center for Health Statistics. The Health Interview Survey of the National Center conducts regular interviews at households selected as a probability sample of the population of the United States, obtaining, among other things, information about the hospitalization experience over the preceding twelve months of all persons in the household[22,23]. There are important differences in methodology and in definitions between the Health Interview Survey and studies based on hospital records of all discharged patients. Not only does the survey depend upon the memory of the respondent rather than hospital records for its information, but it includes in its counts only those hospital episodes in which the patient was hospitalized for at least one night, and for which the patient is still alive at the time the respondent is interviewed.

With the cooperation of various other groups, the National Center has examined the effect on hospital-use statistics of obtaining information from household interviews rather than hospital records[24] and has compared the reporting of hospital episodes using three different survey procedures[25].

²"A hospital patient is a person receiving physician, dentist or allied services in a hospital. Hospital patients are divided into two major types: A hospital inpatient is a patient who is given lodging in a hospital while receiving physician, dentist or allied services in the hospital. A hospital outpatient is a patient who is not lodged in a hospital while receiving physician, dentist or allied services in the hospital"[20].

³"A hospital bed is one maintained for continuous (24-hour) use by in-patients. . . . An in-patient is a person admitted to hospital who occupies an adult or child hospital bed for observation, care, diagnosis, or treatment"[21].

They have evaluated the effects of differences in the definition of a hospital episode by 1) estimating the hospital use of those members of the surveyed households whose hospital experience was excluded from the Health Survey data because they were no longer alive at the time of the interview[26], and 2) estimating the number of hospital episodes excluded from counts by the omission of all hospital episodes during which the patient did not stay overnight[7]. According to the National Health Survey[7], a study conducted by the State Board of Health of Indiana revealed that 2.7 percent of a sample of 11,159 inpatients were discharged on the same day they were admitted. The findings of the present study were similar: 3.6 percent of the 10,469 adult medical and surgical inpatients were admitted and discharged the same day if the 181 temporary admissions were included. If the temporary admissions were excluded, the value was 1.9 percent. Although they make up a relatively small percent of total hospital discharges, from the findings of the present study it might be anticipated that the exclusion of patients not hospitalized overnight would have a considerably greater effect on hospital-use statistics relating to some diagnostic or hospital department categories than to others.

One further point may be noted in connection with the patients undergoing minor surgical procedures and in a hospital for only a few hours. In addition to differences in administrative tabulation such as have been already described, there are differences between and even within hospitals in the admission policy concerning such patients. In some hospitals or hospital services the usual practice is to admit people for certain minor surgical procedures as inpatients while other hospitals or services carry out the same procedures on ambulatory or outpatients. Preliminary studies indicate that such differences in admitting practices probably play a part in the difference observed in the present study between the stays of private and staff ENT patients. As has been pointed out by others[14], admission of such persons as inpatients will shorten the average hospital stay, though few would argue that their admission necessarily represents more efficient hospital use.

Another classification system which is frequently employed in hospital use studies, and which has been based on a variety of definitions from one study to another yielding a variety of conflicting results, is the separation of patients into medical and surgical (or surgical and nonsurgical) categories. A major and usually easily recognized difference from one study to another concerns the classification of obstetrical deliveries. These have been variously considered as surgical[23] and as nonsurgical[6], and in other studies, including the present one, excluded from both categories[4]. A further source of difference in the separation of patients into those receiving medical and those receiving surgical treatment, and one which is easily overlooked, depends upon the classification of endoscopic examinations (e.g., cystoscopy, bronchoscopy, laryngoscopy). These have been considered by some as surgical procedures[23] and by others as nonsurgical[27], while still others have not

considered these examinations as a deciding factor for purposes of classification [28 and the present study]. As many of the patients admitted for procedures of this sort are in the hospital for a short time, variation, between studies or between groups of patients being compared within a single study, in the classification into medical or surgical categories can cause considerable difference in the results obtained. Based on the criteria of the present study, which classified patients as medical or surgical according to the hospital service on which they were treated and excluded those transferred from one service to another, medical patients, both private and staff, had longer mean and median hospital stays than did surgical patients. Among private patients, this difference disappeared when age was taken into account. Staff medical patients, however, had a longer average stay than did surgical patients at each decade of age.

It seems, therefore, that the comparison of the duration of hospital stay among patient groups cannot be relied upon as a direct gauge of relative efficiency or effectiveness of hospital use. However, examination of the length of stay in hospital episodes classified according to one or more of a variety of attributes, including characteristics of the patient, the illness, the doctor, and the hospital, can provide valuable information concerning hospital use. Specifically, differences in length of stay among such classes should suggest areas in which further profitable investigation of hospital use may be conducted and the sources of the variation identified and evaluated as to relative importance. In this way, it should be possible to determine whether the observed variation is either inevitable or desirable, and, if neither, what measures may be taken to minimize or eliminate it. Before undertaking further studies, however, it is important to know that an observed difference in average stay between two patient groups has resulted from some other factor than mere differences in definition of terms or systems of classification.

Conclusion

From studies carried out so far, the differences in the duration of hospitalization between private and staff patients discharged from the medical specialty services of University Hospitals of Cleveland during 1962 do not appear to be explained by variations in age, race, sex, method of paying for care (Blue Cross vs. non-Blue Cross patients), or by any differences in the definition of relevant terms such as "inpatients" or "hospital admissions."

Furthermore, similar differences were observed for hospital discharges which occurred in 1961 and in 1963 and 1964. (These data are not included here.) Studies are continuing to investigate the source of the variation by examining the diagnoses and hospital course of patients as well as the bed supply on the private and staff services. An as yet unexplained difference of another nature was observed between the stays of private and staff patients discharged from the ENT service. This, too, is being investigated further by

examining the diagnoses, operative procedures, and hospital course of each patient discharged from this service during an entire calendar year.

Closely related to the problem of drawing meaningful conclusions from comparisons is the application of results obtained from studying one group of patients to some other group for purposes of prediction, for conclusions based on the investigation of one population will have practical value only if they also apply to other populations. Valid and useful general comparisons and predictions should be possible provided that 1) there is an understanding of the effects that differences in the characteristics of the populations and in methods of acquiring and analyzing data may have on the parameters of hospital use being measured, and 2) published hospital-use studies, describing in sufficient detail the populations included and methods used, are available. More importantly, perhaps, the limitations of such comparisons and predictions can then be recognized and taken into consideration.

Summary

The lengths of hospital stay of adult inpatients discharged during 1962 from the medical and surgical specialty departments of a large, urban, university-affiliated general hospital have been examined. Data are shown comparing the durations of hospitalization of patients who had a private physician directly responsible for their hospital care (private patients) and of those who did not (staff patients). The relation between the lengths of stay of private patients and those of staff patients varied considerably from one hospital department to another. Some of the causes for the observed variation have been determined and discussed, but others remain obscure.

On the medical services, the distributions of hospital stays of private and staff patients were quite different. A much greater proportion of private patients was hospitalized for less than a week; their average hospital stay was approximately three days shorter than the average stay of staff patients. This difference in duration of hospitalization could not be accounted for by variations in age, race, sex, or Blue Cross coverage between the two groups of patients and is being investigated further by examining the diagnoses.

The findings related to patients discharged from the surgical specialty services emphasize the importance in hospital-use studies of consistency in definitions and methods. The distributions of hospital stays among private and staff patients were similar. The major exception was the great excess of stays of one day's duration among surgical staff patients as compared to private patients. The excess of one-day stays for staff patients was found to occur only among those discharged from two surgical specialty services: urology and otolaryngology. Investigation revealed that among urology patients the observed excess in number of one-day stays among staff patients was an artifact rather than a real difference in patterns of hospital use. It resulted from an inconsistency in the rules used by the hospital's statistical section in classifying as inpatients or outpatients persons undergoing short diagnostic

procedures and in the hospital for only a few hours. When comparable criteria were used to define both private and staff inpatients, the distributions of length of hospital stay among the two groups of urology patients became similar. The differences observed in length of stay between private and staff otolaryngology patients, however, could not be accounted for by such differences in definition. Present evidence suggests that at least in part the difference may be due to varying admitting practices, and further studies are under way.

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