

A STUDY OF ONE HUNDRED ADULT PATIENTS'  
EXPRESSED REACTIONS TO SELECTED  
HOSPITAL NOISES

by

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## CHAPTER I

### INTRODUCTION

#### Introduction to the Problem

Much research has been done to indicate that noise is a problem in all walks of life. (20,31,35,41) As far back in history as 720 B.C. it was reported that people were annoyed by noise. Herbert Spencer once stated that a man's intellectual capacity could be gauged by the degree of his intolerance of unnecessary noises. The higher the man's intellectual capacity the lower his tolerance for unnecessary noise. (31) Florence Nightingale has been quoted as saying, "Unnecessary noise is the most cruel absence of care which can be inflicted on either sick or well." (39)

In 1929 the Berlin Chamber of Physicians, recognizing noise as detrimental, drew up and adopted resolutions concerning noise. One of these was "Noise constitutes not merely an annoyance; it frequently becomes one of the social causes of disease." In addition they set up rules, one of which was:

Hospitals, private clinics, sanatoriums and homes for convalescents should be erected only in sections of the city in which noise disturbance need not be feared. When such institutions have been previously established in noisy parts of the city, orders should be issued protecting them by 'zones of quiet' against undue noise. This can be accomplished by prohibiting the erection of noisy establishments in their vicinity, deviation of traffic and the posting of notices warning automobilists against blowing horns loudly. (41)

As our society has expanded and the population grown, the inevitable march of progress has resulted in the development of new housing areas, new and larger airports and relocation of arterial highways. These all have contributed new awareness of the effects of noise and its intensity. (25)

Considerable study has been done in industry to establish the amount of noise that individuals were able to tolerate without physical damage. Little research, however, has been done in hospitals to find what noises were most annoying to patients and at what time of the day or night these noises were most disturbing. No reported research has been done in accumulating data on common factors that might be influencing patients' reactions to noises.

#### Statement of the Problem

Hospitals utilize much modern technology in the treatment of complex illnesses. Despite the advance of science, little seems to be done about hospital noise. Many factors affect patients' reactions to noises to which they are subjected during each twenty-four hour period in a hospital. This study was developed in an attempt to determine which patients were affected by which noises and to what extent they were affected. With this in mind the following hypotheses were formulated:

1. The degree of annoyance to noise was related to whether the patient was bedfast or ambulatory.
2. The degree of annoyance to noise was related to whether the patient's stay was short term or long term.

3. The degree of annoyance to noise was related to the sex of the patient.
4. The degree of annoyance to noise was related to the age of the patient.
5. The degree of annoyance to noise was related to whether the patient had a medical or a surgical problem.

#### Significance of the Problem

Awareness of the effect of noise on the human being has become more acute, particularly in industry. This is true to the extent that various types of industries have had studies done to aid them in eliminating as much noise as possible in order to get the best and most efficient performance from their employees. If this factor was sufficiently important to be studied by industries, it should be equally important for hospitals to find out what effect noise in the hospital has on individuals who are ill and therefore need a quiet environment to speed their recovery.

An editorial from the Canadian Medical Association Journal states:

The modern hospital, with its steel and concrete construction, is not the quietest place in the world. It is really a vast resonance chamber. Metal doors groan and bang; foot-falls and voices re-echo along the corridors; telephones are continually ringing; and conversations can be heard through the partition walls. Certainly noise interferes with sleep, far more than we are apt to realize, and lack of sleep is injurious. In this jazz age, with its high pressure performances both at work and play, its scandalous hours, and dietetic extravagances, there can be little doubt that the nervous system is being maltreated. Add to this the influence of continual noise and in time 'frayed nerves' will become general. It will be interesting to see what the effect of all this will be in the

future on the production of psychoses and insanity.(37)

The literature has placed emphasis on the need for less noise and quieter surroundings in hospitals as well as industry. In one large metropolitan city, a campaign to reduce noise around hospital zones was launched by a woman minister as a result of her visitation to a friend in a hospital and her awareness of the excessive amount of noise. She developed a public education program and obtained the cooperation of newspapers, radio and T.V. stations. The cooperation of the mayor of that city was also entertained and some new regulations were enforced.(6)

Before attempting to remedy those noises that create annoyance it is first necessary to determine which noises can be identified by patients as most disturbing.

#### Assumptions

For purposes of this study it was assumed that:

1. There was a relationship between noise and the patients' well-being.
2. All patients had a range of auditory acuity sufficient to be aware of noises that did or did not annoy them.
3. Patients could identify noises that annoy them.
4. Noises that annoy the patient do interfere with recovery.

#### Definitions

The following definitions are pertinent for the purposes of this study:

1. Noise was any unwanted sound or sound treated as a nuisance.  
(4,10,20,22,23,24,26,35)
2. Annoyance was to be disturbed or irritated as stated by Webster.<sup>(34)</sup> Annoyance was ranked in the following manner: (1) not heard; (2) noticed but not annoyed; (3) moderately annoyed; and (4) greatly annoyed.
3. Short term stay was hospitalization for a period of less than ten days.
4. Long term stay was hospitalization for a period of ten days or more.
5. Bedfast refers to patients not being permitted out of bed.
6. Ambulatory refers to patients being permitted to leave their rooms as desired.

#### Limitations

This study was limited to data obtained by personal interviews of 100 adult patients who met arbitrarily established criteria for participation, namely:

1. The patients selected were not under sedation at the time of the interview.
2. The patients selected were not critically ill.
3. The patients selected had no known hearing defects.
4. No two patients were selected from the same room on the same day.

No attempt was made to ascertain physiological differences in auditory acuity.

Since the sample for this study was limited to 100 adult patients in one specific hospital, conclusions for this study cannot be generalized, but it could be conjectured that similar responses would be elicited by a parallel study in another hospital.

#### Procedure for Solution

Sources of data: Primary sources of data were obtained from personal interviews of 100 selected adult patients. The secondary sources of data were obtained from the literature related to noise and its effect on people.

#### Steps for Carrying Out the Study

The steps whereby this study was conducted may be described as follows:

1. A review of the literature was conducted to obtain a frame of reference regarding noises that have been identified as annoying and studies that have been conducted related to noise in hospitals.
2. The problem of noise in hospitals was identified.
3. A tool for data collection was selected from Goodfriend and Cardinell<sup>(16)</sup> and modified in an endeavor to elicit responses as to degree of annoyance to noises.
4. The tool was submitted to a group of nurses who were teachers and directors in the field of nursing for criticism and suggestions.
5. A hospital was selected wherein the study could be carried out.
6. Criteria were established for selection of the participants.

7. Administrative clearance was obtained from the Director of Nursing Service of the selected hospital for pursuing the study.

8. A pilot study was carried out by interviewing 10 patients not included in the study. The results were found to be satisfactory and no further validation of the tool was required.

9. The data were collected by interviewing 100 adult patients who met the criteria for participating in the study.

10. Data were compiled, tabulated, and interpreted.

11. The study was summarized, conclusions were drawn and recommendations for further study were made.

#### Overview of the Study

There are three chapters in the remainder of this study. In Chapter II, the related literature pertaining to noise and its effect on man is reviewed. In Chapter III, there is a report of the findings of the data obtained from 100 selected adult patients and an analysis and interpretation of the data. Chapter IV consists of the summary, conclusions, and recommendations for further study.

CHAPTER II  
REVIEW OF THE RELATED LITERATURE

Introduction

The literature related to this study has been divided into three groups: general considerations concerning noise, physiological and psychological effects of noise, and noise in hospitals. Following is a review of related studies.

General Considerations Concerning Noise

In discussing sound and noise many different definitions and approaches have been presented by a variety of authors. McLachlan perhaps states it most precisely:

Sound is sensed by the ear when the air particles constituting the atmosphere are in vibration. The frequency of the vibration in cycles per second must be within a certain range in order that the sound shall be audible. The character of the sound sensation depends upon three things: (1) pitch or frequency, (2) loudness, and (3) quality.(24)

The human ear can hear frequency vibrations ranging from 20 - 20,000 cycles per second. Loudness is measured in decibels. Brunner and others state that the critical level of loudness is around 30 decibels.(9) McCord, Teal and Witheride say that "Experience indicates that a noise level of 90 decibels or higher is definitely harmful to the human ear."(22)



Blumenauer says there are two kinds of sound: reverberated and transmitted, of which reverberated is the most common in hospitals. (7)

Robert B. Newman, associate professor of architecture at Massachusetts Institute of Technology, says there are four kinds of noise, each of which reaches the ear by a different means: (1) direct airborne noise which originates in the immediate vicinity; (2) reflected noise caused by sound waves bouncing back from smooth, hard surfaces to add to the din of direct noise that started them; (3) transmitted noise from outside the room that comes through walls, floors and ceilings, and (4) structure-borne noise caused by the impact of bumps or footfalls or the vibration of a machine, each of which turns floors, walls, ducts and conduits into sounding boards or sound conductors. (27)

Helmholtz's description of sound deals primarily with reactions to sound stimulus. "The sensation of sound is a species of reaction against external stimulus, peculiar to the ear, and excitable in no other organ of the body, and is completely distinct from the sensation of any other sense. (19)

Bartlett in The Problem of Noise states that noise is any sound treated as a nuisance. The qualities of a particular sound depend largely upon the background from which the sound is experienced. Certain characteristics of sound stand out, the most important of these being loudness, ambiguity of direction and unfamiliarity. (4)

Man's behavior in response to noise has been an area of research. As reported by Harris, behavior in response to noise can normally be measured in three ways: (1) degree of annoyance to man, (2) physiological measurement, and (3) efficiency.

Harris says there is widespread agreement that some noises are annoying to almost all people, and probably any particular noise is annoying to some person. Emotional associations undoubtedly play a part in producing complaints about particular noises. (18)

McLachlan states that with the sharp, intermittent sound, the individual is in continuous expectation and apprehension, but in a continuous noise the individual adjusts himself to the new condition. (24)

Many studies agree that a high-pitched noise is more annoying than an equally loud low-pitched noise. Both extremely low-pitched noises and extremely high-pitched noises were found to be more annoying than a noise in the middle range. (18)

Peterson and Gross imply that the extent of our annoyance to noise depends greatly on what we are trying to do at the moment the noise occurs. It depends on our previous conditioning and the character of the noise. (28)

Harris writes that a sound which repeatedly changes its location can be assumed to be more annoying than one which remains stationary. In addition, uncertain localization may provoke in human beings feelings of curiosity and even insecurity. A sound whose source is not confidently known may be a nagging intellectual problem. Conversely, definite localization allows a noise to be identified in this way more rapidly and so may reduce its annoyance. The same effect may be produced by verbal explanation. (18)

Berrien comments that in spite of this widespread interest in noise abatement, relatively few facts have been well established. Public support has been enlisted for noise abatement campaigns on

uncritical acceptance of an assumption that noise, because it is annoying, must be harmful. Factors to determine annoyance have not been subjected to thorough analysis. In his opinion there are many circumstances in which noise detracts from efficiency and well-being, but under what circumstances noise is deleterious and for what kinds of individuals are questions for further research. (5)

#### Physiological and Psychological Effects of Noise

According to Rodolsky it has been demonstrated that sounds are capable of bringing about definite chemical changes. A spectacular example is an egg being soft-boiled in a few minutes when being subjected to the effects of intense sound, without raising the temperature. It has also been found that sounds in the supersonic range can actually kill bacteria. "If noise can boil an egg and kill bacteria and coagulate proteins it can certainly bring about changes in the human brain which is made up of proteins." (29)

The New York City Noise Abatement Commission reports that harmful effects of noise are shown in many ways, some of which are: (1) impaired hearing of those exposed to constant loud noises; (2) efficiency of workers is seriously interfered; (3) great strain is put on the nervous system, leading to neurasthenic and psychasthenic states in an attempt to overcome the effect of noise; and (4) serious interference with sleep. (35)

An article from The Illinois Medical Journal states the sensitivity of individuals to noise and the range of hearing vary tremendously. Some people are much more sensitive to noise than others.

As a result of these human factors the effect of ordinary noise is lacking in scientific accuracy. However, it is felt that noise may be a factor in the health of the ordinary citizen. (40)

Lord Horder cites the chief effects of noise as:

- (1) interference with sleep, (2) lowering of efficiency in both manual and mental work,
- (3) a contributory factor in the production of minor and at times major mental disease, and
- (4) a cause of increased incidence of general ill-health when a quiet district becomes a noisy one. (40)

Karl Kryter reports that the effects of noise on man in industry has been the subject of many articles and research projects. He states that feelings of annoyance vary with subjective impressions and individual attitudes, but a few of the more obvious aspects are: (1) unexpectedness; (2) interference with auditory behavior; (3) inappropriateness; (4) intermittency; (5) reverberation, and (6) intensity or loudness. (20)

McKenzie in an article from The British Medical Journal states:

While noise does not induce organic disease, apart from deafness, it does induce a condition of functional weakness or disability, which is manifested in exhaustion more or less severe according to: (1) the kind of noise; (2) the normal mental and constitutional make-up of the recipient; and (3) the state of his health at the time of his exposure. And this state of fatigue, though not itself a disease, opens the door to disease. (23)

From The Journal of the American Medical Association McCord, Teal and Witheride write:

The multiple and insidious ill effects of noise constitute an inadequately recognized baneful influence on the lives of many million persons throughout the country, especially those who live in urban areas. In noisy industrial employments it is not unusual to find

those groups of workers below 30 years of age, as many as 50 per cent, with some degree of impaired hearing. This noise deafness constitutes the most serious and tangible of the ill noise effects, but there is in addition, a host of scarcely measurable injuries made evident by neuroses, loss of sleep, excessive fatigue, emotional disturbances and the like that jeopardize the complete well-being of most persons, and in which noise may play a part. (22)

McLachlan reports that experiments have been done to establish the fact that noise has a physiological effect on an individual. The occurrence of a sudden noise causes a momentary check in the respiratory rate followed by more rapid, deeper, irregular breathing. An unexpected sudden noise causes a rise in blood pressure. A sudden intermittent noise causes the pulse to accelerate. Emotions are influenced by a sudden unexpected noise which in turn affects the stomach contractions, since it is a well established fact that emotional reactions affect the visceral organs. (24)

McCord, Teal and Witheride say:

There is both practical and experimental evidence that noise has been responsible for impaired hearing, fatigue, neuroses, increased blood pressure, and decreased working and mental efficiencies....Exposure to prolonged noises of lower level, which is the case with many occupational noises, is also harmful, but the extent of harm done is not well known and cannot be fairly estimated at this time. (22)

In the article "The Era of Noise" from The Illinois Medical Journal it was written that continued exposure to noise has been proven experimentally to destroy efficiency, produce fatigue, encourage inattention and lack of concentration, promote absenteeism, and make victims jumpy, jittery and irritable. (40)

McCord, Teal and Witheride report on studies which have established

that noise inhibits the normal peristaltic activity of the stomach.  
Long exposure to noise will gradually bring on fatigue.(22)

Professor George Robertson says, as quoted from City Noise:

The effect of noise, especially prolonged noise, on the nervous system may be in the nature of a constant strain and drain on nervous energy and this may lead ultimately to exhaustion. It is this action of noise, causing nervous and mental exhaustion, that leads to neurasthenia.(35)

Sir Maurice Craig, a consulting neurologist, states as quoted from City Noise:

As sleep, and sound sleep, is a fundamental necessity for mental health, it is evident how important becomes the question of disturbing noises. When exposed to these, the auditory centers in the brain can never be at rest and nerve fatigue results with all its concomitant symptoms. Disturbed nights are injurious enough but persons are also exposed by day to much noise which in its own origin is thoughtless and unnecessary. Over-stimulation of the nervous system is one of the most important factors in bringing about minor and at times major mental disorder, and noise is an important factor in producing over-stimulation.(35)

Archambault writes that the average individual requires from six to nine hours of sleep in order to remain fit physically and mentally. Rest is especially important in the case of expectant mothers, invalids, critically ill patients either in their homes or in hospitals.(2)

As quoted from the writings of Archambault, Professor Portier of Paris states "Noise diminishes the recuperative value of sleep even though sleep is not interrupted, for the brain continues to receive auditory impressions even though it does not analyze them."(2)

Archambault writes that Dr. Foster Kennedy and his associates have carried out experimental studies of the effect of noise on the brain. It was shown conclusively that the brain is exquisitely sensitive to

noise and its reaction to this potential traumatism can be measured as accurately as the blood pressure or sugar content in the urine.<sup>(2)</sup>

Dorman says, "Noises occurring near a sleeping person raise the blood pressure and increase the muscular tenseness." While the individual is not always awakened, the result may last as long as thirty minutes after the noise has stopped.<sup>(14)</sup>

Laird reports that during actual sleep there are some night noises which are intense enough to cause the brain cortex to react. It has been proven that a sleeping person has a deep stage of sleep about every hour. In between in the lighter stages of sleeping even slight noises can disturb. The heart rate will also accelerate during sleep when noise occurs. Familiar noises are less disturbing during sleep than strange ones. It is thought strange noises disturb more because they arouse vigilance.<sup>(21)</sup>

Denzel reports on the observations made by S. Rosen, the surgeon who developed the stapes mobilization operation. S. Rosen observed the Malaans, a stone age people in Central Africa. He found they lived in an environment which simulated a soundproof room. They were generally very healthy people, and the older persons in the tribe could hear as acutely as the young.<sup>(13)</sup>

In contrast, Bartlett states that it has been assumed that anything that noticeably annoys us must have an adverse effect on our work but this has not been proven thus far.<sup>(4)</sup>

### Noises in Hospitals

Burger reports that all noises in a hospital fall into three main categories: (1) outside noises; (2) human and animal noises; and (3) maintenance and equipment noises. All these noises combine into one sound resembling a roar. (10)

Bredenberg states that reverberated sounds are a particular problem of hospitals because there is always more noise when sound comes in contact with reflective surfaces, and the average hospital is full of such surfaces. (8)

Agnew says many new hospitals are amplifying every sound. This is due in part to the modern fireproofing consisting of steel, tile and concrete, and the increased plumbing. He suggests that utility rooms and diet kitchens could be placed in areas where sound transmission is minimized. Self-closing doors would also help. The nurses' station should be so situated that the nurse can oversee the entire ward, but conversation, rattling of charts, and other noises would not disturb patients. (1)

Blumenauer states that in the working area of a hospital the noise should be kept below 40 decibels; in patient rooms it should be kept below 32 decibels. (7)

Nurses and doctors contribute much to the noise of hospitals. The banging of a single door, clatter of falling dishes or equipment, flapping of blinds, squeaking of stretchers are all repetitious noises that annoy patients day and night. (1)

From The Lancet it is stated:



Hospital patients often have to put up with a perpetual disturbance by small noises....Much annoyance may be caused to patients by loud buzzers or bells on the telephone system, the clicking of noisy locks, and the noises of plumbing.(38)

Arthur Barnes also related that it was a common complaint of patients that there was too much noise in our hospitals. Often sick people are inclined to be more critical concerning conditions which affect them.

He reports that people create most of the noise and therefore much noise could be eliminated from the hospital with a minimum of expense merely by getting the full cooperation of the employees.(3)

The Central Health Services Council says that noise in hospitals may retard the patient's recovery. Nothing can be done about some noises, but others could be eliminated or softened. They propose several factors for consideration when attempting to reduce noise:

(1) sources of noise; (2) cooperation of staff; (3) emergency admissions or seriously ill patients; (4) equipment; (5) fittings; (6) windows; (7) doors; (8) floors; (9) radio and T.V.'s.(12)

F. R. Watson says that a moderate amount of sound in hospitals is desired. Most patients like the diversion caused by the sounds of something going on. It helps them to forget about the condition that is keeping them in the hospital. Moderate talking, movement and general activity is pleasant to the average patient. However, nervous patients and those with psychotic conditions may need greater than average quiet, and a special area should be provided for these patients.(33)

William J. Cavanaugh states that the first step in analyzing a noise problem is to define the nature and extent of the noise. Inside

noises are usually more numerous than outside noises. Heel clicking, falling objects or vibrating mechanical equipment can act directly on the structure and radiate sound not only on both sides of a structure but also in remote parts of the building. (11)

The control of noise in the hospital was considered to be sufficiently significant to be designated as the problem of the month in the April 1933 issue of The Modern Hospital. John M. Smith, Director of Hahneman Hospital, Philadelphia, expressed the opinion that some of the noise made by nurses and other personnel in utility rooms and floor kitchens was unnecessary and due to carelessness and lack of interest in the patient. (36)

A. E. Hardgrove, General Superintendent, City Hospital, Akron, Ohio, stated that elimination of noise was basically a construction problem and that very little could be accomplished through disciplinary measures. (36)

E. L. Slack, Superintendent, Samuel Merritt Hospital, Oakland, California, found two factors of equal importance in eliminating noise in a hospital. These factors were the type of building construction and the hospital employees' awareness of and attitudes toward noise. (36)

Ada Belle McCleary, Superintendent, Evanston Hospital, Evanston, Illinois, expressed the opinion that there are not two but three factors that have a part in noise making. In her opinion these three factors are construction of the building, personnel and the articles handled. (36)

Marilyn E. Hagans states that if nurses would only take the time to listen in their own hospitals they would probably be appalled by the clatter and chatter that goes on. In her opinion nurses are reconciled

to the theory that equipment must "shake, rattle, and roll" to be of value. Nurses bellow and squeak more loudly than the equipment. In their own homes they demand absolute quietness when their family members are ill but do not apply this same standard when at the hospital. She concludes that some hospital noises cannot be controlled, but nurses could eliminate most of those for which they are responsible. (17)

#### Review of Related Studies

Statham conducted a study in the Royal Northern Hospital, London, of views of adult patients on noise. The findings were correlated with their home background and the tenor of their work. Each patient was asked what noise, if any, disturbed, worried, irritated or kept him awake while in the hospital. A random sample of 114 patients was interviewed from large wards, small wards and single rooms. They were from all walks of life and occupations.

Statham found that fifty per cent of the patients had no complaints of noise at all and fifty per cent complained that noises either worried or irritated them.

Of those studied, fifty per cent of the males and fifty per cent of the females made complaints of noise. Fewer single patients complained than married patients. Patients with noisy environment prior to hospital admission made fewer complaints than those from quieter environments.

Patients who ranged in age from 21 to 65 complained much more than the extreme age groups.

The noises disturbing patients most were those made by other people

such as patients' talking, snoring, calling out at night or in early morning hours, and the voices of the nursing staff. These comprised fifty per cent of the complaints.

The mechanical or equipment noises constituted about twenty-five per cent of the complaints. The more frequent complaints in this category were: doors banging, bedpans clanking, articles dropped in wards or corridors, squeaking carts, bells and buzzers, the scraping sound of moved bedside tables and chairs, and crashing bedrails. The noise of the hospital plumbing system caused very few complaints.

External noises caused about twenty-five per cent of the complaints. These consisted basically of traffic; motorcycles, ambulances and staff cars in the hospital parking lot. (32)

Burger reports that various investigations have been done in England and America. Of these:

50 per cent of all patients were not disturbed by noises in the hospital. Of the remaining 50 per cent half of the complaining 50 per cent ascribed their irritation to both outside maintenance and equipment noises in equal proportions....Age as well as sex have an effect on the susceptibility to noise. Females appear to be more susceptible than males. Young people under 21 and people over 65 are not so susceptible as the in between group. (10)

Edinburgh Royal Infirmary and its associated hospitals has carried out two anti-noise campaigns, the first of which was conducted in February 1962 and the second in February 1965. The campaign was explained to all staff members and suggestions were made to reduce noise. Visitors were also given leaflets and asked to cooperate in the campaign.

Eighty-eight questionnaires were distributed to patients asking them to state the kinds of noises that worried them. Four categories

were used: (1) made by equipment; (2) made by people; (3) outside the ward; (4) outside the building.

Sixty-five per cent of the questionnaires were returned showing that noise caused by equipment and people was of greatest concern to the selected population. Noises outside the ward and building were not of great concern.

Equipment was the chief cause of disturbing noise. Over forty per cent of disturbing noises caused by people were related to staff walking and talking noisily, but thirteen per cent of the complaints were concerned with screaming of patients, patients' loud talking and nursery children crying.

Some of the patients questioned commented that the noise was not excessive and that if it were eliminated their stay in the hospital would be dull. (39)

Goodfriend and Cardinell conducted a study of noise in hospitals to determine the noise sources common to most hospitals. Eight hospitals were utilized. A total of 514 usable questionnaire returns were tabulated. The most prevalent sounds in order of annoyance were found to be: (1) radio and television sets; (2) staff talking in the corridors; (3) other patients in distress and recovery room sounds; (4) voice paging; (5) talking in other rooms; (6) babies or children crying; (7) telephones; and (8) pantry, kitchen, and utility room noise. (16)

Snook did a noise study at the Newton-Wellsley Hospital, Newton, Massachusetts, which combines six hospitals. A ten per cent sampling of patients from medical and surgical units during one month were sent

questionnaires. All the questionnaires were coded as to the hospital, patient's age, sex, marital status, room accommodation, and room number. Tape recordings were also made on specific nursing units in the six hospitals.

It was found that the noon hour was the noisiest time of day in most cases. It was also found that the greatest portion of the noise disturbance was within the nursing unit and created by humans. "Of 90 returns, 34 complaints of noise were attributed to humans; 13 could be attributed to mechanical irritants; and 30 to a combination of human and mechanical sources."

As a result of their study the following conclusions were arrived at:

1. The frequency of noise--as a general rule the higher the frequency range of the noise, the greater the annoyance factor to patients.
2. The time a noise occurs determines in part, how 'noisy' a sound appears to the patient....
3. Personal association with the noise affects the receiver and defines how 'noisy' a sound seems to be to him.

From these conclusions criteria were developed as to "what makes a noise noisy."<sup>(30)</sup>

In conclusion, the review of the literature indicated:

1. Reverberated sound was most common in hospitals.
2. Man's behavior in response to noise can normally be measured in three ways: (1) degree of annoyance to man, (2) physiological measurement, and (3) efficiency.
3. There was agreement that some noises are annoying to almost all people and probably any particular noise is annoying to some person.

4. Experiments have been done to establish that noise has a physiological and psychological effect on individuals. The sensitivity of individuals to noise and the range of hearing vary tremendously.

5. Noises in hospitals fall into three main categories: (1) outside noises; (2) human and animal noises; and (3) maintenance and equipment noises.

Snook has probably summarized all the literature very effectively with his statement:

Noise affects the hospital and its operation in four ways: it retards patient recuperation; generates a fear reaction in patients; and impairs employee relation....Hospital noise contributes to a poor public relations image.(30)

CHAPTER III  
REPORT OF THE STUDY

Procedure

This study was undertaken to determine which patients were affected by which noises and to what extent they were affected. This study further attempted to find out whether there were certain common factors related to these patients that appeared to influence their expressed reactions to degree of annoyance to the noises they experience during each twenty-four hour period in a hospital.

The literature was reviewed to obtain a frame of reference regarding noises that have been identified as annoying and studies that have been done related to noise in hospitals.

An interview guide was constructed (Appendix A). It was modified from a questionnaire by Goodfriend and Cardinell.<sup>(16)</sup> This guide consisted of twenty common noise sources and three open-end responses related to noise and the patients' reaction to it.

The interview guide was then submitted to a group of nurses who were teachers and directors in the field of nursing, for criticism and suggestions.

A hospital was selected wherein the study could be carried out and administrative clearance was obtained from the Director of Nursing Service for pursuing the study.



Criteria were established for selection of the participants as described in Chapter I.

A pilot study was carried out by interviewing 10 patients not included in the study. The results were found to be satisfactory and no further validation of the tool was required.

The investigator conducted personal interviews with 100 participants who met the aforementioned criteria. All interviews were completed during the Spring Quarter 1965.

The data were compiled and tabulated.

#### Findings

In analyzing the data obtained from the interviews it was found that patients were able to identify common noise sources that annoyed them and to express their degrees of annoyance. It should be noted that the items in the interview guide have been alphabetized to expedite tabulation.

In all instances of the selected noise items more than 60% of the selected patients either did not hear or were not annoyed by a specific noise. This differs from the studies reported by Statham<sup>(32)</sup> and Burger<sup>(10)</sup> who found that only 50% of the patients did not complain of noise. Talking in the corridors by hospital personnel was annoying to 36% of the selected patients. Of these patients 13% expressed moderate annoyance and 23% expressed great annoyance.

The sound of radios and TV sets annoyed 34% of the selected patients. Moderate annoyance was expressed by 4% of the patients and 30% expressed great annoyance.

Highway or street traffic noise was annoying to 29% of the selected patients. Only 6% of the patients were moderately annoyed while 23% were greatly annoyed.

These findings are shown in Table 1. It would seem to indicate patients are able to evaluate noises as to degree of annoyance that they experience.

Table 1. Responses of 100 Patients and Degree of Annoyance to 20 Selected Noises

Selected Noises	Degree of Annoyance *				
	Not Heard	Noticed but Not Annoyed	Moderately Annoyed	Greatly Annoyed	Total Per Cent
(1)	(2)	(3)	(4)	(5)	(6)
Airplanes.....	51	42	4	3	100
Call Bell System.....	23	58	5	14	100
Carts.....	7	67	12	14	100
Cleaning Equipment.....	11	65	8	16	100
Floor Polisher.....	20	69	5	6	100
Food Service.....	29	65	4	2	100
Highway or Street Traffic	30	41	6	23	100
Nurses' Station Noise....	31	46	7	16	100
Radios and TV Sets.....	22	44	4	30	100
Service Entrance Noise...	69	24	3	4	100
Slamming Doors.....	58	24	5	13	100
Talking in Corridors (Hospital Personnel).....	0	64	13	23	100
Talking in Corridors (Visitors).....	0	75	12	13	100
Talking in Other Patients' Rooms.....	63	26	5	6	100
Telephones.....	23	52	12	13	100
Toilet Flushing.....	26	60	7	7	100
Utility Room Noise.....	37	48	3	12	100
Voice Paging System.....	3	69	11	17	100
Walking in Corridors.....	9	65	17	9	100
Water Running from a Faucet.....	61	33	1	5	100

\* Responses of 100 Patients Expressed in Percentage

Consideration of type of activity of the patient as the first possible factor in reaction to noise led to the analyzing and comparison of the bedfast and ambulatory patient responses. The responses of 53 bedfast patients indicated that at least 31 (59%) were not annoyed by each selected noise and in one noise source--airplanes--50 patients or 94% were not annoyed. The large percentage not annoyed by airplanes might be due to an acceptance of airplanes as a routine part of our general surroundings in life.

Hospital personnel talking in the corridors was the most annoying noise source to the bedfast patients. A total of 22 (41%) of the bedfast patients were annoyed by this noise. Of this group 7 (13%) patients were moderately annoyed and 15 (28%) were greatly annoyed.

Radios and TV sets were annoying to 20 (38%) of the bedfast patients. All of this group were greatly annoyed by this noise source.

Telephones were annoying to 17 (32%) of the bedfast patients. Of those who responded 7 (13%) were moderately annoyed and 10 (19%) expressed great annoyance.

The voice paging system was annoying to 16 (30%) of the bedfast patients. Moderate annoyance was related by 4 (7%) of the patients and 12 (23%) were greatly annoyed.

Walking in the corridors was also annoying to 16 (30%) of these patients. However, there was equal distribution as to degree of annoyance.

Carts were also annoying to 16 (30%) of the bedfast patients. Of this group 10 (19%) were moderately annoyed and 6 (11%) were greatly annoyed.

Nurses' station noise was also annoying to 16 (30%) of these patients. Of these patients 5 (9%) were moderately annoyed and 11 (21%) were greatly annoyed. The findings are shown in Table 2.

Table 2. Responses of 53 Bedfast Patients and Degree of Annoyance to 20 Selected Noises

Selected Noises	Degree of Annoyance*				Total Per Cent
	Not Heard	Noticed but Not Annoyed	Moderately Annoyed	Greatly Annoyed	
(1)	(2)	(3)	(4)	(5)	(6)
Airplanes.....	51	43	2	4	100
Call Bell System.....	24	59	2	15	100
Carts.....	8	62	19	11	100
Cleaning Equipment.....	7	68	8	17	100
Floor Polisher.....	17	68	6	9	100
Food Service.....	30	58	8	4	100
Highway or Street Traffic	28	43	2	27	100
Nurses' Station Noise....	30	40	9	21	100
Radios and TV Sets.....	22	40	0	38	100
Service Entrance Noise...	73	19	4	4	100
Slamming Doors.....	53	26	6	15	100
Talking in Corridors (Hospital Personnel).....	0	59	13	28	100
Talking in Corridors (Visitors).....	0	72	11	17	100
Talking in Other Patients' Rooms.....	60	28	6	6	100
Telephones.....	25	43	13	19	100
Toilet Flushing.....	26	59	6	9	100
Utility Room Noise.....	28	57	2	13	100
Voice Paging System.....	4	66	7	23	100
Walking in Corridors.....	8	62	15	15	100
Water Running from a Faucet.....	55	38	0	7	100

\*Responses of 53 Bedfast Patients Expressed in Percentage

The responses of 47 ambulatory patients indicated that at least 32 (68%) were not annoyed by each of the selected noises. No ambulatory patients were annoyed by food service noise. This unanimous response might be attributed to the fact that if the patient is ambulatory he is probably able to partake of food, thus making the food service noise a more welcome sound.

Radios and TV sets were annoying to 15 (32%) of the ambulatory patients. There were 4 (9%) who were moderately annoyed and 11 (23%) greatly annoyed. These findings indicate that radios and TV sets were the most annoying noise source to these ambulatory patients.

Talking in the corridors by hospital personnel was annoying to 14 (30%) of the ambulatory patients. There were 6 (13%) who expressed moderate annoyance and 8 (17%) who expressed great annoyance.

Highway or street traffic noise was annoying to 13 (28%) of the ambulatory patients. Moderate annoyance was stated by 4 (9%) and 9 (19%) stated great annoyance. The findings are shown in Table 3.

Table 3. Responses of 47 Ambulatory Patients and Degree of Annoyance to 20 Selected Noises

Selected Noises	Degree of Annoyance*				Total Per Cent
	Not Heard	Noticed but Not Annoyed	Moderately Annoyed	Greatly Annoyed	
(1)	(2)	(3)	(4)	(5)	(6)
Airplanes.....	51	40	7	2	100
Call Bell System.....	21	57	9	13	100
Carts.....	7	72	4	17	100
Cleaning Equipment.....	15	64	6	15	100
Floor Polisher.....	24	72	2	2	100
Food Service.....	30	70	0	0	100
Highway or Street Traffic	32	40	9	19	100
Nurses' Station Noise...	32	53	4	11	100
Radios and TV Sets.....	19	49	9	23	100
Service Entrance Noise..	64	30	2	4	100
Slamming Doors.....	64	21	4	11	100
Talking in Corridors (Hospital Personnel)....	0	70	13	17	100
Talking in Corridors (Visitors).....	0	79	13	8	100
Talking in Other Patients' Rooms.....	66	23	4	7	100
Telephones.....	21	62	11	6	100
Toilet Flushing.....	23	66	7	4	100
Utility Room Noise.....	47	38	4	11	100
Voice Paging System.....	2	72	15	11	100
Walking in Corridors....	11	68	19	2	100
Water Running from a Faucet.....	68	28	2	2	100

\*Responses of 47 Ambulatory Patients Expressed in Percentage



In comparison of these two groups, bedfast patients expressed some degree of annoyance more frequently than ambulatory patients for seventeen of the selected noises, while ambulatory patients expressed some degree of annoyance more frequently in only two noise sources, that of the call bell system and airplanes. Ambulatory patients' greater annoyance to the call bell system might be explained by the fact that the ambulatory patient no longer needs the call bell system. The same percentage of both bedfast and ambulatory patients expressed annoyance to utility room noise.

There were 22 (41%) of the bedfast patients who expressed some degree of annoyance to hospital personnel talking in the corridors while only 14 (30%) of the ambulatory patients expressed annoyance by this source. This might be explained by the fact that the ambulatory patient is able to be out in the corridors and thus is more aware of to what the talking is related.

Radios and TV sets were annoying to 20 (38%) of the bedfast patients and 15 (32%) of the ambulatory patients. This seems to indicate that when patients are hospitalized radios and TV sets are annoying regardless of type of activity the patient is permitted. This might be due to individual choices of programs.

Reactions of bedfast patients and ambulatory patients to telephone noise showed a great difference. There were 17 (32%) of the bedfast patients annoyed as compared to only 8 (17%) of the ambulatory patients.

Walking in the corridors was annoying to 16 (30%) of the bedfast patients and 10 (21%) of the ambulatory patients. It would seem the ambulatory patient might be less annoyed by this source since he is able to ambulate as he desires.

Carts were also more annoying to bedfast patients with 16 (30%) being annoyed and only 10 (21%) of the ambulatory patients annoyed. Again this noise source might be less annoying to the ambulatory patient since he is able to get out and see what the carts contain, thus creating interest.

Nurses' station noise was also much more annoying to bedfast patients than ambulatory patients. There were 16 (30%) bedfast patients who expressed some degree of annoyance and only 7 (15%) ambulatory patients who expressed some degree of annoyance. This would seem to indicate that since the ambulatory patient can see what is happening he is less annoyed by it. The comparisons are shown in Figure 1.

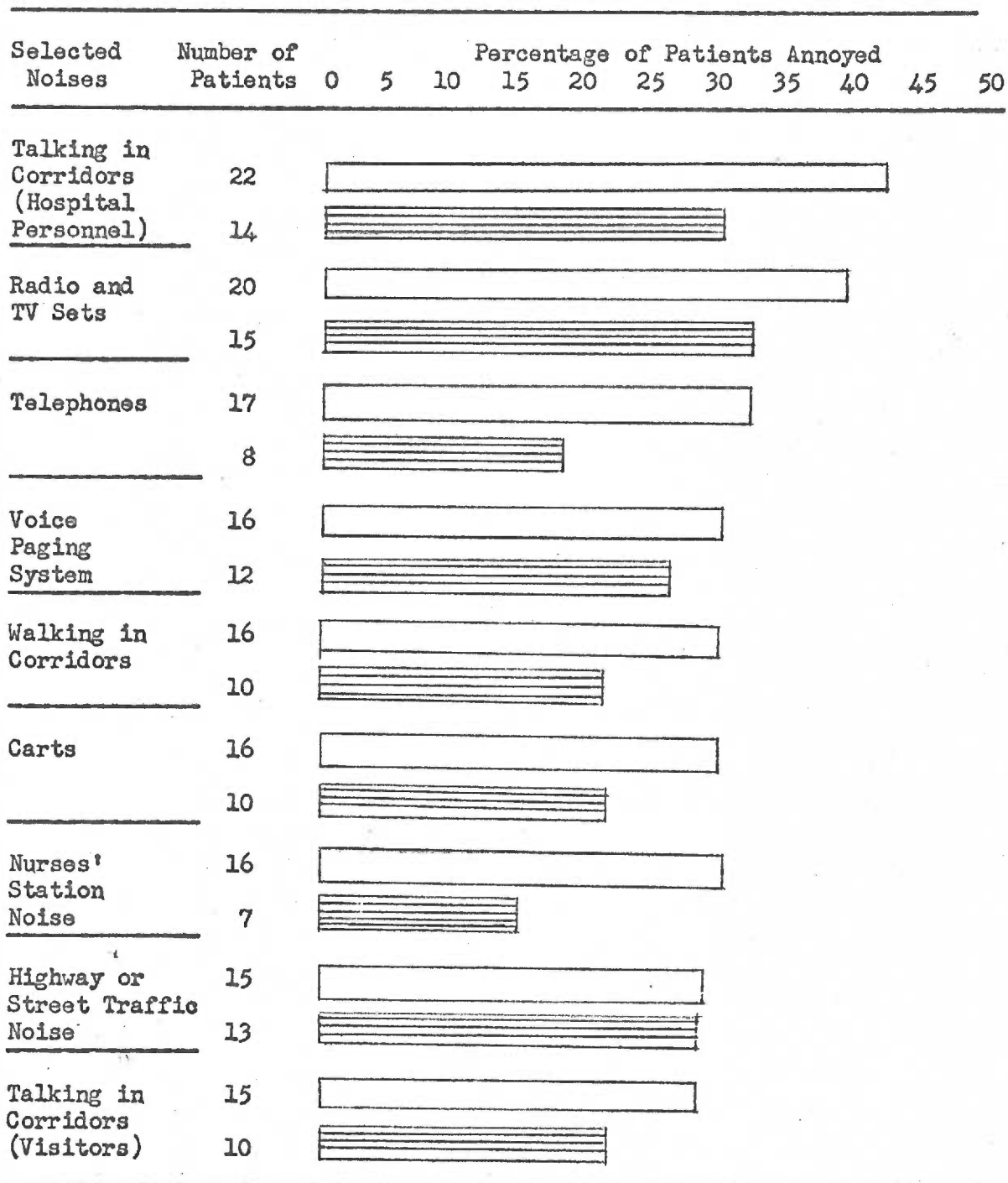


Figure 1. Comparison of 53 Bedfast and 47 Ambulatory Patients' Responses to Annoyance to 20 Selected Noises

Bedfast is represented by [Solid bar]

Ambulatory is represented by [Hatched bar]  
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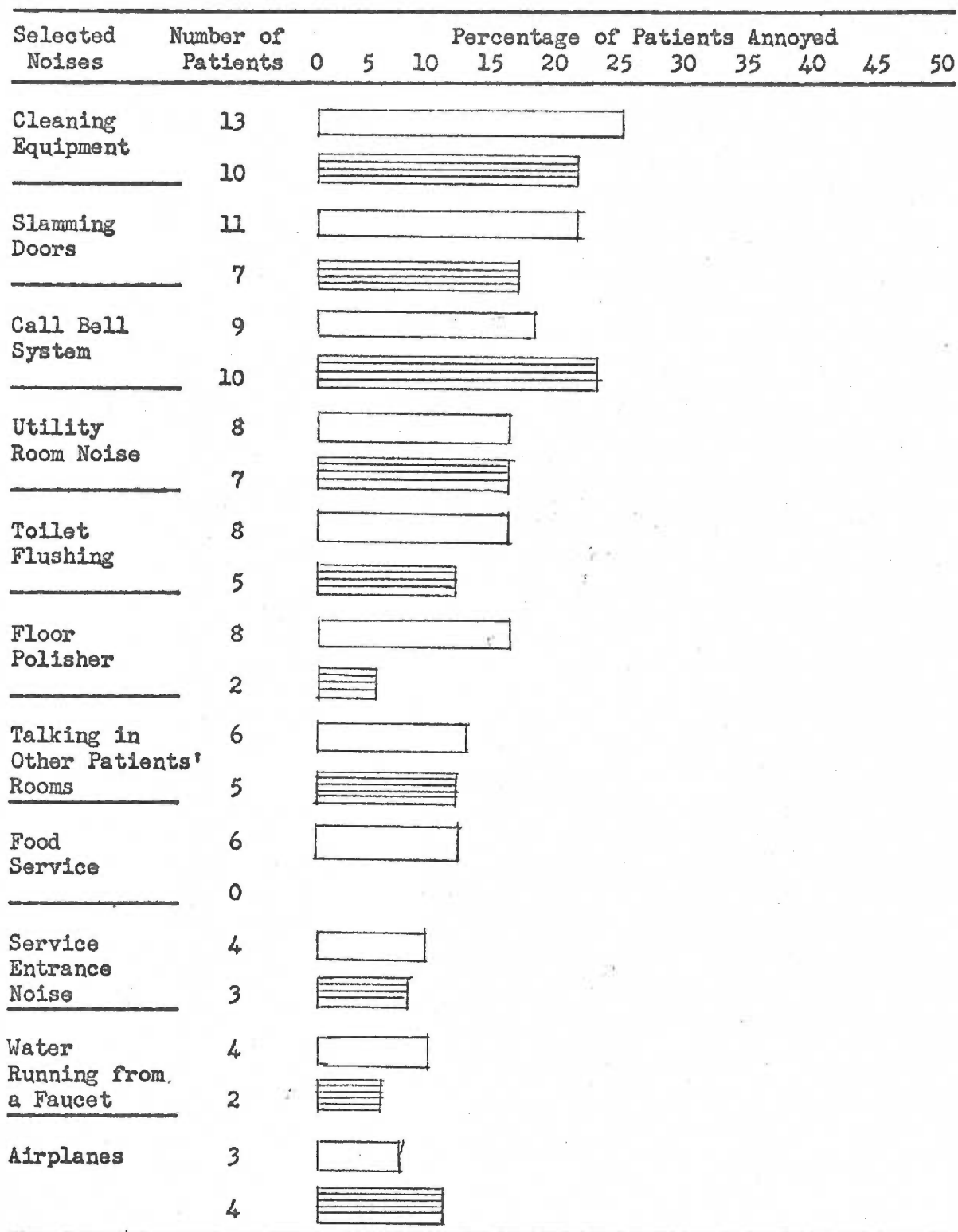


Figure 1. (Concluded)

A second possible factor that might influence the patients' responses to the selected noises was the length of hospitalization. At least 39 (67%) of the short term patients were not annoyed by each of the selected noises. The sound of airplanes annoyed only 5 (4%) of this group.

Talking in the corridors by hospital personnel, and radios and TV sets were both rated by the short term patients as the most annoying noise sources. There were 19 (33%) of the short term patients annoyed by each of these noises. Talking in the corridors by hospital personnel was moderately annoying to 6 (10%) of the group and greatly annoying to 13 (23%). Radio and TV sets were moderately annoying to 2 (4%) and 17 (29%) were greatly annoyed.

The voice paging system and walking in the corridors were equally annoying to the short term patients with 17 (30%) of these patients annoyed by either noise. The voice paging system was moderately annoying to 9 (16%) of the group and greatly annoying to 8 (14%). Walking in the corridors was moderately annoying to 13 (23%) and greatly annoying to 4 (7%). The findings are shown in Table 4.

Table 4. Responses of 58 Short Term Patients and Degree of Annoyance to 20 Selected Noises

Selected Noises	Degree of Annoyance*				
	Not Heard	Noticed but Not Annoyed	Moderately Annoyed	Greatly Annoyed	Total Per Cent
(1)	(2)	(3)	(4)	(5)	(6)
Airplanes.....	65	31	0	4	100
Call Bell System.....	27	50	4	19	100
Carts.....	7	67	12	14	100
Cleaning Equipment.....	15	62	9	14	100
Floor Polisher.....	26	64	2	8	100
Food Service.....	40	53	5	2	100
Highway or Street Traffic	33	45	3	19	100
Nurses' Station Noise...	38	38	5	19	100
Radios and TV Sets.....	24	43	4	29	100
Service Entrance Noise..	76	15	2	7	100
Slamming Doors.....	62	19	7	12	100
Talking in Corridors (Hospital Personnel)....	0	67	10	23	100
Talking in Corridors (Visitors).....	0	76	12	12	100
Talking in Other Patients' Rooms.....	71	24	3	2	100
Telephones.....	29	45	10	16	100
Toilet Flushing.....	26	58	9	7	100
Utility Room Noise.....	38	48	5	9	100
Voice Paging System.....	3	67	16	14	100
Walking in Corridors....	10	60	23	7	100
Water Running from a Faucet.....	64	29	2	5	100

\*Responses of 58 Short Term Patients Expressed in Percentage

In analyzing the responses of 42 long term patients as to their degree of annoyance to the selected noises it was indicated that at least 25 (59%) of the long term patients experienced no annoyance to each noise source. Hospital personnel talking in the corridors was the most annoying noise source to the long term patient. There were 17 (41%) of the group who were annoyed by this noise source. Of this group 7 (17%) were moderately annoyed and 10 (24%) were greatly annoyed.

Radios and TV sets were annoying to 16 (38%) of the long term patients. There were 2 (5%) who were moderately annoyed and 14 (33%) were greatly annoyed.

Highway or street traffic noise was annoying to 15 (36%) of the long term patients. Of these patients 3 (7%) were moderately annoyed and 12 (29%) stated they were greatly annoyed. The findings are shown in Table 5.

Table 5. Responses of 42 Long Term Patients and Degree of Annoyance to 20 Selected Noises

Selected Noises	Degree of Annoyance*				
	Not Heard	Noticed but Not Annoyed	Moderately Annoyed	Greatly Annoyed	Total Per Cent
(1)	(2)	(3)	(4)	(5)	(6)
Airplanes.....	31	57	10	2	100
Call Bell System.....	17	69	7	7	100
Carts.....	7	67	12	14	100
Cleaning Equipment.....	5	71	5	19	100
Floor Polisher.....	12	79	7	2	100
Food Service.....	17	79	2	2	100
Highway or Street Traffic	26	38	7	29	100
Nurses' Station Noise....	21	57	10	12	100
Radios and TV Sets.....	17	45	5	33	100
Service Entrance Noise...	57	38	5	0	100
Slamming Doors.....	52	31	3	14	100
Talking in Corridors (Hospital Personnel).....	0	59	17	24	100
Talking in Corridors (Visitors).....	0	74	12	14	100
Talking in Other Patients' Rooms.....	52	29	7	12	100
Telephones.....	14	62	14	10	100
Toilet Flushing.....	24	67	2	7	100
Utility Room Noise.....	36	47	0	17	100
Voice Paging System.....	2	72	5	21	100
Walking in Corridors.....	7	71	10	12	100
Water Running from a Faucet.....	57	38	0	5	100

\*Responses of 42 Long Term Patients Expressed in Percentage



In comparing the short term patients' and long term patients' responses to the selected noises, short term patients more frequently showed some degree of annoyance to eleven noise sources. Long term patients showed some degree of annoyance more frequently than short term patients to eight noise sources. For one noise source, carts, the reactions were equal.

Talking in the corridors by hospital personnel was indicated as annoying to 17 (41%) of the long term patients and 19 (33%) of the short term patients. Likewise radios and TV sets were annoying to 16 (38%) of the long term patients and 19 (33%) of the short term patients. There were 15 (36%) of the long term patients annoyed by highway or street traffic noise while only 13 (22%) of the short term patients expressed annoyance to this noise source. In all three sources a greater percentage of long term patients indicated annoyance than short term patients. This might be explained by the fact that often long term patients are also bedfast patients, in which case the findings indicated that the first two noise sources were much more annoying to bedfast patients than ambulatory patients. The long term patients' greater response to annoyance by highway or street traffic noise might be indicative of their boredom of daily hospital routine.

Voice paging system, walking in the corridors and the call bell system were much more annoying to short term patients than long term patients. This might seem to indicate that as the patient remains in the hospital for a longer period of time he becomes less aware of these noises since they are repetitious noises. This would be in agreement with McLachlan<sup>(24)</sup> and Harris.<sup>(18)</sup> The comparisons are shown in Figure 2.

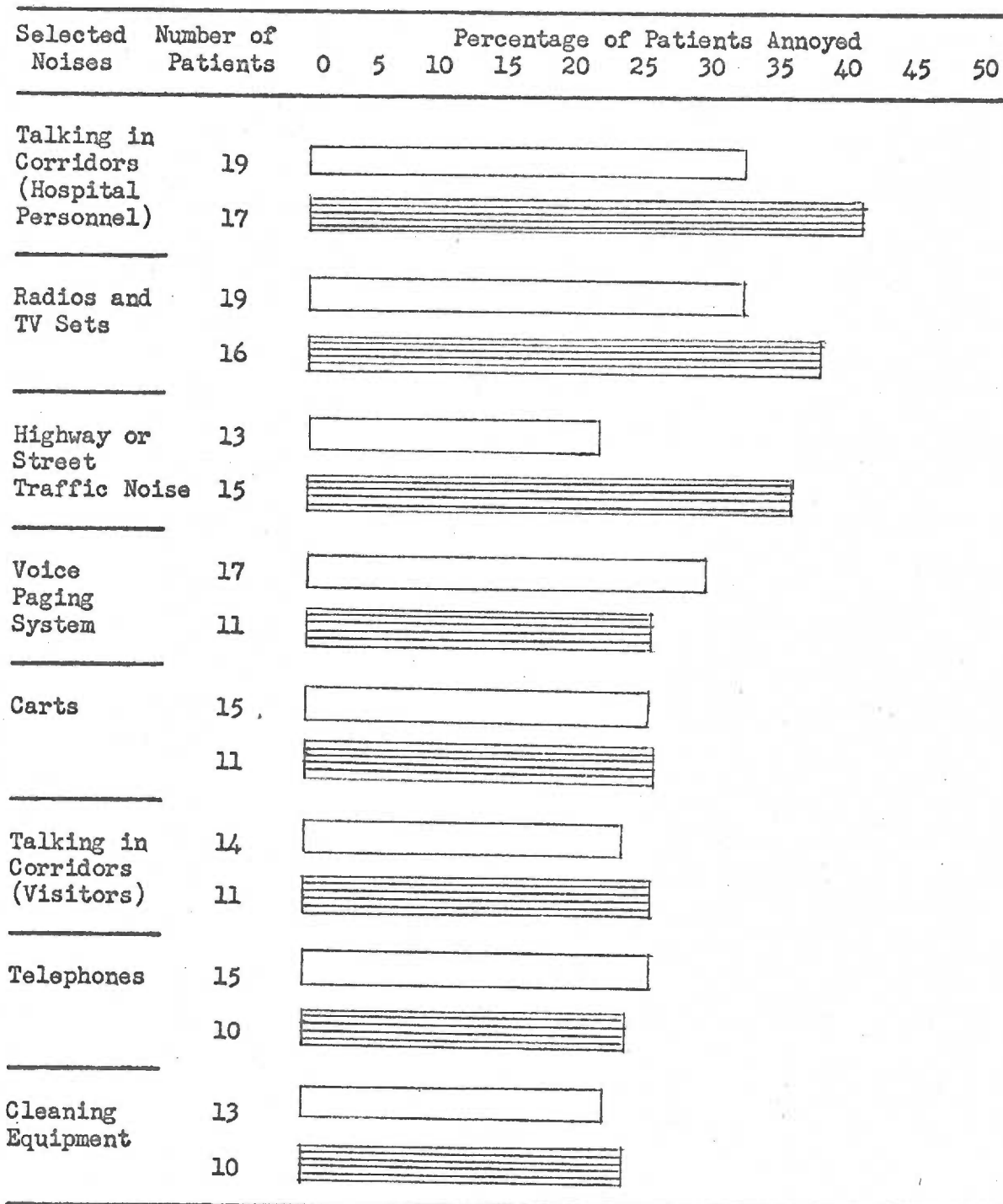



Figure 2. Comparison of 58 Short Term and 42 Long Term Patients' Responses to Annoyance to 20 Selected Noises

Short Term is represented by 

Long Term is represented by 

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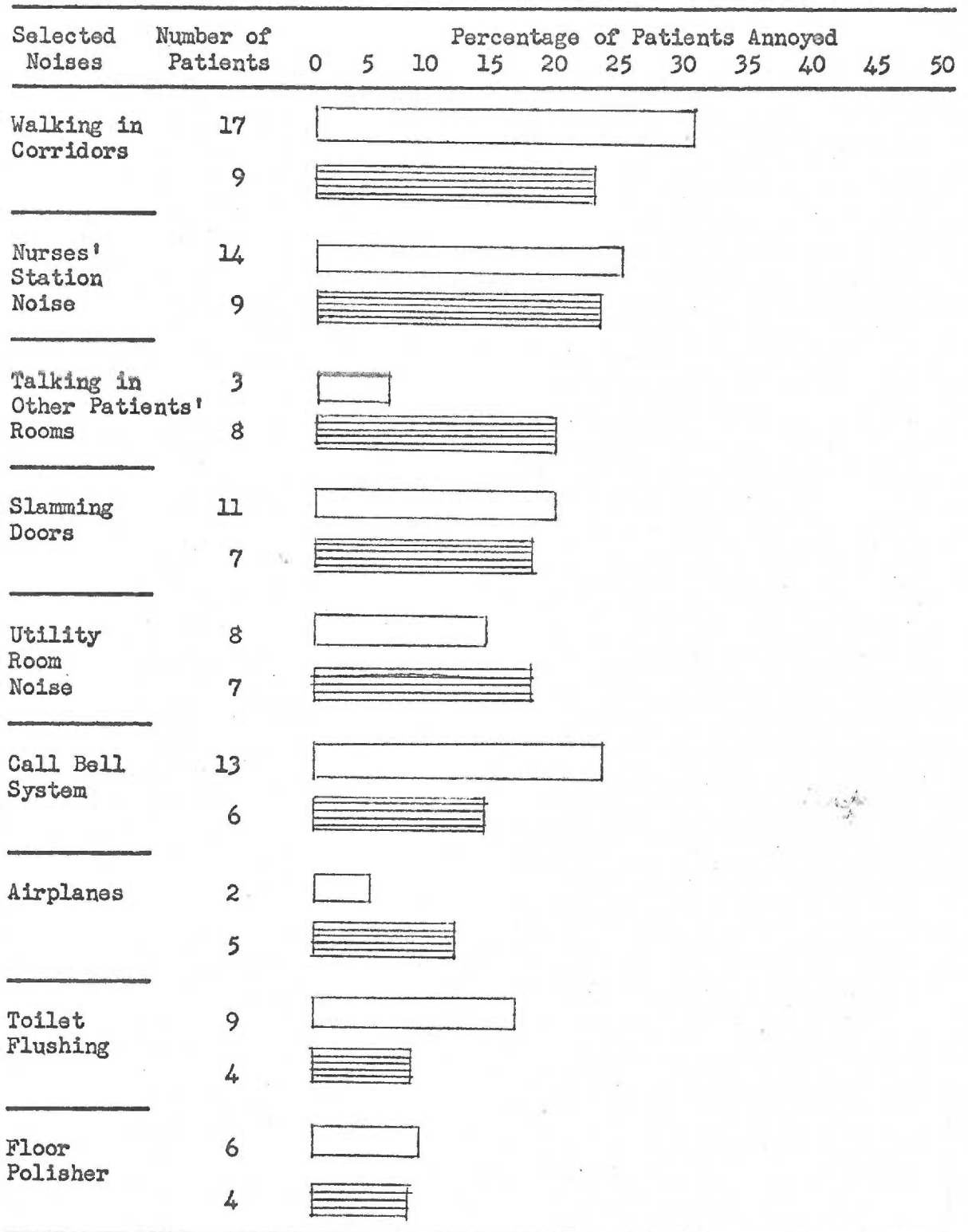


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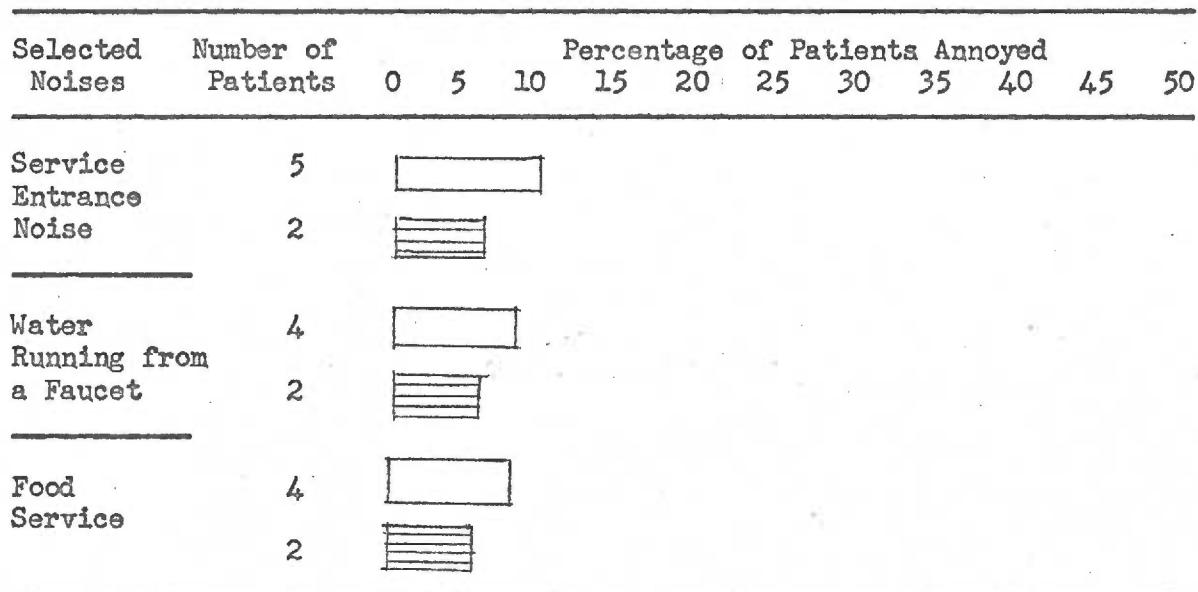


Figure 2. (Concluded)

The sex of the patient was considered as a third possible factor that might influence the patients' responses to degree of annoyance to the selected noises. There were 42 male patients represented from the population of 100 patients. At least 15 (65%) of the male patients were not annoyed by each of the selected noises. A total of 41 (98%) of the male patients were not annoyed by the floor polisher noise.

The voice paging system was the most annoying noise to the 42 male patients. There were 15 (35%) of these patients annoyed to some degree by this source. Moderate annoyance was expressed by 6 (14%) and 9 (21%) expressed great annoyance.

Highway or street traffic noise was annoying to 13 (31%) of the male patients. There were 2 (5%) who expressed moderate annoyance and 11 (26%) expressed great annoyance. The findings are shown in Table 6.

Table 6. Responses of 42 Male Patients and Degree of Annoyance to 20 Selected Noises

Selected Noises	Degree of Annoyance*				Total Per Cent
	Not Heard	Noticed but Not Annoyed	Moderately Annoyed	Greatly Annoyed	
(1)	(2)	(3)	(4)	(5)	(6)
Airplanes.....	38	50	7	5	100
Call Bell System.....	26	57	7	10	100
Carts.....	7	79	7	7	100
Cleaning Equipment.....	5	81	5	9	100
Floor Polisher.....	12	86	0	2	100
Food Service.....	33	62	2	3	100
Highway or Street Traffic	24	45	5	26	100
Nurses' Station Noise....	31	55	2	12	100
Radios and TV Sets.....	12	62	2	24	100
Service Entrance Noise...	57	38	0	5	100
Slamming Doors.....	52	31	7	10	100
Talking in Corridors (Hospital Personnel).....	0	72	14	14	100
Talking in Corridors (Visitors).....	0	83	3	14	100
Talking in Other Patients' Rooms.....	67	24	7	2	100
Telephones.....	22	52	19	7	100
Toilet Flushing.....	24	67	2	7	100
Utility Room Noise.....	40	52	3	5	100
Voice Paging System.....	5	60	14	21	100
Walking in Corridors.....	9	64	17	10	100
Water Running from a Faucet.....	48	45	0	7	100

\*Responses of 42 Male Patients Expressed in Percentage

Of the 58 female patients only 34 (59%) were not annoyed by each of the selected noises. Airplane noise again was the least frequently mentioned source of annoyance with 56 (96%) of the females not annoyed.

Talking in the corridors by hospital personnel was again the most annoying noise source to the female population. A total of 24 (41%) of the females were annoyed by this source. There were 7 (12%) of this group who were moderately annoyed and 17 (29%) were greatly annoyed.

Radios and TV sets were also the most annoying with 24 (41%) of the females being annoyed by this source also. Of these 3 (5%) were moderately annoyed and 21 (36%) were greatly annoyed.

Carts were annoying to 20 (34%) of the females. There were 9 (15%) of the group who expressed moderate annoyance and 11 (19%) who expressed great annoyance.

Talking in the corridors by visitors annoyed 18 (31%) of the females. Moderate annoyance was stated by 11 (19%) of the group and 7 (12%) stated they were greatly annoyed.

Cleaning equipment was annoying to 17 (30%) of the female population. Of these 5 (8%) were moderately annoyed and 12 (21%) greatly annoyed.

Nurses' station noise was annoying to 17 (29%) of the female population. There were 6 (10%) who were moderately annoyed and 11 (19%) greatly annoyed. The findings are shown in Table 7.

Table 7. Responses of 58 Female Patients and Degree of Annoyance to 20 Selected Noises

Selected Noises	Degree of Annoyance*				Total Per Cent
	Not Heard	Noticed but Not Annoyed	Moderately Annoyed	Greatly Annoyed	
(1)	(2)	(3)	(4)	(5)	(6)
Airplanes.....	60	36	2	2	100
Call Bell System.....	22	57	4	17	100
Carts.....	7	59	15	19	100
Cleaning Equipment.....	14	57	8	21	100
Floor Polisher.....	26	59	6	9	100
Food Service.....	26	67	5	2	100
Highway or Street Traffic	34	40	5	21	100
Nurses' Station Noise....	31	40	10	19	100
Radios and TV Sets.....	28	31	5	36	100
Service Entrance Noise...	78	14	5	3	100
Slamming Doors.....	64	17	3	16	100
Talking in Corridors (Hospital Personnel).....	0	59	12	29	100
Talking in Corridors (Visitors).....	0	69	19	12	100
Talking in Other Patients' Rooms.....	60	27	4	9	100
Telephones.....	26	50	7	17	100
Toilet Flushing.....	26	58	9	7	100
Utility Room Noise.....	34	45	4	17	100
Voice Paging System.....	2	76	8	14	100
Walking in Corridors.....	9	65	17	9	100
Water Running from a Faucet.....	71	24	2	3	100

\*Responses of 58 Female Patients Expressed in Percentage

In comparing male and female patients' responses to annoyance to the selected noises, female patients expressed annoyance more frequently than male patients in fourteen of the selected noises. Male patients responded that they were annoyed more frequently than female patients to six of the selected noises.

Talking in the corridors by hospital personnel was expressed as annoying to 24 (41%) of the female population whereas only 12 (28%) of the male population expressed annoyance.

Radios and TV sets were also annoying to 24 (41%) of the female patients. Only 11 (26%) of the male patients expressed annoyance to this noise.

Carts were annoying to 20 (34%) of the female population and only 6 (14%) of the male population expressed annoyance to this source.

In contrast, the voice paging system was annoying to 15 (35%) of the male patients. Only 13 (22%) of the female patients were annoyed by this source. The comparisons are shown in Figure 3.



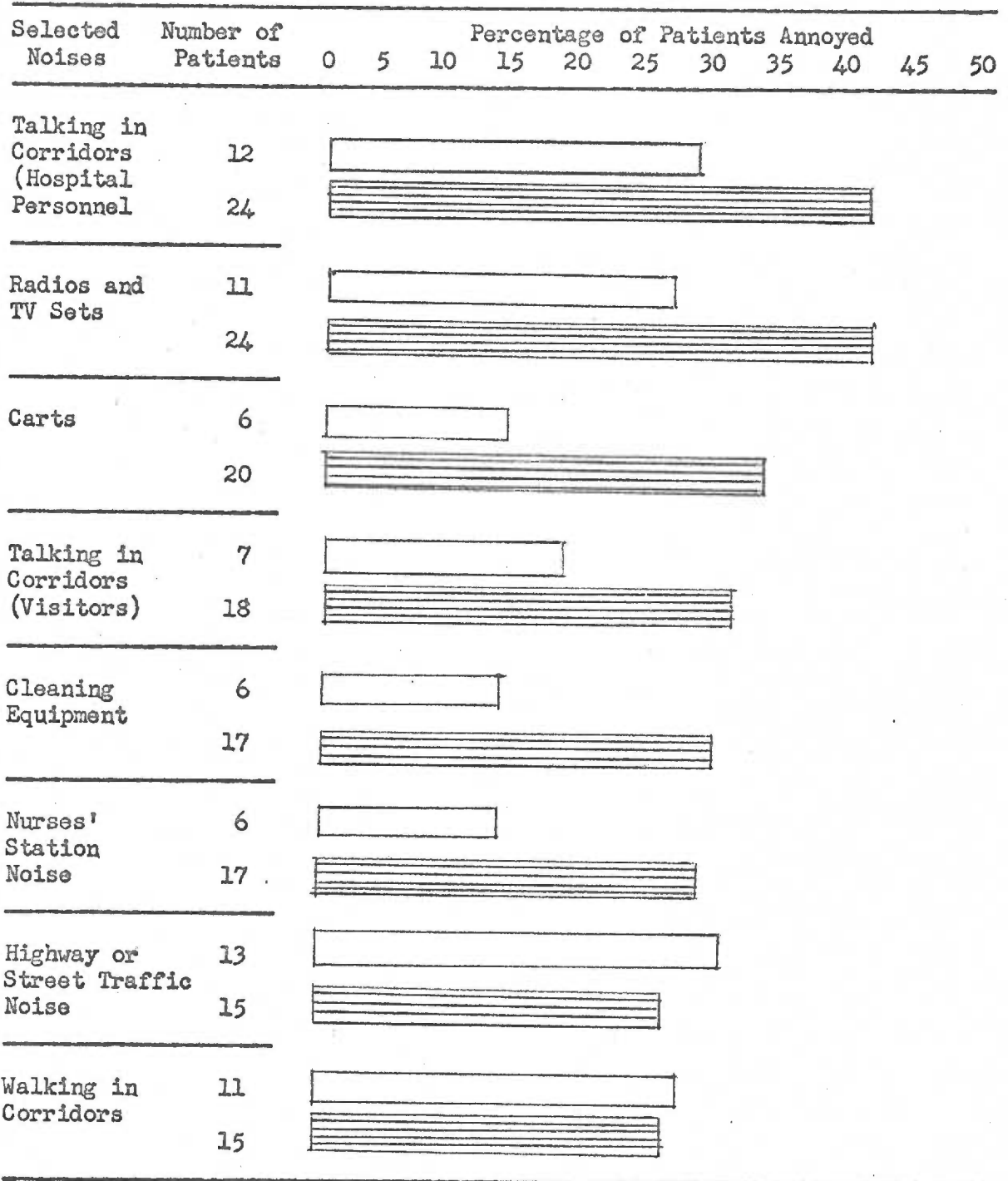


Figure 3. Comparison of 42 Male and 58 Female Patients' Responses to Annoyance to 20 Selected Noises

Male Patients are represented by

Female Patients are represented by

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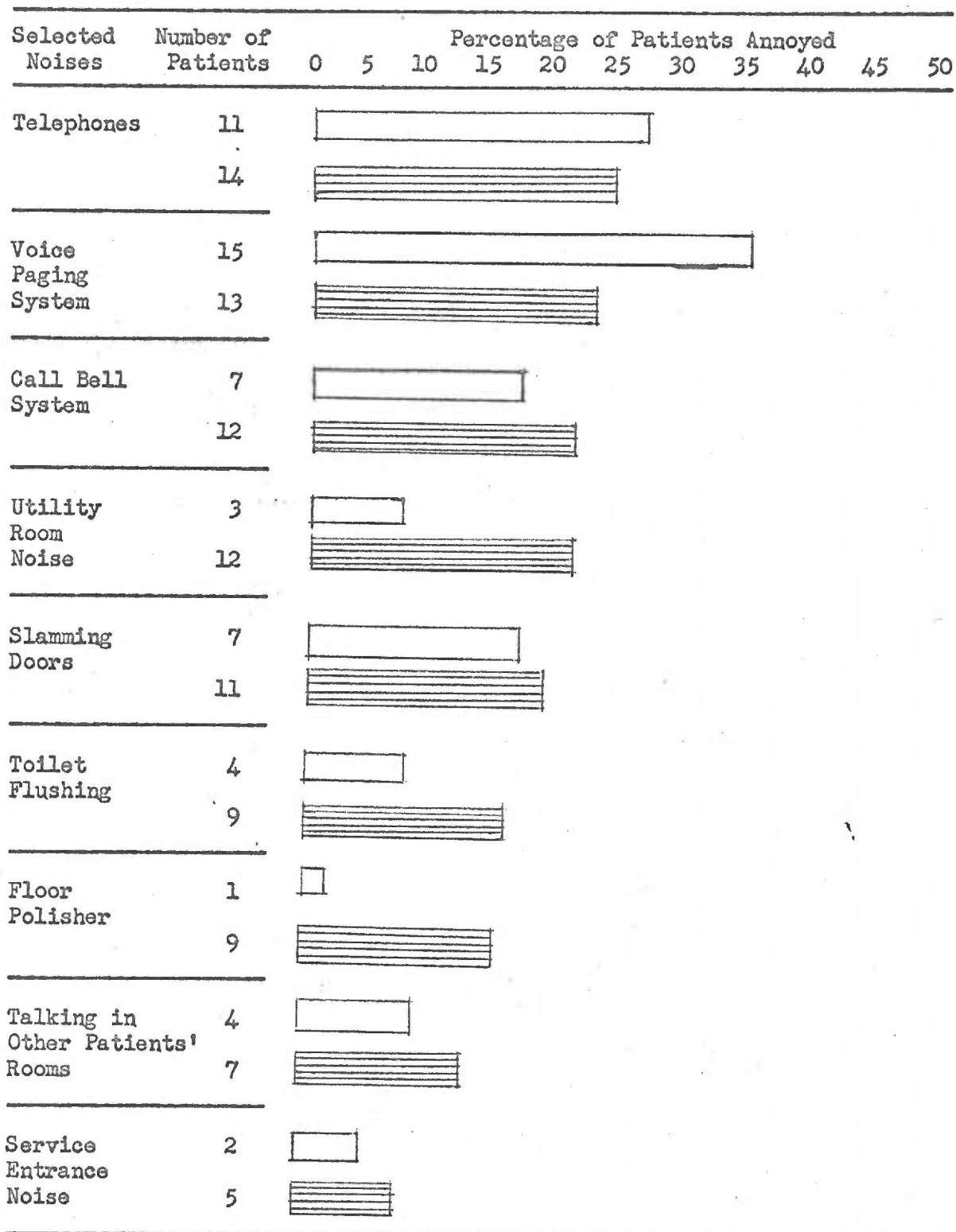


Figure 3. (concluded on next page)

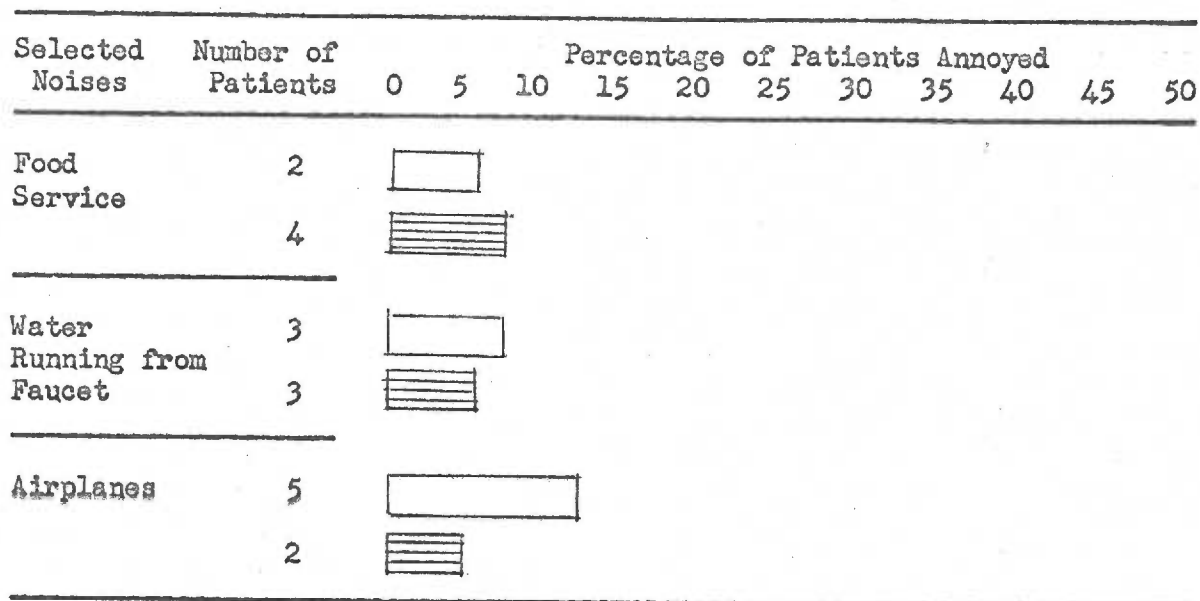


Figure 3. (Concluded)

A fourth factor considered in this study as a possible influence on the patients' responses to the selected noises was age of the patients. For purposes of this study the selected patients were divided into five age groups.

Five patients of the selected population were under 20 years of age. In this group only one patient was not annoyed by any of the selected noises. No one in this age group was annoyed by utility room noise, food service, water running from faucets, the floor polisher or airplanes. The small number of patients in this age group make these findings inconclusive.

Telephones were the most annoying noise source to the patients under 20 years of age. Four of these patients were annoyed by this noise. Moderate annoyance was expressed by one patient while three patients related that they were greatly annoyed.

The voice paging system was annoying to three of the patients in this age group. Two patients were moderately annoyed and one patient was greatly annoyed.

The call bell system was also annoying to three of the patients under 20 years of age. All three patients were greatly annoyed by this noise source. These findings are shown in Table 8.

Table 8. Responses of 5 Patients Under 20 Years of Age and Degree of Annoyance to 20 Selected Noises

Selected Noises	Degree of Annoyance*				
	Not Heard	Noticed but Not Annoyed	Moderately Annoyed	Greatly Annoyed	Total Persons
(1)	(2)	(3)	(4)	(5)	(6)
Airplanes.....	4	1	0	0	5
Call Bell System.....	0	2	0	3	5
Carts.....	1	2	2	0	5
Cleaning Equipment.....	1	2	1	1	5
Floor Polisher.....	2	3	0	0	5
Food Service.....	2	3	0	0	5
Highway or Street Traffic	0	3	1	1	5
Nurses' Station Noise....	0	4	0	1	5
Radios and TV Sets.....	0	4	0	1	5
Service Entrance Noise...	3	1	0	1	5
Slamming Doors.....	3	1	0	1	5
Talking in Corridors (Hospital Personnel).....	0	3	2	0	5
Talking in Corridors (Visitors).....	0	4	1	0	5
Talking in Other Patients' Rooms.....	3	2	0	0	5
Telephones.....	0	1	1	3	5
Toilet Flushing.....	2	2	0	1	5
Utility Room Noise.....	2	3	0	0	5
Voice Paging System.....	0	2	2	1	5
Walking in Corridors.....	1	2	2	0	5
Water Running from a Faucet.....	2	3	0	0	5

\*Responses of 5 Patients Under 20 Years of Age Expressed Numerically

There were fifteen patients in the 20 to 39 year age group. In this group there were 9 (60%) who were not annoyed by each selected noise. Water running from the faucet was not annoying to 14 (94%) of this group of patients. Airplanes were also not annoying to this group of patients.

Talking in the corridors by hospital personnel, nurses' station noise, call bell system, and radios and TV sets were all equally annoying to the patients in the 20 to 39 year age group. In each noise source a total of 6 (40%) of the group were annoyed. Patients reacted equally as to degree of annoyance to talking in the corridors by hospital personnel. Nurses' station noise, call bell system, and radios and TV sets were each moderately annoying to 1 (7%) and greatly annoying to 5 (33%).

The voice paging system was annoying to 5 (33%) of the patients in the 20 to 39 year age group. One (7%) patient was moderately annoyed and 4 (26%) were greatly annoyed.

Highway or street traffic noise was greatly annoying to 5 (33%) of the patients in the 20 to 39 year age group. These findings are shown in Table 9.

Table 9. Responses of 15 Patients in Age Range of 20 to 39 Years and Degree of Annoyance to 20 Selected Noises

Selected Noises	Degree of Annoyance*				
	Not Heard	Noticed but Not Annoyed	Moderately Annoyed	Greatly Annoyed	Total Per Cent
(1)	(2)	(3)	(4)	(5)	(6)
Airplanes.....	40	53	7	0	100
Call Bell System.....	20	40	7	33	100
Carts.....	7	66	7	20	100
Cleaning Equipment.....	0	73	7	20	100
Floor Polisher.....	0	87	7	6	100
Food Service.....	20	60	13	7	100
Highway or Street Traffic	40	27	0	33	100
Nurses' Station Noise....	40	20	7	33	100
Radios and TV Sets.....	20	40	7	33	100
Service Entrance Noise...	53	27	13	7	100
Slamming Doors.....	67	13	7	13	100
Talking in Corridors (Hospital Personnel).....	0	60	20	20	100
Talking in Corridors (Visitors).....	0	73	13	14	100
Talking in Other Patients' Rooms.....	80	7	6	7	100
Telephones.....	20	60	7	13	100
Toilet Flushing.....	47	40	0	13	100
Utility Room Noise.....	60	27	0	13	100
Voice Paging System.....	0	66	7	27	100
Walking in Corridors.....	7	73	20	0	100
Water Running from a Faucet.....	67	27	0	6	100

\* Responses of 15 Patients in Age Range of 20 to 39 Years Expressed in Percentage

Forty-three patients from the selected total population were in the age group 40 to 59 years. In all of the selected noises at least 23 (53%) of the patients from this age group were not annoyed by each of the selected noises. Service entrance noise was not annoying to 42 (98%) of the patients in this group. The low response of annoyance to service entrance noise by this group might be due to the location of these patients' rooms. However, this is not within the scope of this study as was mentioned in Chapter I.

Radios and TV sets were the most annoying noise source to patients in the 40 to 59 year age group. A total of 20 (47%) of these patients were annoyed by this noise source. Only 3 (7%) were moderately annoyed and 17 (40%) were greatly annoyed.

Walking in the corridors was annoying to 17 (40%) of the patients in the 40 to 59 year age group. There were 9 (21%) who were moderately annoyed and 8 (19%) were greatly annoyed.

Talking in the corridors by hospital personnel was annoying to 16 (37%) of the patients in this group. Of these 6 (14%) were moderately annoyed and 10 (23%) were greatly annoyed.

Talking in the corridors by visitors was annoying to 14 (33%) of the patients in the 40 to 59 year age group. There were 8 (19%) who were moderately annoyed and 6 (14%) were greatly annoyed.

Telephones were annoying to 13 (31%) of the patients in this group. Of these 8 (19%) responded moderately annoyed and 5 (12%) responded greatly annoyed.

Highway or street traffic noise was annoying to 13 (30%) of the patients in the 40 to 59 year age group. Only 3 (7%) were moderately annoyed whereas 10 (23%) were greatly annoyed. These findings are shown



in Table 10.

Table 10. Responses of 43 Patients in Age Range of 40 to 59 Years and Degree of Annoyance to 20 Selected Noises

Selected Noises	Degree of Annoyance*				Total Per Cent
	Not Heard	Noticed but Not Annoyed	Moderately Annoyed	Greatly Annoyed	
(1)	(2)	(3)	(4)	(5)	(6)
Airplanes.....	60	33	5	2	100
Call Bell System.....	14	63	9	14	100
Carts.....	7	67	12	14	100
Cleaning Equipment.....	16	58	5	21	100
Floor Polisher.....	21	67	5	7	100
Food Service.....	28	65	5	2	100
Highway or Street Traffic	23	47	7	23	100
Nurses' Station Noise....	30	49	9	12	100
Radios and TV Sets.....	16	37	7	40	100
Service Entrance Noise...	70	28	0	2	100
Slamming Doors.....	54	30	7	9	100
Talking in Corridors (Hospital Personnel).....	0	63	14	23	100
Talking in Corridors (Visitors).....	0	67	19	14	100
Talking in Other Patients' Rooms.....	53	35	5	7	100
Telephones.....	16	53	19	12	100
Toilet Flushing.....	16	72	9	3	100
Utility Room Noise.....	26	63	2	9	100
Voice Paging System.....	0	72	9	19	100
Walking in Corridors.....	9	51	21	19	100
Water Running from a Faucet.....	61	35	2	2	100

\*Responses of 43 Patients in Age Range of 40 to 59 Expressed in Percentage

There were thirty-two patients in the age group 60 to 79 years. At least 24 (75%) of the patients in this group were not annoyed by each selected noise. Food service noise was not annoying to any patient in this age group.

Talking in the corridors by hospital personnel and voice paging system were equally annoying to 8 (25%) of the patients in the 60 to 79 year age group. Talking in the corridors by hospital personnel was moderately annoying to 2 (6%) of these patients and greatly annoying to 6 (19%) of them. There was almost equal reaction to degree of annoyance for the voice paging system. These findings are shown in Table 11.

Table 11. Responses of 32 Patients in Age Range of 60 to 79 Years and Degree of Annoyance to 20 Selected Noises

Selected Noises	Degree of Annoyance*				Total Per Cent
	Not Heard	Noticed but Not Annoyed	Moderately Annoyed	Greatly Annoyed	
(1)	(2)	(3)	(4)	(5)	(6)
Airplanes.....	44	47	3	6	100
Call Bell System.....	41	59	0	0	100
Carts.....	6	72	9	13	100
Cleaning Equipment.....	9	75	10	6	100
Floor Polisher.....	22	72	0	6	100
Food Service.....	31	69	0	0	100
Highway or Street Traffic	40	41	3	16	100
Nurses' Station Noise....	34	53	3	10	100
Radios and TV Sets.....	31	47	0	22	100
Service Entrance Noise...	75	19	3	3	100
Slamming Doors.....	59	25	3	13	100
Talking in Corridors (Hospital Personnel).....	0	75	6	19	100
Talking in Corridors (Visitors).....	0	87	0	13	100
Talking in Other Patients' Rooms.....	69	25	6	0	100
Telephones.....	38	50	6	6	100
Toilet Flushing.....	22	63	6	9	100
Utility Room Noise.....	47	34	6	13	100
Voice Paging System.....	9	66	12	13	100
Walking in Corridors.....	9	78	10	3	100
Water Running from a Faucet.....	59	31	0	10	100

\*Responses of 32 Patients in Age Range of 60 to 79 Years Expressed in Percentage

Five patients from the selected population were 80 years or older comprising the last group. There was one patient in this age group who was not annoyed by each noise. Walking in the corridors, voice paging system, call bell system, food service, toilet flushing, water running from the faucet, airplanes and service entrance noise were not annoying to anyone in this age group.

Talking in the corridors by hospital personnel was the most annoying noise source to patients 80 years of age and over. Four patients were greatly annoyed by this noise source.

Nurses' station noise was annoying to 3 of the patients in the 80 years and over age group. One patient was moderately annoyed and 2 were greatly annoyed. These findings are shown in Table 12.

Table 12. Responses of 5 Patients Ages 80 and Over and Degree of Annoyance to 20 Selected Noises

Selected Noises	Degree of Annoyance*				Total Patients
	Not Heard	Noticed but Not Annoyed	Moderately Annoyed	Greatly Annoyed	
(1)	(2)	(3)	(4)	(5)	(6)
Airplanes.....	1	4	0	0	5
Call Bell System.....	1	4	0	0	5
Carts.....	0	3	1	1	5
Cleaning Equipment.....	0	4	0	1	5
Floor Polisher.....	1	3	1	0	5
Food Service.....	2	3	0	0	5
Highway or Street Traffic	1	2	0	2	5
Nurses' Station Noise....	1	1	1	2	5
Radios and TV Sets.....	1	2	0	2	5
Service Entrance Noise...	4	1	0	0	5
Slamming Doors.....	3	0	0	2	5
Talking in Corridors (Hospital Personnel).....	0	1	0	4	5
Talking in Corridors (Visitors).....	0	3	1	1	5
Talking in Other Patients' Rooms.....	3	0	0	2	5
Telephones.....	1	3	0	1	5
Toilet Flushing.....	2	3	0	0	5
Utility Room Noise.....	0	3	0	2	5
Voice Paging System.....	0	5	0	0	5
Walking in Corridors.....	0	5	0	0	5
Water Running from a Faucet.....	4	1	0	0	5

\*Responses of 5 Patients Ages 80 and Over Expressed Numerically

In making a comparison of patients' responses of annoyance to the selected noises according to age group it was necessary to compare the two extreme groups by themselves since there were so few participants in these two groups.

Talking in the corridors by hospital personnel and nurses' station noise were the most annoying noise sources to the patients who were 80 years and over. Four out of five of these individuals expressed annoyance to some degree. Only two patients under 20 years of age expressed annoyance to talking in the corridors by hospital personnel. Nurses' station noise was expressed as annoying by only one participant under 20 years of age.

Telephones were reported as annoying by four out of five patients under 20 years of age. In comparison this noise source was reported as annoying by only one respondent 80 years and over.

Three out of five participants under 20 years of age expressed some degree of annoyance to the call bell system and the voice paging system. Neither of these noise sources was annoying to the five individuals 80 years and over. This finding might indicate that a repetitive sound is less annoying to older patients than to those in the younger age group.

Patients under 20 years of age expressed annoyance to fourteen selected noise sources. Patients 80 years and over, expressed annoyance to only twelve selected noise sources. Neither group was annoyed by food service, water running from a faucet, or airplanes. From these findings it might indicate that older patients are less annoyed by the selected noises than are the younger age group. The findings are shown in Figure 4.

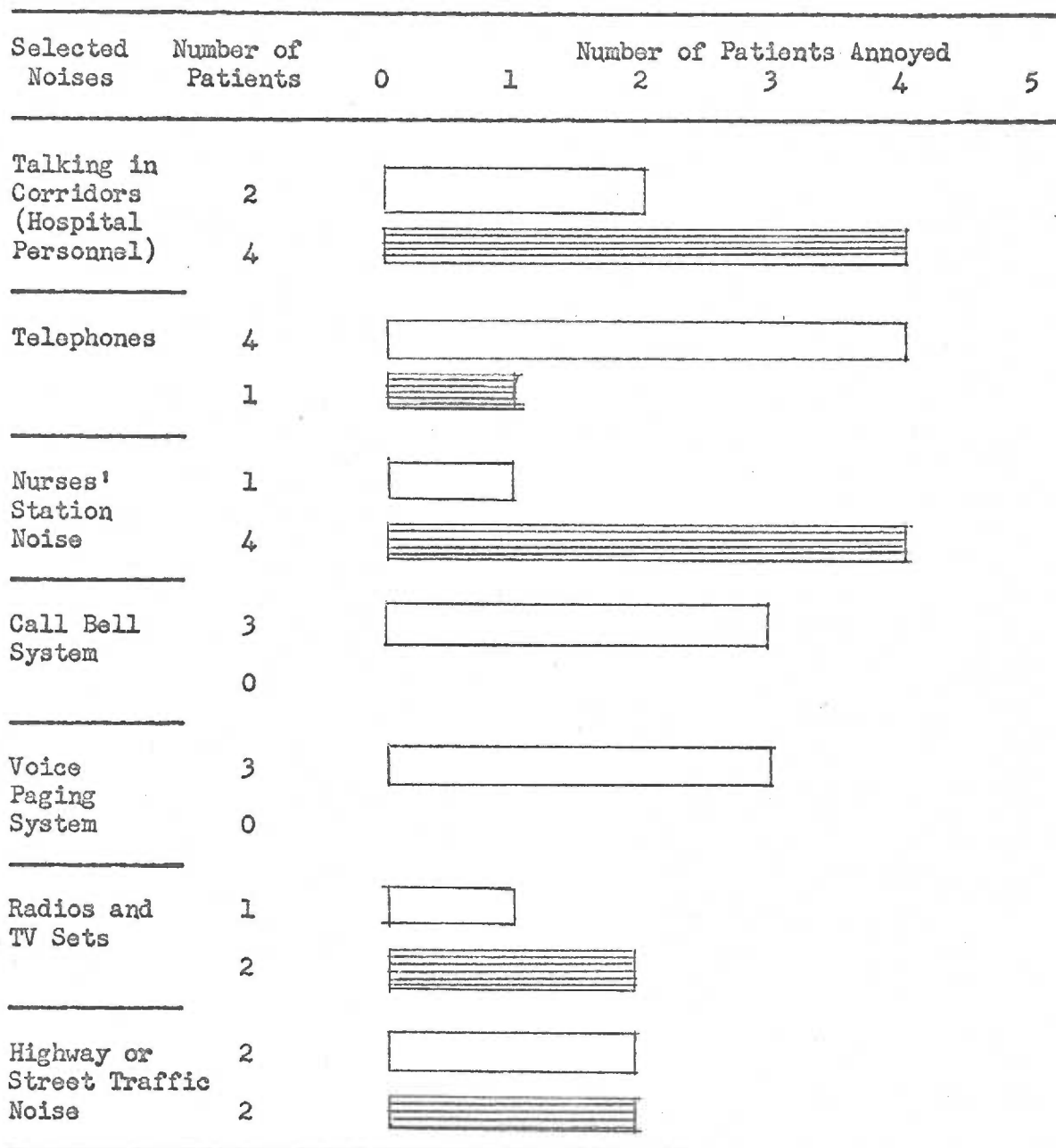




Figure 4. Comparison of 5 Patients Under 20 Years of Age and 5 Patients 80 Years and Over Responses to Annoyance to 20 Selected Noises Expressed Numerically.

Patients Under 20 Years of Age 

Patients 80 Years and Over 

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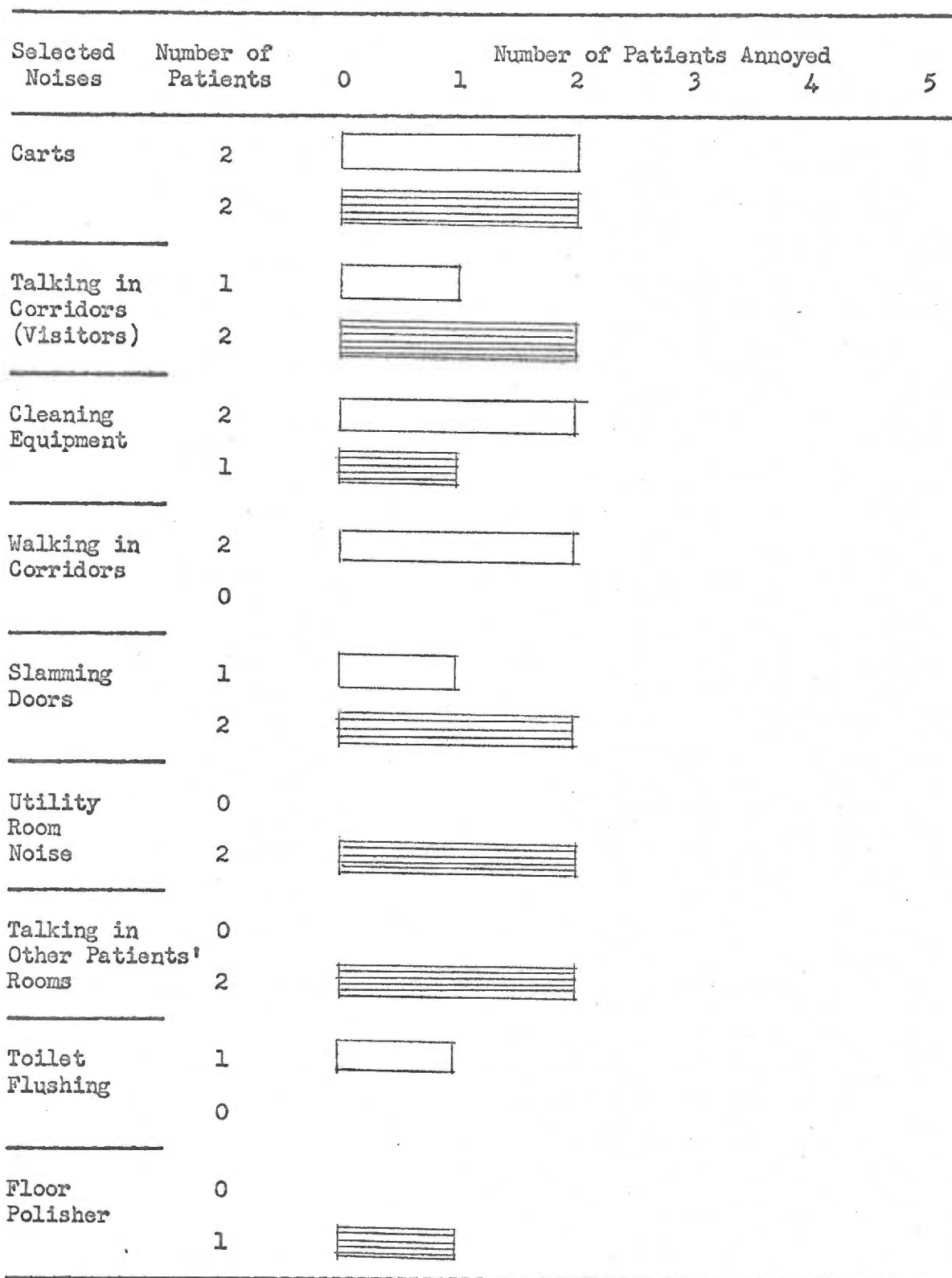


Figure 4. (continued on next page)



Selected Noises	Number of Patients	Number of Patients Annoyed					
		0	1	2	3	4	5
Service Entrance Noise	1						
	0						
Food Service	0						
	0						
Water Running from Faucet	0						
	0						
Airplanes	0						
	0						

Figure 4. (Concluded)

The three intermediate age groups were interesting for comparison also. The respondents in the 20 to 39 year group expressed some degree of annoyance more frequently than participants in either of the other two groups. This group was more frequently annoyed with 12 selected noise sources. These sources, ranked in order of frequency of annoyance, included talking in the corridors by hospital personnel, call bell system, nurses' station noise, voice paging system, highway or street traffic noise, carts, cleaning equipment, slamming doors, service entrance noise, food service, talking in other patients' rooms, and the floor polisher.

Radios and TV sets, walking in corridors, talking in corridors by

visitors and telephones were more frequently annoying to the 40 to 59 year age group than the other two groups. Utility room noise, toilet flushing, water running from a faucet and airplanes were more frequently annoying to those in the age group 60 to 79 years.

Of these three intermediate age groups it would seem to indicate that those ranging in ages 20 to 39 years are more frequently annoyed by the selected noise sources than are other age groups. These findings are shown in Figure 5.

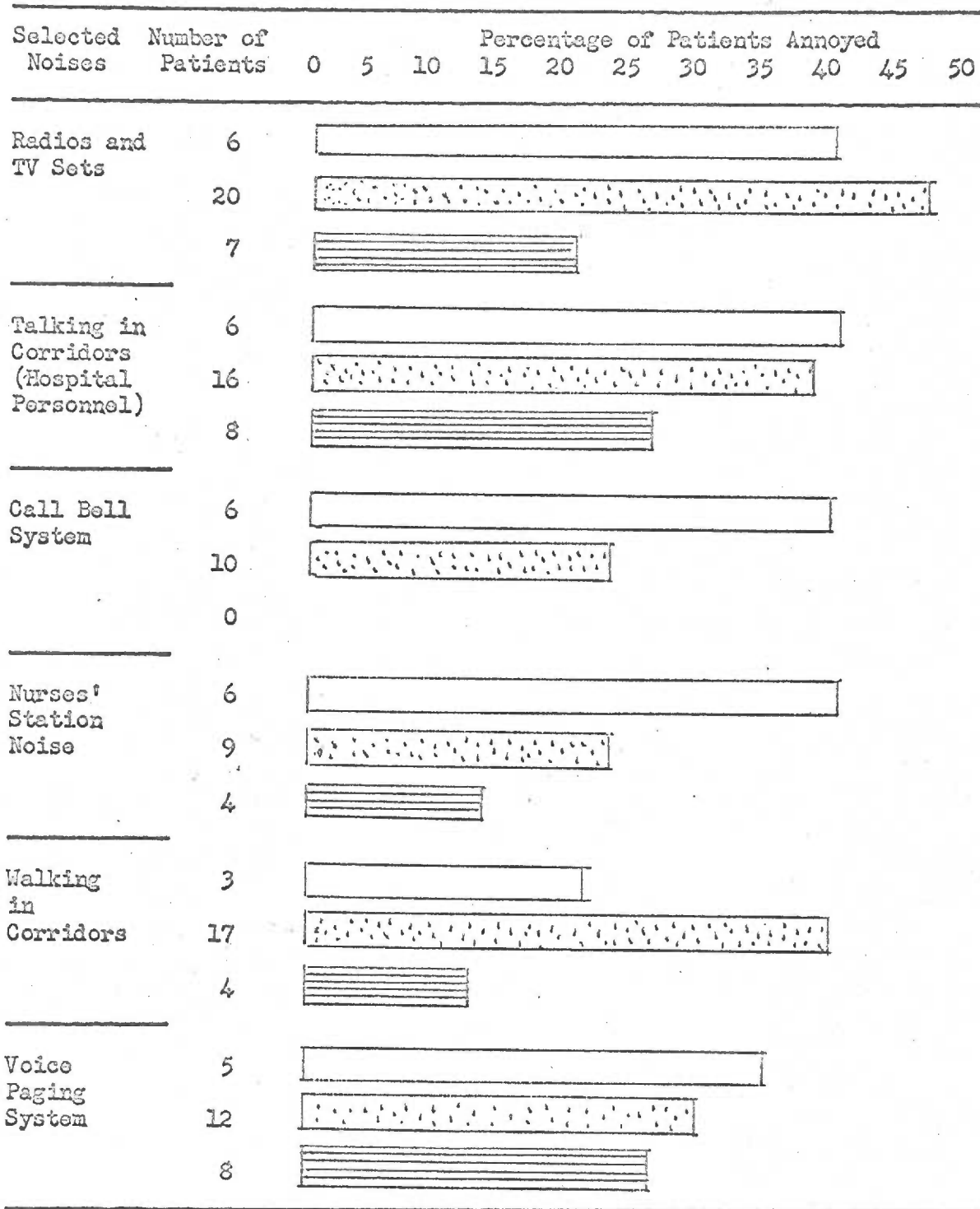


Figure 5. Comparison of Patients in 3 Age Groups Responses to Annoyance to 20 Selected Noises

20 to 39 Years is represented by [Horizontal bar with 0-50% scale]

40 to 59 Years is represented by [Horizontal bar with 0-50% scale]

60 to 79 Years is represented by [Horizontal bar with 0-50% scale]

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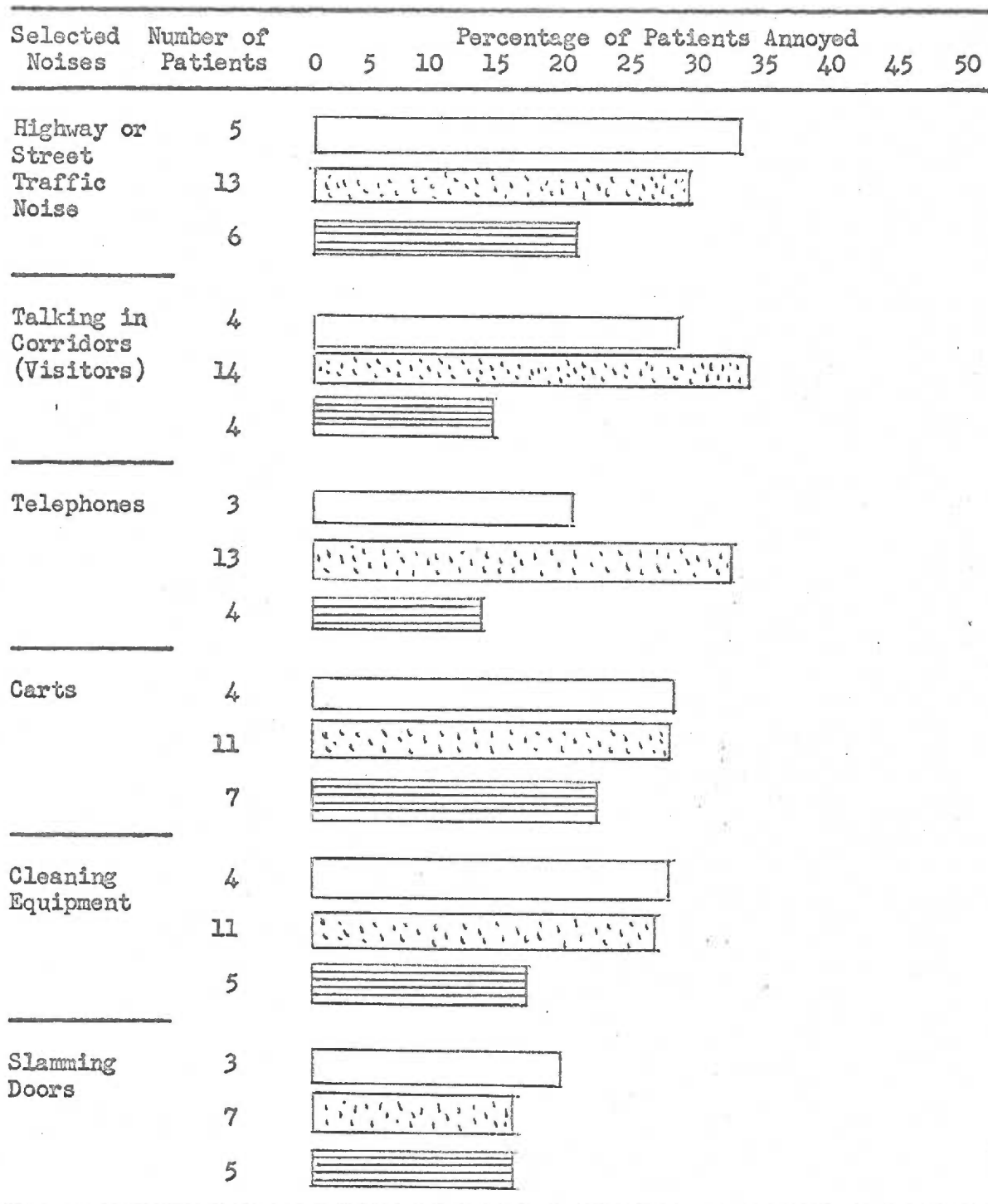


Figure 5. (Continued on next page)

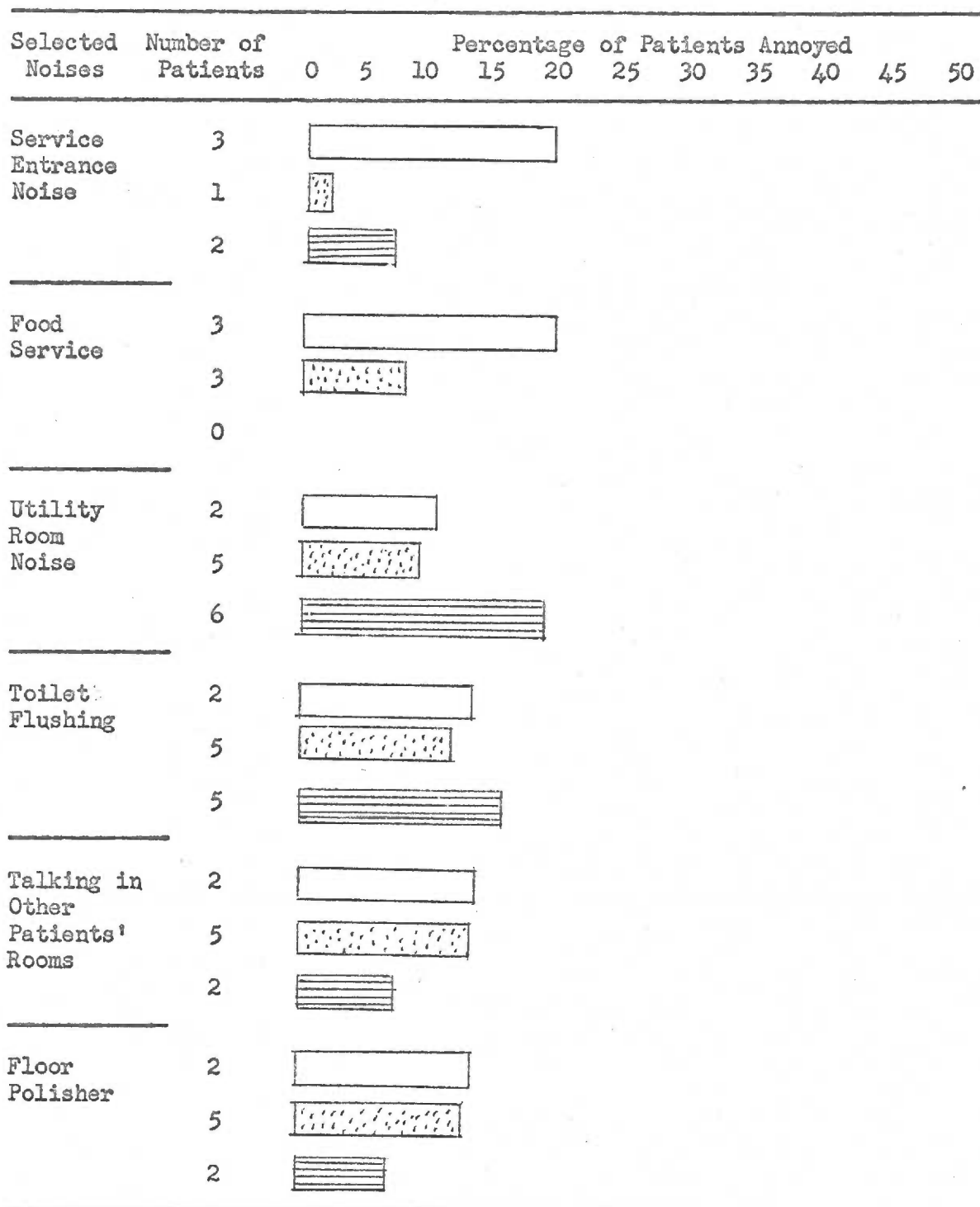


Figure 5. (Continued on next page)

Selected Noises	Number of Patients	Percentage of Patients Annoyed									
		0	5	10	15	20	25	30	35	40	45
Water Running from a Faucet	1										
	2										
	3										
Airplanes	1										
	3										
	3										

Figure 5. (Concluded)

A fifth factor considered as a possible influence on the patients' responses to annoyance to the selected noises was whether the patients had a medical or surgical problem. Of the 100 selected total patient population 51 patients had a diagnosis of medical illness and 49 patients had a diagnosis of surgical illness.

At least 32 (63%) medical patients were not annoyed by each selected noise. Water running from the faucet was not annoying to 48 (94%) medical patients. This response might again indicate that the faucets of this hospital were kept in good repair, thus reducing the chance of responses due to annoyance by this noise source.

Talking in the corridors by hospital personnel was the most annoying noise source to the medical patients. A total of 32 (37%) medical patients were annoyed by this noise source. There were 5 (10%) medical patients who were moderately annoyed and 14 (27%) who were greatly

annoyed.

Radios and TV sets were annoying to 17 (33%) medical patients. Only 1 (2%) patient was moderately annoyed, whereas 16 (31%) patients were greatly annoyed.

Highway or street traffic noise and telephones were each annoying to 14 (28%) medical patients. Highway or street traffic noise was moderately annoying to 4 (8%) patients and greatly annoying to 10 (20%) patients. There were an equal number of patients moderately and greatly annoyed by telephones. These findings are shown in Table 13.

Table 13. Responses of 51 Medical Patients and Degree of Annoyance to 20 Selected Noises

Selected Noises	Degree of Annoyance*				Total Per Cent
	Not Heard	Noticed but Not Annoyed	Moderately Annoyed	Greatly Annoyed	
(1)	(2)	(3)	(4)	(5)	(6)
Airplanes.....	45	47	2	6	100
Call Bell System.....	29	57	4	10	100
Carts.....	4	70	14	12	100
Cleaning Equipment.....	8	72	8	12	100
Floor Polisher.....	10	78	6	6	100
Food Service.....	25	67	6	2	100
Highway or Street Traffic	25	47	8	20	100
Nurses' Station Noise....	27	47	6	20	100
Radios and TV Sets.....	20	47	2	31	100
Service Entrance Noise...	67	25	2	6	100
Slamming Doors.....	61	21	6	12	100
Talking in Corridors (Hospital Personnel).....	0	63	10	27	100
Talking in Corridors (Visitors).....	0	76	10	14	100
Talking in Other Patients' Rooms.....	59	29	4	8	100
Telephones.....	15	57	14	14	100
Toilet Flushing.....	35	55	6	4	100
Utility Room Noise.....	33	49	4	14	100
Voice Paging System.....	2	73	8	17	100
Walking in Corridors.....	8	67	19	6	100
Water Running from a Faucet.....	57	37	0	6	100

\*Responses of 51 Medical Patients Expressed in Percentage



Of the 49 surgical patients who participated in the study at least 32 (65%) surgical patients were not annoyed by each selected noise. Food service was not annoying to 47 (96%) surgical patients. Water running from the faucet was not annoying to 46 (94%) of these patients, which again seems to indicate the previous assumption that faucets were kept in good repair.

Talking in the corridors by hospital personnel and radios and TV sets were equally annoying to the surgical patients. There were 32 (35%) of the surgical patients annoyed by these noise sources. Talking in the corridors by hospital personnel was moderately annoying to 8 (16%) and greatly annoying to 9 (19%) of these patients. Radios and TV sets were moderately annoying to only 3 (6%) but greatly annoying to 14 (29%) of the surgical patients.

The voice paging system was annoying to 15 (31%) of the surgical patients. There were 7 (14%) who responded that they were moderately annoyed and 8 (17%) who responded they were greatly annoyed.

Highway or street traffic noise was annoying to 15 (30%) of the surgical patients. Only 2 (4%) responded that they were moderately annoyed, whereas 13 (26%) responded they were greatly annoyed. These findings are shown in Table 14.

Table 14. Responses of 49 Surgical Patients and Degree of Annoyance to 20 Selected Noises

Selected Noises	Degree of Annoyance*				Total Per Cent
	Not Heard	Noticed but Not Annoyed	Moderately Annoyed	Greatly Annoyed	
(1)	(2)	(3)	(4)	(5)	(6)
Airplanes.....	57	37	6	0	100
Call Bell System.....	16	59	6	19	100
Carts.....	10	63	10	17	100
Cleaning Equipment.....	14	57	8	21	100
Floor Polisher.....	31	59	4	6	100
Food Service.....	33	63	2	2	100
Highway or Street Traffic	35	35	4	26	100
Nurses' Station Noise....	35	45	8	12	100
Radios and TV Sets.....	24	41	6	29	100
Service Entrance Noise...	71	23	4	2	100
Slamming Doors.....	55	27	4	14	100
Talking in Corridors (Hospital Personnel).....	0	65	16	19	100
Talking in Corridors (Visitors).....	0	74	14	12	100
Talking in Other Patients' Rooms.....	67	23	6	4	100
Telephones.....	31	47	10	12	100
Toilet Flushing.....	16	66	8	10	100
Utility Room Noise.....	41	47	2	10	100
Voice Paging System.....	4	65	14	17	100
Walking in Corridors.....	10	63	15	12	100
Water Running from a Faucet.....	65	29	2	4	100

\*Responses of 49 Surgical Patients Expressed in Percentage

In comparing the medical and surgical patients' responses to the selected noises, medical patients were annoyed more frequently by nine selected noises. However, surgical patients also were annoyed more frequently by nine different selected noises. Two selected noise sources, slamming doors and water running from the faucet, were equally annoying to both medical and surgical patients.

Four noise sources were much more annoying to the surgical patients. These were voice paging system, cleaning equipment, call bell system and toilet flushing.

Table 15. Comparison of Percentages of Medical and Surgical Patients Who Indicated Annoyance Due to 4 Selected Noises

Selected Noises	Percentage of Patients Annoyed	
	Surgical	Medical
Voice Paging System	31%	25%
Cleaning Equipment	29%	20%
Call Bell System	25%	14%
Toilet Flushing	18%	10%

In contrast, medical patients were much more annoyed than surgical patients by three noise sources. These were telephones, nurses' station noise and utility room noise.

Table 16, Comparison of Percentages of Medical and Surgical Patients Who Responded Annoyance to 3 Selected Noises

Selected Noises	Percentage of Patients Annoyed	
	Medical	Surgical
Telephones	28%	22%
Nurses' Station Noise	26%	20%
Utility Room Noise	18%	12%

The comparisons of percentage of medical and surgical patients who were annoyed by the 20 selected noises are shown in Figure 5.

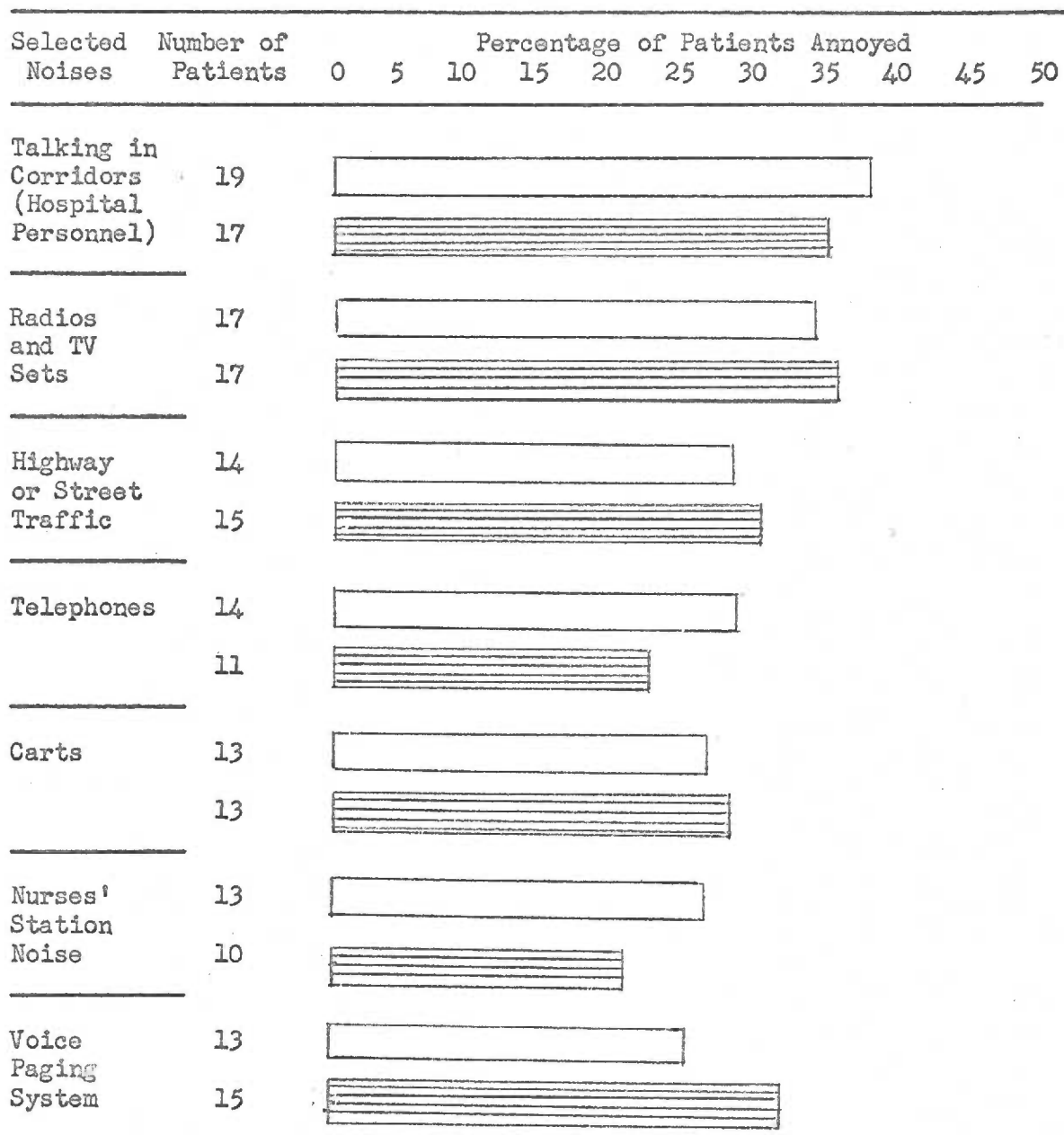




Figure 6. Comparison of 51 Medical and 49 Surgical Patients' Responses to Annoyance to 20 Selected Noises

Medical Patients are represented by 

Surgical Patients are represented by 

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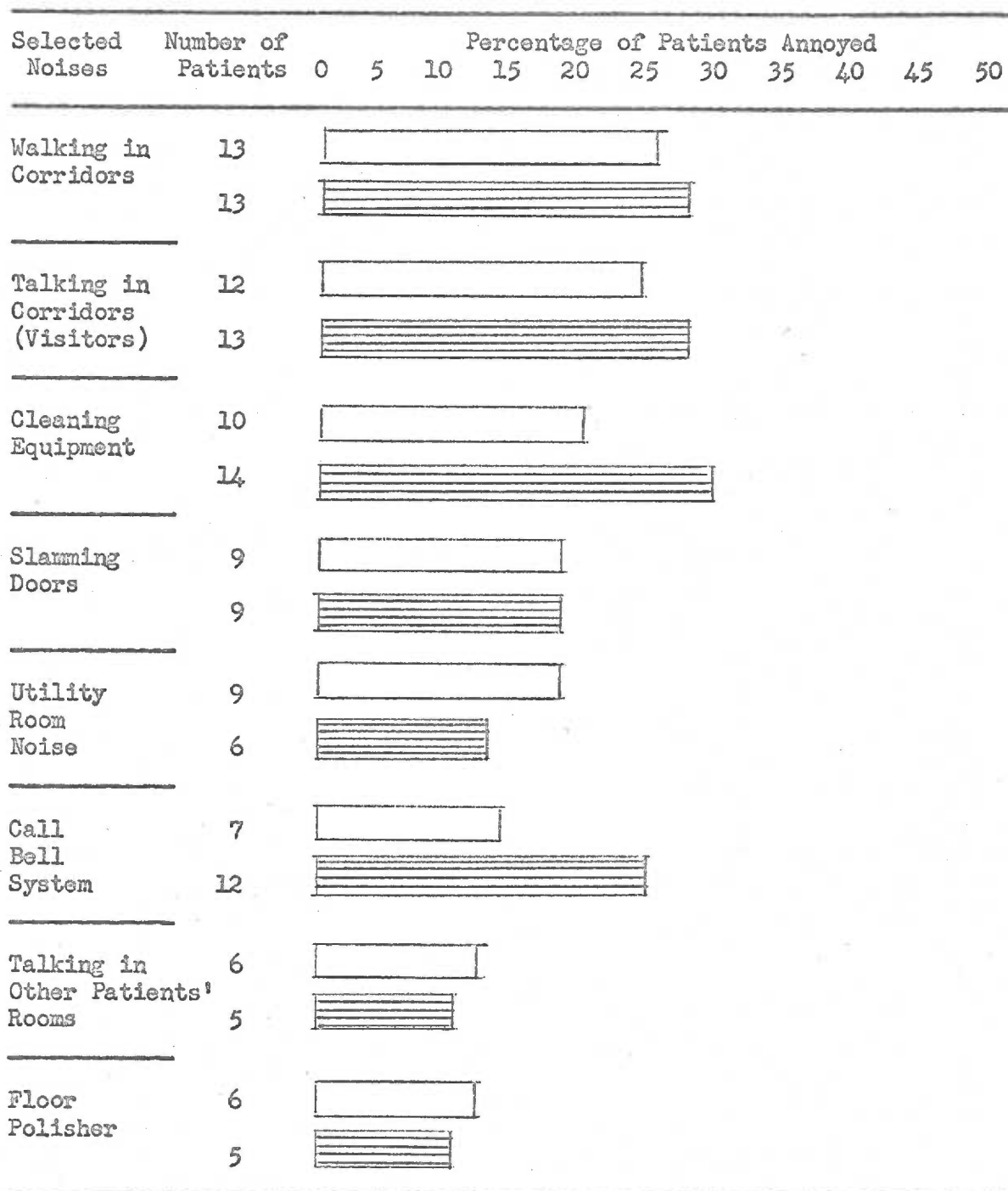


Figure 6. (Continued on next page)

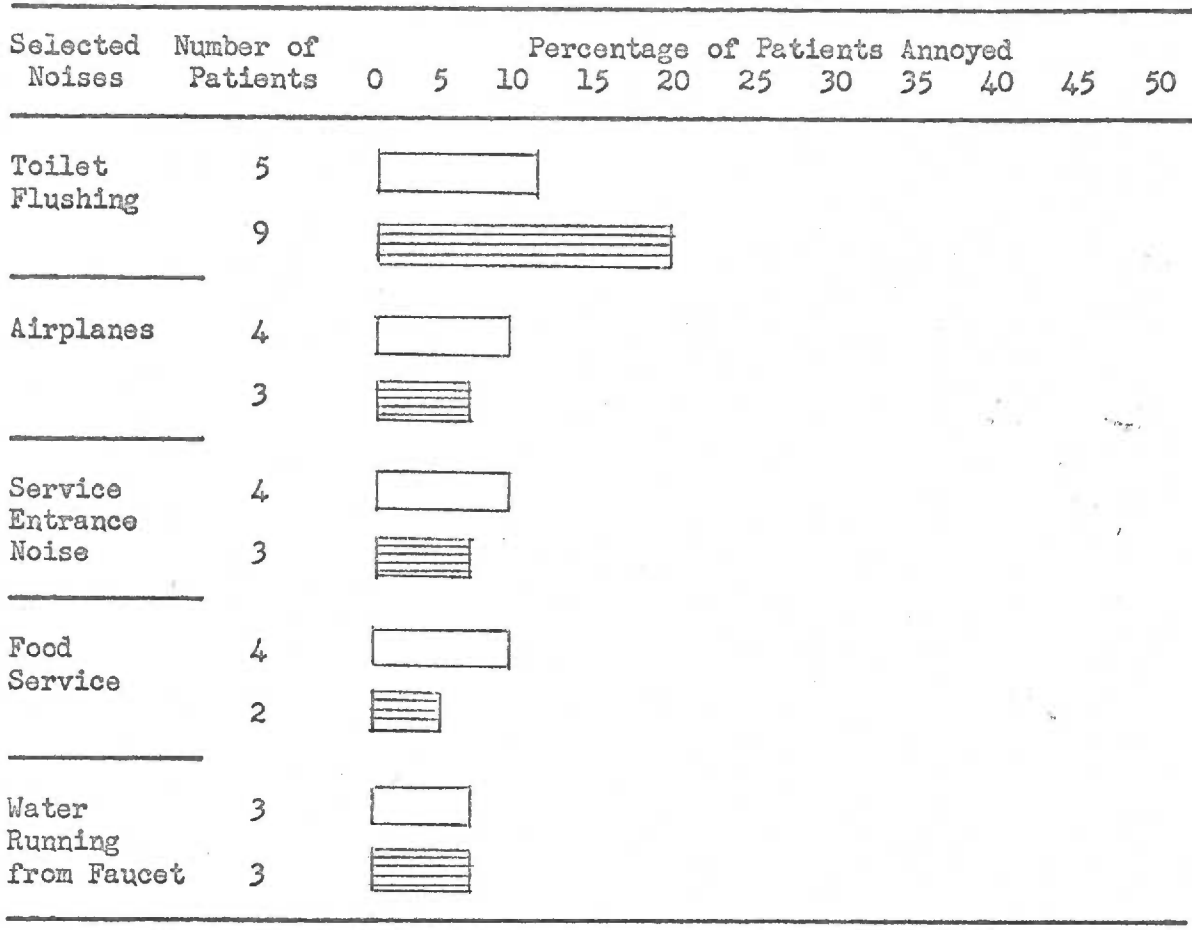


Figure 6. (Concluded)

When the patients were asked what other sounds they found to be bothersome or irritating, 72 patients stated that no other sounds were bothersome or irritating to them. The comments of the remaining 28 patients and their rating of annoyance were as follows:

1. "Too many visitors at one time during visiting hours when you aren't feeling well." The patient ranked this as greatly annoying. This same reaction was reported by 5 other patients.
2. Disturbance by another seriously ill patient in the same room was expressed as greatly annoying to 3 patients.
3. A patient crying or moaning in another room was greatly annoying to 4 patients.
4. Elevator noise was mentioned by 4 patients. Two patients rated it as greatly annoying and two as moderately annoying.
5. "Noise from the floor above" was rated as greatly annoying by 1 patient with 2 additional patients concurring.
6. Children crying in the pediatric ward was reported as greatly annoying to 2 patients.

Each of the following noise sources was mentioned only once.

1. Excessive talking of other patients in the same room - greatly annoying.
2. Visitors talking all day long - greatly annoying.
3. Loud noise in hallway - not identified - moderately annoying.
4. Furniture being knocked over - greatly annoying.
5. Dropping of articles - greatly annoying.
6. Noise from the emergency room - greatly annoying.
7. People walking in the hallways with cleats on their shoes - greatly annoying.



8. Doctors holding consultations in front of patients' rooms - greatly annoying.
9. Newspaper boy hollering about the paper - greatly annoying.
10. Squeaking door - greatly annoying.
11. Motor or furnace fan - greatly annoying.
12. Wind whistling - greatly annoying.
13. Noise in the wall that I can't identify - greatly annoying.

The 100 patients were asked whether noises awakened them from sleep and at what time the noise occurred. There were 47 patients who stated they were not awakened by any noise, while 53 patients gave the following responses:

1. Trucks changing gears and cars hot rodding during the night were reported by 13 patients with no specific time mentioned.
2. Nursing personnel or other patients talking in the hallway during night hours were reported by 11 patients with no specific time mentioned.
3. Nurses caring for another patient in the room during night hours reported by 11 patients.
4. Call bell system during the night reported by 3 patients.
5. Patients crying or moaning at night reported by 3 patients.
6. Telephone ringing in the very early a.m. reported by 2 patients.
7. Hospital personnel talking outside the room periodically after 9:00 p.m. reported by 2 patients.
8. Paging for 'Code 99' in the middle of the night reported by 2 patients.

9. Snoring of other patients in the room during the night reported by 2 patients.
10. Unidentified noise like pipes banging outside the room during the night reported by 2 patients.
11. Siderails banging during the night reported by 2 patients.

The following comments were each mentioned once by a patient.

1. "People coming in and out of the ward at night."
2. "Fire engines anytime."
3. "Doors slamming anytime."
4. "Paperboy wakes me up in the early morning and afternoon."
5. "Motor or furnace fan at night."
6. "Freight elevator in the early a.m."
7. "Nurses waking me up during the night to tell me I need to sleep."
8. "Changing water glasses during the night."
9. "Boy waking me up to ask if I want coffee in the early a.m."
10. "Dropping equipment during the night."
11. "The utility room sounds like a horse snorting during the night."

The final question concerned any additional comments that the patients might have concerning noise in the selected hospital. There were 51 patients who had no comments. Favorable comments were such as:

1. "Rather like activity, makes the time go faster."
2. "Noises don't bother me."
3. "I feel the hospital has been very quiet."
4. "I feel the hospital is extremely quiet for such a large hospital."

5. "Noise creates interest since I have no roommate."
6. "I actually enjoy hospital noises as they give me security. I know if I need someone they are there. I don't like dead silence."
7. "I'm satisfied."
8. "I think this hospital is very quiet in comparison to other hospitals."
9. "I don't find hospital noise any more than what I expected it to be."
10. "It is actually entertaining to know things are going along around you."
11. "Very quiet like nobody lives here."

Comments of noise created by humans were:

1. Disturbed by other patients talking incessantly.
2. "Some types of voices on the PA system are much more annoying than others."
3. "I hate cleaning personnel who talk too much."
4. "They don't follow strict visiting hours. Visitors are coming and going at all hours."
5. "Too many visitors talking at one time."
6. "Other patients talk so loud."
7. "I feel hospital personnel could be a little more careful in talking in the hallways."
8. "The paperboy hollering about his paper is very disturbing."
9. "The staff should be very aware of the effect of noise on the human structure when it is in pain."
10. "There's too much laughing and joking by hospital personnel. A patient can't appreciate it when they are ill."
11. "Doctors are the biggest noise offenders."

12. "Visitors seem to be able to troop in any time."
13. "Small children running around during visiting hours are most disturbing."

Comments of noise through mechanical means were:

1. "If tires on the carts could be better rubber it would sure help."
2. "Doors slamming just get on my nerves."
3. "I feel rooms across from the nurses' station are much noisier."
4. "They could use some other materials for the screening curtains to make them quieter."
5. "All rooms where patients are should be away from nurses' stations and office areas."
6. "Jackhammers always seem to be around hospitals."
7. "These beds tick like a clock."
8. "The floor scrubber starts at 6:00 a.m., too early."

Miscellaneous comments were:

1. "I'm so used to noise I actually can't sleep without noise."
2. "If I know what the noise is it doesn't bother."
3. "It's too quiet at night when you can't sleep."
4. "Unnecessary noises are most disturbing."
5. "Hallways are busy all the time during the day. It should be eliminated somehow."
6. "Noise keeps me awake so I can't sleep."
7. "I hate to be enclosed. They close the door at night to keep it quieter."

8. "When you are really sick, all noises bother excessively. I think a lot of this noise could be eliminated."
9. "I feel the door should be kept shut to eliminate as much noise as possible."
10. "There is an extreme difference between nursing areas in the same hospital. It is like being in two different hospitals."
11. "When the door is closed, street noise becomes exaggerated; when the door is open street noise becomes secondary."
12. "Once the pain is stopped I'm not annoyed by noise as long as I can identify it."

As can be seen by many of the above comments from the selected patients, the bulk of comments are related to hospital personnel and mechanical equipment. Many of the comments were indirectly related to noise sources listed in the earlier portion of this study, which would seem to indicate the patients were reinforcing their feelings about specific noise sources in the hospital.

In summarizing the findings of this study the ten selected noises most frequently mentioned to be annoying to patients were talking in corridors by hospital personnel, radios and TV sets, highway or street traffic noise, voice paging system, walking in the corridors, carts, talking in the corridors by visitors, telephones, cleaning equipment, and nurses' station noise. Figure 7 shows these findings.

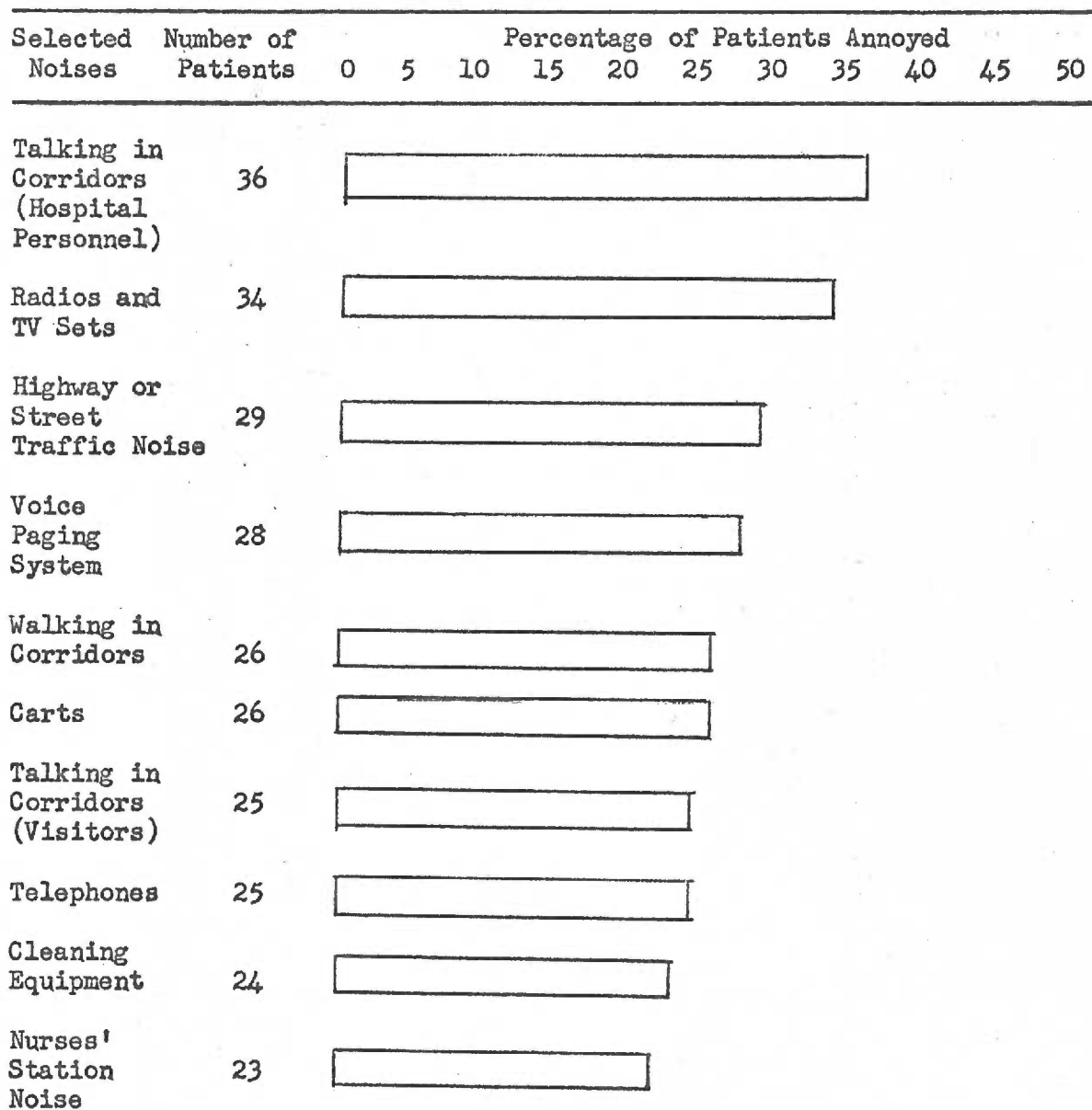


Figure 7. Ten Selected Noises Most Frequently Mentioned to be Annoying to 100 Patients

The final chapter of this study contains the summary, conclusions and recommendations for further study.

## CHAPTER IV

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### Summary

This study was undertaken to attempt to determine which patients were affected by which noises and to what extent they were affected. This study further attempted to determine whether there were certain common factors that appeared to influence their expressed reactions of annoyance to noises they experience while hospitalized. After a review of the related literature five hypotheses were formulated. These hypotheses may be found in Chapter I.

An interview guide was constructed to elicit the desired information. A hospital was selected as the location for carrying out the study and administrative clearance obtained from the Director of Nursing Service. Criteria were established for selection of patients (Chapter I) and a pilot study was conducted by interviewing 10 patients not included in the study. Results of the pilot study were satisfactory. Therefore, no revisions of the interview guide were necessary. One hundred participants who met the established criteria were selected and a personal interview of each was conducted by the investigator.

Data from the interviews were tabulated and the findings revealed that:

1. Patients were able to identify the degree of annoyance they experienced from selected noises.
2. Bedfast patients expressed some degree of annoyance to more of the selected noises than did ambulatory patients.
3. Short term patients expressed some degree of annoyance to more of the selected noises than did long term patients.
4. Female patients expressed some degree of annoyance to more of the selected noises than did male patients.
5. Patients under 20 years of age expressed some degree of annoyance to more of the selected noises than did patients 80 years of age and over.
6. Patients ranging in ages between 20 and 39 years expressed some degree of annoyance to more of the selected noises than did patients ranging in ages 40 to 59 years or 60 to 79 years.
7. Patients with medical or surgical problems equally expressed some degree of annoyance to the selected noises; however, medical patients expressed annoyance to different selected noises than did surgical patients.

#### Conclusions

On the basis of the data collected from the participants of this study no generalizations can be drawn. The findings do indicate that:

1. Bedfast patients are annoyed by noise more frequently and to a greater degree than ambulatory patients.
2. Short term patients are annoyed by noise more frequently than long term patients; however, when long term patients are annoyed by a



noise it is usually to a greater degree than short term patients experience.

3. Female patients are annoyed by noise more frequently than male patients; however, when male patients are annoyed by a noise it is usually to a greater degree than female patients experience.

4. Patients ranging in ages 20 to 39 years are annoyed by noise more frequently and to a greater degree than patients ranging in ages 40 to 79 years.

5. Patients under 20 years of age are annoyed by noise more frequently than patients 80 years and over; but when patients 80 years and over are annoyed by a noise it is usually to a greater degree than patients under 20 years of age.

6. Patients with medical or surgical problems are equally annoyed by noise but the specific noises bothersome to them are different; in addition, medical patients are usually annoyed by the noise to a greater degree than surgical patients.

#### Recommendations for Further Study

Based on the findings and conclusions of this study the following recommendations were made:

1. That this study be repeated in both small and large hospitals to determine if similar answers would be elicited.

2. That a study be done of all patients on a specific medical or surgical unit to determine if similar answers would be elicited in a more confined area.

3. That a study be done to determine why a specific type of patient expresses great annoyance to a specific noise.
4. That a study be done to determine why medical patients are annoyed by different noises than surgical patients.
5. That a study be done to investigate how the findings of this study could be utilized to develop and instigate a "noise abatement" program.

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APPENDICES

APPENDIX A  
INTERVIEW GUIDE

Age\_\_\_\_\_ Sex\_\_\_\_\_ Medical\_\_\_\_\_ Surgical\_\_\_\_\_

Bedfast\_\_\_\_\_ Ambulatory\_\_\_\_\_ Length of Hospitalization\_\_\_\_\_

A. The following list covers many of the frequently encountered noise sources in hospitals. The interviewer will check by placing an "X" in the column of the descriptive word or phrase which the respondent identifies as:

- (1) whether he does not hear it
- (2) whether he notices it but is not disturbed by it
- (3) whether he is moderately annoyed by it
- (4) whether he is greatly annoyed by it

	Not Heard	Noticed But not Annoyed	Moderately Annoyed	Greatly Annoyed
1. Talking in Corridors (Visitors)				
2. Talking in Corridors (Hospital Personnel)				
3. Talking in Other Patients' Rooms				
4. Nurses' Station Noise				
5. Walking in Corridors				
6. Voice Paging System				
7. Call Bell System				
8. Telephones				
9. Radios & TV Sets				
10. Slamming Doors				

	Not Heard	Noticed But not Annoyed	Moderately Annoyed	Greatly Annoyed
11. Utility Room Noise				
12. Food Service				
13. Carts				
14. Toilet Flushing				
15. Water Running from Faucet				
16. Cleaning Equipment, Buckets, etc.				
17. Floor Polishers				
18. Highway or Street Traffic Noise				
19. Airplanes				
20. Service Entrance Noises				

B. Please list or describe any other sound which you found bothersome or irritating and rate it to the above scale.

C. Did any noises awaken you from sleep? No \_\_\_\_\_ Yes \_\_\_\_\_  
If answer is "Yes" please describe. Also indicate approximate time of day or night.

D. Any additional comments you would care to make regarding hospital noises would be appreciated.



## APPENDIX B

## LETTER REQUESTING PERMISSION TO DO RESEARCH

Miss E. Snowhook  
Director of Nursing Service  
Good Samaritan Hospital  
1015 N. W. 22nd Ave.  
Portland, Oregon 97210

Dear Miss Snowhook:

In partial fulfillment of requirements for a Master of Science degree at the University of Oregon School of Nursing, I am undertaking a study of verbal reactions of patients to hospital noise. You are invited to participate by permitting me to interview patients at your hospital. It will involve personal interviews lasting approximately fifteen minutes. A self-addressed post card is enclosed for your convenience in indicating your willingness to assist with the study. A mutually satisfactory date will be arranged for coming to your hospital to conduct the interviews.

Upon completion of the study copies of the report will be placed in the library at the University of Oregon Medical School.

Yours sincerely,

(Mrs.) Irene VanHeusden

Irene VanHeusden is a regularly enrolled graduate student at the University of Oregon School of Nursing. Any assistance you can offer Mrs. VanHeusden will be greatly appreciated.

LUCILE GREGERSON (S)  
Thesis Adviser

APPENDIX C  
 COMPILATION OF RAW DATA

Selected Noises	Not Heard	Noticed But Not Annoyed	Moderately Annoyed	Greatly Annoyed	Total
1. Talking in Corridors (Visitors)	0	75	12	13	100
2. Talking in Corridors (Hospital Personnel)	0	64	13	23	100
3. Talking in Other Patients' Rooms	63	26	5	6	100
4. Nurses' Station Noise	31	46	7	16	100
5. Walking in Corridors	9	65	17	9	100
6. Voice Paging System	3	69	11	17	100
7. Call Bell System	23	58	5	14	100
8. Telephones	23	52	12	13	100
9. Radios & TV Sets	22	44	4	30	100
10. Slamming Doors	58	24	5	13	100
11. Utility Room Noise	37	48	3	12	100
12. Food Service	29	65	4	2	100
13. Carts	7	67	12	14	100
14. Toilet Flushing	26	60	7	7	100
15. Water Running from Faucet	61	33	1	5	100
16. Cleaning Equipment	11	65	8	16	100

Selected Noises	Not Heard	Noticed But Not Annoyed	Moderately Annoyed	Greatly Annoyed	Total
17. Floor Polishers	20	69	5	6	100
18. Highway or Street Traffic Noise	30	41	6	23	100
19. Airplanes	51	42	4	3	100
20. Service Entrance Noise	69	24	3	4	100

Bedfast Patients - 53  
 Ambulatory Patients - 47  
 Total 100

Short Term - 58  
 Long Term - 42  
 Total 100

Male Patients - 42  
 Female Patients - 58  
 Total 100

Medical Patients - 51  
 Surgical Patients - 49  
 Total 100

Patients Under 20 Years of Age - 5  
 Patients 20 to 39 Years of Age - 15  
 Patients 40 to 59 Years of Age - 43  
 Patients 60 to 79 Years of Age - 32  
 Patients 80 Years and Over - 5  
 Total 100

Typed by  
Gwendolyn M. Dunning

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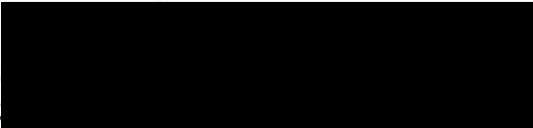
AN ABSTRACT OF THE THESIS OF

Irene F. VanHeusden

for the Master of Science in Nursing

Date of receiving this degree: June 9, 1966

Title: A Study of One Hundred Adult Patients'  
Expressed Reactions to Selected Hospital  
Noises

APPROVED: 

---

Lucile Gregerson, Associate Professor  
(in charge of Thesis)

## THE PROBLEM

Hospitals utilize much modern technology in the treatment of complex illnesses. Despite the advance of science, little seems to be done about hospital noise. Many factors affect patients' reactions to noises to which they are subjected during each twenty-four hour period in a hospital. This study was developed in an attempt to determine which patients were affected by which noises and to what extent they were affected.

## DESCRIPTION OF THE PROCEDURE

Data were obtained by means of a structured interview with one hundred selected adult patients in a specific hospital. The interview guide consisted of twenty common noise sources to which the participants indicated that they did not / did hear the noise and the degree of annoyance experienced if any. In addition, the participants were asked for additional noises that annoyed and time of day or night these occurred.

Data were recorded on a master tabulation sheet and the results compared and interpreted.

## SUMMARY OF RESULTS

From the data obtained from the participants, the following conclusions might be drawn:

1. Bedfast patients are annoyed by noise more frequently and to a greater degree than ambulatory patients.

2. Short term patients are annoyed by noise more frequently than long term patients; however, when long term patients are annoyed by a noise it is usually to a greater degree than short term patients experience.
3. Female patients are annoyed by noise more frequently than male patients; however, when male patients are annoyed by a noise it is usually to a greater degree than female patients experience.
4. Patients ranging in ages 20 to 39 years are annoyed by noise more frequently and to a greater degree than patients ranging in ages 40 to 79 years.
5. Patients under 20 years of age are annoyed by noise more frequently than patients 80 years and over; but when patients 80 years and over are annoyed by a noise it is usually to a greater degree than patients under 20 years of age.
6. Patients with medical or surgical problems are equally annoyed by noise but the specific noises bothersome to them are different; in addition, medical patients are usually annoyed by the noise to a greater degree than surgical patients.

Based on the findings and conclusions of this study the following recommendations for research were:

1. This study be repeated in both small and large hospitals to determine if similar answers would be elicited.
2. A study be done of all patients on a specific medical or surgical unit to determine if similar answers would be elicited in a more confined area.
3. A study be done to determine why a specific type of patient expresses great annoyance to a specific noise.



4. A study be done to determine why medical patients are annoyed by different noises than surgical patients.

5. A study be done to investigate how the findings of this study could be utilized to develop and instigate a "noise abatement" program.