AN ASSESSMENT OF CHANGING PRIORITIES IN INFECTION CONTROL PROGRAMS

By

LADONNA HAGEN KERTON

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University of Redlands

Redlands, California

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Dean of Graduate College

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CHAPTER I

INTRODUCTION

Infections that are acquired by patients during hospitalization, with diagnoses confirmed by clinical or laboratory evidence are called nosocomial infections. Infection control programs evolved to take all reasonable steps possible to keep the number of nosocomial infections to a minimum. Components of a program include infection surveillance and control activities, patient care policies, environmental monitoring, and education of health care personnel. An infection surveillance program should detect and record nosocomial infection in a systematic fashion in order to institute the most effective and practical control procedures.

There are several objectives of hospital infection surveillance. The first is the identification of problems. The second objective is to be able to compare data. The third objective is the role of surveillance in changing behavior of health care personnel. And a fourth objective of surveillance is the evaluation of the activities of an infection control group.

Need for Study

Castle (1980) states that priorities can and should change after an infection control program has been in operation for some time. A hospital that is just beginning a program is different from one that has a well-established program. In initiating infection control activities in a particular hospital, a comprehensive surveillance program is necessary to get to know the hospital and provide base-line statistics. As a program matures, data collection activities which are time consuming may be an inefficient way of conducting infection control. According to Eickhoff (1981), limited surveillance focusing on high risk areas and/or specific infections would detect major problems in the hospital, but would also allow more time for education and consultation activities.

An enormous number of recommendations concerning infection control have been made by the Joint Commission on Accreditation of Hospitals (1976). Fifer (1981) has stated the cost of hospital health care continues to rise at a rate that society may not tolerate much longer. Consequently, it is important to evaluate the efficacy of nosocomial infection control activities in order to determine which measures should be included in a contemporary nosocomial infection control program.

Statement of the Problem

The problem with which this study dealt was the need for information upon which to establish priorities in an infection control program.

Purpose of the Study

The purpose of this study was to determine if more frequent interaction with the infection control nurse had any effect on the knowledge level in regard to infection control practice.

Objectives of the Study

The objectives of this study were:

1. To determine if the visibility and availability of the infection control nurse for consultation and education had any effect on the knowledge level of the receiver.

2. To evaluate the personal and professional characteristics of the infection control nurse as viewed by the study groups.

Assumptions

For purposes of this study, the following assumptions were accepted by the investigation:

1. That the personnel selected for participation in the study were representative of the group as a whole.

2. That the attitudes and answers of the participants

were honest expressions of their opinions.

Limitations

This study contained the following limitations:

1. The study was conducted in only one hospital.

2. Participants in the treatment group may have had limited interaction with the infection control nurse due to informal meeting times.

Definitions

The following definitions of terms are furnished to provide a more clear understanding of this study.

Infection Control Program - because infections acquired in the hospital or brought into the hospital from the community are potential hazards for all persons having contact with the hospital, effective measures must be developed to prevent, identify, and control such infections.

Infection Control Nurse (ICN) - the central figure in the infection control program who is responsible for the day-to-day activities of the program.

Nosocomial infection - an infection that develops during hospitalization and is not present or incubating at the time of admission to the hospital.

Surveillance - when applied to disease is the systematic, active, ongoing observation of the occurrence and distribution of disease within a population and of the

events or conditions that increase or decrease the risk of such disease occurrence.

Comprehensive surveillance - full surveillance of the entire hospital.

Limited surveillance - surveillance limited to high risk areas and/or specific infections.

Nosocomial infection attack rate - the number of nosocomial infections divided by the appropriate population at risk and usually expressed as a percentage.

Organization of the Study

Chapter I introduces the study with a brief description of infection control practice, presents the need for the study and a statement of the problem. The first chapter also includes the purpose and objectives of the study, assumptions, limitations, and definitions of terms. Chapter II reviews the literature from an historical perspective, including various surveillance and control methods, and concludes with changing priorities in the field of infection control. Chapter III reports the methods and procedures utilized in this study, including the selection of the sample population to be surveyed, collection of information, and analysis of data. Chapter IV presents the findings of the study and Chapter V contains a summary, conclusions and recommendations for further research in the practice of infection control.

CHAPTER II

REVIEW OF LITERATURE

This chapter presents a review of literature in the following areas: (1) brief historical review of the development of infection control programs, (2) the various nosocomial infection surveillance methods, and (3) the changing priorities in infection control programs.

Historical Review

Infection has been defined by Webster (1977) as a disease resulting from the presence of certain microorganisms or matter in the body. Infection dates back to the earliest forms of life and has always been a prominent feature of human life. Dubay and Grubb (1973) stated that before the relationship of microorganisms to infection was established, infection rates in hospitals were so high that these institutions were often referred to as "pest houses" or "houses of death".

In the mid-nineteenth century, Semmelweiss in Austria and Holmes in the United States tried to persuade their colleagues that infectious disease was spread by the unclean hands of medical students and physicians coming from the autopsy rooms to the patient wards in hospitals (Fuchs, 1979).

The studies of Pasteur formulated the germ theory of infection and the additional work of Koch made bacteriology an exact science (AHA, 1979). Also during the latter half of the nineteenth century, Lister discovered and introduced the "antiseptic theory" and Nightingale, von Bergmann, and Schimmelbusch initiated some of the aseptic practices (AHA, 1979). Both of these milestones (handwashing and surgical asepsis) remain even today as basic principles in the prevention of nosocomial infection.

The establishment of the germ theory and the development of the principles and practices of aseptic technique was followed by the discovery and development of sulfonamides in the early 1930's (AHA, 1979). In his presidential address to the Surgical Infection Society, Altemeier (1982) reviewed historical events which included the discovery of penicillin in 1928 by Fleming. He stated that it was not until the 1940's through the work of Chain and Florey that penicillin was made available for clinical use in the United States. Thus began the era of antibiotic therapy. The drugs were so effective in preventing and treating infections that "asepsis" lost some of the importance that it had taken so long to attain and the "surgical conscience" deteriorated.

Infections that occur in an institutional setting are called nosocomial infections. According to Dorland (1965), the term nosocomial originated from Greek words nosos (disease) and komeion (to take care of). Nosocomium is an

archaic noun designating a hospital, and nosocomial is an adjective derived from the noun. During a talk at the Second International Conference on Nosocomial Infections, Williams (1981) commented that the word "nosocomial" was first published 42 years ago by Wright in a paper in the Journal of Hygiene to describe infections in a childrens ward in London. Williams (1981) stated that the word was not used again for nearly 39 years, but is now used to generalize about infections that develop in hospital patients without implying culpability or blame.

According to Bennett (1979), interest in nosocomial infections grew at a very rapid rate since the early 1960's, prompted by an increase in serious penicillin resistant staphylococcal infections encountered in hospitals throughout the United States and in many other countries. Garner (1974) states that in 1963 a new nursing role evolved at Stanford University and at the University of Illinois Research and Education Hospital which placed a nurse in the center of infection control activities. This nurse identified, recorded and analyzed the numbers and kinds of infections found within the hospital environment. This activity is generally referred to as surveillance and, in the larger hospitals, is a function of the Epidemiology Department. Epidemiology literally means the study of things that happen to people, but is commonly applied to the study of infections that occur in the hospital.

In 1968, the American Hospital Association (AHA) published Infection Control in the Hospital. The AHA recommended that each hospital establish an Infection Control Committee, to be charged with the responsibility of investigation, control, and prevention of infections (AHA, 1979).

In 1970, the Center for Disease Control (CDC) published the Outline for Surveillance and Control of Nosocomial Infections. This methodology is a baseline for surveillance activities. Components of this surveillance program included definitions, information on nosocomial infections, a place for recording information, the actual process of gathering pertinent information, and a record of each infection. Standards established by the Joint Commission for Accreditation of Hospitals (JCAH) and published in the Accreditation Manual for Hospitals (1976), required hospitals to develop a practical surveillance system, in addition to implementing other infection control standards. Such an enormous number of recommendations were made by JCAH, that Eickhoff (1981), during a presentation at the Second International Conference on Nosocomial Infections in 1980, stated:

> . . . fulfilling the JCAH requirements as they currently stand, would for a 400-bed hospital require at least two full-time nurse epidemiologists, a full-time secretary and a well-stocked xerox machine, together with innumerable hours of work by the chairman and members of the infection committee and others of the professional and administrative staff of the hospital (p. 385).

Brachman (1981) states that it has been estimated that approximately five percent of all patients admitted to

hospitals in the United States develop infection during hospitalization. He goes on to state that there are approximately 34 million admissions to general hospitals in the United States each year; thus, there may be 1.7 million nosocomial infections annually in this country. Hoeprich (1979) stated that the direct cost of nosocomial infections to society is probably well in excess of one billion dollars annually.

Nosocomial Infection Surveillance Methods

According to Eickhoff (1969), Polk (1975), and Stamm (1976), every hospital is required by the Joint Commission for Accreditation of Hospitals (JCAH) to devote part of its infection control program to infection surveillance. Surveillance methods vary from hospital to hospital and can range from "spot" checks to complete review of every hospitalized patient's record, to review of microbiology laboratory results. When broadly defined, surveillance includes not only systematically gathering and analyzing data, and using consistent definitions, but also disseminating and otherwise using the results of surveillance to reduce infection risks.

Brachman (1979) states in his book, Hospital Infections, that the single most important aspect of the nosocomial infection control program is surveillance. His co-author, Bennett (1979), states that surveillance is required for determining baseline information about the frequency and type of infection occurring in a hospital so that upward

deviations from this baseline can be recognized. Bennett (1979), has defined surveillance of nosocomial infections as a continuous process that consists of the following elements: (1) defining the events to be surveyed as concisely and precisely as possible; (2) collecting the relevant data in a systematic way; (3) consolidating or tabulating the data collected into meaningful arrangements; (4) analyzing and interpreting the data; and (5) disseminating the data and interpretations to those who need to know them.

Surveillance may be classified as prospective or retrospective. Prospective surveillance involves using trained personnel who recognize potential problems as they arise and facilitate investigative or control measures. Retrospective surveillance relies upon record review and review of culture reports upon completion of hospital forms. According to Reinarz (1978), retrospective surveillance fulfills only administrative requirements and is useless in effecting meaningful infection control.

Prevalence surveys involve a systematic review of a defined population for evidence of infection at a specific time. Mulholland (1974) and his researchers showed a positive relationship between prevalence and routine surveillance. Prevalence rates reflected an 80-90 percent accuracy for routine surveillance, depending upon the time spent by the infection control personnel.

According to Emori (1981), in 1974 the Center for Disease Control undertook a study in United States hospitals

to determine whether and to what extent organized infection surveillance and control programs had reduced the risks of nosocomial infections during the early 1970's. This project was named the Study on the Efficacy of Nosocomial Infection Control (SENIC). The hospital interview survey, which was conducted between October 1976 and July 1977, gathered data by use of personal interviews with members of the hospital staff in positions considered to be important to infection control. The sample survey included 433 hospitals that were representative of the population of United States hospitals. The summary of this part of the project reported that 97 percent of the hospitals included in the survey had some type of surveillance system. They also reported that most hospitals performed continuous hospital wide surveillance and infection control nurses spent half of their time on surveillance.

Eickhoff (1981) has defined surveillance in three different ways: (1) comprehensive surveillance which is full surveillance of the entire hospital population and is what was recommended by the Center for Disease Control (CDC), (2) limited surveillance which would be carried out in high risk areas of the hospital and on specific types of infections, and (3) project oriented surveillance which is used to identify risk factors and their modification or alteration and the assessment of various interventive strategies. He refers to comprehensive surveillance as the "gold standard". He suggests the project-oriented surveillance

should be used in research centers to obtain answers to existing problems. And he suggests that limited surveillance makes the most sense for an across-the-board recommendation to the majority of hospitals. Dixon (1981), in a discussion published in Reviews of Infectious Diseases, stated that there may be roles for each type or all three types of surveillance depending upon the needs of the hospital.

Sharbaugh (1981) reported that the Medical University of South Carolina, following implementation of continuous hospital-wide surveillance, analyzed data collected during the years 1977 to 1979. Their study concluded that involvement of infection control personnel at all levels of patient care can result in a significant reduction in the incidence of nosocomial infections.

Changing Priorities

Britt, Schleupner, and Matsumiya (1978) reported that an "awareness" program, directed particularly to high-risk patients, had resulted in an almost 50 percent reduction in nosocomial infections. The awareness program focused on patient classification as a method for identifying unusual risks in patients.

Chelgren and LaForce (1978) reported that periodic surveillance of nosocomial infection resulted in more time for infection control activities such as education. Their methodology was unique in that full surveillance was only performed for one month out of every three-month period, or

quarterly per year.

Castle (1980) suggested that after an infection control program has been in operation for some time, the time allotted to the various activities should change. Figure 1 shows the time allotted to a new program versus that of an established program. (See Figure 1.)

Large community hospital,
more than 250 beds

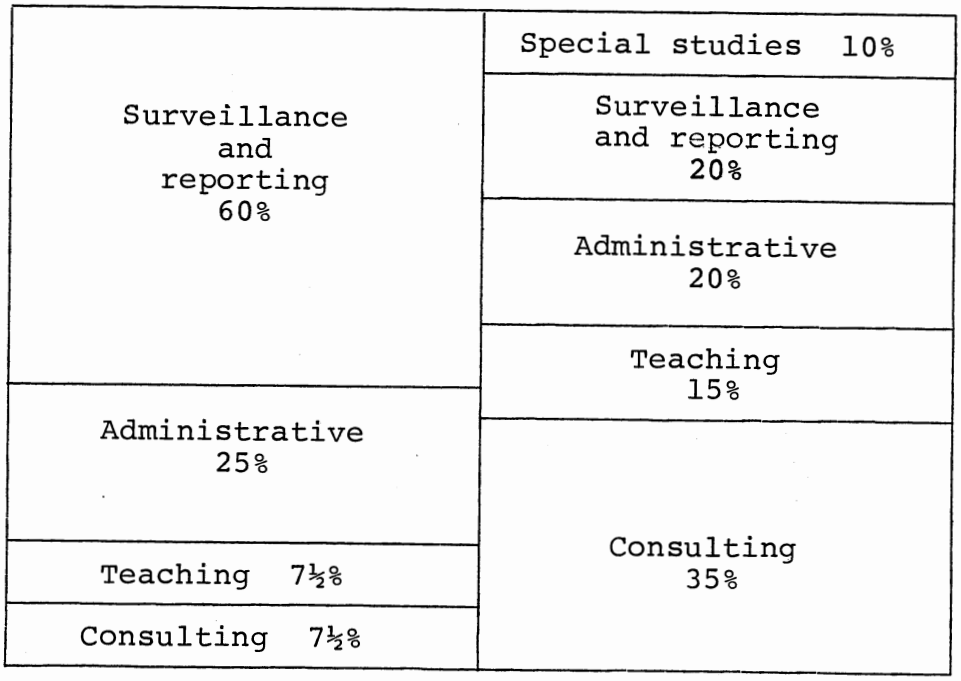

Figure 1. Structure of Infection Control Programs

Pappas and Krause (1980) reported that the infection control program at Veterans Administration Edward Hines Junior Hospital has evolved from one of predominately surveillance to a multifaceted program. Surveillance time decreased from 75 percent in 1972, to only 10-15 percent in 1980. However, their definition of surveillance refers only to review of patients' charts. Wenzel (1981), in a general discussion published in Reviews of Infectious Diseases states that there are many aspects of surveillance other than collecting data from charts, one is visibility on the ward and another is availability for consultation and education.

Wenzel (1981), in a study conducted at the University of Virginia Hospital, reviewed the surveillance data collected between January 1, 1975, and December 31, 1979. The focus was on identifying procedure-related nosocomial infections in high risk patients. The surveillance data indicated that 33-45 percent of all nosocomial bloodstream infections occurred among patients in intensive care units, who occupied only 8 percent of the hospital beds. The data indicated that all major outbreaks over a period of two years involved intensive care unit (ICU) patients. The study recommended that the highest priority for infection control resources should be assigned to surveillance of the patients in intensive care units (ICU's).

Roderick (1983) noted that the prevalence of infections in critical care units is substantially higher, with

infected patients and contaminated equipment acting as potential reservoirs for the spread of infection. Each new technological device and procedure may carry a potential risk of infection.

The November issue of Hospital Infection Control (1982) reported that the preliminary findings from the Study on the Efficacy of Nosocomial Infection Control (SENIC) Project were presented at a session of the Interscience Conference on Antimicrobial Agents and Chemotherapy last October, but the final results have not been published. It was stated that the information provided at this conference seemed to indicate that "high intensity" programs with a full time infection control nurse for every 250 hospital beds were effective in reducing the infection rate of the institution. The January issue of Hospital Infection Control (1983) published comments from an interview with Dixon, who was head of the Center for Disease Control Hospital Infections Program during some phases of the SENIC Project. He indicated that the published study will provide some broad general principles on what is useful in infection control.

Dixon (1981) reviewed the research papers published in the Proceedings of the first International Conference on Nosocomial Infections held in 1970. Both abstracts submitted and actual presentations from the second conference held in 1980 were also reviewed by him. An apparent lack of research in the area of implementation of effective programs was noted. The cause was speculated to be due to attitudes

and interests of those who work in infection control. Dixon (1981) stated that infection control programs have been established to prevent disease by influencing practices in the hospital, it is important that infection control programs examine the effectiveness of the content.

Fifer (1981), speaking at the National Educational Conference of the Association for Practitioners in Infection Control (APIC), pointed out that if health care costs continue to increase at the present rate, the current annual cost of $245 billion per year will rise to an astounding $758 billion by the end of the decade. McGowan (1982) stated that there are no studies to date that deal with the impact or success of infection control programs, so as new patterns of health care financing emerge, it is essential for infection control programs to prove their efficacy.

Summary

A backward glance at the past provided some perspective for assessing the current "state of the art" in infection control. The necessity for surveillance as a first step in the study and prevention of nosocomial infections seems to have been accepted as a given fact. A major challenge in the 1980's will be to determine what is important and what is not, and to provide some rational priorities in infection control.

CHAPTER III

METHODS AND PROCEDURES

This chapter details the methods and procedures for collecting data relevant to the purpose of the study outlined in Chapter I. Included are: (1) the introduction to the study, (2) the selection of the subjects, (3) the creation/selection of the instruments to be used in collecting the information, (4) the collection of the information from the sample population, and (5) the analysis of the data collected by the questionnaire and opinionnaire.

Introduction

This study was conducted in a 900-bed community teaching hospital serving a city of 690,000 population and serving as a referral hospital for a 150-mile radius. All major medical services are available, as well as various modes of specialized care. According to the medical records department, approximately 36,000 patients are admitted annually for a mean hospitalization time of seven days. The hospital employs over 3,500 people and has a medical staff of over 500.

According to the medical director, the infection

control program is the responsibility of the epidemiology department. The records of the epidemiology department indicate that surveillance of the entire hospital has been performed since 1972. Changes in personnel have occurred and the number of personnel in the epidemiology department increased from one infection control nurse (ICN) in 1972 to three nurses and one secretary by September 1982. This was in accordance with the increase in the number of hospital admissions and in more demanding standards as required by the Joint Commission on Hospital Accreditation.

According to the medical records department, there were three intensive care units (ICU) within the hospital in 1981, accounting for approximately eight percent of the hospital beds: an adult ICU (16 beds), a pediatric ICU (6 beds), and a neonatal ICU (44 beds). Six additional beds were added to the adult ICU in the second half of 1982, making a total of 22 adult ICU beds.

The epidemiology department records indicate that in 1981, nosocomial infections occurring in the ICU accounted for approximately 21 percent of the total nosocomial infections per month in the hospital. The number of admissions to the ICU accounted for approximately eight percent of the total number of admissions to the hospital. Therefore, eight percent of the population accounted for 21 percent of the nosocomial infections. Admissions to pediatric and adult ICU accounted for approximately six percent of the total admissions and 12 percent of the nosocomial infections.

These statistics were fairly consistant with those found in the review of literature. With this knowledge, the epidemiology department decided to give the high risk areas for infection the highest priority in surveillance time and informal education.

In January 1982, the epidemiology department changed from total surveillance to limited surveillance. Limited surveillance was to focus on high risk areas (ICU) and on specific infections. The epidemiology department is open from approximately 7 a.m. to 5 p.m. Therefore, the majority of the time spent on infection control activities is during the day shift (7 a.m. to 3 p.m.).

The intensive care unit (ICU) and coronary care unit (CCU) are both specialty critical care units of approximately the same size. They are located in the same wing of the hospital, but they are on different floors. Both units have the same floor plan and a similar nurse-patient ratio.

Selection of the Subjects

Registered nurses who had worked the day shift in ICU for a period of longer than one year were defined as the treatment group, because they had received an increase in contact time with the infection control nurse (ICN). Registered nurses who worked the night shift and who had not worked days within the past year were defined as a comparison or control group. This shift had no opportunity

for interaction with the ICN. Registered nurses who worked the day shift in CCU were selected as another comparison group because of the similarity of the ICU and CCU. CCU was not considered a high risk area for infection, therefore that unit did not receive an increase in surveillance time.

The nurses working in the neonatal intensive care unit were not included in the study. The isolation requirements and precautionary measures are unique to that area, therefore, the same questionnaire was not suitable for that group.

Creation/Selection of the Instruments

A questionnaire was developed by the researcher and pilot tested by experts in the field of infection control, including one physician and three nurses. The questionnaire was further pilot tested by 15 physicians in the residency program and five nurses in the ICU. Finally, it was presented to the education department within the institution for approval.

The questionnaire consisted of 15 multiple-choice questions. Questions the staff nurses frequently asked the ICN and information frequently shared with the staff were used as a basis for the questionnaire. (See Appendix A for the copy of the questionnaire.)

The opinionnaire selected for the study was part of the SENIC Project (Emori, 1982). In the SENIC Project, it

was used to compare the infection control nurse and the infection control laboratorian. In this study, the purpose of the opinionnaire was to assess the personal and professional characteristics of the ICN as perceived by the participant. (See Appendix B for a copy of the opinionnaire.)

Collection of Data

The instrument was given to 67 registered nurses individually and in person by the researcher. The instrument consisted of three pages, the questionnaire, opinionnaire, and a cover page. The cover page included an introductory statement requesting participation in evaluation of the infection control program. It also asked for demographic information including educational background, years of nursing experience, and years of employment in the institution. (See Appendix C for the cover page.)

The 15 multiple-choice questions were designed to be answered by circling one correct answer. The opinionnaire asked the participant to indicate how accurately 10 statements described the personal and professional characteristics of the ICN. They were asked to place a corresponding number beside the statement to indicate if the statement was true of the ICN "rarely or never," "some of the time," "most of the time," or "all of the time." If the participant had not had sufficient contact with the ICN to assess the characteristic described in the statement, an "insufficient contact" response could be selected.

The researcher administered the instrument when the participant had time during the regular working hours. In most instances, it took no more than 10 minutes for an individual to complete the three pages. The data were collected between February 22, 1983 and March 8, 1983.

Analysis of Data

To analyze the data, the responses from the questionnaire and opinionnaire, as well as the demographic information were compiled. The data were then arranged to compare groups by unit, educational background, years of nursing experience, and years of employment in the institution. The questionnaire and opinionnaire scores were tabulated using frequency count and percentages for a method of comparison.

Data collected from the questionnaire were compared through the use of a t-test (Popham, 1973). The researcher hypothesized that there would be no significant difference in the mean score on the questionnaire between the treatment group and each of the two comparison groups at the 0.05 level.

CHAPTER IV

PRESENTATION OF FINDINGS

The purpose of this chapter is to present the findings of the study. The sections are presented in the following order: (1) study response; (2) demographic information; (3) questionnaire response; (4) opinionnaire response; (5) examination of the hypothesis; and (6) summary.

Study Response

Sixty-seven registered nurses participated in the study. Seventeen responses were eliminated from the study because they did not meet the established criteria. Included in this number were 10 responses received from the pediatric ICU. The researcher learned, after administering the instrument, that the pediatric nurses frequently changed or overlapped shifts. Two responses from the ICU day shift and three responses from the CCU day shift were eliminated from the study because they had not worked on the day shift for at least one year. Two responses from the ICU night shift were eliminated because they had worked on the day shift during the past year.

The final analysis included 20 nurses from the ICU day shift or approximately 87 percent of the day staff.

It included 20 nurses from the CCU day shift or approximately 83 percent of the day staff in that unit. It also included 10 nurses from the ICU night shift or approximately 50 percent of the staff.

Demographic Information

The educational background of the three groups is presented in Table I. There were 19 nurses with an associate degree (AD), 11 nurses from a nursing diploma background (ND), and 20 nurses with a bachelors degree (BSN). The numbers of nurses with an AD and BSN were almost equal, but 65 percent of the nurses with a BSN worked the day shift in ICU, while only 25 percent of the nurses with an AD worked in ICU on the day shift.

TABLE I

EDUCATIONAL BACKGROUND OF PARTICIPANTS FROM EACH GROUP

	Educational Background					
	AD		ND		BSN	
Group	N	Percent	N	Percent	N	Percent
ICU (D)*	5	25	2	10	13	65
CCU (D)*	9	45	7	35	4	20
ICU (N)**	5	50	2	20	3	30
Total	19	38	11	22	20	40

* Day shift
** Night shift

The number of years of nursing experience is presented in Table II. Seventy percent of the ICU day nurses and 85 percent of the CCU day nurses had three or more years of nursing experience, while only 40 percent of the ICU night nurses had three years of nursing experience.

The number of years of employment the nurses had in their present position is presented in Table III. Seventy-five percent of the ICU day nurses and 70 percent of the CCU day nurses had worked in that position for three years or more, compared to only 40 percent of the ICU night nurses.

TABLE II

NUMBER OF YEARS OF NURSING EXPERIENCE OF PARTICIPANTS FROM EACH GROUP

	Years of Experience									
	1 or Less		2		3		4		Over 5	
Group	N	Per-cent	N	Per-cent	N	Per-cent	N	Per-cent	N	Per-cent
ICU (D)			6	30	2	10	2	10	10	50
CCU (D)			3	15	2	10			15	75
ICU (N)	3	30	3	30	1	10	2	20	1	10
Total	3	6	12	24	5	10	4	8	26	52

TABLE III

YEARS OF EMPLOYMENT IN PRESENT POSITION
OF PARTICIPANTS FROM EACH GROUP

	Years of Employment									
	1 or Less		2		3		4		5 or More	
Group	N	Per-cent	N	Per-cent	N	Per-cent	N	Per-cent	N	Per-cent
ICU (D)			5	25	4	20	4	20	7	35
CCU (D)			6	30	3	15	3	15	8	40
ICU (N)	5	50	1	10	1	10	1	10	2	20
Total	5	10	12	24	8	16	8	16	17	34

Questionnaire Response

The questionnaire consisted of 15 multiple-choice questions. Each question was given an equal value of one point. The scores ranged from seven correct responses by four participants to all (15) correct responses by one participant. The distribution of the scores from each group is presented in Table IV. Ninety percent of the nurses working the day shift in ICU obtained a raw score of 11 or greater, while only 50 percent of the two comparison groups attained a raw score of 11 or greater.

The distribution of the questionnaire scores by educational background and by group is presented in Table V.

The average score of the ICU day nurse was higher in all three types of educational background. The average score of the ICU day nurse with a BSN was equal to that of the ICU day nurse with an AD.

The number of correct responses by group for each question is presented in Table VI. The same three questions were answered correctly by 50 percent or fewer from all three groups.

TABLE IV

DISTRIBUTION OF QUESTIONNAIRE SCORES BY GROUP

Score		ICU (D)		CCU (D)		ICU (N)	
N	Percent	N	Percent	N	Percent	N	Percent
15	100	1	5	-	-	-	-
14	93	1	5	-	-	-	-
13	87	3	15	1	5	-	-
12	80	4	20	4	20	2	20
11	73	9	45	5	25	3	30
10	67	2	10	4	20	-	-
9	60	-	-	3	15	1	10
8	53	-	-	2	10	1	10
7	47	-	-	1	5	3	30
Total		20		20		10	

TABLE V

DISTRIBUTION OF QUESTIONNAIRE SCORES
BY EDUCATIONAL BACKGROUND

	BSN			ND			AD		
Score	ICU (D)	CCU (D)	ICU (N)	ICU (D)	CCU (D)	ICU (N)	ICU (D)	CCU (D)	ICU (N)
15							1		
14	1								
13	3							1	
12	3	2				1	1	2	1
11	5	1	2	2	2		2	2	1
10	1				2		1	2	
9		1			1	1		1	
8			1		2				
7								1	3
Average Score	11.8	11.0	10.0	11.0	9.6	10.5	11.8	10.6	8.8

TABLE VI

NUMBER OF CORRECT RESPONSES BY GROUP
FOR EACH QUESTION

	ICU (D)		CCU (D)		ICU (N)	
Question	N	Percent	N	Percent	N	Percent
1	16	80	15	75	5	50
2	19	95	18	90	8	80
3	15	75	14	70	5	50
4	12	60	14	70	7	70
5	20	100	17	85	8	80
6	19	95	16	80	6	60
7	17	85	9	45	5	50
8	8	40	6	30	4	40
9	19	95	14	70	8	80
10	11	55	10	50	4	40
11	9	45	10	50	5	50
12	9	45	6	30	4	40
13	20	100	20	100	6	60
14	20	100	18	90	10	100
15	20	100	19	95	10	100

Opinionnaire Response

The responses on the opinionnaire were given values of 0.0 to 1.5. A response of "insufficient contact" or "rarely or never" was given no value. A response of "some of the time" was given a value of 0.5. A response of "most of the time" was given a value of 1.0 and a response of "all of the time" was given a value of 1.5. The best value that could be achieved was 15. The values given by the ICU day nurses ranged from 4.5 to 15 with a mean of 11.45. The values given by the CCU day nurses ranged from 6.5 to 15, with a mean of 10.95. The values given by the ICU night nurses ranged from 0.0 to 10.5 with a mean of 5.15.

The distribution of the response "all of the time" to each statement in the opinionnaire by each group is presented in Table VII. This response was given more frequently by the ICU day nurse than the two comparison groups on every statement except the first. The distribution of the opposite response of "rarely or never" or "insufficient contact" is presented in Table VIII. The statements that resulted in a lower percentage on Table VII usually resulted in a higher percentage on Table VIII from the two day groups. A frequent response from the night group was "insufficient contact."

Twenty-four percent of the nurses in the study included comments or suggestions with the return of the completed instrument. Three nurses from the night group included

suggestions or requests for inservice education classes to be held during working hours. Three nurses from CCU group also requested inservice education on infection control. The six comments received from the ICU day group included three requests for inservice education, three positive statements in regard to the infection control nurse, and two suggestions to improve the interpersonal relationship between the staff nurse and the infection control nurse.

TABLE VII

DISTRIBUTION OF "ALL OF THE TIME" RESPONSES TO EACH STATEMENT IN OPINIONNAIRE BY GROUP

	ICU (D)		CCU (D)		ICU (N)	
Statement	N	Percent	N	Percent	N	Percent
1	8	40	11	55	2	20
2	14	70	12	60	2	20
3	15	75	13	65	3	30
4	9	45	7	35	4	40
5	13	65	11	55	1	10
6	7	35	5	25	1	10
7	9	45	5	25	1	10
8	9	45	6	30	-	-
9	8	40	7	35	-	-
10	14	70	9	45	1	10

TABLE VIII

DISTRIBUTION OF "NONE OF THE TIME" OR INSUFFICIENT CONTACT RESPONSES TO EACH STATEMENT IN OPINIONNAIRE BY GROUP

	ICU (D)		CCU (D)		ICU (N)	
Statement	N	Percent	N	Percent	N	Percent
1	5	25	2	10	4	40
2	-	-	1	5	1	10
3	2	10	1	5	4	40
4	-	-	1	5	2	20
5	-	-	1	5	7	70
6	4	20	2	10	5	50
7	2	10	3	15	6	60
8	-	-	3	15	6	60
9	1	5	1	5	4	40
10	-	-	-	-	4	40

Examination of the Hypothesis

A comparison of the mean scores on the questionnaire between the treatment group (ICU day group) and the two comparison groups (CCU day group and ICU night group) is presented in Tables IX and X. The null hypothesis was not supported. Utilizing a t-test, there was a significant difference in the mean scores beyond the 0.05 level between

the ICU day group and the CCU day group and between the ICU day group and the ICU night group.

A comparison of the mean scores on the questionnaire of the two control groups (CCU day group and ICU night group) is presented in Table XI. By use of a t-test, there was no significant difference between the mean scores of the two control groups.

TABLE IX

A COMPARISON OF QUESTIONNAIRE SCORE FOR TREATMENT GROUP (ICU-DAY) AND CONTROL GROUP (CCU)

Group	N	S.D.	Mean	t
ICU	20	1.29	11.75	3.15[a]
CCU	20	1.59	10.3	

[a]significant beyond the 0.05 level

TABLE X

A COMPARISON OF QUESTIONNAIRE SCORE FOR TREATMENT GROUP (ICU-DAY) AND CONTROL GROUP (ICU-NIGHT)

Group	N	S.D.	Mean	t
ICU (D)	20	1.29	11.75	3.08[a]
ICU (N)	10	2.12	9.5	

[a]significant beyond the 0.05 level

TABLE XI

A COMPARISON OF QUESTIONNAIRE SCORE
FOR BOTH CONTROL GROUPS

Group	N	S.D.	Mean	t
CCU (D)	20	1.59	10.3	1.05[a]
ICU (N)	10	2.12	9.5	

[a]no significant difference

Summary

The questionnaire was intended for a measurement of knowledge level in regard to infection control practices. There was a significant difference found between the mean scores of the treatment group and the comparison or control groups.

The opinionnaire was intended for information only and not for statistical testing. The ICN received a slightly higher average rating in regard to personal and professional characteristics from the treatment group than from the comparison or control groups.

CHAPTER V

SUMMARY, FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

The content of this chapter is divided into five parts. A summary is presented in the first part. This is followed by the findings, conclusions, implications and recommendations for further research.

Summary

The overall goal of an infection control program is to reduce infections. The problem with which this study dealt was the need for information upon which to establish priorities in an infection control program. A comprehensive review of the literature indicated that surveillance, which includes a high degree of visibility and interaction with the health care personnel, is important in an effective infection control program.

The infection control program in the institution where the study was conducted had a change in priorities in January 1982 to allow more time for informal education and consultation in the high risk areas of the hospital. The purpose of the study was to determine if more frequent interaction with the infection control nurse had any effect

on the knowledge level of the staff nurse in regard to infection control practices. This was accomplished by means of a questionnaire, developed by the researcher, which included 15 multiple-choice questions. The questionnaire included topics that were frequently discussed with the staff. An opinionnaire was also included in the study. The opinionnaire contained 10 descriptive statements. The nurse participants were asked to rate them as they applied to the ICN on a scale of 0.0 to 5.0. This attempted to determine how the staff nurse assessed the personal and professional characteristics of the infection control nurse.

Three groups were selected from critical care specialty areas. The adult intensive care unit day nurse was defined as the group that had received treatment or an increase in contact time with the infection control nurse (ICN). Two groups were selected as a comparison or control group. The ICU night nurse was selected because the ICN provided no contact time to that shift. The coronary care unit (CCU) day nurse was also selected because the amount of contact time in that unit decreased or remained the same as the previous year.

Sixty-seven nurses participated in the study. The instruments were administered to the nurses during the working hours. The data were collected between February 22, 1983 and March 8, 1983.

The data were compiled utilizing frequency count and percentages. The statistical measurement used to determine significance of the mean scores on the questionnaire was the t-test.

Findings

The findings of the study indicated that there was a significant difference between the mean scores of the treatment group versus the comparison groups on the questionnaire. The findings on the opinionnaire, which were compared using only frequency count and percentage, indicated that the treatment group selected a favorable response on the assessment of the ICN more frequently than the two comparison groups. Both of the day groups, ICU and CCU, seemed to be similar in educational background and nursing experience. The night nurses, however, had fewer years of experience and had also worked at the institution for a shorter period of time.

Conclusions

The conclusions that resulted from the above findings are as follows:

1. Frequent interactions with the staff are valuable in conveying information at a time and place when the recipient is most likely to listen, to understand, and to learn.

2. Frequent interaction is effective in fostering good interpersonal relationships and in improving adherence to infection control practices.

3. Infection control programs need to develop priorities and to direct their efforts to areas where they will have the greatest effect.

Implications and Recommendations for Practice

Although informal teaching does not lend itself to evaluation as readily as formal programs, it has proved effective. Extensive involvement of infection control personnel at all levels of patient care can increase the awareness level, which may result in a reduction of nosocomial infections.

Based upon these research findings, the following recommendations for practice are presented:

1. Hospitals with limited resources need to develop priorities and direct their surveillance efforts in the high risk areas for infection.

2. Surveillance and/or inservice education should be performed during periods on all hospital shifts and as the need arises.

3. Infection control personnel should develop innovative approaches to motivate the employees with whom they interact.

4. The infection control program should be assessed periodically to provide a perspective of the activities and time spent in each element of the program.

Future Research

Additional research is necessary to assist the infection control nurse in developing priorities and establishing an effective, and efficient program. Listed below are some possible topics for future research.

1. The study should be repeated after an additional year or more of experience or in another high risk area of the hospital.

2. Conduct studies to determine effective techniques to use in influencing human behavior.

3. Conduct an investigation to determine which infection control activities are most cost effective for each type of institution.

4. Conduct a study to evaluate the educational qualifications necessary for the infection control nurse to perform effectively and to develop the best teaching strategies.

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APPENDIXES

APPENDIX A

QUESTIONNAIRE

PLEASE CIRCLE THE CORRECT ANSWER

1. Strict isolation is required in the following situation.

   A. Tetanus
   B. Varicella (chicken pox)
   C. Localized herpes zoster

2. Diseases requiring respiratory isolation include:

   A. Scabies
   B. Hepatitis
   C. Tuberculosis

3. Wound and skin precautions are recommended in the following situation.

   A. Gangrene with no drainage and not due to C. perfringens
   B. Localized herpes zoster
   C. Infected knee joint with no drainage

4. Diseases requiring enteric precautions depend on the following route of transmission.

   A. Ingestion
   B. Inhalation
   C. Neither

5. The following disease requires close intimate contact for transmission, therefore requires only secretion precaution with careful handwashing (no isolation).

   A. Diphtheria
   B. Rubella
   C. Herpes simplex virus infections

6. Patients with the following infectious disease should not be cared for by pregnant employees.

   A. Rocky Mountain Spotted Fever
   B. Cytomegalovirus infection
   C. Pediculosis

7. Herpes encephalitis requires the following:

   A. Strict isolation
   B. Respiratory isolation
   C. None

8. The following type of bacterial meningitis should be handled using respiratory isolation until 24 hours after initiation of effective therapy.

   A. Pneumococcal
   B. Meningococcal
   C. Streptococcal

9. Gastroenteritis is caused by each of the following except:

   A. Salmonella
   B. Pseudomonas
   C. Shigella

10. Swelling of the finger with vesicle formation, pain and fever is a recognized hazard to ICU nurses known as:

    A. Hand, foot, and mouth disease (coxsackie virus)
    B. Disseminated gonococcal infection
    C. Herpetic Whitlow (Herpes simplex)

11. Which of the f ollowing results in the hepatitis profile indicate that the patient is capable of transmitting hepatitis B.

    A. Anti HB_s +
    B. HB_s Ag +
    C. Anti HAV +

12. Which of the following results in the hepatitis profile indicate <u>acute</u> hepatitis A.

    A. HB_s Ag +
    B. Anti HAV +
    C. Anti HAV IgM +

13. Blood precautions should always be taken for the following:

    A. Pediculosis
    B. Sporotrichosis
    C. Hepatitis B

14. Which of the following precautions is recommended for the neutropenic patient.

    A. Protective
    B. Enteric
    C. Secretion

15. The most important procedure in preventing nosocomial infection is:

    A. Isolation
    B. Protective clothing
    C. Handwashing

APPENDIX B

OPINIONNAIRE

INDICATE WHETHER THE FOLLOWING STATEMENT IS TRUE OF THE INFECTION CONTROL NURSE BY PLACING THE CORRESPONDING NUMBER BESIDE THE STATEMENT.

Rarely or never	1
Some of the time	2
Most of the time	3
All of the time	4
Insufficient contact	5

Is not afraid to speak up to people who are breaking infection control technique. _____

Seems to know what to do to prevent cross-infection in the hospital. _____

Is eager to discuss infection control matters. _____

Discusses infection control information in a way that we are able to apply it to our patient area. _____

Makes self available for questions and discussions about infection control matters. _____

Discusses breaks in technique with personnel in a positive way rather than criticizing them. _____

Appears up-to-date in clinical nursing procedures as well as in infection control practices. _____

Reminds us about infection control practices often enough to keep us actively applying them in our patient care. _____

Provides infection control information and explanation of policies which are clear and understandable. _____

Makes infection control practices seem an important part of patient care. _____

Do you have any comments or suggestions?

APPENDIX C

COVER PAGE

EPIDEMIOLOGY DEPARTMENT

Your help is requested in evaluating the Infection Control program at Hospital. All responses to the following questions or comments will be considered confidential. Do not sign your name.

Please indicate your educational background

AD	Diploma	BSN

Number of years of nursing experience

1 or less	2	3	4	5 or more

Number of years of employment at Hospital

1 or less	2	3	4	5 or more

VITA

LaDonna Hagen Kerton

Candidate for the Degree of

Master of Science

Thesis: AN ASSESSMENT OF CHANGING PRIORITIES IN INFECTION CONTROL PROGRAMS

Major Field: Occupational and Adult Education

Biographical:

Personal Data: Born in Kensett, Iowa, December 30, 1937, the daughter of Leonard and Julia Hagen.

Education: Graduated from Northwood High School, Northwood, Iowa, in May, 1955; received diploma from Broadlawns Polk County Hospital School of Nursing in 1958; received Bachelor of Arts degree from University of Redlands, Redlands, California in 1975; completed requirements for the Master of Science degree, with emphasis in Human Resource Development, at Oklahoma State University in May, 1983.

Professional Experience: Staff Nurse, Broadlawns Polk County Hospital, 1958-1959; Staff Nurse, UCLA Medical Center, 1959-1963; Staff Nurse, West Hills Hospital, Canoga Park, California, 1965-1975; Infection Control Nurse, West Hills Hospital, 1975-1977; Epidemiology Nurse Coordinator, Saint Francis Hospital, Tulsa, Oklahoma, 1979 - present.