KNOWLEDGE OF CANCER FACTS AMONG WORKERS FOLLOWING AN EDUCATIONAL PROGRAM

A THESIS

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DEDICATION

Dedicated

to the Memory of

Ila Faye Calloway, R.N.

Without her encouragement, guidance and example during my early years in health service, I may never have completed my pursuit of a nursing career.

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CHAPTER 1

INTRODUCTION

Technical ingenuity in this century has brought forth an array of synthetic substances and chemicals. Because of these products, inhabitants of industrialized nations enjoy a more leisurely and versatile lifestyle than did their ancestors. However, along with the advantages of industrial innovations have come some problems. One of these problems is an increasing incidence of occupationally related cancers.

Occupational carcinogens are not solely the product of this century's technology alone. Over 200 years ago Sir Percivall Pott, an English surgeon, related the high incidence of scrotal cancer among chimney sweeps in London to the men's occupational exposure to soot. The increased incidence of certain work-related cancers is of great concern not only because of worker exposures but exposures of nonworking populations as well. For example, family members of asbestos workers have died of cancer as a result of exposure to the asbestos carried home on the workers' clothing.

Occupational cancer is a concern to all those working with industry. Government, management, labor and the health professional alike are seeking means by which to eradicate the problem. Health education has been implicated as one means of attacking the problem. The Occupational Safety and Health Act of 1970 mandates that the worker be informed of the potential hazards in the workplace and that programs be developed so that employee and employer alike can "recognize, avoid and prevent unsafe or unhealthful working conditions" (Felton, 1977, p. 346).

Cancer is a complex subject and not easily understood by the general public or by health professionals. For this reason, knowledge of the now known facts concerning cancer should enable persons to better assess both their working and nonworking environments for cancer risks. Ultimately, this knowledge should lead individuals to make changes which may reduce both morbidity and mortality resulting from cancer.

Health education for workers is being recognized as an important part of the occupational preventative health program. The literature, however, demonstrated a lack of research data to support the idea that workers learn from educational programs they receive. It is not enough to

present the worker with information. Only through evaluating the worker's comprehension of the information can the health educator know that the program is appropriate for that worker.

Statement of the Problem

This study addressed the following question: Does a cancer education program presented to a select group of workers at risk increase the workers' knowledge of cancer facts?

Statement of the Purposes

The purposes of this study were to:

1. Determine the knowledge of cancer facts among a selected group of workers at risk both before and after the presentation of a cancer education program.

2. Compare the post-program knowledge level of the group receiving the program with that of a control group who is also at risk but has not received the program.

Theoretical Framework

Desire on the part of the health professional to teach the worker about cancer is not enough. The worker must be ready to learn for any educational program to be successful. Rosenstock (1966) in introducing his health belief model stated that:

> Motivation is required for perception and action. Thus, people who are unconcerned with a certain aspect of their health are not likely to perceive any material that bears on that aspect of their health. Even if, through accidental circumstances, they do perceive such material, they will fail to learn, accept or use the information. (p. 98)

Rosenstock's health-belief model emphasizes three major perceptions which affect learning. First, the learner must perceive himself as susceptible to developing the problem. Second, he must perceive the health problem as serious. The third perception is two-fold in that the learner must see that there would be certain benefits that would take place as a result of him taking the health action, and that the benefits of taking the health action would be worth any physiological or psychological discomfort experienced in the process of taking the health action.

An example of a work-related application of these perceptions would be that of an asbestos worker who smokes cigarettes. There is overwhelming evidence that smokers who work with asbestos have a greater chance of developing lung cancer than asbestos workers who do not smoke (National Institute, 1979). A smoking asbestos worker may use effective denial to ignore the much publicized hazardous effects of smoking. If he has no family history of cancer, he may believe that his chances of developing

cancer are remote. In addition, the latency period, before the unhealthful effects of his smoking behavior are realized, may be 20 years or more. The potential ill-effects of smoking cessation will occur immediately (ACS, 1971).

The health educator must consider these perceptions if he/she is to become an effective change agent in the health promotion process. Redman (1976) stated that in the American culture there are many other values of life which compete with the value of health. One such value might be social approval. Felton (1977) described what he calls the "macho" image among male workers which has led to disregard of personal protective devices.

One needs to consider another facet of learner readiness which Redman called experiential readiness. This facet deals with the individual's experiences and background as well as attitudes and skills. Knowles (1978), in his theory of adult learning called andragogy, echoed the need to center adult learning around life experiences. He believed that adults must see the immediate application of learning. The adult learner brings a wealth of life experiences into any educational setting. The value of these experiences should not be overlooked by the health

educator but should be a building block toward acquiring healthful habits of living.

For an educational program in the occupational setting to be effective, the program must be based on the principles of adult learning and beliefs which motivate health behaviors. By incorporating these principles into a health education program, the results will be not only increased knowledge but also the desired outcome of behavior change.

Background and Significance

Cancer is second only to heart disease as a leading cause of death in the United States. Over 375,00 Americans died of cancer in 1976. These cancer deaths accounted for 19.8% of the total deaths that year (ACS, 1979a).

Cancer rates steadily increase each year. Perhaps this is partially due to an increase in population or a longer life-expectancy. However, when the rates are adjusted for these factors there are other unexplained variables. Most human cancers are environmentally induced. In this instance, the term environmental refers to extrinsic factors such as cigarette smoking, overexposure to sunlight, excessive alcohol intake, and so forth. Some of these extrinsically-caused cancers result from workplace exposures (Wynder, 1978).

Just what percentage of cancer is job related is difficult to determine. The difficulty of absolutely attributing cancer risk to a specific job is due to several factors. One factor is the latency period from time of exposure to the onset of clinical manifestations which may be 20 years or greater (Key, 1978).

The second factor is due to the complexity of the chemical processes. Because of this complexity, the establishment of a causal relationship between one chemical and a resultant cancer may be impossible. For example, epidemiologists agree that workers exposed to coke oven emissions in the steel industry are at risk of developing lung cancer, but a specific carcinogen in that process has not been positively identified (Key, 1978).

Still a third factor was reported by Dinman (1974). He stated that "it seems inevitable that a number of malignant events will occur regardless of work exposures" and that "there is little to differentiate the occupational cancer from other tumors on the basis of biological behavior" (p. 6).

Even with these limitations, however, there are epidemiological and experimental evidences that point to an increase of cancer among workers exposed to certain substances in the work environment (Ashford, 1976; Dinman,

1977). One way of dealing with the problem of cancer whether it be occupationally related or not appears to be through worker education. Dinman emphasized the need to combine knowledge with technology to control risks.

Ware and Marcus (1979) reviewed the current status of occupational health education and specifically education as it related to cancer. They concluded that even though health education programs existed some 30 years ago in industry, these early efforts did not survive. This, they found, was partially due to the fact that the programs were offered by outside health educators and not adequately integrated into the in-plant programs.

One study cited in the report by Ware and Marcus was conducted in eight industrial plants in the Massachusetts area. Four health education programs were presented to the plant workers. The programs included such activities as health counseling, poster displays, pamphlet distribution, and health films that were shown during the employees' lunch hour. The results of the study showed that those workers who had contact with the programs were more knowledgeable of related health facts as a result of the program.

A 1976 health education program at Bell Laboratories in Morristown, New Jersey demonstrated the current trend toward evaluating the effectivenesss of health education

programs by attempting to measure health actions taken as a direct result of the program. The study involved presentations of a variety of current health problem programs. These were presented to the workers during their lunch hour. The evaluation instrument was not designed to accurately measure the objectives as they were stated, but certain outcome data are of interest. Of the employees responding to the questionnaire, 96% rated the presentations as good or excellent, and health actions were taken most often by respondents who attended several of the educational sessions. It is mentioned in the study that the second most popular program topic was on cancer (Wagner, Bryant, & Bauer, 1976).

Heyden (1978) has reported on a cancer education program which was conducted at Cannon Mills. The purpose of this one hour presentation was to motivate employees to participate in a screening program. A 100% attendance rate was guaranteed. Twelve thousand (67%) of the employees who attended the program volunteered for screening. Of these 12,000 employees, 530 (9%) of the men and 1200 (21%) of the women were informed by a letter that "an abnormality had been found that required further diagnostic evaluation by their physician" (Heyden, 1978, p. 47). The data revealed that 24 cases of cancer were diagnosed from among

the 12,000 employees screened. Obviously, the researcher not only accomplished the objective of getting the employees to participate in the screening program but the results revealed an obvious need for such a program.

It is well established within the nursing profession that health promotion through education is an essential component of professional nursing practice. Lee (1978) and Brown (1974) included in their listings of occupational health nursing functions both teaching and motivating of workers. The goal of health promotion techniques should be toward helping the worker to adopt healthy and safe practices of living whether it be at work or at home.

The research in health promotion programs in industry, especially those related to cancer prevention, is limited. The references cited, however, give clear indications of the nurse's professional role in health education and the need to evaluate the knowledge acquired as the result of such programs.

Hypotheses

For the purposes of this study the following hypotheses were tested:

1. Workers at risk of developing cancer will show an increase in knowledge of cancer facts following a cancer education program.

2. There is a significant difference between the pre-program knowledge of cancer facts among a group of workers at risk who receive a cancer education program when compared with a group of workers at risk who do not receive the program.

Definition of Terms

For the purposes of this study the following terms were defined:

1. Cancer education program--a 30-minute program developed by the researcher which presents facts about cancer in general as well as specific facts related to occupational exposures. The facts were derived from the current literature and in line with recommendations of the American Cancer Society.

2. Knowledge of cancer facts--this was judged by worker performance on the written Pretest-Posttest Cancer Questionnaire (PPCQ) designed by the researcher.

3. Workers at risk--individuals working in an occupational setting who are exposed by the nature of their work to known or suspected cancer-causing agents.

Limitations

The following limitations were viewed by this researcher as having an effect on this study:

1. Motivation is a factor in any learning situation and this study did not attempt to measure the motivation of the participants prior to the program.

2. Subjects self-selected to participate in the program which could introduce bias.

3. The groups of workers studied may not reflect the population of all workers at risk.

4. The findings of this study cannot be generalized beyond the sample.

Delimitation

The following delimitation was viewed by the researcher as having an effect on this study:

Pre and posttesting occurred under controlled situations so that contamination by other sources of information was eliminated.

Assumptions

The following assumptions were viewed by the researcher as having relevance to this study:

1. Health education for workers is a nursing function.

2. Workers responded honestly to all items on the Pretest-Posttest Cancer Questionnaire (PPCQ).

3. There is a need for cancer education in the occupational setting.

Summary

This chapter outlined the need for research in evaluating the success of health education programs for industrial workers. The study was designed to determine the knowledge obtained by a group of workers after being presented with a cancer education program. The succeeding four chapters review the current literature relevant to this study and explain in detail the study protocol and results of statistical analysis. Chapter 2 reviews the literature relevant to: (1) health education programs in the work setting, (2) research of occupational health education, (3) the nurse's role as an educator, and (4) the need for cancer education programs in industry. Chapter 3 includes the methodology for collection and treatment of data. Chapter 4 is the analysis of the data with the conclusions, implications and recommendations presented in Chapter 5. The information obtained in this study can assist health professionals in planning appropriate educational programs for workers, and hopefully will stimulate further research into responses of workers to such programs.

CHAPTER 2

REVIEW OF THE LITERATURE

It is the purpose of this chapter to review the literature relevant to health education programs in the occupational setting, as well as the need for evaluation of such programs. It is not the intent of the researcher to review the extensive literature on current facts relevant to cancer or theories of teaching and learning. The educational program outlined in Appendix A relates the topics reviewed in preparation of the educational program and demonstrates use of teaching/learning principles. The sources used in preparation of the cancer education program are listed in the bibliography.

An exhaustive search of the literature on health education in the occupational setting was undertaken through a Medlars computer search of literature for the past 10 years. In addition, authorities in the field of health education and occupational health were interviewed. These interviews revealed a few as yet unpublished manuscripts on the topic. This literature search disclosed few occupational health education programs that had employed scientific design and evaluation techniques.

Four main topic areas are reviewed in this chapter. The first is a historical review of health education programs in the work setting and factors influencing the development of such programs. The second is a discussion of the current status of occupational health education research. The third area deals with the nurse's role as an educator, and specifically the occupational health nurse's role in developing sound educational programs incorporating research design. Lastly, this chapter reviews the literature which supports the need for cancer education programs in industry.

Health Education in the Work Setting

Historically it is difficult to establish a date or era when health education programs were first introduced into the occupational setting. The difficulty arises from no firm definition of what constitutes health education. Would informal health teaching by qualified professionals constitute health education? If so, health teaching was integrated into the duties of the first industrial nurse in 1895 as she ministered to ill workers and their families (Markolf, 1945).

Ware and Marcus (1979) presented a report on the current status of occupational health education at a 1979 National Cancer Institute planning meeting on cancer

education. A historical search by these educators revealed that organized health education programs existed at least 30 years ago. A Harvard School of Public Health study in the early 1950s was the first study that investigated health education in industry (Ware & Marcus, 1979).

This Harvard study sampled plants, unions, and health agencies in the Massachusetts area looking for organized health education activities. The study concluded that most of the organized educational activities were being conducted by health educators employed by community agencies (e.g., Heart Association, Cancer Society, and so forth). Of the plants studied, none had programs designed by in-plant health personnel. The programs that were offered by the agencies were stated to have had very low interest and appeal to both management and union personnel. The programs were also cited as being fund-raising and community oriented rather than related to industrial health concerns.

Ware and Marcus (1979) reported additional studies and surveys conducted in the late 1960s and early 1970s which demonstrated both industrial and community efforts toward worker health education. However, they concluded that "while there has been an informal mandate with respect to health education as an integral part of occupational medicine for many years, the evidence would indicate that organized, comprehensive in-house programs were a rarity" (p. 6).

The 1970s have shown the greatest thrust toward improving health education programs for workers. Several factors have influenced this advancement and heightened industry's awareness of the worker's health education needs. The major influence of the decade was the passing of the Occupational Safety and Health Act of 1970 that mandated, and today still mandates, that working men and women should be "safe and healthful" (p. 1). Included in the purposes of the Act was that employers and employees "institute new and perfect existing programs for providing safe and healthful working conditions" (Public Law 91-596, p. 1).

A second major influence was the establishment of the President's Committee on Health Education in 1971. In January, 1972, Dr. Jerry Cassuto spoke at a public hearing on behalf of health education in the occupational setting. He reviewed past efforts toward health education for workers and outlined the need for evaluating programs and determining priorities. The later establishment of the National Center for Health Education gave new impetus to occupational programs when it listed as one of its three program goals the "health education for employees" (Felton, 1977, p. 346).

The Status of Occupational Health Education Research

A search of the literature for health education programs in the occupational setting yielded information

that only a few programs have utilized research methodology to evaluate the success of the programs. Wear, Cox, and Lento (1975) reported on an Atherosclerosis Prevention Program at the Campbell Soup Company. The report was based on six years of observations of cardiovascular disease risk factors in 5,571 company employees. Though not explicitly stated, it seems that the employees self-selected to participate in this program. The larger percentage of older employees in the study group was attributed to the fact that long-service employees were given priority. The following risk factors were evaluated in each participant: smoking, hypertension, positive family history for heart disease and/or diabetes, obesity, and elevated serum lipids. Following the evaluations, educational or medical programs were designed to reduce identified risks. The study did not give statistical evidence that these interventions produced decreases in atherosclerotic risk factors, and there was no control group identified in the study.

Another study on cardiovascular risk factors was reported in 1978 by Bjurstrom and Alexiou. When looking at cardiovascular disease risk factors, the researchers narrowed their study to one risk factor, sedentary lifestyle. Employees of the New York State Education and Civil Service Departments were given the opportunity to participate

in the study regardless of age, sex, salary or health status. Using an instrument that established a risk factor score for each subject, the study group was evaluated prior to a formal, 15-week primary intervention program and at periodic intervals during the secondary program. Primary intervention consisted of an exercise and educational program whereas the secondary program was a continuation of the exercise program. At the end of five years the researchers reported significant improvements in physical work capacity, favorable modifications in risk factors, a decrease in certain health problems and a reduction in employee absenteeism. The study is significant in demonstrating a move by occupational health professionals toward the use of evaluative research in determining the success of health education programs.

In 1974 the Bell Laboratories provided a series of industrial health education programs that were designed and carried out by the Department of Community Health Education in a local hospital. The 30 minute programs covered the health topics of stress, cardiac risk factors, cancer, dentistry, breast self-examination, and adolescent health. Of the 2,500 on-site employees, 600 attended the programs offered during the lunch hour. A questionnaire, sent to employees following the series of programs, allowed

participants to rate the programs and elaborate on changes in health actions that resulted from the attendance at these programs. There was no pretesting of the workers' health habits prior to the sessions or a control group established (Wagner, Bryant, & Bauer, 1976).

Heyden (1978) reported on an educational program at Cannon Mills designed to inform workers of recent developments in early cancer detection. The purpose of the program was to obtain volunteers from among the employees to participate in a cancer screening program. The program was evaluated as successful in that 12,000 (67%) of the employees who attended the program volunteered for screening. Of these 12,000 employees, 530 (9%) of the men and 1,200 (21%) of the women were informed by a letter that "an abnormality had been found that required further diagnostic evaluation by their physician" (Heyden, 1978, p. 47). The data revealed that 24 cases of cancer were diagnosed from among the 12,000 employees screened.

The Occupational Health Nurse as an Educator

The function of teaching has been mandated in nursing practice since the genesis of the profession. Florence Nightingale was quoted as saying in 1895,

> Nursing is not only a service to the sick; it is a service also to the well. We have to teach people how to live. (Brown, 1974, p. 7)

In reviewing nursing education in 1918, the National League of Nursing Education expressed concern that the "ordinary training" of nurses focused only or mainly on disease and neglected prevention and education, two major elements in public health (p. 1). The organization recognized at that time the need for health education in industry as well as in other facets of community life (Redman, 1976, p. 2).

The role of educator for the occupational nurse in the United States became paramount during the economic depression of the 1930s. Though many occupational health nurses lost their jobs, the ones who were retained by industry found that health counseling and teaching were major responsibilities of their jobs. At that time workers did not have unemployment compensation insurance nor medical and hospitalization insurance (Brown, 1964).

World War II also brought emphasis to the teaching role of the nurse in industry. Trained workers were scarce because of the drafting of healthy males into the armed forces. Many women were employed in heavy manufacturing industries and handicapped and older workers were drawn into the labor force. A major emphasis at this time was on conserving the health and productivity of the worker (Brown, 1964). Workers were scarce, and conserving the health of the worker became increasingly important (Brown, 1964).

Brown (1964), a leader and author in the field of occupational health nursing, listed "teaching and motivating employees to be safety and health minded" as a principal role of occupational health nursing if the nurse in the work setting is ever to have "a significant impact on the health of the nation" (Brown, 1964, p. 969).

Tinkham (1977) at the 35th Annual Meeting of the American Association of Occupational Health Nurses made this dynamic statement to the nurses' educator role in industry:

> Health is a nursing concern. Thus the occupational health nurse is concerned with the health of people who work. This concern is not limited to the job hazards but is related to the total health of the workers. If health is defined in its broadest sense, the major activity will be health promotion and disease prevention wherever these activities can be carried out most effectively. (Tinkham, 1977, p. 8)

According to Tinkham, the emphasis on health promotion and disease prevention is one of the most important developments of occupational health nursing since its inception. She stated that: "The potential for the contribution of nursing to the health of the worker is limited only by the creativity, imagination, knowledge, judgement, and experience of the nurse" (Tinkham, 1977, p. 9).

Reynolds (1978) of Eastman Kodak Company of New York used the nursing process to alter the health status of diabetic workers through a diabetes teaching program. For three months prior to initiating the program, it was noted

that a number of diabetic employees were involved in crisis situations which required emergency intervention. An assessment of the problem led to the hypothesis that the crisis events were related to inadequate health education. Research methodology was employed to evaluate whether or not an instructional program for these diabetic workers would alter their crisis events. A review of the participants' need for crisis intervention three months prior to the program and three months after showed a statistically significant ($p \leq 0.05$) reduction in crisis events.

Clearly, the occupational health nurse has an obligation to educate the worker in matters related to health both on and off the job. She also has an obligation to provide evidence that the programs do in fact affect the health behavior of those workers and thereby improve the overall health of the community.

In the 1972 Surveys of Public Health Nursing, the distribution of occupational health services provided in occupational health facilities and public health agencies revealed that 78.5% of the sample provided health counseling while only 38.1% offered group health and safety teaching. This is not surprising data, however, when the educational level of the majority of occupational health nurses is considered. Only 6.8% of the nurses employed in occupational

health units in 1972 had obtained baccalaureate or higher degrees. It is in university programs that the teaching and research methodologies are vital components of the curriculum.

Felton (1977) summarized the need for use of evaluative research in planning health programs when he stated:

> The determination of worth of a health education program is difficult unless one designs the undertaking as a research project, with adequate controls, pre and post-testing, and sequential follow-up at specified temporal increments. (Felton, 1977, p. 350)

The Need for Cancer Education in the Work Setting

Findings from epidemiological studies have demonstrated strong associations between man's environment and the development of cancer. It has been estimated that 70% to 90% of human cancers are due to environmental factors or factors extrinsic to man (Schottenfeld, 1978a). The largest percentage of the environmentally-induced cancers is believed to be attributable to lifestyle factors such as smoking, certain dietary habits, over exposure to sunlight, and the like (Wynder, 1978).

There is some controversy as to what percentage of cancers is attributable to workplace exposures to potential cancer-producing agents or carcinogens. Figures from 1% to 33% have been postulated and currently are being subjected

to testing (Moses, 1979; Schottenfeld, 1978; Selikoff, 1980; Wynder, 1978).

Cancers that are associated with workplace exposures or pollution are of great concern to the population as a whole. Cancer is the second leading cause of death in the United States (ACS, 1979a), and according to Fink (1980), cancer is among the most feared of diseases by the general public.

A 1978 study by Cambridge Reports, Inc. for the Shell Oil Company supported Fink's conclusion. The study was an analysis of public and worker attitudes towards carcinogens and cancer risk. After sampling a large group of workers and community members in heavy industrial areas, the report concluded that "heart disease and cancer are the diseases most Americans expect to contract" (Cambridge, 1978, p. xiii). Of the population surveyed, 60% responded that the amount of cancer in this country is increasing, and only 28% replied that they were "very well informed about cancer" (p. xiii). It is of interest that the respondents in the study blamed cigarettes as the major cause of cancer with food additives and pollution ranking second and third, and the workplace second to last; yet, their response was that government had more potential for controlling workplace hazards than for controlling smoking. This attitude

is interesting. Even though there is congressional support for controlling workplace hazards through the establishment of OSHA and NIOSH, there is limited manpower to enforce the standards set by these organizations.

The sub-sample of workers in chemical plants in the Shell Oil study was compared with a similar sub-sample of American workers from a national survey (Cambridge, 1978). The assumption, although not clear, was that all the workers were full-time employees. The conclusions drawn were: (1) chemical workers were more likely to view their job as dangerous, and (2) chemical workers attributed this danger to the chemicals.

This is only a brief overview of a very extensive survey report but the findings suggested both a concern about cancer and a lack of knowledge of the current theories of causation. Concern regarding cancer among chemical workers is admittedly justified. Thomas et al. (1980) of the National Cancer Institute studied the "cause-specific mortality experience of 3,105 members of the Oil, Chemical and Atomic Workers International Union" in Texas. The death certificates of former union members between 1947 and 1977 were obtained. The findings suggested that workers in the petroleum refining and petrochemical industry may be at increased risk of certain cancers and indicated areas for

further investigation. The researchers did emphasize that the "proportionate mortality ratios may appear higher than they should because of lack of information on workers who retired or left the union for other reasons" (Thomas et al., 1980, p. 105). The authors stated that the study was designed not to give conclusive evidence but to generate hypotheses. However, considering all limitations of the study,

> The findings that risks of stomach cancer, cancer of the brain, leukemia, and multiple myeloma increase with longer union membership among workers in the refining and petrochemical category strengthens the association with occupational factors. (Thomas et al., 1980, p. 102)

Clearly, cancer education is needed in the occupational setting. The Occupational Safety and Health Act of 1970 mandated that workers be informed of job risks and educated in matters of prevention, but the need for cancer education goes beyond this. As Wynder (1978) pointed out, the non-occupationally related lifestyle factors which are associated with cancer can have synergistic effects with other agents to produce cancer. An example of this synergistic effect is the high incidence of bronchogenic carcinoma among asbestos workers who smoke cigarettes (Wynder, 1978). The 1979 Surgeon General's report on Smoking and Health stated that:

> In a prospective study of 370 asbestos insulation workers, 24 of 283 cigarette smokers died of bronchogenic carcinoma during the four year period of the study, while not one of the 87 non-cigarette smokers died of this cancer. This study suggested that asbestos workers who smoke have eight times the risk of lung cancer as compared to all others smokers and 92 times the risk of non-smokers not exposed to asbestos. (NIOSH, 1979, p. 4)

The same group of workers were restudied five years later yielding similar results, thereby strengthening the association. Studies of radon daughters and gold mine exposures, as well as exposures in the rubber industry, also have suggested a synergistic action with tobacco smoke in the formation of occupational disease (NIOSH, 1979).

The National Cancer Institute, in an effort to disseminate information regarding cancer to a high risk population, conducted a conference for workers on job-related cancer in Houston, Texas in 1979. This conference was requested by the Oil, Chemical, and Atomic Workers International Union and was the first conference of its kind. The National Cancer Institute is noted for its professional conferences for clinicians and scientists but this was its first endeavor to bring the latest cancer information directly to a "lay audience" (Anderson, et al., 1980).

At the Houston conference, Dr. Irving J. Selikoff, a renowned authority in occupational carcinogenesis and

professor at the Mt. Sinai School of Medicine in New York City, gave a detailed history of cancer deaths due to occupational exposure. He repeatedly pointed to warning signs in animal studies or human associations that were in the past overlooked or disregarded. Based on these past experiences, he referred to medical and scientific professionals in industry as "slow learners." Dr. Selikoff challenged all persons involved in the cancer prevention effort when he said:

> When we didn't know, we might have had some excuse, but to have people die now, when we know what can be done to prevent such deaths, that's shirking a responsibility. (Selikoff, 1980, p. 64)

Dr. Selikoff cited figures from a study undertaken by Dr. Stallones of the University of Texas School of Public Health that estimated that 20% to 33% of the cancer deaths are due to occupational exposures. Selikoff translated these percentages into actual population numbers meaning that around 125,000 deaths from cancer, this year, would be occupationally related. Based on Stallone's predictions of deaths due to asbestos exposure, Selikoff (1980) stated this one agent alone would account for 40 thousand deaths. Selikoff called this "a public health catastrophe" (p. 85).

Rawson, addressing the same assembly, stressed the importance of educational programs as a part of a cancer prevention plan. He called for union or union and company

sponsored educational programs to help individuals recognize and control factors which increase their cancer risks (Anderson et al., 1980).

The cancer education programs to which Dr. Rawson and others were referring are not the traditional educational approaches of early diagnosis and treatment but programs to promote and sustain health through awareness of preventative measures. Ware and Marcus (1979) in their report on Health Education in Occupational Cancer Programs noted that the occupational setting is unique and that cancer education programs in industry may be more effective in cancer prevention than programs designed for the general population. They attribute this uniqueness to the facts that in industry there is an identifiable "at risk" population, that individuals can affect whether disease occurs and that protective measures are somewhat effective.

Looking back to the theoretical framework for motivating persons to change health behaviors, it is recalled that these factors of personal relevance and perceived benefits are highly motivating components. Rosenstock's health belief model (1966) stressed the importance of motivation in order for individuals to take action in the preservation of health. Knowles (1978) reiterated this belief in his andragogical theory of learning.

Summary

This review of the literature has attempted to relate the need for evaluative research in planning and implementing educational programs in industry. An exhaustive search of the literature for health education programs in industry revealed few which had employed scientific design and evaluation techniques.

The role of the nurse in the workplace as an educator was supported by the historical development of the teaching role of professional nurses in general. In addition, congressional mandates and opinions by nursing and medical authorities give support to the function of teaching workers in order to prevent illness and promote health.

Cancer as a result of workplace exposure is largely preventable. For this reason, the need for preventative cancer education programs for workers is emphasized by all cancer experts. Wynder (1978) summarized best the need for such programs when he said:

> We remind ourselves of the old lesson of history--that nearly all of the triumphs of medicine have come not from therapy, but from prevention. (Wynder, 1978, p. 9)

CHAPTER 3

PROCEDURE FOR COLLECTION AND TREATMENT OF DATA

This study was experimental, explanatory research conducted in an industrial setting with a population of workers at risk of developing cancer. The study was designed to demonstrate that workers receiving a cancer education program were more knowledgeable of cancer facts than workers who did not receive the program.

Setting

The setting for the study was a chemical plant located in a highly industrialized area of the state of Texas. This plant is a part of a large international chemical company. Approximately 2,400 workers are employed by this plant which manufactures and uses over 200 different chemical substances.

Population

The target population consisted of workers who were employed by this chemical plant, and who were working in areas where known or suspected carcinogens are being manufactured or used. There were four groups of workers who worked exclusively in plant locations which met these specific criteria.

This program was conducted during a scheduled company safety program for all plant operators and during the worker's on-job time. The operators from two of the before mentioned groups of workers were selected by the researcher and assigned by the researcher to experimental and control groups. Workers in the experimental group received a cancer education program as part of their all-day safety program. The second group of workers did not receive the program at the time of the study and constituted the control group.

Though attendance at the educational program was mandatory, participation in the study was voluntary. Twenty-three workers consented to participate in the experimental group and eleven workers in the control group. The small number of workers in the control group was attributed to the fact that these workers had to remain after work on their own time to complete the questionnaires.

Individual anonymity was maintained in the study since the workers were not identified by name on the Personal Data Sheet or Pretest-Posttest Cancer Questionnaire (PPCQ). However, the PPCQ was coded for comparisons of individual pretest and posttest results. Approval to conduct the study was given by the Texas Woman's University Human Research Review Committee and by the industrial plant.

Individual consent forms were completed by each study subject (Appendix B).

Instrument

The research instrument, the PPCQ, consisted of a pretest and posttest developed by the researcher. The instrument contained 17 factual statements related to cancer in general, cancer research, prevention and detection and environmental carcinogens. The respondents were asked to read each statement and then circle on the right hand side of the page true, false, or unsure for each statement. In addition, they were asked to identify from a list of signs and symptoms those that are considered the early warning signs of cancer (Appendix C).

Content validity of the instrument was established by expert review of each item. The panel of experts consisted of three authorities in health education, cancer education and occupational health (Appendix D). The suggestions of the panel led to wording changes and an increase in the number of true/false items from an original 15 to 17 in order to more fully evaluate all program objectives. It was also recommended by the health educator that the number of false items be increased to produce a more discriminating instrument. Mehrens and Lehmann (1978) expressed the need for "approximately an equal number of true and false

statements" to limit the influence of response set on the validity of the test scores (p. 270).

The original 25 item instrument was tested for reliability by a group of 21 workers from the chemical plant under study. The subjects who completed the PPCQ were plant operators from a unit other than the units selected for inclusion in the experimental and control groups.

The instrument reliability was analyzed by the Kuder-Richardson Formula 20 test of internal consistency. The result was a reliability coefficient of 0.66. Items 8, 11 and 19 showed negative point biserial correlations. These items were not deleted due to their importance in measuring certain objectives, but they were reworded for clarity. The altered PPCQ was again analyzed for reliability using the pretest responses of the experimental group. The modified PPCQ proved to be less reliable ($r = 0.56$) than the original instrument. The decrease in reliability may be the result of not deleting the negative correlation items and adding the two additional items as was recommended by the panel for validity.

Collection of the Data

The subjects in the experimental group were given a questionnaire packet containing: The informed consent,

the Personal Data Sheet, and two copies of the PPCQ, the second of which was inserted in an envelope to serve as the posttest. After a verbal explanation of the study, all subjects who elected to participate signed and returned the consent form to the researcher. Ten minutes at the beginning of the cancer education program were allowed for completion of the Personal Data Sheet and the PPCQ. The 30 minute program presentation and brief discussion period followed. At the close of the program, the subjects were asked to open the envelope, remove the PPCQ, and were given another 10 minute period in which to complete this PPCQ.

On the same day of the presentation of the program to the experimental group, the subjects who consented to voluntarily participate in the control group were asked to complete the Personal Data Sheet and the PPCQ. The subjects in the control group took the test during their non-working hours. They were in a classroom setting similar to that in which the experimental group was tested.

The Personal Data Sheet information remained anonymous and in no way was coded to correspond with the PPCQ. Thus the confidentiality of the individual worker's responses was protected.

Treatment of the Data

The dependent variable in this experimental study yielded interval level data. The descriptive data were analyzed by the researcher by frequencies and percentages. The test scores on the PPCQ were obtained from the experimental and control groups. The pre and posttest scores in the experimental group were analyzed by the nonparametric technique of the Wilcoxon-Matched Pairs T. Comparisons of the experimental and control groups' pretest scores were analyzed by the nonparametric technique of the Mann-Whitney U.

Summary

This study was designed to evaluate an educational program for workers who are at risk of developing cancer by the nature of their jobs. The pre-posttest design was implemented to demonstrate a change in knowledge of cancer facts in an experimental group as compared to a control group that did not attend the program.

Thirty-four workers self-selected to participate in the study. The subjects were nonrandomly assigned to experimental and control groups with 23 workers in the experimental and 11 workers in the control groups.

Data were collected from these workers on the same day. The data were analyzed using nonparametric statistical

tests to demonstrate differences between the pre and posttest scores of the experimental group and to compare the pretest scores of the experimental and control groups.

CHAPTER 4

ANALYSIS OF DATA

This experimental, explanatory research study was designed to answer the following question: Does a cancer education program presented to a select group of workers at risk increase the workers' knowledge of cancer facts? This chapter presents the analyses of the data obtained from the Personal Data Sheet and the Pretest/Posttest Cancer Questionnaire (PPCQ) administered to two groups (experimental, n=23; control, n=11) of workers at risk of developing cancer.

Description of the Sample

In this study, 34 subjects voluntarily consented to participate. The experimental group contained 23 subjects and the control group contained 11. All subjects were employed by the same chemical plant and performed similar job functions as operators in units where carcinogenic agents were either manufactured or used.

The demographic information was obtained from the Personal Data Sheet which was completed by each subject in both groups prior to administration of the first tests. In the total sample, the ages of the subjects varied

greatly with the youngest participant being 19 years of age and the oldest 62. The mean age was 43 years with a mode of 31 years and a standard deviation of 12.75. A summary of the age distribution is presented in Table 1.

Table 1

Frequency Distribution and Percentages of Age with Ranges and Means of Each Group

Age in Years	Experimental		Control	
	No.	%	No.	%
Under 20	1	4.3	0	0.0
20-29	3	13.0	1	9.0
30-39	6	26.0	3	27.3
40-49	5	22.0	1	9.0
50-59	7	30.4	4	36.4
60 or over	1	4.3	2	18.3
Total	23	100.0	11	100.0
Age Range	19 - 60		22 - 62	
Mean Age	41.7		46.5	

The male subjects greatly outnumbered the female subjects with a total of 30 (88.2%) males to 4 (11.8%) females. The frequency distribution and percentages of sex by groups are presented in Table 2.

Table 2

Frequency Distribution and Percentages by Sex in Each Group

Sex	Experimental		Control	
	No.	%	No.	%
Male	20	87.0	10	90.9
Female	3	13.0	1	9.1
Total	23	100.0	11	100.0

The racial distribution in the two groups was predominantly white with two other racial groups represented. Table 3 indicates this distribution.

Table 3

Frequency Distribution and Percentages of Racial Distribution for Each Group

Racial Group	Experimental		Control	
	No.	%	No.	%
White	20	87.0	8	72.7
Black	1	4.3	2	18.2
Mexican-American	2	8.7	1	9.1
Total	23	100.0	11	100.0

Educational levels as reported by the sample ranged from 11 grades completed to graduation from college. The average educational level for the entire sample was 12.5 years of school completed. One subject in each group did not respond to the question on educational level. The ranges and average years completed in each of the groups are presented in Table 4.

Table 4

Range and Mean of Educational Level Completed as Reported by Subjects in Each Group

Completion of Grades in Years	Experimental[a] (n=22)	Control[a] (n=10)
Range	11 - 14	12 - 16
Mean	12.4	12.7

[a]Note: One person in each group did not respond to this question.

The years of employment both in the same position, namely plant operator, and in the same plant location demonstrated wide variations as shown in Table 5. Four subjects had worked less than a year as operators while nine subjects had worked 30 years or more. The mean years as an operator for the combined sample were 17.4 years. The mode was 32 and the standard deviation was 12.64.

Table 5

Range and Mean Number of Years Worked in Same Position, Operator, and in the Same Plant Location for Each Group

Employment	Experimental (n=23)	Control (n=11)
Range of years as an operator	1 week - 39 years	6 months - 32.5 years
Mean years working as an operator	16 years	20 years
Range of years working in the same plant location	1 week - 32 years	6 months - 32 years
Mean years working in the same plant location	8 years	15 years

The question on number of years in the subjects' plant location was included to assess the number of years that these workers had been working with known or suspected carcinogenic agents. One worker had worked only 1 week in the plant while three workers exceeded 30 years of work in their present plant locations. The mean number of years worked for the total sample was 10.3 with a mode of 2 and a standard deviation of 10.49. The range of years and mean years worked in the same plant location for each group also is reported in Table 5.

Regarding history of cancer, no respondents indicated that they were currently being treated for cancer and only one subject reported past treatment for cancer. A total of 13 (38%) subjects indicated a positive family history of cancer. Ten of these subjects were in the experimental group, three in the control group, and three were non-respondents to this question.

In addition to the demographic data and the questions regarding employment and history of cancer, three questions were included on the Personal Data Sheet to assess prior information on cancer and habits of obtaining physical examinations. Twenty (58.9%) of the 34 subjects answered that they had previously received information concerning cancer. Eleven of the subjects responding affirmatively were from the experimental group and nine were from the control group. Table 6 reflects the frequency distribution and percentages for each group.

The sources for cancer information as reported by each subject who responded affirmatively to the question are listed in Table 7. It is interesting to note that the most common source for learning about cancer was television (40%) with magazine publications second (20%). Physicians were reported as providing 12.5% of the sources of information on cancer.

Table 6

Frequency Distribution and Percentage of Subjects in Each Group Reported to Have Received Previous Information About Cancer

Previous Information About Cancer	Experimental		Control	
	No.	%	No.	%
Yes	11	47.8	9	81.8
No	12	52.2	2	18.2
Total	23	100.0	11	100.0

Table 7

Frequency Distribution and Percentages of Affirmative Responses Regarding Sources of Information on Cancer for Each Group

Data Category-- Information Sources	Experimental (n=11)		Control (n=9)		Total (n=20)	
	No.	%	No.	%	No.	%
Television	12	44.5	4	30.9	16	40.0
Magazines	5	18.5	3	23.0	8	20.0
Labor union	1	3.7	0	0.0	1	2.5
Company doctor	2	7.4	1	7.7	3	7.5
Company publications	2	7.4	3	23.0	5	12.5
Medical books	2	7.4	0	0.0	2	5.0
Relative in the medical field	1	3.7	0	0.0	1	2.5
Family doctor	2	7.4	0	0.0	2	5.0
Medical clinic	0	0.0	1	7.7	1	2.5
Newspaper	0	0.0	1	7.7	1	2.5
Total Sources	27	100.0	13	100.0	40	100.0

The last two questions on the Personal Data Sheet sought information on how often the respondents were receiving physical examinations, and what length of time would lapse between the discovery of a suspected cancerous lesion and the seeking of medical advice. Thirty-one of the 34 subjects answered the question on current trends in receiving physical examinations. Eighteen subjects (58.1%) indicated that they receive an examination at least every year. In the total sample, the most frequently occurring response was one year. Table 8 shows the frequency distribution and percentages of physical examinations for each group.

Table 8

Frequency Distribution and Percentages of Physical Examinations for Each Group

Frequency of Examination	Experimental		Control		Total	
	No.	%	No.	%	No.	%
Every 6 months	1	4.3	0	0.0	1	2.9
Every year	8	34.8	9	81.8	17	50.0
Every 2 years	11	47.9	1	9.1	12	35.4
Other	1	4.3	0	0.0	1	2.9
No response	2	8.7	1	9.1	3	8.8
Total	23	100.0	11	100.0	34	100.0

Of the 31 subjects who answered the question regarding when they would seek medical advice for a suspected cancer, 17 (54.8%) stated they would seek advice in one week or less, 6 in two weeks, and 2 within one month. Additionally, five of the six persons who wrote in the "other" category stated "immediately" as their response. The sixth person stated that "it depended on the growth."

Presentation of the Findings

After the completion of the Personal Data Sheet, the Pretest-Posttest Cancer Questionnaire (PPCQ) was administered to both groups and was scored according to the number of correct responses. There was a total of 27 possible responses, each counting one point if answered correctly. The scores for the experimental group ranged from 13 to 25 points on the pretest with a mean score of 19 points. On the posttest the experimental group scores ranged from 21 to 27 points with a mean score of 23.9. The control group completed the PPCQ only once with scores ranging from 8 to 24 points and a mean score of 18.7 points.

For the purpose of this study, the following hypotheses were tested:

H_{O_1}: Workers at risk of developing cancer will show no increase in knowledge of cancer facts following a cancer education program.

H_{1_1}: Workers at risk of developing cancer will show an increase in knowledge of cancer facts following a cancer education program.

The Wilcoxon Signed Rank Test was used to compare the pretest and posttest scores of the experimental group. The Wilcoxon test is a nonparametric test for matched samples and requires at least ordinal measurement.

Using this method of analysis, the null hypothesis was rejected at the $p = .001$ level of significance. Thus, there was a highly significant difference between the experimental group's pretest and posttest scores. It was concluded that workers at risk of developing cancer showed a significant increase in knowledge of cancer facts following a cancer education program.

H_{O_2}: There is no significant difference between the pre-program knowledge level of cancer facts among a group of workers at risk who received a cancer education program when compared with a group of workers at risk who do not receive the program.

H_{1_2}: There is a significant difference between the pre-program knowledge level of cancer facts among a group of workers at risk who received a cancer education program when compared with a

group of workers at risk who do not receive the program.

The Mann-Whitney U Test was used for the purpose of comparing the pretest scores of the experimental group with the test scores of the control group. The Mann-Whitney U is designed to determine whether two samples have been drawn from the same or a similar population. The independent groups need not have equal numbers of cases in order to use this powerful nonparametric statistical method. The Mann-Whitney U requires only ordinal measurement.

By this method of analysis, the null hypothesis was accepted at the $p = .699$ level of significance. Thus, it was concluded there was no significant difference between the experimental and control groups on level of knowledge prior to the cancer education program. Based on these results, the highly significant increase in the knowledge levels of the experimental groups can be attributed to the presentation of the cancer education program.

Summary

Determination of the level of knowledge of cancer facts among a selected group of workers at risk both before and after presentation of a cancer education program was one of the purposes of this study. The second purpose was to demonstrate that the increase in level of knowledge, as

measured by pre and posttesting, among the workers in the experimental group was the result of the cancer education program by comparison with a control group. The statistical analyses demonstrated a highly significant increase in the knowledge of cancer facts by the experimental group. Subsequently, it showed no significant difference between the pre-program knowledge levels of the experimental and control groups. Thus, it can be inferred that the increase in knowledge of cancer facts among a group of workers at risk who received a cancer education program was the result of the cancer education program.

CHAPTER 5

SUMMARY, CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

This study was conducted among a select group of workers in a chemical industry to determine the knowledge of cancer facts following a cancer education program. This chapter summarizes the study and discusses conclusions drawn from the empirical data, implications for nurses and other health professionals, and recommendations for future research.

Summary

The following question was addressed in this study: Does a cancer education program presented to a select group of workers at risk increase the workers' knowledge of cancer facts? The study was designed to determine if workers who received a cancer education program were more knowledgable of cancer facts following the presentation than a comparable group of workers who did not receive the program. The sample consisted of two groups of workers who were plant operators in areas where known or suspected carcinogenic agents were either manufactured or used. Purposive sampling was used in the selection of these

groups of workers. Participation in the study was voluntary. The nonrandom sample consisted of 23 subjects in the experimental group and 11 in the control group.

On the same day and in classroom settings, both the experimental and control groups completed the Personal Data Sheet and the Pretest-Posttest Cancer Questionnaire (PPCQ) which were developed by the researcher. The PPCQ was a fixed-alternative questionnaire which consisted of 17 factual statements about cancer and 10 physical signs and symptoms. The respondents identified whether the statements were true or false and selected from the list of signs and symptoms those that were considered to be early warning signs of cancer.

Upon completion of the pretest the subjects in the experimental group received a 30-minute program on cancer. At the end of the program they again completed the PPCQ. The control group received the cancer education program after completion of the study.

Nonparametric statistical methods were employed to compare the pre and posttest results of the experimental group and the pretest results of the experimental group with the test results of the control group (the control group completed the PPCQ only once). Two hypotheses were tested in the study. The findings were: (1) There was a

statistically significant increase in knowledge of cancer facts among the selected group of workers at risk who received the cancer education program, and (2) There was no significant difference between the pre-program knowledge level of cancer facts among a group of workers at risk who received a cancer education program when compared with a group of workers at risk who did not receive the program.

Conclusions

The following conclusions were drawn from the findings of this study. Workers, who by the nature of their work were at risk of developing cancer, demonstrated greater knowledge of cancer facts following an organized cancer-education program, as measured by the PPCQ, than they possessed prior to attending the program. Additionally, because the workers in the experimental group demonstrated no difference in scores on the pretest than the scores of the workers in the control group, it is inferred that their increase in knowledge was the result of the cancer education program.

The results of this study were not likely influenced by prior personal experience with cancer as indicated on the Personal Data Sheet. None of the subjects were currently being treated for cancer and only one subject reported having ever been treated for cancer. Of the total

sample, 38% reported a positive family history of cancer. It is also unlikely that the results were affected by the subjects receiving prior information on cancer since 47.8% of the subjects in the experimental group reported that they had received prior information while 81.8% of the control group responded positively to this question.

Twenty subjects from the total sample responded affirmatively when asked if they had received previous information about cancer. When subjects in both groups were asked to identify previous sources of cancer information, the most frequent source of information on cancer was television (40%). The next most common source was magazine publications (20%). Only 12.5% of the responses indicated health personnel as sources of information and these were either company or family physicians. Nurses were not listed as prior sources of information.

Two of the questions on the Personal Data Sheet addressed the subjects' frequency of obtaining physical examinations and the urgency of seeking medical advice if cancer is suspected. Although it is difficult to draw conclusions from these data, the results do elicit some interesting information. For example, prior to the educational program, 52.9% of all the study subjects were adhering to the then American Cancer Society recommendation

of annual physical examinations. Also 22 (71%) of the subjects indicated they would seek immediate (1 week or less) advice if they suspected cancer. These results may demonstrate the seriousness that these subjects feel about cancer. However, there was no attempt to measure these areas following the cancer-education program and any conclusions drawn from these two questions would be highly speculative.

The nonrandomization of the sample selection prevents any generalization of the results beyond the sample selected. Randomization, according to Campbell and Stanley (1968), is essential in assuring equivalence of groups initially, and studies employing nonrandom sampling techniques are categorized within the realm of what he calls quasi-experimental research. However, there are situations as noted by Campbell and Stanley (1968), Kerlinger (1973), and Selltiz, Wrightsman, and Cook (1976) when it is either not feasible or not desirable to randomly assign individuals to study groups. This study occurred within this realm because the workers were preassigned by groups to attend a scheduled safety program, and this study was conducted as a part of that program. The small number of subjects in the control group also must be considered when drawing conclusions from the study since,

according to Kerlinger (1973), the smaller the sample the greater the chance for error.

Implications

The findings of this research suggest implications for nurses in general practice and occupational health. The significant finding in this study is that a group of plant operators learned from a cancer education program designed specifically to meet learning needs of these workers.

The implication for nurses in general practice, especially in industrialized areas, is to become aware of the potential hazards associated with the clients' occupations and to assess their learning needs. Likewise, the occupational health nurse should be aware of the health education needs of the workers. The occupational health nurse should use principles of program planning in determining the most efficient and cost-effective means of disseminating information on health matters. Further consideration is needed regarding the planned use of public forms of media as an informative mechanism. One challenge of the occupational health nurse is to demonstrate to management the benefits of health programs. The nurse should use evaluative research techniques to validate the program

outcomes and consequently use the findings for appropriate program modification.

Additionally, the study has implications for any professionals who may present health information. The fact that this study demonstrated that knowledge of cancer facts was increased by the cancer education program, as measured by pre and posttesting, implies that other health programs should include the components of assessment and evaluation.

Recommendations

Based on the findings of this study, the following recommendations for further research are suggested:

1. This study should be repeated using a larger sample size with a proportionately larger control group.
2. The instrument should be further tested and improved to yield higher reliability results.
3. Replication studies should be conducted in various industries to determine if the findings are consistent.
4. If possible, a design which incorporates probability sampling techniques should be used so that the findings can be generalized beyond the sample.
5. Longitudinal studies should be conducted to show internalization of learning through changes in health behaviors.

6. Studies should be designed to compare alternative modes of health instruction for industrial workers in order to determine the most effective teaching methods.
7. Occupational health nurses and nurses in general should continue to do studies which evaluate health education programs in order to demonstrate the effectiveness of these programs.

APPENDIX A

PROGRAM OUTLINE

AN OVERVIEW OF CANCER FOR INDUSTRIAL WORKERS

Program Objectives

At the completion of the cancer education program the worker should be able to:

1. Distinguish between normal and abnormal cell growth.
2. Understand how cancer spreads within the host.
3. Distinguish between intrinsic and extrinsic causes of cancer.
4. Identify methods for determining carcinogenicity of an agent.
5. Relate the common sites of cancer in men and women.
6. Identify measures for the prevention of cancer.
7. Recall the seven warning signs of cancer.
8. Identify measures for detecting cancer.

Method of Instruction

Lecture with discussion

Introduction and Pretest	10 minutes
Presentation of content	30 minutes
Questions and answers	5 minutes
Posttest	10 minutes
Total	55 minutes

Topic Outline for Presentation

I. What is cancer?

A. Cancer defined

B. Normal cell growth

1. cell division
2. cell differentiation
3. cell regulation

C. Abnormal cell growth

1. benign
2. malignant

II. How does cancer spread?

A. Local extension (by infiltration)

B. Metastasis (by dissemination and colonization)

III. Where does cancer occur?

A. Incidence and common sites in men

B. Incidence and common sites in women

IV. What causes cancer?

A. Intrinsic (host factors)

1. Predisposition (hereditary)
2. Precancerous conditions

B. Extrinsic (environmental factors)

1. Carcinogens defined
2. Methods of determining carcinogenicity
   a. Ames test
   b. animal studies
   c. epidemiology
3. Concept of dose-response
4. Life style as a factor
   a. tobacco
   b. alcohol
   c. ultraviolet radiation

d. diet
e. others (drugs, sexual habits, viruses)

5. Occupational hazards as a factor
   a. chemicals
      (examples: vinyl chloride, benzene)
   b. metals
      (examples: arsenic, cadmium)
   c. dusts and fibers
      (examples: asbestos, cotton dust)
6. Air pollution as a factor
7. Synergistic effects of some life style factors with occupational exposures
8. Latency period in the formation of extrinsically-induced cancer
9. Concept of multicausation

V. How can cancer be prevented?

A. Alterations in life style

1. Stop Smoking programs
2. Protection from ultraviolet radiation

B. Workplace controls

1. Government's role: Toxic Substances Control Act of 1976, OSHA and NIOSH
2. Industry's role: (1) substitution, (2) engineering controls, (3) personal protection measures, and (4) health surveillance.
3. Worker's role: keeping informed and following correct work practices.

VI. How is cancer detected?

A. Warning signs of cancer

B. Self-examination

C. Screening of high-risk individuals

1. Pap smear
2. sputum cytology
3. medical surveillance in industry
4. regular physical examinations

D. Means of diagnosis

1. Laboratory tests
2. Examination of tissue (biopsy)

VII. What services for the prevention and detection of cancer are available through your company's medical department?

A. Annual Multiphasic Health Screening Examination

B. Computerized analysis of the health history and total examination to detect changes from the previous examination

C. Medical surveillance for asbestos, vinyl chloride, benzene, isopropanal, pyrolysis fuel oil, diethyl sulfate, and ethylene dichloride

D. Qualified nursing staff member for conducting a smoking cessation program

E. Physicians and nurses available for information regarding cancer and cancer information resources

APPENDIX B

APPROVAL FORMS AND INFORMED CONSENT

TEXAS WOMAN'S UNIVERSITY
HOUSTON CAMPUS
HUMAN RESEARCH REVIEW COMMITTEE
REPORT

STUDENT'S NAME Linda L. Marley

PROPOSAL TITLE Knowledge of Cancer among Workers following an Educational Program

COMMENTS:

DATE: February 15, 1980

Jane G. Robertson
~~Disapprove~~ Approve

Foley Myers
~~Disapprove~~ Approve

Laura L. Smith
Disapprove Approve

Donna Kelly
Disapprove Approve

ls

TEXAS WOMAN'S UNIVERSITY
COLLEGE OF NURSING
DENTON, TEXAS 76204

DALLAS CENTER
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DALLAS, TEXAS 75235

HOUSTON CENTER
1130 M. D. ANDERSON BLVD.
HOUSTON, TEXAS 77025

AGENCY PERMISSION FOR CONDUCTING STUDY*

THE [redacted]

GRANTS TO Linda L. Marley
a student enrolled in a program of nursing leading to a Master's Degree at Texas Woman's University, the privilege of its facilities in order to study the following problem:

Knowledge of Cancer Among workers Following an Educational Program

The conditions mutually agreed upon are as follows:

1. The agency ~~(may)~~ (may not) be identified in the final report.
2. The names of consultative or administrative personnel in the agency ~~(may)~~ (may not) be identified in the final report.
3. The agency (wants) ~~(does not want)~~ a conference with the student when the report is completed.
4. The agency is (willing) ~~(unwilling)~~ to allow the completed report to be circulated through interlibrary loan.
5. Other _____

Date: 3/5/80

[redacted]
Signature of Agency Personnel

Linda L Marley
Signature of Student

Mary E. Benedict
Signature of Faculty Advisor

* Fill out and sign three copies to be distributed as follows: Original-Student; First copy - agency; Second copy - TWU College of Nursing.

GP:GEN 13
07026074 cd

CONSENT FORM
TEXAS WOMAN'S UNIVERSITY
HUMAN SUBJECTS REVIEW COMMITTEE

Title of the Project: Knowledge of Cancer Among Workers Following an Educational Program

Consent to Act as a Subject for Research and Investigation:

I have received an oral description of this study, including a fair explanation of the procedures and their purposes, any associated discomforts or risks, and a description of the possible benefits. An offer has been made to me to answer all questions about the study. I understand that my name will not be used in any release of the data and that I am free to withdraw at any time. I further understand that no medical service or compensation is provided to subjects by the university as a result of injury from participation in research.

_____ _____
Signature Date

_____ _____
Witness Date

Certification by Person Explaining the Study:

This is to certify that I have fully informed and explained to the above named person a description of the listed elements of informed consent.

Linda L Marley 3/5/80
Signature Date

_____
Position

_____ _____
Witness Date

APPENDIX C

QUESTIONNAIRE PACKET

PERSONAL DATA SHEET

This is a confidential questionnaire. Do not include your name on the form.

I. Please respond to the following statements by placing the requested information in the blank spaces.

1. Age _____

2. Sex_____

3. Race_____

4. Highest grade level completed in school_____

5. How long have you worked as an operator?_____

6. How long have you worked in your present location in this plant?_____

7. Have you previously received information regarding cancer? _____ If answer is yes, list your sources of information._____
(example: TV, magazines, labor union, company doctor or company publications)

II. Please place a check in the blank space which most closely identifies your response.

1. Are you presently being treated for cancer? ___ yes
___ no

2. Have you ever been treated for cancer? ___ yes
___ no

3. Has anyone in your family been treated for cancer?

___ yes

___ no

4. How often do you have a complete physical examination?

_____ every 6 months

_____ every year

_____ every 2 years

_____ other, please specify _____

5. If you were to develop a health problem such as a growth which you suspected might be cancer, how long would you wait before seeking advice from a physician?

_____ one day

_____ one week

_____ two weeks

_____ one month

_____ other, please specify _____

THE PPCQ--PRETEST-POSTTEST CANCER QUESTIONNAIRE

An Overview of Cancer for Industrial Workers

Part I

Directions: Circle TRUE, FALSE or UNSURE for each of the following statements. Please answer every question.

1. Cancer is defined as a group of diseases where there is uncontrolled and disordered growth of abnormal cells. TRUE FALSE UNSURE

2. Cancer is the leading cause of death in the United States today. TRUE FALSE UNSURE

3. Benign tumors are abnormal growths of cells which do not invade surrounding body tissues. TRUE FALSE UNSURE

4. If cancer cells break off and are carried to other parts of the body, this is called metastasis. TRUE FALSE UNSURE

5. If someone in your family has cancer, you can "catch" it from him. TRUE FALSE UNSURE

6. Overexposure to sunlight is a major cause of skin cancer. TRUE FALSE UNSURE

7. Exposure to potential cancer-causing agents at work accounts for the largest percentage of cancers caused by man's environment. TRUE FALSE UNSURE

8. If two men work with the same chemical for the same number of years and one man develops cancer, the other man will also develop cancer. TRUE FALSE UNSURE

9. Cancer of the uterus (womb) is the number one cause of cancer in women. TRUE FALSE UNSURE

10. Cancer of the lungs is the number one cause of cancer in men. TRUE FALSE UNSURE

11. Laboratory tests on bacteria are more accurate for predicting which substances may produce cancers in humans than are animal studies. TRUE FALSE UNSURE

12. When a select group of workers is studied to see who developed a disease and who did not, this is called an epidemiologic study. TRUE FALSE UNSURE

13. Most of the people who are diagnosed as having lung cancer can be cured if treated early. TRUE FALSE UNSURE

14. Industry management should try to control exposures of workers to harmful substances by first trying to replace the harmful substance with an agent which is not believed harmful. TRUE FALSE UNSURE

15. The primary purpose of medical surveillance programs in industry is to offer all employees a free annual physical examination. TRUE FALSE UNSURE

16. Protective equipment worn by the worker will not be helpful in preventing exposures to potential cancer-causing agents. TRUE FALSE UNSURE

17. The American Cancer Society recommends that each person have a physical examination once a year. TRUE FALSE UNSURE

Part II

Directions: Circle the letters which indicate early warning signals of cancer as indicated by the American Cancer Society.

a. change in bowel or bladder habits

b. unusual bleeding or discharge

c. loss of hair

d. indigestion or difficulty in swallowing

e. difficulty in breathing

f. a sore that does not heal

g. nagging cough or hoarseness

h. obvious change in a wart or a mole

i. painless sore on the sex organs

j. thickening or lump in the breast or elsewhere

APPENDIX D

CONTENT VALIDITY

18290 Upper Bay Rd. #43
Houston, Texas 77058

I am currently in the process of developing a cancer education program for industrial workers as part of a research project. This research will fulfill the requirement for a Master of Science Degree from Texas Woman's University.

As an expert in the field of health education and/or cancer, I am requesting that you participate on a committee of experts to establish content validity for my research instrument. The instrument is the PPCQ--Pretest-Posttest Cancer Questionnaire. It consists of 15 factual statements about cancer, and a list of signs and symptoms from which the subject must select the seven warning signs of cancer.

Copies of the instrument and content outline are attached. Please critique each item in the instrument for accuracy of content, choice of words, and clarity of statement. Comments may be made directly on the attached copy. When you have completed your review, please return the instrument with comments in the enclosed, pre-addressed envelope.

Thank you for assisting me with this research.

Sincerely,

Linda L. Marley

Linda L. Marley, R.N., B.S.N.

LIST OF REFERENCES

American Cancer Society. Stop smoking program guide. Smoking Education Project, California Division of the American Cancer Society, 1971.

American Cancer Society. A cancer source book for nurses. New York: The Author, 1975. (a)

American Cancer Society. Teaching about cancer. New York: The Author, 1975. (b)

American Cancer Society. Cancer facts for men. New York: The Author, 1977. (a)

American Cancer Society. Cancer facts for women. New York: The Author, 1977. (b)

American Cancer Society. Cancer facts & figures. New York: The Author, 1979. (a)

American Cancer Society. What everyone should know about cancer. Greenfield, Mass.: Channing L. Bete Co., 1979. (b)

Anderson, C. M., Isom, R. N., Williams, K., & Zimmerman, L. J. (Eds.). The proceedings of a conference for workers on job-related cancer. Houston, Tx.: Department of Community Medicine, University of Texas Medical School, 1979.

Ashford, N. A. Crisis in the workplace: Occupational disease and injury. Cambridge, Mass.: The MIP Press, 1976.

Berenblum, M. D. Established principles and unresolved problems in carcinogenesis. Journal of the National Cancer Institute, 1978, 60(4), 723-726.

Bjurstrom, B. A., & Alexiou, N. G. A program of heart disease intervention for public employees. Journal of Occupational Medicine, 1978, 20(8), 521-531.

Blum, H. L. Planning for health. New York: Human Sciences Press, 1974.

Braum, A. C. The biology of cancer. Reading, Mass.: Addison-Wesley Publishing Co., 1974.

Brown, M. L. Nursing in occupational health. Public Health Reports, 1964, 79(11), 967-972.

Brown, M. L. The profile of occupational health nursing. In M. L. Brown & G. R. Neff (Eds.), Fundamentals of occupational health nursing. Cincinnati: Department of Health, Education, and Welfare, 1974.

Califano, J. A. Surgeon General's report on smoking and health. Reprint from the original by the American Cancer Society, January 11, 1979.

Cambridge Reports Inc. An analysis of public and worker attitudes toward carcinogens and cancer risk. (Prepared for Shell Oil Company.) April, 1978.

Campbell, T., & Stanley, J. C. Experimental and quasi-experimental designs for research. Chicago: Rand McNally College Publishing Co., 1963.

Cassuto, J. Statement to the President's Committee on Health Education. Journal of Occupational Medicine, 1972, 14(8), 630-631.

delRegato, J. A., & Spjut, H. Acherman & delRegato's cancer: Diagnostis, treatment and prognosis (5th ed.). St. Louis: C. V. Mosby, 1977.

Dinman, B. D. The nature of occupational cancer. Springfield, Ill.: Thomas Books, 1974.

Felton, J. S. Health education--a responsibility of the occupational health professional. Journal of Occupational Medicine, 1977, 19(5), 346-350.

Fink, D. Objectives of the conference. In C. M. Anderson, R. N. Isom, K. Williams, & L. J. Zimmerman (Eds.), The proceedings of a conference for workers on job related cancer. Houston, Tx.: Department of Community Medicine, University of Texas Medical School, 1979.

Finn, P. Integrating occupational health and safety into the health education classroom. Health Education Monographs, 1978, 6(3), 312-331.

Fraumeni, J. F. (Ed.). Persons at high risk of cancer: An approach to cancer etiology and control. New York: Academic Press, 1975.

Goldstein, D. H. The Occupational Safety and Health Act of 1970. American Journal of Nursing, 1971, 71(8), 1535-1538.

Green, L. W., & Figá-Tdlamanca, I. Suggested designs for evaluation of patient education programs. Health Education Monographs, 1974, 2(1), 54-70.

Heyden, S. How one firm helps its employees fight cancer. Occupational Health and Safety, 1978, 47(6), 46-48.

Hilgard, E. R., & Bower, G. H. Theories of learning (4th ed.). Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1975.

Homewood, J. V. The role of the occupational health nurse in education within the occupational health team. Occupational Health Nursing, 1976, 24(1), 28-29.

Kerlinger, F. N. Foundations of behavioral research (2d ed.). Dallas: Holt, Rinehart, & Winston, Inc., 1973.

Key, M. M. (Ed.). Occupational diseases: A guide to their recognition. (DHEW-NIOSH Pub. No. 77-181.) Washington, D.C.: U.S. Government Printing Office, 1978.

Knowles, M. The adult learner: A neglected species (2d ed.). Houston: Gulf Publishing, 1978.

Kruse, L. C., Reese, J. L., & Hart, L. K. (Eds.). Cancer: Pathophysiology, etiology and management. St. Louis: C. V. Mosby Co., 1979.

Lassiter, D. V. Occupational carcinogenesis. In H. F. Kraybill & M. A. Mehlman (Eds.). Environmental cancer: Advances in modern toxicology (Vol. 3). Washington: Hemisphere Publishing Corporation, 1977.

Lee, J. A. The new nurse in industry. (DHEW Pub. No. 78-143.) Washington, D.C.: U.S. Government Printing Office, 1978.

Lehman, P. E., & Boland, B. M. Cancer and the worker. New York: The New York Academy of Sciences, 1977.

Markolf, A. S. Industrial nursing begins in Vermont. In B. McGrath. Fifty years of industrial nursing in the United States. Public Health Nurse, 1945, 37(3), 125-129.

Mehrens, W. A., & Lehmann, I J. Measurement and evaluation in education and psychology (2d ed.). Dallas: Holt, Rinehart, & Winston, 1978.

Moses, M. Cancer and the workplace. American Journal of Nursing, 1979, 79(11), 1985-1988.

National Institute for Occupational Safety and Health. Effects of smoking and the occupational environment. (DHEW-NIOSH Pub. No. 79-122.) Cincinnati: NIOSH Publications Dissemination, February 5, 1979.

Public Law 91-596, 91st Congress, S. 2193, December 29, 1970 cited as "Occupational Safety and Health Act of 1970."

Rawson, R. Cancer in the workplace. In C. M. Anderson, R. N. Isom, K. Williams, & L. J. Zimmerman (Eds.), The proceedings of a conference for workers on job-related cancer. Houston, Tx.: Department of Community Medicine School, 1979.

Redman, B. K. The process of patient teaching in nursing (3d ed.). St. Louis: The C. V. Mosby Company, 1976.

Reynolds, W. B. Health education for the diabetic. Occupational Health Nursing, 1978, 26(9), 7-14.

Rosenstock, I. M. Why people use health services. Milbank Memorial Fund Quarterly, 1966, 64(part 2), 94-127.

Schottenfeld, D., & Haas, J. F. The workplace as a cause of cancer--Part I. Clinical Bulletin, 1978, 8(2), 54-60. (a)

Schottenfeld, D., & Haas, J. F. The workplace as a cause of cancer--Part II. Clinical Bulletin, 1978, 8(3), 107-119. (b)

Selikoff, I. J. Cancer in the workplace. In C. M. Anderson, R. N. Isom, K. Williams, & L. J. Zimmerman (Eds.). The proceedings of a conference for workers on job-related cancer. Houston, Tx.: Department of Community Medicine, University of Texas Medical School, 1979.

Selltiz, C., Wrightsman, L. S., & Cook, S. W. Research methods (3d ed.) Dallas: Holt, Rinehart & Winston, 1976.

Suchman, E. A. Evaluating educational programs. The Urban Review, 1969, 3(4), 48-53.

Surveys of Public Health Nursing. (DHEW Pub. No. (HRA)76-8) Bethesda, Md.: USDHEW, Division of Nursing, November, 1975.

Thomas, T. L., Decoufle, P., & Monre-Eraso, R. Mortality among workers employed in petroleum refining and petrochemical plants. Journal of Occupational Medicine, 1980, 22(2), 97-103.

Tinkham, C. W. Occupational health nursing in the 1980s. Occupational Health Nursing, 1977, 25(6), 7-13.

Wagner, M., Bryant, N. H., & Bauer, R. B. Industrial health education in Morristown, N.J. Public Health Reports, 1976, 91(3), 273-274.

Ware, B. G., & Marcus, E. L. Occupational health education and cancer: Current status. A paper presented at the National Cancer Institute's planning workshop; Bethesda, Md., February, 1979.

Wear, R. F., Cox, M. E., & Lento, H. G. An atherosclerosis prevention program. Journal of Occupational Medicine, 1975, 17(5), 295-303.

Wynder, E. L. Environmental carcinogenesis. Clinical Bulletin, 1978, 8(1), 3-9.