

EFFECTIVENESS OF A MULTIMEDIA APPROACH IN THE PREVENTION OF
IRON DEFICIENCY ANEMIA FOR PARENTS OF PRESCHOOL CHILDREN

by

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TABLE OF CONTENTS

	Page
LIST OF TABLES	vi
LIST OF ILLUSTRATIONS	vii
ABSTRACT	viii
CHAPTER	
1. INTRODUCTION	1
Purpose of Study	3
Significance of the Study	3
Prevalence	3
Adverse Effects of Iron Deficiency Anemia	5
Dietary Implications	6
Iron Requirements for Preschool Children	6
Absorption	6
Definitions	7
Hypotheses	8
Limitations	8
2. SELECTED REVIEW OF LITERATURE	10
Iron Deficiency Anemia	10
Role of the Nurse as a Patient Educator	11
Summary	19
3. METHODOLOGY	20
Selection of Teaching Strategy	20
The Measurement Instruments	21
Family Information Form	22
Data Collection Instrument	22
Population, Sample, Setting	23
Method of Data Collection	24
Data Analysis	25
4. ANALYSIS AND INTERPRETATION OF DATA	27
Characteristics of the Sample	27
Characteristics of Parents	27
Characteristics of Children	30

TABLE OF CONTENTS--Continued

	Page
Findings Related to the First Hypothesis	30
Findings Related to the Second Hypothesis	36
Meat Group Category	38
Fruit and Vegetable Category	41
Bread and Cereal Category	42
Milk Category	43
Discussion of Data Related to Iron Deficiency	
Anemia	43
5. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS	49
Conclusions	50
Recommendations	52
APPENDIX A. FAMILY INFORMATION FORM	53
APPENDIX B. PRETEST-POSTTEST FORM	54
APPENDIX C. FLYER	56
SELECTED BIBLIOGRAPHY	57

LIST OF TABLES

Table	Page
1. Pretest-posttest comparison of correct responses related to the iron content of five foods in the meat category	32
2. Pretest-posttest comparison of correct responses related to the iron content of six foods in the fruit-vegetable category	33
3. Pretest-posttest comparison of correct responses related to the iron content of four foods in the bread cereal group	34
4. Pretest-posttest comparison of correct responses related to the iron content of five foods in the milk group	35
5. Raw scores of pretest and posttest comparisons, group mean percentages, and per cent of change in subject's ability to categorize food according to basic food groups	39
6. Pretest and posttest comparison scores on questions related to symptoms of iron deficiency anemia	45

LIST OF ILLUSTRATIONS

Figure	Page
1. Ages of the 18 parents completing questionnaire related to the content of iron in selected foods	28
2. Educational level of 18 parents responding to the questionnaire related to the content of iron in selected foods	29
3. Pretest-posttest comparison of correct responses related to the iron content of each of the four food group categories	37

ABSTRACT

This study was designed to explore the effectiveness of using a 16 millimeter 15 minute, sound color film to instruct parents concerning the relationship of diet to iron deficiency anemia in the preschool child. The data were collected by use of an objective test which was administered before and after viewing the instructional film

The sample consisted of eighteen parents who had a child enrolled in a preschool program in a metropolitan area. The participants were administered a pretest and posttest reflecting the following areas of content: food sources of iron, identification of food according to basic food groups, and the definition and symptoms of iron deficiency anemia.

It was hypothesized that following the viewing of the film parents would show an increase in their knowledge of food sources of iron and increase their ability to categorize foods according to basic food groups. Comparison of pretest and posttest scores indicated a significantly greater accuracy in the identification of foods that are high and low in iron content and greater ability to categorize foods according to basic food groups.

It was concluded that use of the selected film for teaching parents of preschoolers was an effective method to increase their knowledge of food sources of iron and their ability to categorize food into the basic food groups.

CHAPTER 1

INTRODUCTION

For many years, the nursing profession has recognized and accepted the responsibility of its members for client health education. Teaching activities reported by 1500 professional nurses were described by Pohl (1965). Nurses, in the study, most frequently engaged in the instruction of patients in one or more of the following content areas: causes of disease, complications, prevention of illness, objectives of nursing care, treatment procedures, diet, maintenance of health, and services offered by community agencies. The highest incidence of patient teaching activities occurred among nurses employed in community health nursing.

The patient and his family are often responsible for a major portion of his health care. Following a visit to the physician's office or a clinic, the patient is expected to administer his own medications on time and in the right amounts, recognize complications, and apply the principles of health maintenance. The outcome of therapy is dependent upon how well the patient functions over a period that may span several weeks or months. Lack of patient and family involvement in development of a treatment plan or understanding of what is expected from a plan can result in a total disregard of the physician's orders. Preparation of the patient and his family for informed involvement is the responsibility of all health professionals.

Prevention through education has been the role of community health nursing from the beginning. Community health nursing, as described by Reinhardt (1973) refers to a health service that is continuous, comprehensive, coordinated, and is dedicated to providing health care and promoting wellness for families, groups, and individuals in whatever setting they can be found. In 1886, this service was most frequently provided in the patient's home and involved providing required nursing care, preparing meals for the patient and his family, and providing health education through demonstration. This teaching by example has continued to be a highly effective method of presenting facts in an environment conducive to learning.

Until recently, a one-to-one type of instruction with the use of an occasional picture was the method most frequently used by public health nurses. Advances in technology now provide the nurse with new tools to meet the learning needs of our rapidly changing society. The learning environment need no longer be the individual patient or family receiving one-to-one demonstrations in their home. Clients, either in a clinic or in a special interest group, often have similar learning needs. Identification of these learning needs and selection of a method of presentation to best meet these needs offers a solution to the problem of providing health education to the greatest number of recipients.

A learning need that was identified by this nurse researcher was the lack of parental knowledge regarding the role of diet in prevention and treatment of iron deficiency anemia. The teaching approach selected was the presentation of a 16 millimeter movie with specific content

selected to influence the parents' knowledge of diet related to iron deficiency anemia in the preschool child.

Purpose of Study

The purpose of this study was to determine if a selected color film approach to learning would increase parents' knowledge of food sources of iron as well as improve their ability to categorize foods according to basic food groups as reflected in needs of their preschool children.

Significance of the Study

Prevalence of the condition of iron deficiency anemia, as well as the adverse effects and dietary implications are discussed. The geographic incidence of iron deficiency anemia among preschoolers as well as the physical effects of this condition and the importance of diet are presented.

Prevalence

A major health problem among preschool children is iron deficiency anemia. It is prevalent worldwide, as well as locally. Data compiled by the World Health Organization (1972) indicated iron deficiency anemia to be of high incidence among preschoolers. It was acknowledged that lack of comparable data among countries cause specific statistics to be unavailable.

Owen, Nelsen, and Garry (1970) illustrated, in a study of 5,000 preschool children from 15 different states and four categories of income, that the incidence of iron deficiency anemia is a problem in the

United States. Owen et al.'s study found that six to eight per cent of the children surveyed were anemic and 45 to 52 per cent had low iron levels. Findings were comparable regardless of socioeconomic status.

Iron deficiency anemia among preschoolers has also been documented as a problem in the state of Arizona. Anemia was reported in 19.2 per cent of the 4,231 children screened by the statewide Women, Infant and Children (WIC) Supplemental Feeding Program (Annual Report Women, Infant and Children, 1973). The Education and Intervention Program in five northern Arizona counties reported 32 per cent of the 2,000 children screened in 1973 were anemic as reflected in the Annual Report, Arizona State Department of Health Nutrition Section.

Maricopa County, Arizona, where this study was conducted, was also found to have a high incidence of anemia among preschoolers. The Headstart Annual Report (1974) indicated a 13 per cent incidence of anemia in a screening of 681 preschoolers in Maricopa County.

The scope and seriousness of iron deficiency anemia is best demonstrated by considering the consequences resulting from the presence of this condition in children. The number of preschoolers with iron deficiency anemia, as shown by these studies, indicates the need for improved methods to disseminate nutritional information. These improved methods for instruction could be utilized in several settings where parents of preschool children are found in natural groupings. Settings include well child clinics, pediatrician offices, head start parents meetings, and preschool parents groups.

Adverse Effects of Iron Deficiency Anemia

The chief symptoms of iron deficiency anemia, as listed by Weinstein and Beatler (1962) are fatigue, increased irritability, and decreased resistance to infection. Guest and Brown (1957) discussed the tendency for moderate anemia to become severe in the presence of infection. They also stated life threatening complications occur when severe anemia is present. DeSilva and Baptist (1969) demonstrated radiologically bone thinning in the skulls of children with low iron levels. The effect of anemia on the gastric mucosa causing occult blood loss and intensifying the severity of the anemia was observed by Shumway (1972).

As observed and demonstrated by researcher, anemia may affect almost any system of the body. MacBryde, and Blacklow (1970) and Guyton (1971) described symptoms affecting the integumentary, cardiovascular, gastrointestinal, and neurological systems. Symptoms manifested in some of these systems can be recognized by an informed and observant parent. Parents can be taught to observe for symptoms which include increased irritability, fatigue, apathy, decreased resistance to infection, and an increase in the number and severity of complications. Skin pallor, the neurological symptoms of headache, fainting, and dizziness, as well as the gastrointestinal symptoms of nausea, vomiting, dysphagia, and anorexia can also alert parents for the need of professional evaluation of these common symptoms of iron deficiency anemia.

Dietary Implications

Iron requirements are greatest during the rapid growth of preschool children (Dallman, 1977). During this period, the body's stores of iron decrease with a compensatory increase in iron absorption. The magnitude of the compensatory response is directly related to the type of food eaten. The proper combination of food can also enhance iron utilization. Despite food fortification and use of medicinal iron supplements, a diet consisting of food from each of the four basic food groups provides the greatest measure of protection against iron deficiency anemia.

Iron Requirements for Preschool Children

The Food and Nutrition Board of the National Academy of Sciences National Research Council (1973) set the Recommended Dietary Allowance (RDA) of iron. The daily allowance is based on a 10 per cent absorption rate. Preschoolers ages one to three require 15 milligrams (mg) and four to six year olds require 10 milligrams (mg) of iron daily. Iron poisoning has occurred with an overdose of supplemental iron while there is only a remote possibility of an overdose of dietary iron. A lethal dose of iron is 200 to 250 mg per kilogram of body weight and would require ingestion of over six pounds of beef liver by a 10 kilogram or 22 pound child within a 24 hour period.

Absorption

The amount of iron absorbed by the body depends both on the total amount in the diet and the percentage available for absorption.

Children who are iron deficient absorb food iron more efficiently (Schultz and Smith, 1958). A 10 per cent absorption can be expected from milk, chicken liver, and iron supplemental cereals, but the ingestion of milk with doses of ferrous sulfate (30 mg) inhibits the absorption of iron. A technical report of the World Health Organization "Nutritional Anaemias" (1972) indicated that 20 per cent of the iron in meat and fish products is absorbed as compared to only 10 per cent in maize and wheat. Not all sources of dietary iron are calculated in the nutritional analysis studies, which are the basis for food composition tables (Moore, 1965). Among those sources not calculated are drinking water and iron absorption as a result of using iron cookware.

Definitions

For the purpose of this study, terms were defined as follows:

1. Anemia: A condition in which the hematocrit is less than 33 milliliter per cent for a child under 18 months of age and less than 36 milliliter per cent for a child over 18 months of age.
2. Effectiveness: Increase in factual knowledge as measured by pre- and posttest instrument.
3. Hematocrit: Measurement of the concentration of red blood cells (RBC) in a given volume of blood, expressed as a volume of RBC's/100 milliliter blood (Frankel, Reitman, and Sonnenwirth, 1970).
4. Iron: Source iron which is nutritionally available to the body.

5. Learning: A process of interaction between a person and his environment that reflects a change of behavior which may or may not persist (Gagne, 1965).
6. "Liver is Not the Only Way": 15 minute, 16 millimeter color, sound motion picture (LeMay, 1973).
7. Preschool child: A child who is between the ages of one year and six years.

Hypotheses

The following hypotheses were tested in this study:

1. Following the viewing of a film, "Liver is Not the Only Way," the parents of preschool children will show a significant increase in their knowledge of food sources of iron.
2. Following the viewing of a film, "Liver is Not the Only Way," the parents of preschool children will show a significant increase in their ability to categorize foods according to basic food groups.

Limitations

1. The validity of the data was no more accurate than the written responses given by the participants.
2. No attempts were made to measure the retention of learning over a period of time.
3. No attempt was made to control for the participants' educational level.

Iron deficiency anemia among preschoolers is recognized as a worldwide problem and is prevalent in Arizona. Adverse effects of this condition threaten both the physical and mental development of children of this age group. Diet has been established as the best available means for preventing and treating iron deficiency anemia. Recognition and use of available food sources of iron, by concerned informed parents, offers the best defense against iron deficiency anemia in preschoolers. Teaching programs for use by the community health nurse in the contact with families and groups provides a systematic approach to increasing the nutritional knowledge of parents that can then be directed toward reducing the incidence of this condition. Groups can be contacted in the various settings such as well child clinics, pediatricians' offices, and parent groups for preschool children.

CHAPTER 2

SELECTED REVIEW OF LITERATURE

The review of literature focused on iron deficiency anemia, and the role of the nurse as a patient educator. Selection of the material emphasized the preschool child, parents as teachers, and the subject of nutrition.

Iron Deficiency Anemia

Experts in the field have studied the incidence of iron deficiency anemia among preschool children and the effects of diet in the control of this condition. MacBryde (1970) found iron deficiency anemia to be the most common cause of anemia in nontropical countries. Improper diet is a common cause of iron deficiency anemia. MacBryde concluded that correction of this underlying cause of the anemia could restore the patient to good health.

Haddy and others (1974) studied 79 infants and children from four months to five years of age during a three month screening program. One third of the children were found to have iron deficiency anemia. A twenty-four hour food intake history was used to evaluate the adequacy of dietary iron intake. Researchers were able to determine the presence or absence of iron deficiency anemia by evaluating the patients' intake of dietary iron.

Hematologists Brigety and Pearson (1970) studied 532 anemic children to determine the effects of dietary iron supplementation on

hematocrit levels. More than 95 per cent of the four and one half to six and one half year old participants were Negro and all were from poverty level households. The participants were divided into two separate and distinct groups and were studied for a period of five weeks. Children in the first, or control, group received two planned meals per day calculated to provide 25 mg of iron per week. In addition to the diet, the children in the second, or experimental, group received enough supplemental iron to raise their total iron to 175 mg per week. The hematocrit level of each child was measured before beginning the study and again upon completion of the five week study period. Significant anemia was defined as a hematocrit of less than 32 per cent. No child in either group had a value less than 32 per cent at the end of the program. Brigety and Pearson concluded diet was as effective in correcting significant anemia as diet plus iron.

Dillon (1975) initiated a one year nutrition program in the Model Cities area of Chicago which has a population of approximately 101,000. The children studied did not receive sufficient amounts of food from the basic food groups. Seventy-five per cent of the diets were lacking in foods high in iron, ascorbic acid, vitamin A, and calcium. Meals tended to be high in fats and carbohydrates. Anemia was found to be widespread among children between the ages one to five.

Role of the Nurse as a Patient Educator

Early English leaders in nursing in the middle and late nineteenth century saw the importance of teaching families about sanitation,

cleanliness, and the care of the sick. Those efforts to teach represented a way of extending the nurse's services.

Statements by the National League of Nursing Education as early as 1918 reflected concern with preparing nurses for teaching tasks. They indicated that ordinary training was limited because it dealt mainly with disease, neglecting almost entirely the preventive and educational factors essential to many branches of public health work.

Experts in the field recognize patient education as an integral part of nursing. The nurse's contribution, whether in the hospital, clinic, or home is viewed as an essential component of successful educational efforts.

Redman (1971) concluded that the complexities of health care and the necessity of the initiation, participation, and independent functioning of patients over long periods of time require an educational function in nursing. Redman viewed teaching as a highly versatile tool that can be used in all four modes of nursing intervention--to prevent, promote, maintain, and modify a wide variety of behaviors in a receptive individual or group.

Ujhely (1968) viewed teaching as a part of the general goal of nursing--to help patients strengthen themselves through strengthening role performance. This included support during role change initiated by growth and development and transition between health, sick, and handicapped roles.

Aiken (1970) recognized teaching as an integral part of the nurse's role. Patient teaching is viewed as a dynamic process that must begin with an assessment of patient problems, and becomes a continuous

process of helping patients cope with difficulties in their environment. Aiken believes each staff nurse must assume an individual responsibility for initiating teaching plans and must broaden her own perception of patient teaching to recognize that patient problems are problems in learning.

Shaw (1973) found a growing number of hospitals include patient education as part of hospital treatment. Shaw identified the contribution of nurses as the most important component of successful patient education programs. She also found the present commitment to patient teaching as distinctly different from those nursing skills used in the past.

Adamson (1970) found nurses prepared to give direct service to clients because of the altruistic satisfaction derived from the realization that they had given help to someone in need. Adamson recognized that this background of close therapeutic relationships with patients plus a facility for observation and comprehension made nurses valuable as health consultants. To assume the teaching role of the consultant, nurses must be prepared to shift their emphasis from direct care.

Rosen (1971) found education of the public a routine function of public health agencies. Nurses in such agencies accepted the responsibility for health education and viewed it as an essential part of service to clients.

An investigation was undertaken by Pohl (1965) to obtain information which could be used to describe the present teaching role of practicing nurses. A questionnaire was mailed to registered nurses who were members of the American Nurses Association. The total sample

study included 1,818 cases from which 1,500 returns were received. The findings indicated nurses were aware of teaching as one of their responsibilities but that there was no clear concept of the role. The obstacles to teaching which respondents mentioned most frequently were lack of time, heavy work load and inadequate staffing, and inadequate preparation for teaching. However, public health nurses were associated consistently with high teaching activity.

Researchers have demonstrated the benefit of nurses to providing educational experiences for patients. Patients studied were more cooperative and showed less anxiety than those who did not have the benefit of a teaching protocol.

A program entailing visiting kindergartens was initiated by nurses, Abbott, Hansen, and Lewis (1970) to orient well children to hospitals. Seventy-six of the 239 children oriented were admitted to hospitals. Children receiving orientation displayed less anxiety, seemed more familiar with their environment, and were generally more cooperative than children who did not receive this service.

The need to teach large numbers of arthritic adults about their disease and how to cope so they might live more comfortable and useful lives was recognized by Valentine (1970). Valentine developed a multidisciplinary program for 18 patients selected from the arthritic clinic at St. Luke's Hospital, Cleveland, Ohio. The results showed that patients understood the significant points of the material presented and benefited from additional knowledge of nutrition, physical therapy, and the disease. Diet plays an important role in the prevention and treatment of iron deficiency anemia. The need for nutritional education has

been identified as a major problem in all areas of health care. The nurse as a provider of care can include nutritional education as a part of the patient education program.

The community health nurse also has a vital responsibility to disseminate health information to families of patients. When the patients or potential patients are children, the nurses must provide the parents with information that will assist them in recognizing and preventing illness in their children.

The President's Task Force on Patient Education (1974) surveyed the value of including families in all phases of the educational process. Families were found to be more responsive and cooperative when they were included in the educational process during the hospitalization, preparation for discharge, and follow-up care of a family member. Experts in the field have also identified the need to include families in the educational process.

Kitzman (1975) concluded that with effective community health education patients and their families can do much of the basic screening for common diseases including anemia. Parents of preschool children who have been taught to recognize early signs and symptoms of iron deficiency anemia were able to bring specific health questions to health providers.

Patton, Wimberly, and Fadis (1968) studied the effects of planned group discussions on parents of hospitalized children. The groups ranged from two to 16 in number and came from varied socioeconomic backgrounds. Findings indicated that planned group discussions

helped ease the fears of the parents and are useful tools for dissemination of general information.

In a field experiment conducted by Skipper and Leonard (1968), mothers of children undergoing surgery were provided information concerning their children's surgery and emotional support. The mothers experienced a reduction in stress. Reduction in stress in the mothers resulted in a lessened anxiety among the children. There was also a positive effect on the children's social and psychological response to hospitalization and surgery.

Fink and others (1969) conducted a pilot study of 98 families in a pediatric acute care clinic to determine if measurable medical effectiveness could be improved by varying the kind of case management. Three study groups and a control group were established. Patients in Group I and III received care from either the regular clinic physician or a special physician and a family health management specialist who was a nurse. Patients in Group II received care from a special physician and the clinic nurse while patients in the control group received only routine clinic services. Information about care was evaluated for compliance relative to medications, procedures, appointment keeping, and understanding of the illness. The two study groups, where nurses were used as family health management specialists, achieved maximum scores of effectiveness.

Amend (1966) considered parents essential to the recovery of their children. Because the ultimate care of the child rests with parents, efforts must be made to provide conferences and orientation sessions, and to strengthen family relationships. Amend conducted a

study to determine the anxiety level of children when they were received in the operating room waiting area. Before a program of instruction and orientation for parents was initiated an estimated one-quarter of the patients arrived in the operating room in emotional turmoil. Following initiation of the program 96.6 per cent of the children were either asleep or well relaxed when received in the area where the first anesthesia was given.

The purpose of an experimental study by Mahaffey (1965) was to investigate the possibility of improving the hospital care for children by involving parents. A sample of 43 children was randomly selected from a group of children in a pediatric surgical unit of a large urban hospital. All of the children were between the ages of two and ten and were admitted for tonsillectomy and adenoidectomy. The sample included 21 children in the experimental group and 22 children in the control group. The research nurse helped the parents of the experimental patients by supplying needed information, answering questions, or discussing anything which caused confusion. The nurse conferred with the parents at specific times throughout hospitalization. The 22 control patients received only routine care. Children in the experimental group were found to be less anxious, fearful, apprehensive, and suffered fewer complications than those in the control group.

The purpose of a study of 40 families with children seen at a mental retardation clinic undertaken by Matheny and Vernick (1969) was to determine if a clinical experience that primarily emphasized effective communication could result in a change in the parents' expectations and behavior toward their children. The investigators discussed

all findings with the parents, answered questions, and encouraged parents to be present during all aspects of the evaluation. The results indicated emotional factors did not prevent the parents from receiving new information and acting appropriately and that an information-learning approach helped parents change toward more realistic expectations of their children.

Members of the White House Conference on Children and Youth (1970) recognized the need for nutrition educational programs to assist young children to acquire positive attitudes toward food. Education of older children was also considered necessary to prepare them to assume responsibility for their own food selection and to prepare them for adult and parental responsibility.

A small study of 15 public health nurses in Seattle conducted by Spearman (1961) showed opportunity for teaching about nutrition in 66 per cent of the studied home visits. However, the investigator found that 38 per cent of the teaching opportunities were missed.

Packard and Van Ess (1969) studied the effects of a teaching program aimed at increasing intake of vitamin C and thiamine in a group of 102 postpartum patients at a large midwestern medical center. Eighty-five per cent of the patients in the group were educated beyond high school. Results showed a significant difference in ability to choose appropriate foods between this group and an untrained group.

Haar (1966) examined the files of the phenylketonuria population of St. Christopher's Hospital for Children in Philadelphia, Pennsylvania. Ten mothers were selected to take part in a group education experiment to determine if improved patient-child relationship would be

reflected in improved dietary control of the children. Before the group sessions one child in the experimental group was in optimum dietary control. Following the group sessions six children of the experimental group were in optimum dietary control. Children within the control group remained below optimal dietary control throughout the experiment.

Summary

The literature has identified the problem of iron deficiency among preschool children and the need for patient education. Education of patients and their families is viewed as an integral component of health services. To provide this service nurses must recognize teaching as a basic nursing function. With the nurse's therapeutic relationship with patients and their families, their availability and facilities for observation, they are in a better position than other members of the health team to provide information about iron deficiency anemia and its dietary implications. Studies conducted by experts in the field have documented the value of nutritional education on outcome criteria. Informed patients and their families are able to select foods that would prevent or control disease. Few studies of the teaching activities of community health nurses have been conducted and there were no studies of the effectiveness of teaching related to iron deficiency anemia.

CHAPTER 3

METHODOLOGY

This chapter is divided into five content areas: (1) selection of teaching strategy; (2) the measurement instruments; (3) setting, population, and the sample; (4) method of data collection; and (5) data analysis. This study was designed to determine if factual information would increase the parents' knowledge of food sources of iron and improve their ability to categorize foods according to the basic four food groups. Factual information was presented through a film "Liver is Not the Only Way." Knowledge measured related to food needs of preschool children.

Selection of Teaching Strategy

An individual's perception is influenced by the nature of the stimuli selected for use in the learning event. The qualities of intensity, repetitiveness, movement, and novelty tend to make a stimulus more effective. Multimedia presentations have these qualities and provide avenues for learning through both visual and auditory stimuli. Combining the functions of more than one medium, sound films can perform a broad range of instructive functions.

Craig (1969) recognized visual images as the most effective form of communication. He also identified audiovisual systems as the most dynamic because the moving image presents a strong illusion of life. Briggs, Gagne, and May (1965) noted that no one medium is the

ideal selection for the fulfillment of all teaching objectives, but that the selection of the medium is in a sense "programming" the conditions for learning. In addition they identified five steps for the planning of an instructional presentation: (1) designing behavioral objectives, (2) identifying the types of learning involved, (3) designing the media program, (4) analyzing each component's contribution to the total presentation, and (5) determining the appropriateness of the media.

A behavioral objective involving concept information can be effectively attained by selection of the correct media. Chez (1969) compared the advantages and disadvantages of the various types of audio-visuals available for patient education and concluded that a 16 mm movie was the most practical and effective form of media for use with different sized groups in a variety of settings. He found this media provided the visual and auditory stimulation necessary to promote learning.

The film selected was a 15 minute 16 millimeter color sound film entitled "Liver is Not the Only Way" which provided the visual and auditory stimulus necessary to effectively communicate information about iron deficiency anemia. The specific goals of the film were to: (1) define iron deficiency anemia, (2) define hematocrit and illustrate the procedure of its determination, (3) show and describe the quantity of iron in foods and the amounts necessary to meet daily iron requirements, and (4) identify foods in each of the four food categories,

The Measurement Instruments

Two instruments were developed for data collection in the study. They were (1) the family information form and (2) the data collection

instrument. The content of these instruments is described in the following paragraphs.

Family Information Form

The family information form contained five items. Items one and two asked for the age of the enrolled preschool child and other children in the home. Items three and four requested the age of the mother and educational level of the participating parent. Item five asked if there was a history of anemia in the family (see Appendix A).

Data Collection Instrument

Initially a subjective test was developed by the researcher which contained six open-ended questions. This was submitted to a panel of three experts for evaluation. The panel was composed of faculty members with expertise in the areas of nutrition and test construction. Following evaluation by the panel, the test was redesigned and expanded to a 23 item objective test. The selection of the multiple choice format provided for ease and simplicity in handling of the data. The content of the revised instrument is described in the following discussion. The data collection instrument can be seen in Appendix B.

Questions 1 through 20 concentrated on the iron content of foods and categorization of foods into the four food groups. Twenty foods, that had been used as illustrations in the film, were listed on the left side of the form, together with a specific size portion of the food substance. The participants were required to place a check mark in the appropriate column to indicate if the foods were high or low in

iron. Secondly they were to select the correct food group for each food item.

Three additional items were formulated to test the knowledge of the participants. The first item required the participant to select a definition of iron deficiency anemia from five choices. The second item referred to the expected results of a hematocrit test of the blood from a person with iron deficiency anemia. Answer selection was from four possible choices. The third item listed 12 disease symptoms of which only six referred to iron deficiency anemia. The participants were required to place a check mark before each of the symptoms they considered to be present with the condition.

Population, Sample, Setting

The population consisted of parents of preschool age children. The sample consisted of parents with preschool age children enrolled in either of two privately funded preschools in a metropolitan area. There were 80 parents who were potentially available to participate in the study. The researcher contacted the directors of the preschools and explained the purpose and design of the study. Dates, times, and locations were determined. The method of obtaining a voluntary sample was by sending flyers home with the children inviting the parents to take part in the study (see Appendix C). The criteria for inclusion in the study were that they have a preschool child enrolled in one of the two preschool settings, have the ability to read English, and be willing to participate. Both preschools had privately funded

scholarships which enabled families of varied cultural and educational backgrounds to participate in the study.

Method of Data Collection

The investigator prepared a test packet containing a family information form and two copies of the data collection instrument. The first copy was for pretesting and the second for posttesting.

The investigator met each parent upon their arrival to the selected location and verbally confirmed their willingness to participate. At the scheduled starting time the test packet was distributed. The participants were invited to complete the family information form, and the pretest form was then read aloud by the researcher. The researcher was available for additional procedural questions during the 15 minute pretesting time. The participants were then instructed to put aside the test packet and view the 15 minute film. Then without discussion the participants were requested to complete the second copy of the data collection instrument. Following the testing time the researcher was available for discussion and provided nutrition pamphlets from the Maricopa County Health Department and the National Dairy Council.

In summary, the overall design of the study is expressed in the following model:

Knowledge of Parent of Preschool Child	+	16 mm film: "Liver is Not the Only Way"	=	Change in Parents' Knowledge
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As measured by objective test.
Food sources of iron, basic food
categories, definition and causes
of iron deficiency anemia.

As measured by objective test.
Food sources of iron, basic
food categories, definition
and causes of iron deficiency
anemia.

Data Analysis

Characteristics of the family were presented. The age of the mother, educational level of the parent, and the history of anemia in the family were compared with the test results.

The change in the parents' perception was the dependent variable. This change in knowledge was determined by comparing the pretest and posttest scores of the participants. The 16 mm film, used to increase the parents' knowledge of food sources of iron, basic food categories, and the definition and causes of iron deficiency anemia was the independent variable in the study.

In order to test the first hypothesis of the study that parents of preschool children viewing the film, "Liver is Not the Only Way," would show a significant increase in their knowledge of food sources of iron, a 20-item check list of foods and amounts was scored for correct identification of foods high or low in iron. Criterion for a correct response for food high in iron was that the portion specified provided at least 1.5 mg of available iron. This quantity of iron is 10 per cent of the recommended daily dietary allowance for a preschool child. Church and Church (1970) was the authoritative source for scoring the checklist. One point was given for each correct response and none for incorrect or omitted responses. The sum of correct responses for each food item was determined for each participant and totaled for all the pretests. The same procedure was followed for scoring the posttest. These scores were then averaged and a dependent t-test was done.

In order to answer the second hypothesis of the study, that parents of preschool children after viewing the film, "Liver is Not the

Only Way," would show a significant increase in their ability to categorize foods according to the four basic food groups. Parents were presented with a list of 20 food items. For each food the participants were required to select whether it was from the milk group, meat group, fruit and vegetable group, or bread and cereal group. The authoritarian source for correct responses for food categories was the National Dairy Council (1972) publication "A Guide to Good Eating." One point was given for each correct response and no points for incorrect responses. The correct responses were tabulated separately for pretest and posttests. The sums were then determined for total participation for each test. An average was then calculated for both pretest and posttest. A dependent t-test was done on these means. In addition to statistical testing of the hypotheses all data were analyzed descriptively.

The three remaining questions were considered separately and analyzed. The two multiple choice questions pertaining to the definition of iron deficiency anemia and the significance of a low hematocrit were scored. One point was assigned for each correct response and totals presented. The last question required the identification of the signs and symptoms of iron deficiency anemia from a list of twelve disease symptoms. Responses to each choice were totaled and pretest/posttest differences were calculated.

CHAPTER 4

ANALYSIS AND INTERPRETATION OF DATA

This chapter is divided into four content areas: (1) characteristics of the sample population of the parents and their children, (2) findings related to the first hypothesis, (3) findings related to the second hypothesis, and (4) discussion of data related to iron deficiency anemia. The parents comprising the sample took a pretest, viewed the selected film, "Liver is Not the Only Way," and then took an identical posttest. Change in their factual knowledge concerning food sources of iron and their ability to categorize foods according to the basic food groups was measured by comparing the pretest-posttest results.

Characteristics of the Sample

Characteristics of Parents

Eighteen parents with children enrolled in two preschool programs in a metropolitan area of southern Arizona agreed to participate in the study. The subjects consisted of 16 mothers and two fathers. The parents ranged in age from 24 to 50 years with a mean age of 30.7 years. Figure 1 illustrates the ages of the participants. Each participant read English and each parent had a preschool age child attending school.

The largest number of the parents, 11, was in the youngest age category of 21 to 30 years of age. Six parents fell into the 31 to 40

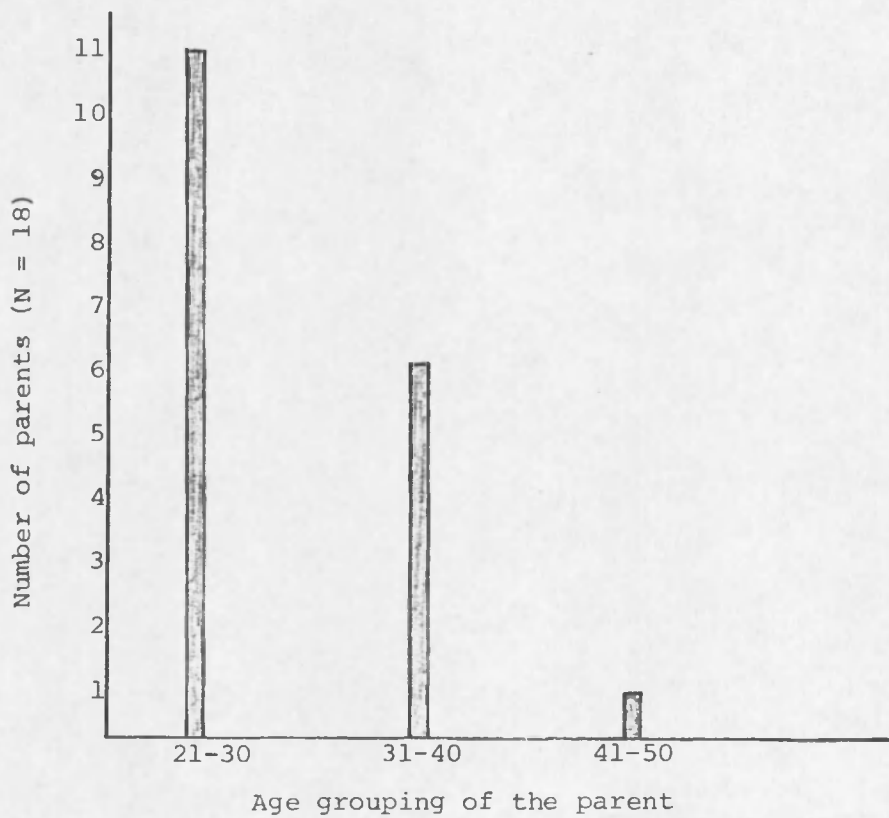


Figure 1. Ages of the 18 parents completing questionnaire related to the content of iron in selected foods.

year old category. Only one parent was over the age of 41. The two fathers were ages 30 and 50.

The educational level of parents participating in the study ranged from 12 to 17 years as illustrated in Figure 2. The mean educational level was 14 years. Four parents had completed 12 years of school while one had completed 13 years. Five parents completed 14 years of school and two completed 15. Five completed 16 years and one parent completed 17 years of education which suggests completion of a four year college degree. Of these participants, one father had completed high school and the other had two years beyond high school. No one stated they had less than a high school education.

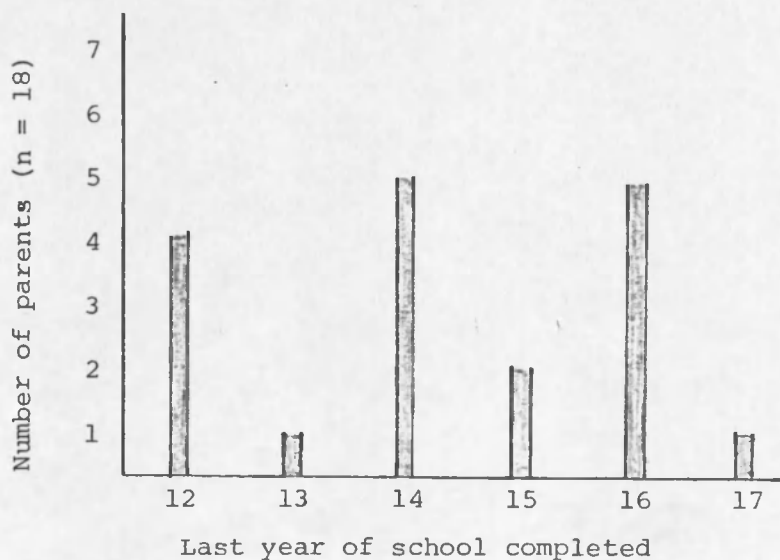


Figure 2. Educational level of 18 parents responding to the questionnaire related to the content of iron in selected foods.

Eighteen participants responded to the question "Has anyone in your family ever had anemia?" Fifteen participants answered "No" and three answered "Yes." Of the "yes" answers two mothers indicated that they had been anemic during pregnancy. The third parent did not state which family member had a history of anemia.

Characteristics of Children

The age of the child and other children in the family assisted the investigator in determining if the children were in the age category where iron deficiency anemia was most prevalent. The parents had a total of 39 children. The 18 preschool children ranged from two to six years of age with a mean age of 3.8 years and a mode of 4 years.

In the placement of the children in the family seven were the youngest with older siblings, nine had one younger sibling, and two had no other siblings. Of the 18 families represented 14 had two children per family, two had only one child, one had six children, and another had three children.

Findings Related to the First Hypothesis

The first hypothesis of this study stated that following the viewing of a film, "Liver is Not the Only Way," the parents of preschool children will show a significant increase in their knowledge of food sources of iron. A pretest and a posttest were completed by all 18 of the participating parents. A 20 item check list of foods and amounts was scored for correct identification of foods high or low in iron. One point was given for each correct response and none for incorrect or omitted responses. The sum of correct responses for each food item was

determined for each participant and totaled for all the pretests and then for the posttests. The means were then determined. The pretest mean was 1.02 and the posttest mean was 14.95. The means were then tested using a t-test for dependent samples and the difference was found to be significant above the .01 level ($t = 3.94$). The first hypothesis was upheld in that viewing the film, "Liver is Not the Only Way," did increase the parents' knowledge of food sources of iron.

Additional findings related to individual questions and groupings of responses within a food group. Table 1 presents pretest and posttest comparison of correct responses related to the iron content of five foods in the meat category. The three selected foods high in iron were one-half cup refried beans, a slice of white turkey meat, and one-half pound hamburger patty. The two foods low in iron content were an egg and one tablespoon of peanut butter. The largest increase of knowledge in this category was for refried beans with a pretest score of 10 and a posttest score of 18 yielding an increase of eight points. There was also an increase of eight points for egg with a pretest score of four and a posttest score of 12. Peanut butter increased by seven points from a pretest score of five to a posttest score of 12. White turkey meat increased by three points from a pretest score of 10 to a posttest score of 13. The smallest increase of knowledge was for hamburger with a pretest score of 14 and a posttest score of 16 with an increase of two. These findings suggest that parents may consider that all meat group dishes should be high in iron. It could be postulated that the predominance of Caucasian parents influenced the lack of entry knowledge concerning refried beans since refried beans are considered to

Table 1. Pretest-posttest comparison of correct responses related to the iron content of five foods in the meat category.

Question	Pretest	Posttest	Difference
Meat Category			
Questions 5, 7, 9, 20, 11			
1/2 cup refried beans ^a	10	18	8
An egg	4	12	8
One tablespoon peanut butter	5	12	7
1 slice of turkey white meat ^a	10	13	3
1/2 lb. hamburger patty ^a	14	16	2

^aFood high in iron.

N = 18.

be Mexican-American food. The highest increase of knowledge concerned the foods refried beans, egg, and peanut butter with increases of eight for the first two and seven for the latter.

Table 2 presents the pretest and posttest correct responses of iron content of six foods in the fruit and vegetable category. The greatest increase in knowledge in this category was for turnips with a pretest score of seven and a posttest score of 12 giving an increase of five points. The next largest difference was dried apricots with a pretest score of 11 and a posttest of 15 giving an increase of four. Spinach posttest scores increased by one from 16 to 17. Turnip greens posttest score also increased by one from 12 to 13. There was a

Table 2. Pretest-posttest comparison of correct responses related to the iron content of six foods in the fruit-vegetable category.

Question	Pretest	Posttest	Difference
Fruit-Vegetable Category			
Questions 17, 16, 15, 13, 12, 1			
1/2 cup turnips ^a	7	12	5
1/2 cup dried apricots ^a	11	15	4
1/2 cup turnip greens ^a	12	13	1
1 cup cooked spinach ^a	16	17	1
1/2 cup cooked mustard greens ^a	15	14	-1
8 oz glass of orange juice	12	7	-5

^aFoods high in iron.

N = 18.

decrease of one in posttest scores for mustard greens from 15 to 14.

All of the foods listed above are high in iron. Orange juice reflected a decrease of 5 points from a pretest total of 12 to a posttest score of 7. Information in the film illustrated the fact that orange juice aids in the absorption of iron. This could have been confusing to the viewers. There was a high level of entry knowledge demonstrated for spinach and turnip greens which would account for the small change of one for posttest scores.

Table 3 lists the comparison of correct responses of the iron content of four foods in the bread and cereal group. The largest

Table 3. Pretest-posttest comparison of correct responses related to the iron content of four foods in the bread cereal group.

Question	Pretest	Posttest	Difference
Bread Cereal Category			
Questions 18, 6, 3, 2			
2 pieces of corn bread ^a (2" x 2")	3	15	12
1 large oatmeal cookie ^a	5	16	11
A bowl of cream of wheat ^a	11	18	7
Slice of white enriched bread	14	10	-4

^aFoods high in iron.

N = 18.

increase in knowledge was for corn bread yielding an increase of 12 points with a pretest score of three and a posttest score of 15. The second largest was 11 points for an oatmeal cookie with a pretest score of five and a posttest score of 16 points. The smallest increase in the group was about cream of wheat with scores of 11 and 18 respectively yielding an increase of seven. A decrease of four occurred for the one food in this group that is low in iron: white enriched bread with a pretest score of 14 and a posttest score of 10. The film presented the foods in circle graphs with percentages. Possibly the word "enriched" tends to falsely reassure the public of the nutritional adequacy of enriched foods.

Table 4 presents the comparison of pretest and posttest scores of the iron content of five foods in the milk group. The foods listed were milk, cheddar cheese, cottage cheese, American cheese, and ice cream. However, all foods in the milk group are low in iron. Milk and cheddar cheese yielded an increase of knowledge of eight points each; milk with a pretest score of 10 and posttest of 18 of the responses and cheddar cheese with a pretest score of six and posttest of 14. The item cottage cheese was next highest with an increase of six. The pretest was 10 and the posttest 16. American cheese had an increase of two with scores changing from 13 to 15. Ice cream reflected the least change with an increase of one from a high pretest score of 15. The film illustrated the low iron content in milk and other foods in the milk group.

Table 4. Pretest-posttest comparison of correct responses related to the iron content of five foods in the milk group.

Question	Pretest	Posttest	Difference
Milk Category			
Questions 4, 8, 19, 14, 10			
8 oz glass of milk	10	18	8
Cheddar cheese (4 one inch cubes)	6	14	8
1/2 cup cottage cheese	10	16	6
2 slices American cheese	13	15	2
1/2 pint ice cream	15	16	1

N = 18.

The bread and cereal group showed the greatest increase in knowledge of iron content with the pretest 45.8 per cent correct responses and the posttest with 81.9 per cent correct responses giving an increase of 36.1 per cent. The next highest increase was the meat group with a pretest total of 47.7 per cent and a posttest total of 78.8 per cent yielding a net increase of 31.1 per cent. The milk group was of particular interest; initially 62.2 per cent indicated that milk contained no foods rich in iron while on the posttest 87.7 per cent responded correctly. The milk group showed the highest group per cent of correct responses on the posttest. The pretest-posttest difference was 25.5 per cent. The fruit and vegetable group showed the least amount of increase between the pretest and posttest with the pretest showing 67.6 per cent and the posttest showing 72.2 per cent for an increase of 4.6 per cent. It should be noted that the film did increase knowledge of iron content of food in all four categories.

The comparison of increase of selection of foods according to iron content is grouped according to questions corresponding to each of the four food groups in Figure 3.

Findings Related to Second Hypothesis

The second hypothesis of this study stated that following the viewing of a film, "Liver is Not the Only Way," the parents of preschool children will show a significant increase in their ability to categorize foods according to the basic food groups. From the list of 20 food items the participants were required to select the group to which the food belongs. There were four food groups from which to select. One

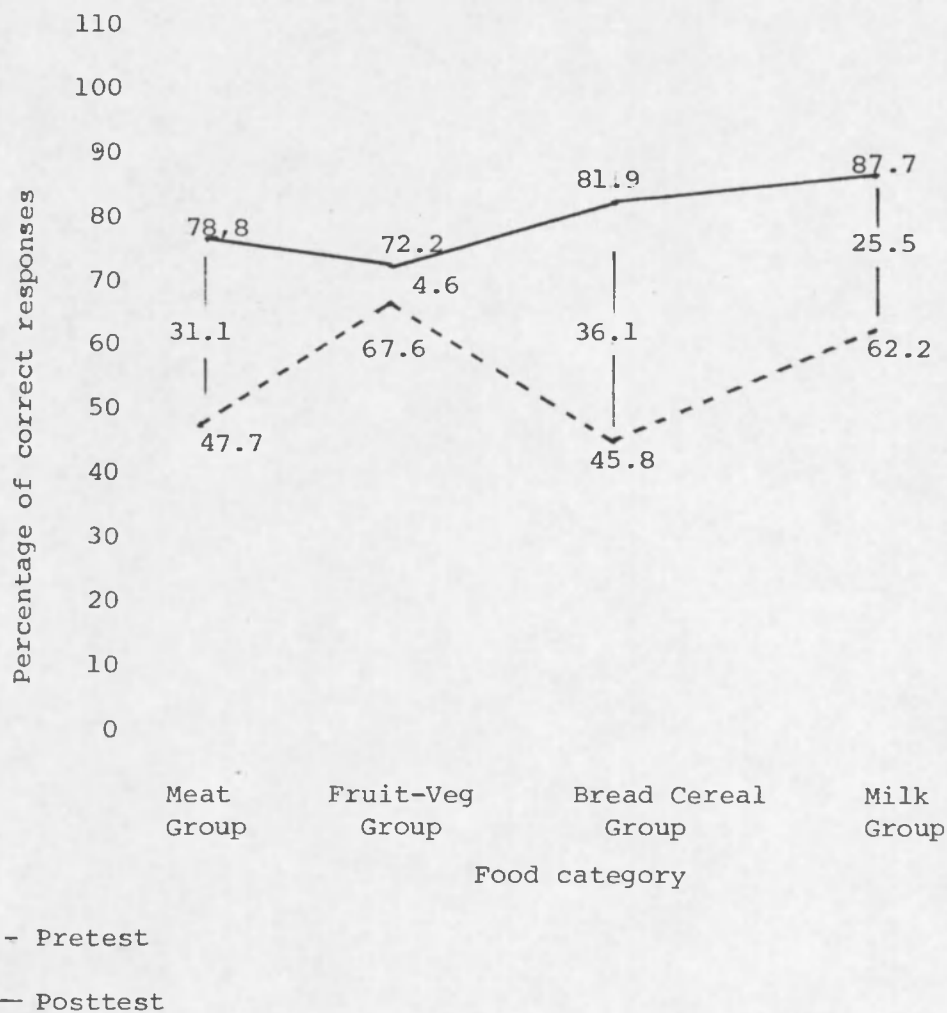


Figure 3. Pretest-posttest comparison of correct responses related to the iron content of each of the four food group categories
 -- N = 18.

point was scored for each correct response. Two participants did not answer this question on the posttest, therefore, a total of 16 respondents were used to test the second hypothesis. Correct responses for each food item were totaled per respondent on the pretest and posttest. The average number of correct responses across all respondents on the pretest was 12.57. The average number of correct responses across all respondents on the posttest was 14.82. A dependent t-test was done between the means to determine if the difference between the means was significant. The means were found to be significant above the .01 level ($t = 3.18$). The primary finding was that the parents learned to categorize foods with a greater degree of accuracy from viewing the film.

Additional findings related to the change in responses for the individual food items and consideration of percentage of change per food category. Table 5 presents the comparison of correct responses of pretest and posttest scores with percentages of change for each food item and each food category.

Meat Group Category

The 16 participants correctly categorized the foods in the meat group 57.5 per cent of the time on the pretest and 68.75 per cent of the time on the posttest yielding an 11.25 per cent increase in correct responses. The five meat group foods listed were refried beans, eggs, peanut butter, hamburger, and turkey. The food item with the greatest change in knowledge was refried beans. On the pretest only one parent correctly categorized refried beans in the meat group and on the

Table 5. Raw scores of pretest and posttest comparisons, group mean percentages, and per cent of change in subject's ability to categorize food according to basic food groups -- N = 16.

Questions	Pretest			Posttest			Change Correct Responses	
	Right	Wrong	Omitted	Right	Wrong	Omitted	Raw	
							Score	% Change
<u>Meat Group:</u>								
Refried beans	1	14	1	9	7	0	8	50%
Egg	7	7	2	9	7	0	2	12.5%
Peanut butter	8	5	2	9	6	1	1	6.5%
Hamburger	16	0	0	13	2	1	3	-18.75%
Turkey	14	1	1	15	1	0	1	6.25%
Group mean %	57.5%	35%	7.5%	68.75%	28.75%	2.5%		11.25%
<u>Fruit & Vegetable Group:</u>								
Orange juice	15	0	1	14	1	1	-1	-6.25%
Mustard greens	15	0	1	16	0	0	1	6.25%
Spinach	16	0	0	16	0	0	0	0
Turnip greens	15	1	1	16	0	0	1	6.25%
Dried apricots	16	0	0	16	0	0	0	0
Turnips	15	0	1	16	0	0	1	6.25%
Group mean %	95%	1%	4%	98%	1%	1%		3%
<u>Bread & Cereal Group:</u>								
White bread	16	0	0	15	0	1	-1	-6.25%
Cream of wheat	12	2	2	14	1	1	2	12.5%
Oatmeal cookie	15	0	1	16	0	0	1	6.25%
Corn bread	12	3	1	15	1	0	3	18.75%
Group mean %	86%	8%	6%	94%	3%	3%		8%

Table 5.--Continued

Questions	Pretest			Posttest			Change Correct Responses	
	Right	Wrong	Omitted	Right	Wrong	Omitted	Raw Score	% Change
Milk Group:								
Milk	13	1	2	16	0	0	3	18.75%
Cheddar cheese	13	2	1	12	2	2	-1	-6.25%
Ice cream	16	0	0	16	0	0	0	0
American cheese	12	3	1	15	1	0	3	18.75%
Cottage cheese	13	1	2	16	0	0	3	18.75%
Group mean %								10%

posttest nine parents placed refried beans in the meat group yielding an increase of eight correct responses which was a 50 per cent increase. Most of the errors placed this food item in the fruit and vegetable group. One parent did place refried beans in the bread and cereal group on both tests. Eggs and peanut butter also had posttest scores of nine with increases of two and one, respectively. There was a 12.5 per cent increase of knowledge for an egg and a 6.25 per cent increase for peanut butter. Knowledge that beans, nuts, and eggs do belong to the meat group must not be known by the sample population since almost half of the study group were still in error on the posttest. Entry knowledge at the category for hamburger and turkey was high, 16 and 14, respectively. There was an increase of knowledge of one point for turkey from 14 to 15. Hamburger yielded a decrease of three points from 16 to 13. One respondent omitted an answer on the posttest. The other two errors were placing hamburger in the milk category. These errors may possibly be attributable to the single spacing and central location of hamburger and ice cream in the test layout.

Fruit and Vegetable Category

The study group provided entry knowledge of 95 per cent correct responses in the fruit and vegetable category. The six foods listed from the fruit and vegetable category were orange juice, mustard greens, spinach, turnip greens, dried apricots, and turnips. There was a high level of knowledge reflected in this category with a 95 per cent correct response on pretest and an increase of only three per cent to 98 per cent on the posttest. This category had the greatest percentage of

accuracy for pretest and posttest responses. Sixteen of the study group correctly categorized spinach and apricots on the pretest and posttest. On the posttest there was an increase of one point each for a total of 16 for mustard greens, turnip greens, and turnips. The only decrease in correct responses was orange juice with a decrease of one point; the pretest score was 15 and the posttest was 14. The placement of orange juice as the first of the check list would indicate this was not an error reflecting test design. The findings then would indicate that entry level knowledge of foods fitting into the fruit and vegetable group were already high and further teaching on this may not be needed.

Bread and Cereal Category

The study group responded on the pretest with 86 per cent correct answers to foods belonging in the bread and cereal group. The four foods listed from the bread and cereal category were white bread, Cream of Wheat, oatmeal cookies, and corn bread. On the posttest there was a group mean of eight per cent with a total of 94 per cent correct responses. Sixteen of the participants correctly categorized white bread on the pretest, one omitted this item on the posttest. All of the participants gave correct responses for oatmeal cookies on the posttest for an increase of one point. Cream of Wheat and corn bread had pretest scores of 12 and posttests scores of 14 and 15, respectively, providing increases of two and three points. Cream of Wheat had a 12.5 per cent increase of correct responses and corn bread had a 18.75 per cent increase of correct responses on the posttest. The finding related to corn bread with an increase of three correct responses and

Cream of Wheat with an increase of two indicate that there remains a need to present these foods when teaching food selection from the bread and cereal food group. The entry level knowledge for white bread and oatmeal cookies was high enough to indicate that further teaching may not be needed.

Milk Category

The study group on the pretest selected correct responses 83.75 per cent of the time for food belonging in the milk group. Foods listed in the milk group were milk, cheddar cheese, ice cream, American cheese, and cottage cheese. On the posttest the participants chose correct answers 93.75 per cent of the time giving an increase of 10 per cent. All of the sixteen participants correctly categorized milk, ice cream, and cottage cheese on the posttest. This provided an increase of 3 points for milk and cottage cheese and no change for ice cream. Two participants categorized cheddar cheese in the meat group for both pretest and posttest resulting in a decrease of one point from 13 to 12. The one wrong response for the posttest on American cheese was also placing it into the meat category. Perhaps the common selection of cheese for a main dish influenced their maintaining this selection. A finding of interest is that the participants did learn to categorize food belonging to the milk group with greater accuracy.

Discussion of Data Related to Iron Deficiency Anemia

The 18 participants were asked three multiple choice questions relating to iron deficiency anemia. The first was to identify the

definition of iron deficiency anemia from five choices. The second question required the selection of the relationship of hematocrit to iron deficiency anemia from four choices. The third question required the selection of six symptoms of iron deficiency anemia from a list of twelve possible symptoms.

The data obtained from selections made by the 18 participants for the three questions relating to iron deficiency anemia on the pretest and posttest were analyzed. In the pretest 12 of 18 subjects correctly defined iron deficiency anemia as "lack of enough iron in the blood which is often related to poor food habits." Fifteen subjects selected the right definition on the posttest. There was an increase of three responses or 17 per cent increase in correct responses on the posttest.

The second multiple choice question required selecting the range of the hematocrit and/or hemoglobin as related to iron deficiency anemia. On the pretest 13 of 18 subjects selected the correct answer "the hematocrit and/or hemoglobin test of a person with iron deficiency anemia would be low." On the posttest 15 subjects selected the correct answer. There was an 11 per cent increase in correct answers on the posttest.

The last question required the recognition of six symptoms of iron deficiency anemia. Of the 12 symptoms listed the six correct symptoms were: tired most of the time, weakness, pale skin, poor appetite, irritable most of the time, and low resistance to infection. Table 6 lists the breakdown of responses for each symptom of iron deficiency anemia. The correct symptom of weakness was unchanged at 16

Table 6. Pretest and posttest comparison scores on questions related to symptoms of iron deficiency anemia.

Symptoms	Pretest	Posttest	Difference
Rosy Complexion	0	0	0
Tired Most of the Time ^a	18	16	-2
Tendency to Overeat	1	0	-1
Weakness ^a	16	16	0
Pale Skin ^a	13	16	3
Thirsty Most of Time	2	2	0
Poor Appetite ^a	11	12	1
Overactive	0	0	0
Cheerful Most of Time	0	0	0
Irritable Most of Time ^a	10	9	-1
Low Resistance to Infection ^a	12	12	0
Blue Tinge to Skin	0	0	0

^aSymptoms of Iron deficiency anemia.

N = 18.

and "low resistance to infection" was unchanged at 12. The symptom "tired most of the time" decreased by two from 18 to 16 responses and "irritable most of the time" decreased by one from 10 to nine. The symptom "poor appetite" increased from 11 to 12 and "pale skin" increased from 13 to 16. It is interesting to note that the highest level of learning was in the selection of the symptom "pale skin." Parental knowledge of this objective sign may assist in early awareness of the possibility of iron deficiency anemia of these preschool children.

Four of the six symptoms listed that were not related to iron deficiency anemia and were not chosen by any of the participants were "rosy complexion," "overactive," "cheerful most of the time," and "blue tinge to the skin." Two incorrect symptoms were selected on the pretest; two chose "thirsty most of the time" on both tests and one chose "tendency to overeat" on the pretest but not the posttest.

Responses to the symptoms of iron deficiency anemia in children indicated a general high level of knowledge by parents. One can assume that some health care provider was influential in providing the necessary information, although the source of this information was not asked. The findings indicate that the entry level of parents' ability to recognize symptoms was much higher than their knowledge of prevention of disease through nutrition.

A correlation coefficient was done to determine if a relationship existed between the iron content and food categorization test scores and the following variables: age of the child, placement of the child in the family, age of mother, education of parent, and family history of anemia. The findings indicated there was no significant

relationship between any of these variables and the means of the individual test scores. For example, those with a history of anemia in the family did not tend to select the high iron foods on the pretest with more accuracy than those who did not have prior experience with anemia. Those with higher education did not tend to score higher pretest or posttest scores than those with less education. Older parents with more than one child did not tend to indicate more knowledge from experience than younger less experienced parents, nor did the parents of only children show less knowledge on the items tested.

A pretest and a posttest were administered before and after viewing a 16 millimeter film that provided factual knowledge concerning the iron content of foods and the categorization of foods according to the four basic food groups. The mean scores across all participants were calculated for the pretest and the posttest. Dependent "t" tests were done and found to be significant at the .01 level. As a result both hypotheses were accepted. The first hypothesis stated that following the viewing of a film "Liver is Not the Only Way," the parents of preschool children will show a significant increase in their knowledge of food sources of iron. Responses of 18 parents were used for testing the first hypothesis.

The second hypothesis stated that following the viewing of the film "Liver is Not the Only Way," the parents of preschool children will show a significant increase in their ability to categorize foods according to the four basic food groups. The study group that tested the second hypothesis was comprised of sixteen parents of preschool children.

Four foods high in iron content each contributing over 35 per cent increase of knowledge from pretest and posttest scores were refried beans, corn bread, oatmeal cookies, and Cream of Wheat. Four foods low in iron content each contributing over 35 per cent increase of knowledge from pretest and posttest scores were egg, peanut butter, milk, and cheddar cheese. The group of four foods from the bread and cereal reflected the greatest amount of increase of knowledge with a group increase of 36.1 per cent. One food, refried beans, was correctly categorized into the meat category with a pretest/posttest increase of 50 per cent. Four foods provided an 18.75 increase of posttest correct responses. They were milk, American cheese, and cottage cheese from the milk group and corn bread from the bread and cereal group.

Three additional objective questions were asked concerning iron deficiency anemia. For the first question there was an increase of 17 per cent correct responses in the selection of the correct definition of iron deficiency anemia. On the second multiple choice question there was an 11 per cent increase in the correct selection of a low hematocrit relationship to iron deficiency anemia. On the third question there was an increase of one correct symptom of iron deficiency anemia selected on the posttest. The interpretation of the data presented indicates that the use of the selected film was an effective method to increase knowledge of food sources of iron and the categorizing of foods into the basic food groups.

CHAPTER 5

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The literature identified the problem of iron deficiency anemia among preschool children and the need for patient education. Education of patients and their families is viewed as an integral component of health services. To provide this service nurses must recognize teaching as a basic nursing function. With the nurse's therapeutic relationship with patients and their families, their availability and facilities for observation, they are in a good position to provide information about iron deficiency anemia and its dietary implications. Studies conducted by experts in the field have documented the value of nutritional education on outcome criteria. Informed patients and their families are able to select foods that would prevent or control disease. Few studies of the teaching activities of community health nurses have been conducted and there were no studies of the effectiveness of teaching related to iron deficiency anemia.

Iron deficiency anemia among preschoolers is recognized as a worldwide problem and is also prevalent in Arizona. Adverse effects of this condition threaten both the physical and mental development of children of this age group. Diet has been established as the best available means for preventing and treating iron deficiency anemia. Recognition and use of available food sources of iron, by concerned informed parents, offers the best defense against iron deficiency anemia

in preschoolers. Developed programs for use by the community health nurse in her everyday contact with families provides a systematic approach to increasing the nutritional knowledge of parents that can then be directed toward reducing the incidence of this condition.

The purpose of this study was to determine if the presentation of a 16 millimeter 15 minute color film, "Liver is Not the Only Way," would change the amount of knowledge parents have concerning the cause and diet relationship of iron deficiency anemia. Film selection is in accordance with Craig's (1969) observation that visual images of audio-visual systems are the most effective form of communication. Emphasis was placed on parents' ability to select foods according to iron content and knowledge of categories of food according to the four food groups as reflected in needs of their preschool children. The change in knowledge was determined through the administration of an objective pretest and posttest. Entry knowledge was tested before viewing the selected film and acquired knowledge was measured immediately after viewing the film. The participants were parents with children enrolled in either of two privately funded preschools. Eighteen parents volunteered for the study from a potential sample of 80. Five presentations of the film were scheduled and completed to attain the final study group.

Conclusions

This study indicated that a selected film can increase the knowledge of parents of preschool children concerning the relationship of diet to iron deficiency anemia. It was concluded that the participants in the study demonstrated the greatest increase of knowledge in

their ability to select foods according to iron content. Secondly it was concluded that parents were able to demonstrate an increase in their ability to categorize foods according to the four basic food groups.

Additional conclusions are based on data obtained within the study. The selected film was particularly effective in teaching parents that milk is a poor source of iron. Another area of high effectiveness was recognition that refried beans is included in the meat group and is a food of high iron content. Another food high in iron in which there was a large increase in posttest correct responses was corn bread.

Participants tended to rate all meat substitute dishes as being high in iron. This included low iron food items such as eggs, peanut butter, American cheese, and cheddar cheese. It may be concluded from this observation that the film alone probably will not correct this misconception. Two foods actually showed a decrease in posttest knowledge. One was orange juice which is low in iron but aids absorption of iron. The second food item was white enriched bread that is enriched with vitamins but not with iron. It may be concluded that the film alone will not assist the viewers in making these discriminations.

It may be concluded that this multimedia approach to teaching can introduce sources of iron from a variety of foods. This study has shown that an appropriate person for teaching the preventive aspects of iron deficiency anemia is the community health nurse in groups. Redman (1971) noted teaching is a highly versatile tool that can be used in all modes of nursing intervention. With the use of this film and the data

collected community health nurses will have a more sophisticated approach to use in the future.

Recommendations

Based on the findings and conclusions of the study, the following recommendations are made:

1. Replicate this study with parents from distinct sub-cultures including Mexican-American, Indian, and Black populations to compare the effectiveness of this film in teaching populations with other dietary patterns.
2. Replicate this study with a repeat posttest after one month to determine the amount of information that is retained.
3. Replicate this study using a random sample population from child health clinics and private physician offices to increase the population sample for validity and reliability purposes.
4. Replicate the study redesigning the data collection instrument with a double space after every five foods to assist the test taker in visualizing discrete items.
5. Design a similar data collection instrument using pictures of the food to aid in the selection of an adequate diet for testing of participants who cannot read.

APPENDIX A

FAMILY INFORMATION FORM

Age of your preschool child _____

Ages of other children in the home _____

Age of mother _____

What is the last grade you attended in school? _____

Has anyone in your family ever had anemia? _____

APPENDIX B

PRETEST-POSTTEST FORM

Indicate with a check mark the food group each item belongs and if the food is high or low in food iron content (a food high in iron provides 10% and over of a preschooler's recommended daily needs).

FOOD	High in Iron	Low in Iron	Meat Group	Fruit & Veg. Group	Bread and Cereal	Milk
Example: Liver (2 oz.)						
1. 8 oz glass of orange juice						
2. slice of white enriched bread						
3. a bowl of Cream of Wheat						
4. 8 oz. glass of milk.						
5. 1/2 cup refried beans						
6. a large oatmeal cookie						
7. an egg						
8. cheddar cheese (4-inch cube)						
9. one tablespoon peanut butter						
10. 1/2 pint ice cream						
11. 1/2 lb. hamburger patty						
12. 1/2 cup cooked mustard greens						
13. 1 cup cooked spinach						
14. 2 slices American cheese						
15. 1/2 cup turnip greens						
16. 1/2 cup dried apricots						
17. 1/2 cup turnips						
18. 2 pieces of corn bread (2"x2")						
19. 1/2 cup cottage cheese						
20. 1 slice of turkey white meat						

21. Check which one of the following best defines iron deficiency anemia:
- ☐ A condition of iron poor blood that is always caused by poor diet.
 - ☐ A condition caused by eating dirt.
 - ☐ Lack of enough iron in the blood which is often related to poor food habits.
 - ☐ Too few red blood cells.
 - ☐ Not enough blood.

22. The hematocrit and/or hemoglobin test of a person with iron deficiency anemia would be:

- a. ☐ Normal
- b. ☐ High
- c. ☐ Low
- d. ☐ Unrelated

23. From the list below check each item that may be a symptom of iron deficiency anemia.

- | | |
|---|--|
| <input type="checkbox"/> Rosy complexion | <input type="checkbox"/> Poor appetite |
| <input type="checkbox"/> Tired most of the time | <input type="checkbox"/> Overactive |
| <input type="checkbox"/> Tendency to overeat | <input type="checkbox"/> Cheerful most of the time |
| <input type="checkbox"/> Weakness | <input type="checkbox"/> Irritable most of the time |
| <input type="checkbox"/> Pale skin | <input type="checkbox"/> Low resistance to infection |
| <input type="checkbox"/> Thirsty most of the time | <input type="checkbox"/> Blue tinge to skin |

APPENDIX C

FLYER

COMING SOON

Motion Picture

and

Research Project

"LIVER
IS NOT

THE ONLY WAY"

An entertaining 15 minute color movie developed to present helpful hints for good nutrition to mothers of preschool children.

Show Times:

Monday, November 18, 1974 - 9:15 a.m. & 12:45 p.m.

Thursday, November 21, 1974 - 9:15 a.m.

ALL MOTHERS of Preschool children are cordially invited to attend.

Address: Central Christian Preschool
Blue Room
315 N. Hobson
Mesa, Az.

Phone: 962-4843

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