School Nurses' Knowledge of Changes in Height in Healthy Children

Colleen Miller-Owen

Loyola University Chicago

Follow this and additional works at: https://ecommons.luc.edu/luc_theses

Part of the Nursing Commons

Recommended Citation


https://ecommons.luc.edu/luc_theses/4097

This Thesis is brought to you for free and open access by the Theses and Dissertations at Loyola eCommons. It has been accepted for inclusion in Master's Theses by an authorized administrator of Loyola eCommons. For more information, please contact ecommons@luc.edu.

This work is licensed under a Creative Commons Attribution-Noncommercial-No Derivative Works 3.0 License.

Copyright © 1995 Colleen Miller-Owen
LOYOLA UNIVERSITY CHICAGO

SCHOOL NURSES' KNOWLEDGE OF CHANGES IN HEIGHT IN HEALTHY CHILDREN

A THESIS SUBMITTED TO
THE FACULTY OF THE NIEHOFF SCHOOL OF NURSING
IN CANDIDACY FOR THE DEGREE
MASTER OF SCIENCE IN NURSING
DEPARTMENT OF MATERNAL-CHILD HEALTH NURSING

BY

COLLEEN MILLER-OWEN

CHICAGO, ILLINOIS
JANUARY 1995
# TABLE OF CONTENTS

ACKNOWLEDGEMENTS ........................................................................................................... v

LIST OF TABLES .................................................................................................................. vi

Chapter

I. INTRODUCTION ............................................................................................................... 1
   Definition of Terms ......................................................................................................... 2
   Research Question ......................................................................................................... 3
   Purpose of the Study ...................................................................................................... 3
   Limitations ..................................................................................................................... 4

II. REVIEW OF THE LITERATURE ..................................................................................... 5
   Role of School Nurses ................................................................................................... 5
   Growth Patterns of Children Aged 5-10 Years ............................................................. 10
   Measurement and Recording of Height in Children ...................................................... 12
   Summary ...................................................................................................................... 15

III. METHODOLOGY .......................................................................................................... 16
   Research Question and Design .................................................................................... 16
   Research Sample .......................................................................................................... 17
   Research Procedure ...................................................................................................... 18
   Summary ...................................................................................................................... 23

IV. DATA ANALYSIS ........................................................................................................... 24
   Demographic Data Analysis ........................................................................................ 24
   Interview Data Analysis .............................................................................................. 28
   Summary ...................................................................................................................... 37

V. DISCUSSION .................................................................................................................... 38
   Discussion of Demographic Data ................................................................................ 38
   Discussion of Interview Data ....................................................................................... 39
   Summary ...................................................................................................................... 54
VI. SUMMARY AND RECOMMENDATIONS ................................................ 55

  Summary .................................................................................................. 55
  Recommendations .................................................................................... 59

Appendix

  A. CHILD AT STADIOMETER ................................................................. 61
  B. GROWTH CHARTS ............................................................................... 63
  C. INSTRUMENTATION ............................................................................. 66
  D. PERMISSION LETTERS ....................................................................... 70

REFERENCES ................................................................................................................... 74

VITA .................................................................................................................................. 77
ACKNOWLEDGEMENTS

I would first like to thank all of the school nurses who took time from their very busy schedules to participate in this study. Without their help, this study would not have been possible.

I also thank Dr. Beverly Kopala, the chairperson of my thesis committee, for all her help and guidance on this project and throughout my graduate studies. My second committee member was Dr. Marybeth Young and I thank her for all of her help and input. I would also like to thank Dr. Elizabeth Brophy, who helped start this project and worked on it until her retirement.

My mother, Marge Miller, is the best nurse that I know and I truly admire her work. I thank her for all of her love and encouragement throughout my life.

And finally, I thank my husband, Mike Owen, for all the support, help and love he's given me while I was working on this project. Despite any obstacles, he was always willing to help and encourage.
LIST OF TABLES

Table............................................................................................ Page
1. Years in Current Position: Cook County Subjects.......................... .25
2. Years in Current Position: Collar County Subjects.......................... .25
3. Number of Students: Cook County Subjects................................. .26
4. Number of Students: Collar County Subjects................................. .26
5. Age: Cook County Subjects.......................................................... .28
6. Age: Collar County Subjects.......................................................... .28
7. Expected Yearly Growth Rate for Healthy Children, Aged 5-10 Years: Cook County Subjects................................. .29
8. Expected Yearly Growth Rate for Healthy Children, Aged 5-10 Years: Collar County Subjects................................. .29
9. Indicators Causing Concern: Cook County Subjects....................... .32
10. Indicators Causing Concern: Collar County Subjects...................... .32
11. Actions Taken if Growth Pattern Indicates: Cook County Subjects................................. .34
12. Actions Taken if Growth Pattern Indicates: Collar County Subjects................................. .34
13. Obstacles to Performing Height Screenings: Cook County Subjects................................. .35
14. Obstacles to Performing Height Screenings: Collar County Subjects................................. .36
CHAPTER I

INTRODUCTION

School nurses are health care professionals who have a close relationship with school children. Since twelve million children in the United States do not have health insurance and many others are underinsured (Igoe, 1993), basic health maintenance services should be available, at least, to children in the public schools. For those who are not adequately insured, the activities of school nurses for basic health maintenance are essential. Basic health maintenance for grammar school children involves routine health assessments and education by health care professionals. All children can benefit from these services.

One of the best indicators of children's overall health is their individual pattern of growth. School children, aged 5-10 years, should increase in height at a rate of 2 to 2.5 inches (5-6.5 cm) per year (Amer, August and Robnett, 1992). If children are not growing at this rate, it could be a sign that there is an underlying pathological condition and a referral for a complete physical examination and evaluation would be advised. School nurses monitor patterns of growth in order to identify children who are not maintaining appropriate growth rates. Accurate measurement of height, with the proper plotting of the results on an individual's growth chart graph, is the best way to identify children with growth disorders. Ideally, school nurses measure and plot the heights of all the children in the school or schools for which they are responsible (Parker, 1992).
School nurses are knowledgeable about general developmental principles but may not realize that accurate records reflecting children's growth rates are necessary in order to identify a potential growth problem. Since school nurses usually care for large numbers of students and are called upon to fulfill multiple functions, it is critical that they understand the importance of maintaining accurate growth charts for healthy children.

In this exploratory, descriptive study, the knowledge base of school nurses regarding the importance of monitoring the height of healthy school children, aged 5-10 years, as a reflection of the children's overall growth pattern, was explored.

Definition of Terms

The terms used in this study are: school nurses, school children, knowledge base and changes in height. These terms are defined as they are used in this study.

School nurses

School nurses are health care professionals who have graduated from an accredited nursing program, and have a professional nursing license, and who focus primarily on the promotion of health in children enrolled in a basic educational system. In this study, school nurses are defined as those who have met the requirements of the Illinois State Board of Education, have been hired by a public school district superintendent and are responsible for grammar school children in that district.

School children

School children are healthy boys and girls engaged in a primary educational experience. In this study, the focus is on healthy children, aged 5-10 years.
Knowledge base

Knowledge base is a body of specialized information mastered by an individual. In this study, a major variable is school nurses' awareness of a particular area of importance; specifically, the importance of measuring and recording changes in height in healthy children, aged 5-10 years.

Changes in Height

Changes in height is a developmental phenomenon that is reflective of an overall pattern of growth and health. In this study, the focus is on the school nurses' knowledge of the appropriate increments in height changes for children, aged 5-10 years, as well as on methods for documenting heights on individual children's growth charts.

Research Question

What is the knowledge base of school nurses with regard to the importance of monitoring changes in height and recording that information on individual growth chart graphs in healthy children, aged 5-10 years?

Purpose of the Study

The purpose of the study is to answer the research question and establish what is the current knowledge base of school nurses. If a knowledge deficit is found, further study regarding this question is needed. If further studies indicate that there is a knowledge deficit among school nurses regarding growth, the development of educational programs could ensue.
The information sought was obtained from practicing school nurses. They were selected by a random cluster sampling method. Six elementary school districts were randomly selected from two different counties. The individual nurses at these schools served as subjects.

An interview guide was used to elicit the information to answer the research question. It was developed by the researcher since there was no tool available to answer the research question. Interviews were completed with 12 school nurses from the randomly selected school districts.

Limitations

The results of this study are drawn from a small sample. Therefore, the results of this study can only be generalized to the twelve school nurses who served as subjects.

The interview guide used has not been subject to any psychometric testing to examine its reliability and validity. Also, the tool is limited in the scope of questions and may not elicit enough thorough information from the subjects. No pilot study was performed to examine the need to revise the interview guide.

Despite limitations, some interesting data were generated from this study. The results are discussed in Chapters 4 and 5.
CHAPTER II
REVIEW OF THE LITERATURE

It is essential to review pertinent literature in order to explore school nurses' knowledge regarding the importance of changes in height in healthy children. Chapter II provides a review of the literature related to the: (1) the role of school nurses, (2) growth patterns of children aged 5-10 years and (3) methods of measuring and recording height in children. These topics form the conceptual framework for the study.

This is an exploratory, descriptive study which seeks information regarding school nurses' knowledge regarding growth in healthy children, aged 5-10 years. No similar studies regarding this information have been located.

Role of School Nurses

School nurses are nursing professionals whose practice domain is in an educational setting. According to the American Nurses' Association Task Force on Standards of School Nursing Practice (1983), the purpose of having school nurses is to improve students' response to the educational process by modifying or removing health-related barriers to learning and by promoting wellness. This role can be very complex and requires many skills of the nurse in this specialized practice area.

In 1903, school nurses were introduced to the United States educational system in New York City by Lillian Wald, a public health nurse (Edwards and Cowell, 1986). Their
major functions were to meet the physical needs of the children, prevent and control communicable diseases and educate children and families regarding health issues. The position, which was primarily a public health role, evolved to include responsibilities associated with the particular needs of a school population. For example, classes focused on nutrition for parents and teachers. Other health professionals, social workers, psychologists, health educators and therapists, joined the nurse in providing school system services. Over time, functions of school nurses such as the counseling function began to overlap with the functions of other professionals. School nurses then began to have a difficult time defining their role (White, 1985).

The challenges of developing and defining the role of the school nurses, have been compounded by changes in our society. In the present time, the number of children in the United States living in poverty, without health insurance or adequate insurance has increased dramatically. In addition, the structure of the American family, with an increase in the number of single parents, has changed. These changes can make it difficult for individual families to provide for adequate health care services and, consequently, they may rely on such caregivers as the school nurse. Public Law 94-142, a federal law requiring schools to provide education for all handicapped children, has further increased the complexities of school children's health care needs (Edwards and Cowell, 1986).

Adding to the responsibilities of school nurses has not resulted in an increase in the number of nurses to provide services. In fact, the numbers of nurses hired by the schools have continued to decline (Whited and Starke, 1989). This increases the student/nurse ratio and often may result in more fragmented services.
Despite many obstacles, school nurses are successful in meeting their many responsibilities (Wold, 1981). School nurses cite their primary function, and the one with which they are most comfortable, as providing physical care to students (Stone and Perry, 1990; Thurber, Berry and Cameron, 1991; White, 1985). This includes providing first aid and emergency care, assessing health characteristics in children and obtaining and reviewing health histories. These tasks can be overwhelming if there is a large population for which the nurse is responsible. Reviewing all the students' charts for evidence of required immunizations and health physicals, and completing the mandated screenings, is time consuming. In fact, these tasks can be so time consuming that it becomes nearly impossible for school nurses to accomplish anything else.

Tasks that received a lesser priority included those where the nurse acts as a facilitator (Thurber, Berry and Cameron, 1991; White, 1985). Functions in this category include counseling of students and families, providing faculty inservice programs, referring to available community resources and coordinating and directing health care for students. For school nurses, tasks which fall into the instructive, administrative and clerical domain of their practice hold a lesser priority than direct health care interventions such as immunization records or mandated screenings.

Clearly, school nurses frequently can only meet the acute demands of their students. This occurs despite a recognition that there are many additional services that school nurses could provide, such as teaching health promotion classes or becoming actively involved in research. The ability to meet only the acute demands of their students interferes with the goal of school nursing to improve the health of children and youth. According to Collis and Dukes
(1989), school nursing should be based on "four principles". These are: the provision of health care; recognition of the nurse as a source of knowledge and teacher; promotion of health in the school setting; and the recognition of the partnership of the children's parents. If these principles are applied in school nursing practice, promoting the health of the nation's children can occur.

There are many ways for school nurses to promote the health of children. Igoe (1990) suggests an eight-step plan. The plan includes monitoring changes in heights of children, an important indicator of overall health and well-being. However, with all the other tasks the school nurses must complete, height screenings are often not given a strong priority except when mandated by law. Continuing education, critical to maintain and improve practice (Felton and Parsons, 1993), could help school nurses increase their knowledge base regarding growth in children and consequently, promote the health of their students.

Since 95% of all children in the United States are enrolled in elementary and secondary schools (Igoe, 1990), large numbers of children can be screened and potential health problems identified by routine measuring and plotting of school children's heights. School nurses should measure and record the heights of all students for whom they are responsible. Records should be maintained from year to year and be sent to other schools with the children if they transfer. Screenings performed by nursing professionals can result in the identification of more potential problems than examinations by physicians because a larger population can be targeted (DeAngelis, Berman, Oda and Meeker, 1983).

In a public school system, access to nursing services such as disease prevention, health promotion and health protection, can be provided since, ideally, all children are
accepted. Lack of resources, disabilities and transportation should not be impediments to the provision of care.

In Illinois it is not mandated that a professional nurse be hired in individual schools. If schools choose to hire nurses, the state sets the minimum requirements for certification. An Illinois state professional nursing license is required, as is a baccalaureate degree; however, the degree does not necessarily need to be in Nursing. In addition, there are required courses that must be completed. These include public and community health nursing, psychology, sociology, growth and development, education, nutrition, communication and administration. A ten week internship is also required before the nurse is granted an Illinois Certificate 73 and can practice as a school nurse (Minimum Requirements for State Certificates, Illinois State Board of Education, 1992). According to Ruthann Sanders, President-Elect, Illinois Association of School Nurses, (personal communication, July 10, 1993), eighty-five percent of the school districts in Illinois have certified school nurses practicing in their districts. However, a district may have a nurse with a state certification in a supervisory role over non-certified nurses or health aides. Therefore, the non-certified nurses or health aides may actually provide the physical care to school children.

The role of school nurses is to promote the health of their students. An easy way to assess whether children are healthy is to make sure the children are growing at the appropriate rate for their age.
Growth Patterns of Children Aged 5-10 Years

Much has been written about physical growth in children. Growth patterns are unique for each stage of growth and development. Children, aged 5-10 years, should show a growth rate in height of 2-2.5 inches (5-6.5 cm) per year (Amer et al., 1992).

Linear growth occurs in the epiphyses of the long bones. Growth is influenced by hormonal controls from the pituitary, thyroid, pancreas, gonadal and adrenal glands (Aceto et al., 1990; Amer et al., 1992; Coody and Stevens, 1989). The primary hormone responsible for an increase in height in children, aged 5-10 years, is growth hormone (GH) secreted from the anterior pituitary. Aceto et al., 1990; Amer et al., 1992; and Coody and Stevens, 1989 provide detailed explanations for the hormonal control of growth as described in the next four paragraphs.

Growth hormone secretion is controlled by the hypothalamus which releases growth hormone releasing factor (GHRF). The GHRF stimulates the anterior pituitary to secrete growth hormone (GH). This release occurs several times a day in pulsatile bursts of growth hormone, so the serum level of growth hormone is not consistent. In children, many of these releases of growth hormone occur during sleep.

Growth hormone circulates in the blood stream and enters the body tissues. In these tissues, primarily the liver, growth hormone is converted to insulin-like growth factor (IGF1). The IGF1 stimulates the epiphyseal plates (growth plates) of the long bones. Here, the cells reproduce and create limb lengthening and, thus, height increases.
Negative feedback to the hypothalamus is regulated by growth hormone and IGF1. The hypothalamus secretes somatostatin which modulates the amount of growth hormone secreted by the anterior pituitary.

Linear growth can only occur before the epiphyseal plates are fused. During puberty the epiphyseal plates close or fuse. Once this fusion occurs, further linear growth is not possible. This validates the importance of recognizing and treating growth disorders as early as possible.

When children do not maintain the growth rate for their appropriate developmental level, a serious pathological condition could be the cause and further evaluation is necessary (Amer et al., 1992; Coody and Stevens, 1989; Henry, 1992). Growth disorders, both excessive growth and insufficient growth, can be treated. A complete history and physical should be performed when children are not growing at the proper rate for their developmental stage. Underlying illnesses must be ruled out as the cause of the growth problem. If no underlying condition is found, immediate further assessment and evaluation are indicated because the treatment time for a growth disorder is limited.

The first symptom of chronic illness, in previously healthy children, may be growth failure. Children have a great physiologic ability to compensate when they are ill. However, the demands of growth may not be able to be met and growth failure can result. Conditions such as diabetes mellitus, celiac disease, inflammatory bowel disease, renal disease hypothyroidism, genetic syndromes and neoplasms must all be considered as possible causes of growth failure. If there is an underlying disease process or condition causing the growth failure, it must be treated to restore and maintain health. If the cause of growth failure is due
to growth hormone deficiency, treatment with replacement therapy can begin (Aceto et al., 1990; Amer et al., 1992; Coody and Stevens, 1989; Henry, 1992; Parker, 1992). This will allow the child to attain his genetically targeted height.

Excessive growth may be indicative of a pathological condition as well. Conditions such as neoplasms, genetic syndromes, endocrine dysfunctions and precocious puberty may cause a too rapid growth rate. If the excessive growth is due to a neoplasm, it must be treated. Conditions that cause excessive growth due to endocrine factors can be treated as well (Aceto et al., 1990; Coody and Stevens, 1989; Parker, 1992). Hormone therapy can be used to slow the growth rate to normal. This allows the children to grow over a longer period of time. An early and rapid increase in height ultimately results in premature closure of the epiphyseal plates, and hence a final height that is less than their genetic target.

In order to identify a potential growth disorder in a child, the individual's change in height must be known. It is the significance of the pattern of change in height, not necessarily the child's individual size that is the important factor in the identification of potential growth disorders (Amer et al., 1992, Henry, 1992, Parker, 1992). The method used to reflect or communicate changes in height in children is another factor which must be considered.

Measurement and Recording of Height in Children

In order to assure that children are maintaining appropriate growth rates, proper measurement and recording of results are necessary. An accurate record of children's heights compiled over time is one of the best indicators of a growth disorder (Amer et al., 1992; Henry, 1992). Since growth disorders have a limited treatment time and may be indicative of a serious health problem, school nurses should be aware of the importance of their role in
measuring and plotting children's growth rates (Parker, 1992). It is imperative that the height measurements be accurate and the results correctly plotted on growth charts or the nurse's efforts are futile (Cross, 1985).

To accurately measure children's heights so that reliable, reproducible records are obtained, a stadiometer should be utilized (see Appendix A). This piece of equipment has a moveable headpiece secured at a ninety degree angle to a measuring device. It is designed to obtain the most accurate measurements when used correctly. The standard doctor's scale with a floppy arm measuring device does not ensure a ninety degree angle between the top of the child's head and the measurement stick. If a ninety degree angle is not maintained during the measuring procedure, the results can vary significantly (Amer et al., 1992; Henry, 1992; Parker, 1992). A tape measure affixed to a wall should not be used either since it can stretch and cause inaccurate measurements as well (Henry, 1992).

Amer et al. (1992) lists several details regarding positioning a child for measurement and how to measure. The child stands with feet and legs together; heels, backs of knees, shoulders and occiput against the stadiometer or wall; and with the head lifted in the Frankfort plane position. To maintain accuracy, any hair accessories such as hair clips, braids or ponytails should be removed. Once the child is in proper position, the moveable head plate is then brought down until it touches the top of the child's head. This step should be repeated three times with positioning checks between each measurement.

Once an accurate result is obtained, it is necessary to plot the height measurement on each child's individual growth chart. The most common growth charts are compiled by the
National Center for Health Statistics (Hamill et al., 1979). There are separate charts for boys and girls as well as different charts for different age groups (see Appendix B).

Growth charts are simple graphs with one axis listing ages and the other axis listing measurements in either inches or centimeters. These charts are divided into percentile channels. The divisions are at the 5th, 10th, 25th, 50th, 75th, 90th and 95th percentiles. The 50th percentile is the statistical mean. For example, children whose height measurements fall on the 50th percentile are smaller than 50% of the children the same age and taller than 50% of children the same age. The space between percentiles is called a growth channel. The percentiles allow for the variation among children of the same age.

To use the growth charts, the exact age of the child must be known (Amer et al., 1992). A dot or X is marked where the age and measurement lines cross. These consistent plots of height measurements indicate the pattern of change in height. By the age of 3 years, children establish a growth channel or percentile and should not deviate from it. If they do, it is a signal that there may be an underlying growth disorder and further evaluation may be warranted (Amer et al., 1992; Henry, 1992; Parker, 1992).

In order to recognize normal growth patterns and changes in height as indicators of overall health, monitoring of children's growth patterns must occur. A minimum of at least two accurate measurements at least two months apart are necessary to calculate changes in height and recognize a pattern of growing (Amer et al., 1992; Henry, 1992). This can be accomplished by a variety of health care professionals who encounter children, specifically school nurses (Igoe, 1990; Parker, 1992).
Summary

In Chapter II the literature was reviewed regarding the role of school nurses, growth patterns of healthy children, aged 5-10 years and methods of measuring and recording height in children. This study seeks to answer the research question: What is the knowledge base of school nurses' regarding the importance of monitoring changes in height and recording that information on individual growth graphs in healthy children, aged 5-10 years? In Chapter III the methodology of the study conducted to answer the research question is discussed.
CHAPTER III

METHODOLOGY

The overall purpose of this exploratory, descriptive study was to explore school nurses' knowledge base with regard to measuring and recording children's heights. A questionnaire was used to obtain demographic data about the subject group. Then, an open-ended interview guide was used to answer the research question. This chapter includes a discussion of the study design, sampling procedures, subjects and data analysis procedures. Approval to conduct the study was obtained from the Institutional Review Board at the institution the investigator was attending.

Research Question and Design

This study seeks to establish what is school nurses' knowledge base of the importance of monitoring changes in height and recording that information on growth charts in healthy children, aged 5-10 years? An exploratory, descriptive survey research design was used to seek this information from the identified subject group. The setting in which the study was conducted is also described.

Research Question

The research question that this study seeks to answer is: What is the knowledge base of school nurses with regard to the importance of monitoring changes in height and recording that information on individual growth charts in healthy children, aged 5-10 years?
Research Design

An exploratory, descriptive survey research design was used to answer the research question. No similar study was found when the literature was reviewed. The investigator sought to elicit information about the subject groups' knowledge base.

Setting

The setting for this study was two counties in northeastern Illinois. Cook County, Illinois, an urban county in a major city, was purposefully selected in order to ensure representation from a major city. The five counties that surround Cook County and share a common border were identified as collar counties. These include: DuPage, Kane, Lake, McHenry and Will counties. One collar county was randomly selected. This allowed for comparison of subjects from each setting.

Research Sample

Next the aspects of the research sample used in the study are discussed. These include the selection of subjects and a description of the subjects.

Selection of Subjects

The list of collar counties was alphabetized and ordered numerically. Then, by using a table of random numbers (Burns and Grove, 1987), a county selected.

The school districts in each county were obtained from the 1992 Illinois Department of Revenue School District Codes and a random cluster sampling method was used to choose the school districts. The alphabetized lists of school districts in each county were numbered, and, using a table of random numbers, school districts were selected. The desired N for each county was six. However, in order to control for potential subject refusal; or lack of school
nurse in a particular district, a larger sample from each county was randomly selected. In Cook County, twelve districts were randomly chosen and give a number from 1 to 12 reflecting the order in which they were selected. In the collar county all nine districts were numbered in the order in which they were randomly chosen. The school districts were approached in their numerical order. Two of the first six randomly selected districts in Cook County did not employ school nurses and could not be used. Eight district offices were contacted before the sample N=6 was obtained. In the collar county, the sample N=6 was met from the first six districts contacted.

Subjects

In this study, the subjects are school nurses caring for children aged 5-10 years in the randomly selected school districts. Not all subjects participating were certified school nurses. A supervisor or director may have been that district's certified school nurse but not have actually cared for children aged 5-10 years. Subjects selected were those who actually provide nursing care to the desired age group. The subjects verbally agreed to participate after the study was explained to them and any questions they had answered. They were informed that their responses were confidential. Detailed information was sought about the subject group as part of the data collection procedure and is discussed in Chapters IV and V.

Research Procedure

In this section, the research tools, including the Demographic Data Sheet and open-ended interview guide (see Appendix C), are presented. The methods for administering the instrument and analyzing the research data are discussed.
Instrumentation

A Demographic Data Sheet was used to elicit detailed information about the subject groups and their practices. This was done in order to learn more about the subjects who were participating in the study.

An open-ended interview guide was used to assess each school nurses' knowledge of growth in healthy children, aged 5-10 years; the importance of accurate measuring and recording heights in order to identify growth patterns or problems in children; and, the school nurse's role in monitoring height changes in this population. Specifically, the following information was sought:

(a) knowledge of growth patterns, specifically changes in height, in healthy children, aged 5-10 years;
(b) cognizance of common growth disorders in children, aged 5-10 years;
(c) awareness of methods of obtaining accurate height measurements;
(d) methods of recording height measurements;
(e) familiarity with and use of appropriate growth charts;
(f) awareness of the importance of individual graphs representing changes in height;
(g) cognizance of the importance of the school nurse in measuring, recording and maintaining growth records;
(h) barriers school nurses face in completing this task; and
(i) recent continuing education regarding growth in children.
No appropriate tool to obtain the desired information was available from the literature. Therefore, an interview guide was designed by the investigator for use in this study. No psychometric data are available for this tool.

The tool was developed directly from the research and the three components of the conceptual model identified in the review of the literature. This was done in an attempt to control the construct validity of the tool. A practicing school nurse reviewed the tool for content validity. The validity of the study was strengthened because the investigator compared her analysis of the subjects' responses with a second reader.

After the interview was completed, the subjects generally requested to discuss their responses with the investigator in order to obtain information about the subject matter. Therefore, the reliability of the tool is untested.

An open-ended interview has many advantages. The subjects are able to respond to the question in their own words and are able to expand and identify areas not considered by the researcher. In an interview, the question can be clarified if the subject does not understand what is being asked.

Although the interview has some advantages, there are also many disadvantages. Conducting an interview is time consuming. Since the interview guide was not pre-tested or piloted, no revisions or clarifications after a trial use could be incorporated into the tool. During an interview, the investigator's behavior can lead the subjects to answer the question or change their initial response.
Method of Data Collection

After the school districts were randomly selected, the Superintendent's Office in each district was contacted by telephone. The investigator identified herself and explained the purpose of the study. Permission was sought to speak with a school nurse caring for children aged 5-10 years in that district. In Cook County, four of the superintendents gave the investigator a telephone number to directly contact a school nurse. One referred the request to the principal of the grammar school and asked that he grant the permission. After the investigator explained the purpose of the telephone call and how the principal's number was obtained, permission to call the school nurse was given. The sixth superintendent referred the investigator to the Special Education Services Office, the administrative office for that district's nurses. After speaking with an official in that department, the investigator was given the telephone number of a school nurse.

In the collar county, the same procedure for contacting the school districts was followed. After speaking with the Superintendent's Office in two districts, the investigator was put in contact with a school nurse by a direct telephone number. In one district the investigator was asked to contact the Director of Special Education Services. After speaking with this person, the investigator was given permission to directly contact the nurse. In the three remaining districts, the investigator was asked to contact the Personnel Office. After an explanation regarding the study, the investigator was given telephone numbers to directly contact the nurses.

Each school nurse was contacted by telephone. The investigator identified herself and explained the purpose of the study. Each nurse was informed that the district office had been
contacted and directed the investigator to the individual nurse. Nurses were given the opportunity to ask questions about the study and their permission to serve as subjects was verbally sought. The nurses were informed that they would be asked to complete a Demographic Data Sheet and participate in an interview which would be audio-recorded. Their confidentiality and their school district's confidentiality was assured. None of the nurses contacted refused to participate. A time for the interview was arranged to accommodate the nurse's schedule.

All twelve interviews were conducted between March 28, 1994 and April 19, 1994 at the nurses' schools, either in their offices or in conference rooms. One interview was conducted in the faculty cafeteria due to lack of space in the nurse's office. The nurses were asked if they had any questions regarding the study or interview process and their questions were answered before the interview began. Immediately prior to the interview each nurse completed the Demographic Data Sheet. The audio-taped interview took approximately twenty minutes to complete. Shortly after the interview, the responses were type-transcribed. Both the Demographic Data sheet and audio-tape were assigned a code number to maintain confidentiality.

In appreciation for participating, the nurses were given educational materials regarding growth in children. If the nurses desired stadiometers, arrangements were made to have them shipped to the schools without cost.

Analysis of Data

Data were obtained from the Demographic Data Sheet and the responses to the interview. Data were analyzed using both quantitative and qualitative methods. Demographic
information was sought from the two groups of subjects, the Cook County group and the collar county group, to learn about each group. The groups were compared for similarities and differences.

The information obtained in the interviews was reported in terms of commonalities and differences in responses of the school nurses in the twelve grammar schools. The coded, typed transcriptions were first analyzed by using a manifest content analysis. Units of information, i.e. specific words, phrases, descriptors and terms were counted (Woods and Catanzaro, 1988) and the results reported in percentages. Then, latent manifest content analysis was used. In this analysis the transcriptions were reviewed in terms of understanding the "underlying meanings" of the answers (Woods and Catanzaro, 1988). Conclusions were then drawn from the results. The analysis of the data is in Chapter IV and discussion is in Chapter V.

Summary

In summary, the research design was selected to answer the research question: What is the knowledge base of school nurses with regard to the importance of monitoring changes in height and recording that information on individual growth chart graphs in healthy children, aged 5-10 years? The unique sample was randomly selected from school nurses practicing in the specified setting. The instrumentation used in the study as well as the method of collecting and analyzing the data are discussed. The analysis of the data collected is in Chapter IV.
CHAPTER IV

DATA ANALYSIS

In this chapter, data obtained in the study are analyzed. Information obtained from the Demographic Data Sheet is discussed followed by data obtained during the interview.

Demographic Data Analysis

Once the subjects agreed to participate, they were asked to complete a Demographic Data Sheet. This information was sought to learn about the background of the subject group. The subjects were assigned a code number to maintain confidentiality.

The first question on the Demographic Data Sheet asked about the number of years the subject had been in the nursing profession. In Cook County, the range of years in nursing was 17 to 30 years with a mean of 24 years. The range of years in nursing in the collar county was 10 to 31 years with a mean of 23.8 years.

In response to the question about the number of years the subject had been practicing as a school nurse, Cook County nurses had a range of 1.5 to 19 years with a mean of 11.75 years. The collar county nurses had been in school nursing between 0.7 years and 13 years with a mean of 6.3 years.

The subjects were asked about the number of years in the current school nurse position to obtain more information about their practices. For both subject groups the range of years in the current position was the same as the range for years in practice as a school nurse.
nurse. However, the means were different. For the Cook County subjects, the mean number of years in the current position was 9.9 years and in the collar county 6.3 years. Tables 1 and 2 show the number of years in the present school nurses positions for all subjects.

TABLE 1
YEARS IN CURRENT POSITION: COOK COUNTY SUBJECTS

<table>
<thead>
<tr>
<th>Number of Years</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0.</td>
<td>1</td>
</tr>
<tr>
<td>3.0.</td>
<td>1</td>
</tr>
<tr>
<td>7.0.</td>
<td>1</td>
</tr>
<tr>
<td>14.0.</td>
<td>1</td>
</tr>
<tr>
<td>15.0.</td>
<td>1</td>
</tr>
<tr>
<td>19.0.</td>
<td>1</td>
</tr>
</tbody>
</table>

TABLE 2
YEARS IN CURRENT POSITION: COLLAR COUNTY SUBJECTS

<table>
<thead>
<tr>
<th>Number of Years</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.7.</td>
<td>1</td>
</tr>
<tr>
<td>2.0.</td>
<td>1</td>
</tr>
<tr>
<td>7.0.</td>
<td>2</td>
</tr>
<tr>
<td>8.0.</td>
<td>1</td>
</tr>
<tr>
<td>13.0.</td>
<td>1</td>
</tr>
</tbody>
</table>

There was a wide variation in the number of students for which each school nurse is responsible. In Cook County, the range was 350 to 3500 students with a mean of 1248. The
range in the collar county was 1200 to 2700 students with a mean of 1758.3. Tables 3 and 4 show the range in the number of students for which each subject is responsible.

TABLE 3

NUMBER OF STUDENTS: COOK COUNTY SUBJECTS

<table>
<thead>
<tr>
<th>Number of Students</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>350</td>
<td>1</td>
</tr>
<tr>
<td>500</td>
<td>1</td>
</tr>
<tr>
<td>938</td>
<td>1</td>
</tr>
<tr>
<td>1100</td>
<td>2</td>
</tr>
<tr>
<td>3500</td>
<td>1</td>
</tr>
</tbody>
</table>

TABLE 4

NUMBER OF STUDENTS: COLLAR COUNTY SUBJECTS

<table>
<thead>
<tr>
<th>Number of Students</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>1200</td>
<td>2</td>
</tr>
<tr>
<td>1450</td>
<td>1</td>
</tr>
<tr>
<td>2000</td>
<td>2</td>
</tr>
<tr>
<td>2700</td>
<td>1</td>
</tr>
</tbody>
</table>

Data about nursing education revealed that in Cook County, four subjects (66.6%) received their basic educational preparation through a diploma program and two (33.3%) through a baccalaureate program. Three subjects in the collar county (50%) had basic nursing preparation at the diploma level and three (50%) through a baccalaureate program. Three of the subjects (50%) in Cook County had a baccalaureate degree. One had a BSN, another had
a BS in Health Occupations and the third received a BS in Allied Health with a Concentration in School Nursing. All six subjects (100%) in the collar county had attained a baccalaureate degree. Four had a BSN, one had a BA in School Nursing and the other a BS in Health Arts.

Three of the subjects in Cook County (50%) held the Illinois Type 73 Certificate and were certified school nurses. In the collar county, five of the subjects (83.3%) were certified school nurses.

Of the subjects in Cook County, three (50%) held additional certifications. One held a school nurse certification from the American Nurses' Association (ANA). Two other subjects held State of Illinois audio and vision screening certificate. Two collar county nurses (33.3%) listed additional certifications. One held a certificate from the American Red Cross and the other a State of Illinois audio and vision screening certificate.

Data about personal statistics revealed that the subjects were a mature group between the ages of 36 and 60 years. Tables 5 and 6 compare the differences in age ranges between the two subject groups. Finally, in both groups, all subjects (100%) classified themselves as married.
TABLE 5

AGE: COOK COUNTY SUBJECTS

<table>
<thead>
<tr>
<th>Age (in Years)</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>36-40</td>
<td>0</td>
</tr>
<tr>
<td>41-45</td>
<td>1</td>
</tr>
<tr>
<td>46-50</td>
<td>2</td>
</tr>
<tr>
<td>51-55</td>
<td>2</td>
</tr>
<tr>
<td>56-60</td>
<td>1</td>
</tr>
</tbody>
</table>

TABLE 6

AGE: COLLAR COUNTY SUBJECTS

<table>
<thead>
<tr>
<th>Age (in Years)</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>36-40</td>
<td>1</td>
</tr>
<tr>
<td>41-45</td>
<td>2</td>
</tr>
<tr>
<td>46-50</td>
<td>1</td>
</tr>
<tr>
<td>51-55</td>
<td>2</td>
</tr>
<tr>
<td>56-60</td>
<td>0</td>
</tr>
</tbody>
</table>

Interview Data Analysis

Data regarding the subjects' knowledge of growth in healthy children, aged 5-10 years, and the importance of monitoring the height of children were analyzed by examining the subjects' responses to the questions in the interview guide. A manifest content analysis method was used to interpret the subject's responses (Woods and Catanzaro, 1988).

The first question of the interview guide was designed to determine if the subjects knew the expected yearly growth rate for healthy children, aged 5-10 years. Tables 7 and 8 show the subjects' responses.
TABLE 7

EXPECTED YEARLY GROWTH RATE FOR
HEALTHY CHILDREN, AGED 5-10 YEARS:
COOK COUNTY SUBJECTS

<table>
<thead>
<tr>
<th>Response</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Don't Know</td>
<td>2</td>
</tr>
<tr>
<td>2 Inches</td>
<td>2</td>
</tr>
<tr>
<td>About 2 Inches</td>
<td>1</td>
</tr>
<tr>
<td>2-3 Inches</td>
<td>1</td>
</tr>
</tbody>
</table>

TABLE 8

EXPECTED YEARLY GROWTH RATE FOR
HEALTHY CHILDREN, AGED 5-10 YEARS:
COLLAR COUNTY SUBJECTS

<table>
<thead>
<tr>
<th>Response</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Don't Know</td>
<td>3</td>
</tr>
<tr>
<td>1/2 Inch</td>
<td>1</td>
</tr>
<tr>
<td>1-1 1/2 Inches</td>
<td>1</td>
</tr>
<tr>
<td>1-2 Inches</td>
<td>1</td>
</tr>
</tbody>
</table>

Two of the Cook County subjects (33.3%) and three of the collar county subjects (50%) stated that they did not know the expected yearly growth rate for healthy children, aged 5-10 years. Two Cook County subjects (33.3%) stated "two inches" while one Cook County subject (16.6%) said "about two inches". "Two to three inches" was the response of the remaining Cook County subject (16.6%). One of the collar county subjects (16.6%)
stated "1/2 inch per year" while another collar county subject said "one to one and a half inches per year". The remaining collar county subject (16.6%) stated "one to two inches".

In Cook County, the responses to the question on the number of times students in the subject's care were screened for height ranged from "never" to "monthly". One subject (16.6%) never measures the students, two subjects (33.3%) reported measurements are obtained at the kindergarten and fifth grade physicals, two subjects (33.3%) measure once a year and one (16.6%) measures once a year and then monthly if a problem is noted. The collar county responses also varied from "never" measuring to "once a year". One subject (16.6%) never measures students, four (66.6%) stated only at the kindergarten and fifth grade physicals and one (16.6%) measures once a year.

In response to the question on how students are selected to be measured, the answer "all students are measured", was given by three Cook County subjects (50%). Two Cook County subjects (33.3%) said that no students in their care are measured. One Cook County subject (16.6%) responded that students who appear out of the expected ordinary size for age are the only children selected for measurement. In the collar county group one subject (16.6%) stated that all students are measured while two subjects (33.3%) in this group measure none of their students. Three of the collar county subjects (50%) stated that students are not routinely measured but that selected students may be measured if the subject feels height measurement is indicated.

When questioned about the type of measuring device used to obtain students' heights, all of the Cook County subjects (100%) have a standard doctor's scale with a floppy arm measuring device available. Three of the collar county (50%) subjects use the same device.
One collar county subject (16.6%) uses a tape measure on the wall for measurements. Two of the collar county subjects (33.3%) have nothing available to measure students.

The subjects were then asked how they would position a child for a height measurement. Amer et al. (1992) describe the proper positioning for height measurement. Children should stand with their feet and legs together; their heels, backs of knees, shoulders and occiput should be against the stadiometer or wall; and the head should be lifted in the Frankfort plane position. Additionally, the children's arms should be at their sides, shoes and socks off and any hair ornaments removed. None of the subjects gave a complete detailed description for accurate height measurement. However, two of the Cook County (33.3%) subjects' responses and those of five of the collar county (83.3%) group included more than one criterion for positioning. Four of the Cook county subjects (66.6%) and one collar county subject (16.6%) did not include at least two measuring criteria in their answers.

Data from the question inquiring if the subjects plotted the children's height measurements on a standard growth chart revealed that in the Cook County group five subjects (83.3%) did not put height measurements on a growth chart nor did four subjects (66.6%) of the collar county group. One Cook County subject (16.6%) stated that this was the first year that heights would be plotted. Two of the collar county subjects (33.3%) routinely plot students' measurements on growth charts.

In response to the question on growth patterns or heights that would cause them concern, more than one answer was accepted from each subject (see Tables 9 and 10).
The subjects gave a variety of responses to this question. Two of the Cook County subjects (33.3%) and five collar county subjects (83.3%) are concerned with children who are very small in stature. Children whose growth is not progressing are a concern of three of the Cook County subjects (50%) and two of the collar county group (33.3%). Tall statured children cause one Cook County subject (16.6%) and two collar county subjects (33.3%) to be concerned. Two Cook County subjects (33.3%) and one collar county subject (16.6%)
are concerned if children are overweight. Gaining more than twenty pounds in one year is alarming to two Cook County subjects (33.3%). A large growth spurt is given by one Cook County subject (16.6%) as a cause for concern. Lastly, children who are below the percentiles on standard growth charts are a concern to one collar county subject (16.6%).

When subjects were asked what they would do if they are concerned about a child's growth pattern or height, more than one response was given by the subjects. Tables 11 and 12 show the subjects' responses.

All of the Cook County subjects (100%) and five of the collar county subjects (83.3%) stated that if they had a concern with a child's growth pattern, they would call the child's parents. One Cook County subject (16.6%) and one collar county subject (16.6%) stated they would look at that individual's family growth patterns and size to see if the child's growth pattern or size was similar. Checking the medical records was a response given by one Cook County subject (16.6%) and one collar county subject (16.6%). Two subjects in the collar county (33.3%) stated that they would directly call the child's physician if they had a concern. Remeasuring the child at a later date was a response given by two subjects. A Cook County subject (16.6%) stated that she would remeasure the child in six months while the collar county subject (16.6%) would monitor the child's height monthly. One collar county subject (16.6%) stated that she would talk with the child's teacher.
Subjects differed in their views on height screening as an important role for the school nurse to perform. Four of the Cook County subjects (66.6%) and three of the collar county subjects (50%) see this as an important task. Another collar county subject (16.6%) thinks it is an important task but that it is impossible to accomplish. One Cook County subject
(16.6%) and one collar county subject (16.6%) do not think that height screening is a task that is important for them to perform. Two subjects, one Cook County subject (16.6%) and one collar county subject (16.6%) are undecided if height screening is an important task for the school nurse to perform.

In response to the question on obstacles school nurses face that could prevent them from performing height screenings and plotting the results, the subjects gave multiple answers. Tables 13 and 14 show the subjects' responses.

**TABLE 13**

**OBSTACLES TO PERFORMING HEIGHT SCREENINGS: COOK COUNTY SUBJECTS**

<table>
<thead>
<tr>
<th>Obstacles</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack Of Time</td>
<td>4</td>
</tr>
<tr>
<td>Too Many Students</td>
<td>1</td>
</tr>
<tr>
<td>Lack Of Privacy</td>
<td>1</td>
</tr>
<tr>
<td>Teachers' Cooperation</td>
<td>1</td>
</tr>
<tr>
<td>No Obstacles</td>
<td>1</td>
</tr>
<tr>
<td>Lack Of Medical Follow-Up</td>
<td>0</td>
</tr>
</tbody>
</table>
Lack of time and a busy schedule was the response given by four Cook County subjects (66.6%) and five collar county subjects (83.3%). The large number of students for which the subjects are responsible for was the response of one Cook County subject (16.6%) and three collar county subjects (50%). The lack of private space to perform screenings was a response of one Cook County subject (16.6%). Another Cook County subject (16.6%) found getting the cooperation of other teachers with whom the students were in class with at the time an obstacle. One Cook County subject (16.6%) stated that there were no obstacles to performing height screenings and plotting the results. The lack of available medical follow-up was an obstacle that one collar county subject (16.6%) cited.

When asked if they had any recent educational program or inservice regarding growth in children, five of the Cook County subjects (83.3%) stated they had not recently received any information on this topic. One subject (16.6%) had, within the past year, attended a
lecture about growth in children. Among the collar county subjects, none of the six (100%) had recently had any education regarding growth.

Summary

In this chapter, the data collected using the demographic sheet and in the interview is analyzed. In the next chapter the above data are discussed in detail. The responses of the subjects are examined to fully understand their meanings.
CHAPTER V
DISCUSSION

In this chapter, a discussion of the data is provided. Latent manifest content analysis is used to understand the "underlying meaning" of the subjects' response to the interview questions (Woods and Catanzaro, 1988).

Discussion of Demographic Data

The information obtained from the Demographic Data Sheet gives insight into the subject groups. In general, they are very similar. Both groups represent many years in nursing practice. The Cook County group had been in nursing for between 17 to 30 years and in the collar county group between 10 and 31 years.

The range of years practicing as a school nurse was also similar in both subject groups. However, the subjects in Cook County had a higher mean, indicating this group had more collective years in school nurse practice. Over half of the Cook County subjects had been in their current positions longer than the collar county subject with the greatest number of years of experience.

One difference between the two groups was the number of students for which the subjects had responsibility. The range in numbers of students in Cook County were much larger than that of the collar county. However, the mean in the collar county was almost 500
students higher. This indicates that, in general, the collar county subjects were individually responsible for a greater number of students.

In general, the majority of subjects had received formal education beyond their basic nursing preparation. All six of the collar county subjects held baccalaureate degrees while only half of the Cook County subjects did. Also, five of the six collar county subjects had Illinois State Certification 73, compared to three subjects in Cook County. In general, the collar county group had more formal education leading to a college degree and on the principles of school nursing than the Cook County group.

Although there were some differences, the two subject groups had many similarities. It must be noted however, that the subject groups for both counties are small. The general demographic data about the subject groups can only be generalized to these school nurses. Next the discussion of the analysis of the information obtained during the interview guide will be presented.

Discussion of Interview Data

The first interview question seeks to determine whether the subjects are aware that the expected yearly growth rate for healthy children, aged 5-10 years, is 2 to 2.5 inches (Amer et al., 1992). None of the subjects gave that exact answer. However, four Cook County subjects and one collar county subject gave responses that fell somewhere in the expected growth range. A response of "don't know" was given by two of the Cook County subjects and three of the collar county subjects. Two of the collar county subjects gave responses that were not within the expected range. The majority of the Cook County subjects were able to give answers that fell within the range of normal. However, from these
responses, evidently the expected growth rate for healthy children, aged 5-10 years, is not a part of either group's general knowledge base.

The second question sought to ascertain how often the subjects measure children in their schools. Three of the six Cook County subjects measured the children once a year. One of those subjects further qualified her answer by adding that monthly follow-up is done if a problem is noted at the initial measurement. In the collar county, one of the six measured students once a year. One subject in Cook County and one in the collar county never measures students. Two of six Cook County subjects and four of the collar county subjects responded that measurements are done at kindergarten and fifth grade. It should be noted that these are the times the State of Illinois mandates by law that school children have physicals to enter or stay in school (Illinois Complied Statues, 1992). The subjects accepted the measurements that were obtained by the individual children's health care providers. The subjects' only concern is to see that the measurement has been obtained.

As part of the interview, the nurses were given opportunities to elaborate on their answers. Responses to the question regarding why they did or did not measure children included: "...student I might be following for [um] failure to thrive or obesity"; "once in a blue moon an isolated child that we're concerned about" and "the kindergarten does it as a math project, it just happens that I do it, they do it in here" (the nurse's office).

Although 50% percent of the Cook County nurses do measure students, this is not the standard for both subject groups in general. The majority of subjects do not include measuring of students as part of their yearly routine.
In response to the question on how the subjects select students for height measurement, if they did perform this task, the majority of subjects stated that routine measuring of students does not occur. However, some subjects stated their reasons for selecting a few students to be measured. The Cook County subject who did not routinely measure students stated, "Just someone who seems out of the ordinary, maybe too tall or two short for the rest of the classroom, often it's a teacher recommendation". The collar county subjects who only periodically measure, responded with qualifying statements as well. These included: "...Not measured unless some particular concern. There is no routine measuring.", "Eyeball or visual assessment to identify. Or perhaps a child that the teacher is concerned about..." and finally: Not regularly in my education population. Well, I have done, if I have a youngster whom I'm concerned about, yes I do measure. That's happened a few times in the last seven years that I have weighed and measured kids I was concerned about like overweight or underweight. Sometimes by eyeballing appearance or sometimes by teacher report or the PE teacher will bring it to my attention.

These responses suggest that no scientific method is used by these subjects to identify children whom they measure. The subjects instead choose to use intuition or input from other school professionals. The subjects' responses about current practices do not indicate that knowledge about growth of healthy children, aged 5-10 years, is applied to their selection of students to be measured.

The fourth question sought information about the type of measuring device the subjects had available. All six of the Cook County subjects and three of the collar county subjects had a standard doctor's scale with the floppy arm measuring device. One collar
county subject had a tape measure on a wall to use for measurements. Two of the collar county subjects had nothing available to measure students. The majority of subjects had some instrument to measure heights even if they never performed this task.

The devices available to these subjects was not the stadiometer (Figure 1), the instrument designed to give the most accurate and reliable measurements (Amer et al., 1992).

The next question pertained to the height measuring procedure. As stated by Amer et al. (1992) not only is a proper measuring device necessary but, also, proper positioning of the children in order to obtain accurate and reliable measurement results. None of the subjects in either group were able to give detailed answers regarding positioning for height measurements.

Two of the Cook county subjects and five of the collar county subjects included at least two positioning requirements in their answers. One Cook County subject stated she had no idea how to position children for height measurement. Three Cook County subjects and one collar county subject gave incomplete answers saying that the children's backs are to the measuring device but no other positioning detail.

Two Cook County subjects and one collar county subject stated that students are asked to remove their shoes. Two Cook County subjects said that shoes are not removed but this could affect the accuracy of the measurement. Understanding the importance of proper positioning in obtaining accurate heights is not a part of either subject groups' knowledge or practice.

The sixth question sought to determine whether students' height measurements are recorded and plotted on standard growth charts. Also, the researcher asked subjects for a
sample of one of the student's charts. This information was sought because once accurate height measurements are obtained, the results should be plotted on a standard growth chart (Hamill et al., 1979). Children's results should be on their own individual charts so a pattern of growing can be recognized. If height measurements are not plotted on growth charts and individually analyzed, the effort of measuring is futile (Cross, 1985).

In Cook County, only one subject plots height results on standard growth charts. This subject added that this was the first year that this was being done in her district. This interview was conducted at the district office rather than a school so no student health records were accessible to the investigator. In the collar county group, two subjects said that student's heights are recorded on standard growth charts.

One of these subjects stated, "I was recently encouraged by another school nurse not to plot but I did so because I felt it was important to identify children who fell below the percentile." This subject did not show an actual student record when asked but showed an example of the standard growth chart. She stated that there are different charts for boys and girls. She was able to independently explain how to plot a height measurement requiring the age of the child and the height measurement. The other collar county subject who plots heights stated she does so on the children whose height she monitors. This interview was conducted at the district's high school for the school nurse's convenience; no records were available for examination.

One Cook County subject stated that she does not plot heights on individual growth charts. However, she said that she does have a growth chart and would "spot" a child's height on it if she were concerned; "We've only had a couple of kids off the chart in either direction."
Three Cook County subjects did show examples of the comparison records or physical forms on which students' heights were recorded. These were simply lists of height measurements from each year obtained.

Although a few subjects use standard growth charts, they are primarily looking for individual children whose heights are either above or below the standard percentiles. Certainly children who are outside of the standard percentiles are at risk for growth disorders but so are children whose measurements fall within the standard percentiles. None of the subjects was able to state the purpose of plotting heights on individual growth charts as a tool to examine each child's individual patterns of growing.

Question seven asked what growth patterns or heights caused the subjects to be concerned or alarmed, and why. Children who are very small in stature are the ones that cause concern for the majority of subjects, including two from the Cook County group and five from the collar county group. The very tall statured child is a concern of one Cook County subject and two collar county subjects. One of the subjects stated she is concerned about the "...child who is outside the range of average" and this appears to be the general consensus of both subject groups.

Children whose growth patterns are not progressing are a concern of three Cook County subjects and two collar county subjects. A large growth spurt is a concern of a Cook County subject while a collar county subject mentioned a child who is below the percentiles on a standard growth chart. These answers show more insight into the need to examine each child's pattern of growing. More subjects gave these responses than the number who actually
plot heights. But these responses show that some subjects are aware of the many physiological influences on growth.

One of the Cook County subjects stated, "But the very slight of stature, now you're talking about hypothyroidism and things like that." Collar county subjects gave responses that indicated further understanding of growth including: "If have a smaller child, look at the child, if have smaller or petite parents, look at that or see if abnormal pattern."; "Either lack of growth hormones or excess." and "Make sure it's just delayed growth and perhaps the parents could follow through more like into x-rays if eventually the child will grow or is it something of endocrine nature and has to do with the pituitary gland." These responses validate that the subjects are concerned because abnormal growth patterns in otherwise healthy children can be an indicator of a physiological problem.

Children who gain more than twenty pounds in one year are a concern of two Cook County subjects. Two subjects in Cook County and one collar county subject are concerned with children whom they consider to be overweight. Responses from Cook County subjects included: "Anyone who's gained over twenty pounds. Yes, we have quite a few obese children."; "If a child hasn't grown anything and has gained over twenty pounds, I'm going to be much more concerned about that."; and "I get concerned when I see children that are extremely overweight, what I would almost consider obese." A collar county subject who was concerned with weight stated she is, "...concerned about the nutritional status either way or the dietary habits of the family...".

Although the interview questions were specifically about height as a measure of physical growth, it is difficult to discuss this without considering weight as a measure of
physical growth as well. Many of the subjects brought up the issue of weight, both over and under, several times so their responses warrant being mentioned.

When measuring children and plotting their heights, weighing and plotting this result is also imperative. However, this information was not sought as it was beyond the scope of this study.

In question eight the subjects were asked what steps they would follow if they were concerned with a child's growth pattern or height. All of the Cook County subjects and five of the collar county subjects stated that their initial action would be to call the child's parents. The subjects were all looking for more information to see if they should be concerned about the child. Directly related to this was the response, "look at family patterns", given by one Cook County subject and one collar county subject. The subjects' primary action is to investigate if the child is within the range of normal for his family. The subjects are aware that heredity plays an important role in children's growth patterns and heights. The majority of the subjects would speak directly with the parents about this. However, two subjects would also look at siblings if they attended the same school. Subjects who stated that they would speak with the parents to seek more information also would encourage the parents to seek medical attention for that child.

Cook County responses included: "I would just notify parents. Gee, we're doing heights...and I noticed that Susie hasn't, you know...isn't growing...or something like this. You might want to just check with your doctor."; "...calling the parents, that's what we [uh], that's in our school district is how we do things. See if they've had a doctor's physical
recently, if they've noticed any problems.; "Just recommendations to the parents and tell them why I'm concerned." and

...one little girl I was concerned about [ugh] I ended up, I called the mom and she said "Oh, [um], she's always been small." And then I happened to meet the mom about three weeks later and mom was tiny also. So you really need to try to make contact with the parents visually because sometimes the parents are really small.

And the response from the remaining Cook County subject:

Well, if we knew family we might look at siblings, [um], which sometime we do know family quite well and you're not going to get concerned if mom's only four feet ten or something like that, so we look at family patterns.

Collar county subjects responses included: "See who they go to for their routine care and then pursue whether the pediatrician or whoever they go to had been keeping records of their growth and if any concern had been expressed on the part of the doctor."; "Encourage them to seek medical attention"; and "Regular communication with the parents and advise them to see a doctor or specialist if need be." and, finally:

Find out any familial patterns. I'll get a brief family history, if it's that sort of a thing. if it's a familial short stature and everyone in the family is very little then I wouldn't be as concerned. If everyone in the family was of average height and this one child was outside of the range of average I would suggest that they talk with their physician, the child's physician.

These subjects see the parents as a source of information about the child's health. The subjects demonstrate that they are responsible to inform the children's parents if they are
concerned about the children's health. In addition, the subjects direct the parents to seek medical attention if indicated. Recognition of the partnership of the children's parents and the school nurse is an important aspect of the school nurse role (Collis and Dukes, 1989).

One Cook County subject and one collar county subject stated that in addition to contacting the parents, they would check the child's medical records to see if this concern had been mentioned by the physician. One subject in the collar county group stated that she might directly call the physician as well as contacting the parents. For one collar county subject, calling the physician was her only response if she had concerns about a child's growth pattern.

Other responses include remeasuring the child at a later time and talking with the child's teacher. A Cook County subject stated that she would remeasure the child in six months and a collar county subject would monitor a child monthly. One collar county subject stated she would talk with the child's teacher,

I'd talk with the teacher and see if they know any background, the teachers, even if there are health related concerns, so many times the teachers are so much more versed than the nurse, in my situation especially, because I'm only in the building one day a week, so the teachers are very up on things.

In summary, these responses reveal that the subjects are aware that alterations in growth patterns, specifically height, are indicative of a potential health problem that requires further investigation. All subjects responded that seeking more information or further evaluating the problem would be their primary action if concerned about a child's growth pattern or height.
The subjects were then asked if they feel that height screening is an important function of the school nurse role. They were then asked to qualify their responses as to why they felt this is important or not. Four of the Cook County subjects and three of the collar county subjects think that this is an important school nurse function. Cook County responses included: "As long as you're doing weights"; "For too many kids there's not preventive health care and the space between kindergarten and a fifth grade physical is too long."; and "We did have a child who was not growing and when he got into high school he was way under and the doctor called to the school to get the child's records." Collar county responses were similar: "You'd be able to screen out those that do have problems."; "I think it's a good way of identifying, screening for anything that falls in the range of normal. We do a lot of screening and prevention." and,

The children get physicals in kindergarten and fifth grade and there are those years in between when some parents, a lot, don't take their children to the doctor every year. So you have that period in between if they're not growing properly they can have lots of problems.

One collar county subject felt that height screening is important but impossible to perform. She stated, "I don't see it as an unimportant role but in my particular situation I see it as an impossibility."

These responses again show that these subjects recognize one of the principles of school nursing, that the school is a place to promote health (Collis and Duke, 1989). Included in Igoe's (1990) plan for the promotion of health in school children is monitoring their changes in height. It is essential that these services be provided in the public schools
considering the number of children in the United States that are uninsured or underinsured (Igoe, 1993) and unlikely to receive routine health maintenance care including height measurement.

Two subjects, one Cook County subject and one collar county subject, are undecided about height screening being an important function for them to perform. They gave responses that were both positive and negative. One Cook County subject and one collar county subject did not feel height screening was an important function for school nurses. The negative responses from the Cook County subjects were: "Most of them are normal, just a few you have problems with." and,

I would say 98-99% of kids just grow normally. [Uh], we require by law a physical examination for entrance to school so we know they've seen a physician at age 5. We also require again at age ten. So, therefore, they are seen just before we get them and I don't think that it is all that important. I think that it's one of those things that they use to keep school nurses busy.

The collar county responses that were negative included: "I think it's something in the realm of the school year to consider, again like I said before, I think you have to weigh your priorities." and,

I guess I don't from my point of view. It seems to me if lack of development was there it might be obvious, is it not obvious without keeping track? Perhaps that's an ignorant response. I think I'm not geared in the school of training to think I should be plotting heights.
These negative responses indicate that there is some lack of knowledge regarding growth in healthy children and the school nurse's role in monitoring height. Also, school nurses have many barriers preventing them from performing height screenings. This is the subject of the next question.

In question ten, the subjects were asked to list obstacles that prevented them from measuring children and plotting their heights. The lack of time and extremely busy schedules were the primary responses mentioned by four Cook County subjects and five collar county subjects.

Some Cook County responses included: "...and the nature of the job which is to get called away for an emergency. You may be starting something, well, you could, but you still get interrupted.";

Time factors. That would be the only thing. And, it wouldn't be the measuring, it would be what does it entail to follow up on it. I've done scoliosis screenings, and you can take a whole day and screen a whole school, but the paper work and follow-up and what do the people do with it and the telephone calls. That is where, not the actual screening.

And the final comment:

I think it's more important to find out if we have a head lice epidemic starting in school. I think it's more important to find out, kids that just have [um], adjustment problems. I see an awful lot of tummy aches and headaches that have nothing to do with tummy aches and headaches. They just might need a time out and I should be there for that. I think vision and hearing screening are absolutely top of the line.
important for this age...I think all of that is very important and I can mean I can go on and on and on....

Collar county time and scheduling obstacles included: "getting the kids to the nurses' office"; "I'm at this school a day and a half a week. I'm at *** School, kindergarten and first grade, only half a day a week. I'm at the early childhood program. So I travel."; "I'm in a supervisory role over other nurses...we have no health aides and I have three buildings and the outside placement kids."; "I'm here a half a day and move on"; "Medication, I give all the medications here"; and,

Perhaps you can plan to do it (height screening) and an abuse case comes along or I mean there's all sorts of things in the gamut of our day that we do and I get a very heavy traffic of kids that come in for ice bags and bandages, three pages of kids on Ritalin."

The large number of students for which subjects are responsible for was given as an obstacle by one Cook County subject and three collar county subjects. The Cook County subject said, "1100 students for one nurse". Collar county subjects mentioned, "the fact that I have 2700 hundred students, it kind of puts an obstacle in my way for doing it."; "I have 1200 students."; and "With a thousand kids in a building I may see a kid and I mean I sometimes think maybe I should take that kid's height but you just have to fit things in."

The number of students, busy schedule and lack of time are major obstacles school nurses face in providing care for their students. In addition, the number of school nurses has declined over the past years (Whited and Starke, 1989). Complicating the increase in numbers of students and decease in number of school nurses are the changes in society that
may prohibit families from sometimes providing even basic needs for their children and relying on the school system to help provide for some of the child's basic health care needs (Igoe, 1993; Vessey and Swanson, 1993).

One of the changes in our society, a lack of insurance coverage for children is an obstacle observed by a collar county subject. She stated, "A big problem is that if they have a public aid card there's no local doctors, good doctors, that take the public aid card so you have to go through DSCC or one of the local agencies and that is a long wait. They will eventually get seen but it's a long time."

Cook County subjects also identified two other obstacles. One subject stated that there is frequently a lack of available private space to perform the screenings. "We try to do it as privately as possible, I mean it can be, it's a very sensitive issue, especially for an overweight child or usually tall or short child." This sensitivity is very important to consider when screening children. The other obstacle is gaining cooperation of the other teachers to allow the school nurse to perform the screenings.

One Cook County subject stated that there is no obstacle to performing height screenings. However, the subjects who identified obstacles gave very valid reasons as to why this is a difficult task to accomplish. Also, their responses validate all the excellent, health promoting tasks the school nurses do accomplish despite their many demands.

The final question of the interview guide was to see if the topic, growth in children, had been a part of any of the subjects' continuing education or inservice activities. As stated, only one subject of both groups had within the past year, attended a lecture regarding growth
in children. One collar county subject stated, "I just recently finished my school nurse certification and it wasn't something that was gone into in detail."

Within all specialities of nursing there is always new information to learn. School nursing is no exception (Felton and Parsons, 1993). In this subject group, general knowledge about growth in healthy children is not part of continuing education information.

Summary

In summary, the subject groups were very similar in years of nursing practice and nursing education. Although they are a well-educated and experienced group of school nurses, they do not collectively have a thorough understanding of the knowledge of: normal growth in healthy children, aged 5-10 years; how to measure children's heights and importance of monitoring and recording the heights of children in their care. A summary of the study and implications and recommendations for future research are discussed in the next section.
CHAPTER VI

SUMMARY AND RECOMMENDATIONS

In this chapter, the results of the study are summarized. Recommendations to improve the study are discussed as well recommendations for further study.

Summary

The purpose of this study was to answer the research question: What is the knowledge base of school nurses with regard to the importance of monitoring changes in height and recording that information on individual growth chart graphs in healthy children, aged 5-10 years? This question was asked to determine if there is a knowledge deficit among school nurses regarding this subject matter. Since this was found to be true, the need to further explore this question is apparent.

It should be noted that the subject group in this study is small, N=12. Therefore, the results of this study can only be generalized to this specific subject group. A study with a larger, more representative sample group could determine whether findings of this study apply to school nurses in general.

The subject group in this study was a very mature, experienced group of nurses. They had a number of years of experience in general nursing and in the practice area of school nursing. These subjects were responsible for large number of students. Three of the Cook
County subjects and all six of the collar county subjects were responsible for over a thousand students.

This subject group was also very well-educated and had continued their education beyond their basic nursing preparation. Three of the Cook County subjects and six of the collar county subjects had attained baccalaureate degrees. One of these Cook County subjects and three of the collar county subjects had continued their basic nursing education to attain baccalaureate degrees. Obtaining the State of Illinois State Certification Certificate 73 for school nurses was accomplished by three of the Cook County subjects and five of the collar county subjects.

In summary, this subject group was experienced and well-educated. Next, a summary of this subject group's responses to the information sought from the interview guide is discussed.

The interview was used to identify school nurses' knowledge of the importance of monitoring changes in height in healthy children aged, 5-10 years and recording that information on children's growth charts. Specifically, the following information was sought: knowledge of growth in healthy children, aged 5-10 years; the importance of measuring and recording heights in order to identify growth patterns or potential growth problems and the school nurse's role in monitoring height changes in her population.

None of the subjects was able to give the exact expected growth rate for healthy children, aged 5-10 years. Two Cook County subjects and three collar county subjects responded that they did not know the correct response. The other subjects gave responses that fell somewhere in the expected range but were not completely correct. The normal
growth rate of healthy children, aged 5-10 years, is not a part of this subject group's knowledge base.

The importance of accurate measuring and recording of children's heights in order to recognize growth patterns or identify potential growth problems is also not a general part of the subjects' knowledge base. None of the subjects has a stadiometer to measure children. In fact, two subjects in the collar county group have no type of measuring device available for use. None of the subjects were able to correctly give detailed answers regarding how to position children for height measurement. Children need to be positioned properly for measurement so the results are accurate and reproducible.

Once accurate height measurements are obtained, it is necessary to graph the results on each child's individual growth chart. This is necessary so that the child's pattern of growing can be identified. Only one Cook County subject and two collar county subjects routinely plot the results of the height measurements that they obtain.

Although few subjects plot heights on growth charts, more subjects are aware that by examining a growth chart, potential growth problems can be identified. A child with an abnormal growth pattern is a concern for all subjects. However, many subjects are content to rely on only being concerned with a child who appeared different from his or her peer group in size. In general, they are only concerned with the very small or very large child.

Finally, the subjects were asked about the school nurses' role in monitoring height in children in her school population. Only three Cook County subjects and one collar county subject routinely measure all students in their care. One Cook County subject and three collar county subjects might measure selected students if she feels it is indicated.
Not measuring students was most often because of busy schedules and lack of time to complete this task. Directly related to this is the obstacle of having such a large number of students for whom to provide care.

Despite being unable to complete the task of measuring and recording the heights of students, the majority of subjects feel it is an important role for school nurses to assume. Four Cook County subjects and four collar county subjects feel it is important; however, one of the collar county subjects clarified her response by saying it is "impossible in my situation". One Cook County subject and one collar county subject were undecided if this function should be in the school nurses' role. And, one Cook County subject and one collar county subject do not think measuring and recording of heights is an important role for the school nurse to perform.

If any concern was noted about a child's growth, the subjects feel their role is to speak with the child's family. The subjects wished to speak with the family in order to further assess their findings. The subjects also feel that is their responsibility to explain their concerns to the family and encourage them to seek medical attention.

In general, this subject group does not have a strong knowledge base regarding the importance of monitoring height changes in healthy children, aged 5-10 years, and recording that information on individual growth charts. School nurses are responsible for having a large knowledge base for conducting their practices. This subject group is very well-educated and experienced. However, they could benefit from an educational program about growth in children and the school nurses' role in monitoring growth. Only one Cook County subject had recently had an educational program about growth.
Now that the results of this study have been summarized, recommendations to improve the study are discussed. In addition, the need to expand and repeat the study are considered.

Recommendations

Several recommendations to improve the study are evident. A pilot study would have generated data to improve the interview guide. For example, weight was a major concern of many subjects. This subject was not included in the interview questions as the issue of weight was considered beyond the scope of this study. A pilot study would have demonstrated that weight was a concern of the subjects and, that it is also, very difficult for the subjects to separate the concept of height from weight. A pilot may have demonstrated the need to expand the study to the issue of weight.

A trial with a pilot study would have also shown the need to incorporate standard probes in the interview guide. The questions were designed to be open-ended but often resulted in only very short answers. Probes incorporated into the interview guide could result in expanded responses.

The sample used for this study, an N of twelve, is small. A random cluster sampling method was used to obtain subjects representative of the two counties chosen. However, a small sample size allows the results of the study to be generalized only to that subject group. A larger sample would yield more data. If a random sampling technique is used on a larger sample, the results would then be more reflective of school nurses' knowledge of changes in height in healthy children.
If a larger sample indicates that there is a lack of knowledge among school nurses regarding: growth in healthy children, aged 5-10 years; the importance of accurate measuring and recording of heights in order to identify children with potential growth problems in children; and the school nurses' role in monitoring the height changes of the children in her population, the conclusions from this study would be further validated. A large, randomized study should be conducted to see if the results are consistent with this study. If there is a lack of knowledge noted in a larger, randomly selected population, development of appropriate educational programs regarding this topic could be developed and disseminated.

The knowledge gained from this study and future studies could be very beneficial. School nurses could increase their knowledge base and improve their practices. Improved health of school children would be the result of school nurses applying their knowledge to practice. Finally, our society would benefit from preventative care and improved health of our nation's school children.
APPENDIX A

CHILD AT STADIOMETER
Fig. 1. Child at Stadiometer
Drawing by Melody Rosales. Reprinted with permission.
APPENDIX B

GROWTH CHARTS
Fig. 2. Boys: 2 to 18 Years Physical Growth
Reprinted, by permission, from Genentech, Inc.
Fig. 3. Girls: 2 to 18 Years Physical Growth
Reprinted, by permission, from Genentech, Inc.
APPENDIX C

INSTRUMENTATION
DEMOGRAPHIC DATA SHEET

1. How many years have you been in nursing?

2. How many years have you been a school nurse?

3. How long have you worked in your current position?

4. For how many students are you responsible?

5. What was your basic nursing preparation? (Please check one)
   
   ADN _____ Diploma _____ BS _____ Other _____

6. Do you have a baccalaureate degree? 
   
   If so, in what area?

7. Are you certified as a school nurse?

8. Do you hold any other certifications?

   If yes, please list
9. What is your age range? (Please check one)
   20-25 years _____ 26-30 years _____
   31-35 years _____ 36-40 years _____
   41-45 years _____ 46-50 years _____
   51-55 years _____ 56-60 years _____
   61-65 years _____ 65+ years _____

10. What is your marital status? (Please check one)
    Single _____ Married _____ Divorced _____ Widowed _____ Separated _____
SCHOOL NURSES INTERVIEW GUIDE

1. What is the expected yearly growth rate for healthy children, aged 5-10 years?

2. How often are the students in your school screened for height?

3. How do you select which students are measured?

4. What type of measuring device is used to obtain heights?

5. Can you describe how the child is positioned for measurement?

6. Are the student's heights recorded and plotted on a standard growth chart? May I see a sample of one of your graphs?

7. What growth patterns or heights cause you to be alarmed or concerned? Why?

8. What steps would you follow if you were concerned about a child's growth pattern or height?

9. Do you see height screening as an important role for the school nurse to perform? Why?

10. What are the obstacles to performing height screenings and plotting results?

11. Have you recently had any inservice or continuing education regarding growth in children?
APPENDIX D

PERMISSION LETTERS
Melody Rosales  
618 W. Hill St.  
Champaign, IL 61820  

Dear Ms. Rosales:  

I am completing my thesis at Loyola University Chicago entitled "School Nurses' Knowledge of Changes in Height in Healthy Children". I would like your permission to reprint in my thesis a drawing you did of a child being measured at a stadiometer.  

The requested permission extends to any future revisions and editions of my thesis, including non-exclusive rights in all languages, and to the prospective publication of my thesis by University Microfilms, Inc. These rights will in no way restrict republication of the drawing in any other form by you or others authorized by you. Your signing of this letter will also confirm that you own the copyright to the above-described material.  

If these arrangements meet with your approval, please sign this letter where indicated below and return it to me in the enclosed return envelope. Thank you very much.  

Sincerely,  

Colleen Miller-Owen  

PERMISSION GRANTED FOR THE USE REQUESTED ABOVE:  

Date: 9/29/94
Colleen Miller-Owen  
101 Ridge Lane  
Geneva, IL 60134  
(708) 208-0610  

October 12, 1994  

Janet Hasak  
Genentech, Inc.  
460 Point San Bruno Blvd.  
South San Francisco, CA 94080  

Dear Ms. Hasak:  

I am completing my thesis at Loyola University Chicago entitled "School Nurses' Knowledge of Changes in Height in Healthy Children". I would like your permission to use copies of Genentech's growth charts in my thesis. The two charts are: Boys: 2 to 18 years and Girls: 2 to 18 years. Enclosed are copies of these charts.  

The requested permission extends to any future revisions and editions of my thesis, including non-exclusive rights in all languages, and to the prospective publication of my thesis by University Microfilms, Inc. These rights will in no way restrict republication of the drawing in any other form by you or others authorized by you. Your signing of this letter will also confirm that you own the copyright to the above-described material.  

If these arrangements meet with your approval, please sign this letter where indicated below and return it to me in the enclosed return envelope. Thank you very much.  

Sincerely,  

Colleen Miller-Owen  

PERMISSION GRANTED FOR THE USE REQUESTED ABOVE:  

Date: 10/12/94
Ms. Colleen Miller-Owen  
101 Ridge Lane  
Geneva, Illinois  60134

Re:  Copyright Clearance

Dear Ms. Miller-Owen:

Responsive to your letter of October 12, 1994, enclosed are two copies of the signed agreement you requested. We have made and initialled one change to the agreement. Please counter-initial both copies and send one back to my attention for our records. Thank you.

Very truly yours,

[Signature]

Janet E. Hasak  
Manager, Patent Prosecution  
and Trademarks

JEH/pf  
Enclosures
REFERENCES


VITA

The author, Colleen Miller-Owen, was born in Dubuque, Iowa. She was raised and educated in Indiana until 1990 when she moved to Chicago, Illinois.

In August, 1981, Ms. Miller-Owen entered Butler University for general studies. In January 1984, she entered J. Everett Light School of Practical Nursing and graduated in May, 1985. In August, 1985, she entered Marian College and received the degree of Associate Degree Nurse in May, 1987. In August, 1987, she entered Ball State University and in August, 1990, was awarded the degree Bachelor of Science with a Major in Nursing. In August, 1990, Ms. Miller-Owen entered Loyola University Chicago and is to receive the degree Master of Science in Nursing in January, 1995.

Since July, 1985, Ms. Miller-Owen had worked in many areas of pediatric nursing. These include: general pediatrics, pediatric rehabilitation, pediatric intensive care, pediatric endocrinology and pediatric nursing education. She is a member of several professional organizations including Sigma Theta Tau, the Pediatric Endocrine Nursing Society and the American Association of Diabetes Educators.
The thesis submitted by Colleen Miller-Owen has been read and approved by the following committee:

Beverly Kopala, Ph.D., R.N., Director
Associate Professor, Department of Maternal Child Health Nursing
Loyola University Chicago

Marybeth Young, Ph.D., R.N.
Associate Professor, Department of Maternal Child Health Nursing
Loyola University Chicago

The final copies have been examined by the director of the thesis and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the thesis is now given final approval by the Committee with reference to content and form.

The thesis is therefore accepted in partial fulfillment of the requirements for the degree of Master of Science in Nursing.

12-1-94  B. Kopala
Date  Director's Signature