

Comparison of Recall of Cardiopulmonary
Resuscitation Information Between Mothers of
Monitored High-Risk Infants and Mothers of
Nonmonitored High-Risk Infants

by

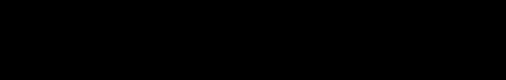
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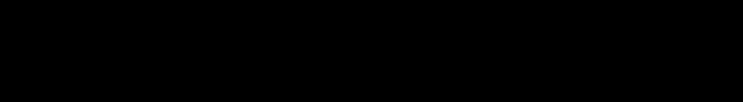
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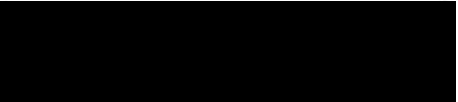
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APPROVED:


Sheila M. Kodadek, RN, PhD, Associate Professor, Thesis Advisor


Sylvia McSkimming, RN, PhD, Continuing Education Coordinator and Primary
Faculty, First Reader


Rebecca Jones, RN, MN, Home Monitoring Nurse Coordinator, Second Reader


Carol A. Lindeman, RN, PhD, Dean, School of Nursing

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CHAPTER I

INTRODUCTION

Modern medical technology has lowered both the gestational age and birth weight thresholds which are compatible with viability (Stewart, Reynolds, & Lipscomb, 1981). A new arena of learning has become evident for the parents of these infants who in the past would have died. These parents must learn to cope with the pre-term birth itself and learn how to care for an infant whose needs are very different from those of the full-term newborn they had anticipated. Caring for a high-risk infant requires the acquisition of more complex caregiver skills than are needed by other parents.

Statement of the Problem

Until recently, little research had been done on learning needs of parents of high-risk infants in general and pre-term infants specifically. Brown (1986) studied a group of mothers of premature infants and found several categories of learning needs identified by those parents. Much of this parental learning was done as a response to the birth of a premature infant and the resulting parental need to "handle" the care of the child. The majority of parents in Brown's study initiated their own learning in order to meet their own needs in learning parenting skills.

Health care professionals at institutions that care for high-risk infants instruct parents of high-risk infants in many aspects of their infant's care. Since premature infants are prone to having apnea,

approximately one out of four infants are discharged home on cardiorespiratory monitors which alert parents to apnea episodes. Parents of premature infants are taught cardiopulmonary resuscitation (CPR) before taking their infant home, so that they may intervene should a life-threatening event occur after their infant's discharge from the hospital. At the Oregon Health Sciences University Hospital (the OHSU Hospital), an instructional program in CPR is offered to parents of high-risk infants. An investigation of parental recall of CPR instruction after discharge from the hospital may indicate whether this learning need of this group of parents is being met and may suggest additional learning needs.

Significance of the Problem

Due to improvements in technology and the impact of Diagnostic Related Groups (DRGs) on health care, many facets of nursing care are changing rapidly. Premature infants may be acutely ill yet survive and ultimately be discharged earlier than their counterparts would have been a decade ago. Consequently, the parental burden of caring for a high-risk infant has increased. Many health care professionals have recognized the additional needs and services required by these parents. Research is urgently needed to determine whether available parental training is meeting those needs. Questions that must be answered include: Does training result in a high degree of retention by parents? And is that training being presented in the most effective way?

This study addressed the recall of CPR information by mothers of monitored high-risk infants and nonmonitored high-risk infants. This

chapter will present a review of related literature, the conceptual framework for the study, research questions, research hypothesis and definition of terms.

Review of the Literature

The review of the literature is divided into three parts. The first section reviews apnea and Sudden Infant Death Syndrome (SIDS) as an underlying rationale for teaching CPR. The second section describes effects cardiorespiratory monitors may have on families. The final section reviews adult learning in general and CPR training in particular.

Apnea and SIDS

As survival statistics increase for low birth weight infants, so do statistics on the incidence of SIDS. SIDS affects 2 per 1,000 term newborns and 6 per 1,000 pre-term infants. In Oregon, the rate is 18.6 per 1,000 for pre-term infants with a birth weight of less than 2,000 grams. Even without dividing SIDS deaths by birth weight, Oregon has a rate 2 1/2 times the national average (Oregon State Health Division, 1982). Yet despite an increase in SIDS research, more remains unknown than known about this condition.

The etiologic factors that cause SIDS have yet to be proven. Hypotheses of precipitating causes include apneic spells, metabolic imbalances, and cardiac arrhythmias (Arriagno, 1984; Duncan, 1983; Smith, 1984; Thompson, 1984).

Although apnea has not been demonstrated as a definite precursor condition to SIDS, some researchers believe that there is an association

between these two factors (Rigatto, 1982; Sham & Messerly, 1978). For the pre-term infant, apneic episodes may occur on any day of life, may be repetitive, and tend to be more common in smaller infants. Sham and Messerly (1978) postulate five causes of apnea in such infants: central nervous system (CNS) immaturity, hypoxemia, anemia, CNS hemorrhage, and/or metabolic disorders. The hypoxia that ensues from apneic episodes may damage the CNS of surviving infants; and this, in turn, may predispose the pre-term infant to sudden death (Rigatto, 1982; Sham & Messerly, 1978).

Epidemiological factors found to be associated with SIDS include low socioeconomic status of the family, mothers less than 20 years of age, unmarried mothers, poor prenatal care with the pregnancy, illness during the pregnancy, short intervals between pregnancies, previous fetal loss, and drug abuse (Kelly & Shannon, 1982; Thompson, 1984). After completing a comprehensive literature review, Kelly and Shannon (1982) compiled other epidemiological factors linked with SIDS. Ethnically, there is a high incidence among Blacks, a moderate incidence among American Indians and Caucasians, and a relatively low incidence among Orientals. Infant factors associated with SIDS include pre-term birth, intrauterine growth retardation, amnionitis, low Apgar scores, a need for oxygen and resuscitation at birth, the second or third child in birth order, and multiple birth children, especially the second of a twin pair (Thompson, 1984). Maternal factors include third trimester bleeding and the delivery of a hypotonic infant with excessive molding

has also been considered a potential risk factor by some (Kelly & Shannon, 1982).

Since many of the above maternal and infant factors contribute to being classified as a high-risk delivery and birth, many of these infants spend their initial days in a neonatal intensive care unit. Sells, Neff, Forrest, and Robinson (1983) studied the relationship between neonatal intensive care unit survivors and SIDS. SIDS was the leading cause of death for this group. The study encompassed 3 years, and while the number of survivors per year was relatively constant, the rate of SIDS victims increased yearly. Sells et al. concluded that infants discharged from a neonatal intensive care unit are at definite increased risk for early death when compared to the general infant population.

The parent population at the OHSU Hospital is strikingly similar to the description of a parent of a SIDS victim. Moreover, the high-risk infant population at the OHSU Hospital shares one or more of the traits associated with SIDS victims. Because of the potential for life-threatening episodes to occur in the high-risk infant, parental knowledge of CPR may help parents intervene effectively if such events occur and ultimately prevent their infant's death. In light of this, CPR instruction for those families seems to be crucial.

Cardiorespiratory Home Monitoring

The use of home monitors for high-risk infants is controversial. Monitors impact on family life in several ways. Parents feel a sense of isolation related to having little respite from the infant's needs due

to a lack of willing or able sitters who are CPR certified (Smith, 1984; Stengel, Echeveste, & Schmidt, 1985; Wasserman, 1984). There also tend to be decreased flexibility of parental roles, excessive fatigue from multiple false alarms by the monitor, and a lack of perceived support from the family doctor and other health care professionals (Black, Hersher, & Steinschneider, 1978; Cain, Kelly, & Shannon, 1980; Stengel et al., 1985). Cain et al. (1980) found that parents are most anxious during the first week at home and that mothers are more anxious than fathers. All authors agreed that parental support was essential for successful monitoring. The spouse, family doctor, monitor program staff, and support group of other parents with monitored children all play a role in giving support to the already stressed parents (Cain et al., 1980; Favorito, Pernice, & Rungiero, 1979; Stengel et al., 1983; Yount & Lewman, 1982). In summary, cardiorespiratory home monitors serve as tangible reminders that an infant is at high risk for possibly life-threatening episodes and also provide the security that the monitor will alert parents that a problem has occurred. However they are viewed by users, they do impact considerably on the parents of such infants.

Adult Learning and CPR Retention

Adult learning has been examined from a number of viewpoints. Knowles (1973) believes that conditions present for adult learning to occur are five-fold. The learner: (a) feels a need to learn, (b) feels that the goals of the learning experience are his or her goals, (c) accepts some responsibility for planning or operating the learning experience and thereby feels committed to it, (d) participates actively

in the learning process, and (e) has a sense of progress toward goals. One characteristic of adult learning was described by Knowles as "readiness to learn" (p. 39). When an adult's motivation to learn is strong because such learning will meet a pressing need, Knowles calls such times "teachable moments" (p. 40).

Factors that affect an adult's need and readiness to learn include his or her IQ, developmental stage, personal traits, educational background, prior experience, sociocultural group, religious group and prevalent life needs (Stanton, 1985). Jordan-Marsh, Gilbert, Ford and Kleeman (1984) believe that in order to learn, mastery through practice and evaluation for refinement are essential, that change rarely occurs from a single experience, that client beliefs play a key role, and that environmental factors function as either a barrier or support.

Health care professionals apply principles of adult learning to discharge teaching plans for parents of ill/pre-term infants. Cohen (1986), Hazinski (1986) and McCarthy (1986) agree that training parents to be caregivers at home involves four facets: (a) assessing parental ability and motivation to learn specialized care, (b) teaching pertinent information regarding this care, (c) requiring demonstrated competence in caretaking skills, and (d) maintaining follow-up after discharge. To be effective, parents must be involved in this process long before discharge.

Several authors have studied adult learning as applied to CPR instruction. Wilson, Brooks, and Tweed (1983) believe that skill retention may be influenced by the method and intensity of initial

training of CPR, motivation of the learner, reinforcement, and opportunity for use. They also state that youth and previous first aid training appear to favor retention. Other authors (Gass & Curry, 1983; Gombeski, Effron, Ramirez, & Moore, 1982; Martin, Loomis, & Lloyd, 1983; Weaver, Ramirez, Dorfman & Raizner, 1979; and Wilson et al., 1983) agree that 1 year is too long between retraining sessions. In fact, significant deterioration of skills occurred after 3- and 6-month intervals. Gass (1983) compared retention of knowledge and skills between physicians and nurses. He concluded that practice, not professional training, would have the greatest effect on retention. After testing a group of young health care workers whose skills had decreased significantly 3 months after instruction, Gombeski et al., (1982) questioned whether one can expect the average lay person to retain CPR knowledge/skills when health care workers cannot master and retain them. Finally, a study done by Weaver et al. (1979), tested both skill and cognitive retention of CPR in subjects 6 months after initial teaching. They also studied what factors predicted later levels of retention. Though all groups had a significant decrease in performance and retention, those that practiced on a manikin or reviewed CPR material demonstrated better recall. Follow up cognitive evaluations in the form of a mailed test appeared to have the best predictive value for future skill performance.

Learning CPR is an important component of discharge teaching for parents of high-risk infants. Adult methods of learning are different than those of children, and learning in order to parent more effectively

adds a new dimension to the learning process. Because CPR is not performed on children as often as on adults, there is less objective data about the effectiveness of instruction in the literature. Therefore, a study into one aspect of parental retention of CPR is warranted.

Conceptual Framework

The conceptual framework for this study is a modification of the Health Belief Model (Becker, 1974). In its original premise, the Health Belief Model posits that individuals will not seek preventive care for themselves unless they have sufficient knowledge and motivation to do so. This concept fits with Knowles' (1973) idea of teachable moments. A person must believe himself or herself to be vulnerable or at risk for problems which will occur unless one follows a given intervention and be convinced that the intervention is effective. Finally, one must feel able to carry out the treatment independently (Given, Given, & Coyle, 1984; Jenny, 1983). The Health Belief Model incorporates aspects of adult learning principles such as the prevalent life needs stated by Stanton (1985) and recognizing the role client beliefs play in learning by Jordan-Marsh et al. (1984).

In adult learning, an adult learns best when he or she feels the need to learn something. Learning CPR may be seen by parents of high-risk infants as one way to lessen the threat of sudden death in their child. At the OHSU Hospital, CPR training for parents is a prerequisite for discharge. Parents of monitored infants have reinforcement of their CPR learning after discharge. The Home

Monitoring Nurse Coordinator maintains contact with these families and reviews monitor function and CPR with them. Whether anxiety about their infant is a facilitating factor or barrier in parental learning of this group is unknown. Conversely, parents of non-monitored, high-risk infants may not believe that CPR knowledge is essential for them to learn. The present study will look at the CPR training parents at the OHSU Hospital receive and compare the amount of recall of CPR information both groups of parents retain.

Research Questions

The research questions for this study are:

1. What information about CPR can mothers of high-risk infants recall using a written test 1 month after their infant's discharge?
2. Is there a difference in recall of knowledge about CPR between mothers of high-risk infants discharged with monitors and mothers of high-risk infants discharged without monitors?

Hypothesis

The following hypothesis underlies this study: Mothers of high-risk infants discharged with cardiorespiratory monitors will demonstrate greater recall of CPR knowledge on a written test than will mothers of high-risk infants discharged without a cardiorespiratory monitor.

Definition of Terms

Mother is defined as the primary caregiver involved with the infant's care, biological or adoptive. A high-risk infant is defined as any infant from 25 to 40 weeks gestation who requires more than 2 days'

hospitalization for their medical condition. Cardiorespiratory monitors are portable monitors for home use which are designed to detect aberrations in an infant's heart rate or respiratory rate.

CHAPTER II

METHODS

Design

This study used a pretest-posttest-posttest design with a nonrandomized control group. Time intervals used for the design are discussed within this chapter.

Setting

The setting for this study was the Oregon Health Sciences University Hospital (the OHSU Hospital) in Portland, Oregon. As a tertiary, regional medical facility serving Oregon, southwestern Washington, and western Idaho, it receives high-risk infants transferred from outlying hospitals. A key part of parental discharge teaching for parents of high-risk infants includes instruction in CPR. At the OHSU Hospital, CPR teaching consists of a videotaped demonstration of correct CPR techniques, a return demonstration by the parent two to three times, discussion and clarification by using hypothetical situations, and use of CPR handouts to reinforce learning. Cardiopulmonary resuscitation instruction is taught by staff nurses who work in nursing units serving high-risk infants.

CPR instruction is given to all parents of high-risk infants prior to discharge, whether a home monitor will be needed or not. For parents of infants discharged with monitors, CPR training is a mandatory prerequisite for discharge. After discharge, families with monitored infants maintain periodic contact with the Home Monitoring Nurse

Coordinator at the OHSU Hospital. Monitor functioning and CPR are reviewed at this time.

Sample

The subjects used for this study were composed of a convenience sample of mothers of infants hospitalized at the OHSU Hospital during a 6-month period in 1988. The infants were 25-40 weeks gestation, required more than 2 days hospitalization for their medical condition, and had not been home since birth. Mothers were biological or adoptive, and mothers were English-speaking.

There were two groups of mothers in the study. One group consisted of mothers of infants discharged home on cardiorespiratory monitors, while the second group was mothers of infants discharged home without monitors. Both groups had infants labeled as high-risk by previous definition, and all mothers had been instructed in CPR according to the standard practice at the OHSU Hospital prior to discharge of their infant.

Instrument

Two instruments were used for this study: a demographic data questionnaire and a CPR questionnaire. Each participant was given a packet which included: a cover letter inviting participation in the study (see Appendix A), a statement of informed consent (see Appendix B), a CPR questionnaire (see Appendix C), and a demographic data questionnaire (see Appendix D). Demographic data included the age of the parent, educational level, race, marital status, income and family size. Information about the infants included gestational age, birth

weight, sex, and whether or not the infant was discharged on a monitor. The CPR questionnaire was a 20-question, multiple-choice written test excerpted by the investigator from the test given by the American Red Cross to students attending their CPR classes. Permission was obtained from the American Red Cross to use this test, the American Red Cross CPR Module Respiratory and Circulatory Emergencies Final Test, Form B, and henceforth referred to as CPR questionnaire (see Appendix E). The reliability of this instrument has not been formally tested. However, the test is used throughout the United States by the American Red Cross and was chosen because of its standard use. The proposed questionnaire was reviewed for accuracy and clarity of language by Rebecca Jones, RN, MN, Home Monitoring Nurse Coordinator at the OHSU Hospital.

Data were collected at three points in time. A pretest was administered to mothers of 63 high-risk infants who had not yet been instructed in CPR at the OHSU Hospital. Both the researcher and staff nurses identified prospective subjects and acquainted them with the study. If a mother agreed to participate in the study, the informed consent and demographic data were obtained concurrently with administration of the pretest. A posttest was administered twice to each mother. The first posttest was given to all mothers of high-risk infants who fit the criteria listed above. The parents had to have undergone CPR instruction including viewing the videotape, discussing the procedure, and giving return demonstration. The first posttest was administered to the parent by the staff member who instructed them in CPR or by the researcher before their infant was discharged from the

hospital. Timeliness for Posttest 1 administration was determined by chart review and/or staff interview. Both the pretest and Posttest 1 were collected in an envelope on each unit involved in the study. Current mailing addresses were obtained from the parent or the infant's chart at the time of the first posttest. If the infant was discharged with a monitor, the first posttest was given before monitor teaching was given to the parents. The second posttest, administered approximately 1 month after discharge, was mailed to all parental subjects with return envelopes with prepaid postage. Follow-up notices were mailed to participants after 10 days if no response had been obtained (see Appendix F). Anonymity and confidentiality were maintained through use of a coding system. The anticipated number of subjects was 30 in each of the two groups. Analysis of the data was done by using descriptive statistics, t tests and analysis of variance (ANOVA).

CHAPTER III

RESULTS

This chapter will begin with a description of the sample. A report of the findings of the study will follow.

Description of the Sample

The convenience sample was comprised of mothers of high-risk infants hospitalized at the OHSU Hospital between March 1988 and August 1988 who met the criteria for the study. Of 72 prospective mothers contacted, 70 elected to participate in the study and subsequently completed the pretest. The two mothers who declined to participate in the study did not give a reason for declining. All participants were birth mothers except for one maternal grandmother who became the legal custodial parent of her grandson. Attrition due to unexpected discharge before completion of the first posttest, Posttest 1, resulted in a reduction of eligible subjects to 63. The 1-month post-discharge survey, Posttest 2, was completed and returned by 46 subjects. Study results were based on the 63 subjects who completed both the pretest and Posttest 1, and when appropriate, on the 46 subjects who completed Posttest 2.

Selected demographic characteristics of the study sample are presented in Table 1. The sample was predominantly Caucasian (96.6%), and the mean educational level completed was 12.2 years of school, although highest grade completed ranged from sixth grade to post-graduate level of 17 or more years of schooling. Nearly one third of

Table 1

Maternal & Family Characteristics

Maternal age and education (in years)			
	Mean	Range	Standard deviation
Maternal age (<u>n</u> = 60)	26.9	18.5 - 43.7	5.75
Education (<u>n</u> = 59)	12.2	6 - 17+	2.40

Family annual income (<u>n</u> = 58)			
	<u>n</u>	Percentage	Cumulative percent
< \$5,000	18	29.5	29.5
\$5,001 - 10,000	13	21.3	50.8
\$10,001 - 20,000	10	16.3	67.1
\$20,001 - 30,000	8	13.1	80.2
\$30,001 - 40,000	3	4.9	85.1
> \$40,000	5	8.1	93.1

Marital status (<u>n</u> = 59)		
	<u>n</u>	Percentage
Never married	19	31.1
Divorced/separated	9	14.7
Married	32	52.4
Widowed	0	0.0

Table 1 (Continued)

Racial/ethnic group (<u>n</u> = 59)		
	<u>n</u>	Percentage
Caucasian	57	96.6
Afro-American	1	1.6
Native American	1	1.6

Parity (<u>n</u> = 60)		
	<u>n</u>	Percentage
1	31	50.8
2	13	21.3
3	11	18.0
4	2	3.2
5	3	4.9
6 or more	1	1.6

the subjects (29.5%) had incomes of less than \$5,000 per year; and one half (50.8%) had incomes of \$10,000 or less annually. More than half the mothers were married (52.4%), while almost one third had never married (31.1%). The majority of mothers (59 of 63) had given birth to a single infant. The other 4 mothers delivered twins. For one half the subjects (50.8%), this infant was their first child. Mean maternal age was 26.9 years.

Demographic data about infants of the mothers in this study are displayed in Table 2. For the purpose of this study, the mothers were

divided into two groups based on whether their infants were discharged home on a cardiorespiratory monitor or without one. Two thirds (66.6%) of the subjects formed the group discharged home without monitors (Group 1). One third (33.3%) formed the monitored group (Group 2). Among the infants of the 63 participants, there was an almost even split between males and females ($\underline{n} = 32$ and $\underline{n} = 33$, respectively), but males outnumbered females by a 2:1 margin in the monitored group (14 males to 7 females). Mean birth weight for all infants was 1957 grams, and mean gestation 32.7 weeks. The return rate for Posttest 2 was 73% for all

Table 2

Comparative Demographic Data for Infants Based on Monitor Need at Discharge

	Total		Monitored		Nonmonitored	
	<u>N</u>	%	<u>n</u>	%	<u>n</u>	%
Subjects	63	(100)	21	(33.3)	42	(66.6)
Sex						
Female	31	(49.2)	7	(33.3)	24	(57.1)
Male	32	(50.7)	14	(66.6)	18	(42.8)
Mean birth weight (grams)						
	1957		1963		1951	
Mean gestational age (weeks)						
	32.7		32.3		33.0	

subjects, with a higher rate of return among mothers of monitored infants (80.9%) than mothers in the nonmonitored group (69%).

When independent groups t tests were done on the demographic variables, only two variables had statistically significant differences, at an alpha level of 0.05. Multiple births was a statistically significant variable, with more multiple births in the monitored group in relation to total subjects than in the nonmonitored group (i.e., 2 multiple births per 21 monitored infants versus 2 multiple births per 42 nonmonitored infants.) (Caution needs to be made because of the small size of these groups.) The other statistically significant variable was infant gestation. The mean age of the monitored infants was significantly lower statistically than the age of the nonmonitored infants.

Research Questions

Research Question 1

The first research question asked in this study was what information was recalled about CPR 1 month after a mother was exposed to it. The same questionnaire was administered to 63 subjects at three separate time intervals. The pretest, given before formal learning had begun, was used to differentiate prior learning from current learning. The first posttest was given within 1 week of formal, multimodal instruction. The second posttest was given 1 month after discharge of one's infant from the hospital. Due to pre-discharge factors (i.e., early, long-term discharge teaching, setbacks in infant's condition) or subject factors (i.e., moved to new address after discharge resulting in

mail delays, needing reminder letter to respond), the actual time between learning CPR and taking Posttest 2 varied between 4 and 6 weeks. The questionnaire used was a 20-question multiple choice test. On the pretest, the mean score for all subjects was 15.5 correct out of 20 possible questions, and the median 16. Posttest 1 had a mean of 17.5, and a median of 18. Posttest 2 had a mean of 17.4, with a median of 17.4. Posttest 1 and the pretest results were based on all 63 subjects, but Posttest 2 results were based upon the 46 subjects that responded by mail.

A paired differences t test was done comparing how all subjects performed on each question at two different time intervals. When each question of the pretest was compared to each question of Posttest 1, no significant differences were found. Similarly, there were no significant differences found when comparing the results of each question in Posttest 1 with those in Posttest 2.

Research Question 2

Research Question 2 asked whether there was a difference in recall of information between mothers of monitored infants and mothers of nonmonitored infants. An independent groups t test was done to compare these groups. No statistically significant differences between groups was found on any question of the pretest, Posttest 1 or Posttest 2. (An alpha level of $p < .05$ had been preset, and a one-tailed test was used.)

To further examine the differences between the two groups and to determine possible interactions between variables, an ANOVA was done. Table 3 displays mean scores for all three tests. The ANOVA

Table 3

Mean Scores of Subjects for Pretest, Posttest 1 and Posttest 2

	<u>n</u>	Mean	S.D.
Pretest			
Total subjects	63	15.5	2.04
Monitored group	21	14.5	2.12
Nonmonitored group	42	15.7	1.81
Posttest 1			
Total subjects	63	17.5	1.29
Monitored group	21	17.8	1.16
Nonmonitored group	42	17.4	0.98
Posttest 2			
Total subjects	46	17.4	1.62
Monitored group	17	17.4	1.67
Nonmonitored group	29	17.5	1.61

demonstrated that there was no statistical significant difference between mean scores of mothers of monitored infants and those of nonmonitored infants. However, the test for subjects within groups showed significant differences. The Scheffé test was done to determine where within the groups a difference might lie. Each group had altered mean scores significantly ($p < .001$) between the pretest and Posttest 1,

and the pretest and Posttest 2, but not between Posttest 1 and Posttest 2. An ANOVA table is presented in Table 4.

Table 4

ANOVA Summary Table: Differences in CPR Knowledge Retention Between and Within Monitored and Nonmonitored Groups

Source	df	SS	MS	F	P
Between groups	45	127.862	6.062	1.141	0.2913
Within groups	92	372.166			
Variance by time	2	154.531	77.265	33.139	0.000
Parallel variance	2	12.460	6.230	2.672	0.0742
Error	88	205.175	2.331		

CHAPTER IV

DISCUSSION OF THE RESULTS

Discussion of the results will be divided into the following sections: sample, instrument, Research Questions 1 and 2 and hypothesis.

Sample

The subjects in this sample are representative of the population from which they were drawn (the parents of high-risk infants at the OHSU Hospital). The common perception of typical the OHSU Hospital parents held by staff nurses consists of the teenage single mother. However, it is more likely that that stereotypical parent is remembered for her immature affect in parenting and the intensive interactions the nurse needed to plan adequately for discharge rather than being the normative parental type. Although the average maternal age of 26.9 years in this sample may be slightly higher than average age for this population as a whole, the average maternal age may be increasing. Delaying childbearing and the efficacy of the OHSU Hospital's infertility programs have resulted in primiparas in the mid-thirties age range.

Other demographic factors in the sample appear to match traits within the population, with the exception of racial ethnic traits. The sample included only English-speaking mothers and thereby eliminated or under-represented the small but clinically significant numbers of Hispanic mothers that comprise a segment of the OHSU Hospital's population.

Kelly and Shannon (1982) noted that low socioeconomic status, maternal age of less than 20 years and being single were some of the epidemiological factors associated with parents of SIDS victims. The study sample was similar to Kelly and Shannon's parental profiles only in income levels (over 50% of all subjects had incomes of less than \$10,000). Average maternal age was 26.9 years, and more than half the mothers were married.

Kelly and Shannon (1982) describe multiple births, and preterm births as a few of the characteristics of SIDS victims. The two statistically significant variables for infants in the present study were gestation and multiple births. Infants with shorter gestational periods in utero (preterm) appear to take longer to mature in all areas. In some infants, full maturation of the CNS can take longer than 40 weeks post-conceptual age to complete. Also, since the respiratory system is the last body system to develop, it is logical that such infants would be more likely to have immature respiratory systems; these immature behaviors persist when the infant is ready for discharge. Such behavior often necessitates home monitoring. Therefore, the lesser gestational age of the monitored group has credence. The presumption is made that a monitored infant is more at risk for SIDS than a nonmonitored infant with mature respiratory patterns. Multiple births are also associated with a higher SIDS risk, especially the second born of a twin pair (Kelly & Shannon, 1982). In the study sample, of the two twin pairs in the monitored group, the need for monitors was established because of immature respiratory patterns in the second born twin only.

Test

The instrument used to test CPR information retention was the CPR questionnaire described previously in this paper. The benefits of using a 20-question survey were ease of use for the subjects and concreteness of subject matter; these are the same characteristics that make it useful for practice and research. Disadvantages included lack of validity and reliability data for the questionnaire and poorly written questions. Question #13 was answered incorrectly by 46% of the mothers on the pretest, 73% of them on Posttest 1, and 67% on Posttest 2. For more than 50% of subjects to incorrectly answer a multiple choice question with only two possible answers implies either a poorly written question or a question that was misunderstood by participants. There appeared to be a confusion factor in the learning process, since subjects did worse on Question #13 on both posttests than on the pretest. Confusion about specific questions on the survey was noted by several subjects in the margin of the questionnaire as either "Did not understand question" or "Was not taught." Because of such unexpected findings that resulted from use of this instrument, clinical use of this questionnaire is suspect. If this study was to be repeated, a different instrument, one with known reliability and clearer questions, should be used. Perhaps the American Red Cross may consider revising their instrument for future test administration.

To facilitate study completion, a reminder letter was sent to 35 mothers when no response had been obtained from mailing Posttest 2. This tactic resulted in 17 responses. The overall response rate of 73%

of subjects who returned Posttest 2 was higher than expected. Mailed responses often have a return rate of less than 50%. The higher rate for this study may reflect the personal acquaintance of the subjects to the researcher as a caregiver for their infants.

The first posttest was taken without prompts. The second posttest may have been done with the aid of CPR handouts. Any of the times the survey was done may have been a collaborative effort with the mother's significant other or anyone else, for that matter. Fathers and other potential caregivers are encouraged to learn CPR. By using a mail survey, one is never certain that the intended subject was the person who completed it.

Results

The first research question asked what information was retained 1 month after instruction in CPR was given to mothers of high-risk infants. From total frequencies and ANOVA statistics, it is apparent that a significant amount of learning occurred between the pretest and Posttest 1. Scheffé tests exhibited a significant difference between scores at the pretest and Posttest 1 levels, and the pretest and Posttest 2 levels. However, although scores dipped slightly between the first and second posttests, it was not a statistically significant drop. The clinical significance demonstrated that subjects answered on the average two more questions correctly on the posttests than on the pretest. Learning did occur for all subjects, and degree of retention of CPR information 4-6 weeks after formal instruction appeared to be nearly as complete as recent instruction had been. Parents apparently

do learn CPR as taught at the OHSU Hospital and retain that cognitive learning for at least 1 month. This learning and retention occur regardless of whether or not one's infant is ultimately discharged with a monitor.

The second research question asked if there is a difference in retention of CPR information between mothers of monitored and nonmonitored infants. Both an independent groups t test and an ANOVA demonstrated that there were no significant differences between retention of CPR information between these two groups. The subjects were divided into these two groups based on an infant variable: need for home monitoring. There were no statistically significant differences between the two groups with regard to maternal characteristics. Maternal ability to learn and retain CPR information was consistent for all mothers, regardless of the category to which their infant belonged. Perhaps the lack of differences between groups suggests that monitors are not the critical factors to enhance retention of CPR information. Becoming a parent of a high-risk infant may be a cogent enough reason to master CPR.

The directional hypothesis of this study stated that mothers of monitored infants would retain more information about CPR than mothers of nonmonitored infants. This assumption was based on three premises. The first was that a home monitor is a tangible reminder that one's infant is at real risk for apnea and possibly SIDS. Therefore, a mother would view or remember CPR as a necessary fact of life. The second premise was that because the Home Monitoring Nurse Coordinator calls

monitored parents and reviews CPR with them, retention would be enhanced. The last premise was that anxiety might galvanize a mother to perfect her CPR knowledge and technique. In this study, the hypothesis was tested and rejected. As previously stated, there was no difference between these groups. While a monitor is a tangible reminder of an infant's vulnerability to untoward behaviors, it seems no more so than the actuality of having a preterm infant. Review of CPR by the Home Monitoring Nurse Coordinator after discharge does not appear to appreciably enhance retention, since the nonmonitored group also retained information well. The role of anxiety in enhancing retention was not explored, so its effect is unknown. The usefulness of the interesting findings of this study will be discussed in the next chapter.

CHAPTER V

CONCLUSIONS

Summary

Burgeoning technological advances in neonatal health care have led to higher survival rates for low birth weight infants and infants born during complicated deliveries. Today parents of such high-risk infants often take their infant home before their original due date. Specialized teaching, such as instruction in infant CPR, is a part of parental preparation for discharge at the OHSU Hospital.

The conceptual framework for this study attempted to suggest factors that could either enhance or hinder parental learning of CPR as based on principles of adult learning. The study of parental recall of CPR information was intended to examine the effectiveness of the CPR training for parents of high-risk infants at the OHSU Hospital. The two research questions formulated were: How much information about CPR is recalled by parents about CPR 1 month after their infant's discharge from the hospital? And is there a difference in retention between parents of monitored infants and those of nonmonitored infants?

The sample consisted of 63 mothers of high-risk infants at the OHSU Hospital. The participants predominantly were Caucasian, high school educated, and had relatively low income levels. About half were married. Data was collected at three separate time intervals: before formal teaching began, within 1 week of completion of teaching, and approximately 1 month after teaching was completed. The instrument used

was the American Red Cross CPR Module Respiratory and Circulatory Emergencies Final Test, Form B.

Results demonstrated that there were no statistically significant differences in learning or retention between mothers of monitored infants and mothers of nonmonitored infants. However, there were differences in learning by all subjects over time. The higher scores on either posttest when compared to the pretest implied that learning occurred, and the minimal decrease in score at the 1-month interval implied that recall was still present.

Limitations

There are several limitations within this study. Since the sample was a convenience sample, not a random one, certain variables relative to this population (such as racial/ethnic groups) may have been over- or underrepresented. Also, generalizability to the population is limited because of the sampling plan. The instrument used for this study had serious limitations. The questions appeared to confuse several subjects and did not reflect a comprehensive sampling of CPR information as taught at the OHSU Hospital. It also lacked evidence of validity and reliability as an instrument.

Implications for Nursing Practice

Parental training in CPR at the OHSU Hospital appears to be effective in the short term. The multimodal teaching techniques (i.e., video, handouts, skill demonstration, and role play) may aid retention for at least 1 month post learning. Continued parental instruction in CPR appears warranted. Further investigations may seek to determine if

parental retention of such information is adequate for use in an emergency. In the absence of actual practice at home, it is unknown what factors may reinforce retention of CPR information. The handouts given to parents before discharge and/or calls from the Home Monitoring Nurse Coordinator to review CPR to the monitored group may possibly reinforce learning. Perhaps to reinforce learning, the primary nurse could call a parent after discharge to ask if the parent has any concerns in general about the infant's care and review CPR at that time. Although parental learning did occur with current teaching methods, specialized training for staff nurses who serve as educators in CPR may be clinically warranted. The psychology of adult learning and teacher effectiveness training could affect their teaching methods in a positive way and result in more learning for the parents because of a more effective teaching style.

Recommendations for Future Research

This study reveals the need for further studies to answer questions it raises. Future studies should be done using larger, random samples. The time interval for testing retention should be lengthened to 3 months, as suggested in the literature. A valid and reliable tool is needed to assess CPR knowledge and skill. Finally, whether or not cognitive learning measured in a written test is useful in actually performing CPR skills in an emergency situation needs to be examined.

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APPENDIX A
INFORMED CONSENT

Oregon Health Sciences University

CONSENT FORM

I, _____ agree to participate in the investigation "Comparison of recall of cardiopulmonary resuscitation information between mothers of monitored high-risk infants and nonmonitored high-risk infants" being conducted by Nancy Duncan, RN, as part of a masters thesis in Family Nursing at the Oregon Health Sciences University. Sheila Kodadek, RN, PhD, is the faculty thesis advisor. The purpose of the study is to learn what information about cardiopulmonary resuscitation (CPR) is recalled by parents after their infant is discharged from the hospital.

I understand that participation in this study involves the following: I will complete a written questionnaire before I am taught CPR, after I am taught CPR, and about 1 months after my infant is discharged from the hospital. The final questionnaire will be mailed to my home.

The investigator is not aware of any known risks or discomforts that may result from this research. It may not benefit me directly but may result in an improved teaching program for others parents of high-risk infants.

Nancy Duncan, RN, has offered to answer any questions I might have and may be reached at (503) 279-7544. I understand I may refuse to participate or withdraw from this study at any time without affecting my relationship with, or treatment at, the Oregon Health Sciences University.

I further understand that my responses to the questionnaire will be strictly confidential. I understand that I do not have to answer all questions. The answers I give will be seen only by the research staff. Neither my name nor my identity will be used for publication or publicity purposes.

I have read the foregoing and agree to participate in this study.

By: _____ Date: _____

Witness: _____ Date: _____

APPENDIX B
COVER LETTER

OREGON HEALTH SCIENCES UNIVERSITY

Dear Parent,

I would like to invite you to be part of a study being done at the Oregon Health Sciences University. The study is being done to see how much information about cardiopulmonary resuscitation (CPR) is recalled after learning it. The information you provide may be used to help improve CPR teaching for other parents.

You may be assured of complete confidentiality. The questionnaire has an identifying code number for mailing purposes only. This is so that we can check off your name on the mailing list when it is returned. Your name will never appear on the questionnaire.

I would be happy to answer any questions you might have. I can be reached at (503) 279-7544.

Thank you for your assistance.

Sincerely,

Nancy Duncan

APPENDIX C
QUESTIONNAIRE

Code _____

THE OREGON HEALTH SCIENCES UNIVERSITY
INFANT CPR SURVEY

The following questions are reprinted with permission of The American National Red Cross.

Circle the best answer to the questions below:

1. When performing CPR, tip a baby's head gently:
 - a. as far as an adult's.
 - b. not as far as an adult's.
2. Check a baby's pulse:
 - a. at the middle of the upper arm.
 - b. at the wrist.
3. After giving two quick puffs, give a baby one puff of air every:
 - a. 5 seconds
 - b. 3 seconds
4. How big a breath do you give a baby?
 - a. the amount of air you can hold in your cheeks.
 - b. a breath of moderate size.
5. You believe a baby has an object caught in its airway. It cannot cough or cry. What do you do?
 - a. Let it alone and watch closely.
 - b. Give 4 back blows and 4 thrusts.
6. When you give back blows to a baby, hold the baby with its head:
 - a. Lower than its chest.
 - b. Higher than its chest.
7. You hold a baby face up when you give
 - a. chest thrusts.
 - b. back blows.
8. Use a finger sweep to remove an object from the throat of a baby:
 - a. only when you can see the object.
 - b. after every 4 thrusts.
9. Use the head tip-chin lift on a baby:
 - a. when tipping the head by lifting the neck does not work.
 - b. only when a foreign object is blocking the airway.

INFANT CPR SURVEY

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10. A baby's stomach can fill up with air if you:
 - a. blow too hard or if the airway is partially blocked.
 - b. do not blow hard enough or tip the head too far.
11. Give a baby chest compressions at the rate of:
 - a. 100 per minute
 - b. 80 per minute
 - c. 60 per minute
12. If tipping a baby's head lifts the back, you should:
 - a. tip the head less far.
 - b. support the back with the other hand.
13. What can you say to yourself to help you time the rate of 100 compressions per minute?
 - a. one, two, three, four, five (breathe), one, two . . .
 - b. one, one-thousand, two, one-thousand, three, one-thousand . . .
14. How far do you compress a baby's chest?
 - a. about 1-1/2 to 2 inches.
 - b. about 1/2 to 1 inch.
15. Push on the chest of a child or baby at the:
 - a. top half of the sternum.
 - b. middle of the sternum.
 - c. lower half of the sternum.
16. When giving chest compressions to a baby, use:
 - a. 2 or 3 fingers one finger width below the nipples.
 - b. the heel of the hand one finger width below the nipples.
17. Give babies and children:
 - a. 15 compressions, then 2 breaths.
 - b. 5 compressions, then 2 breaths.
 - c. 15 compressions, then 1 breath.
 - d. 5 compressions, then 1 breath.
18. The first time you try to give two quick breaths, you cannot inflate the lungs. You should:
 - a. sweep the mouth.
 - b. retip the head and try again.
19. Should you keep repeating the sequence of breaths, blows, thrusts and finger sweep if it does not work the first time?
 - a. yes
 - b. no

INFANT CPR SURVEY
Page 3

20. Try to remove an object by:
 - a. poking straight into the throat.
 - b. sweeping in from the side.

APPENDIX D
DEMOGRAPHIC DATA

Code _____

THE OREGON HEALTH SCIENCES UNIVERSITY
 INFANT CPR SURVEY

Sex of infant: _____ (M or F)
 Birth weight: _____
 Gestation: _____ (at birth)
 Was your baby sent home on a monitor? _____ (yes or no)

Please answer the following questions as completely as you can.

1. What is your birthdate? _____

2. What is your marital status? (check one)
 - _____ Never married
 - _____ Separated or divorced
 - _____ Widowed
 - _____ Married

3. Please circle the highest grade of school you have completed:

6 7 8 9 10 11 12 13 14 15 16 17+

4. What is your racial/ethnic background? (check one)
 - _____ Caucasian
 - _____ Afro-American
 - _____ Asian
 - _____ Hispanic
 - _____ Native American
 - _____ Other (please specify) _____

5. Including this child, how many children have you had? (circle one)

1 2 3 4 5 6 or more

6. What amount best describes your family's annual income? (check one)
 - _____ less than \$5,000
 - _____ \$5,001 - \$10,000
 - _____ \$10,001 - \$20,000
 - _____ \$20,001 - \$30,000
 - _____ \$30,001 - \$40,000
 - _____ more than \$40,000

APPENDIX E

LETTER FROM THE AMERICAN RED CROSS



Western Operations Headquarters⁴⁸
1870 Ogden Drive
P.O. Box 909
Burlingame, California 94010
(415) 692-5201

November 3, 1987

Dear Ms. Duncan:

Thank you for your letter of October 18 regarding the use of American Red Cross materials for your research project.

You request to use the following questions from the American Red Cross CPR module respiratory and circulatory emergencies final test, form B (which is located in the instructor's manual, stock number 321245), has been approved:

Unit # 5 questions 48, 49, and 51

Unit # 6 questions 53 through 62

Unit # 7 questions 63 through 70; excluding (per your request) question number 68.


This approval is limited to use in your thesis on CPR recall while attending the graduate nursing program at Oregon Health Sciences University. Please use the following statement when referencing the source of the questions: "[as numbered or identified in your document] questions were reprinted with the permission of the American National Red Cross."

You should be aware, however, that these test questions are focused on the pre-1986 standards and guidelines for Cardiopulmonary Resuscitation (CPR) and Emergency Cardiac Care (ECC). If you are testing that information, then these questions would be most appropriate. If you are testing the new standards established by the 1986 CPR and ECC Conference I would recommend that you consult with John Hamilton of the Oregon Trail Chapter in Portland, OR (503)284-1234.

In addition, I have sent a copy of your letter to one of the research and evaluation associates at our national headquarters. Dr. Sharron Silva has already begun work with relation to retention of CPR skills and may be interested in discussing your research project with you, with your permission of course.

Good luck with your project.

Sincerely,



Margo Malarkey
Director
Health Services

Nancy A. Duncan
2623 S.E. Swain Avenue
Milwaukie, OR 97267

cc: John Hamilton
Sharron Silva

APPENDIX F
REMINDER LETTER

OREGON HEALTH SCIENCES UNIVERSITY

June 19, 1988

Dear Ms.

A study at the Oregon Health Sciences University is being done to see how much information about cardiopulmonary resuscitation (CPR) is recalled a month after learning it. The information you provide may be used to help improve CPR teaching for other parents.

As a parent who has had training in CPR at the Oregon Health Sciences University, your help is appreciated.

You may be assured of complete confidentiality. The questionnaire has an identifying code number for mailing purposes only. This is so that we can check off your name on the mailing list when it is returned. Your name will ever appear on the questionnaire.

The results of this study will be made available to the Nursing Division at the Oregon Health Sciences University. You may received a summary of the results by writing to us.

I would be happy to answer any questions you might have. I can be reached at (503) 279-7544.

Thank you for your assistance.

Sincerely,

Nancy Duncan

ABSTRACT

AN ABSTRACT OF THE THESIS OF
NANCY DUNCAN, RN, BSN

For the MASTER OF SCIENCE

Date of Receiving this Degree:

Title: COMPARISON OF RECALL OF CARDIOPULMONARY RESUSCITATION
INFORMATION BETWEEN MOTHERS OF MONITORED HIGH-RISK INFANTS AND
NONMONITORED HIGH-RISK INFANTS

APPROVED: _____

This research study investigated learning and retention of cardiopulmonary resuscitation (CPR) knowledge of mothers of high-risk infants at a regional medical center. Three time intervals were used. A pretest was administered to subjects prior to being instructed in CPR. A posttest was given within 7 days after instruction was completed and again approximately 1 month after the infant's discharge from the hospital. Parental subjects were 63 mothers from two groups: 21 mothers whose infants were discharged with cardiorespiratory monitors and 42 mothers whose infants were discharged without monitors. All mothers received routine CPR instruction prior to their infant's discharge. Instruments used were the standardized American Red Cross CPR Test and a demographic form. The first two tests were distributed to the subjects in person and the final test by mail. Results showed no differences in learning and retention between mothers of monitored infants and mothers of nonmonitored infants. Significant differences in learning occurred in both groups between the pretest and both posttests ($p < .001$), and retention after 1 month was nearly as great as retention immediately after learning CPR. Mothers of high-risk infants can learn and retain specialized CPR information for at least 1 month successfully. Future studies may investigate retention for longer time intervals.