

NURSING OBSERVATION AND ASSESSMENT OF DERMAL
ICTERUS IN NEWBORNS

by

Carol Nola Traa, B. S.

A THESIS

Presented to
the University of Oregon School of Nursing
and the Graduate Council
of the University of Oregon Medical School
in partial fulfillment
of the requirements for the degree of
Master of Science

June 8, 1973

APPROVED:



Evelyn Schindler, M.A., Associate Professor, Thesis Adviser



Lucile Gregerson, M. Ed., Associate Professor, First Reader



Bernice Jones, M.N., Assistant Professor, Second Reader



John M. Brookhart, Ph.D., Chairman, Graduate Council

This study was supported by a United States Public Health
Service Traineeship from Grant Number 2 All NU 00035-14.

ACKNOWLEDGEMENTS

The author wishes to express her appreciation to Miss Evelyn Schindler, M.A., Associate Professor, Miss Lucile Gregerson, M. Ed., Associate Professor and Mrs. Bernice Jones, M.N., Assistant Professor, for their assistance during the preparation of this study.

The author also wishes to express gratitude to those nurses who participated in the study and to the computer programmer who assisted with the statistics.

c. n. t.

TABLE OF CONTENTS

Chapter	Page
I. INTRODUCTION TO THE STUDY	1
Statement of the Problem	1
Review of Literature Regarding Theoretical Framework For Observation of Dermal Icterus	2
Summary of Literature	8
Purpose of the Study	9
Hypotheses	9
Explanation of Terms	10
Overview of the Study	11
II. METHOD	12
The Setting	12
Subjects	12
The Infants	14
Factors of Observations	17
Procedure	17
III. RESULTS	21
Analysis of Data	24
IV. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS	31
Summary and Conclusions	31
Recommendations for Further Study	32
BIBLIOGRAPHY	
APPENDIX A Correspondence	39
APPENDIX B Procedure for Assessment Using Color Intensity	42
APPENDIX C Color Intensity Worksheet and Record of Observation	45

	Page
APPENDIX D Procedure for Assessment Using Dermal Zones	47
APPENDIX E Dermal Zones Worksheet and Record of Observations	40
APPENDIX F Coding Instructions	52
APPENDIX G A Comparison of the Routine Procedures for the Care of the Newborn, Both Hospitals	54
APPENDIX H Bilirubin Results and Nursing Assessment Made by Each Observer, Divided According to Groups A or B	61
ABSTRACT	

LIST OF TABLES

Table		Page
1.	Range of Experience of Observers	13
2.	Number of Observations per Nurse	14
3.	Race of Babies According to Group	24

Appendix Tables

1.	Comparison of the Routine Procedures for the Care of the Newborn, Both Hospitals	55
2.	Bilirubin Results and Nursing Assessment Made by Each Observer Divided According to Groups A and B	62

LIST OF FIGURES

Figure		Page
1.	Age of Babies, Color Assessment Group	21
2.	Age of Babies, Dermal Zone Group	22
3.	Weight of Babies, Color Assessment Group	23
4.	Weight of Babies, Dermal Zone Group	23
5.	Relationship of Color Intensity in mg of Bilirubin	26
6.	Relationship of Dermal Zone to mg of Bilirubin	27

Chapter I

INTRODUCTION OF THE STUDY

Statement of the Problem

The nurse is the first professional person to receive and care for the newborn infant in the newborn nursery. She is the one who has the most contact with the infant, and is a vital link between the newborn infant and the pediatrician. It is a nursing function to evaluate the newborn for deviations from normal on admission to the nursery and to report to the physician any subsequently developing abnormal signs and symptoms. Since the nurse is present in the nursery continuously, it is she who is responsible for assessment of the newborn for developing jaundice.

The effects of hyperbilirubinemia can be extreme and far reaching. (18). Spasticity, retardation and hearing loss are most often noted. Less frequently there are problems associated with difficulties in visual motor coordination, deficiencies in short memory tasks, evidence of distractibility greater than expected for the age, and a lower IQ when compared with siblings. (18). Symptoms of hyperbilirubinemia can be prevented by treatment with

phototherapy or exchange transfusion. The importance of early recognition and adequate treatment is apparent.

It is important to determine the accuracy of the present procedure. Nursing assessment is a primary screening procedure which if accurate could be expected to prevent unnecessary bilirubin tests thus avoiding the trauma to the infant of a painful heel stick which could be a source of infection, and the cost of the laboratory procedure. If hyperbilirubinemia is identified by the nurse the necessary laboratory verification can be ordered and treatment instituted. The problem then is evaluation of nurses' assessments of icteric newborn and of methods by which the problems are communicated.

Review of Literature Regarding Theoretical Framework For Observation of Dermal Icterus

King (23), referred to the nursing act as including the process of observation. She indicated that knowledge is a basis of cognitive awareness of facts, including perception, and implied that action and its consequences are weighted according to perception. Perceiving is done by the individual from life experiences, knowledge and needs. Perception can be studied only under specified conditions in order to be verifiable.

Perception of the nurse leads to judgment and to action by the nurse. There are three sets of conditions to be taken into account

in perception: the object, intervening circumstances between the observation and the object, and factors within the organism. Perception influences one's evaluation of a situation and this evaluation then influences further perception. The nurse should recognize the elements in the perceptual environment that motivate or hinder goals. She is then better able to interpret actions and reactions of the patient in the environment. (16)

After the observation is made, communication of pertinent data is the next step. (7) Communication involves the perception of the person to whom communication is directed. The experience and background of the person to whom communication is directed determines the effect of the communication. (23)

The literature was searched for the information which provides the necessary background for nursing observation of the problem of icterus in newborn infants.

Hyperbilirubinemia is an excessive amount of the pigment bilirubin in the blood, the effects of which can be drastic. Neonatal hyperbilirubinemia from any cause is potentially dangerous and may produce kernicterus. (5) In kernicterus there is spasticity, retardation, athetosis and deafness. (18). With simple hyperbilirubinemia there are subtle effects such as minimal cerebral dysfunction and low motor or mental scores. Odell and others (30) found evidence of abnormal cognitive functioning in a study of children at five years

of age who had had hyperbilirubinemia. There was no evidence of lower intelligence quotients or other symptoms of brain damage.

These abnormalities of cognitive functioning included:

1. Difficulties in visual motor coordination with slow inaccurate and clumsy movement.
2. Deficiencies in short term memory tasks.
3. Inability for abstract reasoning appropriate for age.
4. Evidence of distractibility to a degree greater than expected for the age of the child.
5. Hyperactivity.
6. Short attention span.

The fetus is dependent to a large extent on clearance through the placenta for removal of bilirubin. The mother's liver functions to destroy the bilirubin that has passed across the placental membrane. (6) Hemoglobin is the principle source of bilirubin, (9) and is formed in the reticuloendothelial system. (33) The rate of formation of bilirubin is affected by the type of erythrocyte destruction, whether by phagocytosis or sequestration as in the case of hemolytic disease. (19) Sequestered cells may be outside the circulation and constitute significant amounts of bilirubin not immediately available for destruction by phototherapy, or removable by exchange transfusion. This bilirubin will need to diffuse back into circulation before it can be excreted. (6)

Kaplan says that there is no great difference between the life span of fetal and adult erythrocytes but indicates that the fetal cells might be more fragile especially in a premature baby. Fetal hemoglobin is more readily oxidized when combined with albumin than when combined with haptoglobins. Haptoglobins are not readily available at birth. (21)

Zinkman stated that enzyme systems in the newborn are different from those of the adult. (40) Felsher and others have noted a relationship between caloric intake and the degree of hyperbilirubinemia in Gilbert's Syndrome. (15, 13). Korones indicates that a deficiency in glucuronyl transferase is involved with hyperbilirubinemia. (20) Zinkman also emphasized the need for blood sugar to protect the fetal erythrocyte from oxidation. A low blood sugar may make the red cells more susceptible to breakdown. (40) This small difference in susceptibility may be the deciding factor in overburdening the liver with bilirubin.

There are two main types of bilirubin. These are classified as direct or indirect according to the way that they react chemically. The indirect reacting pigment is free bilirubin, fat soluble, not excreted by the liver or kidney and has an affinity for brain and fat tissue. (3, 10). It produces damage to the cell. The direct reacting bilirubin is combined (or conjugated) with a glucuronide, is water soluble and is not damaging to the cell. (6, 26) Conjugation of

bilirubin takes place in the hepatic parenchymal cells, the kidney and the gastrointestinal tract. (24)

Glucose is necessary for the synthesis of glucuronides. Early feeding now done in most hospital nurseries, is of great importance in allowing the jaundiced newborn to conjugate bilirubin and excrete it. If a baby cannot take fluids by mouth, intravenous feedings of dextrose are given. Oxygen is also needed to conjugate bilirubin. (14). An acidotic child with respiratory distress is often treated with oxygen therapy, intravenous sodium bicarbonate and fifty percent dextrose. (2)

The limited capacity of the neonatal liver for conversion of the bilirubin appears to be very close to the physiologic load imposed on the system by the breakdown of hemoglobin at a normal rate. (41) An increase in the rate of hemolysis that is very slight can lead to the retention of appreciable amounts of bilirubin. The excretory capacity of the liver begins to increase rapidly after birth in the full term baby. Most normal newborn infants can clear the accumulating bilirubin and also the previously accumulated bilirubin by the fourth or fifth day. (41) The degree of maturity seems to be a large factor in the development of enzyme systems and negro babies are said to have greater degrees of maturity in enzymatic process than caucasian babies. (41) No verification of less jaundice in negro babies was given in this reference. Breast fed babies may be at risk since

breast milk sometimes contains a form of pregnanediol that inhibits the activity of glucuronyl transferase. (24) There is however, a large degree of variability from infant to infant. Bruising, hematoma, ecchymosis are all evidences of increased rate of hemolysis which the nurse observes and notes. (2, 24)

The state of hydration may be a critical factor in determining the plasma bilirubin concentration. A dehydrated infant will have a high plasma bilirubin, because of a decrease in the amount of overall plasma. This will cause a higher interstitial bilirubin and a higher intracellular bilirubin. (28)

Limitations can be placed on the plasma bilirubin as an indicator of the total bilirubin in the baby's body. The tissues of the body form an important reservoir for bilirubin. Adipose tissue can store more bilirubin than other tissue because of bilirubin's affinity for lipids. Small babies who lack adipose tissue are more endangered than larger babies by a similar quantity of bilirubin. (29, 32, 34, 36, 39)

'Physiologic jaundice' is considered to be the type of jaundice in the newborn, which follows a pattern according to degree and time of appearance and disappearance that can be totally explained by the limited capacity of the normal newborn liver to metabolize bilirubin (6, 17) With these general limits to the definition of physiologic jaundice it is possible to judge whether a case fits within those

boundaries. A jaundiced infant is evaluated for the possibility of hemolytic disease. (2, 20, 22, 27, 37)

A history of prolonged or difficult labor, delayed onset of respiration and respiratory distress or cyanosis is found in many cases of hyperbilirubinemia. The conjugation of bilirubin demands oxygen in every enzymatic step. If the enzymatic system requires oxygen, there is a depression of the conjugation system when it is not adequate. (31)

Indirect bilirubin is destroyed by light in vivo. This is a photo-oxidative process, (23) and apparently takes place in the skin. The products are water-soluble and nontoxic, (10) and appear to be more rapidly excreted than normal bilirubin. (10) Phototherapy should not be used routinely in all infants to prevent hyperbilirubinemia because of biological effects of light and unknowns concerning these. (3)

Summary of Literature

Observation and reporting of abnormal physiological signs and symptoms are legally defined functions of nurses. Bilirubin is the yellow pigment causing jaundice and damage to the central nervous system in the newborn. Hemolytic disease, trauma, a poorly developed enzyme system, deficiencies of oxygen, sugar and/or fluid are circumstances in which an increased bilirubin may occur. The

assessment of hyperbilirubinemia is crucial in the prevention of permanent damage to growth and development of the patient. Early identification of the problem with verification by laboratory reports followed by treatment may prevent abnormalities in cognitive function and in motor coordination. This review of the literature emphasizes the background knowledge that influences the nurse's perception of jaundice. The nurse's ability to perceive and make an accurate assessment of the amount of dermal icterus is dependent upon knowledge of the factors which are related to the production of increased yellow pigmentation of the skin and the possible consequences.

Purpose of the Study

This study was undertaken for the purpose of comparing two methods used to identify jaundice in the newborn. The first method is commonly used by nurses, i. e. determining the intensity of yellow color of the skin and describing it in terms of yellowness. The second method is that of Kramer describing advancement of the yellow color over the body according to dermal zones. (25) A comparative study of these two methods could identify the more accurate method.

Hypotheses

A study was made to evaluate the null hypotheses.

1. There is no statistically significant correlation between nursing assessment of jaundice in newborns, using color intensity method, and laboratory bilirubin test results.

2. There is no statistically significant correlation between nursing assessment of jaundice in newborns, using the dermal zone method, and laboratory bilirubin test results.

3. There is no difference in accuracy of these two methods of nursing assessment, namely; color intensity and dermal zone.

Explanation of Terms

Terms used in this study include the following:

Bilirubin level: serum blood content of the pigment bilirubin, expressed in milligrams percent.

Bilirubin test: laboratory test of blood serum content of the yellow pigment bilirubin in milligrams per 100 milliliters.

Color intensity method: determining amount of yellow color in skin and stating according to degree of yellowness.

Dermal zone method: determining the amount of body area that appears yellow and stating according to arbitrarily chosen zones.

Exchange transfusion: the replacement of a portion of blood in the body, given as a treatment for jaundice in newborns.

Heel stick: the procedure of stabbing a baby's heel to obtain a blood specimen.

Hyperbilirubinemia: excessive amount of bilirubin in the body.

Icterus: a condition characterized by yellowness of skin, sclera, mucous membranes, and body fluids due to excess of bilirubin.

Jaundice: same as icterus.

Newborn: babies from the age of birth to one month of age.

Observation/assessment: the gathering of data by recognizing and noting facts or occurrences.

Phototherapy: treatment with light-specifically high intensity daylight fluorescent bulbs.

Phototherapy lamp: a lighting unit with high intensity fluorescent bulbs used in treating jaundice in the newborn.

Overview of the Study

The introductory chapter included the statement of the problem, review of literature, the purpose of the study, hypotheses, explanation of terms, and a short description of the method. The second chapter will consist of a complete description of the method. Chapter III will consist of the research and the findings. Chapter IV will be the discussion.

CHAPTER II

METHOD

The Setting

The study was conducted in two hospitals in Portland, Oregon, June, July, and August 1971. One was a publicly funded hospital with a total obstetric capacity of 29 beds and 38 bassinets. The other was a private hospital associated with a prepaid insurance plan with 36 obstetric beds and 36 bassinets. The average census as estimated by the personnel in the nurseries during the course of the study was 15 to 20 in the publicly funded hospital (67), and 30 to 36 in the private hospital (63), for the babies to be included in the study. The usual length of stay in the nursery was three days.

Cesarean section babies generally stayed no longer than five days.

Subjects

Regular nursery personnel were included as observers. No students, or temporarily assigned personnel were included, although registered nurse staff members employed on a part time basis

were included if they were routinely assigned to the service.

The observers were all registered nurses. There were five observers making evaluations at the private hospital and three observers at the public hospital. The observers at the public hospital (hospital I) had an average of 10 years of nursery experience which ranged from seven to 15 years. Those at the private hospital (hospital II) had a average of six years of nursery experience.

Table 1. Range of Experience of Eight Observers. *

Years experience	Hospital I n = 3	Hospital II n = 5
Less than one year		SA 0.3
One to five years		RT 1.5 IS 4
Six to ten years	DW 7 MEN 8	DG 10
More than 10 years	GS 15	GA 25

* Letters identify individuals, the numbers refer to length of experience

The observations made at the public hospital were fairly evenly divided between the three individuals with 18, 20, and 12 observations made by each person. Three individuals at the private hospital made all be two of the observations. Two other individuals made one observation each. One person at the private hospital made nine observations, another made five and another made four. The

observations in the color intensity group, (Group A) were made by six people, while those in the dermal zone group, (Group B) were made by seven people. The sample was not large enough to find any statistical relation between the observations made and the observers. This information is tabulated in Appendix. (H)

Table 2. Number of Observations Per Nurse.*

Observer	Hospital I		Hospital II	
	Group A	Group B	Group A	Group B
DG			0	1
DW	4	16		
GA			0	4
GS	9	3		
IS			8	1
MEN	12	6		
SA			1	0
RT			1	4

* Letters identify individuals.

The Infants

Infants included in the study were those who met the following criteria.

A. Observation has been made under a phototherapy lamp in which day light bulbs were used.

B. Blood tests were drawn in two hours or less from the time of the assessment.

Delivery problems and abnormalities can influence the incidence of jaundice in the newborn. This information was obtained with the assessment for all the newborn. The sample in this study was too small to provide a statistical sample of any one abnormality, so no statistical inference could be drawn between an abnormality and unrecognized jaundice.

There was a preponderance of abnormalities and problems in the color differentiation group or group A. There were two Cesarean sections, one case of amnionitis, one incidence of the membranes being ruptured more than 24 hours, one mother taking medication that could cause jaundice in the newborn, one premature baby, one with a low Apgar, three incidences of circumvallate placenta, marginal sinus and rupture of the placenta. There was one baby with asphyxia neonatorum, one with the cord around the neck, one with a broken cord with blood loss, one incidence of fetal distress, and one of shoulder dystocia. There were no twins in group A and all of the mothers of babies in that group had had prenatal care. There were five incidences of Rh incompatibility, and seven incidences of ABO incompatibility. Group A also had four incidences of jaundice attributed to low intake of fluids.

In the B group, assessed by dermal zone procedure, there

were four infants delivered by Cesarean sections. There was one amniotitis and one premature infant. There were no incidences of the membranes being ruptured more than 24 hours, a mother taking medication that could cause jaundice in the neonate, a low Apgar score or placental abnormalities. There were however, one mother who had no prenatal care, one set of twins, one posterior presentation, one instance of hematoma, one instance of use of forceps. There were no instances of asphyxia neonatorum, no cords around the neck or broken cords, no postmaturity, no blood incompatibilities, no instance of bruising and no jaundice attributed to low intake of fluids.

It was anticipated that a correlation might be determined between phototherapy and a change in the accuracy of the nursing assessment during the study. If a baby was evaluated and did not have blood drawn from a bilirubin test, the observation was excluded from the study. If the blood was drawn under the light, or more than two hours after the observation was made, that observation was also excluded.

Babies who had been treated with phototherapy were included. Phototherapy does change the bilirubin concentration in the skin.

A total of 70 infants were included in the study. From the publicly funded hospital, there were 25 infants evaluated for each

method. Ten infants were evaluated for each method from the privately funded hospital.

Factors of Observations

Babies observed were chosen by the nurses making the observation. This depended on their time, and judgment. The study continued until ten observations were made in each group at one hospital and 25 observations for each group at the other hospital. The forms used for recording observations are in Appendices C and E.

Procedure

Two procedures were used for the assessment.

Procedure I: The nurses inspected the babies' skin under the phototherapy lamp for intensity of the yellow color in the color differentiation or color intensity method. They could blanch the skin by using pressure with a thumb or finger but were not required to do so. The nurses were not required to look at the whole body. They were then asked to classify the skin color according to one of the following terms, not yellow, slightly yellow, yellow, very yellow, or orange. They then marked the space on the worksheet by the term that they had chosen (see appendix C).

Procedure II. In the dermal zone method, the nurse examined the baby under the phototherapy light and decided how far down the

body the icterus had advanced. She did this by inspecting and blanching the skin with a thumb or finger. Here the nurse was required to look at the baby's whole body. She decided in which zone the icterus stopped, and marked this on a work sheet which consisted of an outlined figure of the body of a baby with the various parts of the body marked into zones. The head was zone one. The chest zone two. The abdomen and the legs down to the knees were zone three. Zone four included the arm from the shoulder to the wrist and the legs from the knees to the ankles. Zone five consisted of the hands and the feet (see appendix E).

The assessment was made at both hospitals before the blood for the bilirubin test was drawn. In the public hospital the nurses generally examined the babies and if jaundice was identified, filled out a requisition for the bilirubin test without consulting the doctor. The laboratory results were then reported to the doctor. At the private hospital, the nurses reported the jaundice to the doctor and he then ordered the bilirubin test. If the nurses failed to observe the jaundice, and the doctor identified it, the nurse would make her observation, and record on the work sheet that the jaundice was noted by the doctor.

The babies were examined under the phototherapy light in both nurseries. This is because daylight, which is present in both nurseries varies in intensity according to the time of the day, and

the weather. Daylight bulbs were used in the phototherapy lamps in each nursery. The phototherapy lamps were utilized for the observation since the light source would then be much more constant for each observation and be most readily available for the observation. Of 70 assessments, only four were not made under a phototherapy lamp and in these cases because the lamps were all being used for treatment. The babies were identified according to code letters to protect them and their parents from invasion of privacy. The nurse used her initials to identify herself.

The time was marked by the nurse when she made her observation to identify the assessment and the findings in relation to the time the blood for the bilirubin test was drawn. Assessments made more than two hours before the bilirubin test, were discarded. A bilirubin level may change rapidly and two hours was arbitrarily chosen as a reasonable amount of time in which the laboratory could draw blood after an order was given. If the baby had already received phototherapy treatment, the length of time spent under the phototherapy lamp was marked in hours.

Other information sought regarding each infant consisted of the age in hours at the time of the assessment, the race, since normal skin color does make jaundice more or less apparent, the weight in pounds and ounces, the cause of icterus if known, and delivery problems.

In the public hospital, the nurses generally did not fill in the other information. The researcher completed the information from the baby's chart. In the private hospital, the nurse observer generally obtained the information from the chart. This was because of the small number of observations done over a longer time. It was generally easier for the nurse to fill out the other information on the worksheet herself, than to telephone the researcher, and then obtain the chart for her when she came.

CHAPTER III

RESULTS

The study proceeded as previously described. The observations revealed that:

The babies in the color assessment group (Group A) had a mean age of 54.9 hours with a standard deviation of 19.57 hours. The color assessment group had a range of 79 hours with babies from 17 hours to 96 hours of age.

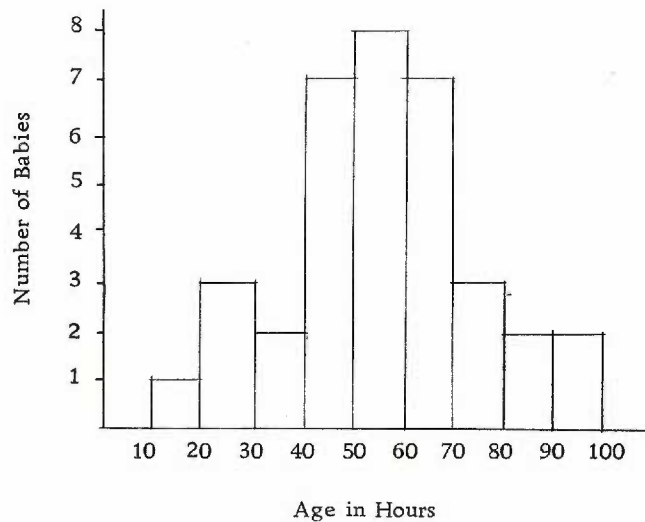


Figure 1. Age of Babies--Number of Babies in Age Groupings by Ten Hour Divisions of Those Observed For Color Assessment Both Hospitals -- Mean = 54.9 hours, Standard Deviation = 19.57 Hours.

The babies in the dermal zone group (Group B) had a mean of 45.7 hours with a standard deviation of 22.9 hours. The range was 91 hours, with babies from 7 to 98 hours of age.

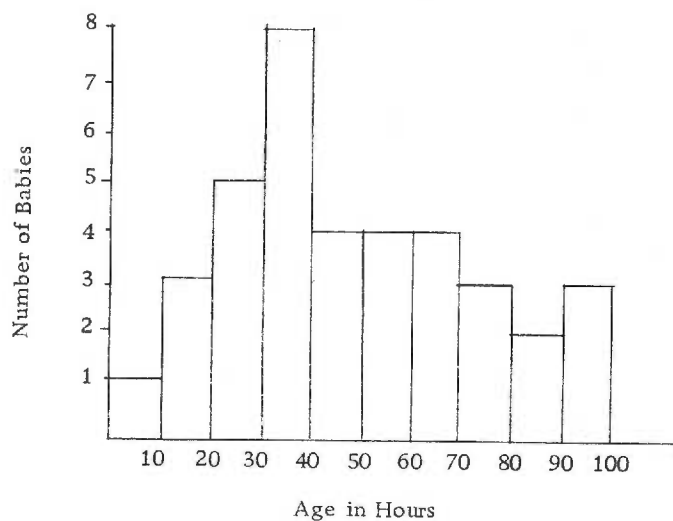


Figure 2. Age of Babies--Number of Babies in Age Groupings by Ten Hour Divisions of Those Observed for Dermal Zone Assessment, Both Hospitals -- Mean 45.7 Hours, Standard Deviation 22.9 Hours.

The weight of the babies in both groups was as follows:

The color assessment group at both hospitals had a mean of 7 pounds 2 ounces with a Standard Deviation of 1 pound 2 ounces.

The dermal zone group had a mean of 7 pounds 1 ounce with a Standard Deviation of 1 pound 4 ounces. The weights of the babies ranged from 4 pounds 7 ounces to 9 pounds 7 ounces (Figure 4).

Since color influences the observation of dermal zone and color differentiation assessment, the number of babies in each group

according to race is pertinent. There were 31 white babies in the dermal zone group (Group B) with 4 Mexican American babies for a total of thirty-five babies. In the color differentiation group (Group A), there were 32 white babies, with two black babies and one Chinese baby.

Table 3. Race of Babies Included in Study According to Color Intensity (Group A) or Dermal Zone (Group B).

Race	Group A	Group B
Caucasion	32	31
Black	2	0
Mexican American	0	4
Oriental	1	0

Analysis of Data

A correlation coefficient of the nursing assessment number and the bilirubin results for each method was done. Data from both hospitals were combined resulting in a sample of 35 for each method. The data were computed by hand and checked by computer.

The product-moment correlation coefficient of nursing assessment using the color intensity method and the laboratory bilirubin results was 0.62. This is significant at the 0.01 level. There is a positive correlation between nursing assessment using the color

intensity method and laboratory bilirubin results. This can be considered a moderate correlation coefficient according to guidelines by Downie and Heath (19). The null hypothesis that there is no statistically significant correlation between nursing assessment of jaundice in newborns, using the color intensity method, and laboratory bilirubin test results is therefore rejected. There is a correlation between nursing assessment of jaundice in newborns and laboratory bilirubin results using the color differentiation or intensity method, with a confidence level of 99 per cent. Figure 5 shows the relationship of nursing assessment using the color intensity method and milligrams of bilirubin as reported by the laboratory. It should be noted that one baby appeared less yellow in relation to his bilirubin in comparison to the other babies. This baby had had 67 hours of phototherapy.

The product-moment correlation coefficient of nursing assessment using the dermal zone method and the laboratory bilirubin results was 0.57. This is also considered a moderate coefficient. There is a positive correlation between nursing assessment using the dermal zone method with a confidence level of 0.1. The second null hypothesis, there is no statistical significant correlation between nursing assessment of jaundice in newborns, using the dermal zone method and laboratory bilirubin test results, is also rejected.

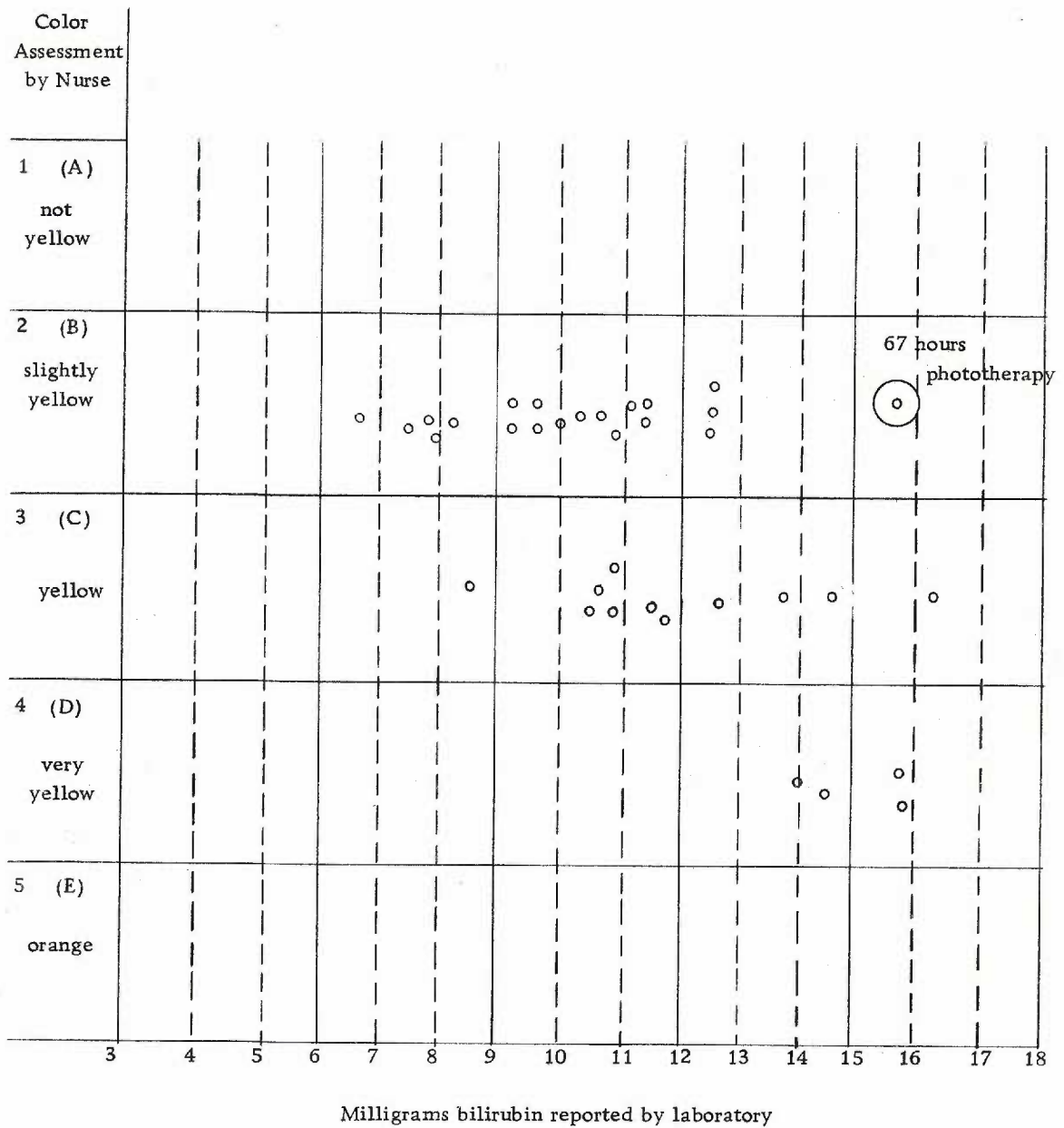


Figure 5. Relationship of 35 Color Assessment Observations by Nurse to Milligrams of Bilirubin as Reported by Laboratory.

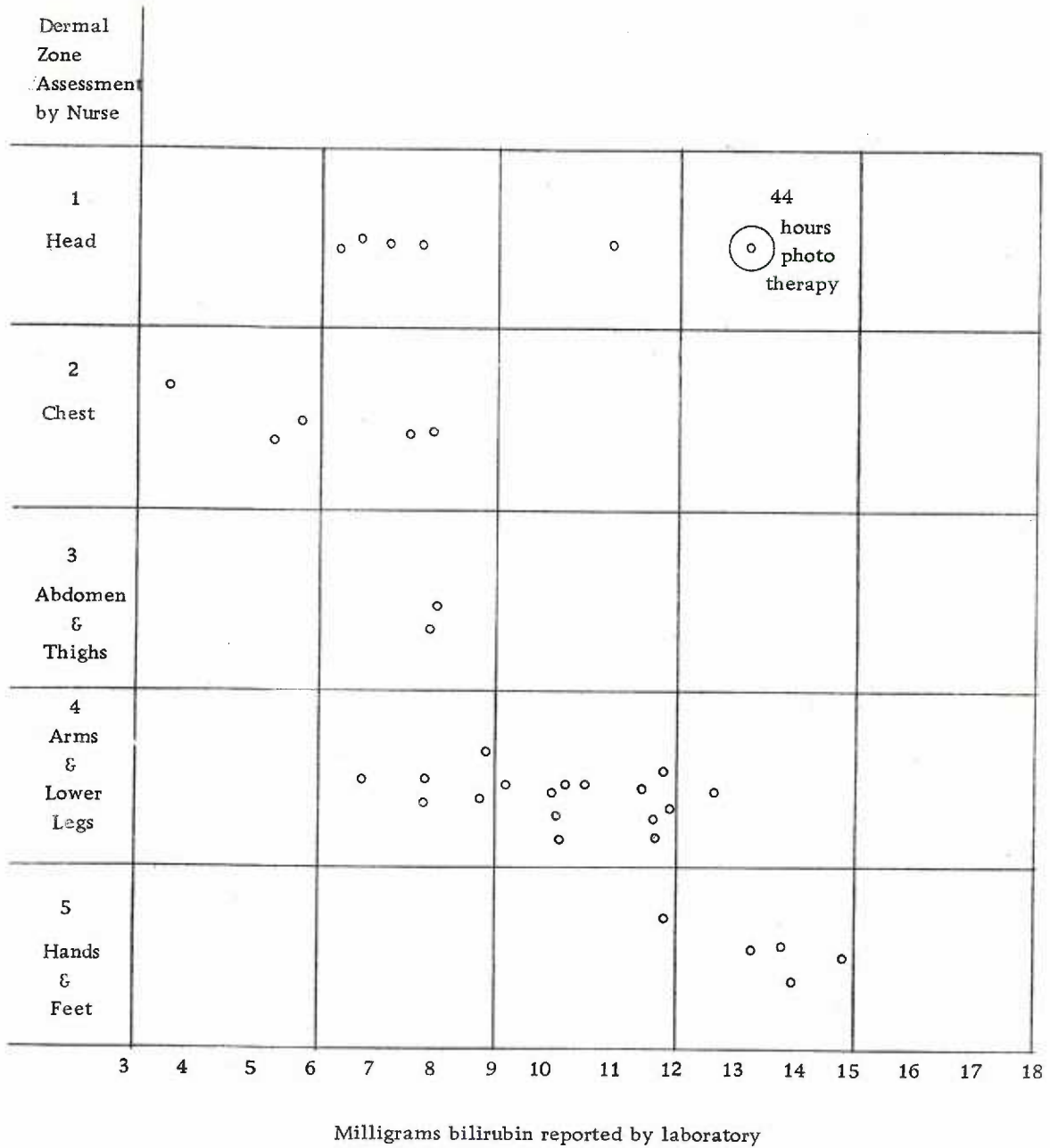


Figure 6. Relationship of 35 Dermal Zone Assessment Observations by Nurse to Milligrams of Bilirubin as Reported by Laboratory.

A z test was then done with the correlation coefficients of the two groups. This z was 0.28. Referring to Table III in Edwards (20), this computed value is less than the table value for a 99 per cent confidence level and the null hypothesis, there is no difference in accuracy of these two methods of nursing assessment, is accepted.

Figure 6 shows the relationship of nursing assessment using the dermal zone method and milligrams bilirubin. In Group B also there was a baby who had had phototherapy. The nursing assessment was made on that baby after 44 hours of phototherapy treatment. As can be noted in the scattergram, the baby was evaluated in the number one zone, with a reported bilirubin test result of 13 milligrams per cent. This, in addition to the baby in the color intensity group who was evaluated as slightly yellow after having 67 hours of phototherapy, might indicate that phototherapy in some ways makes outward signs of a high bilirubin test less noticeable to the nurse assessor.

The size of the study may be interpreted as pilot research to initiate further investigation. Beyond the scope of this paper are some pertinent problems identified in the literature.

1. The relation between drugs taken by the mother prenatally and jaundice in the newborn. Sulfonamides and phenothiazines taken by the mother have been shown to cause jaundice in the newborn. (4) Phenobarbital has been shown to decrease jaundice. (1) Other drugs might also mask jaundice or increase or decrease it.

2. The influence of heat on the amount of dermal icterus. This might be related to the amount of blood perfusing the tissues as well as the serum bilirubin.
3. The relationship between skin vascularity and dermal icterus. The bilirubin would be influenced by the rapidity of transport through tissue areas that light could penetrate.
4. The relationship of adipose tissues and dermal icterus. Fat cells deposit more bilirubin. Would more fat determine the amount of brain damage at a given bilirubin level?
5. The amount of practice using the dermal zone method. This procedure was new to all those nurses making the observations, yet there was not a significant difference between it and the color intensity method which was informally used by those nurses before the study.
6. The relationship between trauma and decrease of oxygen in the birth process, with increased bilirubin results. This study did not control the collection of this information, but used that information that had been recorded on the chart by the staff. A check list of all possible deviations might prevent data from being omitted.
7. The possibility that high bilirubin levels go undetected when babies present no symptoms. Babies could have high bilirubin levels without being jaundiced and this would be undetected. Tests

might be done on all babies (with and without symptoms). This would cost a great deal but would establish a continuum of jaundice in relation to laboratory tests.

8. The relationship between hemolytic diseases and the presence of dermal icterus. A B O incompatibility might have more easily recognizable jaundice than perhaps some of the Rhesus factor incompatibilities.

9. The study be altered from the observer position. Would a person with less experience be more accurate using one method than the other. Would different types of personalities be more conservative in their nursing assessment than other types? Does the relationship between the physician and the nurse affect the communication of the nursing assessment? Would using different methods of assessment affect this in any way? In instances of differing amounts of communication between the delivery area and the nursery, is there a difference in the amount or number of jaundiced babies identified? Does more accurate charting and reporting of pertinent data have an effect on the nursing assessment of the baby?

CHAPTER IV

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary and Conclusions

The purpose of the study was to compare two methods of nursing assessment of newborn jaundice. The dermal zone method which uses body zones to describe jaundice was compared with the color intensity method which differentiates between amounts of yellow color in describing jaundice. Seventy observations were made in two hospital nurseries by eight nurses. The infants observed were described according to weight, age and abnormalities. The observers were described according to length of nursery experience.

The observations were correlated with laboratory bilirubin test results. An analysis of the data showed no statistical difference between the two methods. Both methods were found to be useful as screening devices for detecting jaundice in newborns. Nursing assessment of jaundice in newborns can identify babies which require treatment to prevent damage to the central nervous system or problems with growth and development.

Recommendations for Further Study

It is recommended that there be studies of:

1. The relation between drugs taken by the mother prenatally and incidence of jaundice in the newborn.
2. The influence of heat on the amount of dermal icterus.
3. The relationship between skin vascularity and dermal icterus.
4. The relationship of adipose tissues and dermal icterus.
5. The relationship between trauma or decrease of oxygen during the birth process, with increased bilirubin results.
6. The possibility that high bilirubin levels go undetected when babies present no symptoms.
7. The relationship between hemolytic diseases of different types and dermal icterus.
8. The amount of practice using the dermal zone method necessary for development of skill.

Bibliography

BIBLIOGRAPHY

1. Ackerman, Bruce D., M.D., "Phenobarbital for Neonatal Jaundice", The Journal of Pediatrics, (November 1970), 77:5;916.
2. Babson, S. Gorham, M.D., and Ralph C. Benson, M.D., Management of High Risk Pregnancy and Intensive Care of the Neonate, The C. V. Mosby Company, St. Louis, 1971.
3. Behrman, R. E., and D. Y. Y. Hsia, "Summary of a Symposium on Phototherapy for Hyperbilirubinemia", The Journal of Pediatrics (October 1967), 75:3;718-726.
4. Benson, Ralph C., Handbook of Obstetrics and Gynecology, Lange Medical Publications, Los Altos, California, 1971.
5. Broughton, P. M. G., and others, "Effects of Blue Light on Hyperbilirubinaemia", Archives of Diseases of Childhood, (April 1965), 40:4;666-671.
6. Brown, Audrey K., "Neonatal Jaundice", Pediatric Clinics of North America, (March 1961), 9:3;575.
7. Byers, Virginia B., Nursing Observation, W. M. C. Brown Company, Dubuque, Iowa, 1968.
8. Cremer, R. J., and P. W. Perryman, "Influence of Light on the Hyperbilirubinaemia of Infants", The Lancet, (May 24, 1958) 1094.
9. Crosby, Lt. Col. William H., M. D., "The Metabolism of Hemoglobin and Bile Pigment in Hemolytic Disease", American Journal of Medicine, (January 1955), 18:1;112-122.
10. Diamond, Ivan, M. D., and Rudi Schmid, M. D., "Neonatal Hyperbilirubinemia and Kernicterus", Archives of Neurology, (June 1968) 18:6;699-702.
11. Downie, N. M. and R. W. Heath, Basic Statistical Methods, Harper and Row, Publishers, New York, Evanston and London, 1967.

12. Edwards, Allen L., Statistical Methods Second Edition, Holt, Rinehart and Winston, Inc., New York, Chicago, San Francisco, Atlanta, Dallas, Montreal, Toronto, London, 1967.
13. Felsher, Gertram, and others, "The Reciprocal Relation Between Caloric Intake and the Degree of Hyperbilirubinemia in Gilberts Syndrome", The New England Journal of Medicine, (July 23, 1970).
14. Gartner, Lawrence M., M.D., and others, "Kernicterus: High Incidence in Premature Infants with Low Serum Bilirubin Concentrations", Pediatrics, (August 1969) 44:2;162-167.
15. Gorodischer, Rafael, M. D., and others, "Congenital Non-obstructive Nonhemolytic Jaundice", The New England Journal of Medicine, (February 12, 1970), 28:7;375-377.
16. Henderson, Virginia, The Nature of Nursing, The MacMillan Company New York, Collier-MacMillan Limited, London, 1967.
17. Hsia, D. Y., and others, "Serum Bilirubin Levels in the Newborn Infant", The Journal of Pediatrics, (March 1953), 42:3;277-285.
18. Hyman, Carol B., M. D., and others, "CNS Abnormalities After Neonatal Hemolytic Disease or Hyperbilirubinemia", American Journal of Diseases of Children, (April 1969), 117:4;395-405.
19. Jandl, James H., and others, "The Destruction of Red Cells by Antibodies in Man-Observations on the Sequestration and Lysis of Red Cells Altered by Immune Mechanisms", Journal of Clinical Investigation, (October 1957), 36:4;1428-1457.
20. Johnston, W. H., M.D., and others, "Erythroblastosis Fetalis and Hyperbilirubinemia", Pediatrics, (January 1967), 39:1;88-92.
21. Kaplan, Eugene, "Studies of Red Cell Survival in Early Infancy", A.M.A. Journal of Diseases of Children, (November 1959), 98:5;603-604.

22. Keaster, Jacqueline, M. S., and others, "Hearing Problems Subsequent to Neonatal Hemolytic Disease of Hyperbilirubinemia", American Journal of Diseases of Children, (April 1969), 117:4;406-410.
23. King, Imogene, Toward a Theory for Nursing, John Wiley and Sons, New York, 1971.
24. Korones, Sheldon, High-Risk Newborn Infants--the Basis for Intensive Nursing Care, The C. V. Mosby Company, Saint Louis, 1972.
25. Kramer, Lloyd I., M. D., "Advancement of Dermal Icterus in the Jaundiced Newborn," American Journal of Diseases of Children, (September 1969), 25:4;690-708.
26. Lucy, Jerold, M. C., and others, "Prevention of Hyperbilirubinemia of Prematurity by Phototherapy", Pediatrics, (June 1968), 41:6;1047-1054.
27. McKay, R. James, Jr., M. D., "Current Status of Use of Exchange Transfusion in Newborn Infants", Pediatrics, (May 1964), 33:5;763-767.
28. Nordmark, Madelyn T., and Anne W. Rohweder, Scientific Foundations of Nursing, J. B. Lippincott Company, Philadelphia, Toronto, 1967.
29. Odell, Gerard B., M. D., "The Distribution of Bilirubin Between Albumin and Mitochondria", The Journal of Pediatrics, (February 1966), 68:2;164-180.
30. Odell, Gerard, M. D., and others, "Studies in Kernicterus, III, The Saturation of Serum Proteins With Bilirubin During Neonatal Life and Its Relationship to Brain Damage at Five Years", The Journal of Pediatrics, (January 1970), 76:1;12.
31. Pineda, Rebecca G., M. D., and others, "Serial Bilirubin Concentrations in Low Birth Weight Infants", American Journal of Diseases of Children, (November 1969), 118:5;733-742.
32. Porto, Sergio O., M. D., and others, "Studies on the Effect of Phototherapy on Neonatal Hyperbilirubinemia Among Low-Birth-Weight Infants. I. Skin Color", The Journal of Pediatrics, (December 1969), 75:6;1045-1047.

33. Pullman, Bernard, and Anne Marie Perault, "On the Metabolic Breakdown of Hemoglobin and the Electronic Structure of the Bile Pigments", Proceedings of the National Academy of Science, (October 1959), 45:10;1476-1480.
34. Shiller, Jack G., M. D., and William A. Silverman, M. D., "Uncomplicated Hyperbilirubinemia of Prematurity", American Journal of Diseases of Children, (May 1961), 101:5;587-592.
35. Styles, Ihlene, R. N., Personal Interviews, Portland, Oregon, July, August 1971.
36. Stern, Leo, M. D., and Ronald L. Denton, M. D., "Kernicterus in Small Premature Infants", Pediatrics, (March 1965) 35:3;483-485.
37. Weldon, Virginia V., M. D., and Gerard B. Odell, M. D., "mortality Risk of Exchange Transfusion", Pediatrics (April 1968), 41:4;797-801.
38. Whitaker, Dorothy, R. N., Personal Interviews, Portland, Oregon, July, August 1971.
39. Wishingrad, Lester, M. D., and others, "Studies of Non-Hemolytic Hyperbilirubinemia in Premature Infants", Pediatrics, (August 1965), 36:2;162-172.
40. Zinkham, William H., "An in Vitro Abnormality of Glutathione Metabolism in Erythrocytes From Normal Newborns; Mechanism and Clinical Significance", Pediatrics, (January 1959), 23:1;1832.
41. Zuelzer, Wolf W., and Audrey K. Brown, "Neonatal Jaundice, A Review," American Journal of Diseases of Children, (January 1961) 101:1;87-127.

APPENDICES

APPENDIX A

CORRESPONDENCE

The following letters were written to the hospitals where the data were collected. Each letter was answered by a phone call and was followed by a personal interview. The director of nursing at each hospital was the person who gave permission for the study.

2200 S. W. 195th
Aloha, Oregon, 97005

June 3, 1971

Mrs. Gale Rankin, Director
Multnomah Hospital
3171 S. W. Sam Jackson Pak Road
Portland, Oregon, 97201

Dear Mrs. Rankin,

In partial fulfillment of requirements for a Master of Science degree at the University of Oregon School of Nursing, I am undertaking a study of nursing observation and evaluation of dermal icterus in the newborn. I would like to use the newborn nursery and the personnel there as participants. The study would require 50 observations, which I anticipate would take less than three weeks, depending on the number of babies that appear jaundiced.

If you would like to discuss the study with me, please call or write. I would appreciate hearing from you before June 15th.

Upon completion of the study, copies of the report will be placed in the library at the University of Oregon School of Nursing.

Yours sincerely,

Carol Traa, R. N.
Phone: 649-6589

Carol Traa is a regularly enrolled graduate student at the University of Oregon School of Nursing. Any assistance you can offer her will be greatly appreciated.

Evelyn Schindler M. A.
Thesis Advisor

2200 S. W. 195th
Aloha, Oregon, 97005

June 3, 1971

Mrs. Audrey Wallingford, Director
Kaiser Hospital
5055 N. Greely Avenue
Portland, Oregon

Dear Mrs. Wallingford;

In partial fulfillment of requirements for a Master of Science degree at the University of Oregon School of Nursing, I am undertaking a study of nursing observation and communication of dermal icterus in the newborn. I would like to use the newborn nursery and the personnel there, as participants. The study involves having nurses observe jaundice in the newborn using two methods, and recording their observations. Depending on the amount of time needed, anywhere from 20 to 50 observations will be done.

Upon completion of the study, copies of the report will be placed in the library at the University of Oregon Medical School.

Yours sincerely,

Carol Traa R. N.
Phone: 649-6589

Carol Traa is a regularly enrolled graduate student at the University of Oregon School of Nursing. Any assistance you can offer her will be greatly appreciated.

Evelyn Schindler M. A.
Thesis Advisor

APPENDIX B

PROCEDURE FOR ASSESSMENT
USING COLOR INTENSITY

PROCEDURE FOR ASSESSMENT USING COLOR INTENSITY

1. The baby need not be totally exposed, the baby has some symptoms of jaundice.
2. Examine the baby under the phototherapy light if possible.
3. Examine the baby's skin by inspecting or blanching the skin with a thumb or finger to determine how the baby should be classified; not yellow, slightly yellow, yellow, very yellow, or orange. You need not look at the whole baby's body.
4. Decide how you would describe the baby using these terms. Mark the space by the term you would use.
5. Put the baby's identification letters in the proper space. This is the first 3 letters of the baby's name.
6. Mark the time at the top of the work sheet and put your initials or code letters that you have chosen in the space at the bottom of the sheet. If you choose to use code letters rather than initials, be different from others making assessments, and also be consistent in using the same ones.
7. You need not fill out the other blanks since the graduate student can do this from the chart when she picks up the work sheet and records the bilirubins on it.

PERTINENT INFORMATION CONCERNING THE ASSESSMENT

1. Laboratory results will be accepted as final since the researcher has no control over the laboratory determinations.
2. Bilirubin tests that are drawn under a phototherapy light will be excluded since light destroys the pigment and the results will not be accurate.
3. Babies over 7 days of age will be excluded.
4. Observations will be recorded by Registered Nurse.

5. Observations will be limited to regular nursery personnel.
6. If two nurses want to combine their observation, each should mark a work sheet BEFORE they share results. Two nursing assessments on the same baby will add depth to the study and is welcomed as long as the two assessors do not influence each other's results.
7. Bilirubin tests drawn over 2 hours after the nurse's assessment will be excluded since an increase could have occurred during that time.
8. Babies who have been treated with phototherapy will be included even though phototherapy changes the bilirubin concentration in the skin. It is hoped that the researcher may pick up a correlation between phototherapy and possible less accurate nursing assessments.
9. Babies who have had exchange transfusions will be included. If this N is large enough it will be evaluated for a correlation between transfusion and possible inaccuracy of the nursing assessment. FOR A POST EXCHANGE TRANSFUSION OBSERVATION, WRITE POST EXCHANGE ON THE WORK SHEET.
10. Babies being evaluated and not having a bilirubin drawn will be excluded since no correlation can be made between the assessment and the bilirubin result.
11. No more than 25 infants will be evaluated with this color differentiation method at each hospital due to lack of time and expense. It is hoped that there will be a total N or 50 who show some symptoms of jaundice and can be evaluated.
12. If the observation was not made under the phototherapy light mark the appropriate blank on the work sheet.
13. If the doctor was the first one to notice the jaundice make a note to that effect in the upper margin of the work sheet.

APPENDIX C

COLOR INTENSITY WORKSHEET AND RECORD
OF OBSERVATION

COLOR INTENSITY WORKSHEET AND RECORD
OF OBSERVATION

First 3 letters of baby's name ___ ___ ___ Time _____
Age in hours _____ Weight _____
Race _____ Phototherapy already
given in hours _____
Cause of icterus if known _____

Delivery problems _____

- _____ A. not yellow
_____ B. slightly hellow
_____ C. yellow
_____ D. very yellow
_____ E. orange

Serum bilirubin total _____
Observation not under phototherapy light _____
Initials or code letters of observer _____
Total experience of observer in newborn nursery _____ years

APPENDIX D

PROCEDURE FOR ASSESSMENT
USING DERMAL ZONES

PROCEDURE FOR ASSESSMENT
USING DERMAL ZONES

1. Expose the baby, who shows some symptoms of jaundice, so that the whole body may be examined.
2. Examine the baby under the phototherapy light if possible.
3. Examine the baby's skin by inspecting and blanching the skin with a thumb or finger to determine how far the icterus has advanced.
4. Decide in which zone the icterus stops. Mark this on a work sheet which has a chart of the various zones.
5. Put the baby's identification letters in the proper space.
6. Mark the time at the top of the work sheet and put your initials or code letters that you have chosen in the space at the bottom of the sheet. If you choose to use code letters rather than initials, be different from others making assessments, and also be consistent in using the same letters.
7. You need not fill out the other blanks since the graduate student can do this when she picks up the work sheet and records the bilirubin on it.

PERTINENT INFORMATION CONCERNING THE ASSESSMENT

1. Laboratory results will be accepted as final since the researcher has no control over the laboratory determinations.
2. Bilirubin tests that are drawn under a phototherapy light will be excluded since light destroys the pigment and the results will not be accurate.
3. Babies over 7 days of age will be excluded.
4. Observations will be recorded by Registered Nurses.
5. Observations will be limited to regular nursery personnel.

6. If two nurses want to combine their observation, each should mark a work sheet BEFORE they share results. Two nursing assessments on the same baby will add depth to the study and is welcomed as long as the two assessors do not influence each other's results.
7. Bilirubin tests drawn over 2 hours after the nurse's assessment will be excluded since an increase could have occurred during that time.
8. Babies who have been treated with phototherapy will be included even though phototherapy changes the bilirubin concentration in the skin. It is hoped that the researcher may pick up a correlation between phototherapy and possible less accurate nursing assessments.
9. Babies who have had exchange transfusions will be included. If this N is large enough it will be evaluated for a correlation between transfusion and possible inaccuracy of the nursing assessment. FOR A POST EXCHANGE TRANSFUSION OBSERVATION, WRITE POST EXCHANGE ON THE WORK SHEET.
10. Babies being evaluated and not having a bilirubin drawn will be excluded since no correlation can be made between the assessment and the bilirubin result.
11. No more than 25 infants will be evaluated with this dermal zone method at each hospital due to a lack of time and expense. It is hoped that there will be a total N of 50 who show some symptoms and jaundice and can be evaluated.
12. If the observation was not made under the phototherapy light mark the appropriate blank on the work sheet.
13. If the doctor was the first one to notice the jaundice make a note to that effect in the upper margin of the work sheet.

APPENDIX E

DERMAL ZONES WORKSHEET AND RECORD
OF OBSERVATIONS

DERMAL ZONES WORKSHEET AND RECORD
OF OBSERVATION

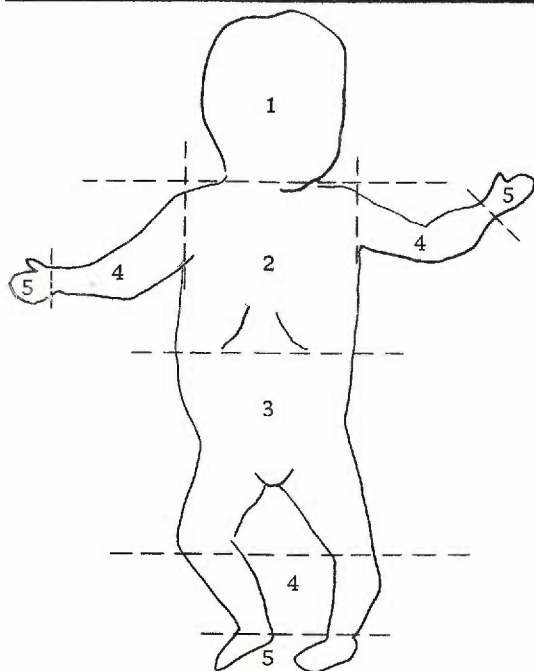
First 3 letters of baby's name ___ ___ ___ Time _____

Age in hours _____ Weight _____

Race _____ Phototherapy already given in hours _____

Cause of icterus if known _____

Delivery problems _____



Serum bilirubin total _____

Observation not made under phototherapy light _____

Initials or code letters of observer _____

Total experience of observer in newborn nursery _____ years

APPENDIX F

CODING INSTRUCTIONS

CODING INSTRUCTIONS

Baby's name; The first three letters of the babies' last name will be used for identification on the worksheet.

Nurse observers' name; The nurse is not to use her name. She may use her initials or she may pick other letters. She must be consistent in using the same ones and must choose letters that are different from the other nurse observers.

APPENDIX G

A COMPARISON OF THE ROUTINE PROCEDURES
FOR THE CARE OF THE NEWBORN

BOTH HOSPITALS

Appendix Table 1. Comparison of the Routine Procedures for the Care of the Newborn, Both Hospitals.

Public Hospital	Private Hospital
1. Babies are examined at delivery by the obstetrician.	Same
2. Babies stay in a warmed Kreisman with heatlamps over it while in the delivery room.	Same, excepting for males who have circumcision done in delivery room.
3. Babies stay in the delivery room only long enough to be identified suctioned, resuscitated, and shown to the mother, so that they can be immediately moved to the nursery.	Babies stay in the delivery room until the mother is taken to her room. Exceptions occur when there is a Caesarian Section, or a tubal ligation.
4. Babies generally stay less than 10 minutes in the delivery room and then go immediately to the nursery.	Time varies but is generally less than an hour.
5. A registered nurse evaluates the baby when it comes into the nursery although a licensed practical nurse may do the admission procedure of temperature taking, bathing, AgNO ₃ drops in the eyes and alcohol on the cord.	A registered nurse does evaluate the baby, and licensed practical nurses do the procedure. AgNO ₃ drops are put in the eyes in the delivery room.
6. Each baby goes into an incubator or white box warmer on admission. All babies stay in these for at least two hours or until their condition is stable.	All babies go into a warmer. The average time there is one hour.
7. Babies are evaluated according to the following and in that order. . .	
a. color	a. yes
b. cry if present, respiratory problems	b. same
c. temperature, apical beat, and respirations	c. same
d. weight in grams.	d. weight in pounds and ounces

Appendix Table 1. Continued.

Public Hospital	Private Hospital
e. presence of three vessel cord	e. same
f. presence of molding, overlapping sutures, open fontanel, caput, cephalhematoma, forceps marks.	f. same
g. eyes are opened and AgNO ₃ gtts are put in, then rinsed out after one minute with sterile water.	g. AgNO ₃ drops are put into the eyes in the delivery room.
h. mouth and palate are checked a number eight davol nasogastric tube is passed through the mouth to the stomach and the stomach is aspirated.	h. stomach is not aspirated routinely.
i. baby is made to breath through the nose.	i. same
j. General condition of baby is observed including meconium staining, size and proportions of the body, peripheral cyanosis, petechiae, jaundice, shape of ears, presence of skin tags, shape of mouth with crying, bulging or hollow abdomen, normal genitals as well as descended testes, pigmentation of the skin and mongolian spots, general muscular control, or absences of reflexes, such as the Moro and the sucking reflex, flacidness, bruising or anything else out of the ordinary.	j. same, except nurses do not look for descended testes.
8. Babies are given 1 mg of Aquamephyton I. M. in the front of the thigh.	same
9. Only a diaper is put on the infant while in the incubator or warmer.	same
10. The infant is in the same room as the nurses' desk and has almost continuous observation the first 24 hours.	The baby is put into the admission nursery and advanced.

Appendix Table 1. Continued.

Public Hospital	Private Hospital
11. If the baby's temperature is 98 F. or above after 2 hours in the incubator and his condition is otherwise stable, with an apical beat below 160 and respirations below 60, then the nurse decides whether or not the baby goes to a crib.	Nurse's judgment
12. If taken out of the incubator, the baby is dressed and put into a crib and wrapped in a double blanket. It then stays in the same room.	Same
13. The first feeding may be given from 2 to 6 hours of age. At 2 hours of age if the baby is above 9 lbs or below 6 lbs and has a dextrostix below 45mg/100 ml in which case a blood sugar is also drawn and the baby may have an I. V. There is a written procedure providing for differing conditions.	A dextrostix is done on babies under 5 lbs 8 oz, and above 9 lbs 8 oz. immediately. If the blood sugar is under 45mg/100 ml then the baby gets feed right away. The feeding is 5% glucose water.
14. The average baby gets a first feeding at 6 hours of age, of 10% glucose not more than 25 cc.	The average baby gets fed at 12 hours of age, and gets 5% glucose.
The first feeding is given in the nursery, and pertinent observations such as suck and swallow, breathing coordination, presence of mucus are made.	Same
15. If the baby does all right, it can then be taken out to the mother the next feeding providing there are no problems. Otherwise, a nursery person helps the mother with the feeding. This is done with all primiparas and breast feeding mothers anyway.	Same

Appendix Table 1. Continued.

Public Hospital	Private Hospital
16. The baby gets Dextrose 10% for 24 hours then house formula, if it is a bottle baby every four hours. Bottle babies are not taken out at the 2 A. M. and 6 A. M. feedings but are fed in the nursery.	The baby gets 3 feedings of Dextrose 5%, then Similac 13 calories/oz. for six feedings then full strength similac at 4 hour intervals.
17. The baby gets Dextrose 5% with the breast, with no formula unless there are special conditions. The babies on breast milk go out to the mothers at the 2 A. M. and the 6 A. M. feedings if the mothers request them. If they are over 30 hours old then they can have house formula in the nursery during those feedings, otherwise they have Dextrose 5%. All of this is subject to the doctor's and the charge nurse's decision.	Dextrose 5% is given after the breast feeding in the nursery. Special feedings are given to babies below 5 lbs 8 oz and those that have more than a 10% weight loss.
18. Babies are examined in the first 24 hours by a pediatric resident for a newborn physical. He takes head, chest, and length measurements, as well.	Babies are examined by a pediatrician. The nurse takes the babies' measurements.
19. The resident will also see any baby that the charge nurse would like him to see.	Same pediatrician rather than resident.
20. The resident does a discharge physical on the day of discharge.	Same but pediatrician rather than resident.
21. Babies are routinely checked and turned every 2 hours, including before and after each feeding.	No routine is established but babies with forceps marks are changed more frequently
22. There is always a person in the nursery, two people if one is occupied and not free to check mucousy babies.	Same

Appendix Table 1. Continued

Public Hospital	Private Hospital
23. Babies are weighed each day. Complete phisohex baths are given every other day. Faces, creases, and buttocks are done every day and whenever needed.	Babies are weighed every other day. They are given a bath on admission, and as needed after that.
24. Corn starch is used as powder. A and D ointment is used for buttocks and dry skin. Alcohol is used on the cords. Hollister clamps are removed after 24 hours.	No powder is used. Phiso-hex followed by water and then alcohol is used on the cord.
25. Mothers who have had a temperature of 100 F. or above may not have their baby for 24 hours, unless special permission is obtained from her doctor.	100.4 F is the determining point. The mother's temperature must be below that for 8 hours before she can hold her baby again.
26. Cord blood type and rh, Coombs test, and hematocrit are done routinely on all babies. Hematocrits below 50 are repeated.	Cord blood work is done only on rh negative mother's babies. Only if the baby is pale or has lost blood is a hematocrit done.
27. The nurse decides which babies are jaundiced enough to have bilirubins. One consideration is a positive coombs on the cord blood.	Any baby with a positive Coombs gets bilirubin done.
28. Special problems in delivery or prenatally (like a rh negative mother) require the work to be stat.	The pediatrician decides.
29. The lab draws the blood work except on the weekend when the charge nurse does it herself. This includes evenings and nights.	Nurses draw blood gases and PKUs. Heel sticks are done by the laboratory. Femoral sticks are done by the pediatrician.

Appendix Table 1. Continued.

Public Hospital	Private Hospital
30. A charge nurse can decide to put a baby under phototherapy if she draws a bilirubin and reports to the resident. This often happens at night.	This is in transition. At present the nurse may order a bilirubin. If it is above normal then the baby is put under the lights.
31. Babies are kept in the nursery while visitors are on the floor.	Babies of rooming in mothers stay out in the rooms during visiting hours.
32. House formula is 20 calorie per ounce and can be Enfamil, Similac or SMA.	House formula is Similac.
33. Babies under phototherapy are completely undressed except for a cap that comes down over their eyes.	Eye patches are used in addition to the cap.
34. Babies under phototherapy are kept in an incubator or white box warmer.	Babies are kept in bassinet unless they are small or their temperature is dropping. Their temperature is taken rectally every four hours.
35. The cap is taken off at feedings, and the eyes are cleaned with water at least once a day.	The eyes are irrigated with N.S. every 8 hours. Eye pads are changed every 8 hours.
36. Babies are turned every two hours	Same
37. Babies are fed as usual and under most circumstances go out to the mother for feedings.	Whether the babies go out to mother or not is up to the discretion of the nurse. Breast feeding babies usually go out.
38. Lights are cool-white. They are changed when they are burnt out.	Same
39. Lights come from the top and only one side of the incubator.	Lights are in a concave arrangement above the crib.

APPENDIX H

BILIRUBIN RESULTS AND NURSING ASSESSMENT
MADE BY EACH OBSERVER,

DIVIDED ACCORDING TO GROUPS A OR B

Appendix Table 2. Bilirubin results and Nursing Assessment Made by Each Observer Divided According to Groups A or B.

Observer	<u>Group A</u>		<u>Group B</u>	
	Color Differentiation		Dermal Zone	
	Color Intensity	Bilirubin	Dermal Zone	Bilirubin
MEN	3	12.4	2	7.5
	2	10.2	2	7.8
	3	13.8	1	7.2
	3	11.4	1	7.8
	4	15.6	1	13.0
	3	10.3	1	6.1
	2	8.4		
	2	10.9		
	2	10.7		
	2	9.5		
	2	11.3		
	2	15.3		
	GS	2	9.1	1
2		7.5	2	5.1
2		9.1	5	11.4
2		9.9		
2		6.6		
3		14.9		
3		16.0		
3		11.9		
2	7.9			
DW	2	7.9	4	7.7
	3	10.8	4	9.0
	2	8.2	1	6.4
	2	12.2	4	9.8
			5	14.8
			4	10.0
			3	11.8
			2	5.9
			4	6.3
			5	13.1
			5	13.5
			4	9.9
		5	13.9	
		4	10.4	

Appendix Table 2. Continued.

Observer	<u>Group A</u>		<u>Group B</u>	
	Color Differentiation		Dermal Zone	
	Color Intensity	Bilirubin	Dermal Zone	Bilirubin
IS	4	14.5	3	8.0
	2	11.3		
	2	12.5		
	2	11.5		
	4	15.5		
	3	10.5		
	3	9.5		
	2	12.5		
RT	r	14.0	4	12.5
			2	3.3
			4	11.3
			3	8.0
GA			4	11.3
			5	11.9
			4	11.7
			4	10.0
DG			4	8.8
SA	3	8.6		

AN ABSTRACT OF THE THESIS OF

CAROL N. TRAA

For the MASTER OF SCIENCE in NURSING EDUCATION

Date of receiving this degree: June 8, 1973

Title: NURSING OBSERVATION AND ASSESSMENT OF DERMAL
ICTERUS IN NEWBORNS

Approved: _____
(Associate Professor in Charge of Thesis)

A study of two methods of nursing assessment of jaundice in newborns was done. The dermal zone method as described by Kramer, and the color intensity method were used. Seventy observations were made over a period of three months at two hospitals in Portland, Oregon in the summer of 1971. Both methods were found to be useful as screening devices when correlated with bilirubin test results. No statistical difference was noted.

Conclusions: The dermal zone method and the color intensity method are satisfactory as a screening device for evaluating jaundice in newborns. One is not statistically more valid than the other.

Recommendations: Both methods should receive more evaluation. The observers should be given more practice using the dermal zone method. Factors influencing jaundice and those which could

influence jaundice need to be evaluated for relationships to the nursing assessment of jaundice.

Typed by Ilene Anderton