

**EFFECTIVENESS OF CLINICAL PATHWAY FOR NEONATAL  
HYPERBILIRUBINEMIA UPON THE KNOWLEDGE AND  
PRACTICE OF NURSES AND NEONATAL OUTCOME**

**BY**

**ANNIE JINCY MATHEW**

**A DISSERTATION SUBMITTED TO THE TAMILNADU DR.M.G.R.MEDICAL  
UNIVERSITY, CHENNAI, IN PARTIAL FULFILMENT OF THE  
REQUIREMENTS FOR THE DEGREE OF MASTER  
OF SCIENCE IN NURSING**

**APRIL 2012**

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Approved by the dissertation committee on : \_\_\_\_\_

Research Guide : \_\_\_\_\_

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**APRIL 2012**

## DECLARATION

I hereby declare that the present dissertation entitled **“Effectiveness of clinical pathway for neonatal hyperbilirubinemia upon the knowledge and practice of nurses and neonatal outcome”** is the outcome of the original research work undertaken and carried out by me under the guidance of **Dr. Latha Venkatesan**, M.Sc (N)., M.Phil., Ph.D., Principal, Apollo College of Nursing, **Ms. Nesa Sathya Satchi**, M.Sc (N)., Reader, Apollo College of Nursing, Chennai. I also declare that the material of this has not found in any way, the basis for the award of any degree or diploma in this university or any other university.

MSc (N) II Year

## ACKNOWLEDGEMENT

My sincere and heartfelt gratitude to Lord Almighty for His support, guidance, wisdom, courage and blessings on me throughout my endeavor and for sustaining me in hours of need.

I proudly and honestly express my sincere gratitude to **Dr Lata Venkatesan, MSc (N), M.Phil., Ph.D.**, Principal, Apollo College of Nursing for her caring spirit, excellent guidance, support and valuable suggestions during the course of my work.

I take this opportunity to express my deep sense of gratitude to **Prof. Lizy Sonia, MSc(N)**, Vice Principal, Apollo College of Nursing, for her caring spirit and excellent guidance during the course of my work.

I express my greatest pleasure and sincere gratitude to my guide **Mrs. Nesa Sathya Satchi, MSc (N)**, Reader, Pediatric Nursing, Apollo College of Nursing for her constant encouragement, splendid and inspiring guidance throughout my work.

I owe my profound guidance to **Dr Meena Thiagarajan, M.D., M.R.C.P., DCH.**, (Consultant Neonatologist), Apollo Children Hospital, for her valuable suggestion and guidance.

I profoundly thank **Dr. Radha Rajagopalan**, Director of Medical Education, Apollo Main Hospital for permitting me to conduct my study in their esteemed institution.

I profoundly thank **Mrs Punitha Singh, Nursing Director** and **Mrs Lydiya, Nurse Educator**, Apollo Main Hospital, Chennai for granting permission to conduct the study.

I honestly express my gratitude to **Prof. Vijayalakshmi, MSc (N)**., Research Coordinator, Apollo College of Nursing for her support and valuable suggestions. I am grateful to all the Experts for validating the tool.

My sincere thanks to **Mrs Asha Latha, NICU incharge**, Apollo Children Hospital and all the nursing staff of Apollo Main Hospital and Apollo Children Hospital, Chennai for extending their cooperation and support during the data collection.

I extend my earnest gratitude to all the **Lecturers of Pediatric Nursing Department** for their constructive guidance throughout my study.

I honestly express my sincere gratitude to all **The Parents** of the neonates in this study and I am greatly indebted to them for their patience, cooperation and acceptance to participate in the study.

I am indebted to my parents, **Mr. K.M.Mathew** and **Mrs. Aleyamma Mathew** for their prayers, encouragement and cooperation at all stages of my work and for encouraging me to go higher in the ladder of this profession. I am immensely grateful to my brother, **Mr. Jijo.K.Mathew** for his constant encouragement and valuable tips.

Last but not the least, I extend my warm thanks to all who helped me in shaping this study, directly or indirectly.

## **SYNOPSIS**

A Quasi Experimental Study to Assess the Effectiveness of Clinical Pathway for Neonatal Hyperbilirubinemia upon the Knowledge and Practice of Nurses and Neonatal Outcome at Apollo Main Hospital, Chennai.

### **The Objectives of the Study were,**

1. To assess the pre and post test level of knowledge and practice of nurses regarding clinical pathway for neonates with hyperbilirubinemia.
2. To assess the neonatal outcome in control and experimental group of neonates with hyperbilirubinemia.
3. To evaluate the effectiveness of clinical pathway by comparing the pre and post test level of knowledge and practice of nurses regarding clinical pathway for neonates with hyperbilirubinemia.
4. To compare the neonatal outcome in control and experimental group of neonates with hyperbilirubinemia.
5. To compare the level of parental satisfaction on nursing care in control and experimental group of neonates with hyperbilirubinemia.
6. To determine the association between the selected demographic variables of nurses and their pre and post test level of knowledge regarding clinical pathway for neonates with hyperbilirubinemia.
7. To determine the association between selected demographic variables of control and experimental group of neonates with hyperbilirubinemia and their outcome.
8. To determine the association between selected clinical variables of control and experimental group of neonates with hyperbilirubinemia and their outcome.

The conceptual framework for the study was developed on the basis of Kurt Lewin's Model of Change (1947).

In this study, Quasi-experimental research design was adopted. Since there were limited number of nurses available, one group pre and post test design was adopted for the nurses. The present study was conducted at Apollo Main Hospital, Chennai among nurses who take care of neonates with hyperbilirubinemia and neonates admitted with hyperbilirubinemia. The study sample size for the present study was 20 nurses and 60 neonates with hyperbilirubinemia who were selected by purposive sampling technique.

An extensive review of literature and guidance by experts laid the foundation to the development of the tools for the study. The investigator used the demographic variables of nurses, neonatal variable proforma, clinical variable proforma and demographic variable proforma for mothers to obtain the baseline data. Structured questionnaire was used to assess the knowledge of nurses, practice checklist to identify whether the neonates were receiving the appropriate care, rating scale to assess the level of parental satisfaction and checklist to assess the neonatal outcome. The data collection tools were validated and reliability was established. After the pilot study, the data for the main study was collected.

#### **Major Findings of the Study were**

- Majority of the nurses for the study were in the age group of 21-24 years (70%), were GNM qualified (60%) and most of them had less than 2 years of professional experience in NICU(60%). Ninety percent were trained in private

institutions and none of them had attended any inservice education on clinical pathway for neonatal hyperbilirubinemia.

- Majority of neonates in both control and experimental group were of 1-3 days of age on admission (73.3%, 66.7%) respectively, were females (53.3%) in control group and in experimental group were males (70%). Regarding gestational age, majority in both control and experimental group were in the gestational age of 38-40 weeks (76.7%, 86.7%) and were first born (73.3%, 83.3%) and all the neonates in control and experimental group were born in hospitals.
- When nature of birth was taken into consideration, most of the neonates in control and experimental group were born by caesarean section delivery (46.7%, 63.3%) and majority had cried at birth (93.3%, 96.7%). Most of the neonates in control group were O positive (43.3%) and in experimental group were B positive (43.3%). Majority in both control and experimental group of neonates had bilirubin level of 12-15 mg/dl (70%, 66.7%) and also didn't have any birth injuries (90%, 96.7%) respectively.
- Most of the mothers in control group of neonates were in the age group of 26-30 years of age (46.7%), whereas in experimental group majority were in the age group of 21-25 years of age (70%). All the mothers of control and experimental group had a non consanguinous marriage. Fifty percent of the mothers in control and experimental group were primigravida and multigravida and majority in experimental group were primigravida (80%). Regarding blood group and Rh status, most of them were O positive in both control and experimental group (60%, 43.3%) and majority of the mothers in control and experimental group

dint have any history of previous child with hyperbilirubinemia (86.7%, 93.3%) respectively.

- The findings showed that fifty percent of nurses had moderate and fifty percent had inadequate knowledge in pre test. But almost all the nurses had adequate knowledge in post test regarding clinical pathway for neonatal hyperbilirubinemia.
- The mean and standard deviation of post test knowledge was higher (M=25, SD=1.41) than the pre test scores (M=14.5, SD=3.17). The calculated t value (17.59) was also greater than the table value (3.88) at  $p < 0.001$  and thus the null hypotheses  $H_{01}$  was rejected. This showed that the teaching on clinical pathway was effective in improving the knowledge of the nurses.
- The overall mean practice of nurses in control group of neonates were lower (M=60.7, SD=2.56) than in the experimental group (M=80.7, SD=1.52). The difference was significant at  $p < 0.001$  and thus the null hypotheses  $H_{01}$  was rejected. This revealed that clinical pathway helped in bringing out 100% compliance in nursing care.
- The parental satisfaction on nursing care was lower in control group (M=64.8, SD=7.16) when compared to the parental satisfaction in experimental group of neonates (M=72.3, SD=6.71).
- The study also revealed that the outcome of control group of neonates is lower (M=19.3, SD=2.07) when compared to the outcome in experimental group of neonates (M=21.2, SD=0.77). The difference was significant at  $p < 0.001$  and thus the null hypotheses  $H_{02}$  was rejected.

- There is no association between age of nurses, professional qualification, professional experience, years of experience in NICU and institution trained to the pre and post test knowledge of nurses regarding clinical pathway for neonatal hyperbilirubinemia; hence the null hypotheses  $H_{03}$  was retained.
- The findings also revealed that there was no association between age of neonate on admission, gender, gestational age in weeks at birth and birth order to the parental satisfaction on nursing care.
- The findings showed that there was no significant association between age of neonate on admission, gender, gestational age in weeks and birth order to the outcome in control and experimental group of neonates and hence the null hypotheses  $H_{04}$  was retained.
- The findings revealed that there was no significant association between nature of birth, baby condition at birth, blood group, bilirubin level on admission and birth injuries to the outcome in control and experimental group of neonates and hence the null hypotheses  $H_{05}$  was retained.

### **Recommendations**

- The same study can be conducted on larger sample size to generalize the findings.
- A comparative study can be conducted in different settings with similar facilities.
- A study could be conducted to analyze the relationship between the use of clinical pathway and time management by the nurse.
- A study can be done among pathological jaundice.

## TABLE OF CONTENTS

<b>Chapter</b>	<b>CONTENTS</b>	<b>Page no</b>
<b>I</b>	<b>INTRODUCTION</b>	<b>1 – 15</b>
	Background of the study	1
	Need for the study	4
	Statement of the problem	7
	Objectives of the study	7
	Operational definition	8
	Assumptions	10
	Null hypothesis	10
	Delimitation	11
	Conceptual frame work	12
	Summary	15
	Organization of research report	15
<b>II</b>	<b>REVIEW OF LITERATURE</b>	<b>16-22</b>
	Neonatal Hyperbilirubinemia	16
	Clinical pathway	18
	Guidelines and protocols on neonatal hyperbilirubinemia	20
<b>III</b>	<b>RESEARCH METHODOLOGY</b>	<b>23-36</b>
	Research approach	23
	Research design	24
	Variables	26

	Research setting	26
	Population, sample, sampling techniques	27
	Sampling criteria	28
	Selection and development of study instruments	29
	Psychometric properties of the instruments	33
	Pilot study	34
	Protection of human rights	34
	Data collection procedure	34
	Problems faced during data collection	36
	Plan for data analysis	36
<b>IV</b>	<b>ANALYSIS AND INTERPRETATION</b>	<b>37-63</b>
<b>V</b>	<b>DISCUSSION</b>	<b>64-75</b>
<b>VI</b>	<b>SUMMARY, CONCLUSION, IMPLICATIONS AND RECOMMENDATION</b>	<b>76-86</b>
	<b>REFERENCES</b>	<b>87-89</b>
	<b>APPENDICES</b>	<b>xiv-lxiv</b>

## LIST OF TABLES

<b>Table No.</b>	<b>Description</b>	<b>Page No.</b>
1.	Frequency and Percentage Distribution of Demographic Variables of Nurses	40
2.	Frequency and Percentage Distribution of Neonatal Variables in Control and Experimental group of Neonates	41
3	Frequency and Percentage Distribution of Clinical Variables in Control and Experimental group of Neonates	45
4.	Frequency and Percentage Distribution of Demographic Variables of Mothers of Control and Experimental group of Neonates	47
5.	Frequency and Percentage Distribution of Pre and Post test Knowledge of Nurses regarding Clinical Pathway for Neonatal Hyperbilirubinemia	49
6.	Frequency and Percentage Distribution of Practice of Nurses in Control and Experimental group of neonates regarding Clinical Pathway for Neonatal Hyperbilirubinemia	50
7.	Frequency and Percentage Distribution of Neonatal Outcome in Control and Experimental group of Neonates	51
8.	Comparison of Mean and Standard Deviation of Pre and Post test Knowledge of Nurses regarding Clinical Pathway for Neonatal Hyperbilirubinemia	53

9.	Comparison of Mean and Standard Deviation of Pre and Post test Knowledge of Nurses in various dimensions regarding Clinical Pathway for Neonatal Hyperbilirubinemia.	54
10.	Comparison of Mean and Standard Deviation of Practice of Nurses for the Control And Experimental Group of Neonates	55
11.	Comparison of Mean and Standard Deviation of Parental Satisfaction on Nursing Care in Control and Experimental group of Neonates	56
12.	Comparison of Mean and Standard Deviation of Parental Satisfaction on various dimensions of Nursing Care in Control and Experimental group of Neonates	57
13.	Comparison of Mean and Standard Deviation of Neonatal Outcome in Control and Experimental group of Neonates	58
14.	Association between Selected Demographic Variables and Pre and Post Test Knowledge of Nurses	59
15.	Association between Selected Demographic Variables of Neonates and Parental Satisfaction of Control and Experimental group of Mothers of the Neonates with Hyperbilirubinemia	60
16.	Association between Selected Demographic Variables of Neonates and Outcome of Control and Experimental group of Neonates with Hyperbilirubinemia	61
17.	Association between Selected Clinical Variables of Neonates and Outcome of Control and Experimental group of Neonates	62

## LIST OF FIGURES

<b>Fig. No</b>	<b>Description</b>	<b>Page No.</b>
1.	Conceptual Framework Based on Kurt Lewin's Model of Change.	14
2.	Schematic Representation of Research Design	25
3.	Percentage Distribution of Age of Neonates on Admission with Hyperbilirubinemia in Control and Experimental group of Neonates.	42
4.	Percentage Distribution of Gender of Neonates with Hyperbilirubinemia in Control and Experimental group of Neonates.	43
5.	Percentage Distribution of Gestational Age of Control and Experimental group of Neonates with Hyperbilirubinemia.	44
6.	Percentage Distribution of Parental Satisfaction on Nursing Care in Control and Experimental group of Neonates with Hyperbilirubinemia.	52

## LIST OF APPENDICES

<b>Appendix</b>	<b>Title</b>	<b>Page No.</b>
I	Letter seeking permission to conduct the study	xiv
II	Letter granting permission to conduct the study	xv
III	Ethical Committee Letter	xvi
IV	Letter seeking permission for content validity	xviii
V	Plagiarism originality report	xix
VI	Certificate for content validity	xx
VII	List of experts for content validity	xxi
VIII	Research participant consent form	xxii
IX	Certificate for English Editing	xxiii
X	Demographic Variable Proforma of Nurses caring for Neonates with Hyperbilirubinemia	xxiv
XI	Neonatal Variable Proforma of Neonates with Hyperbilirubinemia	xxvi
XII	Clinical Variable Proforma of Neonates with Hyperbilirubinemia	xxviii
XIII	Demographic Variable Proforma of Mothers of Neonates with Hyperbilirubinemia	xxx
XIV	Clinical pathway for Neonatal Hyperbilirubinemia	xxxii
XV	Structured Knowledge Questionnaire for nurses regarding Clinical Pathway for Neonatal Hyperbilirubinemia	xli
XVI	Practice Checklist for Nurses caring for Neonates with Hyperbilirubinemia	li
XVII	Rating scale on the Parental satisfaction of Nursing care for Neonates with Hyperbilirubinemia	lvi
XVIII	Neonatal Outcome Checklist for Neonates with Hyperbilirubinemia	lx
XIX	Data code sheet	lxii
XX	Master Code sheet	lxiv

## APPENDIX I

### LETTER SEEKING PERMISSION TO CONDUCT THE STUDY



**Apollo College of Nursing**

(Recognised by the Indian Nursing Council and Affiliated to  
the Tamil Nadu Dr. M.G.R. Medical University, Chennai)

CO/0111/11

15.03.11

The Nursing Director  
Apollo Main Hospitals  
Greams Road  
Chennai – 600 006.

Respected Sir / Madam,

**Sub.:** To request permission for research study – Reg.

**Greetings!** As part of the curriculum requirement our 2nd year M. Sc. (N) student  
Ms. Annie Jincy Mathew has selected the following title for her research study.

**“A quasi experimental study to assess the effectiveness of clinical pathway for  
Neonatal Hyperbilirubinemia upon the knowledge and practice of nurses and  
neonatal outcome at Apollo hospitals , Chennai”.**

So I kindly request your goodselves to permit her to conduct study in your esteemed  
institution.

Thanking You,

  
**Dr. LATHA VENKATESAN**  
**PRINCIPAL**

IS/ISO 9001:2000



Vanagaram to Ambattur Main Road, Ayanambakkam, Chennai - 600 095.  
Ph. : 044 - 2653 4387 Tele fax : 044 - 2653 4923 / 044- 2653 4386

## APPENDIX II

### LETTER GRANTING PERMISSION TO CONDUCT THE STUDY



**Apollo College of Nursing**

(Recognised by the Indian Nursing Council and Affiliated to  
the Tamil Nadu Dr. M.G.R. Medical University, Chennai)

CO/0111/11

15.03.11

The Nursing Director  
Apollo Main Hospitals  
Greaves Road  
Chennai – 600 006.

Respected Sir / Madam,

  
Director of Nursing  
Apollo Hospitals  
Chennai-600 006.

Sub.: To request permission for research study – Reg.

**Greetings!** As part of the curriculum requirement our 2nd year M. Sc. (N) student  
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Thanking You,

  
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**PRINCIPAL**

IS/ISO 9001:2000



Vanagaram to Ambattur Main Road, Ayanambakkam, Chennai - 600 095.  
Ph. : 044 - 2653 4387 Tele fax : 044 - 2653 4923 / 044- 2653 4386

## APPENDIX III

### ETHICAL COMMITTEE LETTER

#### Ethics Committee



22 June, 2011

To,  
Ms. Annie Jincy Mathew  
1<sup>st</sup> Year M.Sc (Nursing)  
Dept. of Pediatrics  
Apollo College of Nursing, Chennai  
Tamil Nadu, India

**Ref:** A quasi experimental study to assess the effectiveness of clinical pathway for neonatal hyperbilirubinemia upon knowledge and practice of nurses and patients outcome at Apollo Hospitals, Chennai

**Sub:** Your letter dated 9 June, 2011 for approval of the above referenced project and its related documents

Dear Ms. Annie Jincy Mathew,

Ethics committee – Apollo Hospitals has received the following document submitted by you related to the conduct of the above – referenced study.

- Project Proposal titled “A quasi experimental study to assess the effectiveness of clinical pathway for neonatal hyperbilirubinemia upon knowledge and practice of nurses and patients outcome at Apollo Hospitals, Chennai”
- Study Performa

The above-mentioned documents have been reviewed and approved (through expedited review) by the Chairman, Vice-Chairman and Member Secretary at a specially convened meeting of the Ethics Committee. The study is hereby approved to be conducted by you in the presented form.

The following Ethics Committee members were present at the meeting held on 22 June, 2011

Name	Profession	Position in the committee
Mr. S. S. Narayanan	Ethicist	Chairman
Dr. Radha Rajagopalan	Clinician	Vice - Chairman
Dr. Jayanthi Swaminathan	Sr.GM Clinical & Collaborative Research	Member Secretary

Apollo Hospitals Enterprise Limited  
21, Greams Lane, Off Greams Road, Chennai - 600 006  
Tel : 91 - 44 - 2829 3333 Extn : 6008, 91 - 44 - 2829 5465 Extn : 6639 Fax : 91 - 44 - 2829 4449  
E - Mail : [ecapollochennai@gmail.com](mailto:ecapollochennai@gmail.com)

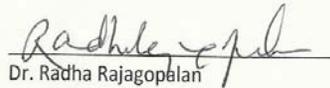
## Ethics Committee



After due ethical and scientific consideration, the Ethics Committee has approved the above presentation submitted by you. Since your dissertation does not involve any administration of drug(s) or therapeutic composition(s) to patients and involves only interpretation of collected data, the Ethics Committee has decided to waive the requirement of informed consent

The Ethics Committee is constituted and works as per ICH-GCP, ICMR and revised Schedule Y guidelines.

Yours sincerely,

  
Dr. Radha Rajagopalan  
Ethics Committee – Vice Chairman  
Apollo Hospitals, Chennai

Date 22/6/11

DR. RADHA RAJAGOPALAN  
Vice Chairman  
Ethics Committee  
Apollo Hospitals Enterprise Limited  
Chennai-600 006 Tamil Nadu.

**APPENDIX IV**  
**LETTER REQUESTING OPINIONS AND SUGGESTIONS OF EXPERTS FOR**  
**ESTABLISHING CONTENT VALIDITY OF RESEARCH TOOL**

From

MS. Annie Jincy Mathew  
M.Sc., (Nursing) Second Year,  
Apollo College of Nursing,  
Chennai - 600095.

To

Forwarded Through:  
Dr. Latha Venkatesan,  
Principal,  
Apollo College of Nursing.

**Sub: Requesting for opinions and suggestions of experts for establishing content validity for Research tool.**

Respected Madam,

I am a postgraduate student of the Apollo College of Nursing. I have selected the below mentioned topic for research project to be submitted to The Tamil Nadu Dr. M.G.R Medical University, Chennai as a partial fulfillment of Masters of Nursing Degree.

**TITLE OF THE TOPIC:**

A quasi experimental study to assess the effectiveness of clinical pathway for neonatal hyperbilirubinemia upon the knowledge and practice of nurses and neonatal outcome at Apollo Hospitals, Chennai.

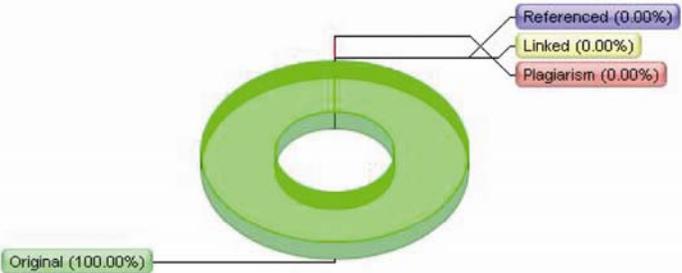
With regards may I kindly request you to validate my tool for its appropriateness and relevancy. I am enclosing the Background, Need for the study, Statement of the problem, Objectives of the study, Demographic Variable Proforma for Nurses, Neonatal Variable Proforma, Clinical Variable Proforma, Demographic Variable Proforma for Mothers, Structured Knowledge Questionnaire for Nurses, Practice Check list, Parental Satisfaction Rating Scale and Neonatal Outcome Checklist for your reference. I would be highly obliged and remain thankful for your great help if you could validate and send it as soon as possible.

**Thanking you,**

**Yours sincerely,**  
**(ANNIE JINCY MATHEW)**

## APPENDIX V

### PLAGIARISM ORIGINALITY REPORT

	<b>Plagiarism Detector - Originality Report</b> Plagiarism Detector Project: [ <a href="http://plagiarism-detector.com">http://plagiarism-detector.com</a> ] Application core version: 557										
	<b>This report is generated by the unregistered Plagiarism Detector Demo version!</b> <ul style="list-style-type: none"><li>• 600 initial words analysis only</li><li>• partial plagiarism detection</li><li>• some important results are excluded</li><li>• no external file processing</li></ul> <a href="#">Register the software</a> - get the complete functionality!										
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Plagiarism	0.00%										
Referenced 0% / Linked 0%											
Original - 100% / 0% - Plagiarism											

**APPENDIX VI**  
**CERTIFICATE FOR CONTENT VALIDITY TO WHOM EVER IT MAY**  
**CONCERN**

This is to certify that tools and content for the research study developed by \_\_\_\_\_, II year Msc Nursing student of Apollo College of Nursing for her dissertation, **“A Quasi Experimental Study to Assess the Effectiveness of Clinical Pathway for Neonatal Hyperbilirubinemia upon the Knowledge and Practice of Nurses and Neonatal Outcome at Apollo Main Hospital, Chennai”** was validated for content validity.

**Signature of the Expert**

## APPENDIX VII

### LIST OF EXPERTS FOR CONTENT VALIDITY OF THE TOOL

**1. Dr. Latha Venkatesan, M.Sc., M.Phil., Ph.D.,**  
Principal,  
Apollo College of Nursing,  
Chennai – 95.

**2. Dr. Meena Thiyagarajan,**  
M.D., M.R.C.P., DCH.,  
Consultant Neonatologist  
Apollo Children's Hospital,  
Chennai – 10.

**3. Prof. Mrs. Lizy Sonia, M.Sc (N).,**  
Vice Principal,  
Apollo College of Nursing,  
Chennai – 95.

**4. Ms. Nesa Sathya Satchi M.Sc (N).,**  
Reader,  
Apollo College of Nursing,  
Chennai - 600095.

**5. Ms. Kanimozhi, M.Sc (N).,**  
Assistant Lecturer,  
Apollo College of Nursing,  
Chennai – 95.

**6. Ms. Jamuna Rani, M.Sc (N).,**  
Lecturer,  
Apollo college of Nursing,  
Chennai – 95.

**7. Ms. Jennifer, M.Sc (N).,**  
Lecturer,  
Apollo College of Nursing,  
Chennai – 95.

**APPENDIX VIII**

**RESEARCH PARTICIPANT'S CONSENT FORM IN ENGLISH**

Dear Participant,

I am MS. ANNIE JINCY MATHEW, M.Sc. Nursing student of Apollo College of Nursing, Chennai. As a part of my study, I have selected a Research Project on **“A Quasi Experimental Study to Assess the Effectiveness of Clinical Pathway for Neonatal Hyperbilirubinemia upon the Knowledge and Practice of Nurses and Neonatal Outcome at Apollo Main Hospital, Chennai.”**

I hereby seek your consent and co-operation to participate in the study. Please be frank and honest in your response. The information collected will be kept confidential and anonymity will be maintained.

**Signature of the Researcher**

I ....., hereby give my consent to participate in the study.

**Signature of the Participant**

**APPENDIX IX**  
**CERTIFICATE FOR ENGLISH EDITING**  
**TO WHOMSOEVER IT MAY CONCERN**

This is to certify that the dissertation "A Quasi Experimental Study to Assess the Effectiveness of Clinical Pathway for Neonatal Hyperbilirubinemia upon the Knowledge and Practice of Nurses and Neonatal Outcome at Apollo Main Hospital, Chennai." by Ms. Annie Jincy Mathew, II year M. Sc (N), Apollo College of Nursing was edited for English language appropriateness by *B. Peter Gnanasekaran.*

*B. Peter Gnanasekaran*

Signature

*B. Peter Gnanasekaran,*  
M.A., M.Phil., B.Ed.,  
P.G. Asst. in English  
C.S.I. St. Andrew's Hr. Sec. School,  
Arakkonam - 631 001.

## APPENDIX X

### DEMOGRAPHIC VARIABLE PROFORMA OF NURSES CARING FOR NEONATES WITH HYPERBILIRUBINEMIA

#### Purpose

This proforma will be used by the researcher to collect the information on demographic variables such as age, professional qualification, professional experience, institution trained and history of participation in in-service education on clinical pathway for neonatal hyperbilirubinemia.

**Instruction:** The investigator will give the proforma to the nurses to fill the details.

**1. Sample number**

**2. Age in years**

2.1 21-24

2.2 25-29

2.3 30 yrs and above

**3. Professional qualification**

3.1 GNM

3.2 Post Basic BSc

3.3 BSc(N)

**4. Professional experience**

4.1  $\leq 2$  years

4.2 2-5 years

4.3  $\geq 5$  years

**5. Years of experience in NICU**

5.1  $\leq 2$  years

5.2 2-5 years

5.3  $\geq 5$  years

**6. Institution trained**

6.1 Private

6.2 Government

6.3 Mission

**7. Have you attended any inservice education on clinical pathway for neonatal hyperbilirubinemia?**

7.1 Yes

7.2 No

**APPENDIX XI**  
**NEONATAL VARIABLE PROFORMA OF NEONATES WITH**  
**HYPERBILIRUBINEMIA**

**Purpose**

This proforma is used by the researcher to collect information on neonatal variables like age, gender, birth order, gestational age and type of delivery.

**Instruction**

The investigator will collect data by interviewing the mother and also by reviewing hospital records for relevant details.

**1. Sample number**

**2. Hospital number**

**3. Age of the neonate on admission**

3.1  $\leq 24$  hrs

3.2 1-3 days

3.3 More than 3 days

**4. Gender**

4.1 Male

4.2 Female

**5. Gestational age in weeks at birth**

5.1 35-37

5.2 38-40

5.3 More than 40

**6. Birth order**

6.1 First

6.2 Second

6.3 Others

**7. Place of birth**

7.1 Hospital

7.2 Primary health centre

7.3 Home

**APPENDIX XII**  
**CLINICAL VARIABLE PROFORMA OF NEONATES WITH**  
**HYPERBILIRUBINEMIA**

**Purpose**

This proforma is used to assess the clinical variables such as nature of birth, baby condition at birth, blood group, Rh group, bilirubin level on admission and other health related information.

**Instruction**

The investigator will collect data by interviewing the mother and also by reviewing hospital records for relevant details.

**1. Nature of birth**

1.1 Normal vaginal delivery

1.2 Caesarean section

1.3 Assisted vaginal delivery

**2. Baby condition at birth**

2.1 Cried

2.2 Not cried

**3. Blood group of the baby**

3.1 A

3.2 B

3.3 AB

3.4 O

**4. Rh group of the baby**

4.1 Positive

4.2 Negative

**5. Bilirubin level of the neonate on admission**

5.1 Less than 12mg/dl

5.2 12-15mg/dl

5.3 More than 15mg/dl

**6. Birth injuries**

6.1 Cephal hematoma

6.2 Caput succedaneum

6.3 Skull fracture

6.4 Nerve injury

6.5 None

**APPENDIX XIII**  
**DEMOGRAPHIC VARIABLE PROFORMA OF MOTHERS OF NEONATES**  
**WITH HYPERBILIRUBINEMIA**

**Purpose**

This proforma will be used by the researcher to collect information on demographic variables such as age, type of marriage, parity, blood group and Rh group of mother and previous history of child with hyperbilirubinemia.

**Instruction**

The investigator will collect data by interviewing the mother and also by reviewing hospital records for relevant details.

**1. Age in years**

1.1 21-25

1.2 26-30

1.3 31-35

**2. Type of marriage**

2.1 Consanguineous

2.2 Non consanguineous

**3. Parity**

3.1 Primi

3.2 Multi

**4. Blood group of mother**

4.1 A

4.2 B

4.3 AB

4.4 O

**5. Rh group of the mother**

5.1 Positive

5.2 Negative

**6. Previous history of child with hyperbilirubinemia**

6.1 Yes

6.2 No

## APPENDIX XIV

### CLINICAL PATHWAY FOR NEONATAL HYPERBILIRUBINEMIA

#### **Definition**

Clinical Pathway (CP) is multidisciplinary plans of best clinical practice for specified groups of patients with a particular diagnosis that aid the co-ordination and delivery of high quality care. It is also a structured treatment protocol with pre-specified outcomes.

The synonyms for clinical pathways are Anticipatory recovery pathways (ARPs), Integrated Care Pathways, Multidisciplinary pathways of care (MPCs), Care Maps, Collaborative Care Pathways and Critical Pathway.

#### **Characteristics of care pathways:**

- An explicit statement of the goals and key elements of care based on evidence best practice and patient expectation.
- The facilitation of the communication, coordination of roles and sequencing the activities of the multidisciplinary care team, patients and their relatives.
- The documentation, monitoring and evaluation of variances and outcomes.
- The aim of care path is to enhance the quality of care by improving patient outcome, promoting patient safety, increasing patient satisfaction and optimizing the use of resources.
- Orders not on the pathway should be written on the standard order sheet.

**Team composition:**

- Physician experts
- Nurses
- Community based physician experts
- Quality management department.

**Benefits**

- Can support continuity and co-ordination of care across different clinical disciplines
- Provide explicit and well-defined standards for care
- Helps to reduce variations in patient care (by promoting standardisation)
- Helps to ensure quality of care and provide a means of continuous quality improvement
- Expected to reduce risk
- Expected to help reduce cost by reducing the length of hospital stay.

**NEONATAL HYPERBILIRUBINEMIA**

Hyperbilirubinemia is a condition in which there is too much bilirubin in the blood. When red blood cells break down, a substance called bilirubin is formed. Babies are not easily able to get rid of the bilirubin and it can build up in the blood and other tissues and fluids of the baby's body. This is called hyperbilirubinemia.

Normal newborn produces 6-10 mg of bilirubin/kg/day and newborns appear jaundiced when the bilirubin level is more than 7 mg/dl.

## Causes

- **Physiologicjaundice**

Physiologic jaundice occurs as a "normal" response to the baby's limited ability to excrete bilirubin in the second to third day of life.

- **Breastmilkjaundice** Breast milk jaundice is thought to be caused by a factor in the mother's breast milk that increases the reabsorption of bilirubin through the intestinal tract. This process is called enterohepatic circulation and it mainly occurs 4<sup>th</sup> to 7<sup>th</sup> day of life.

- **Breastfeedingfailurejaundice**

It is caused by failure to initiate breastfeeding, resulting in dehydration, decrease urine production and accumulation of bilirubin and occurs on 2<sup>nd</sup> to 4<sup>th</sup> day of life.

- **Jaundicefromhemolysis**

Jaundice may occur with the breakdown of red blood cells due to hemolytic disease of the newborn (Rh disease) and occurs within the first 24 hours of life.

## Symptoms

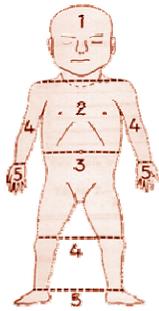
The following are the most common symptoms of hyperbilirubinemia. However, each baby may experience symptoms differently. Symptoms may include:

- Yellow colouring of the baby's skin (usually beginning on the face and moving down the body)
- Poor feeding or lethargy

## Diagnosis

### *Kramer's dermal zones of jaundice*

- Progresses in cephalocaudal direction
- Blanch skin with digital pressure and underlying colour of skin and subcutaneous tissue is noted
- Not reliable if newborn is receiving phototherapy and if baby has dark skin



1-5mg/dl
2-10mg/dl
3-12mg/dl
4-15mg/dl
5- More than 15mg/dl

## Treatment options

### Phototherapy

Phototherapy involves the exposure of the skin of the jaundiced baby to blue or cool white light of wavelength 400-500nm. Photo oxidation and photo isomerisation are the two mechanisms thought to change bilirubin into water soluble and excretable forms.

### Sunlight Exposure

Although sunlight provides sufficient irradiance in the 425- to 475-nm band to provide phototherapy, the practical difficulties involved in safely exposing a naked newborn to the sun either inside or outside (and avoiding sunburn) preclude the use of sunlight as a reliable therapeutic tool, and it therefore is not recommended.

### **Exchange transfusion**

***Rh isoimmunisation:*** Blood used for exchange transfusion in neonates with Rh isoimmunization should always have Rh negative blood group. The best choice would be O (Rh) negative packed cells suspended in AB plasma. O (Rh) negative whole blood or cross-matched baby's blood group (Rh negative) may also be used in an emergency.

### **Pharmacological treatment:**

***Phenobarbitone:*** It improves hepatic uptake, conjugation and excretion of bilirubin thus helps in lowering of bilirubin. However its effect takes time. When used prophylactically in a dose of 5 mg/kg for 3-5 days after birth, it has shown to be effective in babies with hemolytic disease, extravasated blood and in preterms without any significant side effects.

***Intravenous Immunoglobulins (IVIG):*** High dose intravenous -globulin (IVIG) (0.5 to 1 gm/kg) has been shown to reduce the need for exchange transfusions in Rh and ABO hemolytic disease.

***Pharmacologic Therapy:*** There is now evidence that hyperbilirubinemia can be effectively prevented or treated with tin-mesoporphyrin, a drug that inhibits the production of heme oxygenase. Tin-mesoporphyrin is not approved by the US Food and Drug Administration. If approved, tin-mesoporphyrin could find immediate application in preventing the need for exchange transfusion in infants who are not responding to phototherapy.

## **Virginia Henderson's 14 basic needs**

The clinical pathway for neonatal hyperbilirubinemia is based on the 14 basic needs of Virginia Henderson.

1. Breathe normally.
2. Eat and drink adequately.
3. Eliminate body wastes.
4. Move and maintain desirable positions.
5. Sleep and rest.
6. Select suitable clothing.
7. Maintain body temperature.
8. Maintain bodily cleanliness and grooming.
9. Avoid dangers in the environment.
10. Communicate with others to express emotions, needs, fears or opinions.
11. Worship according to one's faith.
12. Work in a way that provides a sense of accomplishment.
13. Play or participate in various forms of recreation.
14. Learn, discover or satisfy the curiosity that leads to normal development and health.

**CLINICAL PATHWAY FOR NEONATAL HYPERBILIRUBINEMIA**

<b>DAY 1</b>	<b>DAY 2</b>	<b>DAY 3</b>
<p><b>1.ASSESSMENT</b></p> <p>1.1 General appearance                      1.2 Anthropometric Measurements                      1.3 Vital signs                      1.4 Kramer’s dermal zones of jaundice                      1.5 History collection from parents</p>	<p><b>1.ASSESSMENT</b></p> <p>1.1 General appearance                      1.2 Dehydration                      1.3 Vital signs                      1.4 Weight measured on same scale</p>	<p><b>1.ASSESSMENT</b></p> <p>1.1 General appearance                      1.2 Dehydration                      1.3 Vital signs                      1.4 Weight measured on same scale</p>
<p><b>2. DIAGNOSTIC TESTS</b></p> <p>2.1 As ordered by physician</p>	<p><b>2. DIAGNOSTIC TESTS</b></p> <p>2.1 As ordered by physician</p>	<p><b>2. DIAGNOSTIC TESTS</b></p> <p>2.1 As ordered by physician</p>
<p><b>3. RESPIRATION</b></p> <p>3.1 Monitor SpO2</p>	<p><b>3. RESPIRATION</b></p> <p>3.1 Monitor SpO2</p>	<p><b>3. RESPIRATION</b></p> <p>3.1 Monitor SpO2</p>
<p><b>4. PHOTOTHERAPY</b></p> <p>4.1 Note</p> <ul style="list-style-type: none"> <li>• Starting time</li> <li>• Type and number of lamps</li> <li>• Photometer measurement of light intensity</li> </ul> <p>4.2 Undress the neonate completely.                      4.3 Keep eyelids closed before shield is applied to prevent corneas from becoming excoriated.                      4.4 Ensure that eye shield do not occlude the nares to prevent apnea.                      4.5 Use mask as a mini nappy.                      4.6 Keep the gonads (males) covered.                      4.7 Maintain distance of 45 cm between the neonate and light.                      4.8 Observe for hazards like:</p> <ul style="list-style-type: none"> <li>• Increased frequency of greenish stool</li> <li>• Hypo and hyperthermia</li> <li>• Erythematous rash</li> <li>• Dehydration</li> </ul>	<p><b>4. PHOTOTHERAPY</b></p> <p>4.1 Undress the neonate completely.                      4.2 Keep eyelids closed before shield is applied to prevent corneas from becoming excoriated.                      4.3 Ensure that eye shield do not occlude the nares to prevent apnea.                      4.4 Use mask as a mini nappy.                      4.5 Keep the gonads (males) covered.                      4.6 Maintain distance of 45 cm between the neonate and light.                      4.7 Observe for hazards like:</p> <ul style="list-style-type: none"> <li>• Increased frequency of greenish stool</li> <li>• Hypo and hyperthermia</li> <li>• Erythematous rash</li> <li>• Dehydration</li> </ul>	<p><b>4. PHOTOTHERAPY</b></p> <p>4.1 Note the skin colour                      4.2 Record the time of discontinuing phototherapy.                      4.3 Reinforce to parents that bilirubin should be checked within 12-24 hours after discontinuing phototherapy.</p>

<p><b>5. NUTRITION</b></p> <p>5.1 Verify successful latch.</p> <p>5.2 Breastfeed on demand.</p> <p>5.3 Supplement with EBM or formula if intake is inadequate or weight loss is excessive.</p> <p>5.4 Burp soon after the feeds.</p> <p>5.5 Administer extra fluids if ordered at the rate of 10-20 ml/kg/day to compensate insensible fluid loss for child in phototherapy.</p> <p>5.6 Maintain Intake &amp; Output chart.</p>	<p><b>5. NUTRITION</b></p> <p>5.1 Verify successful latch.</p> <p>5.2 Breastfeed on demand.</p> <p>5.3 Burp soon after the feeds.</p> <p>5.4 Maintain Intake &amp; Output chart.</p>	<p><b>5. NUTRITION</b></p> <p>5.1 Discuss and reinforce feeding cues and associated behaviour with parents.</p>
<p><b>6. ELIMINATION</b></p> <p>6.1 Weigh the diaper</p> <p>6.2 Maintain wet diaper count</p> <p>6.3 Check the colour, frequency and consistency of stool</p>	<p><b>6. ELIMINATION</b></p> <p>6.1 Weigh the diaper</p> <p>6.2 Maintain wet diaper count</p> <p>6.3 Check the colour, frequency and consistency of stool</p>	<p><b>6. ELIMINATION</b></p> <p>6.1 Inform parents to observe for 5-6 voids/day.</p> <p>6.2 Reinforce care and that number of stools more if breastfed.</p>
<p><b>7. THERMOREGULATION</b></p> <p>7.1 Monitor temperature every 2 hours when the neonate is in phototherapy.</p> <p>7.2 If in radiant warmer, monitor servo controlled temperature.</p>	<p><b>7. THERMOREGULATION</b></p> <p>7.1 Monitor temperature every 2 hours when the neonate is in phototherapy.</p> <p>7.2 If in radiant warmer, monitor servo controlled temperature.</p>	<p><b>7. THERMOREGULATION</b></p> <p>7.1 Mummify the neonate during transport and discharge.</p>
<p><b>8. POSITIONING</b></p> <p>8.1 Change positions every 2 hours when on phototherapy.</p> <p>8.2 Keep neonate in right lateral position after feeds.</p>	<p><b>8. POSITIONING</b></p> <p>8.1 Change positions every 2 hours when on phototherapy.</p> <p>8.2 Keep neonate in right lateral position after feeds.</p>	<p><b>8. POSITIONING</b></p> <p>8.1 Reinforce about positioning after feeds to parents.</p>
<p><b>9. HYGIENE</b></p> <p>9.1 Do not apply lotions to prevent increased tanning.</p> <p>9.2 Provide cord care</p>	<p><b>9. HYGIENE</b></p> <p>9.1 Do not apply lotions to prevent increased tanning.</p> <p>9.2 Provide cord care.</p>	<p><b>9. HYGIENE</b></p> <p>9.1 Educate parents to maintain adequate cleanliness.</p>
<p><b>10. SLEEP AND REST</b></p> <p>10.1 Club all nursing activities to provide adequate sleep and rest.</p>	<p><b>10. SLEEP AND REST</b></p> <p>10.1 Club all nursing activities to provide adequate sleep and rest.</p>	<p><b>10. SLEEP AND REST</b></p> <p>10.1 Reinforce about sleep patterns of neonates to parents.</p>

<b>11.SAFETY</b> 11.1 Verify ID band with parents. 11.2 Check preventive maintenance status of the phototherapy unit.	<b>11. SAFETY</b> 11.1 Verify ID band with parents. 11.2 Check preventive maintenance status of the phototherapy unit.	<b>11.SAFETY</b> 11.1 Verify ID band with parents. 11.2 Remove ID band only at discharge.
<b>12. COMMUNICATION</b> 12.1 Remove eye shields before feeding to facilitate attachment process. 12.2 Provide auditory and tactile stimulation.	<b>12. COMMUNICATION</b> 12.1 Remove eye shields before feeding to facilitate attachment process. 12.2 Provide auditory and tactile stimulation.	<b>12. COMMUNICATION</b> 12.1 Reinforce to parents the importance of auditory and tactile stimulation.
<b>13. PSYCHOSOCIAL SUPPORT</b> 13.1 Assess parental attachment behaviour. 13.2 Assess mother’s skill in feeding infant. 13.3 Encourage breastfeeding.	<b>13. PSYCHOSOCIAL SUPPORT</b> 13.1 Encourage breastfeeding.	<b>13. PSYCHOSOCIAL SUPPORT</b> 13.1 Discuss and reinforce importance of breastfeeding. 13.2 Encourage KMC
<b>14. SPIRITUAL NEEDS</b> 14.1 Assess the spiritual pattern of parents. 14.2 Orient parents to spiritual services available.	<b>14. SPIRITUAL NEEDS</b> 14.1 Assess and encourage the spiritual habits of parents.	<b>14. SPIRITUAL NEEDS</b> 14.1 Encourage the spiritual habits of parents.
<b>15. EDUCATION AND DISCHARGE PLANNING</b> 15.1 Assess needs and document.	<b>15. EDUCATION AND DISCHARGE PLANNING</b> 15.1 Verify discharge plan with continuing care coordination.	<b>15. EDUCATION AND DISCHARGE PLANNING</b> 15.1 Explained to parents about rebound phenomenon. 15.2 Parents should be advised to come to hospital: <ul style="list-style-type: none"> <li>• If their baby is very drowsy</li> <li>• If their baby does not awaken on its own to feed at least every 4 hrs</li> <li>• If their baby is hard to wake up</li> <li>• If the white part of the eye looks yellow</li> <li>• If the skin looks yellow</li> <li>• If baby is not feeding well</li> </ul>

**APPENDIX XV**

**BLUEPRINT FOR STRUCTURED QUESTIONNAIRE ON KNOWLEDGE OF  
NURSES REGARDING CLINICAL PATHWAY FOR NEONATAL  
HYPERBILIRUBINEMIA**

<b>SL NO</b>	<b>CONTENT</b>	<b>ITEMS</b>	<b>TOTAL ITEMS</b>	<b>PERCENTAGE</b>
1.	Clinical Pathway	1,2,3,4,5	5	16.7
2.	Neonatal Hyperbilirubinemia and phototherapy	6,7 ,21,23,28	5	16.7
3.	Nutrition and Elimination	9,10,13,14,18	5	16.7
4.	Respiration, Temperature, and Hygiene	15,16,19,25,27	5	16.7
5.	Positioning and Safety	12,17,20,22,26	5	16.7
6.	Communication and Education	8,11,24,29,30	5	16.7
		<b>Total</b>	<b>30</b>	<b>100</b>

**STRUCTURED QUESTIONNAIRE ON KNOWLEDGE OF NURSES  
REGARDING CLINICAL PATHWAY FOR NEONATAL  
HYPERBILIRUBINEMIA**

**Purpose**

This questionnaire will be used to assess the knowledge of nurses regarding clinical pathway for neonatal hyperbilirubinemia.

**Instructions**

The structured questionnaire consists of 30 multiple choice questions. Each question has four options. Please read the questions carefully and place a tick mark (√) for the correct answer in the box provided. The information collected will be kept confidential and anonymity will be maintained and will be solely used for research purpose.

**1. A clinical pathway is**

- 1.1 A guideline prepared at the time of admission
- 1.2 A structured treatment protocol with pre-specified outcomes.
- 1.3 An unstructured treatment plan
- 1.4 A care map followed by the physicians

**2. Clinical pathways are used to**

- 2.1 Improve patient care
- 2.2 Facilitate quality management
- 2.3 Eliminate prolonged length of stay
- 2.4 All of the above

**3. If an additional order not on the pathway is desired, such an order must be written on the**

- 3.1 standard order sheet
- 3.2 pathway
- 3.3 progress notes
- 3.4 nurses notes

**4. If the admitting staffs fail to activate clinical pathway for a child, we should**

- 4.1 Continue writing orders in the standard order sheet
- 4.2 Ask the admitting staff to fill retrospectively
- 4.3 Activate the pathway in the succeeding days
- 4.4 Do not activate the pathway anymore

**5. The pathway will be discontinued when**

- 5.1 The child's condition improves
- 5.2 The child's condition worsens
- 5.3 The child meets the clinical outcome within 24 hrs
- 5.4 Mother is un co-operative

**6. Newborns appear jaundiced when bilirubin level is**

- 6.1 1-2 mg/dl
- 6.2 3-4 mg/dl
- 6.3 5-6 mg/dl
- 6.4 7-8 mg/dl

**7. Physiologic jaundice appears**

- 7.1 06-12 hrs
- 7.2 13-24 hrs
- 7.3 25-47 hrs
- 7.4 48-72 hrs

**8. The nurse must educate the mother to breastfeed**

- 8.1 On demand
- 8.2 Every two hours
- 8.3 Every four hours
- 8.4 Whenever she feels to

**9. The method to make sure that the baby has had adequate feeds is**

- 9.1 The baby urinates 6 times or more within 24 hrs.
- 9.2 The baby sleeps most of the time.
- 9.3 The baby never cries.
- 9.4 The baby vomits after the feed.

**10. The neonate should be burped after feeds to**

- 10.1 To induce sleep
- 10.2 To expel the air sucked while feeding
- 10.3 To relieve discomfort
- 10.4 To prevent spitting of milk

**11. The best position after feeding the baby is**

- 11.1 Supine
- 11.2 Right lateral
- 11.3 Left lateral
- 11.4 Prone

**12. Before starting phototherapy, the nurse must note the following EXCEPT**

- 12.1 Availability of biliblankets
- 12.2 Starting time
- 12.3 Number of lamps
- 12.4 Photometer measurement of light intensity

**13. Extra fluids should be administered for a neonate under phototherapy to prevent**

- 13.1 Invisible water loss
- 13.2 Inadequate water loss
- 13.3 Insensible water loss
- 13.4 Increased water loss

**14. The nurse must administer fluids for a neonate undergoing phototherapy at the rate of**

- 14.1 5-10 ml/kg/day
- 14.2 10-15 ml/kg/day
- 14.3 15-20 ml/kg/day
- 14.4 10-20 ml/kg/day

**15. The nurse must monitor temperature of neonate undergoing phototherapy**

**every**

- 15.1 1 hour
- 15.2 2 hours
- 15.3 3 hours
- 15.4 4 hours

**16. If the neonate is in radiant warmer along with phototherapy, the temperature**

**should be assessed**

- 16.1 Every 1/2 hour
- 16.2 Every 1 hour
- 16.3 Every 2 hours
- 16.4 Servo controlled

**17. The eyelids should be closed before the shield is applied**

- 17.1 For good appearance
- 17.2 For easy application
- 17.3 To prevent discomfort
- 17.4 To prevent corneas from becoming excoriated

**18. The nurse must ensure that the eye shield do not occlude the nares as it may result in**

- 18.1 Discomfort
- 18.2 Apnea
- 18.3 Bad appearance
- 18.4 Lack of protection of eyes

**19. Eye shield should be removed during feeding for**

- 19.1 Visual stimulation
- 19.2 Sensory stimulation
- 19.3 Tactile stimulation
- 19.4 Visual and sensory stimulation

**20. A distance of \_\_\_\_\_ cms should be maintained between the neonate and the phototherapy light.**

- 20.1 25
- 20.2 35
- 20.3 45
- 20.4 55

**21. According to Kramer's rule, dermal staining of bilirubin on chest indicates a bilirubin level of**

- 21.1 5 mg/dl
- 21.2 10mg/dl
- 21.3 15mg/dl
- 21.4 20mg/dl

**22. The nurse must check the stools for their**

- 22.1 Colour
- 22.2 Frequency
- 22.3 Consistency
- 22.4 All of the above

23. The problems encountered by a neonate undergoing phototherapy are the following **EXCEPT**

- 23.1 Dehydration
- 23.2 Loose stools
- 23.3 Thermoregulatory instability
- 23.4 Excessive weight gain

24. Neonates undergoing phototherapy should have their position changed every

- 24.1 1 hour
- 24.2 2 hours
- 24.3 3 hours
- 24.4 4 hours

25. The following can be performed by a nurse taking care of a neonate undergoing phototherapy **EXCEPT**

- 25.1 Provide additional feedings to compensate the insensible fluid loss.
- 25.2 Monitor temperature every 4 hrs.
- 25.3 Apply lotions on the skin for dryness.
- 25.4 Change nappy

26. The \_\_\_\_\_ of the male neonates should be covered with a mini nappy.

- 26.1 Head
- 26.2 Eyes
- 26.3 Gonads
- 26.4 Abdomen

**27. The nurse must educate parents that auditory and tactile stimulation in neonates help in**

- 27.1 Attachment process
- 27.2 Pleasure giving
- 27.3 Inducing sleep
- 27.4 Activity changes

**28. The transient increase in bilirubin level as soon as phototherapy is discontinued is called as**

- 28.1 Recovery effect
- 28.2 Retrograde effect
- 28.3 Rebound effect
- 28.4 Radiation effect

**29. Educate the parents to come to hospital if**

- 29.1 The baby is not drowsy
- 29.2 The baby awakens its own to feed
- 29.3 The baby is not lethargic
- 29.4 The baby not feeding well

**30. The nurse must reinforce to parents about checking bilirubin levels at \_\_\_\_\_ hours after phototherapy is discontinued.**

- 30.1 0-6
- 30.2 6-12
- 30.3 12-24
- 30.4 24-36

### Scoring key and interpretation

Score	Percentage	Interpretation
≤ 15	≤ 50	Inadequate knowledge
16-22	51-75	Moderately adequate knowledge
≥23	≥76	Adequate knowledge

### Answer key for knowledge questionnaire

Question no.	Key	Question No	Key
1.	1.2	16.	16.4
2.	2.4	17.	17.4
3.	3.1	18.	18.2
4.	4.3	19.	19.4
5.	5.2	20.	20.3
6.	6.4	21.	21.2
7.	7.4	22.	22.4
8.	8.1	23.	23.4
9.	9.1	24.	24.2
10.	10.2	25.	25.3
11.	11.2	26.	26.3
12.	12.1	27.	27.1
13.	13.3	28.	28.3
14.	14.4	29.	29.4
15.	15.2	30.	30.3

## APPENDIX XVI

### PRACTICE CHECK LIST FOR NURSES CARING FOR NEONATES WITH HYPERBILIRUBINEMIA

**Purpose:** This checklist is used to assess the practice of nurses on clinical pathway for neonatal hyperbilirubinemia on 14 aspects of nursing care such as assessment, respiration, nutrition, elimination, thermoregulation, positioning, hygiene, sleep and rest, safety, communication, psychosocial support, spiritual needs, education and discharge planning of the neonates

**Instructions:** The researcher completes this checklist by direct observation of nursing care and from nurses documentation in neonates record.

**Name of the patient:**

**Age:**

**Address:**

**IP No:**

**Consultant:**

**Date of admission:**

**Expected length of stay:**

**Date of discharge:**

#### *Scoring key and interpretation*

1. *Compliant (C)*: Indicates that the activity has been completed.(Score=2)
2. *Partially compliant (PC)*: Indicates that the activity was only partially performed.  
(Score=1)
3. *Non compliant (NC)*: Indicates that the activity was not performed (Score=0)

DAY 1	C	P	N	DAY 2	C	P	NC	DAY 3	C	P	N
	C	P	C		C	P	C		C	P	C
<b>1.ASSESSMENT</b> 1.6 General appearance 1.7 Anthropometric Measurements <ul style="list-style-type: none"> <li>• Length</li> <li>• Weight</li> <li>• Head circumference</li> </ul> 1.8 Vital signs <ul style="list-style-type: none"> <li>• Temperature</li> <li>• Heart rate</li> <li>• Respiratory rate</li> <li>• SpO2</li> </ul> 1.9 Kramer’s dermal zones of jaundice 1.10History collection from parents <ul style="list-style-type: none"> <li>• Any maternal illness present during antenatal period</li> <li>• Type of delivery</li> <li>• Condition of child after birth</li> <li>• Previous history of child with hyperbilirubinemia</li> <li>• Blood group and type of mother and child</li> <li>• History of breastfeeding</li> <li>• Colour of stool and urine</li> </ul>				<b>1.ASSESSMENT</b> 1.5 General appearance  1.6 Dehydration status <ul style="list-style-type: none"> <li>• Behaviour</li> <li>• Anterior fontanel</li> <li>• Skin turgor</li> <li>• Urine output</li> </ul> 1.7 Vital signs <ul style="list-style-type: none"> <li>• Temperature</li> <li>• Heart rate</li> <li>• Respiratory rate</li> <li>• SpO2</li> </ul> 1.4 Weight measured on same scale				<b>1.ASSESSMENT</b> 1.1 General appearance  1.2 Dehydration <ul style="list-style-type: none"> <li>• Behaviour</li> <li>• Anterior fontanel</li> <li>• Skin turgor</li> <li>• Urine output</li> </ul> 1.3 Vital signs <ul style="list-style-type: none"> <li>• Temperature</li> <li>• Heart rate</li> <li>• Respiratory rate</li> <li>• SpO2</li> </ul> 1.4 Weight measured on same scale			
<b>2. DIAGNOSTIC TESTS</b> 2.1 As ordered by physician				<b>2. DIAGNOSTIC TESTS</b> 2.1 As ordered by physician				<b>2. DIAGNOSTIC TESTS</b> 2.1 As ordered by physician			
<b>3. RESPIRATION</b> 3.1 Monitor SpO2				<b>3. RESPIRATION</b> 3.1 Monitor SpO2				<b>3. RESPIRATION</b> 3.1 Monitor SpO2			
<b>4. PHOTOTHERAPY</b> 4.9 Note <ul style="list-style-type: none"> <li>• Starting time</li> <li>• Type and number of lamps</li> <li>• Photometer measurement of</li> </ul>				<b>4. PHOTOTHERAPY</b> 4.1 Note <ul style="list-style-type: none"> <li>• Starting time</li> <li>• Type of lamps</li> <li>• Photometer measurement of</li> </ul>				<b>4. PHOTOTHERAPY</b> 4.1 Note the skin colour 4.2 Record the time of discontinuing phototherapy. 4.3 Reinforce to parents that bilirubin should be checked within 12-24 hours after			

<p>light intensity</p> <p>4.10 Undress the neonate completely.</p> <p>4.11 Keep eyelids closed before shield is applied.</p> <p>4.12 Ensure that eye shield do not occlude the nares.</p> <p>4.13 Use mask as a mini nappy.</p> <p>4.14 Keep the gonads (males) covered.</p> <p>4.15 Maintain distance of 45 cm between the neonate and light.</p> <p>4.16 Observe for hazards like:</p> <ul style="list-style-type: none"> <li>• Increased frequency of greenish stool</li> <li>• Hypo and hyperthermia</li> <li>• Erythematous rash</li> <li>• Dehydration</li> </ul>			<p>light intensity</p> <p>4.2 Un dress the neonate completely.</p> <p>4.3 Keep eyelids closed before shield is applied.</p> <p>4.4 Ensure that eye shield do not occlude the nares.</p> <p>4.5 Use mask as a mini nappy.</p> <p>4.6 Keep the gonads (males) covered.</p> <p>4.7 Maintain distance of 45 cm between the neonate and light.</p> <p>4.8 Observe for hazards like:</p> <ul style="list-style-type: none"> <li>• Increased frequency of greenish stool</li> <li>• Hypo and hyperthermia</li> <li>• Erythematous rash</li> <li>• Dehydration</li> </ul>			<p>discontinuing phototherapy.</p>		
<p><b>5. NUTRITION</b></p> <p>5.7 Verify successful latch.</p> <p>5.8 Breastfeed on demand.</p> <p>5.9 Supplement with EBM or formula if intake is inadequate or weight loss is excessive.</p> <p>5.10 Burp soon after the feeds.</p> <p>5.11 Administer extra fluids if ordered at rate of 10-20 ml/kg/day/surface to compensate insensible fluid loss for child in phototherapy.</p> <p>5.6 Maintain I&amp; O chart.</p>			<p><b>5. NUTRITION</b></p> <p>5.1 Verify successful latch.</p> <p>5.2 Breastfeed on demand.</p> <p>5.3 Burp soon after the feeds.</p> <p>5.4 Maintain I &amp; O chart</p>			<p><b>5. NUTRITION</b></p> <p>5.1 Discuss and reinforce feeding cues and associated behaviour with parents.</p>		
<p><b>6. ELIMINATION</b></p> <p>6.4 Weigh the diaper</p> <p>6.5 Maintain wet diaper count</p> <p>6.3 Check the colour, frequency and consistency of stool</p>			<p><b>6. ELIMINATION</b></p> <p>6.1 Weigh the diaper</p> <p>6.2 Maintain wet diaper count</p> <p>6.3 Check the colour, frequency and consistency of stool</p>			<p><b>6. ELIMINATION</b></p> <p>6.1 Inform parents to observe for 5-6 voids/day.</p> <p>6.2 Reinforce care and that number of stools more if breastfed.</p>		
<p><b>7. THERMOREGULATION</b></p> <p>7.1 Monitor temperature every 2 hours when</p>			<p><b>7. THERMOREGULATION</b></p> <p>7.1 Monitor temperature every 2 hours when</p>			<p><b>7. THERMOREGULATION</b></p> <p>7.1 Mummify the neonate during transport and</p>		

the neonate is in phototherapy. 7.2 If in radiant warmer, monitor servo controlled temperature.			the neonate is in phototherapy. 7.2 If in radiant warmer, monitor servo controlled temperature.			discharge.		
<b>8. POSITIONING</b> 8.1 Change position every 2 hours when on phototherapy. 8.2 Keep neonate in right lateral position after feeds.			<b>8. POSITIONING</b> 8.1 Change position every 2 hours when on phototherapy. 8.2 Keep neonate in right lateral position after feeds.			<b>8. POSITIONING</b> 8.1 Reinforce about positioning after feeds to parents.		
<b>9. HYGIENE</b> 9.1 Do not apply lotions to prevent increased tanning. 9.2 Provide cord care			<b>9. HYGIENE</b> 9.1 Do not apply lotions to prevent increased tanning. 9.2 Provide cord care.			<b>9. HYGIENE</b> 9.1 Educate parents to maintain adequate cleanliness.		
<b>10. SLEEP AND REST</b> 10.1 Club all nursing activities to provide adequate sleep and rest.			<b>10. SLEEP AND REST</b> 10.1 Club all nursing activities to provide adequate sleep and rest.			<b>10. SLEEP AND REST</b> 10.1 Reinforce about sleep patterns of neonates to parents.		
<b>11.SAFETY</b> 11.1 Verify ID band with parents. 11.2 Check preventive maintenance status of the phototherapy unit.			<b>11. SAFETY</b> 11.1 Verify ID band with parents. 11.2 Check preventive maintenance status of the phototherapy unit.			<b>11.SAFETY</b> 11.1 Verify ID band with parents. 11.2 Remove ID band only at discharge.		
<b>12. COMMUNICATION</b> 12.1 Remove eye shields before feeding to facilitate attachment process. 12.2 Provide auditory and tactile stimulation.			<b>12. COMMUNICATION</b> 12.1 Remove eye shields before feeding to facilitate attachment process. 12.2 Provide auditory and tactile stimulation.			<b>12. COMMUNICATION</b> 12.1 Reinforce to parents the importance of auditory and tactile stimulation.		
<b>13. PSYCHOSOCIAL SUPPORT</b> 13.1 Assess parental attachment behaviour. 13.2 Assess mother's skill in feeding infant. 13.3 Encourage breastfeeding.			<b>13. PSYCHOSOCIAL SUPPORT</b> 13.1 Encourage breastfeeding.			<b>13. PSYCHOSOCIAL SUPPORT</b> 13.1 Discuss and reinforce importance of breastfeeding. 13.2 Encourage KMC		
<b>14. SPIRITUAL NEEDS</b> 14.1 Assess the spiritual pattern of the parents.			<b>14. SPIRITUAL NEEDS</b> 14.1 Assess the spiritual pattern of the parents.			<b>14. SPIRITUAL NEEDS</b> 14.1 Encourage the spiritual needs of parents.		

<p><b>15. EDUCATION AND DISCHARGE PLANNING</b> 15.1 Assess needs and document.</p>		<p><b>15. EDUCATION AND DISCHARGE PLANNING</b> 15.1 Verify discharge plan with continuing care coordination.</p>		<p><b>15. EDUCATION AND DISCHARGE PLANNING</b> 15.1 Explained to parents about rebound phenomenon. 15.2 Parents should be advised to come to hospital:</p> <ul style="list-style-type: none"> <li>• If their baby is very drowsy</li> <li>• If their baby does not awaken on its own to feed at least every 4 hrs</li> <li>• If their baby is hard to wake up</li> <li>• If the white part of the eye looks yellow</li> <li>• If the skin looks yellow</li> <li>• If baby is not feeding well</li> </ul>	
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**Scoring key and interpretation**

<b>Scores</b>			<b>Percentage</b>	<b>Level</b>
<b>Day 1</b>	<b>Day 2</b>	<b>Day 3</b>		
0-55	0-43	0-30	< 50	Non compliant
56-83	44-68	31-45	51-75	Partially compliant
84-110	69-86	46-60	76-100	Compliant

**APPENDIX XVII**

**BLUEPRINT FOR RATING SCALE FOR PARENTAL SATISFACTION OF  
NURSING CARE OF NEONATES WITH HYPERBILIRUBINEMIA**

<b>SL NO</b>	<b>CONTENT</b>	<b>ITEMS</b>	<b>TOTAL ITEMS</b>	<b>PERCENTAGE</b>
1.	Admission and overall care	1,2,3,4,5	5	25
2.	Nutrition, Elimination, Sleep and Positioning	6,7,8,9,10	5	25
3.	Thermoregulation, Hygiene, Safety, Communication and Spiritual needs.	11,12,13,14,17	5	25
4.	Education and Discharge instructions	15,16,18,19,20	5	25
		<b>Total</b>	<b>20</b>	<b>100</b>

**RATING SCALE ON THE PARENTAL SATISFACTION OF NURSING CARE  
OF NEONATES WITH HYPERBILIRUBINEMIA**

**Purpose:** This rating scale is designed to assess the level of parental satisfaction on nursing care. This is assessed by the researcher after the implementation of the clinical pathway.

**Instruction:** Given below is a parental satisfaction scale for which 4 alternative responses are provided. You are requested to put a tick mark (√) against the statement which you consider correct. The responses will be kept confidential.

SL NO	STATEMENT	HIGHLY SATISFIED	SATISFIED	DISSATISFIED	HIGHLY DISSATISFIED
1.	The way the staff treated you at the time of admission.				
2.	Orientation to the hospital environment and other facilities.				
3.	Nurses effort to include you in decisions about your child's treatment.				
4.	Explanations given before any procedures.				
5.	Privacy provided for parental bonding.				
6.	Clarifying doubts on feeding cues and associated behaviour.				
7.	Explanation given as to how to burp the neonate after the feeds.				

8.	Reinforcement given on positioning of child after the feeds.				
9.	Information given on the normal elimination pattern that should be present for the neonates.				
10.	Measures taken to maintain normal sleep pattern of the neonates.				
11.	Description on how to mummify the neonate during transport.				
12.	Information given on the hygienic aspects.				
13.	Child safety measures taken.				
14.	Reinforcement given on the importance of auditory and tactile stimulation.				
15.	Explanation given on the rebound phenomenon of hyperbilirubinemia.				
16.	Psychological support in addressing treatment needs.				
17.	Respected the spiritual patterns of the parents.				

18.	Speed of discharge process after you were told that you could go home.				
19.	Instructions given about how to take care of the baby at home.				
20.	Instructions regarding when to consult a physician after discharge				

**Scoring key and interpretation**

<b>Score</b>	<b>Percentage</b>	<b>Interpretation</b>
< 20	Less than 25%	Highly dissatisfied
20-40	25-50%	Dissatisfied
41-60	51-75%	Satisfied
> 60	More than 75%	Highly satisfied

## APPENDIX XVIII

### NEONATAL OUTCOME CHECKLIST TO ASSESS THE EFFECTIVENESS OF CLINICAL PATHWAY FOR NEONATAL HYPERBILIRUBINEMIA

**Purpose:** This checklist helps to assess the effectiveness of clinical pathway as it measures the clinical and nursing outcome of neonate with hyperbilirubinemia.

**Instructions:** The checklist will be completed by the researcher by gathering data from the clinical record, observation and other documentations if any.

S. NO	Neonatal outcome	SCORE		
		Major Complication <b>0</b>	Minor Complication <b>1</b>	No Complication <b>2</b>
1	<b>Respiration</b>	➤ Oxygen saturation less than 90%	➤ Oxygen saturation 91%-94%	➤ Oxygen saturation 95%-100%
2	<b>Nutrition</b>	➤ No good latch ➤ Inadequate intake	➤ Inadequate intake	➤ Good intake of feeds
3	<b>Elimination</b>	➤ Clay coloured stools ➤ Decreased urine output	➤ Greenish stools ➤ Decreased urine output	➤ Presence of 5-6 voids per day
4	<b>Rest</b>	➤ Restless ➤ Irritability	➤ Altered sleep pattern	➤ Maintains normal sleep pattern
5	<b>Positioning</b>	➤ Changes in positioning not done	➤ Changed position seldom	➤ Changed position every 2 hours

<b>6</b>	<b>Regulatory Functions</b>	<ul style="list-style-type: none"> <li>➤ Temperature &gt; 100<sup>0</sup> F</li> <li>➤ Pulse rate &gt; 180 beats/ min</li> <li>➤ Respiration &gt;50breaths/min</li> </ul>	<ul style="list-style-type: none"> <li>➤ Temperature: 99-100<sup>0</sup> F</li> <li>➤ Pulse rate: 140-180 beats/ min</li> <li>➤ Respiration: 30-50 breaths/min</li> </ul>	<ul style="list-style-type: none"> <li>➤ Temperature: 98.4<sup>0</sup> F- 99<sup>0</sup>F</li> <li>➤ Pulse rate: &lt; 140 beats/min</li> <li>➤ Respiration : &lt; 30 breaths/min</li> </ul>
<b>7</b>	<b>Personal hygiene</b>	<ul style="list-style-type: none"> <li>➤ Poor hygiene</li> </ul>	<ul style="list-style-type: none"> <li>➤ Moderate personal hygiene</li> </ul>	<ul style="list-style-type: none"> <li>➤ Good personal hygiene</li> </ul>
<b>8</b>	<b>Communication</b>	<ul style="list-style-type: none"> <li>➤ No parent child bonding</li> </ul>	<ul style="list-style-type: none"> <li>➤ Poor parent child bonding</li> </ul>	<ul style="list-style-type: none"> <li>➤ Parent child bonding present</li> </ul>
<b>9</b>	<b>Activity</b>	<ul style="list-style-type: none"> <li>➤ Not active</li> </ul>	<ul style="list-style-type: none"> <li>➤ Less active</li> </ul>	<ul style="list-style-type: none"> <li>➤ Normal activity</li> </ul>
<b>10</b>	<b>Health teaching for parents</b>	<ul style="list-style-type: none"> <li>➤ No response</li> </ul>	<ul style="list-style-type: none"> <li>➤ Less response</li> </ul>	<ul style="list-style-type: none"> <li>➤ Good response</li> </ul>
<b>11</b>	<b>Length of stay</b>	<ul style="list-style-type: none"> <li>➤ Extended days of stay</li> </ul>	<ul style="list-style-type: none"> <li>➤ Extended hours of stay</li> </ul>	<ul style="list-style-type: none"> <li>➤ Discharged on the expected day</li> </ul>

### Scoring interpretation

<b>Scores</b>	<b>Percentage</b>	<b>Interpretation</b>
0-11	≤50%	Negative Outcome
12-16.1	51-75%	Moderately Positive Outcome
> 16	≥76%	Positive Outcome

**APPENDIX XIX**  
**DATA CODE SHEET**

**AGE** – Age in years

1. 21-24
2. 25-29
3. 30 years and above

**PROF QUA** – Professional qualification

1. GNM
2. Post Basic Bsc
3. Bsc(N)

**PROF EXP**- Professional experience

1.  $\leq 2$  years
2. 2-5 years
3.  $\geq 5$  years

**YRS OF EXP** –Years of experience in NICU

1.  $\leq 2$  years
2. 2-5 years
3.  $\geq 5$  years

**INT TRND** – Institution trained

1. Private
2. Government
3. Mission

**AT INS**-Attention in inservice education

1. Yes
2. No

**AG** – Age of neonate on admission

1.  $\leq 24$  hours
2. 1-3 days
3. More than 3 days

**GD** - Gender

1. Male
2. Female

**GS** – Gestational age in weeks at birth

1. 35-37
2. 38-40
3. More than 40

**BOD**- Birth order

1. First
2. Second
3. Others

**POB** – Place of birth

1. Hospital
2. Primary health centre
3. Home

**NB**- Nature of birth

1. Normal vaginal delivery
2. Caesarean Section
3. Assisted vaginal delivery

**BN – Baby condition at birth**

1. Cried
2. Not cried

**BL GP- Blood group of the baby**

1. A
2. B
3. AB
4. O

**Rh- Rh group of the baby**

1. Positive
2. Negative

**BL LV- Bilirubin level of the neonate on admission**

1. Less than 12 mg/dl
2. 12-15 mg/dl
3. More than 15 mg/dl

**BIJ- Birth injuries**

1. Cephal haematoma
2. Caput succedaneum
3. Skull fracture
4. Nerve injury
5. None

**AG- Age in years**

1. 21-25
2. 26-30
3. 31-35

**TYM- Type of marriage**

1. Consanguinous
2. Non consanguinous

**PR- Parity**

1. Primi
2. Multi

**BL GP- Blood group of mother**

1. A
2. B
3. AB
4. O

**Rh- Rh group of mother**

1. Positive
2. Negative

**PR HS- Previous history of child with hyperbilirubinemia**

1. Yes
2. No

**APPENDIX XX**  
**MASTER CODE SHEET- NURSES**

Sample no	Demographic variable proforma of nurses						Pre Test		Post Test	
	AGE	PROF QUA	PROF EXP	YRS OF EXP	INT TRND	AT INS	Score (30)	Level	Score (30)	Level
1	2.1	3.3	4.1	5.1	6.2	7.2	11	I	24	A
2	2.2	3.1	4.2	5.2	6.1	7.2	13	I	21	A
3	2.2	3.1	4.2	5.2	6.1	7.2	16	M	22	A
4	2.1	3.1	4.2	5.1	6.1	7.2	10	I	19	M
5	2.1	3.1	4.1	5.1	6.1	7.2	8	I	18	M
6	2.2	3.1	4.2	5.2	6.2	7.2	12	I	20	M
7	2.1	3.1	4.1	5.1	6.1	7.2	17	M	25	A
8	2.1	3.3	4.1	5.1	6.1	7.2	19	M	27	A
9	2.1	3.3	4.3	5.1	6.1	7.2	18	M	26	A
10	2.1	3.3	4.1	5.1	6.1	7.2	18	M	27	A
11	2.1	3.1	4.2	5.2	6.1	7.2	18	M	28	A
12	2.1	3.3	4.1	5.1	6.1	7.2	12	I	23	A
13	2.1	3.3	4.1	5.1	6.1	7.2	13	I	22	M
14	2.1	3.1	4.1	5.1	6.1	7.2	11	I	24	A
15	2.1	3.3	4.1	5.1	6.1	7.2	13	I	25	A
16	2.3	3.1	4.1	5.1	6.1	7.2	16	M	23	A
17	2.3	3.1	4.1	5.1	6.1	7.2	19	M	25	A
18	2.1	3.2	4.2	5.2	6.1	7.2	17	M	26	A
19	2.1	3.1	4.2	5.2	6.1	7.2	15	M	26	A
20	2.3	3.1	4.1	5.1	6.1	7.2	14	I	23	A

## MASTER CODE SHEET-CONTROL GROUP

Sl no	Neonatal variable proforma					Clinical variable proforma						Demographic variable proforma (mother)							Parent satisfaction (80)			Outcome (6)			Day1(110)	Day2(86)	Day3(60)
	AG	GD	GS	BOD	POB	NB	BN	BL GP	Rh	BL LV	B LJ	AG	TYM	PR	BL GP	Rh	PR HS	ICM	Sc	Per	Lev	Sc	Per	Lev	Score	Score	Score
1	2	1	1	1	1	2	1	4	1	2	5	2	2	1	4	1	2	3	61	76.25	H	17	83	P	75	57	31
2	3	2	2	1	1	3	2	4	1	3	2	2	2	2	1	1	2	3	56	70	M	18	83	P	80	54	42
3	2	2	2	1	1	2	1	2	1	2	5	2	2	2	1	1	2	3	68	85	H	18	83	P	82	61	35
4	2	1	2	1	1	2	1	1	1	2	5	2	2	1	4	1	2	3	68	85	H	18	83	P	85	52	45
5	2	1	2	3	1	1	1	2	2	2	5	2	2	1	4	1	2	3	72	90	H	14	50	MP	76	60	46
6	2	1	2	2	1	2	1	4	1	2	5	3	2	1	2	1	2	3	56	70	M	14	50	MP	78	56	45
7	2	2	1	2	1	2	1	1	1	1	5	2	2	2	4	1	2	3	78	97.5	H	18	83	P	79	55	47
8	2	1	2	1	1	1	1	4	1	2	5	2	2	1	1	1	2	3	56	70	M	18	83	P	87	54	44
9	2	2	2	1	1	3	1	1	1	2	2	3	2	2	4	1	2	3	75	93.75	M	18	83	P	82	58	42
10	3	2	2	1	1	1	1	1	2	3	5	3	2	2	1	1	2	3	75	93.75	H	16	50	MP	86	64	40
11	3	2	1	2	1	1	1	1	1	3	5	2	2	1	1	2	2	3	76	95	H	18	83	P	84	62	38
12	2	2	2	1	1	2	1	4	1	2	5	3	2	1	4	1	2	3	56	70	M	15	50	MP	78	60	39
13	2	1	1	1	1	2	1	4	1	3	5	3	2	2	4	1	1	3	68	85	H	18	83	P	76	66	38
14	2	2	2	1	1	2	1	2	1	2	5	1	2	2	4	1	1	3	57	71.25	M	20	83	P	75	68	40
15	3	1	2	2	1	1	1	4	1	3	5	3	2	2	4	1	2	3	72	90	H	18	83	P	74	65	43
16	2	2	2	1	1	1	1	2	1	2	5	3	2	1	4	1	2	3	68	85	H	14	50	MP	80	64	35
17	2	2	1	1	1	3	1	4	1	2	5	2	2	2	4	1	1	3	69	86.25	H	14	50	MP	82	54	38
18	3	1	2	2	1	2	1	1	1	2	5	3	2	1	4	1	2	3	56	70	M	18	83	P	86	52	34
19	3	1	1	1	1	1	1	4	1	3	5	2	2	2	4	1	1	3	62	77.5	H	18	83	P	76	62	33
20	2	1	2	1	1	2	1	2	1	2	5	2	2	2	4	1	2	3	61	76.25	H	14	50	MP	82	66	45
21	3	2	1	2	1	3	2	4	1	3	2	1	2	1	1	1	2	3	61	76.25	H	18	83	P	80	67	46
22	2	1	2	1	1	2	1	4	1	2	5	2	2	2	4	1	2	3	56	70	M	14	50	MP	74	59	39
23	3	2	2	1	1	1	1	4	1	3	5	2	2	2	4	1	2	3	77	96.25	H	20	83	P	75	60	42
24	2	1	2	2	1	2	1	3	1	2	5	1	2	1	1	1	2	3	63	78.75	H	14	50	MP	78	65	49
25	2	2	2	1	1	1	1	2	1	2	5	3	2	2	2	1	2	3	72	90	H	18	83	P	80	62	46
26	2	2	2	1	1	1	1	2	1	2	5	2	2	1	4	1	2	3	59	73.75	M	20	83	P	82	70	42
27	2	1	2	1	1	2	1	4	1	2	5	1	2	1	4	1	2	3	60	75	M	20	83	P	85	72	39
28	2	1	2	1	1	1	1	1	1	2	5	1	2	1	3	1	2	3	64	80	H	18	83	P	78	68	32
29	2	1	2	1	1	1	1	2	1	2	5	1	2	1	2	1	2	3	62	77.5	H	16	50	MP	79	66	45
30	2	1	2	1	1	2	1	2	1	2	5	1	2	2	2	1	2	3	60	75	M	18	83	P	72	67	48

**MASTER CODE SHEET- EXPERIMENTAL GROUP**

Sl no	Neonatal variable proforma					Clinical variable proforma						Demographic variable proforma (mother)						Parent satisfaction (80)			Outcome (6)			Day1(110)	Day2(86)	Day3(60)	
	AG	GD	GS	BOD	POB	NB	BN	BL GP	Rh	BL LV	BLJ	AG	TYM	PR	BL GP	Rh	PR HS	ICM	Sc	Per	Lev	Sc	Per	Lev	Score	Score	Score
1	2	2	2	1	1	1	1	2	1	2	5	1	2	1	4	1	2	3	61	76.3	H	18	100	P	103	85	58
2	3	2	2	1	1	2	1	1	1	1	5	2	2	1	1	1	2	3	77	96.3	H	18	100	P	102	84	55
3	2	1	2	1	1	1	1	4	1	2	5	2	2	1	4	1	2	3	68	85	H	20	83.3	P	104	83	56
4	2	1	1	1	1	2	1	1	1	2	5	1	2	1	1	1	2	3	68	85	H	20	100	P	100	86	54
5	3	1	2	1	1	1	1	1	2	3	5	1	2	1	4	1	2	3	72	90	H	18	100	P	101	80	57
6	3	1	2	1	1	1	1	2	2	3	5	1	2	1	4	1	2	3	80	100	H	18	100	P	105	86	59
7	2	1	2	1	1	2	2	4	1	2	5	1	2	1	2	1	2	3	78	97.5	H	18	100	P	103	82	56
8	2	1	2	1	1	1	1	4	1	2	5	1	2	1	4	1	2	3	56	70	M	20	100	P	100	78	57
9	3	1	2	2	1	2	1	4	1	2	5	1	2	2	1	1	2	3	62	77.5	H	18	100	P	102	86	59
10	3	1	2	2	1	1	1	4	1	2	5	3	2	2	2	1	2	3	75	93.8	H	20	83.3	P	103	86	58
11	2	1	2	1	1	2	1	2	1	2	5	2	2	1	2	1	2	3	76	95	H	18	100	P	95	85	56
12	3	1	2	1	1	1	1	4	1	3	5	1	2	1	1	1	2	3	80	100	H	17	100	P	99	83	57
13	2	1	2	1	1	2	1	2	1	2	5	2	2	1	4	1	2	3	68	85	H	18	83.3	P	100	81	54
14	2	2	1	1	1	2	1	4	1	2	5	1	2	1	4	1	2	3	64	80	H	18	100	P	106	86	55
15	2	2	2	2	1	2	1	2	1	2	5	2	2	2	4	1	1	3	72	90	H	20	100	P	103	79	57
16	2	1	2	1	1	2	1	4	1	3	5	1	2	1	2	1	2	3	68	85	H	20	100	P	105	86	58
17	2	1	1	3	1	2	1	2	1	2	5	3	2	2	2	1	1	3	69	86.3	H	20	100	P	102	84	57
18	2	1	1	1	1	2	1	2	1	2	5	1	2	1	4	1	2	3	80	100	H	18	100	P	104	82	56
19	3	1	2	1	1	2	1	2	1	3	5	1	2	1	2	1	2	3	61	76.3	H	20	83.3	P	98	79	54
20	2	2	2	1	1	2	1	4	1	2	5	1	2	1	4	1	2	3	68	85	H	18	100	P	103	82	53
21	3	2	2	1	1	1	1	1	1	3	5	1	2	1	1	1	2	3	61	76.3	H	20	100	P	100	81	60
22	3	2	2	1	1	2	1	3	1	3	5	1	2	1	3	1	2	3	80	100	H	18	100	P	105	86	54
23	2	1	2	1	1	2	1	1	1	3	5	1	2	1	4	1	2	3	77	96.3	H	20	100	P	103	85	57
24	2	2	2	2	1	3	1	2	1	2	2	2	2	2	1	1	2	3	60	75	M	18	83.3	P	104	83	60
25	3	1	2	1	1	2	1	2	1	3	5	1	2	1	4	1	2	3	72	90	H	18	100	P	106	86	53
26	2	1	2	1	1	2	1	4	1	2	5	2	2	1	4	1	2	3	80	100	H	18	100	P	102	84	56
27	2	2	2	1	1	2	1	2	1	2	5	1	2	1	2	1	2	3	60	75	M	18	83.3	P	103	82	60
28	2	1	2	1	1	1	1	1	1	2	5	1	2	1	3	1	2	3	64	80	H	20	100	P	104	84	57
29	2	1	2	1	1	1	1	2	1	2	5	1	2	1	2	1	2	3	64	80	H	20	100	P	100	80	58
30	2	1	2	1	1	2	1	2	1	2	5	1	2	2	2	1	2	3	60	75	M	18	100	P	102	84	60

**CHAPTER I**  
**INTRODUCTION**

**Background of the Study**

**“Every child born into the world is a new thought of God, an ever fresh and radiant possibility.”**

**-Child care**

The birth of a baby is one of the most inspiring and emotional events that can occur in one's life time. When a baby is born, they leave behind their soft, curved, subdued aquatic environment and emerge into an expansive world of air, variation and stimulus. This is quite a transition and within one minute of birth, the normal newborn adapts from dependent fetal existence to an independent one through physiological processes. The little ones who are not able to adapt well to this transition may require stay in the NICU. NICU thus serves as a home away from home.

Neonatal survival is a very sensitive indicator of population growth and socio-economic development. Nearly 27 million babies are born in India every year. This accounts for 20% of global births. Of these 1 million die before completing the first 4 weeks of life. This accounts for nearly 25% of the total 3.9 million neonatal deaths worldwide. India's current neonatal mortality rate (2009) of 34 per 1000 live births itself shows the need for a comprehensive care. Among the causes of this mortality is neonatal hyperbilirubinemia which, if not treated may end in fatality.

According to American College of Gastroenterology (2010), neonatal jaundice is usually a normal condition resulting from the destruction of old red blood cells. After red blood cells are broken down, bilirubin is made. Bilirubin is the pigment that causes jaundice. One of the major functions of the liver is to clear bilirubin from the body. The liver of a baby in the first 1-2 weeks of life is immature and may not be able to handle disposal of all the bilirubin made. The extra bilirubin will be deposited in the skin, causing the skin to look yellow.

Physiologic jaundice is also called non pathologic or developmental jaundice. It is caused by transient hyperbilirubinemia and is considered normal. It is not present during the first 24 hours of life in term infants, but appears on the second or third day after birth. Jaundice becomes visible when the serum bilirubin reaches 5 to 7 mg/dl (Blackburn, 2007). In physiologic jaundice, the bilirubin peaks at 5 to 6 mg/dl between the second and fourth day of life.

Bilirubin levels greater than 12 mg/dl develop in 13% of breastfed infants by 1 week of age (Piazza and Stoll, 2007). The most common cause of jaundice in breastfed infants is insufficient intake, often called breastfeeding jaundice or early onset jaundice. True breast milk jaundice, also called late onset breast milk jaundice, occurs after the first 3 to 5 days of life. The exact cause is unknown but some studies say that it is due to certain substances in the breast milk that increase absorption of bilirubin from the intestine.

Neonatal hyperbilirubinemia occurs due to immaturity of liver function or by blood group incompatibility leading to increased erythrocyte destruction. Although low levels of bilirubin are not usually a concern, large amounts can circulate to tissues in the

brain and may cause seizures and brain damage. This leads to a condition called kernicterus. In the early 1950's, the link between hyperbilirubinemia and neurologic dysfunction was scientifically established and treatment with exchange transfusion was found to decrease neurological impact in infants with hemolytic conditions. During this time, the discovery was made that infants exposed to sunlight were less jaundiced than their non exposed counterparts. Thus, began the era of phototherapy, which was widely used by the late 1960's (Garter, 1997).

It is commonly accepted that the role of nurse has expanded and developed in response to a myriad of social and technological changes. This has resulted in nurses caring for the patients with increasingly complex conditions and having a stronger presence in the multidisciplinary health care team.

The nursing profession has continued to reinvent itself to meet new challenges, while maintaining a patient centered focus since its inception. There are various models and standards which are developed throughout the world with the aim of enhancing the quality and promoting uniformity in care. Though nursing process model is practised widely, it is complex and requires proper documentation.

Therefore, the nurses who take care of these angels should be equipped with a standard tool like the clinical pathway. The clinical pathway concept appeared for the first time at New England Medical Centre, Boston in 1985 inspired by Karen Zander and Kathleen Brown. They are both, a tool and a concept, which embed guidelines, protocols, evidence-based, patient-centered best practice into everyday use for the individual patient.

Clinical Pathways are structured, multidisciplinary plans of care designed to support the implementation of clinical guidelines and protocols. They are designed to support clinical management, clinical and non-clinical resource management, clinical audit and also financial management. They provide detailed guidance for each stage in the management of a child with a specific condition over a given time period, and include progress and outcomes details. Clinical pathway helps to reduce the risk, reduce the costs by shortening hospital stays, improve the patient outcome and helps to identify the clinical variation.

Pathways are typically not prescriptive; the patient's journey is an individual one, and an important part of the purpose of the pathway documents is to capture information on "variances", where due to circumstances or clinical judgment different actions have been taken, or different results unfolded.

However, evidence evaluating the effectiveness of clinical pathway for neonates with hyperbilirubinemia in the Indian scenario is lacking. The clinical pathway will be highly beneficial to our Indian neonates with hyperbilirubinemia.

### **Need for the Study**

The transition from fetal to newborn life is a critical period involving diverse physiologic changes. The newborn must move from an organism, completely dependent on another for life sustaining oxygen and nutrients to an independent being, a task that requires intense adjustment carried over a period of hours to days.

Neonatal jaundice is of concern because of the current early hospital discharge patterns. It is a clinical symptom that occurs in 60% of neonates more than 37 weeks

gestation, and 80% of preterm neonates less than 37 weeks. The peak value of physiological jaundice occurs after 48 hours. So, most of the cases of jaundice will not occur until the infant is at home. Now a days economic criteria leads to early maternal discharge, even before 48 hours after labour, causing an increase in neonatal readmissions for hyperbilirubinemia (Estrany, et al. 1999).

Johnson (2002) conducted a study to determine wheather early maternal discharge increases neonate readmission rates for potentially preventable causes like dehydration, jaundice, feeding problems, inadequate weight gain and social reasons by analyzing the records of birth from April 1<sup>st</sup> 1997 to March 31<sup>st</sup> 2000 among neonates of vaginal deliveries weighing at least 2500 grams. The result showed that most common reason for readmission was neonatal hyperbilirubinemia (74%).

Although neonatal hyperbilirubinemia is not a problematic condition, it still needs attention to prevent the complications. Many studies reveal that parents of neonates admitted to an NICU are believed to experience heightened distress compared to the parents of healthy neonates. This occurs because many aspects of NICU are stressful to parents, including prolonged hospitalization, alterations in parenting and exposure to technical environment.

Clinical pathways are best described as planned and systematic detailing of the usual patterns of care for a patient with specific disease or diagnosis. Clinical pathways are paths that health professionals can follow that should enable them to provide the best possible outcomes for the patient, health care team and the health care organizations.

Smith and Gow (1999) contributes a unique angle to the argument in claiming that a major benefit of pathways is that they provide a means of measuring care delivered, thus directly linking care to quality. They also pointed out that pathways necessarily minimize practice variation and this was one key factor behind the decision to use clinical pathways as a management tool in this study.

Team building is one of the major successes achievable through clinical pathway. It can be competently argued that any improvement in team relations results in a more seamless and satisfactory realisation of mutual goals. Cost containment continues to be a crucial issue for all health care organizations to the extent that it has embedded in health care policy. Therefore, sustainable claim that departure from the clinical pathway increases the cost of patient care, is an influential factor in the adoption of pathways as a model of care.

Clinical pathway is thus a step wise sequencing of care which will improve the continuity of care disciplines. Nurses participation in these processes is essential for the successful implementation of clinical pathways and ultimately, the opportunity to improve patient care. The neonatal care providers should thus be trained in the art of care and communication along with other health care team members. Focussing this aspect, the researcher has formulated a clinical pathway to find out its effectiveness in decreasing the length of hospital stay and preventing the complications while maintaining the quality of patient outcomes.

## **Statement of the Problem**

A Quasi Experimental Study to Assess the Effectiveness of Clinical Pathway for Neonatal Hyperbilirubinemia upon the Knowledge and Practice of Nurses and Neonatal Outcome at Apollo Main Hospital, Chennai.

## **Objectives of the Study**

1. To assess the pre and post test level of knowledge and practice of nurses regarding clinical pathway for neonates with hyperbilirubinemia.
2. To assess the neonatal outcome in control and experimental group of neonates with hyperbilirubinemia.
3. To evaluate the effectiveness of clinical pathway by comparing the pre and post test level of knowledge and practice of nurses regarding clinical pathway for neonates with hyperbilirubinemia.
4. To compare the neonatal outcome in control and experimental group of neonates with hyperbilirubinemia.
5. To compare the level of parental satisfaction on nursing care in control and experimental group of neonates with hyperbilirubinemia.
6. To determine the association between the selected demographic variables of nurses and their pre and post test level of knowledge regarding clinical pathway for neonates with hyperbilirubinemia.
7. To determine the association between selected demographic variables of control and experimental group of neonates with hyperbilirubinemia and their outcome.
8. To determine the association between selected clinical variables of control and experimental group of neonates with hyperbilirubinemia and their outcome.

## **Operational Definitions**

### **Clinical pathway**

In this study, it is a structured multidisciplinary plan of care designed to support the implementation of nursing care guidelines and protocols. They provide detailed guidelines for each stage of a patient from admission to discharge with specific disease conditions over a given time period and include the patients progress and outcome details.

### **Neonatal hyperbilirubinemia**

In this study, it refers to a condition in neonates, characterized by an abnormal increase of bilirubin in the blood above 12mg/dl manifested as yellowish discolouration of skin and clay coloured stools and is managed with breast feeding, fluids and phototherapy.

### **Clinical pathway for Neonatal Hyperbilirubinemia**

In this study, it involves the guidelines for nursing care of neonates with hyperbilirubinemia for 3 days from admission to discharge that is formulated by the researcher based on the 14 basic needs of Henderson. The aspects included are assessment, nutrition, respiration, thermoregulation, elimination, positioning, hygiene, sleep and rest, safety, communication, psychosocial support, spiritual needs, education and discharge planning for neonates with hyperbilirubinemia. Nursing interventions are listed under each aspect and based on this, the nurses will be giving care to the neonates with hyperbilirubinemia.

**Effectiveness**

In this study, it refers to the difference between the pre and post test knowledge and practice of nurses on clinical pathway for neonates with hyperbilirubinemia.

The effectiveness is also measured by comparing the control and experimental group of neonatal outcome in terms of length of stay, prevention of complications and parental satisfaction.

**Outcome**

In this study, it refers to the length of stay in the hospital, prevention of complications and satisfaction of parents regarding nursing care.

**Knowledge**

In this study, it refers to the level of awareness and understanding that nurses have regarding the care of neonates with hyperbilirubinemia using clinical pathway and measured using a structured questionnaire.

**Practice**

In this study, it refers to the nursing care provided by the nurses while caring for neonates with hyperbilirubinemia which is measured in terms of compliance with clinical pathway.

## **Nurses**

In this study, it refers to a person who is a registered nurse qualified with General Nursing and Midwifery or Bachelor of Science in Nursing Degree working in NICU and providing care to the neonates with hyperbilirubinemia.

## **Neonate**

In this study, it refers to the newborn from birth to 7 days.

## **NICU**

Neonatal Intensive Care Unit, it refers to a special area in the hospital where newborn babies who need intensive medical care or critically ill are admitted.

### **Assumptions**

- Clinical pathway provides explicit and well defined standard of care.
- Nurses require guiding tool for implementation of clinical pathway.
- Appropriate documentation prevents adverse outcomes.
- Standardized protocols and guidelines improve uniformity of care.
- Neonatal hyperbilirubinemia is treatable.

### **Null Hypothesis**

**H<sub>01</sub>** There will be no significant difference between the pre and post test level of knowledge and practice of nurses regarding clinical pathway for neonates with hyperbilirubinemia.

- H0<sub>2</sub>** There will be no significant difference in the neonatal outcome between the control and experimental group after implementation of clinical pathway for neonates with hyperbilirubinemia.
- H0<sub>3</sub>** There will be no significant association between the selected demographic variables of nurses and their pre and post test level of knowledge regarding clinical pathway for neonatal hyperbilirubinemia.
- H0<sub>4</sub>** There will be no significant association between the selected demographic variables of control and experimental group of neonates with hyperbilirubinemia and their outcome.
- H0<sub>5</sub>** There will be no significant association between the selected clinical variables of control and experimental group of neonates with hyperbilirubinemia and their outcome.

### **Delimitations**

The study was delimited to

- Nurses working at Apollo Main Hospital, Chennai.
- Nurses willing to participate in the study.
- Neonates of 1-7 days of age.
- Neonates with gestational age of 35 or more weeks.

### **Projected Outcome**

The study will help to improve the knowledge and practice of nurses regarding clinical pathway for neonatal hyperbilirubinemia as well as the neonatal outcome in terms of length of stay, prevention of complications and parental satisfaction.

### **Conceptual Framework**

A conceptual framework or model is interrelated concept or abstractions assembled together in a rational scheme by virtue of their relevance to a common theme. (Polit and Beck, 2008)

The investigator adopted the **“Planned Change Model”** by Kurt Lewin (1947) as conceptual framework for the present study.

Kurt Lewin has defined the Planned Change Model as a purposeful designed effort to make an improvement in the system with the assistance of a change agent that is crucial for the development and implementation of the clinical pathway which will ultimately help in improving the quality of nursing care.

In this study, the depromoting factors are the lack of knowledge of nurses, negative attitude towards the change and lack of awareness about the use of clinical pathways in providing care for the neonates with hyperbilirubinemia.

The promoting factors are knowledge about the disease condition, positive attitude and awareness about the care to be given for the neonates with hyperbilirubinemia. Changing agent among the health care consumers must be responsible to accomplish the health goals and thus promote change to improve the quality of nursing care. There are three stages of changes in the behaviour i.e., unfreezing, changing and refreezing.

## **Unfreezing**

In this stage, people are motivated to change; it involves initiating the change. The change agent may need to initiate the unfreezing stage by attempting to motivate the nurses through education and other strategies. In this study, the researcher first identifies the driving and restraining forces that will help to bring about the change.

**Driving forces-** The investigator identified the need of clinical pathway as it is a new concept and it has many benefits like reducing length of stay, preventing complications, parental satisfaction and improving the overall outcome.

**Restraining forces-** Restraining forces hinder the change to occur and in this study it was the nurses as they didn't want to move from their current comfort zone of providing care for the neonates with hyperbilirubinemia.

## **Changing**

During this stage, the nurses caring for the neonates with hyperbilirubinemia accepts and tries the innovation. They experience a series of attitude transformation, ranging from early questioning of the innovation worth to full acceptance and commitment to accomplish the change. The change agents role during this stage was to help the nurses to see the value of the change and encourage them to try it out.

## **Refreezing**

The third stage refreezing occurs when change is established and accepted. The researcher observes that the nurses are ready to use the clinical pathway and the neonates needs had been met as a result of the investigators action in terms of length of stay in hospital, prevention of complications and satisfaction of parents regarding nursing care.

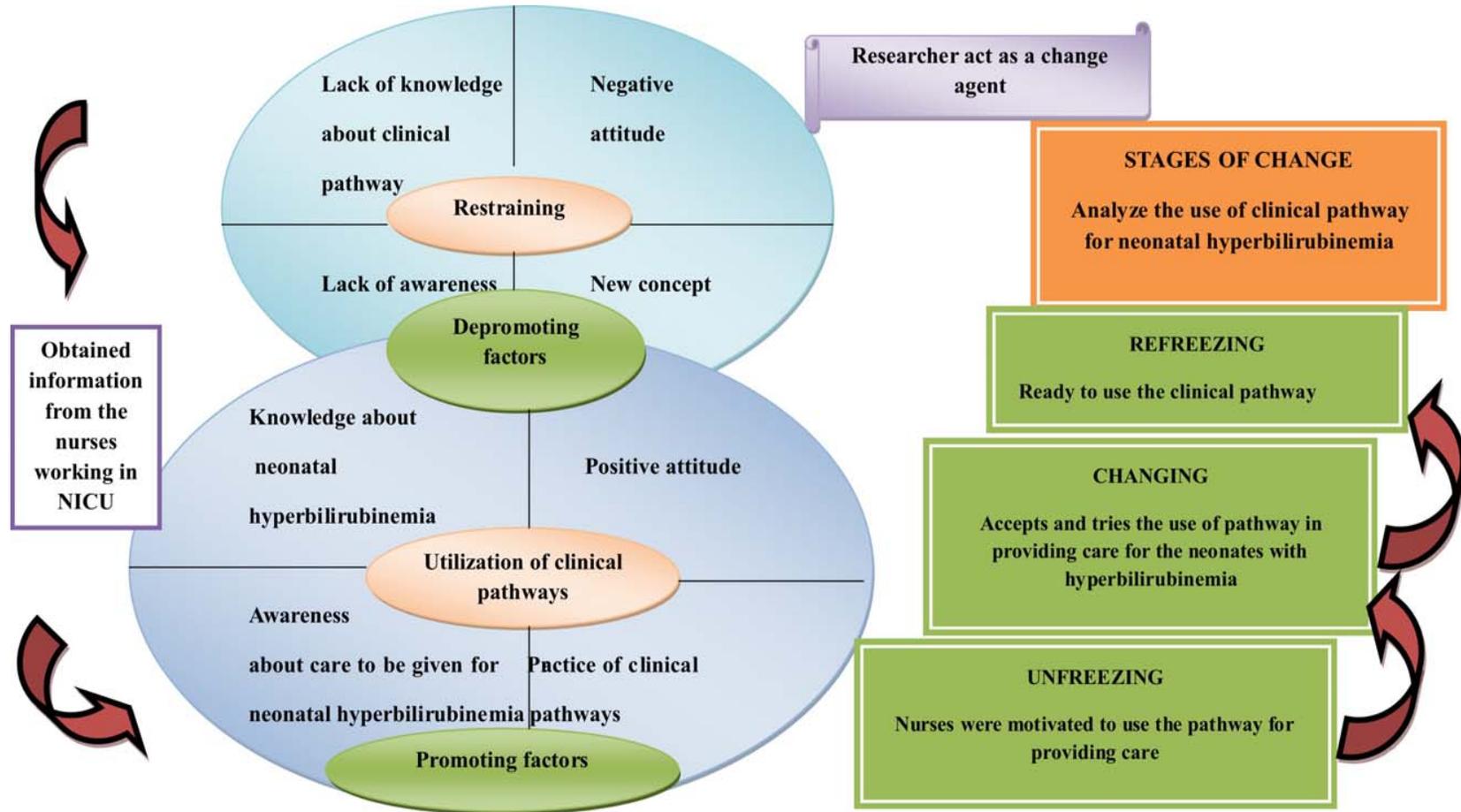


Fig. 1 Conceptual Framework based on Kurt Lewin Change Model (1947)

## **Summary**

This chapter has dealt with the background, need for the study, statement of the problem, objectives, operational definitions, assumptions, null hypothesis and conceptual framework.

## **Organization of the Report**

Further aspects of the study are presented in the following five chapters.

- In chapter II:** Review of literature
- In chapter III:** Research methodology which includes research approach, design, setting, population, sample and sampling technique, tool description, content validity and reliability of tools, pilot study, data collection procedure and plan for data analysis.
- In chapter IV:** Analysis and interpretation of data
- In chapter V:** Discussion
- In chapter VI:** Summary, Conclusion, Limitations, Implications  
and Recommendations

## **CHAPTER II**

### **REVIEW OF LITERATURE**

Review of literature is an essential component of the research process. It is the critical examination of publication related to a topic of interest. Review of literature helps to plan and conduct the study in a systematic manner. Review of literature helps the researcher to build on existing work; he or she should understand what is already known in the topic (Polit and Beck, 2008).

This chapter deals with a review of published and unpublished research studies and from related material for the present study. The review helped the researcher to develop an insight into problem area. This helped the researcher in building the foundation of the study.

The review of literature in this chapter has been presented under the following headings:-

- **Literature related to Neonatal Hyperbilirubinemia**
- **Literature related to Clinical Pathway**
- **Literature related to Guidelines and Protocols on Neonatal Hyperbilirubinemia**

#### **Literature related to Neonatal Hyperbilirubinemia**

A descriptive study was conducted by Brethau in 2010 to describe the lived experience of mothers having an infant with neonatal jaundice. A phenomenological design with 6 mothers was taken and strubert's method of phenomenology guided the

collection, organization and analysis of data to abstract themes. 8 major themes emerged relating to the lived experience: physical and emotional exhaustion, feeling robbed, distressed by infants physical appearance, loss of control, maternal vigilance and feeling discounted.

Korejo et al. (2010) conducted a cross sectional study to identify the risk factors for kernicterus in neonatal jaundice. 100 clinically diagnosed cases of kernicterus were studied. Purposive sampling technique was used. Out of 100 neonates, 62% were males and 38% females with a ratio of 1:6:1. Home delivery was found to be a major risk factor (60%) for development of kernicterus.

Bhatt and Rao conducted a descriptive study in KMC, Manipal in 2008 to assess the utility of 24 and 48 hrs transcutaneous bilirubin (TcB) index for predicting subsequent significant hyperbilirubinemia in healthy term neonates. Sensitivity and specificity were optimized at TcB value of 7 at 24 hours and 10 at 48 hours. Chi square statistics for 24 and 48 hour measurements are 0.838 and 0.836 respectively. The study thus concluded that 24 and 48 hours TcB indices are predictive for subsequent hyperbilirubinemia and can guide clinician in early discharge of healthy term neonates.

In 2004, Suresh et al. conducted a study about cost effectiveness that are intended to prevent kernicterus in newborn infants. The three strategies studied were: universal follow up in office or at home within 1-2 days of early newborn discharge, routine pre discharge serum bilirubin with selective follow up and laboratory testing and routine pre discharge transcutaneous bilirubin with selective follow up and laboratory testing. They concluded that widespread implementation of these technologies is likely to increase health care cost significantly with uncertain benefits and it is premature to implement

routine pre discharge serum bilirubin test or transcutaneous bilirubin screening on a large scale.

A study was conducted by Bhutani et al. to propose and implement a family-centered systems approach to manage newborn jaundice for safer outcomes. 31,059 well babies discharged as healthy from a cohort of 41,961 live births (1990-2000) were taken as study participants. Incremental implementation of a systems approach that incorporated a hospital policy to authorize nurses to obtain a bilirubin (total serum/transcutaneous) measurement for clinical jaundice, universal predischarge total serum bilirubin (at routine metabolic screening), and targeted follow-up, using the bilirubin nomogram (hour-specific, percentile-based total serum bilirubin/transcutaneous bilirubin). The results revealed that adverse outcomes decreased for well babies: exchange transfusion, intensive phototherapy, and readmission. During the study period, there were no "never events" (total serum bilirubin greater than or equal to 30 mg/dl), while "close calls" (total serum bilirubin greater than or equal to 25 mg/dl) were 1 in 15,000 as compared to a reported incidence of 1 in 625.

### **Literature related to Clinical Pathway**

In the year of 2008-2010, multi-centre evaluation of a clinical pathway for chronic cough in children was done by Chang and Schutz. The aims of the study were to determine if a standardised clinical management pathway improves clinical outcomes, to assess the reliability, validity and direct health costs of this pathway, to examine the feasibility of using the standardised pathway in a range of settings and to describe the outcomes of chronic cough in indigenous children. This study assumed that by assessing the effect of the clinical pathway in a multicentre study in various specialist clinics, the

results should be generalisable to other similar settings. The study concluded that a standardised clinical management pathway has the potential to reduce the morbidity of chronic cough, unnecessary costs and adverse events of medications used as well as encourage early referral of children with chronic lung disease.

Cheney (2005) conducted a study in Australia to evaluate the effectiveness of clinical pathway for bronchiolitis. 229 infants admitted to hospital with acute viral bronchiolitis and prospectively managed by using a pathway protocol were compared with a retrospective analysis of 207 infants. The results showed that there were no differences between groups in demographic factors or clinical severity. The pathway had no effect on length of stay or time in oxygen administration. Readmission to hospital was significantly lower in the pathway group ( $p=0.001$ ). Administration of supplemental fluids ( $p=0.001$ ) and use of steroids was lower ( $p=0.005$ ) in the pathway group. Documentation of variances from the pathway was misunderstood by staff. The study thus concluded that clinical pathways specifies local practice guidelines and discharge criteria that can reduce the risk of readmission to hospital and use of inappropriate therapies.

A case study was done in 2001 to find the association between clinical pathways and hospital length of stay by Stanbridge in a rural hospital in a Midwestern state. All inpatient cases were used with the primary diagnoses of chronic obstructive pulmonary disease, congestive heart failure, diabetes, myocardial infarction, and pneumonia from the years of 1999–2003. By controlling for gender, age, insurance type, and year, this study employs a multiple regression analysis to evaluate the association between clinical pathways and the length of stay. Only one (the clinical pathway for myocardial

infarction) out of the five pathways studied showed an association with a statistical significance in decreasing the length of stay. The study concluded that the health care administrators should consider other aspects as well as the hospital length of stays when implementing clinical pathways in their facility.

According to Lagoe and Aspling (1997), reduced length of stay is associated with the use of clinical pathway. Decreased length of stay is perhaps the most significant advantage of clinical pathway as this in itself is a self evident positive outcome for both the patient and health care agency. Reduced length of stay also has other advantages such as reducing the risk of iatrogenic infections and social burden on families.

#### **Literature related to Guidelines and Protocols on Neonatal Hyperbilirubinemia**

Bishop et al. (2009) conducted a study to determine whether implementation of a clinical pathway in a Level two NICU is cost effective. Data were collected on cost of the multi-disciplinary team to develop the tool, cost to educate NICU staff on how to use the tool, costs of clerical support, and cost of printing. Length of Stay (LOS) data were collected to determine if cost related to LOS was influenced by implementation of the clinical pathways. Results showed that LOS was significantly less in the post-implementation group compared to the pre-implementation group ( $18.9 \pm 9$  days vs.  $14.6 \pm 7$  days,  $p < 0.05$ ). There was a cost saving of \$1,931 per patient discharged home in the post-group compared to the pre-group. The study concluded that implementation of clinical pathways was cost-effective.

In 2003, Asha and Shetty et al. conducted a study for 6 months in KMC, Manipal to find out the incidence of hyperbilirubinemia and the effect of phototherapy among full

term newborns with a view to develop a nursing care protocol. Incidence of hyperbilirubinemia was found to be 198/1000 population. No significant association was found between invasive and non invasive assessment of bilirubin level. Loss of weight had significant relationship with duration of phototherapy ( $r=0.486$ ).

Madden et al. conducted a study in the year of 2001 on length of stay policies and ascertainment of post discharge problems in newborns. The objective of the study was to evaluate the effects of an early postpartum discharge program and a subsequent legislative mandate for 48 hours of hospital coverage on incidence of newborn jaundice and feeding problems. Interrupted time series analysis was the sampling method used. The study concluded that sudden increase in jaundice and infant feeding problems were not associated with changes in length of stay in this setting. Instead, these increases seem to be the result of more frequent evaluation of newborns during the critical day 3 to 4 periods and may also have been elevated by a new climate of concern about neonatal vulnerability.

There are limited studies that have been done where pathways have been developed and used to manage paediatric patient care (Chin et al, 2002). Critical analysis of the use of these pathways in neonates has revealed small study group numbers, and there appears to be few published studies available that specifically evaluate the use of clinical pathway in the management of neonatal hyperbilirubinemia.

## **Summary**

This chapter has dealt with review of literature related to the problem stated. The literatures presented here were extracted from 13 primary and 5 secondary sources. It has helped the researcher to understand the impact of the problem under study. It has also enabled the investigator to design the study, develop the tool, plan the data collection procedure and to analyze the data.

## **CHAPTER III**

### **RESEARCH METHODOLOGY**

The methodology of research study is defined as the way data are gathered in order to answer the research questions (Polit and Beck, 2008).

The research methodology involves a systematic procedure by which the researcher starts from the initial identification of the problem to its final conclusion. It enables the researcher to project a blueprint of the research undertaken. The aim of the present study was to assess the effectiveness of clinical pathway for neonatal hyperbilirubinemia.

This chapter deals with a brief discussion of different steps undertaken by the researcher for the study. It involves research approach, research design, setting, population, sample and sampling technique, development and description of tool, validity, reliability, pilot study, data collection procedure and plan for data analysis.

#### **Research Approach**

Research approach is the most significant part of any research. The appropriate choice of the research approach depends on the purpose of the research study which is undertaken.

According to Polit and Beck (2008), experimental research is an extremely “applied” form of research and it involves finding out how well a program, practice or policy are working. Its goals are to assess or evaluate the success of the intervention. In this study, the researcher wanted to assess the effectiveness of clinical pathway for

neonatal hyperbilirubinemia. After extensive review of literature, the researcher found that the experimental approach was the best suited approach.

### **Research Design**

A research design incorporates the most important methodology design that a researcher works in conducting a research study. (Polit and Beck, 2008)

Quasi-experimental research design was adopted for conducting the study. Since there were limited number of nurses available, one group pre and post test design was adopted for the nurses. Here, the investigator administered pre test for the selected nurses and manipulated the independent variables ie. administration of clinical pathway for the same group of nurses and the post test was conducted.

### **Nurses**

#### **01 X 02**

**01** - Pre test to assess the knowledge and practice of nurses regarding clinical pathway for neonatal hyperbilirubinemia.

**X** – Structured teaching on clinical pathway.

**02** -Post test to assess the gained knowledge and practice of nurses regarding clinical pathway for neonatal hyperbilirubinemia

### **Neonates**

#### **-01**

#### **X 01**

**-01** Assessment of neonatal outcome and parental satisfaction

**X-** Implementation of clinical pathway for neonates with hyperbilirubinemia

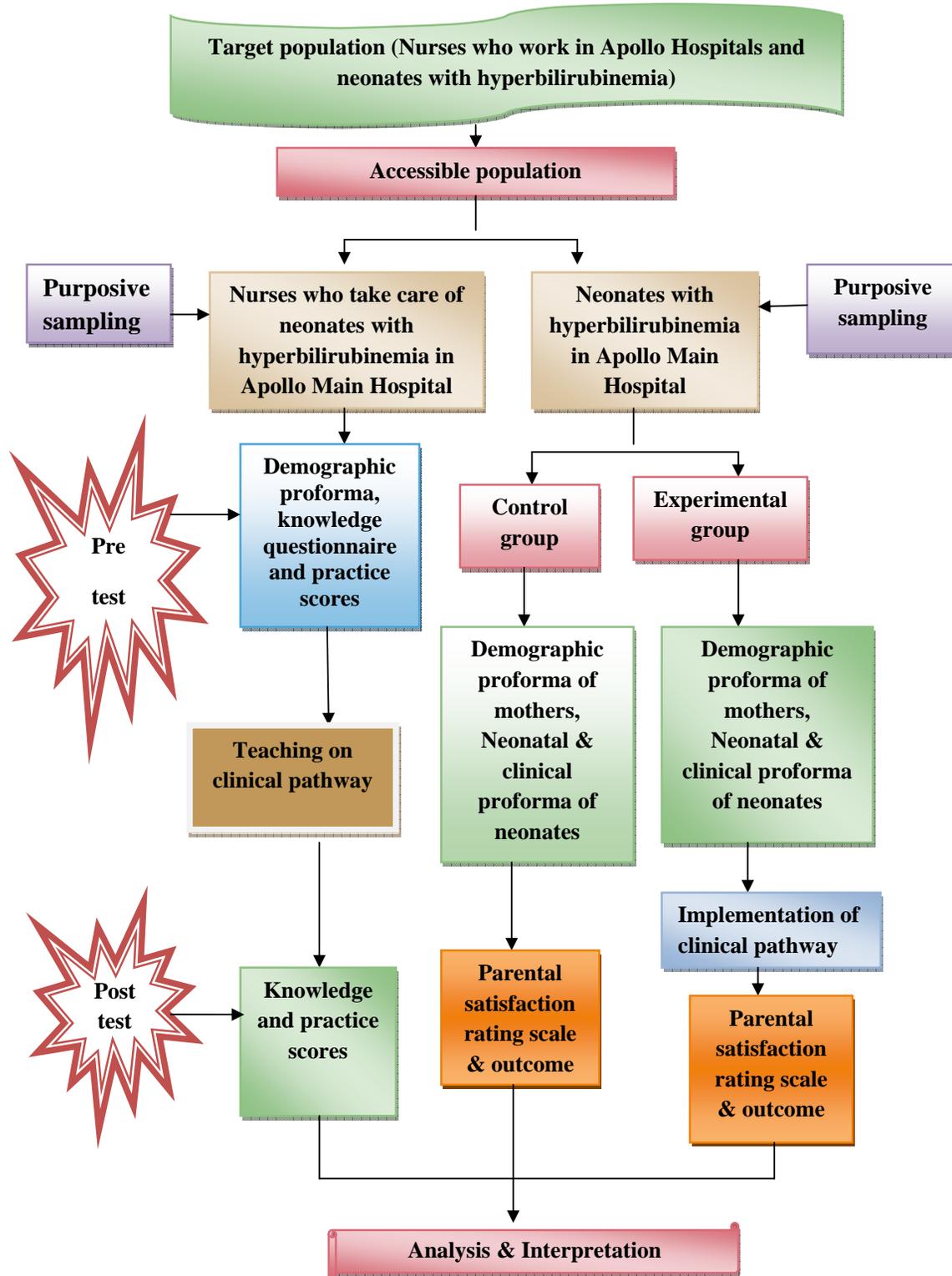


Fig.2 Schematic Representation of Research Design

## **Variables**

### **Independent variable**

The variable that is believed to cause or influence the dependent variable is the independent variable (Polit and Beck, 2008). The independent variable for this study was the clinical pathway for neonatal hyperbilirubinemia.

### **Dependent variable**

The variable hypothesized to depend on or be caused by another variable is the dependent variable (Polit and Beck, 2008). The dependent variable for this study was knowledge and practice of nurses and neonatal outcome.

### **Attribute variable**

Variables that describe the study sample characteristics are termed as attribute variables (Polit and Beck, 2008). In this study, the attribute variables were demographic variable proforma for nurses, neonatal variable proforma, clinical variable proforma and demographic variable proforma for mothers of the neonates with hyperbilirubinemia.

## **Research Setting**

Research setting is the physical location and conditions in which data collection takes place in a study (Polit and Beck, 2008).

The study was conducted at Apollo Main Hospital, Chennai. It is a Joint Commission International (JCI) accredited hospital and is a 1000 bedded multi specialty tertiary care centre having over 50 medical and surgical departments with specific areas of specialty like Cardiology, Nephrology, Urology, Orthopaedics, Gynaecology,

Pediatrics, and Cardio-Thoracic. It also has a well equipped Neonatal Intensive Care Unit with 10 beds. It takes care of babies for observation after delivery, neonates with hyperbilirubinemia and other babies with minor disorders.

### **Population**

Population is the entire set of individuals or objects having some common characteristics (Polit and Beck, 2008).

#### **Target population**

The target population is the aggregate of cases in which a researcher is interested and would like to generalize the study results (Polit and Beck, 2008). In this study, the target population comprises of nurses working in NICU and neonates with hyperbilirubinemia.

#### **Accessible population**

The accessible population is the aggregate of cases that conforms to designated criteria and that are accessible as subjects for a study (Polit and Beck, 2008). In this study, the accessible population were the all nurses caring for neonates with hyperbilirubinemia and neonates with hyperbilirubinemia admitted in Apollo Main Hospital, Chennai during the data collection period.

### **Sample**

According to Polit and Beck (2008), a sample is a subset of a population selected to participate in a study. Sample size for the present study was 20 nurses and 60 neonates

with hyperbilirubinemia, 30 in control and 30 in experimental group who satisfied the inclusion criteria.

### **Sampling Technique**

It was stated by Polit and Beck (2008) that sampling is a process of selecting a portion of the population to represent the entire population. The nurses and the neonates with hyperbilirubinemia for the present study were selected by purposive sampling technique.

### **Sampling Criteria**

#### **Inclusion criteria**

- Neonates who were diagnosed with hyperbilirubinemia above 12 mg/dl.
- Neonates of 1-7 days of age.
- Neonates with a gestational age of 35 or more weeks.
- Neonates who were admitted in Apollo Main Hospital, Chennai.
- Nurses who take care of neonates with hyperbilirubinemia.
- Nurses who were working in Apollo Main Hospital, Chennai.
- Nurses who were willing to participate in the study.

#### **Exclusion criteria**

- Nurses who were not willing to participate in the study.
- Neonates who were critically ill.
- Neonates diagnosed with hyperbilirubinemia within 24 hrs.

## **Selection and Development of Study Instruments**

The study aimed at evaluating the effectiveness of clinical pathway for neonatal hyperbilirubinemia. Data collection instruments were developed through extensive review of literature, consultation with experts and opinion from faculty members. The instruments used were demographic variable proforma for nurses, neonatal variable proforma, clinical variable proforma, demographic variable proforma for mothers, structured knowledge questionnaire for nurses, practice check list, parental satisfaction rating scale and neonatal outcome check list.

### **Demographic variable proforma of nurses caring for neonates with hyperbilirubinemia**

Demographic variable proforma for nurses consisted of information regarding age, professional qualification, professional experience, years of experience in NICU and institution trained.

### **Neonatal variable proforma of neonates with hyperbilirubinemia**

Neonatal variable proforma consisted of information regarding age of neonate on admission, gender, gestational age in weeks at birth, birth order and place of birth.

### **Clinical variable proforma of neonates with hyperbilirubinemia**

Clinical variable proforma consisted of information regarding nature of birth, baby condition at birth, blood group of the baby, bilirubin level of the neonate on admission and birth injuries.

### **Demographic variable proforma for mothers of neonates with hyperbilirubinemia**

Demographic variable proforma for mothers consisted of information regarding age, religion, educational status, occupation, type of marriage, parity, blood group, Rh group, previous history of child with hyperbilirubinemia and monthly family income.

### **Clinical pathway for neonates with hyperbilirubinemia**

The researcher developed the clinical pathway for neonates with hyperbilirubinemia by extensive review of literature, participatory observation of nursing care of neonates with hyperbilirubinemia from admission to discharge and suggestions from the health care team members. After formulating, the pathway was validated by the experts. Henderson's 14 basic needs was the basis for the pathway which includes:

1. Breathe normally.
2. Eat and drink adequately.
3. Eliminate body wastes.
4. Move and maintain desirable positions.
5. Sleep and rest.
6. Select suitable clothing.
7. Maintain body temperature.
8. Maintain bodily cleanliness and grooming.
9. Avoid dangers in the environment.
10. Communicate with others to express emotions, needs, fears or opinions.
11. Worship according to one's faith.
12. Work in a way that provides a sense of accomplishment.

13. Play or participate in various forms of recreation.

14. Learn, discover or satisfy the curiosity that leads to normal development and health.

The pathway contained eligibility criteria and activities were tabulated on 14 aspects for 3 days. The aspects were assessment, respiration, nutrition, elimination, thermoregulation, positioning, hygiene, sleep and rest, safety, communication, psychosocial support, spiritual needs, education and discharge planning. The prescribed length of stay was 3 days. The clinical pathway will be attached with the child's file and the nurse caring for the child should act according to it and document it. If any variances are observed, it should be noted in the pathway.

#### **Structured knowledge questionnaire for nurses regarding clinical pathway for neonatal hyperbilirubinemia**

The structured knowledge questionnaire was formed very carefully considering language and sequence of items. The questions were formulated and options were given below each question. It consisted of 30 multiple choice questions and it had 4 options. Each correct answer was given a score of 1 and every wrong answer 0. The total score of structured questionnaire was 30. The knowledge scores were classified into 3 levels.

<b>Scores</b>	<b>Percentage</b>	<b>Interpretation</b>
$\leq 15$	$\leq 50$	Inadequate knowledge
16-22	51-75	Moderately adequate knowledge
$\geq 23$	$\geq 76$	Adequate knowledge

**Practice check list for nurses regarding clinical pathway for neonatal hyperbilirubinemia**

The three days of care in the practice check list had items on assessment, diagnostic tests, respiration, phototherapy, nutrition, elimination, thermoregulation, positioning, hygiene, sleep and rest, safety, communication, psychosocial support, spiritual needs, education and discharge planning. The scores ranged from non compliant to compliant depending on the care received by the neonates with hyperbilirubinemia.

Scores			Percentage	Interpretation
Day 1	Day 2	Day 3		
0-55	0-43	0-30	< 50	Non compliant
56-83	44-68	31-45	51-75	Partially compliant
84-110	69-86	46-60	76-100	Compliant

**Rating scale on parental satisfaction of nursing care for neonates with hyperbilirubinemia**

It included items on admission, nutrition, thermoregulation, sleep, positioning, hygiene, safety, communication, spiritual needs, education and discharge instructions given to parents. The scores ranged from low to highly satisfaction.

Scores	Percentage	Interpretation
≤10	≤ 50	Low satisfaction
11-15	51-75	Moderate satisfaction
≥16-20	≥76	High satisfaction

## **Outcome checklist to assess the effectiveness of clinical pathway for neonatal hyperbilirubinemia**

It included items on respiration, nutrition, elimination, rest, positioning, regulatory functions, personal hygiene, communication, activity, health teaching for parents and length of stay.

<b>Scores</b>	<b>Percentage</b>	<b>Interpretation</b>
0-11	$\leq 50\%$	Negative outcome
12-16	51-75%	Moderately positive outcome
>16	$\geq 76\%$	Positive outcome

### **Psychometric Properties**

#### **Validity of Study Instruments**

Content validity is the degree to which the item in an instrument adequately represents the universe of the content. (Polit and Beck, 2008)

The constructed tool was given to six experts in the field of nursing and to one neonatologist. The validators had suggested some modifications in the clinical pathway as well as in the knowledge questionnaire. Modifications and suggestions of the experts were incorporated in the final preparation of the tool.

#### **Reliability of the Instrument**

Reliability refers to the accuracy and consistency of the measuring tool. The reliability of the structured knowledge questionnaire was elicited by using test- retest method and was found to be 0.97. The reliability of the practice checklist was found by

inter rater technique and was 0.88. The reliability of parental satisfaction and neonatal outcome was elicited by split half method and was found to be 0.94 respectively.

### **Pilot Study**

Polit and Beck (2008) said that pilot study is a miniature version of actual study, in which the instruments is administered to the subjects drawn from the same population. It is a small scale version or trial done in preparation for a major study. The purpose was to find out the feasibility and practicability of the study design. Pilot study was conducted in Apollo Children's Hospital, Chennai with 12 neonates with hyperbilirubinemia. Thus the whole pilot study revealed that the present study was feasible to conduct.

### **Protection of Human Rights**

The researcher obtained permission to conduct the study from the Principal and Head of Department of Paediatric Nursing Department of Apollo College of Nursing. The researcher then, presented the proposal to the ethical committee of Apollo Hospitals and got ethical clearance to conduct the study. In the clinical area, approval for the study was obtained from the Medical and Nursing Directors of Apollo Main Hospital, Chennai to conduct the study. Informed Consent was obtained from the parents of the neonates before collecting the data. Confidentiality of the participants were maintained throughout the study.

### **Data Collection Procedure**

Data collection is the precise, systematic gathering of information relevant to the research purpose. The investigator collected the data from Apollo Main Hospital after obtaining proper administrative permission from concerned authorities. The study

participants were selected using purposive sampling. The observation time schedule was from 7 am – 12noon and 12.30 to 5.30pm respectively from Monday to Saturday. The data collection period was from June 17<sup>th</sup> to July 17<sup>th</sup> 2011.

The investigator selected 20 nurses from NICU using purposive sampling and obtained verbal consent. During the shift changing time (2-3 pm) the nurses were gathered in the nurses station and the investigator collected the baseline demographic data and assessed the pre test knowledge level using structured knowledge questionnaire. Then the investigator obtained consent from the control group of mothers of the neonates with hyperbilirubinemia and collected their demographic data. The demographic and clinical variables of the neonates with hyperbilirubinemia were also taken with the help of hospital records. The practice of the nurses was then observed by participant observation method and compliance on care of control group of neonates with hyperbilirubinemia were assessed for 3 days by practice checklist. The outcome of 30 neonates and the parental satisfaction on nursing care at the time of discharge in control group of neonates were assessed. The same group of nurses were then educated about the clinical pathway for neonatal hyperbilirubinemia with power point presentation and the doubts of nurses were cleared.

After two weeks the investigator assessed the post test knowledge level of nurses. The nurses were then instructed to use the clinical pathway from the time of admission of the experimental group of neonates with hyperbilirubinemia. The pathway was kept on the child's file and used by the nurses. After verbal consent, the investigator obtained baseline demographic and clinical variables of the experimental group of neonates with hyperbilirubinemia during admission. The investigator observed the practice of nurses for

3 days using practice checklist. The outcome of 30 experimental group of neonates were assessed using the clinical outcome checklist and rating scale of parental satisfaction on nursing care were also assessed at the time of discharge.

### **Problems faced during Data Collection**

- Lack of time for nurses to fill the questionnaire.
- Some nurses were not interested to fill the questionnaire.

### **Plan for Data Analysis**

Data analysis is the systematic organization and synthesis of research data and testing of research hypothesis by using the obtained data (Polit and Beck, 2008). Descriptive statistics like frequency distribution, percentage, mean and standard deviation and inferential statistics like paired t-test and chi square were used to analyze the data.

### **Summary**

This chapter has dealt with research approach, design, setting, population and sample, sampling technique, inclusion criteria, exclusion criteria, selection and development of study instruments, content validity, reliability, pilot study, data collection procedure and plan for data analysis.

## **CHAPTER IV**

### **ANALYSIS AND INTERPRETATION**

This chapter includes both descriptive and inferential statistics. Statistics is a field of study concerned with techniques or methods of collection of data, classification, summarizing, interpretation, drawing inferences, testing of hypothesis, making recommendation (Mahajan, 2004).

The data was collected from 60 neonates with neonatal hyperbilirubinemia and 20 nurses working in Apollo Main Hospital, Chennai to determine the effectiveness of clinical pathway on neonatal hyperbilirubinemia. The data were analyzed according to the objectives and hypothesis of the study. Analysis of study was completed after all the data was transferred to the master coding sheet. The investigator used descriptive and inferential statistics for analysis.

#### **Organization of the Findings**

The findings of the study were organized and presented under the following headings

- Frequency and percentage distribution of demographic variables of nurses.
- Frequency and percentage distribution of neonatal variables in control and experimental group of neonates.
- Frequency and percentage distribution of clinical variables in control and experimental group of neonates.
- Frequency and percentage distribution of demographic variables in control and experimental group of mothers of the neonates.

- Frequency and percentage distribution of pre and post test level of knowledge of nurses regarding clinical pathway for neonatal hyperbilirubinemia.
- Frequency and percentage distribution of practice of nurses in control and experimental group of neonates regarding clinical pathway for neonatal hyperbilirubinemia.
- Frequency and percentage distribution of neonatal outcome in control and experimental group of neonates.
- Frequency and percentage distribution of parental satisfaction on nursing care in control and experimental group of neonates.
- Comparison of mean and standard deviation of pre and post test knowledge of nurses regarding clinical pathway for neonatal hyperbilirubinemia.
- Comparison of mean and standard deviation of pre and post test knowledge of nurses in various dimensions regarding clinical pathway for neonatal hyperbilirubinemia.
- Comparison of mean and standard deviation of practice of nurses for control and experimental group of neonates.
- Comparison of mean and standard deviation of parental satisfaction on nursing care in control and experimental group of neonates.
- Comparison of mean and standard deviation of parental satisfaction on nursing care in various dimensions in control and experimental group of neonates.
- Comparison of mean and standard deviation of neonatal outcome in control and experimental group of neonates.
- Association between selected demographic variables and pre and post test knowledge of nurses.

- Association between selected demographic variables of neonates and parental satisfaction on nursing care in control and experimental group of neonates.
- Association between selected demographic variables of neonates and outcome of control and experimental group of neonates.
- Association between selected clinical variables of neonates and outcome of control and experimental group of neonates.

**Table. 1****Frequency and Percentage Distribution of Demographic Variables of Nurses****N=20**

<b>Sample Characteristics</b>	<b>n</b>	<b>p</b>
<b>Age in years</b>		
21-24	14	70
25-29	3	15
30 years and above	3	15
<b>Professional qualification</b>		
GNM	12	60
Post Basic Bsc	1	5
BSc (N)	7	35
<b>Professional Experience</b>		
Less than 2 years	12	60
2-5 years	7	35
More than 5 years	1	5
<b>Years of experience in NICU</b>		
Less than 2 years	14	70
2-5 years	6	30
More than 5 years	-	-
<b>Institution trained</b>		
Private	18	90
Government	2	10
Mission	-	-
<b>Inservice education attended</b>		
Yes	-	-
No	20	100

The data in table 1 reveals that majority of the nurses were in the age group of 21-24 years (70%), GNM qualified (60%) and also had less than 2 years of experience in NICU (60%). Majority were trained in private institutions (90%) and none of them had attended any inservice education on clinical pathway for hyperbilirubinemia.

**Table. 2**

**Frequency and Percentage Distribution of Neonatal Variables in Control and Experimental group of Neonates**

Neonatal variables	Control group (n=30)		Experimental group (n=30)	
	n	p	n	p
<b>Birth order</b>				
First	21	70	25	83.3
Second	8	26.7	4	13.3
Others	1	3.3	1	3.3
<b>Place of birth</b>				
Hospital	30	100	30	100
PHC	-	-	-	-
Home	-	-	-	-

The data in table 2 reveals that majority of neonates in control and experimental group were in the first birth order respectively (70%, 83.3%) and all the neonates in both control and experimental group were born in hospitals.

Fig.3 depicts that majority of the neonates in both control and experimental group were of 1-3 days of age on admission (73.3%, 66.7) respectively.

Fig. 4 shows that most of the neonates in both control and experimental group were males (70%, 53.3%) respectively.

Fig. 5 shows that majority of the neonates in both control and experimental group were in the gestational age of 38-40 weeks (76.7%, 86.7%) respectively.



**Fig.3 Percentage Distribution of Age of Neonates on Admission with Hyperbilirubinemia in Control and Experimental group of Neonates**

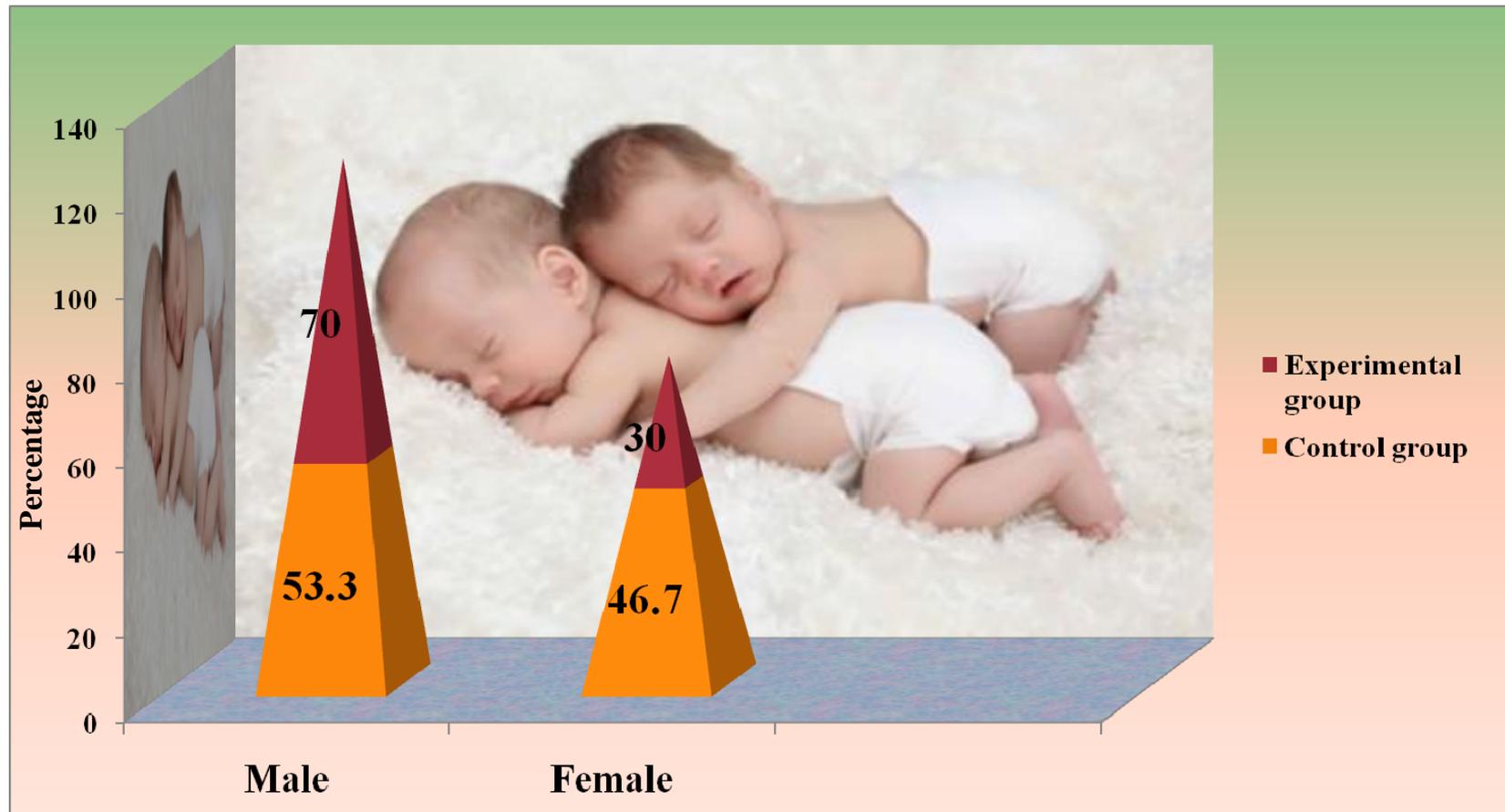
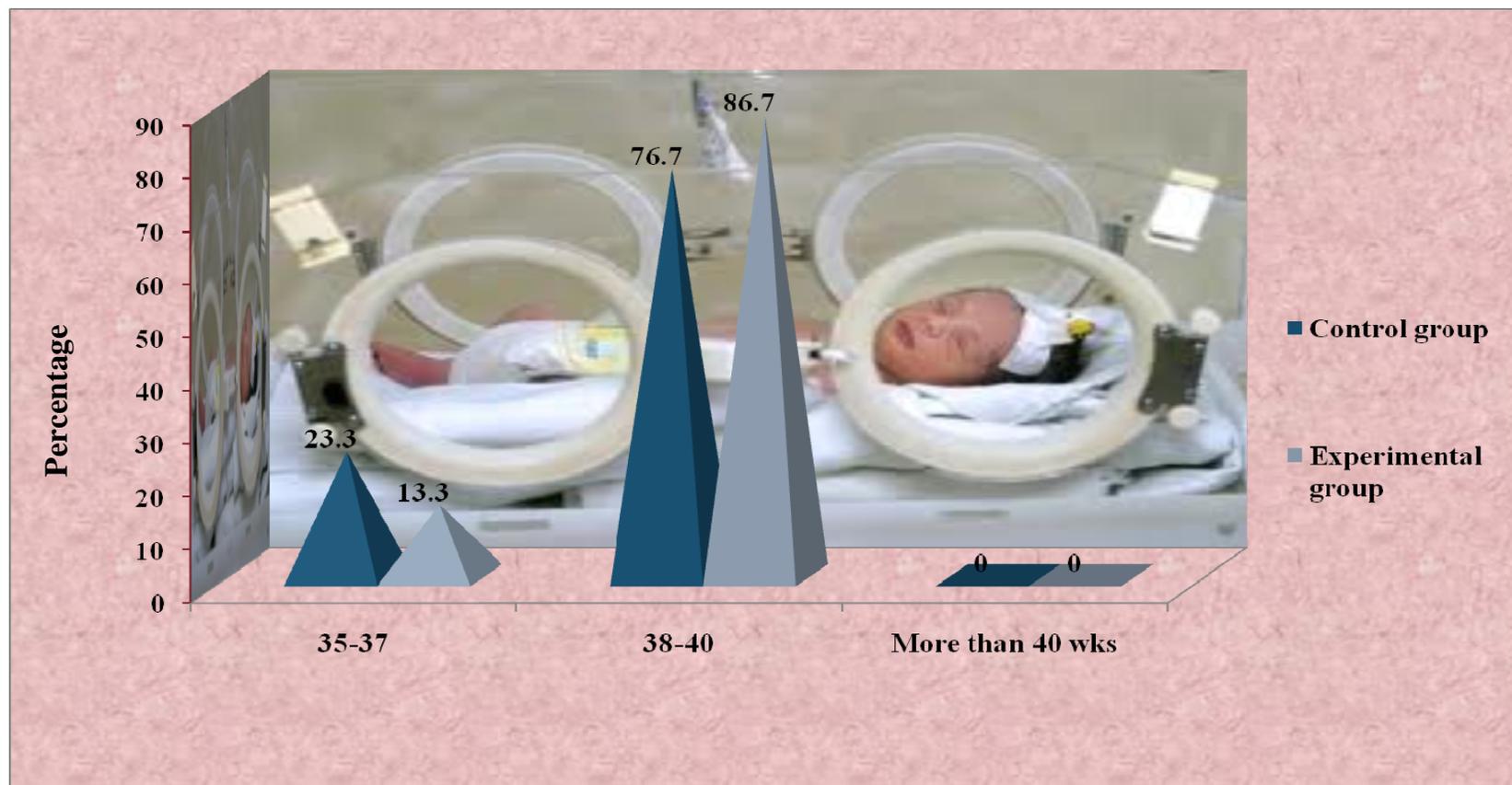


Fig.4 Percentage Distribution of Gender of Neonates with Hyperbilirubinemia in Control and Experimental group of Neonates



**Fig.5 Percentage Distribution of Gestational Age of Control and Experimental Group of Neonates with Hyperbilirubinemia**

**Table.3**

**Frequency and Percentage Distribution of Clinical Variables of Control and Experimental group of Neonates.**

Clinical variables	Control group (n=30)		Experimental group (n=30)	
	n	p	n	p
<b>Nature of birth</b>				
Normal vaginal delivery	12	40	10	33.3
Caesarean section	14	46.7	19	63.3
Assisted vaginal delivery	4	13.3	1	3.3
<b>Baby condition at birth</b>				
Cried	28	93.3	29	96.7
Not cried	2	6.7	1	3.3
<b>Blood group of baby</b>				
A	7	23.3	6	20
B	9	30	13	43.3
AB	1	3.3	1	3.3
O	13	43.3	10	33.3
<b>Rh group of baby</b>				
Positive	28	93.3	28	93.3
Negative	2	6.7	2	66.7
<b>Bilirubin level on admission</b>				
Less than 12mg/dl	1	3.3	1	3.3
12-15mg/dl	21	70	20	66.7
More than 15 mg/dl	8	26.7	9	30
<b>Birth injuries</b>				
Cephal haematoma	3	10	1	3.3
Caput succedaneum	-	-	-	-
Skull fracture	-	-	-	-
Nerve injury	-	-	-	-
None	27	90	29	96.7

The data in table 3 reveals that most of the neonates in control and experimental group were born by caesarean section delivery (46.7%, 63.3%) and had cried at birth (93.3%, 96.7%) respectively.

Regarding blood group, most of the neonates in control group were O positive (43.3%) and in experimental group were B positive (43.3%). Majority of the neonates in control and experimental group had bilirubin level of 12-15 mg/dl (70%, 66.7%) and also didn't have any birth injuries (90%, 96.7%) respectively.

**Table. 4**

**Frequency and Percentage Distribution of Demographic variables of Mothers of Control and Experimental group of Neonates**

Demographic Variables	Control group (n=30)		Experimental group (n=30)	
	n	p	n	p
<b>Age in years</b>				
21-25	7	23.3	21	70
26-30	14	46.7	7	23.3
31-35	9	30	2	6.7
<b>Type of marriage</b>				
Consanguinous	-	-	-	-
Non Consanguinous	30	100	30	100
<b>Parity</b>				
Primi	15	50	24	80
Multi	15	50	6	20
<b>Blood group of mother</b>				
A	7	23.3	6	20
B	4	13.3	9	30
AB	1	3.3	2	6.7
O	18	60	13	43.3
<b>Rh group of mother</b>				
Positive	29	96.7	30	100
Negative	1	3.3	-	-
<b>Previous child with hyperbilirubinemia</b>				
Yes	4	13.3	2	6.7
No	26	86.7	28	93.3

The data in table 4 reveals that most of the mothers of control group of neonates were in the age group of 21-25, 26-30 and 31-35 years of age respectively (23.3%, 46.7%, 30%). Whereas, majority of mothers of experimental group of neonates were in the age group of 21-25 years of age (70%). All the mothers of control and experimental group had a non consanguinous marriage.

Fifty percent of the mothers in control group were primigravida and multigravida and majority in experimental group were primigravida (80%). Regarding blood group and Rh status, most of the neonates in both control and experimental group were O positive (60%, 43.3%) respectively. Majority of the mothers in control and experimental group had no history of previous child with hyperbilirubinemia (86.7%, 93.3%).

**Table.5**

**Frequency and Percentage Distribution of Pre and Post test Knowledge of Nurses regarding Clinical Pathway for Neonatal Hyperbilirubinemia.**

**N=20**

<b>Variable</b>	<b>Pre test</b>		<b>Post test</b>	
	<b>n</b>	<b>p</b>	<b>n</b>	<b>p</b>
<b>Knowledge</b>				
Adequate	-	-	20	100
Moderately adequate	10	50	-	-
Inadequate	10	50	-	-

The data in table 5 reveals that 50% of nurses had moderate and 50% had inadequate knowledge in pre test. But almost all the nurses had adequate knowledge in post test regarding clinical pathway for neonatal hyperbilirubinemia.

**Table.6**

**Frequency and Percentage Distribution of Practice of Nurses in Control and Experimental group of neonates regarding Clinical Pathway for Neonatal Hyperbilirubinemia.**

Practice scores	Control group (n=30)		Experimental group (n=30)	
	n	p	n	p
<b>Day 1</b>				
Compliant	-	-	30	100
Partially compliant	30	100	-	-
Non compliant	-	-	-	-
<b>Day 2</b>				
Compliant	-	-	30	100
Partially compliant	17	56.7	-	-
Non compliant	13	43.3	-	-
<b>Day 3</b>				
Compliant	1	3.3	30	100
Partially compliant	23	76.7	-	-
Non compliant	6	20	-	-

The data in table 6 reveals that all the nurses had moderate compliant in day 1. In day 2, most of them had moderate compliant scores (56.7%) and in day 3, majority had moderate compliant scores (76.7%). Whereas in experimental group, all the nurses had adequate compliance in day 1, 2 and 3.

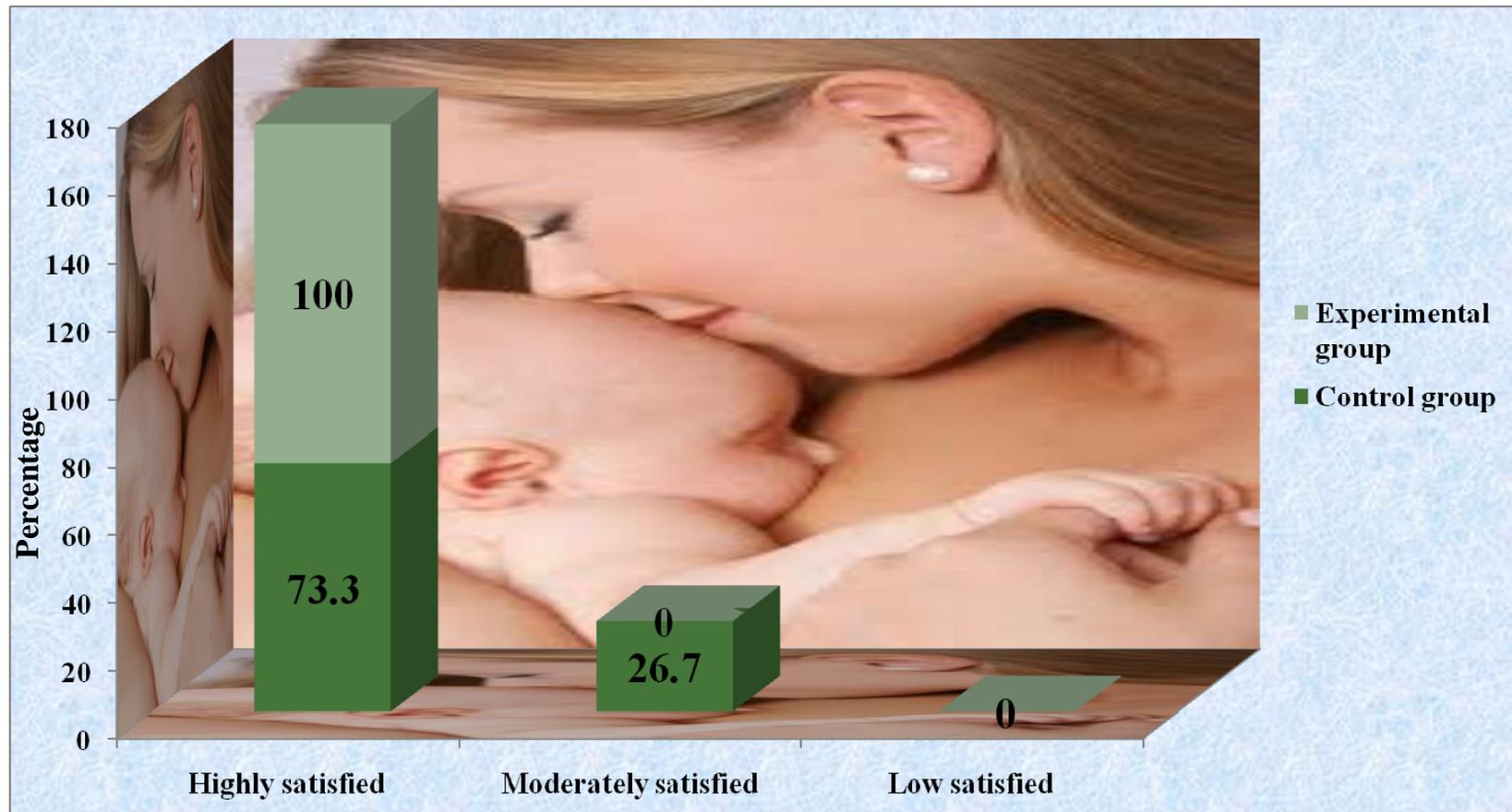
**Table.7**

**Frequency and Percentage Distribution of Neonatal Outcome in Control and Experimental group of Neonates with Hyperbilirubinemia.**

Outcome	Control group (n=30)		Experimental group (n=30)	
	n	p	n	p
Negative outcome	-	-	-	-
Moderately positive outcome	12	40	-	-
Positive outcome	18	60	30	100

The data in table 7 reveals that most of the neonates in control group had positive outcome (60%) and almost all the neonates in experimental group had positive outcome.

Fig. 6 depicts that majority of the parents of the neonates with hyperbilirubinemia in control group were highly satisfied with the nursing care provided (73.3%) and all the parents of the neonates in experimental group were highly satisfied.



**Fig.6 Percentage Distribution of Parental Satisfaction on Nursing Care in Control and Experimental group of Neonates with Hyperbilirubinemia**

**Table.8**

**Comparison of Mean and Standard Deviation of Pre and Post test Knowledge of Nurses regarding Clinical Pathway for Neonatal Hyperbilirubinemia.**

**N=20**

<b>Level of knowledge</b>	<b>Mean</b>	<b>SD</b>	<b>t</b>
Pre test	14.5	3.17	
Post test	25	1.41	17.59***

\*\*\* p< 0.001

The data in table 8 depicts that the mean and standard deviation of post test knowledge was higher (M=25, SD=1.41) than the pre test scores (M=14.5, SD= 3.17). The calculated t value (17.59) is greater than the table value (3.88) at p<0.001 and thus the null hypotheses Ho<sub>1</sub> was rejected.

**Table.9**

**Comparison of Mean and Standard Deviation of Pre and Post test Knowledge of Nurses in various dimensions regarding Clinical Pathway for Neonatal Hyperbilirubinemia.**

Components	Pre test		Post test		t
	Mean	SD	Mean	SD	
Clinical Pathway	1.3	0.78	4.3	0.64	17.6***
Neonatal Hyperbilirubinemia and phototherapy	2.6	0.92	3.4	1.15	5.52***
Nutrition and Elimination	2.4	0.73	3.8	0.81	4.72***
Respiration, Temperature and Hygiene	2.1	1.09	3.7	1.05	0.16
Positioning and Safety	3.3	1.34	4.3	0.84	4.74***
Communication and Education	2.9	1.09	4.3	0.62	4.7***

\*\*\* p< 0.001

It could be inferred from table 9 that the mean and standard deviation of post test knowledge was higher than the pre test on various dimensions of clinical pathway. The difference was found to be statistically significant at p< 0.001.

**Table.10**

**Comparison of Mean and Standard Deviation of Practice of Nurses for the Control and Experimental group of Neonates**

Practice scores	Control group (n=30)		Experimental group (n=30)		t
	Mean	SD	Mean	SD	
Day 1	79.5	3.99	102.2	2.42	26.71***
Day 2	61.5	5.46	83.3	2.41	20***
Day 3	40.9	4.87	56.7	2.05	16.45***
Mean	60.7	2.56	80.7	1.52	36.4***

\*\*\* p< 0.001

It could be inferred from table 10 that the practice of nurses in control group of neonates were lower (Day 1: M=79.5, SD=3.99; Day 2: M=61.5, SD=5.46; Day 3: M=40.9, SD=4.87) when compared to the practice scores in experimental group of neonates. The calculated t value of all the three days were greater than the table value (3.46) at p< 0.001 and thus is found to be significant.

The overall mean score also showed that the practice scores in control group were lower (M=60.7, SD=2.56) than the practice scores of experimental group of neonates (M=80.7, SD=1.52). The calculated t value is also greater than the table value (3.46) at p<0.001 and thus the null hypothesis  $H_{01}$  was rejected.

**Table. 11**

**Comparison of Mean and Standard Deviation of Parental Satisfaction on Nursing Care in Control and Experimental group of Neonates.**

Level of satisfaction	Mean	SD	t
Control group (n=30)	64.8	7.16	4.19***
Experimental group (n=30)	72.3	6.71	

\*\*\* p< 0.001

The data in table 11 shows that the parental satisfaction on nursing care in control group of neonates is lower (M=64.8, SD=7.16) when compared to the parental satisfaction in experimental group of neonates (M=72.3, SD=6.71). The calculated t value is also greater than the table value (3.46) at p< 0.001 and thus is found to be significant.

**Table. 12**

**Comparison of Mean and Standard Deviation of Parental Satisfaction on various dimensions of Nursing Care in Control and Experimental group of Neonates.**

Components	Control group		Experimental group		t
	(n=30)		(n=30)		
	Mean	SD	Mean	SD	
Admission and overall care	15.8	2.05	16.6	2.46	2.38*
Nutrition, Elimination, Sleep and Positioning	16.2	2.06	17.5	1.98	2.5*
Thermoregulation, Hygiene, Safety, Communication and Spiritual needs	16.4	1.67	17.2	2.69	2.56
Education and Discharge instructions	16.4	2.33	17.6	2.51	2.35*

\*p< 0.05

It could be inferred from table 12 that the mean and standard deviation of parental satisfaction in experimental group was higher than the control group on various dimensions of nursing care provided. The difference was found to be statistically significant at p< 0.05.

**Table. 13**

**Comparison of Mean and Standard Deviation of Neonatal Outcome in Control and Experimental group of Neonates.**

Outcome	Mean	SD	T
Control group (n=30)	19.3	2.07	9.9***
Experimental group (n=30)	21.2	0.77	

\*\*\*p< 0.001

The data in table 13 shows that the outcome of control group of neonates is lower (M=19.3, SD=2.07) when compared to the outcome of experimental group of neonates (M=21.2, SD=0.77). The calculated t value is also greater than the table value (3.46) at p< 0.001 and thus the null hypothesis Ho<sub>2</sub> was rejected.

**Table. 14****Association between Selected Demographic Variables and Pre and Post test Knowledge of Nurses****N=20**

Variables	Pre test			Post test		
	Inadequate n	Moderately adequate n	$\chi^2$ (df=1)	Moderately Adequate n	Adequate n	$\chi^2$ (df=1)
<b>Age in years</b>						
21-24	7	7	0.24	3	11	0.21
25 and above	3	3		1	5	
<b>Professional qualification</b>						
GNM	6	6	0.2	3	9	0.01
Post Basic Bsc and Bsc (N)	4	4		1	7	
<b>Professional Experience</b>						
Less than 2 years	7	5	0.2	2	10	0.01
2 years and above	3	5		2	6	
<b>Years of experience in NICU</b>						
Less than 2 years	8	6	0.24	3	11	0.13
2 years and above	2	4		1	5	
<b>Institution trained</b>						
Private	8	10	0.56	3	15	0.04
Government	2	0		1	1	

p&lt; 0.05

It could be inferred from table 14 that there is no association between age of nurses, professional qualification, professional experience and years of experience in NICU and the pre and post test knowledge scores of nurses regarding clinical pathway for neonatal hyperbilirubinemia; hence the null hypotheses  $H_{03}$  was retained.

**Table. 15**

**Association between Selected Demographic Variables of Neonates and Parental Satisfaction of Control group and Experimental group of Mothers of the Neonates with Hyperbilirubinemia**

Demographic variables	Level of satisfaction of parents					
	Control group (n=30)			Experimental group (n=30)		
	Moderately Satisfied	Highly satisfied	$\chi^2$ (df=1)	Moderately satisfied	Highly satisfied	$\chi^2$ (df=1)
	n	n		n	n	
<b>Age of neonate on admission</b>						
1-3 days	8	14	0.029	-	20	-
More than 3 days	2	6		-	10	
<b>Gender</b>						
Male	6	11	0.031	-	21	-
Female	5	8		-	9	
<b>Gestational age in weeks at birth</b>						
35-37	0	7	3.5	-	5	-
38-40	11	12		-	25	
<b>Birth order</b>						
First	9	13	0.12	-	22	-
Second and others	2	6		-	8	

p< 0.05

It could be inferred from table 15 that there is no association between age of neonate on admission, gender, gestational age in weeks at birth and birth order to the parental satisfaction on nursing care provided.

**Table. 16**

**Association between Selected Demographic Variables of Neonates and Outcome of Control and Experimental group of Neonates with Hyperbilirubinemia**

Demographic variables	Control group (n=30)			Experimental group(n=30)		
	Moderately Positive n	Positive n	$\chi^2$ (df=1)	Moderately Positive n	Positive n	$\chi^2$ (df=1)
<b>Age of neonate on admission</b>						
1-3 days	10	12	1.45	-	20	-
More than 3 days	1	7		-	10	
<b>Gender</b>						
Male	6	10	0.02	-	21	-
Female	4	10		-	9	
<b>Gestational age in weeks at birth</b>						
35-37	1	6	0.54	-	4	-
38-40	9	14		-	26	
<b>Birth order</b>						
First	6	15	0.18	-	25	-
Second and others	4	5		-	5	

p< 0.05

From the table 16, it can be inferred that there is no significant association between age of neonates on admission, gender, gestational age in weeks and birth order to the outcome of control and experimental group of neonates; hence the null hypotheses  $H_{04}$  was retained.

**Table.17**

**Association between Selected Clinical Variables of Neonates and Outcome of Control and Experimental group of Neonates.**

Clinical variables	Control group (n=30)			Experimental group (n=30)		
	Moderately	Positive	$\chi^2$ (df=1)	Moderately	Positive	$\chi^2$ (df=1)
	positive			positive		
	n	n		n	n	
<b>Nature of birth</b>						
Normal vaginal delivery	4	8	0.012	-	10	-
Caesarean and assisted vaginal delivery	7	11		-	20	
<b>Baby condition at birth</b>						
Cried	10	18	0.093	-	29	-
Not cried	1	1		-	1	
<b>Blood group of the baby</b>						
A and B	5	11	0.058	-	19	-
AB and O	4	10		-	11	
<b>Bilirubin level of neonate on admission</b>						
≤ 15 mg/dl	9	13	1.08	-	21	-
> 15 mg/dl	1	7		-	9	
<b>Birth injuries</b>						
Cephal haematoma	0	3	0.419	-	1	-
None	10	17		-	29	

p< 0.05

From the table 17, it can be inferred that there is no significant association between nature of birth, baby condition at birth, blood g group of the baby, bilirubin level on admission and birth injuries to the outcome of neonates in control and experimental group of neonates; hence the null hypotheses  $H_{05}$  was retained.

## **Summary**

This chapter has dealt with the analysis and interpretation of the data obtained by the researcher. The analysis showed that the post test knowledge of nurses were improved. The practice of nurses, neonatal outcome and parental satisfaction on nursing care were higher in experimental group of neonates after the implementation of clinical pathway for neonatal hyperbilirubinemia.

## **CHAPTER V**

### **DISCUSSION**

A Quasi Experimental Study to Assess the Effectiveness of Clinical Pathway for Neonatal Hyperbilirubinemia upon the Knowledge and Practice of Nurses and Neonatal Outcome at Apollo Main Hospital, Chennai.

**The Objectives of the Study were:**

1. To assess the pre and post test level of knowledge and practice of nurses regarding clinical pathway for neonates with hyperbilirubinemia.
2. To assess the neonatal outcome in control and experimental group of neonates with hyperbilirubinemia.
3. To evaluate the effectiveness of clinical pathway by comparing the pre and post test level of knowledge and practice of nurses regarding clinical pathway for neonates with hyperbilirubinemia.
4. To compare the neonatal outcome in control and experimental group of neonates with hyperbilirubinemia.
5. To compare the level of parental satisfaction on nursing care in control and experimental group of neonates with hyperbilirubinemia.
6. To determine the association between the selected demographic variables of nurses and their pre and post test level of knowledge regarding clinical pathway for neonates with hyperbilirubinemia.

7. To determine the association between selected demographic variables of control and experimental group of neonates with hyperbilirubinemia and their outcome.
8. To determine the association between selected clinical variables of control and experimental group of neonates with hyperbilirubinemia and their outcome.

The study was carried upon 60 neonates and 20 nurses from Apollo Main Hospital, Chennai. The nurse's knowledge on clinical pathway was assessed in pre test. After teaching the pathway, post test was conducted. Practice of nurses by means of compliant check list, neonatal outcome by checklist and parental satisfaction on nursing care through a rating scale were assessed and the effectiveness of clinical pathway was found through comparison of control and experimental group of neonates with hyperbilirubinemia.

#### **Demographic Variables of Nurses**

The demographic data of the nurses reveals that majority of the nurses were in the age group of 21-24 years (70%), GNM qualified (60%) and also had less than 2 years of professional experience in NICU (60%). Majority were trained in private institutions (90%) and none of them had attended any inservice education on clinical pathway for hyperbilirubinemia.

The researcher concluded that young nurses are interested in working in speciality areas like NICU immediately after completion of their nursing course. It also indicates that turnover of nurses are more in NICU and it could be due to increased work stress because of the complex nature of neonates health problems. Another aspect might be the migration of nurses to other places after gaining their experience. The reason for leaving

the organization maybe due to lack of career development opportunities, poor salaries and inequality with other health professions. In-service education is an important component of nursing practice which makes the nurses to update their knowledge. The present study shows that none of the nurses had in-service education on clinical pathway. The nurse administrators and nurse managers should give importance to this aspect and promote evidence based practice.

This was consistent with the findings by Cangelosi et al. (1998) who conducted a study and found that higher staff turnover was associated with higher level of nursing stress. Regarding inservice educations, findings by Bavin (1997) showed that intensive care nurses has to be highly skilled today due to technological advances.

#### **Neonatal Variables in Control and Experimental group of Neonates**

The findings revealed that majority of the neonates in control and experimental group were of 1-3 days of age on admission (73.3%, 66.7%) respectively. Regarding gender, most of them were females (53.3%) in control group and in experimental group, 70% were males. Majority of the neonates in control and experimental group were in the gestational age of 38-40 weeks (76.7%, 86.7%) respectively. Considering the birth order, majority of neonates in control and experimental group were first born (73.3%, 83.3%) and all the neonates in control and experimental group were born in hospitals.

The researcher concluded that the first week of life is considered as early neonatal period, which is considered as crucial period of life. The extra uterine life also presents a challenge to the newborn baby and normal healthy term foetuses were only able to adapt well to the physiological changes during labour. Regarding the birth order, the researcher

felt that public is aware about the small family norms by which the quality of life is improved much than the large family and since all the neonates in the present study were born in hospitals, it shows that parents are able to afford institutional deliveries to decrease mortality and morbidity in the neonatal period.

The findings were highlighted by Balaka et al (1999) in his study that early neonatal mortality is responsible for almost 75% of overall neonatal mortality in West Africa. Regarding gender, findings by Jehan (2009) showed that the gender differential in early and late neonatal mortality is worth noting. Proportionately, there were more male deaths in the early neonatal period, a finding consistent with the well described biological survival advantage of girls in the neonatal period. In contrast, there were more female deaths in late neonatal period.

#### **Clinical Variables in Control and Experimental group of Neonates**

When nature of birth is taken into consideration, most of the neonates in control and experimental group were born by caesarean section delivery (46.7%, 63.3%) respectively. Majority of the neonates in both control and experimental group had cried at birth (93.3%, 96.7%) and had bilirubin level of 12-15 mg/dl (70%, 66.7%) respectively. The findings also revealed that most of the neonates in control group were O positive (43.3%) and in experimental group were B positive (43.3%). Regarding birth injuries, majority of the neonates in both control and experimental group didn't have any birth injuries (90%, 96.7%) respectively.

The researcher concluded that hyperbilirubinemia is a common finding in the newborn and in most instances is relatively benign. The unconjugated form is the type

most commonly seen in neonates. Therefore, the high risk group of neonates for the hyperbilirubinemia and those who exhibit the features should be estimated for serum bilirubin with laboratory method. Regarding birth injuries, the researcher concluded that early identification of fetal well being was well established nowadays and thus can easily predict the predisposing factors for birth injuries and can prevent it.

The data was supported by Singh et al (2009) in a prospective cohort study that ABO incompatibility was found to be a major risk factor for neonatal hyperbilirubinemia. This finding suggests that there is a need of screening cord blood bilirubin and continuous monitoring of bilirubin level in the hospital especially among ABO incompatible neonates.

#### **Demographic Variables of Mothers of Control and Experimental group of Neonates**

Most of the mothers in control group of neonates were in the age group of 26-30 years of age (46.7%). Whereas majority of mothers in experimental group of neonates were in the age group of 21-25 years of age (70%). All the mothers in both control and experimental group had a non Consanguinous marriage. Fifty percent of the mothers in control and experimental group were primigravida and multigravida and majority in experimental group were primigravida (80%). Regarding blood group and Rh status, most of them were O positive in both control and experimental group (60%, 43.3%) respectively. Majority of mothers in control and experimental group had no history of previous child with hyperbilirubinemia (86.7%, 93.3%) respectively.

The researcher felt that many mothers were young and need emphasis on care of neonates with hyperbilirubinemia. Hence, they could be given health education on the importance of breastfeeding and the role it has in improving the condition of the neonates. The above data also showed that Rh positive mothers were more common than Rh negative mothers and that there was no significant difference with the history of previous child with hyperbilirubinemia and without hyperbilirubinemia.

The above data was supported by Icke (2002) in his study that majority of the Asians were Rh positive (90-95%) and it was recommended that all mothers should be tested for ABO and Rh (D) blood types and be screened for red cell antibodies during pregnancy to avoid the complications of neonatal hyperbilirubinemia.

**The first objective was to assess the pre and post test level of knowledge and practice of nurses regarding clinical pathway for neonates with hyperbilirubinemia.**

The study findings revealed that fifty percent of nurses had moderate and fifty percent had inadequate knowledge in pre test. However, it was astonishing to note that almost all the nurses had adequate knowledge in post test regarding clinical pathway for neonatal hyperbilirubinemia. As none of the nurses had in-service education, their knowledge level in the pre test was not adequate.

The mean and standard deviation of post test knowledge was also higher (M=25, SD=1.41) than the pre test scores (M=14.5, SD=3.17). The calculated t value (17.59) was also greater than the table value (3.88) at  $p < 0.001$  and thus the null hypotheses  $H_{01}$  was rejected.

When the practice of nurses in control group of neonates were assessed, it was found to be lower (Day1: M=79.5, SD=3.99; Day2: M=61.5, SD=5.46; Day3: M=40.9, SD=4.87) than in the experimental group of neonates (Day1: M=102.2, SD=2.42; Day2: M=83.3, SD=2.41; Day3: M=56.7, SD=2.05). The calculated t value of all the three days were greater than the table value (2.00) at  $p < 0.05$  and thus was found to be significant.

The researcher concluded that this difference might be due to their educational level, migration of experienced nurses or increased turnover of the nurses due to the stress in NICU. After the clinical pathway was taught to the nurses, all of them had adequate knowledge in the post test. This can be attributed to the effectiveness of the teaching on clinical pathway for neonatal hyperbilirubinemia, thus helping to improve their knowledge. The value of clinical pathway was appreciated as it made 100% adequate compliance care among experimental group of neonates with hyperbilirubinemia.

**The second objective was to assess the neonatal outcome in control and experimental group of neonates with hyperbilirubinemia.**

Surprisingly, most of the neonates in control group had positive outcome (60%) and almost all the neonates in experimental group had positive outcome. The researcher thus concluded that the clinical pathway for neonatal hyperbilirubinemia is indeed a useful innovative tool that health professionals can follow to bring about the best possible neonatal outcome in terms of length of stay, prevention of complications and parental satisfaction.

The mean outcome of control group of neonates was lower (M=19.3, SD=2.07) when compared to the mean outcome of experimental group of neonates (M=21.2, SD=0.77). The calculated t value was also greater than the table value (3.46) at  $p < 0.001$  and thus the null hypotheses  $H_{o2}$  was rejected. These findings strongly suggest that clinical pathway has significant role in improving the outcome of these neonates. So, the researcher felt that it should be implemented in all tertiary hospitals caring for the neonates with hyperbilirubinemia.

**The third objective was to evaluate the effectiveness of clinical pathway by comparing the pre and post test level of knowledge and practice of nurses regarding clinical pathway for neonates with hyperbilirubinemia.**

The mean and standard deviation of post test knowledge was also higher (M=25, SD=1.41) when compared to the pre test scores (M=14.5, SD=3.17). This result could be attributed to the increase in knowledge regarding clinical pathway for neonatal hyperbilirubinemia, which was statistically significant at  $p < 0.001$  level. Thus the null hypotheses  $H_{o1}$  was rejected. It was also surprising to note that the overall mean score of practice of nurses in control group of neonates were lower (M=60.7, SD=2.56) than in the experimental group (M=80.7, SD=1.52). The calculated t value was also greater than the table value (3.46) at  $p < 0.05$  and thus the null hypotheses  $H_{o1}$  was rejected.

These findings revealed that the clinical pathway for neonatal hyperbilirubinemia was precise, organised and consolidated, thus helping the nurses to view information at a glance. The researcher thus concluded that this would help nurses to spent more time in nursing care thereby improving the overall quality of nursing care.

**The fourth objective was to compare the neonatal outcome in control and experimental group of neonates with hyperbilirubinemia.**

While comparing the neonatal outcome, it was observed that the outcome of control group of neonates was lower (M=19.3, SD=2.07) when compared to the outcome of experimental group of neonates (M=21.2, SD=0.77). The calculated t value was also greater than the table value (3.46) at  $p < 0.001$  and thus the null hypotheses  $H_{02}$  was retained.

This showed that clinical pathway is a step wise sequencing of care which will help to measure the care provided thus ultimately, helping to improve the continuity of care, thereby directly linking care to quality.

**The fifth objective was to compare the level of parental satisfaction on nursing care in control and experimental group of neonates with hyperbilirubinemia.**

It was interesting to note that the parental satisfaction on nursing care in control group of neonates was lower (M=64.8, SD=7.16) when compared to the parental satisfaction in experimental group of neonates (M=72.3, SD=6.71). The calculated t value was also greater than the table value (3.46) at  $p < 0.001$  and thus was found to be significant.

Nurses spend more time with the hospitalized neonates than other members of the healthcare team and therefore have a significant impact upon parent's perceptions of their hospitalized experience. Nurses can help to tailor care in order to meet the needs of the neonates family. Parents should be empowered to make decisions regarding a neonate's

care. Understanding of the family's capabilities and strengths will help nurses to ensure that the neonate is provided the best care even after discharge.

The researcher thus concluded that clinical pathways help to reduce or eliminate variation of care thereby improving the parental satisfaction on nursing care for neonates with hyperbilirubinemia. The control group of neonates showed lack of nursing care on psychosocial aspect, which may attribute to the lack of parental satisfaction in the control group.

**The sixth objective was to determine the association between selected demographic variables and pre and post test knowledge of nurses regarding clinical pathway for neonates with hyperbilirubinemia.**

It was astonishing to find that there was no association between age of nurses, professional qualification, professional experience, years of experience in NICU and institution trained to the pre and post test knowledge of nurses regarding clinical pathway for neonatal hyperbilirubinemia and hence the null hypotheses  $H_{03}$  was retained.

However, the researcher concluded that since clinical pathway itself is new in the Indian scenario, there should be more inservice education regarding this new concept. These findings also implies that irrespective of demographic variables, all nurses need teaching and continuing education regarding clinical pathway to improve their knowledge and provide quality nursing care to the neonates with hyperbilirubinemia.

**The seventh objective was to determine the association between selected demographic variables of control and experimental group of neonates with hyperbilirubinemia and their outcome.**

The findings showed that there is no significant association between age of neonate on admission, gender, gestational age in weeks and birth order to the outcome in control and experimental group of neonates. Thus the null hypotheses  $H_{04}$  was retained.

The researcher concluded that extrauterine adaptation is itself a crucial process and only healthy term neonates will adapt successfully. These findings also support that, irrespective of the demographic variables, the clinical pathway for neonates with hyperbilirubinemia was effective and so, it can be used for all the neonates with hyperbilirubinemia without any discrimination

**The eighth objective was to determine the association between selected clinical variables of control and experimental group of neonates with hyperbilirubinemia and their outcome.**

The findings revealed that there was no significant association between nature of birth, baby condition at birth, blood group, bilirubin level on admission and birth injuries to the outcome in control and experimental group of neonates, hence the null hypotheses  $H_{05}$  was retained.

Many findings reveal that about 60 percent of term newborns and 80 percent of premature babies develop jaundice. Neonates of diabetic mothers and of mothers with Rh disease are more likely to develop hyperbilirubinemia. Clinical variables did not make any major variance in the care of neonates with hyperbilirubinemia. Thus the researcher

concluded that early recognition and treatment are important in preventing bilirubin levels from rising to dangerous levels.

### **Summary**

This chapter dealt with the discussion of findings in the present study which includes demographic variables of nurses, neonatal variables, clinical variables of neonates, level of knowledge of nurses, neonates outcome and parental satisfaction, and effectiveness of clinical pathway on parental satisfaction and clinical outcome.

## **CHAPTER VI**

### **SUMMARY, CONCLUSION, IMPLICATION AND RECOMMENDATION**

The heart of the research project is in reporting the findings. This is the most creative and demanding part of the study. This chapter gives a brief account of the present study including the conclusion drawn from the findings, nursing implications of the study and recommendations.

#### **Summary**

The present study was indented to analyze the effectiveness of clinical pathway for neonatal hyperbilirubinemia upon the knowledge and practice of nurses and neonatal outcome at Apollo Main Hospital, Chennai.

#### **Objectives of the study**

1. To assess the pre and post test level of knowledge and practice of nurses regarding clinical pathway for neonates with hyperbilirubinemia.
2. To assess the neonatal outcome in control and experimental group of neonates with hyperbilirubinemia.
3. To evaluate the effectiveness of clinical pathway by comparing the pre and post test level of knowledge and practice of nurses regarding clinical pathway for neonates with hyperbilirubinemia.
4. To compare the neonatal outcome in control and experimental group of neonates with hyperbilirubinemia.
5. To compare the level of parental satisfaction on nursing care in control and experimental group of neonates with hyperbilirubinemia.

6. To determine the association between the selected demographic variables of nurses and their pre and post test level of knowledge regarding clinical pathway for neonates with hyperbilirubinemia.
7. To determine the association between selected demographic variables of control and experimental group of neonates with hyperbilirubinemia and their outcome.
8. To determine the association between selected clinical variables of control and experimental group of neonates with hyperbilirubinemia and their outcome.

### **Null Hypothesis**

- Ho<sub>1</sub>** There will be no significant difference between the pre and post test level of knowledge and practice of nurses regarding clinical pathway for neonates with neonatal hyperbilirubinemia.
- Ho<sub>2</sub>** There will be no significant difference in the neonates outcome between the control and experimental group after implementation of clinical pathway for neonates with hyperbilirubinemia.
- Ho<sub>3</sub>** There will be no significant association between the selected demographic variables of nurses and their pre and post test level of knowledge regarding clinical pathway for neonatal hyperbilirubinemia.
- Ho<sub>4</sub>** There will be no significant association between the selected demographic variables of control and experimental group of neonates with hyperbilirubinemia and their outcome.

**Ho5** There will be no significant association between the selected clinical variables of control and experimental group of neonates with hyperbilirubinemia and their outcome.

The conceptual framework for the study was developed on the basis of Kurt Lewin's Model of Change, which was modified for the present study. An intensive review of literature and experts guidance laid the foundation to the development of tools such as demographic variable proforma for nurses, neonatal variable proforma, clinical variable proforma, demographic variable proforma for mothers, structured knowledge questionnaire for nurses, practice check list, parental satisfaction rating scale and neonatal outcome check list.

In this study, Quasi-experimental research design was adopted. Since there were limited number of nurses available, one group pre and post test design was adopted for the nurses. The present study was conducted at Apollo Main Hospital, Chennai among nurses who take care of neonates with hyperbilirubinemia and neonates admitted with hyperbilirubinemia. The study sample size for the present study was 20 nurses and 60 neonates with hyperbilirubinemia, 30 in experimental group and 30 in control group who satisfied the inclusion criteria.

The investigator used the demographic variables of nurses, neonatal variable proforma, clinical variable proforma and demographic variable proforma for mothers to obtain the baseline data. Structured questionnaire was used to assess the knowledge of nurses, practice checklist to identify whether the neonates were receiving the appropriate care, rating scale to assess the level of parental satisfaction and checklist to assess the neonatal outcome. The data collection tools were validated and reliability was

established. After the main study, the data collection of the main study was conducted for 4 weeks. The collected data was tabulated and analyzed by using appropriate descriptive and inferential statistics.

### **Major Findings of the Study**

#### **Demographic variables of nurses caring for neonates with hyperbilirubinemia**

Majority of the nurses for the study were in the age group of 21-24 years (70%), were GNM qualified (60%) and most of them had less than 2 years of experience (60%).

Considering the years of experience in NICU, most of the nurses had less than 2 years of experience (60%). Ninety percent were trained in private institutions and only ten percent were government trained nurses. None of the nurses had attended any inservice education on clinical pathway for hyperbilirubinemia.

#### **Neonatal variables in control and experimental group of neonates with hyperbilirubinemia**

The findings revealed that majority of the neonates in control and experimental group were of 1-3 days of age on admission (73.3%, 66.7%) respectively. Regarding gender, most of them were females (53.3%) in control group and in experimental group, 70% were males. Majority of the neonates in control and experimental group were in the gestational age of 38-40 weeks (76.7%, 86.7%) respectively.

Considering the birth order, majority of neonates in control and experimental group were first born (73.3%, 83.3%) and all the neonates in control and experimental group were born in hospitals.

### **Clinical variables in control and experimental group of neonates with hyperbilirubinemia**

When nature of birth is taken into consideration, most of the neonates in control and experimental group were born by caesarean section delivery (46.7%, 63.3%). Majority of the neonates in both control and experimental group had cried at birth. (93.3%, 96.7%) and had bilirubin level of 12-15 mg/dl (70%, 66.7%) respectively.

The findings also revealed that most of the neonates in control group were O positive (43.3%) and in experimental group were B positive (43.3%). Regarding birth injuries, majority of the neonates in both control and experimental group didn't have any birth injuries (90%, 96.7%) respectively.

### **Demographic variables of mothers of control and experimental group of neonates with hyperbilirubinemia**

Most of the mothers in control group of neonates were in the age group of 26-30 years of age (46.7%). Whereas majority of mothers in experimental group of neonates were in the age group of 21-25 years of age (70%). All the mothers in both control and experimental group had a non Consanguinous marriage.

Fifty percent of the mothers in control and experimental group were primigravida and multigravida and majority in experimental group were primigravida (80%). Regarding blood group and Rh status, most of them were O positive in both control and experimental group (60%, 43.3%). Majority of mothers in control and experimental group had no history of previous child with hyperbilirubinemia (86.7%, 93.3%) respectively.

### **Knowledge of nurses regarding clinical pathway for neonatal hyperbilirubinemia.**

Fifty percent of nurses had moderate and fifty percent had inadequate knowledge in pre test. But almost all the nurses had adequate knowledge in post test regarding clinical pathway for neonatal hyperbilirubinemia.

### **Comparison of mean and standard deviation of pre and post test knowledge of nurses regarding clinical pathway for neonatal hyperbilirubinemia.**

The study findings revealed that the mean and standard deviation of post test knowledge was higher (M=25, SD=1.41) than the pre test scores (M=14.5, SD=3.17). The calculated t value (17.59) was also greater than the table value (3.88) at  $p < 0.001$  and thus the null hypotheses  $H_{01}$  was rejected.

### **Comparison of mean and standard deviation of pre and post test knowledge of nurses in various dimensions regarding clinical pathway for neonatal hyperbilirubinemia.**

The study findings showed that the mean and standard deviation of post test knowledge was higher than the pre test on various dimensions of clinical pathway. The difference was found to be statistically significant at  $p < 0.001$ .

### **Comparison of mean and standard deviation of practice of nurses for the control and experimental group of neonates**

The practice of nurses in control group of neonates was found to be lower (Day1: M=79.5, SD=3.99; Day2: M=61.5, SD=5.46; Day 3: M=40.9, SD=4.87) than the practice in experimental group of neonates (Day1: M=102.2, SD=2.42; Day2: M=83.3, SD=2.41;

Day 3:  $M=56.7$ ,  $SD=2.05$ ). The calculated  $t$  value of all the three days were greater than the table value (2.00) at  $p<0.001$  and thus is found to be significant.

The overall mean score also showed that the practice of nurses in control group of neonates were lower ( $M=60.7$ ,  $SD=2.56$ ) than the practice in experimental group ( $M=80.7$ ,  $SD=1.52$ ). The calculated  $t$  value was also greater than the table value (3.46) at  $p<0.001$  and thus the null hypotheses  $H_{01}$  was rejected.

**Comparison of mean and standard deviation of parental satisfaction on nursing care in control and experimental group of neonates.**

The parental satisfaction on nursing care in control group of neonates was lower ( $M=64.8$ ,  $SD=7.16$ ) when compared to the parental satisfaction of experimental group of neonates ( $M=72.3$ ,  $SD=6.71$ ). The calculated  $t$  value was also greater than the table value (3.46) at  $p<0.001$  and thus was found to be significant.

**Comparison of mean and standard deviation of parental satisfaction on various dimensions of nursing care in control and experimental group of neonates.**

Regarding the parental satisfaction on nursing care, the mean and standard deviation in experimental group was higher than in the control group of neonates. The difference was found to be statistically significant at  $p<0.05$ .

**Comparison of mean and standard deviation of neonatal outcome in control and experimental group of neonates.**

The outcome of control group of neonates was lower ( $M=19.3$ ,  $SD=2.07$ ) when compared to the outcome of experimental group of neonates ( $M=21.2$ ,  $SD=0.77$ ). The

calculated t value was also greater than the table value (3.46) at  $p < 0.001$  and thus the null hypotheses  $H_{02}$  was rejected.

**Association between selected demographic variables and pre and post test knowledge of nurses**

There is no association between age of nurses, professional qualification, professional experience, years of experience in NICU and institution trained to the pre and post test knowledge of nurses regarding clinical pathway for neonatal hyperbilirubinemia; hence the null hypotheses  $H_{03}$  was retained.

**Association between selected demographic variables of neonates and parental satisfaction of control and experimental group of neonates**

The findings revealed that there was no association between age of neonate on admission, gender, gestational age in weeks at birth and birth order to the parental satisfaction on nursing care.

**Association between selected demographic variables of neonates and outcome of control and experimental group of neonates**

The findings showed that there is no significant association between age of neonate on admission, gender, gestational age in weeks and birth order to the outcome in control and experimental group of neonates and hence the null hypotheses  $H_{04}$  was retained.

## **Association between selected clinical variables of neonates and outcome of control and experimental group of neonates**

The findings revealed that there was no significant association between nature of birth, baby condition at birth, blood group, bilirubin level on admission and birth injuries to the outcome in control and experimental group of neonates and hence the null hypotheses  $H_{05}$  was retained.

### **Conclusion**

Clinical pathways are proposed as a means of providing high quality care in a timely and cost effective manner. The findings of the study indicated that it will improve the knowledge and practice of nurses regarding clinical pathway for neonatal hyperbilirubinemia as well as the neonate's clinical outcome in terms of length of stay, prevention of complications and parental satisfaction.

### **Implications**

The findings of the study has implications in the different branches of nursing profession i.e. nursing practice, nursing education, nursing administration and nursing research. By assessing the effectiveness of clinical pathway for neonatal hyperbilirubinemia, we get a clear picture regarding different steps to be taken in all fields to improve the standards of nursing profession.

### **Nursing practice**

Nurses have a major role in assessing and providing necessary care to decrease the serum bilirubin level of neonates with hyperbilirubinemia. Practising nurses should

attend short term courses and update their knowledge with practice of clinical pathway which would thereby help in providing quality and efficient care to the neonates.

### **Nursing education**

With emerging health care trends, nursing education must focus on clinical pathways that will help to enhance nursing care. The education to the students and the nurses in the clinical area could be in the form of continuing nursing education programs on clinical pathway for neonatal hyperbilirubinemia. The research findings serves as a guide to evidence based practice and hence the student should be informed about the research findings.

### **Nursing administration**

With the ever growing challenges of health care needs, the administrators have a responsibility to provide nurses with substantive continuing education opportunities. Nurse administrators should conduct periodical review meetings to evaluate the quality of clinical pathway.

### **Nursing theory**

The conceptual and theoretical models exclusively in clinical pathway is yet to be developed by nursing theorist. The present study is based on Kurt Lewin's Model of Change which can be used to motivate and guide the nurses in taking care of neonates with hyperbilirubinemia using the clinical pathway.

## **Nursing research**

There is a need for extensive and intensive research in this area. It opens a big avenue for research on comparison of clinical pathway and other modalities of care and its quality, advantages and disadvantages. As evidence based practice is the recent trend in paediatric nursing care, this will further encourage studies on the effectiveness of clinical pathway upon the knowledge and practice of nurses and neonatal outcome. Dissemination of the findings of evidence based practice through conferences, seminars, publications in national and international nursing journals and World Wide Web will benefit a wider community.

### **Recommendations**

- The same study can be conducted on larger sample size to generalize the findings.
- A comparative study can be conducted in different settings with similar facilities.
- A study could be conducted to analyze the relationship between the use of clinical pathway and time management by the nurses.
- A study can be done among pathological jaundice.

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