Manual of Newborn Nursing

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Manual of Newborn Nursing

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Nurses are the first point of contact for the parents, patient ie the newborn and the treating clinician. Working hard with humbleness, they continue to function as a valued member of comprehensive team of health care providers.

There is a felt need to provide a rapid reference guide, with clear , concise, practical, up to date and evidence based information about care of the newborn in simple and easy to understand language with focus on essential newborn nursing skills. An attempt is made here to meet this requirement through this Manual. Divided into theme based sections, several topics of practical relevance are being covered under the headings – Fundamentals of Newborn Care, Essential nursing skills, Nursing Care of the newborn, Assisting Procedures, Nursing Checklist and Common Neonatal Disorders.

A thorough knowledge of normal newborn characteristics enables the competent nurse to quickly identify deviations from norm and/ or potential complications. We are confident that this Manual will be a step in this direction.

With contributions from several national medical experts in Neonatology & Nursing staff members ,we hope this Manual will bridge the gap between knowledge and practice in the art and science of newborn nursing.

Our heart felt appreciation and thanks to the managing editors and the contributors , whose hard work has made this Manual a reality.

Manual of Newborn Nursing

From the desk of Managing Editors

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It gives us immense pleasure to present this "Manual of Newborn Nursing" as a simplified book for the benefit of nursing staff working in neonatal intensive care units across India.

Nursing staff form the backbone of neonatal care throughout the world. Of all the caregivers in the NICU, nurses usually spend the most time at a baby's bedside caring for the baby and the family. In India the neonatal mortality rate continues to remain unacceptably high. If we wish to improve this dismal statistics, we need look after our newborn babies well. We need to train our nurses for care of the newborn better than before. This manual attempts to empower nurses with knowledge to care for the sick newborn. This manual has covered all aspects of essential neonatal nursing such as: fundamentals of newborn care, essential nursing skills, nursing care of newborn, nursing protocols and checklists, assisting procedures and common newborn disorders.

We wish to express our heartfelt thanks to Dr Ranjan Kumar Pejavar, Chairperson and Dr Rhishikesh Thakre, Secretary of IAP Neonatology Chapter for their whole hearted support. We will also like to thank our entire editorial team which has worked hard to finish the assignment in timely fashion.

We are extremely grateful to all the respected authors and reviewers who have taken time out of busy schedule and contributed to this manual. This would not have been possible without their help.

Finally, we sincerely hope that the nursing staff look after the sick newborn babies will immensely benefit by reading this manual.

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MANUAL OF NEWBORN NURSING

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SECTION 1

FUNDAMENTALS OF NEWBORN CARE

1. Classification of new born babies

Dr Veeraraja B Sathenahalli Dr Ashish Jain

Learning objectives:

1. Understand classification of newborn babies.
2. Assess the gestational age of newborn.
3. Assess the fetal growth according to gestational age.

Introduction:

New born care depends on the gestational age and fetal growth of the baby. Different clinical problems develop in babies with different gestational age and different fetal growth status. Hence, a classification system using gestational age and birth weight information has been evolved. Every year an estimated 15 million pre term babies are born with 1 million babies dying annually. With a rising incidence, pre term birth leading cause of death among new born. Majority of these deaths can be prevented with current, cost effective interventions. India accounts to leading country with greatest number of pre term births. Hence, it is advised that all health care personnel should be able to identify pre term baby at birth and manage accordingly. Asia accounts to more than 75% of IUGR babies, the peculiarity and increased risk of immediate and long term complications of these babies makes identification and appropriate management an area of importance. Thus, classification of babies helps in identification of babies at high risk and management. Nursing personnel be well acquainted with this classification system so that proper coding can be done.

Classification of new born babies:

New born can be classified according to

a. Gestational age
b. Birth weight
c. Fetal growth.

Gestational age wise classification:

New born is classified into pre term, term and post term according to gestational age. Various methods have been evaluated for gestational age assessment. Gestational age assessment can be done by a. menstrual dates, b. USG assessment, c. assessment in early neonatal period. We will be discussing gestational age assessment in early neonatal period in this chapter. Over a period, many scoring methods were evolved to assess gestational age assessment using physical and neuromuscular findings as tool. Dubowitz came up with first scoring system to assess gestational age, followed by Ballard scoring system which was modified later to include extremely pre mature babies and has been followed worldwide uniformly. New Ballard score assesses physical and neuromuscular maturity. Skin, lanugo, plantar surface, breast, eye/ear, genitals are assessed in physical maturity. Posture, square window, arm recoil, popliteal angle, scarf sign and heel to ear are assessed in neuromuscular maturity.

NEUROMUSCULAR MATURITY

	-1	0	1	2	3	4	5
Posture							
Square Window (wrist)	 >90°	 90°	 60°	 45°	 30°	 0°	
Arm Recoil		 180°	 140°-160°	 110°-140°	 90°-110°	 <90°	
Popliteal Angle	 180°	 150°	 140°	 120°	 100°	 90°	 <90°
Scarf Sign							
Heel to Ear							

PHYSICAL MATURITY

Skin	sticky; friable; transparent	gelatinous; red; translucent	smooth; pink; visible veins	superficial peeling &/or rash; few veins	cracking; pale areas; rare veins	parchment; deep cracking; no vessels	leathery; cracked; wrinkled
Lanugo	none	sparse	abundant	thinning	bald areas	mostly bald	
Plantar Surface	heel-toe 40-50 mm: -1 <40 mm: -2	<50 mm: no crease	faint red marks	anterior transverse crease only	creases ant. 2/3	creases over entire sole	
Breast	imperceptible	barely perceptible	flat areola; no bud	stippled areola; 1-2 mm bud	raised areola; 3-4 mm bud	full areola; 5-10 mm bud	
Eye/Ear	lids fused loosely: -1 tightly: -2	lids open; pinna flat; stays folded	sl. curved pinna; soft; slow recoil	well-curved pinna; soft but ready recoil	formed & firm; instant recoil	thick cartilage; ear stiff	
Genitals male	scrotum flat; smooth	scrotum empty; faint rugae	testes in upper canal; rare rugae	testes descending; few rugae	testes down; good rugae	testes pendulous; deep rugae	
Genitals female	clitoris prominent; labia flat	prominent clitoris; small labia minora	prominent clitoris; enlarging minora	majora & minora equally prominent	majora large; minora small	majora cover clitoris & minora	

Scoring system: Ballard JL, Khoury JC, Wedig K, Wang L, Eilers-Walsman BL, Lipp R. New Ballard Score, expanded to include extremely premature infants. *J Pediatr.* 1991;119:417-423.

MATURITY RATING

score	weeks
-10	20
-5	22
0	24
5	26
10	28
15	30
20	32
25	34
30	36
35	38
40	40
45	42
50	44

Depending on the gestational age, newborn babies are divided into

a. Pre term: gestational age less than 37 weeks

b. Term: 37 weeks gestation age to 42 weeks

c. Post term: more than 42 weeks

Birth weight wise classification:

Birth weight wise babies are classified into

a. Low birth weight: birth weight less than 2500 gms.
b. Very low birth weight: birth weight less than 1500 gms.
c. Extremely low birth weight: birth weight less than 1000 gms.

Fetal growth wise classification:

On plotting birth weights of babies, a frequency distribution is obtained. According to the classification, they are classified into

a. Small for gestational age (SGA):refers to weight below the 10^{th} percentilefor gestational age, corrected for parity and gender, as per the population growth charts.
b. Appropriate for gestational age (AGA):refers to weight between 10^{th} to 90^{th}percentile for gestational age.
c. Large for gestational age (LGA): refers to birth weight above 90^{th} percentile for gestational age.

Small for gestational age can be further classified into moderate (3^{rd} to 10^{th} percentile), severe ($< 3^{rd}$ centile).

Intrauterine growth restriction (IUGR) is defined as fetal growthless than the normal growth potential of a specific infant because ofgenetic or environmental factors. The terms IUGR and Small forGestational Age (SGA) are often used to describe the same problem,although there are subtle differences between the two. SGA isdiagnosed as birth weight less than (less than 10%

for that particulargestational age, parity and gender) the population norms on thegrowth chart. IUGR is a clinical definition and applied to neonateswith clinical evidences of malnutrition.

Ponderal Index (PI) is also used to determine the degree of fetalmalnutrition. It is defined as the ratio of body weight to lengthexpressed as (PI=[weight (in g) x 100]÷[length (in cm)3]). PI of lessthan 10 percentile reflects fetal malnutrition; PI of less than 3percentile indicates severe fetal wasting.

There are three types of IUGR.

a. Symmetrical IUGR (hypoplastic small for date):

a. Begins early in gestation.
b. Cell number is reduced.
c. Cause: Intrinsic factors such as congenital infections orchromosomal abnormalities.
d. Have reductions in allparameters including weight, length and the head circumference.
e. There will be less than 3 cm difference between the head andthe chest circumference.
f. PI is more than 2

b. Asymmetrical IUGR (malnourished babies):

a. Typically begins in the late second or third trimesters.
b. Cell numbers are normal but cell size is reduced.
c. Reductions in fetal nutrients that limit glycogen and storage,caused usually due to placenta disorders.

d. Reduction in the weight and length occurs due to Brain sparing.

e. Features of malnutrition are pronounced in the form of loose skinfold, loss of buckle fat, featuring aged people.

f. Ponderal Index (PI) is less than 2

c. Mixed IUGR:

a. Decrease in the number of cell and cell size.

b. Occurs mostly when IUGR is affected further by placental causes inlate pregnancy.

c. Represents the clinical features of both symmetrical andasymmetrical IUGR.

d. Infants with the normal cell numbers experience better andimmediate neonatal and long term growth with improved neurodevelopmentaloutcomes.

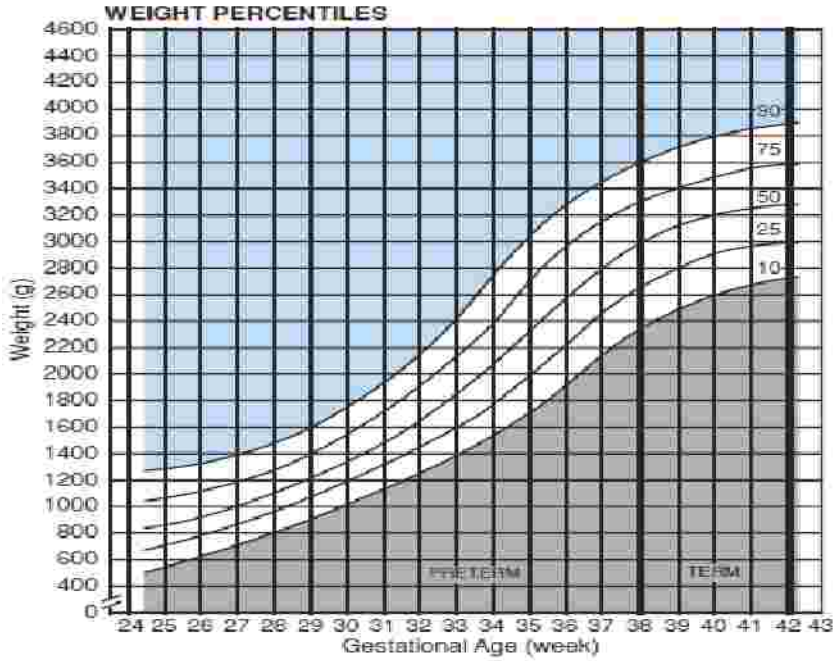

Fig 1. Battaglia FC, Lubchenco LO: A practical classification of newborn infants by weight and gestational age.J Pediatr 1967; 71:159-163.

Implications:

After birth, every baby should be classified using above methods, birth weight should be plotted on the chart by the attending nurse or doctor. Baby at high risk as defined by hospital authority. The classification and identification of high risk babies will help in better management and thus reducing neonatal mortality rate.

Suggested reading:

1. Battaglia FC, Lubchenco LO: A practical classification of newborn infants by weight and gestational age. J Pediatr 1967; 71:159-163.
2. Murki S and Sharma D (2014).Intrauterine Growth Retardation - A Review Article. J Neonatal Biol 3: 135. doi: 10.4172/2167-0897.1000135.
3. Ballard JL, Khoury JC, Wedig K, Wang L, Eilers-Walsman BL,Lipp R. New Ballard Score, expanded to include extremely premature infants.J Pediatr. 1991;119:417-423.
4. Blencowe H, Cousens S, Oestergaard M, Chou D, Moller AB, Narwal R, Adler A, Garcia CV, Rohde S, Say L, Lawn JE. National, regional and worldwide estimates of preterm birth. The Lancet, June 2012. 9;379(9832):2162-7

Nursing Etiquettes

Ms Hebsiba L.D Ms Ankita Raj

Before round

- Hand washing prior to entering the unit
- Ensure all personnels in nursery have short nails
- Written hand over of all assigned newborns and related ents from the relieving nurse
- Check identity of the patients and their mother/parent status
- Check all IV lines and central line functioning and insertion sites
- Cross check the medications administered (dosage, timing and preparation)
- If there is any sick baby (on CPAP, Ventilator, Multiple medications)
    - Maintain the newborn in correct position
    - Check for contents and functioning of emergency tray
    - Check all the equipments and their functionality
    - Check for water in humidification chamber of all CPAP and ventilators
- Collect all the relevant reports (investigations) which were sent and to be collected
- Talk to the resident for the need of any emergency int tions or medications
- Check availability of all emergency drugs and resuscitation equipments in the unit.
- Check for the TPN room and fridge temperature
- Ensure the cleanliness of the nursery
- Dispose the biomedical waste according to its nature
- Ensure all equipments are in functional order. If not, place requisition for repairs immediately

During rounds

- Ensure that all the persons attending the rounds are following the aseptic precautions
- Attend the rounds with case sheets and notebook for taking notes
- Contribute to the patient by highlighting the nursing issues, medication administration and family concerns
- Listen to the discussion done during the rounds and write down the important points
- Participate in decision making with the team
- Monitor and address the emergencies during rounds
- To follow the orders (in case of stat medication order given during the rounds)
- To ask about queries related to management and disease of the patient to the consultant

After rounds

- To go through the instructions from the rounds
- Prioritize the work according to the urgency and sickness of the newborn
- Recheck and discuss the orders written by the doctors
- To administer the medications as per the written instructions.
- Avoid medication errors. Confirm the dosing and administration of medications such as heparin, insulin, analgesics, sedatives (morphine or fentanyl), amphotericin, IVIG and so on. All medications administered should be signed
- If in doubt re-confirm with the consultant
- Record vitals, input and output variables
- Sent the relevant samples for investigations as advised
- To collect all the pending investigation and enter the reports in patient case sheet at the designated place
- Communicate with the infant's parents briefly about the present condition and try to answer the queries

- Assist the mothers in milk expression, pain relief and develop cordial relation
- To see for any shifting of the babies is required and advised by the doctors
- Bring to the notice of the consultant all issues in the unit
- Indent the medications and disposables from the pharmacy or from the parents
- Assist the attending residents/doctors in procedures
- Communicate with the colleague sisters all relevant issues and maintain cordial working atmosphere
- Involve in teaching activities for educating juniors and other paramedical personal
- If possible attend the follow up clinics or at-least know the outcomes of sick newborns treated
- Enjoy the work being done
- Follow up regarding non functional equipments
- Note and rotate position of baby, probes, tubes, iv sites periodically

NICU Housekeeping Practices

Ms Sashikala Dr Srinivas Murki

To minimize the transmission of microorganisms from equipment and the environment, adequate methods for Cleaning, disinfecting and sterilizing must be in place.

Definitions

Cleaning

Removing foreign material (soil, organic matter, microbes) from an object. It is best done with clean and cold running water. Sometimes mild disinfection with 0.5% chlorine is required before cleaning. Most environmental objects (floors, walls, sinks) require only mild disinfection and then cleaning. All objects in the NICU require cleaning.

Disinfection

Disinfection is removing all pathogenic microbes except spores. All objects must be cleaned before disinfection. This is required for all objects come in contact with baby (warmers, equipment, linen, cotton, gauze, baby belongings etc.). Disinfection is done with moist heat (70 to100° c) or with chemicals (2% glutaraldehyde, 6% Hydrogen peroxide, 0.2 -0.3% peracetic acid). When using chemicals for disinfection, these sh not come in contact with the newborn

Sterilization

This is removal of all living microbes including spores. This is required for all objects that invade the body (orogastric tube, catheters, and ventilator circuits). Sterilization is done with autoclave/dry heat/ethylene oxide gas

Decontamination

It involves Cleaning, Disinfection and Sterilization

Table 1: Time schedule for cleaning and disinfection

Time Schedule For Cleaning And Disinfection	
Once A Day - Morning	o Sterilizer o Swab Container, Injection & Medicine Tray o Cheatle Forceps o Steel Drums o Baby Linen, Blanket & Blanket Cover o Cotton Gauze
Once A Day - Night	o Warmer Or Incubator o Bed Making o Infusion Pump /Syringe Pump o Stethoscope, Measuring Tape, Cotton, Syringe, Gauze, Thermometer o Weighing Scale o Ambu Bag o Laryngoscope o Oxygen Hood, Oxygen Tube, Suction Tube o Change Water in Oxygen And Suction Bottle
Once A Day - Evening	o TPN or Drug Preparation Area o Unused Medical Equipment, Incubator, Warmer o Crash Trolley, Files, Nursing Stations
Once Or Twice - Weekly	o Ambu Bag To Be Sterilized o Refrigerator o Procedure Trays (Exchange, LP, ICD, Central Line Kit)
After Every Use	o Stethoscope, Thermometer, Laryngoscope, Feeding Utensils

Table 2: The preferred order of Housekeeping practices

Order of Cleaning	Responsibility	Cleaning Method	Frequency
1	Suction Jars, Oxygen Humidifiers, Suction Tubing.	Removed & Washed with Soap and Water. Sent for Sterilization With ETO or In 2% Cidex for 8 Hours	2 Times/Week
2	Surface Cleaning (Horizontal Surfaces, Window Sills, Top of Doors, Doorknobs, Light Switches, Lights, Furniture in Nursing Station, Racks.)	[0.5% Chlorine+ Detergent Cleaning solution.] Only Wet Dusting With Cleaning Cloth	Daily and Whenever Visibly Soiled.
3	Procedure and Examination Rooms	Wipe Horizontal Surfaces With [0.5% Chlorine + Detergent Cleaning solution.]	After Each Procedure and Whenever Visibly Soiled.
4	Walls, Windows, Ceilings, Window Curtains, Window blinds, Doors.	[0.5% Chlorine+ Detergent Cleaning Solution]	Spot Cleaning Only When Soiled
5	Main Scrub Area & Sinks	Scrub with a Separate Brush and [0.5% Chlorine+ Detergent Cleaning Solution.] Rinse With Water.	Daily
6	Soiled Linen	Collect Soiled Linen in Closed, Leak Proof Containers.	Daily (or More often as Needed)
7	Waste	Collect Waste from all Areas	At least Daily (or more Frequently as Needed). Avoid Overflowing
8	Floor Mopping	0.5% Chlorine Cleaning + Detergent Solution, Only Wet Mopping	Once Per Shift (3 Times / Day) and When Soiling or Spill Occurs.
9	Slippers	Detergent solution	Every Night
10	Waste Disposal Bins	[0.5% Chlorine + Detergent solution] and Scrub to Remove Soil and Organic Material.	Clean Contaminated waste containers Daily And Non Contaminated Containers When Visibly Soiled And At Least Once a Week.
11	Toilets	Scrub With a Separate Brush and Harpic.	3 times/day (At the End of Every Shift.)

The Formula for Making a Dilute Chlorine Solution From Any Concentrated Hypochlorite Solution Is:

- Check concentration (% concentrate) of the chlorine product you are using
- Determine total parts water needed using the formula below
- Total parts (TP) water = [%concentrate] - 1 % dilute
- Mix 1 part concentrated bleach with the total parts water required.

Example: Make a dilute solution (0.5%) from 5% concentrated solution

STEP 1: Calculate TP water: [5.0%]/0.5% - 1 = 10 – 1 = 9

STEP 2:Take 1 Part Concentrated solution and add to 9 parts water.

The formula for making a dilute solution from a powder of any percent available chlorine is:

Formula for making Chlorine Solution from Dry Powders:

- Check concentration (% concentrate) of the powder you are using.
- Determine grams bleach needed using the formula below.
- Grams/liter = [% Dilute] X 1000 / % Concentrate
- Mix measured amount of bleach powder with 1 litre of water.

Example: Make a dilute Chlorine-releasing solution (0.5%) from a Concentrated Powder (35%).

STEP 1: Calculate grams/litre: $\frac{\text{x } 1000 = [\ 0.5\%\ ] \text{ X } 1000}{35\%} = 14.2 \text{ g / l}$

STEP 2: Add 14.2 grams (Approximately 14 g) to 1 litre of water.

Cleaning Methods of Housekeeping Surfaces

Cleaning should start with the least soiled area and move to the most soiled area and from high to low surfaces.

Wet Mopping

- Is the Most Common and Preferred Method to Clean Floors.

Double-Bucket Technique

- Two different buckets are used, one containing a cleaning solution and the other containing rinse water. The mop is always rinsed and wrung out before it is dipped into

the cleaning solution. The double-bucket technique extends the life of the cleaning solution (fewer changes are required), saving both labor and material Costs.

Dusting

- Most Commonly Used for Cleaning walls, Ceilings, Doors, Windows, Furniture and Other Environmental Surfaces

Cleaning strategies for spills of blood and body substances

- Clean spills with a 0.5% chlorine solution.
- Clean spills of blood, body fluids and other potentially infectious fluids immediately

For Small Spills

- While wearing utility or examination gloves, remove visible erial using a cloth soaked in a 0.5% chlorine solution, then wipe clean with a disinfectant cleaning solution.

For large spills

- While wearing gloves, flood the area with a 0.5% chlorine solution, mop up the solution and then clean as usual with detergent and water

Suggested reading

1. Checklists, Bundles and Infection Control: http://fernandezresearch.files.wordpress.com/2013/01/checklist-bundles-infection-control.pdf
2. Prevention of Hospital acquired Infections. A Practical guide http://www.who.int/csr/resources/publications/whocdscsreph200212.pdf
3. Prevention of HAI http://www.cdc.gov/hai/