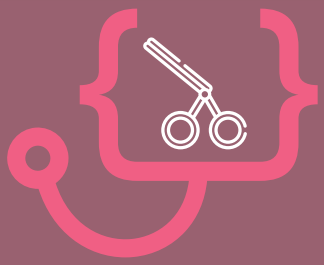
सत्यमेव जयते

Department of Health Research
Ministry of Health and Family Welfare, Government of India

INDIAN COUNCIL OF MEDICAL RESEARCH
Serving the nation since 1911



2022 Edition, Vol.III

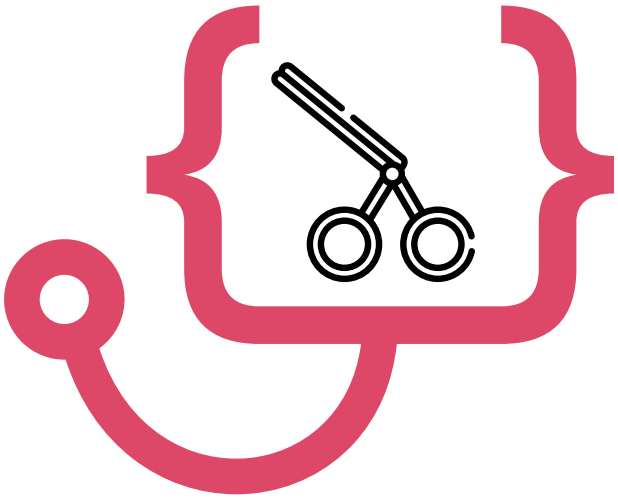
STANDARD TREATMENT WORKFLOWS

of India

PARTNERS

national health authority

World Health Organization India



STANDARD TREATMENT WORKFLOWS *of India*

Department of Health Research
Ministry of Health and Family Welfare, Government of India

These STWs have been prepared by national experts of India with feasibility considerations for various levels of healthcare system in the country. These broad guidelines are advisory, and are based on expert opinions and available scientific evidence. There may be variations in the management of an individual patient based on his/her specific condition, as decided by the treating physician. There will be no indemnity for direct or indirect consequences. Kindly visit our web portal (**stw.icmr.org.in**) for more information.

Suggested Citation: Standard Treatment Workflows of India, 2022, Edition, Vol. 3, New Delhi, Indian Council of Medical Research, Department of Health Research, Ministry of Health and Family Welfare, Government of India.

Printed in India

CONTENTS

Department of Health Research
Ministry of Health and Family Welfare, Government of India

INTRODUCTION

Department of Health Research
Ministry of Health and Family Welfare, Government of India

icmr INDIAN COUNCIL OF MEDICAL RESEARCH

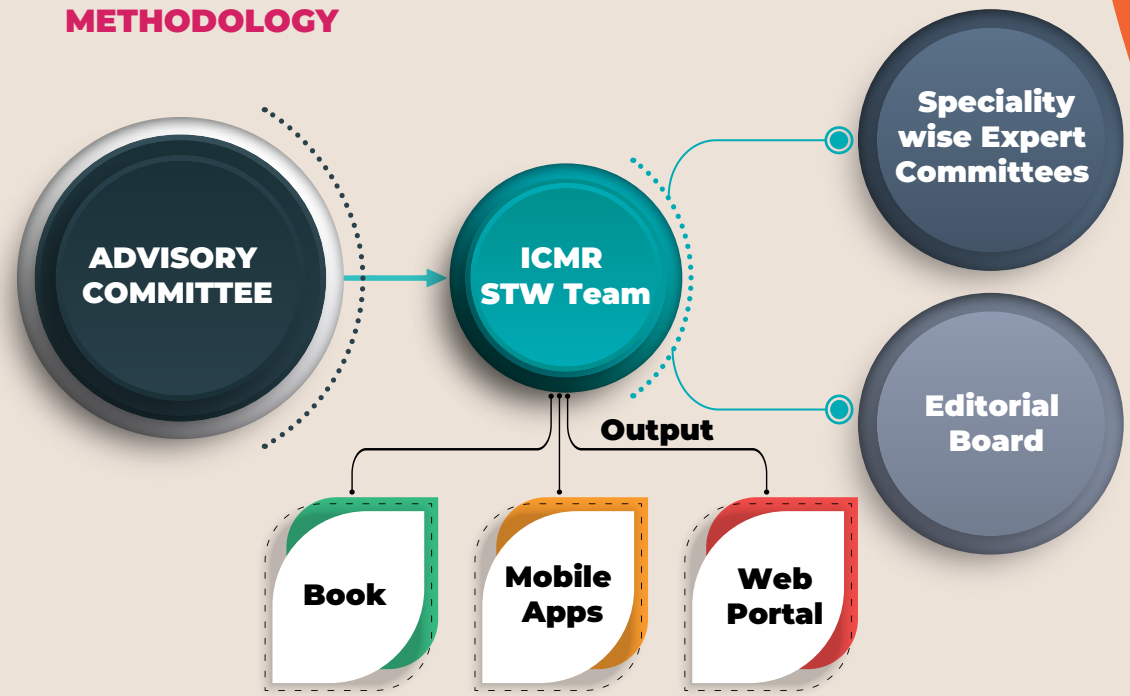
GOAL

To empower the primary, secondary and tertiary health care physicians/surgeons towards achieving the overall goal of Universal Health Coverage with disease management protocols and pre-defined referral mechanisms by decoding complex guidelines.

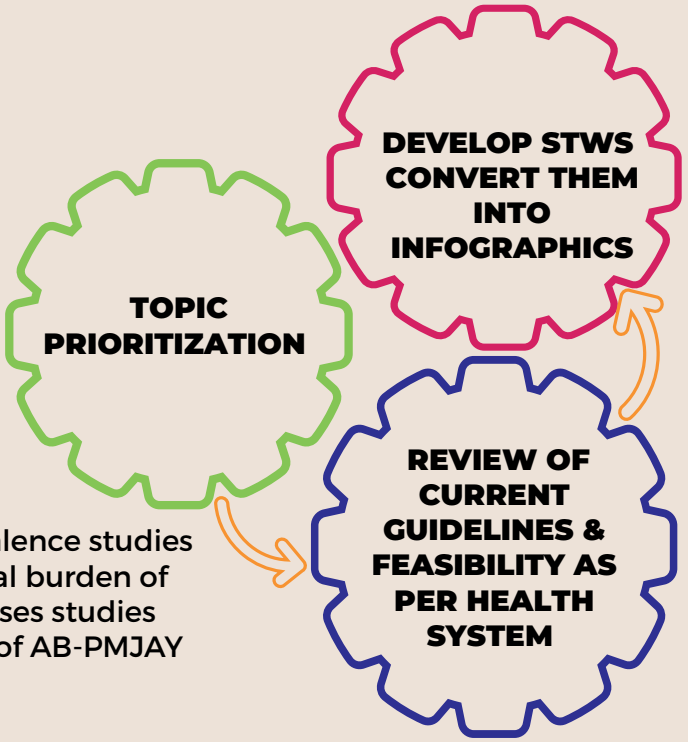
OBJECTIVES

To formulate treatment algorithms for common and serious medical & surgical conditions for both outdoor & indoor patient management at primary, secondary and tertiary levels of India's healthcare system that are scientific, robust and locally contextual.

METHODOLOGY



PROCESS OVERVIEW



- Participation also from Public Health Specialists Search Strategists Graphic Designers

- Prevalence studies
- Global burden of diseases studies
- HBP of AB-PMJAY

- Review by Editorial Board
- Approval by Advisory Committee

NEONATOLOGY

July/ 2020

Department of Health Research
Ministry of Health and Family Welfare, Government of India

Standard Treatment Workflow (STW)

NEONATAL TRANSPORT

INDICATIONS FOR TRANSPORT IN NEONATES

REFERRAL TO HIGHER CENTRE

Any newborn who is assessed by the Health Care Provider as sick and needs referral

NBCC/NBSU TO SNCU

- Birth weight <1800 grams and/or gestational age <34 weeks
- Neonates with:
  - Apnea or gasping
  - Respiratory distress with retractions or grunt, or not maintaining SpO_2 with oxygen
  - Persistent Hypothermia or Hyperthermia
  - Severe jaundice requiring intensive phototherapy
  - Vomiting or abdominal distention
  - Central cyanosis
  - Need of positive pressure ventilation>60 seconds at birth
  - Non-passage of stool or urine for more than 24 hours after birth
  - Shock (Cold periphery with CFT > 3 seconds, and weak/fast pulse)
  - Refusal to feed, less movement, abnormal movements
  - Significant bleeding

SNCU TO NICU

- Birth weight <1000 grams and/or gestational age < 28 weeks
- Neonates with:
  - Respiratory distress requiring mechanical ventilation
  - Unresponsive shock
  - Jaundice requiring exchange transfusion, if facility is not available
  - Refractory seizures
  - Need for surgical intervention
  - Birth asphyxia qualifying for therapeutic hypothermia
  - Multiorgan failure
  - Refractory hypoglycemia
  - Acute kidney injury needing dialysis

PREPAREDNESS AND PRE-TRANSPORT STABILIZATION

- Identify and communicate with the referral facility
- Check availability of the services and bed in the referral facility (e.g. Ventilator)
- Explain the condition of the patient, need for transport to higher facility, the expected plan and prognosis to the family
- Discuss with parents the possible expenses
- Take informed consent of the parents prior to transport
- Share the contact numbers of both referring and the receiving facility including the concerned doctor
- Enclose (1) Complete summary (2) All investigations (3) Mother's blood sample
- Identify the transport team with appropriate skilled persons
- Ensure the logistics and the vehicle are organised
- If shock present - start treatment before transport
- All doses of antibiotics and drugs should be timed prior to transport
- Check temperature and blood glucose prior to transport
- Ensure clear airway, appropriate respiratory support and secure IV access

MONITORING AND MANAGEMENT DURING TRANSPORT

MONITORING DURING TRANSPORT

- **Parameters to be monitored:** Temperature, Heart rate, Respiratory rate, Air entry, SpO_2, GI Aspirates, Position of tubes (ET, OG, Catheter, ICD, IV cannula), Ventilator/ Continuous positive airway pressure (CPAP) settings
- **Frequency of monitoring:** Every 30 minutes depending on the sickness of the baby
- **Communication:** Parents and the receiving doctor should be informed of any change in the condition of the baby by the transport team

MANAGEMENT DURING TRANSPORT

- Maintain temperature and warmth (incubator / clothing / Kangaroo Mother Care)
- Position, clear the secretion and assess for need of intubation
- Assist with appropriate respiratory support (Oxygen, CPAP, Neonatal ventilation). Stop the vehicle if needed for urgent care, e.g. intubation
- Manage shock by titrating the fluids and inotropes
- Appropriate quantity, frequency and modality of feeding should be followed during transport (preferably breastfeeding or expressed breastmilk)

TRANSFER (HANDING OVER) TO THE RECEIVING CENTER BY TRANSPORT TEAM

Transport team should assist the transfer of the baby to the SNCU/ NICU in the receiving center

Once transferred to the SNCU/ NICU bed, the baby should be stabilized by both the teams

The recieving doctor should have a one to one discusssion with the handing over team

All the documents viz. discharge summary, investigations, mothers' samples, list of awaited investigations that will be intimated later etc. should be handed over

The family should be introduced to the new team in person

ABBREVIATIONS

CFT: Capillary filling time
ET: Endo tracheal
ICD: Intercostal drain
NBCC: Newborn care corner
NBSU: Newborn stabilization unit
NICU: Neonatal Intensive care unit
OG: Orogastric
SNCU: Special Newborn care unit
SpO_2: Pulse Oxygen saturation

REFERENCE

1. Transport of a sick neonate. Evidence-based clinical practice guidelines. National Neonatology Forum India. Available at www.nnfi.org/cpg

☛ AVOID INVASIVE PROCEDURES DURING TRANSPORT

This STW has been prepared by national experts of India with feasibility considerations for various levels of healthcare system in the country. These broad guidelines are advisory, and are based on expert opinions and available scientific evidence. There may be variations in the management of an individual patient based on his/her specific condition, as decided by the treating physician. There will be no indemnity for direct or indirect consequences. Kindly visit the website of DHR for more information: (**stw.icmr.org.in**) for more information.

July/ 2020

Department of Health Research
Ministry of Health and Family Welfare, Government of India

INDIAN COUNCIL OF MEDICAL RESEARCH
Serving the nation since 1911

Standard Treatment Workflow (STW)

NEONATAL EMERGENCY TRIAGE ASSESSMENT AND MANAGEMENT

SICK OR AT-RISK NEONATE PRESENTING TO HEALTH FACILITY

- Place under radiant warmer
- Attach temperature probe and pulse oximeter
- Assess for emergency signs using TABCD
  - **T**emperature
  - **A**irway and **B**reathing
  - **C**irculation (CFT, pulse, BP)
  - **C**oma/**C**onvulsions
  - **D**ehydration

EMERGENCY SIGNS
- Apnea or gasping
- Severe respiratory distress (severe retractions, grunt, RR>70)
- Central cyanosis/oxygen satuation <91%
- Shock (Cold peripheries, mottled/grey skin, CFT>3 sec, weak & fast pulse, low BP)
- HR > 200/min
- Coma or convulsions
- Severe dehydration(in cases of diarrhoea)
- Severe Hypothermia (< 32°C)

PRIORITY SIGNS
- Weight < 1800 g or > 3.8 kg
- Respiratory distress(RR>60, no retractions)
- Severe jaundice (onset < 24 h /palm or sole staining/ duration > 2 weeks)
- Severe pallor
- Bleeding
- Major malformation (tracheo-esophageal fistula, meningomyelocele, gastroschisis, anorectal malformation)
- Abdominal distension
- Irritable/Restless
- Refusal to feed
- Moderate (32-35.9°C) or mild (36-36.4°C) hypothermia

NON-URGENT SIGNS
- Jaundice
- Transitional stools
- Minor birth trauma
- Minor malformations
- Superficial infections
- Breastfeeding difficulty
- Regurgitation

INITIATE EMERGENCY TREATMENT AND STABILIZE
- Resuscitation as per NRP
- Maintain TABC
- Check SpO_2 and start oxygen if < 91%
- Start CPAP if respiratory distress
- Start IV fluids as per weight and postnatal age (Refer to STW on Feeds & Fluids)
- Check blood glucose, draw CBC and blood culture, and give first dose of antibiotics(Refer to STW on Sepsis in neonates)

ASSESS AND ACT RAPIDLY
- Maintain TABC
- Check SpO_2 and start oxygen if < 91%
- Check blood glucose
- Start IV fluids (if abdominal distension/GI malformation) or gavage feeds (Refer to STW on Feeds & Fluids)
- Elicit perinatal risk factors for sepsis and evaluate if sepsis workup is needed (refer to STW on Sepsis in neonates)
- Investigations as per clinical findings

ASSESS AND COUNSEL
- Assessment and treatment as per requirement
- Explain danger signs
- Counsel for breastfeeding

Follow specific STWs
A neonate may have more than one condition

SPECIFIC MANAGEMENT WORKFLOWS

SHOCK
- Provide warmth
- IV NS 10mL/kg bolus over 30-60 min
- May repeat bolus if evidence of volume deficit
- Consider inotropes

HR> 200/MIN
- Urgent ECG-look for p waves
- If SVT, consider ice-pack and IV adenosine
- Check for and correct hyperthermia if present

SEVERE DEHYDRATION (Diarrhoea plus any two of lethargy, very slow skin pinch and sunken eyes)
- Provide warmth
- IV 30 mL/kg of RL or NS in 1 hour followed by 70 mL/kg in next 5 hours (WHO plan C)
- If IV not possible, give ORS at 20 mL/kg/h for 6 hours
- Assess 1-2 hourly and titrate the volume of fluids

HYPOTHERMIA (Refer to STW on thermal care of newborn)
- Mild (36-36.4°C): Warm environment, skin-to-skin contact, breastfeeding
- Moderate (32-35.9°C): Place under servo-controlled warmer; skin-to-skin contact till arranged
- Severe(< 32°C): As for moderate hypothermia plus IV fluids and inj. vitamin K

HYPOGLYCEMIA (Refer to STW on neonatal hypoglycemia)
- Blood glucose < 45mg/dL and asymptomatic : supervised breastfeeding or EBM
- Blood glucose < 20 mg/dL OR symptomatic : 2mL/kg 10% dextrose IV followed by infusion @ 6mg/kg/min

JAUNDICE (Refer to STW on neonatal jaundice)
- Serious jaundice (onset at < 24 h of age, palm or sole staining, or signs of acute bilirubin encephalopathy): Intensive phototherapy, consider IV fluids if suspicion of dehydration, prepare for exchange blood transfusion

SEIZURES (Refer to STW on neonatal seizures)
- Maintain TABC
- Check blood glucose by glucometer: If < 45 mg/dL, 2mL/kg 10% dextrose IV followed by infusion @ 6mg/kg/min
- If not controlled, 2 mL/kg 10% calcium gluconate IV, diluted 1:1 with D5, D10 or DW, over 10 min under cardiac monitoring
- If not controlled, Inj. Phenobarbitone 20 mg/kg IV over 15 mins. If seizures persist after 15 min. consider another bolus of 10mg/kg phenobarbitone over 10 min

SURGICAL
- Cover any skin defects with warm saline sterile gauze
- Maintain hydration
- Consult surgeon

BREASTFEEDING DIFFICULTY
- Observe and look for proper positioning and attachment of baby during breastfeeding
- Counsel mother

ABBREVIATIONS

CFT: Capillary filling time
CPAP: Continuous positive airway pressure
ECG: Electrocardiogram
EBM: Expressed breastmilk
NRP: Neonatal resuscitation protocol
NS: Normal saline
RL: Ringer lactate
SpO_2: Pulse oxygen saturation
SVT: Supraventricular tachycardia
STW: Standard treatment workflow
TABC: Temperature, airway, breathing, circulation

REFERENCE

1. Guideline for Paediatric emergency triage, assessment and treatment. World Health Organization 2016. Available at https://apps.who.int

☛ IDENTIFICATION AND PROMPT TREATMENT OF EMERGENCY AND PRIORITY SIGNS IS THE KEY TO PREVENT MORTALITY

This STW has been prepared by national experts of India with feasibility considerations for various levels of healthcare system in the country. These broad guidelines are advisory, and are based on expert opinions and available scientific evidence. There may be variations in the management of an individual patient based on his/her specific condition, as decided by the treating physician. There will be no indemnity for direct or indirect consequences. Kindly visit the website of DHR for more information: (**stw.icmr.org.in**) for more information.

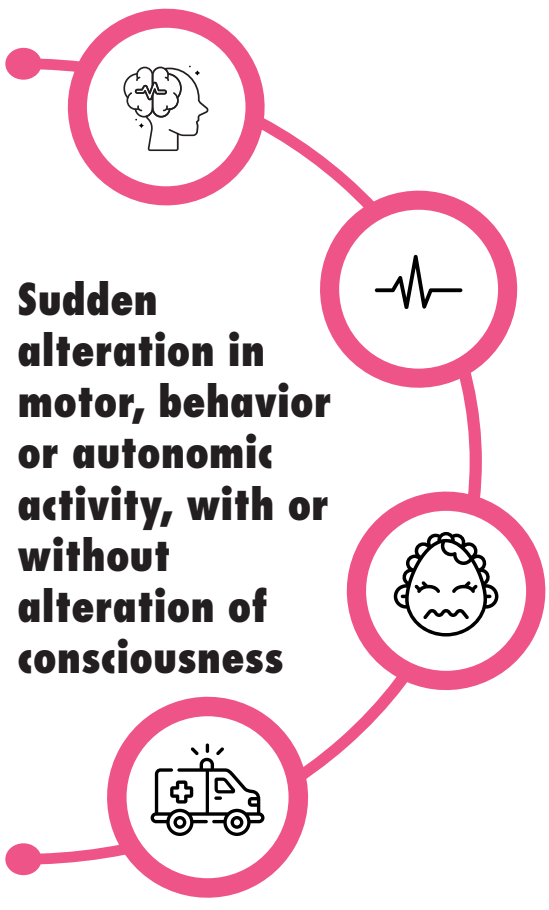
July/ 2020

Department of Health Research
Ministry of Health and Family Welfare, Government of India

Standard Treatment Workflow (STW)

NEONATAL SEIZURES

ICD-10-P90



NEONATES AT RISK FOR SEIZURES

- Birth asphyxia
- Sepsis
- Meningitis
- Preterm
- Small for gestational age
- Metabolic or electrolyte abnormalities
- Major bleeding

IDENTIFICATION OF SEIZURES

Motor manifestations
- Rhythmic jerks of limb(s) or facial part(s)
- Tonic contraction of limb(s)
- Stereotypical movements of limbs, face, eyes
  - **Limbs:** Pedalling, rowing, swimming, cycling, stepping
  - **Oral:** Pouting of lips, mouthing, repeated sucking
  - **Eyes:** Vacant stare, transient eye deviation, nystagmoid movements, repeated blinking

Behavioural manifestations
- Sudden change in consciousness or cry characteristic

Autonomic manifestations
- Fluctuations in heart rate, sudden change in BP, sudden appearance of unexplained apneic episodes

HISTORY

Antenatal: First trimester viral illness, PIH, diabetes, PROM/ chorioamnionitis, STDs, drugs or substance abuse, decreased fetal movements
Intrapartum: Fetal distress, difficult delivery, cord complications, mode of delivery, instrumentation
Postnatal: Resuscitation, other organ system involvement, feeding history, Seizure details: onset, duration, description (review videos)
Family: Consanguinity, early neonatal deaths, mental retardation, epilepsy

EXAMINATION

Vital signs: Temp, BP, HR, RR, CFT, SpO2
General: pallor, icterus, rash, skin lesions
Head to toe : Head circumference , bulging fontanelle, needle marks on scalp, dysmorphism, malformations, petechie, ecchymoses
Systemic exam : Level of alertness, cranial nerve and motor exam, examination of all systems
Fundus examination

INVESTIGATIONS

In all neonates: Blood glucose, Serum electrolytes, hemogram, ionized calcium, blood urea/ creatinine, liver function tests, blood gas analysis, cranial ultrasound
Specific circumstances
Suspected sepsis: cerebrospinal fluid examination
Suspected TORCH infections : paired mother and baby serology (for toxoplasma, CMV, rubella), body fluids for PCR (urine for CMV), CSF for toxoplasma, CMV, herpes
Suspected intracranial bleed: Ultrasound or CT or MRI head, Platelet count and Coagulogram
Electroencephalography

ACUTE MANAGEMENT OF SEIZURES

Goal of the treatment is the total or near total elimination of seizures. However, with higher doses and addition of more anti-epileptic drugs, the neonate requires intensive respiratory and cardiac monitoring. If recurrent seizures, isolated twitches may be just monitored

Neonate with seizure

Ensure TABC, IV access
Check blood glucose by Glucometer

BG < 45 mg/dL — Yes → 10% dextrose 2 mL/kg bolus, followed by infusion @ 6 mg/kg/min → Follow STW on Neonatal Hypoglycemia

No → 2 mL/kg 10% calcium gluconate IV, diluted 1:1 with D5, D10 or DW over 10 min under cardiac monitoring

If available, measure ionized Calcium (iCa). If iCa <1.0 mmol/L and seizures persist, repeat Calcium dose

Seizures persist

Inj. Phenobarbitone 20 mg/kg IV over 15 mins. If seizures persist after 15 min. consider another bolus of 10mg/kg phenobarbitone over 10 min. Assess seizure control after 15 min

Seizures persist

Phenytoin or Fosphenytoin 20 mg/kg PE: infuse over 20 min under cardiac monitoring. Assess seizure control after 30 min → Consider referral. Follow STW on Neonatal Transport

Seizures persist

Give Lorazepam 0.05 mg/kg IV over 2-5 mins
Can repeat dose once if seizures persist

Seizures persist

- Midazolam 0.1 mg/kg IV bolus, followed by continuous infusion (1µg/kg/min) increasing by 0.5 to 1 µg/kg/min every 2 min until a favorable response or max. 18 µg/kg/min
- Levetiracetam 40 mg/kg IV bolus followed by 40-60 mg/kg/day IV or oral in 2-3 divided doses

DURATION OF ANTICONVULSANTS

- Maintenance therapy is not needed in case of a single brief seizure that needs only one loading dose of phenobarbitone
- If more than one loading dose OR more than one drug is needed to control seizures - start the maintenance dose 24 h after the loading dose of the respective drugs. Prefer oral route if no contraindication
- After a seizure-free period of 72 h, stop all other anticonvulsants one by one, except phenobarbitone
- After one week or at discharge (whichever is earlier), stop phenobarbitone if neurological examination and EEG are normal. If the neurological examination or EEG is abnormal (electrical seizure activity or a burst-suppression background): discharge on maintenance therapy
- Review at monthly intervals and taper anticonvulsants if neurological examination and EEG become normal
- If anticonvulsants are required beyond 3 months, consult a neurologist and switch to other drugs

ABBREVIATIONS

BG: Blood glucose
BP: Blood pressure
CFT: Capillary filling time
CSF: Cerebrospinal fluid
DW: Distilled water for injection
EEG: Electroencephalography
HR: Heart rate
iCA: Ionised calcium
PIH: Pregnancy induced hypertension
RR: Respiratory rate
SGA: Small for gestational age
SPO2: Pulse oxygen saturation
STD: Sexually transmitted diseases
TABC: Temperature, airway, breathing, circulation

REFERENCES

1. Guidelines on neonatal seizures . World Health Organization 2011. Available at https://apps.who.int
2. Management of Seizures in the Newborn. Evidence Based Clinical Practice Guidelines. National Neonatology Forum India 2011. Available at www.nnfi.org/cpg

NEONATES WITH SEIZURES REQUIRE LONG TERM NEURODEVELOPMENTAL FOLLOW-UP AND HEARING ASSESSMENT

July/ 2020

Department of Health Research
Ministry of Health and Family Welfare, Government of India

INDIAN COUNCIL OF MEDICAL RESEARCH
Serving the nation since 1911

Standard Treatment Workflow (STW)

RESPIRATORY DISTRESS IN NEONATES

ICD-10-P22.0

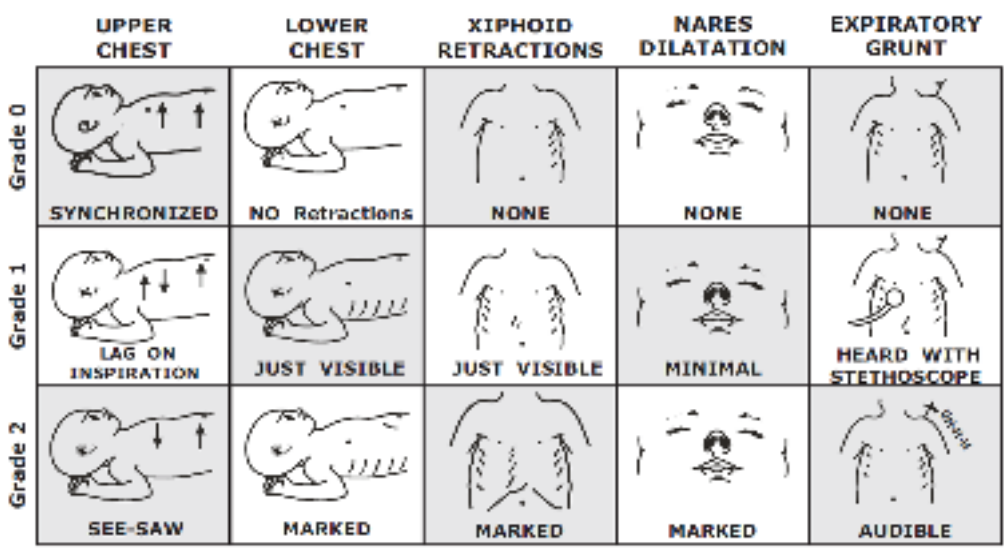
Presence of any one: Tachypnea (RR >60 bpm), OR lower chest retractions, nasal flaring, grunting OR cyanosis

ACTIONS

- Rapid assessment of TABC (temperature, airway, breathing, circulation) and stabilize the baby
- Admit the baby in SNCU/NICU
- Nurse in a radiant warmer/incubator; monitor with continuous pulse oximetry
- Quantify the severity of RD using Silverman Anderson Score [SAS]
- Closely monitor RR, SAS, SpO2, and CFT
- Most neonates with RD can be fed enterally (by breastfeeding [if RR<70 bpm and not on respiratory support] or orogastric tube). Those with severe distress or any contraindication to enteral feeding should be given IV fluids

GOALS

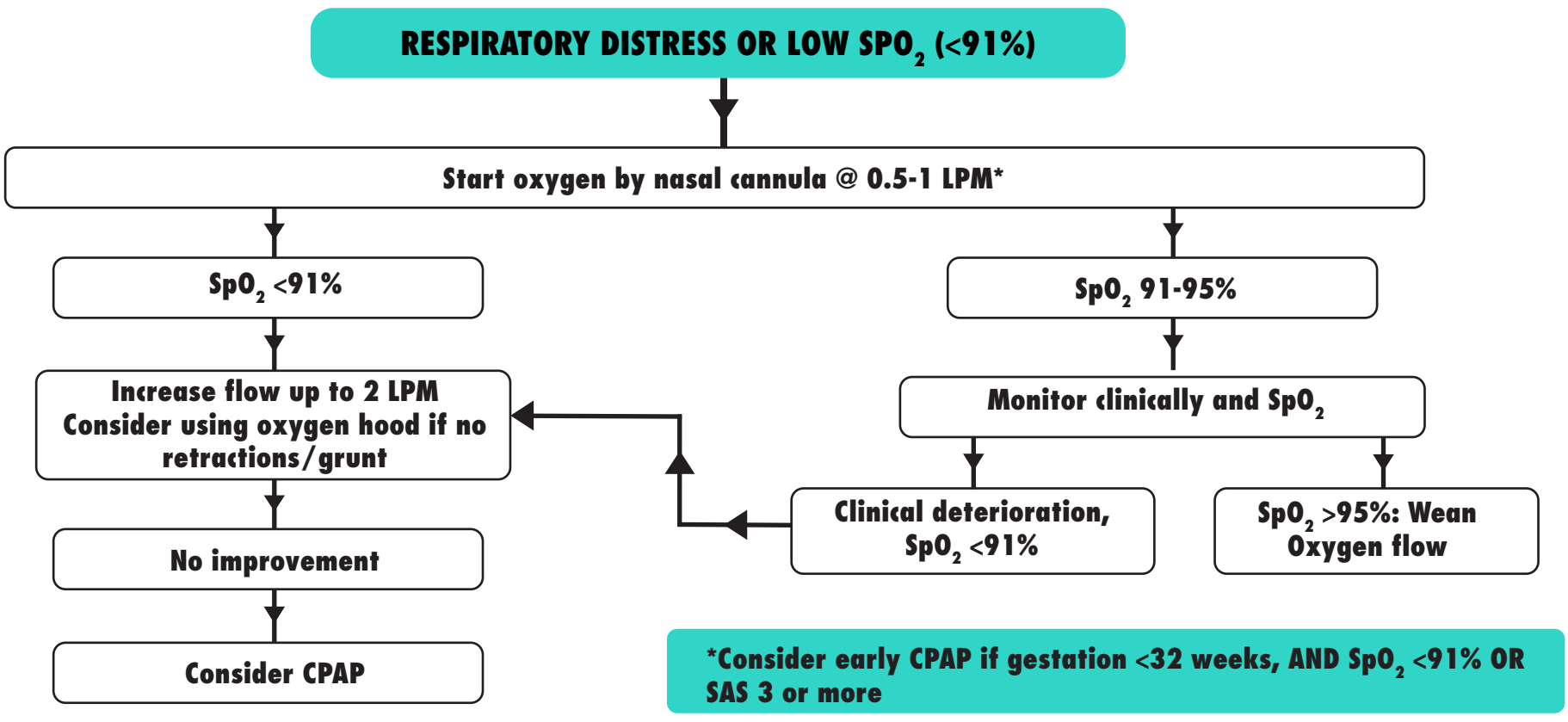
- To alleviate the work of breathing by providing appropriate respiratory support
- To maintain oxygen saturations from 91% to 95%
- Identify and treat the underlying cause



SILVERMAN ANDERSON SCORE (SAS)

RESPIRATORY SUPPORT

- SpO_2< 91%: Oxygen by nasal prongs(NP) 0.5 -1.0 Lpm (max. 2 Lpm)
- Gestation ≥ 32 weeks: CPAP if SAS 4 >, OR no improvement with NP oxygen
- Gestation < 32 weeks: CPAP if SpO_2< 91% OR SAS 1-3
- Those with severe RD (SAS of 5 >; FiO2 of more than 60-70%), unresponsive to CPAP, having shock or repeated episodes of apnea, may require mechanical ventilation and referral (See STW on Transport)



ASSESS AND TREAT THE UNDERLYING CAUSE

- **RESPIRATORY DISTRESS SYNDROME (RDS):** Consider surfactant replacement therapy as per indication
- **PNEUMONIA-SEPSIS:** Treat with antibiotics as per unit's protocol (refer to sepsis STW)

WHAT NOT TO DO

- DO NOT let SpO_2 exceedc 95% while supplementing oxygen. High oxygen saturation is a risk factor for retinopathy of prematurity
- DO NOT give unnecessary IV fluids, antibiotics, blood products or drugs
- DO NOT perform unnecessary investigations (CBC, CRP, routine ABG)
- DO NOT do routine chest X-ray in all neonates with RD. Perform chest X-ray if RD is persisting beyond 6 hours of age, there is worsening or a diagnostic dilemma

ABBREVIATIONS

BW: Birth weight
CPAP: Continuous positive airway pressure
CFT: Capillary filling time
GA: Gestational age
IV: Intravenous
RD: Respiratory distress
RR: Respiratory rate
SAS: Silverman Anderson score

REFERENCES

1. Oxygen therapy in neonates, and Surfactant Replacement therapy in neonates. Evidence-based Clinical Practice Guidelines. National Neonatology Forum India. Available at www.nnfi.org/cpg

☛ PREVENT HYPOXIA AND HYPEROXIA

July/ 2020

Department of Health Research
Ministry of Health and Family Welfare, Government of India

INDIAN COUNCIL OF MEDICAL RESEARCH
Serving the nation since 1911

Standard Treatment Workflow (STW)

THERMAL CARE OF NEWBORN

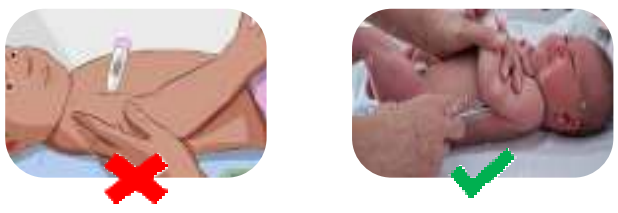
ICD-10-P81.8

Temperature measurement for neonates is mandatory in the given settings to diagnose hypothermia

- Delivery room - in the first hour after delivery
- Prior to and during transport
- At the time of admission
- Continuous monitoring for all babies nursed in radiant warmer/ incubator
- At-risk neonates staying with mother e.g. - LBW, preterms - every 4 hourly

STANDARD TECHNIQUE FOR MEASUREMENT OF TEMPERATURE

- Use a standard digital thermometer
- Place the tip in the neonate's axilla keeping it parallel to the neonate's trunk
- Read once the beep sound is heard



REGULARLY MONITOR TEMPERATURE AND DOCUMENT

Is it <36.5 °C?

NO → Regularly monitor temperature and document

YES →
- Check for possible cause of hypothermia
- Assess for risk factors & clinical features of sepsis (Refer to sepsis STW)
- Check room temperature

YES →

MILD HYPOTHERMIA: 36 °C- 36.4 °C

- Ensure room temperature 25-28 °C
- Provide skin-to-skin (STS) contact
- Continue breastfeeding
- If sick, nurse under radiant warmer

• RECHECK TEMPERATURE IN 1 HOUR:

- If normal, wrap properly
- If still <36.5 °C then treat as moderate hypothermia

MODERATE HYPOTHERMIA: 32 °C- 35.9 °C

- Nurse under radiant warmer in servo mode with temperature probe attached to neonate
- Continue skin-to-skin contact till warmer is available ensuring mother-neonate dyad is covered with pre-warmed linen
- Start O_2 if SpO_2<91%
- Check blood sugar, if <45 mg/dL then follow STW on Hypoglycemia
- Recheck temperature every 15 minutes till it normalizes
- Continue feeding if stable and abdominal examination is normal

SEVERE HYPOTHERMIA: <32 °C

- Manage as per moderate hypothermia
- Make nil per oral
- Start IV fluids (refer to STW on Feeds and fluids)
- Give Inj. Vitamin K
- Refer to higher centre if develops shock or respiratory failure (refer to STW on Neonatal Transport)

PREVENTION OF HYPOTHERMIA- MAINTENANCE OF WARM CHAIN

DELIVERY ROOM (DR)

- Radiant warmer is must in Neonatal Care Corner
- Area should be air draught free
- All DRs should have room thermometer
- Maintain DR temperature >25 °C
- Switch on radiant warmer 20-30 minutes before delivery
- Radiant warmer should be in manual mode with heater output being 100%
- Pre-warm two to three sterile towels by keeping them under radiant warmer for 20 minutes
- Practice early skin-to-skin contact for stable neonates for 1 hour or at least till first breastfeeding
- Dry newborn immediately after birth
- Remove wet linen immediately
- Weighing and checking temperature should be done after breastfeeding

POSTNATAL WARDS

- Cover neonate adequately
- Practice rooming-in 24x7
- Avoid air draughts by closing windows, doors, and switching off fans and air conditioners
- Start Kangaroo Mother Care (KMC) as early as possible for eligible neonate
- Promote exclusive breastfeeding
- Delay bath till after discharge
- Remove wet clothes as early as possible
- Educate mother regarding identification of hypothermia using touch method

WARM CHAIN DURING TRANSPORT

Without external heat source:

- A fully wrapped neonate with cap can be transported in an adult's arms in a closed vehicle
- Neonate can be transported in skin-to-skin contact
- Ensure that the neonate is in upright position and covered snuggly with the person's clothes and a blanket

With external heat source:

- A thermal mattress or a transport incubator
- Indigenous insulated boxes can be used in resource-limited settings
- No neonate should be placed naked in a trolley or bed without an external heat source

Early skin-to-skin contact

Adequate clothing & rooming-in

Kangaroo Mother Care

Radiant warmer

HYPERTHERMIA

- Neonates may become hyperthermic due to high environmental temperature and/ or overclothing
- Differentiate from sepsis: If both trunk & extremities are hot, an environmental cause is likely. If trunk is hot & extremities are cold, consider sepsis
- If baby is hyperthermic, move to cooler environment and decrease clothing. Ensure adequate breastfeeding and check weight loss
- If still hyperthermic, needs further evaluation

REFERENCES

1. World Health Organization. Maternal Health and Safe Motherhood Programme & Meeting of Technical Working Group on Thermal Control of the Newborn (1992 :Geneva, Switzerland). (1993). Thermal control of the newborn : a practical guide. World Health Organization. https://apps.who.int/iris/handle/10665/60042

☛ HYPOTHERMIA IN NEWBORNS INCREASES MORTALITY. PREVENT HYPOTHERMIA - MAINTAIN WARM CHAIN

July/ 2020

Department of Health Research
Ministry of Health and Family Welfare, Government of India

INDIAN COUNCIL OF MEDICAL RESEARCH
Serving the nation since 1911

Standard Treatment Workflow (STW)

NEONATAL HYPOGLYCEMIA

ICD-10-P70.4

WHOM TO SCREEN FOR HYPOGLYCEMIA?

- Preterm infants (< 37 weeks gestational age)
- Low birth weight Infants (< 2500 g)
- Small for gestation age (SGA): birth weight < 10th percentile
- Large for gestation age (LGA): birth weight > 90th percentile
- Infant of diabetic mother (IDM)
- Sick infants (eg: sepsis, asphyxia, respiratory distress, shock,polycythemia, seizure)
- Post exchange blood transfusion
- Infants on intravenous fluids and parenteral nutrition

Do not monitor blood glucose routinely in term healthy AGA infants

SCHEDULE OF BLOOD GLUCOSE (BG) MONITORING (PREFEED)

CATEGORY	TIME SCHEDULE
At-risk infants	At 2, 6, 12, 24, 48, 72 hours of life
Infants on IV fluids/ parenteral nutrition	Every 6-8 hours

HOW TO MONITOR BLOOD GLUCOSE (BG)?

- Use Glucose reagent strips along with a glucometer
- Low value (< 45 mg/dL) – Send a blood sample to the lab for confirmation
- Do not delay treatment

BLOOD GLUCOSE <45 mg/dL

LOOK FOR FOLLOWING SYMPTOMS AND SIGNS

- Stupor, lethargy, limpness
- Jitteriness, tremors, convulsions
- Episodes of cyanosis, apnea or tachypnea
- Weak and high-pitched cry
- Difficulty in feeding

ASYMPTOMATIC

- Immediate supervised feeding
- Breastfeeding or a measured volume of expressed breast milk (formula milk if EBM not available) by paladai or gavage

RE-CHECK BG AFTER 1 HOUR

If BG ≥ 45 mg/dL
- Continue feeds
- Continue BG monitoring every 6 hourly for 24 hours

Start IV glucose infusion if:
BG < 45 despite one attempt of feeding
OR
Baby becomes symptomatic

SYMPTOMATIC OR BG < 20mg/dL

- IV bolus: 2 mL/kg 10% dextrose
- Start IV infusion of dextrose at a glucose infusion rate (GIR) of 6 mg/kg/min

Re-check BG every 30 mins till 2 values ≥ 45 mg/dL & then every 6 hrs

BG < 45 mg/dL

Increase GIR @ 2 mg/kg/min till max GIR 12 mg/kg/min

Refractory hypoglycemia: High (>12 mg/kg/min for 24 hours) or persistent (> 7 days) GIR requirement

CONSIDER DRUGS* AND REFER TO HIGHER CENTRE

BG ≥ 45 mg/dL

Euglycemic for 24 hours on IV fluids

- Wean @ 2 mg/kg/min every 6 hourly
- Increase oral feeds
- Monitor BG every 6 hourly

Stop IV fluids when euglycemic on GIR 4 mg/kg/min

PREVENTION OF HYPOGLYCEMIA

- Support mother for early initiation and regular breastfeeding
- Maintain normothermia
- Do not feed 5%, 10% or 25% dextrose as a substitute for breast milk

PRACTICAL POINTS

- Avoid > 12.5-15% dextrose infusion through a peripheral vein
- Use a syringe/ infusion pump to deliver glucose
- Avoid frequent dextrose boluses
- Send blood in fluoride or oxalate vial for laboratory glucose estimation
- Always search for an underlying cause - polycythemia, sepsis, meningitis, hypothermia, IUGR
- Do not give antibiotics unless sepsis is suspected (refer to STW on sepsis)

*DRUGS FOR REFRACTORY HYPOGLYCEMIA

- Hydrocortisone: 5 mg/kg/day IV in two divided doses
- Diazoxide: 10-25 mg/kg/day PO in three divided doses
- Glucagon: 300 µg/kg SC or IM
- Octreotide: 2-10 µg/kg/day SC

ABBREVIATIONS

AGA : Appropriate for Gestational Age
EBM : Expressed breast milk
IV : Intravenous
IM: Intramuscular
PO : Per oral
SC : Subcutaneous
IUGR: Intra uterine growth retardation

☛ SYMPTOMATIC AS WELL AS ASYMPTOMATIC HYPOGLYCEMIA CAN LEAD TO PERMANENT BRAIN DAMAGE

July/ 2020

Department of Health Research
Ministry of Health and Family Welfare, Government of India

INDIAN COUNCIL OF MEDICAL RESEARCH
Serving the nation since 1911

Standard Treatment Workflow (STW)

FEEDS & FLUIDS IN NEONATES

ICD-10-R63.3

PART A
Nutritional plan for infants not on enteral feeds at admission

IF ANY OF THE FOLLOWING ARE PRESENT

- Gestation <35 wks & REDF in antenatal USG → NPO for 24 h → Re-assess → Abdomen soft, no distension → Start feeds @ 10-20 ml/kg/d → If tolerates, increase @ half of weight/ gestation specific increments
- OR
- Gestation <35 wks and birth weight <3rd centile or AEDF in antenatal USG, need for extensive resuscitation, HIE, 5 minute Apgar <7, has RED signs (Part B) → Keep NPO for 6 h → Re-assess → Abdomen soft, no distension & recovery from red signs → Start feeds as per gestation/ weight specific protocol
- OR
- Suspected GI malformation or suspected NEC → Keep NPO → Take pediatric surgery consultation*

NO

GA <26 weeks* BW < 750 g	GA 26-27 weeks* BW 750-999 g	GA 28-30 weeks BW 1000-1250 g	GA >30 weeks BW >1250 g
NPO for 24 h Trophic feeds @ 10 ml/kg/d for 48 h Increase @ 10-15 ml/kg/d	NPO for 24 h Start feeds @ 20 ml/kg/d Increase @ 15-20 ml/kg/d	Start feeds @ 30 ml/kg/d Increase @ 30 ml/kg/d	All fluid as feeds from D1

- For total daily fluid requirement see table 1. Remaining fluid requirement after accounting for feed volume, should be given as IV fluids and if feasible as PN in neonates born at less than 28 weeks or 1000 g*
- IV fluids can be stopped once infant is tolerating feeds @ 120 mL/kg/d, if blood glucose is maintained.
- Preferred mode of feeding: < 32 weeks: Oro-Gastric tube; 32-34 weeks: Spoon/Paladai; and ≥ 35weeks: Breast feeds
- Choice of milk in order of preference: Expressed breast milk (EBM) >> pasteurized donor human milk >> formula milk
- Frequency of feeds: q 2 h if PMA < 32 weeks/ weight <1500g and q 3 h if ≥ 32weeks/ weight ≥1500g
- Add supplements as per Table 2

**Indicates conditions which need admission/referral to tertiary care health facility*

PART B
Nutritional plan for infants on partial or full enteral feeds at admission

ARE ANY OF THESE RED SIGNS PRESENT?

- Significant respiratory distress (Silverman/ Downe score>6)
- Ongoing hypoxia or moderate to severe apneas
- Ongoing seizures
- Severe hypothermia
- Shock needing inotropes
- Feed intolerance (abdominal distension with vomiting, bilious or bloody gastric aspirates)

NO → Continue feeds and advance as given in flow chart in part A

YES → Keep NPO and start IV fluids
Consider PN if gestation < 28 weeks or weight <1000 g*
Take Pediaric surgery consultation if suspecting GI obstruction or peritonitis* → Every 12-24 h re-assess for readiness of feed by presence of soft abdomen, no distension and absence of red signs → Restart at 50% of the volume of feed being tolerated before making NPO and make increment as per chart in part A

TABLE 1
Maintenance volume (Enteral + IV, mL/kg/d) and type of IV fluids

BIRTH WEIGHT	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
<1000 g or Gestation <28 weeks	80-100	Advance strictly as per clinical and lab hydration status					
1000-1250g 28 to 30 weeks	80	100	120	140	150	150-160	150-160
>1250 g >30 weeks	60	80	100	120	140	150	150-160
Type of IV fluids	Start with D10 Titrate dextrose concentration as per blood glucose	N/5 in D10 with KCl					

TABLE 2
Supplements

- Start when infant is on 100ml/kg/day of enteral feeds
- Start Iron at 2 weeks of age

Weight <1800 gram or Gestation <35 weeks
- If on EBM Or Donor Milk: HMF + Iron + Vitamin D3
- If on Breastfeeds: Iron + Calcium + Phosphorus + Multivitamins + Vitamin D3
- If on Preterm Formula: Iron and Vitamin D3

Weight >=1800 gram and Gestation >=35 weeks
- Vitamin D 3 and Iron (only for gestation <37 weeks)

Dose	Duration
Iron: 2mg/kg/day Vit -D3: 400 IU to 800 IU/day Calcium: 120mg/kg/day Phosphorus: 60mg/kg/day	Iron and Vit-D3: till 1 year Calcium and Phosphorus: till term PMA Multivitamins: till 6 months

- Table 1 is a general guide and daily increments may be based on daily weight change, urine output, serum sodium and co-morbidities such as PDA or sepsis
- Daily increments of feed should be based on tolerance and weight gain.
- Monitor growth by regular measurement of weight and head circumference. Once full feeds have been achieved, preterm neonates are expected to gain weight @ 10-20 g/kg/day. Plot the growth parameters on intergrowth 21st postnatal charts for preterm neonates
- If not gaining weight adequately on exclusive enteral feeds, after 2 weeks of life, feed volume may be increased gradually upto 200-250 mL/kg/d as per tolerance

ABBREVIATIONS

AEDF: Absent end diastolic flow
HIE: Hypoxic ischemic encephalopathy
HMF: Human milk fortifiers
NEC: Necrotizing enterocolitis
PDA: Patent ductus arteriosus
PMA: Post menstrual age
PN: Parenteral nutrition
REDF: Reversed end diastolic flow

EARLY AND AGGRESSIVE ENTERAL FEEDING BY BREASTMILK DECREASES MORTALITY AND MORBIDITY

July/ 2020

Department of Health Research
Ministry of Health and Family Welfare, Government of India

INDIAN COUNCIL OF MEDICAL RESEARCH
Serving the nation since 1911

Standard Treatment Workflow (STW)

NEONATAL JAUNDICE IN INFANTS ≥ 35 WEEKS

ICD-10-P59.9

Approach to neonatal jaundice

VISUAL ASSESMENT

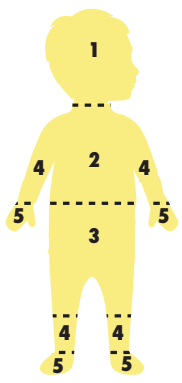
- Examine the baby in bright natural/ white fluorescent light
- Make sure the baby is naked and no yellow/ off white background
- Examine blanched skin
- Assess severity of jaundice

LOOK FOR THESE RISK FACTORS

- Gestation < 38 weeks
- Previous sibling requiring treatment for jaundice
- Blood group incompatibility (ABO/Rh)
- High prevalence of G6PD deficiency
- Exclusively breast fed baby with weight loss >3% per day; or >10% cumulative
- Total serum bilirubin (TSB) / Transcutaneous bilirubin (TcB) value in the high/ high-intermediate risk zone

ASSESSMENT OF SEVERITY OF JAUNDICE

Clinical examination every 12 hrs during the initial 3 to 5 days of life; use TcB if available



	KRAMER ZONES	APPROX SERUM BILIRUBIN
1	Face and neck	4 to 6 mg/dL
2	Chest and upper abdomen	8 to 10 mg/dL
3	Lower abdomen and thighs	12 to 14 mg/dL
4	Legs and arms/ forearms	15 to 18 mg/dL
5	Palms and soles	>15 to 20 mg/dL

ASSESS IF THE BABY HAS SERIOUS JAUNDICE*?

SERIOUS JAUNDICE

- Visible jaundice in first 24 hrs OR
- Yellow palms and soles anytime OR
- Signs of acute bilirubin encephalopathy (ABE) like poor suck/feeding, lethargy, hypotonia OR
- Abnormal posturing such as arching, retrocollis, opisthotonus, convulsion, fever, high pitched cry

MANAGEMENT

Does the infant have serious jaundice?

YES

Start Intensive Phototherapy
- Document serum bilirubin simultaneously
- Prepare for exchange blood transfusion (EBT) if signs of ABE are present

As per TSB, determine if baby requires phototherapy/ EBT if TSB at/more than cut-off?

YES

Continue phototherapy/prepare for EBT and determine the cause

Investigation:
- Blood type and DCT (if mother is 'O' or Rh -ve
- G6PD status
- Peipheral smear and reticulocyte count

Stop phototherapy
TSB falls below 13-14 mg/dL or 2 mg/dL below cut-off

NO

Stop phototherapy

NO

Does the infant require TSB measurement ?
- Jaundice in first 24 hrs ?
- Beyond 24 hrs: more than 12-14 mg/dL on visual assessment / TcB or near PT cut-off ?
- Unsure about visual assessment ?

YES

NO

Continue visual assessment/TcB (if available) every 12 to 24 hrs till discharge

ENSURING OPTIMAL PHOTOTHERAPY

- Keep the baby naked (only small nappy to cover the genitalia and eye covers)
- Place the baby close to the lights
- Phototherapy can be interrupted for feeding & clinical procedures
- Encourage frequent breastfeeding
- Monitor temperature regularly
- Maintain equipment as per manufacturer's instructions
- Frequency of repeat TSB measurement depends on cause, severity, age and gestation
  - **Hemolytic jaundice :** 6 to 8 hourly during initial 24 to 48 hrs
  - **Non-hemolytic jaundice :** 12-24 hourly

ENSURING OPTIMAL EXCHANGE BLOOD TRANSFUSION (EBT)

- Immediate EBT is recommended if infant shows signs of ABE or if TSB is above the recommended age and risk specific cut off
- Exchange volume = Twice the estimated blood volume of 80-100 mL/kg

DISCHARGE ADVICE

- Reinforce breastfeeding at discharge
- If discharged before 72 hrs; follow up at 48 to 72 hrs after discharge

SOME IMPORTANT DO'S ✓	SOME IMPORTANT DON'TS ✗
Encourage frequent breastfeeding	Sunlight should not be used for treatment of hyperbilirubinemia
Avoid exposure to naphthalene balls	Do not rely on visual assessment/ TcB while the baby is under phototherapy
Complete evaluation of newborn is important to evaluate for risk factors and underlying causes	Do not give phenobarbitone for treatment of hyperbilirubinemia
Do pre-discharge risk assessment	Do not stop breastfeeding

ABBREVIATIONS

ABE: Acute bilirubin encephalopathy
DCT: Direct coombs test
EBT: Exchange blood transfusion
G6PD: Glucose-6-phosphate dehydrogenase
TcB: Transcutaneous bilirubin
TSB: Total serum bilirubin

REFERENCES

1. Screening, Prevention and Management of Neonatal Hyperbilirubinemia. Clinical Practice Guidelines. National Neonatology Forum India 2020. www.nnfi.org/cpg
2. Management of hyperbilirubinemia in the newborn infant 35 or more weeks of gestation. American Academy of Pediatrics Practice Guidelines . www.cdc.gov

☛ HYPERBILIRUBINEMIA IS A PREVENTABLE CAUSE OF BRAIN DAMAGE

July/ 2020

सत्यमेव जयते

Department of Health Research
Ministry of Health and Family Welfare, Government of India

INDIAN COUNCIL OF MEDICAL RESEARCH
Serving the nation since 1911

Standard Treatment Workflow (STW)

POST-ASPHYXIAL MANAGEMENT OF NEONATES

ICD-10-P21.0

IMMEDIATE MANAGEMENT OF AN ASPHYXIATED NEONATE

Need for Positive pressure ventilation (PPV) at birth
OR
Referred with history of delayed cry at birth

- PPV for <60 seconds OR
- Delayed cry and resuscitation details not available

Assess 15 minutes after birth OR at admission

1. Lethargy/coma or irritability?
2. Absent spontaneous movements?
3. Absent Suck and Moro's reflex ?
4. Abnormal movements (limb jerks, cycling, swimming, chewing, sucking movements which are persistent and monotonous) ?
5. Respiratory distress ?
6. Features of shock ?

No

- Shift to mother's side
- Initiate breastfeeding
- Skin-to-skin contact
- Observe every 15 minutes for 1 hour

- PPV for 60 seconds or more OR
- Needed intubation or medications OR
- Cord pH <7.1 (if available)

At risk of hypoxic-ischemic encephalopathy (HIE)

Yes

Check vitals and blood glucose

- Temperature, heart rate, respiratory rate, oxygen saturation (SpO_2), capillary refill time
- Check blood glucose

If any value is abnormal, follow appropriate STW for Neonatal Triage

Stabilization and Supportive Treatment

- Secure airway
- If SpO_2 <91%, start O_2 by prongs/ hood
- If respiratory distress persists, follow STW for respiratory distress; consider CPAP if chest retractions or persistent hypoxia
- Start IV 10% dextrose at 60 mL/kg/day
- Maintain normal temperature; avoid hyperthermia
- Target blood glucose of 50-125 mg/dL
- If infant has seizures, follow STW for seizure

Assess for moderate to severe HIE

Lethargic or comatose with ANY ONE of the following:

1. Seizures
2. Decreased muscle tone
3. Absent /weak Suck or Moro's reflex

Yes → Moderate or severe HIE → Needs further assessment; may need therapeutic hypothermia

No → **No HIE or Mild HIE**

- Initiate feeds once vitals are stable
- Switch to breastfeeding as early as possible.
- Continue monitoring for 24hrs

NEONATE WITH MODERATE OR SEVERE HYPOXIC-ISCHEMIC ENCEPHALOPATHY

FULFILLS ALL OF THE FOLLOWING CRITERIA?

- ≥ 36 weeks gestational age
- ≥ 1800g birth weight
- < 6 hrs old
- Admission temperature 36-37.4 ^{0}C

NO → **PROVIDE SUPPORTIVE TREATMENT**

- Secure airway
- If SpO_2 <91%, start O_2 by prongs/ hood
- Start IV 10% dextrose at 60 mL/kg/day
- Maintain normal temperature; avoid hyperthermia
- Target blood glucose of 50-125 mg/dL
- If infant has seizures, follow STW for seizures

YES

All of the following are fulfilled:

- pH <7 or base excess ≥16 on cord or arterial blood gas done within 1 h of life **AND**
- Apgar score< 5 at 10 minutes or at least 10 min of PPV **AND**
- History of acute perinatal event (such as but not limited to placental abruption, uterine rupture, cord prolapse)

NO → **PROVIDE SUPPORTIVE TREATMENT** (as above)

YES

Moderate to Severe HIE

NO → **PROVIDE SUPPORTIVE TREATMENT** (as above)

YES

Written protocol and facility for therapeutic hypothermia and level-3 intensive care available?

NO → **REFER TO HIGHER CENTRE**

YES

Initiate whole body cooling using a servo-controlled mattress / phase-change material (PCM) based device / ice or gel packs.

- If using gel or ice packs/PCM - ensure presence of nurse in 1:1 ratio for the neonate being cooled
- Whatever the device used, the cooling targets and monitoring are similar:
  - Continuous rectal temperature monitoring is required from initiation until 8 hrs after rewarming
  - Target rectal temperature is 33-34 °C
  - Induction: aim to attain target temperature in the first 30 minutes
  - Maintenance: continue to maintain target temperature for 72 hrs after initiation
  - Rewarming: increase rectal temperature to 36.5 °C over 6-12 hrs, at a rate ≤ 0.5 °C per hour

ABBREVIATIONS

BE: Base excess
CBC: Complete blood count
CRP: C reactive protein
CSF: Cerebrospinal fluid
HIE: Hypoxic-ischemic encephalopathy
NICU: Neonatal intensive care unit
PPV: Positive pressure ventilation
SNCU: Special newborn care unit

REFERENCES

1. NNF Working Group. Position Statement and Guidelines for Use of Therapeutic Hypothermia to treat Neonatal Hypoxic Ischemic Encephalopathy in India. New Delhi: National Neonatology Forum, India; 2021 Oct.
2. Sarnat HB, Sarnat MS. Neonatal Encephalopathy Following Fetal Distress: A Clinical and Electroencephalographic Study. Arch Neurol-chicago. 1976; 33(10):696–705.
3. Abate BB, Bimerew M, Gebremichael B, Kassie AM, Kassaw M, Gebremeskel T, et al. Effects of therapeutic hypothermia on death among asphyxiated neonates with hypoxic-ischemic encephalopathy: A systematic review and meta-analysis of randomized control trials. Plos One. 2021; 16(2):e0247229.

FREQUENT MULTI-SYSTEM MONITORING IS A MUST

This STW has been prepared by national experts of India with feasibility considerations for various levels of healthcare system in the country. These broad guidelines are advisory, and are based on expert opinions and available scientific evidence. There may be variations in the management of an individual patient based on his/her specific condition, as decided by the treating physician. There will be no indemnity for direct or indirect consequences. Kindly visit the website of DHR for more information: (**stw.icmr.org.in**) for more information.

July/ 2020

Department of Health Research
Ministry of Health and Family Welfare, Government of India

INDIAN COUNCIL OF MEDICAL RESEARCH
Serving the nation since 1911

Standard Treatment Workflow (STW)

SEPSIS IN NEONATES

ICD-10-P36

Assess every neonate born in or brought to a health facility for presence of sepsis, at admission and during hospital stay, by looking for red and yellow flag signs and risk factors

RED FLAG SIGNS

- Shock
- Bleeding from multiple sites
- Hardening of skin so that it cannot be pinched off the underlying tissue or bone (look at cheeks and thighs)
- Respiratory distress onset more than 6 hrs after birth
- Respiratory distress needing intubation or Silverman's score >6
- If age of baby is less than 7 days and mother has foul smelling discharge or chorioamnionitis

YELLOW FLAG SIGNS

Seizures	Refusal to feed	HR>160 persisting for one hour despite normal temperature	Respiratory distress	Floppiness
Lethargy	Feed intolerance	New or increased apneic episodes	Fever or hypothermia not due to environmental temperature	

Any of the maternal risk factors: If age of baby is less than 7 days and mother has

Dai handling or unclean vaginal examination	Rupture of membranes ≥18 hrs	pPROM	Urinary tract infection	Diarrhea	Fever

HIGH PROBABILITY OF SEPSIS

Start treatment and investigate

- Any RED flag sign is present
- Two YELLOW signs/ maternal risk factors are present
- One YELLOW sign or maternal risk factor is present AND baby's gestation at birth is ≤ 32 weeks

- Admit in the NICU/SNCU
- Obtain blood sample for culture and sensitivity
- Start empirical antibiotics as per local/unit policy pending reports
- Provide supportive care and do appropriate laboratory investigations as indicated clinically (Chest X-ray, CBC, platelet count, RBS, serum electrolytes, renal functions)
- Perform lumbar puncture (LP) for CSF analysis when baby is hemodynamically stable

AT-RISK/SUSPECT SEPSIS

Observe

- One YELLOW sign or maternal risk factor is present AND
- Baby's gestation at birth is >32 weeks

- Keep baby under close observation for 48-72 hrs
- Start antibiotics if another yellow/ red sign appears during observation
- Obtain sample for blood culture and sensitivity before starting antibiotics
- Perform LP for CSF analysis if starting antibiotics or if the blood culture is positive

REVIEW AT 48 HRS

SIGNS OF SEPSIS DISAPPEARED AND CRP <12 MG/L

- Stop antibiotics
- Keep under observation till blood culture is reported as sterile after 48 hrs of incubation

SIGNS OF SEPSIS IMPROVING BUT STILL PRESENT

- Continue antibiotics
- Antibiotic duration based on blood culture and LP report

SIGNS OF SEPSIS WORSENED, OR A RED SIGN APPEARED AFTER STARTING TREATMENT

- Upgrade antibiotics as per antibiotic local/unit policy
- Antibiotic duration based on blood culture and LP report

If antibiotics are continued, review again at 5 days: If baby is now well from last 48 hrs, blood culture is sterile and CSF is normal: Stop antibiotics

If blood culture was not done, a negative CRP or Procalcitonin at 24-48 hrs after starting antibiotics, can help in early stopping of antibiotics

DURATION OF ANTIBIOTICS

CONDITION	DURATION
Pneumonia	5-7 DAYS
Sepsis with CRP >12 mg/L AND sterile blood culture AND normal CSF analysis	5-7 DAYS
Blood culture positive	10-14 DAYS
CSF suggestive of meningitis	21 DAYS

REMEMBER

Do not start antibiotics without indication. Clinical features in neonates are non-specific. Looking for alternative reasons for sickness and careful serial observations are important ways to avoid unnecessary use of antibiotics.

Believe a negative blood culture report and stop antibiotics if baby has recovered.

Main utility of both CRP and procalcitonin is to rule-out sepsis. A positive test may also be due to several non-infective conditions. Therefore, a positive CRP or procalcitonin should be interpreted carefully giving due weightage to clinical course of the baby.

ABBREVIATIONS

CBC: Complete blood count
CRP: C-reactive protein
CSF: Cerebrospinal fluid
LP: Lumbar puncture
NICU: Neonatal intensive care unit
pPROM: Preterm premature rupture of membranes
RBS: Random blood sugar
SNCU: Special newborn care unit

REFERENCES

1. Sankar MJ, Agarwal R, Deorari AK, Paul VK. Sepsis in the newborn. Indian J Pediatrics. 2008; 75(3):261–6.
2. The Young Infants Clinical Signs Study Group. Clinical signs that predict severe illness in children under age 2 months: a multicentre study. Lancet. 2008; 371(9607):135–42.
3. Neonatal infection: antibiotics for prevention and treatment. London: National Institute for Health and Care Excellence (NICE); 2021 Apr 20. (NICE Guideline, No. 195.). Available from: https://www.nice.org.uk/guidance/ng195 Last access on 20/04/2022

PREVENT SEPSIS BY ENSURING HAND HYGIENE, ASEPSIS DURING PROCEDURES AND DILIGENT HOUSEKEEPING

This STW has been prepared by national experts of India with feasibility considerations for various levels of healthcare system in the country. These broad guidelines are advisory, and are based on expert opinions and available scientific evidence. There may be variations in the management of an individual patient based on his/her specific condition, as decided by the treating physician. There will be no indemnity for direct or indirect consequences. Kindly visit the website of DHR for more information: (**stw.icmr.org.in**) for more information.

CONTRIBUTORS

ADVISORY COMMITTEE

CHAIRMAN

Prof. (Dr.) Balram Bhargava, Secretary-DHR and DG-ICMR

VICE CHAIRMAN

Dr. Nikhil Tandon, AIIMS, New Delhi

MEMBERS

Dr. Anil Bhansali, Endocrinology, PGIMER, Chandigarh
Mrs. Anu Nagar, Jt. Secretary, Dept. of Health Research, MoHFW, Govt. of India
Dr. Ashok Deorari, Neonatology, AIIMS, New Delhi
Dr. Binod K Khaitan, Dermatology, AIIMS, New Delhi
Dr. Pramod Garg, Gastroenterology, TISHTI, Faridabad
Dr. Radhika Tandon, Ophthalmology, AIIMS, New Delhi
Dr. Rajdeep Singh, General Surgery, MAMC, New Delhi
Dr. S. C. Goel, Orthopaedics, BHU, Varanasi
Dr. Sandeep Agarwala, Paediatrics, AIIMS, New Delhi
Dr. Sudeep Gupta, Oncology, TMC, Mumbai
Dr. T. Sundararaman, Former Executive Director, NHSRC, New Delhi
Dr. Usha Dutta, Gastroenterology, PGIMER, Chandigarh
Ex officio Additional Secretary & MD (NHM), MoHFW, Govt. of India
Ex officio Director General Health Services / Representative

EDITORIAL BOARD

EXTERNAL COMMITTEE

Dr. Anil Bhansali, Endocrinology, PGIMER, Chandigarh
Dr. Anurag Srivastava, Oncology, AIIMS, New Delhi
Dr. Deepika Pandhi, Dermatology, UCMS, New Delhi
Dr. Neeraj Gupta, Paediatrics, AIIMS, Jodhpur
Dr. Radhika Tandon, Ophthalmology, RP Centre, AIIMS, New Delhi
Dr. Rajdeep Singh, General Surgery, MAMC, New Delhi
Dr. Usha Dutta, Gastroenterology, PGIMER, Chandigarh
Dr. Vijay Jain, Orthopaedics, RML, New Delhi

INTERNAL COMMITTEE

Dr. R S Dhaliwal, Scientist G & Head (NCD), ICMR
Dr. Ashoo Grover, Scientist F, ICMR
Dr. Lokesh Kumar Sharma, Scientist E, ICMR
Dr. Aparna Mukherjee, Scientist E, ICMR
Dr. Jerin Jose Cherian, Scientist D, ICMR
Dr. Saumya Srivastava Aggarwal, Project Scientist C, ICMR

EXPERT GROUPS

NEONATOLOGY

CHAIR

Dr. Ashok K Deorari, AIIMS, New Delhi

CO-CHAIR

Dr. Praveen Kumar, PGIMER, Chandigarh

MEMBERS

Dr. Adhisivam B, JIPMER, Puducherry

Dr. Anu Sachdeva, AIIMS, New Delhi

Dr. Ashish Jain, MAMC, New Delhi

Dr. Ashish Mehta, ANCC, Ahmedabad

Dr. Asim Kumar Mallick, NRSMH, Kolkata

Dr. Damera Yadaiah, GGH, Nalgonda

Dr. Deepak Chawla, GMC, Chandigarh

Dr. Geeta Gathwala, Pt. BDS PGIMS, Rohtak

Dr. Gopal Agrawal, CH, Gurgaon

Dr. J Kumutha, SMC, Chennai

Brigadier (Dr.) K Venkatnarayan, NITI Ayog, New Delhi

Dr. M JeevaSankar, AIIMS, New Delhi

Dr. Mangala Bharathi S, MMC, Chennai

Dr. Nandkishor S Kabra, SH, Mumbai

Dr. Neelam Kler, SGH, New Delhi

Dr. Neeraj Gupta, AIIMS, Jodhpur

Dr. Nishad Plakkal, JIPMER, Puducherry

Dr. Poorva Gohiya, GMC, Bhopal

Dr. Ramesh Agarwal, AIIMS, New Delhi

Dr. Rhishikesh Thakre, NCH, Aurangabad

Dr. Ruchi N. Nanavati, KEM, Mumbai

Dr. S. Giridhar, CHRI, Chennai

Dr. Sandeep Kadam, KEM Hospital, Pune

Dr. Sarita Verma, TISS, Mumbai

Dr. Shiv Sajan Saini, PGIMER, Chandigarh

Dr. Siddarth Ramji, MAMC, New Delhi

Dr. Sindhu Sivanandan, JIPMER, Puducherry

Dr. Sridhar Santhanam, CMC, Vellore

Dr. Srinivas Murki, PCH, Hyderabad

Dr. Suja Mariam G, SRH, Coimbatore

Dr. Suksham Jain, GMC, Chandigarh

Dr. Suman Rao PN, St. JMCH, Bengaluru

Dr. Sushma Nangia, LHMC, New Delhi

Dr. Tapas Som, AIIMS, Bhubaneswar

Dr. Venkataseshan Sundaram, PGIMER, Chandigarh

CHIEF PATRON

Dr Mansukh Mandaviya
Union Minister for Health & Family Welfare

PATRON

Dr Bharati Pravin Pawar
Union Minister of State for Health & Family Welfare

ADVISOR

Prof. Dr Balram Bhargava
Secretary, DHR & Director General, ICMR

ICMR STW TEAM

Dr R S Dhaliwal, Scientist G & Head(NCD), ICMR
Dr Ashoo Grover, Scientist F, ICMR
Dr Lokesh Kumar Sharma, Scientist E, ICMR
Dr Jerin Jose Cherian, Scientist D, ICMR
Mr Neeraj Parmar, Technical Officer A, ICMR
Dr Saumya Srivastava Aggarwal, Project Scientist C, ICMR
Mr Dhiraj Kumar, Project Graphics Designer, ICMR

ADMINISTRATION

Shri R. Ramakrishnan, Sr DDG (Admin.), ICMR
Shri Rajeev Roy, Sr FA, ICMR
Dr R Lakshminarayanan, DDG(Admin.), ICMR
Shri Jagdish Rajesh, ADG (Admin.), ICMR
Shri Vinod Sharma, ADG(Finance), ICMR

STANDARD
TREATMENT
WORKFLOWS
of India

Scan to access Standard Treatment Workflows

Web Portal

Google Play

App Store

सत्यमेव जयते
Department of Health Research
Ministry of Health and Family Welfare, Government of India

INDIAN COUNCIL OF MEDICAL RESEARCH
NEW DELHI

icmr
INDIAN COUNCIL OF MEDICAL RESEARCH
Serving the nation since 1911

STANDARD TREATMENT WORKFLOWS *of India*

PARTNERS

national health authority

World Health Organization India

2022 EDITION

VOLUME III