

2. Growth

Long Essays

(Nil)

Short Essays

(Nil)

Short Answers

March 2017

1. Ponderal Index

- It is the parameter used to assess the pattern of fetal growth in those who has not attained the growth for the gestational age.

$$\text{PONDERAL INDEX} = \text{BODY WEIGHT IN GRAMS} \times 100 \text{ LENGTH (CM}^3\text{)}$$

- In malnourished babies (asymmetric IUGR), Ponderal Index is < 2 ; Good prognosis
- In appropriate for gestation babies, Ponderal Index is > 2.5 ; Bad prognosis

February 2018

2. Failure to thrive

Ans: Definition: Failure to thrive refers to weight below third or fifth centile, failure to gain weight over a period of time or a change in rate of growth that has crossed two major centiles over a period of time. Causes:

1. Organic

- Gastrointestinal: GERD, malabsorption
- Neurological cerebral palsy
- Renal: CKD, RTA
- Cardio pulmonary: congenital heart disease, cystic fibrosis, Asthma
- Infection: chronic parasitic infections, HIV, TB
- Endocrine: diabetes mellitus, hypothyroidism
- Genetic: inborn errors of metabolism, chromosomal anomalies

2. Nonorganic

- Poverty
- Lack of knowledge about diet and feeding
- Lack of breastfeeding
- Dysfunctional parent child relationship.
- Feeding diluted formulae

Clinical feature:

- Poor growth
- Poor development
- Poor cognitive function

Management:

- Initial valuation – complete history taking and physical examination.
- Investigations if required:
- complete blood count

- Urine and stool microscopy and culture
- Renal and liver function test

Adequate calorie feeding must be established and monitor weight measurement.

August 2018

3. Growth assessment of 1 year old child

Ans:

1. Weight: 9 kg (*weight needed for 1 year old child) measured by minimal clothing.

2. Length: 75 cm (Length needed)

- Hair pins are removed and braid undone
- Bulky diapers should be removed.
- Infantometer is used.

3. Head circumference: 46 cm

- Maximum circumference of head from occipital protuberance to supraorbital A non-stretchable ridges on the forehead is recorded.
- A non stretchable measuring tape is used

4. chest circumference: 46 cm

- Measured at the level of nipple.
- Midway

Development

Gross motor

- neck holding-3 month/not
- rollover 5 months/not
- Sits in tripod fashion - 6 months
- Sitting without support - 8 months
- Stands holding on - 9 months
- Creeps well stands without support-1 year

Fine motor

- Bidextrous reach in 4 months/not
- Unidextrous reach in 6 months /not
- Immature pincer grasp in 9 months/not
- If the child can able to do mature pincer grasp in 12 months

Social and adaptive mile stones

- If the child comes when called/plays simple ball games/ social smile in-2 months or not.
- Recognise mother/not - 3 months
- Recognise strangers/not-6 months
- Waves/byebye-9 months

Language milestone

- Alerts to sound -1 months
- Coos-3 months

- Laugh loud 4 months
- Monosyllables 6 months
- Bisyllables 9 months
- 1-2 words with meaning - 1 year

Vision

- Can able to follow rapidly moving objects

Hearing

- Looks at the source of sound diagonally

Precise Answers

(Nil)

3. Development

Long Essays

(Nil)

Short Essays

(Nil)

Short Answers

March 2024

1. Enumerate four obligatory developmental milestones in all domains in a two-year-old child. Name two developmental screening tools

Ans:

Gross Motor Development:

- Supine and pull to sit: child has complete neck control by 20 weeks
- Ventral suspension: by 12 weeks, can lift his head above the horizontal plane
- Prone position: by 10 months, creeps (abdomen off the ground, with weight on knees and hands)
- Sitting: by 10-11 months, he can pivot in sitting position
- Standing and walking: child can walk backwards, climbs upstairs with both feet on one step

Fine motor skill development:

- Hand eye coordination: By 9-10 months, the child approaches the pellet by an index finger and lifts it using finger thumb apposition, termed 'pincer' grasp
- Hand-to-mouth coordination: By 18 months, he can feed himself well using a spoon
- Advanced hand skills: he can unscrew lids and turn doorknobs and his block skills also advance (Tower of 6 blocks; vertical and circular stroke), He now can turn pages of a book, one at a time.
- Dressing: By 2 years, he can put on shoes or socks and can undress completely

Personal and Social Development and General Understanding:

- At 2 years, when asked he can point to 5-6 familiar objects, name at least 2-3 objects and point to 3-4 body parts.
- Language: vocabulary increases rapidly to around 100 words by 2 years, at which time 2-3 words are joined to form simple sentences

Vision and Hearing:

- Vision: can follow rapidly moving objects

Long Essays

August 2019

1. 2-year-old male child with weight 5 kg, height 75 cm & mid-upper arm circumference of 10 cm presenting with B/L pedal edema. What is your probable diagnosis? What complication do you expect in this child? How will you manage the child?

This is a case of severe acute malnutrition. A normal healthy child of 2 years age must have above 12 kg weight, height 90 cm.

Since the child is having,

- Weight for height below -3SD of WHO Growth Standard.
- Presence of bipedal edema.
- MUAC < 11.5cm

Hence this is a case of Severe Acute Malnutrition.

COMPLICATION OF SAM:

- Infection: Pneumonia, ADD, sepsis, skin infections etc.
- Hypothermia
- Severe anaemia
- Dehydration
- Electrolyte imbalance
- Hypocalcemia
- Hypokalemia
- Hypomagnesemia
- Micro nutrient deficiency
- Growth retardation
- Neurodevelopmental delay

Complication encountered during nutritional rehabilitation:

- Pseudotumor cerebri

- Nutritional recovery syndrome
- Encephalitis

MEDICAL MANGEMENT OF SAM

A. Assessment

History:

- Ask for dietary, infective, social, economic factors
- Vomiting, loss of weight, loss of appetite
- Contact with TB
- History to rule out other causes of FTT

B. Examination

- Anthropometry
- Signs of dehydration, shock
- Severe palmar pallor (indicates low Hb level <7 mg%)
- Eye sign of Vitamin A deficiency
- Localizing sign of infection
- Hypothermia

C. Investigation

- Hb count: to r/o anemia
- Peripheral & smear: to r/o infection like malaria
- Blood, sugar, urea, electrolyte
- Blood culture: to r/o infection
- Severe protein, albumin: check hypoalbuminemia
- Mantoux test: to r/o TB
- X-ray chest
- Urine routine examination: proteinuria (renal pathology)
- LFT, RFT if indicated

D. Treatment

Assess for the following complication:

- Severe edema or
- Low appetite or
- Medical complication or
- One or more danger sign as per IMNCI

- No danger signs---- uncomplicated SAM ----supervised home management
- Danger signs present---- complicated SAM---inpatient management in a facility

The management of complication SAM in hospital involves 10 steps.

- Initial stabilization phase: 2-7 days

- Rehabilitation phase: may take several weeks.

I. Treat/prevent hypoglycemia

- Asymptomatic-50 ml of 10% glucose or sucrose solution
- Symptomatic-5 ml/kg of 10% dextrose iv

II. Treat hypothermia

- Rewarm child using overhead warmer or conduction (skin contact) or convection (heat convector)
- In severe hypothermia water humidified oxygen should be given followed immediately by 5 or 50 ml ml/kg of 10% dextrose iv or 50 ml of 10% dextrose by nasogastric route

III. Treat dehydration

- ORS given orally or NG tube.
- IV only in severe dehydration or shock

IV. Correct electrolyte imbalance

- Correct hypokalemia, hypomagnesaemia

V. Treat infection

- Broad spectrum parenteral antibiotics; ampicillin, gentamicin or amikacin
- Antimalarials & antituberculous treatment only to be given when particularly diagnosed.

VI. Correct micronutrient deficiency

- Although anemia is common, iron should not be given initially due to danger of promoting free radical generation & bacterial proliferation.
- Vit A, Vit K, folic acid, Cu also given.

VII. Initiate refeeding

- Starter F 75 diet

Begin with 80 Kcal/kg/day & gradually to 100 Kcal/kg/day night feeds are essential.

VIII. Achieve catch-up growth with F100 diets RUTF/Cantioushalm 100 kcal / 100ml

IX. Provide sensory stimulation & emotional support

X. Prepare for follow up

6-8 week of hospitalization is required for optimum recovery. To all children with SAM before discharge- give single oral dose of Albendazole 200 mg for children 12-23 months, 400 mg for ≥ 24 months.

- child with SAM can be discharged if there is no edema for at least 2 wks plus weight for height reaches -2 SD or higher on WHO growth standard or mid arm circumference is more than 12.5 cm

- Failure to treatment is indicated by.

Primary failure to respond

- Failure to regain appetite by day 4
- Failure to start losing edema by day 4
- Presence of edema on day 10
- failure to gain at least 5 gm/kg/day by day 10

2. Secondary failure to respond

- Failure to gain at least 5 gm/kg/day for consecutive days during the rehabilitation phase.

(Nil)

Short Answers

September 2016

1. Grading of Marasmus

Ans-Grade 1: loss of fat from axilla and groin

Grade 2: loss of fat from thigh and buttock

Grade 3: loss of fat from chest and abdomen

Grade 4: Loss of Buccal Pad of fat

September 2017

2. Grading of Kwashiorkor

- Grade 1: Pedal edema
- Grade 2: Grade 1 + Facial edema
- Grade 3: Grade 2+ Para spinal and chest edema
- Grade 4: Grade 3 + ascites

February 2019

3. Kwashiorkor

Kwashiorkor is a severe type of malnutrition.

Features

- i. General appearance fat sugar baby appearance.
- ii. Edema mild to gross
- iii. Muscle wasting

- Present (as compared to marasmus)
- Weak, hypotonic
- Unable to stand/walk

IV. Skin changes

- Flaky paint appearance-typically on buttocks, perineum and upper thigh

V. Mucous membrane lesion

- Smooth tongue
- Cheilosis
- Angular stomatitis

VI. Hair

- Depigmentation
 - Sparseness especially over temple & occiput
 - Loss of lustre, easily pluck able
 - Flag sign (alternate black & white hair)

vii. Mental changes

- Apathy
- Irritability
- Intermittent cry
- No sign of hunger
- Difficult to feed

viii. GI

- Anorexia
- Abdominal distension

ix. CVS

- Cold, pale extremities
- Bradycardia
- Diminished CO
- Hypotension

X. renal

- GFR decreased
- Renal plasma flow
- Aminoaciduria (+)ve

February 2019

4. What are the age independent criterias for diagnosis of malnutrition

- **Mid upper arm circumference (MUAC)**

Mark a point midway between olecranon of ulna and tip of acromion process of scapula while the child hold his arm by his side and measured.

During 1-5 years, its static: 15-17 cm

MUAC; <11.5 → SEVERE MALNUTRITION

MUAC; 11.5-13.5 MILD TO MODERATE MALNUTRITION

- **Skinfold thickness**

Measured with herpender's caliper

Caliper is applied over the triceps or subscapular region

>10mm: Healthy children-(1-6yr)

<6 mm: Moderate to Severe malnutrition

- **Body Mass Index**

$$\text{BMI} = \frac{\text{MASS (kg)}}{\text{HEIGHT (m}^2\text{)}}$$

<18.5

18.5-25

>30kg/m²:

kg/m²: underweight

kg/m²: normal 25-30 kg/m²: overweight

obese

- **Ponderal Index**

Defining newborn babies with intrauterine growth retardation

$$\text{PONDERAL INDEX} = \frac{\text{BODY WEIGHT IN GRAMS X 100 LENGTH (cm}^3\text{)}}{\text{LENGTH (m}^3\text{)}}$$

Ponderal Index <2: malnourished

Ponderal Index > 2.5: appropriate for gestation babies

- **Upper segment - Lower Segment Ratio**

Upper segment - vertex to upper edge of pubic symphysis

Lower segment - pubic symphysis to heel

Ratio 1:1 in healthy individual

- **Shaker Tape Method**

- **Bangle Method**

- **Quetlet Index**

$$\text{QUETLET INDEX} = \frac{\text{BODY WEIGHT IN (kg)} \times 100}{\text{HEIGHT (CM)}^2}$$

- **Kanawati and McLaurin Index**

$$\text{KANAWATI AND MCLAURIN INDEX} = \frac{\text{MID UPPER ARM CIRCUMFERENCE}}{\text{HEAD CIRCUMFERENCE}}$$

- **Jelliffe's Ratio**

$$\text{JELLISFE'S RATIO} = \frac{\text{HEAD CIRCUMFERENCE}}{\text{CHEST CIRCUMFERENCE}}$$

- **Quackstick**

Mid Upper Arm Circumference that would be expected for the given weight

- **Arm Span**

Distance between the tip of the middle fingers of both arm outstretched at right angles to the body

Precise Answers

April 2016

1. 4 cardinal signs of Kwashiorkor.

Ans:

- Edema
- Psychomotor changes / apathy
- Growth retardation
- Muscle wasting

September 2016

2. Antioxidant vitamins.

Ans: Vit A, Vit C, Vit E

Short Answers

April 2015

1. Biochemical changes in rickets.

Ans: 1. Vitamin D deficiency less than 10 microgram per ml or vitamin D at low level of 10 to 20 microgram per ml

2. calcium normal or decreased (calcium maybe decrease due to deficiency of vitamin D or Calcium may remain normal due to reabsorption from the bone secondary pth action)
3. parathyroid hormone increase (decreased calcium levels in turn stimulate pth hormone production)
4. phosphate decrease 5. Alkaline phosphatase increased (increases calcium reabsorption from bone resulting in secondary activation of osteoblast hence increased alp).

April 2015

Radiological Findings in Rickets

- Rickets is a disease of growing bone mainly caused due to Vitamin D deficiency and less commonly phosphorus and calcium deficiency.
- Radiological changes are more common and characteristically seen at the metaphysis
- The first change is loss of normal zone of metaphysis seen as blurring or frayed appearance of metaphyseal margin. (**Fraying**)
- Cartilage hypertrophy led to widening of growth plate giving the appearance of cupping and widening of metaphyseal ends (**Splaying**)
- Weight-bearing and stress on uncalcified bone give rise to bowing of limbs in forms of bow leg (**genu varum**) or lock knees (**genu valgum**).
- Generalized reduction of bone density (**Osteopenia**)
- Beaded appearance of the anterior costochondral junction (**Rachitic Rosary**)
- A depression may be evident along the lower border of chest at the site of insertion of diaphragm which appears due to pull of diaphragm on the weakened chest wall (**Harrison Sulcus**)

Delayed closure of anterior fontanelle, craniotables (soft skull bones), delayed ossification

April 2015

2. Difference between caput succedaneum and cephalhematoma

Ans:

Caput succedaneum	Cephalohematoma
1. More common	1. Less common
2. Found in the subcutaneous plane	2. Found over parietal bone, between skull and periosteum
3. Presenting in maximum size and firmness at birth	3. Presenting in increasing hours and then stable. size for 12-24
4. Softens progressively from birth and resolves within 2-3 days	4. Takes 3-6 weeks to resolve
5. Characteristically diffuse and crosses suture line	5. Does not cross suture lines and has distinct margin
6. No association	6. Association with linear skull fracture. hyperbilirubinemia.

March 2017

8. Advantage of Kangaroo Mother Care (3 marks)

An: kangaroo Mother Care refers to care of preterm or low birth weight infants by placing the infant in skin-to-skin contact with the mother or any others care givers.

Key features of KMC includes:

- a. Started early after birth and ideally provided continuously and for prolonged period.
- b. Exclusive breast feeding.
- c. Initiated in the hospital, baby is discharged early and the KMC continued at home.

Criteria for eligibility

Baby : KMC is indicated all stable low birth weight babies.

September 2017

9. Advantages of breastfeeding.

Ans:

(1) **NUTRITIONAL SUPERIORITY** breast milk contains all the nutrients a baby needs for normal growth and development in an optimum proportion and in a form that is easily digested and absorbed

- **Carbohydrates**

Lactose is in high concentration 6-7 gram/dL

Galactose essential for formation of galactocerebrosides

lactose helps in absorption of calcium and enhance the growth of lactobacillus in intestine

- **Proteins**

Easily digestible form of lactalbumin and lactoglobulin.

Human milk contains amino acids like taurine and cysteine which are necessary for neurotransmission and neuro modulation.

- **Fats**

PUFA for myelination of nervous system

Omega 3 and Omega 6 fatty acid for formation of PG and cholesterol

- **Vitamins and minerals**

- **Water**

88% water content

no additional water is required for baby

(2) **IMMUNOLOGICAL SUPERIORITY**

IgA, macrophages, lymphocytes, lactoferrin, lysozyme, interferons, bifidus factor present.

Low risk of allergy, ear infection orthodontic infection
Lowers diabetes, heart disease, lymphoma incidence in adults
Hence decrease chance of infection.

(3) Breast milk contains number of growth factor, enzymes, hormones

- Enhances maturation of intestinal cells, reduces risk of allergy in later life
- Lipase increase digestion of fat in milk

(4) Breastfed infants show higher IQ than others

(5) benefits to mother

- Help in involution of uterus
- Reduces chances of pph
- Lactational amenorrhea
- Reduces risk of breast and ovarian cancer
- helps to shed extra weight that mother has gained during pregnancy

14. Immunological benefits of breastfeeding

IMMUNOLOGICAL AGENT	BENEFITS
Immunoglobulins (Ig A, Ig M, Ig E)	Protective against bacterial and viral infection
Bifidus factor	Promote formation of healthy bacterial colonization in infants lower GI
Lactoferrin	Fe binding proteins that reduce availability of Fe to the bacteria in the GIT
Lactoperoxidase	Destroys bacteria

Lysozyme	Kills bacteria by destroying the cell wall
Enzymes like lipase, Amylase, Oxidase, Lactoperoxidase, Leucocytes, Myeloperoxidase	Increase digestibility and also act as defence against microbes
Macrophages	Destroy bacteria by phagocytosis synthesis, lactoferin and lysozyme
Lymphocytes	Synthesis Ig A

February 2019

15. Hypoglycemia in new-born

Ans: Hypoglycemia is defined as blood glucose value of less than 40mg/dl (plasma glucose < 45 mg/dl)

Causes of hypoglycemia

March 2024

18. Enumerate the components of newborn screening program in Kerala.

Ans:

1. Congenital Hypothyroidism (CH):

- **Screening Method:** Thyroid Stimulating Hormone (TSH) measurement from a heel prick blood sample.
- **Importance:** Early detection allows for timely initiation of thyroid hormone replacement therapy to prevent developmental delays.

2. Congenital Adrenal Hyperplasia (CAH):

- **Screening Method:** Measurement of 17-hydroxyprogesterone from a blood sample.
- **Importance:** Detects adrenal enzyme deficiencies early, which can lead to life-threatening adrenal crises if untreated.

3. Phenylketonuria (PKU):

- **Screening Method:** Measurement of phenylalanine levels from a blood sample.
- **Importance:** Early detection prevents severe intellectual disability by ensuring a low-phenylalanine diet is started promptly.

4. Glucose-6-Phosphate Dehydrogenase (G6PD) Deficiency:

- **Screening Method:** Enzyme activity assay from a blood sample.
- **Importance:** Identifies newborns at risk for hemolytic crises triggered by certain drugs or infections, allowing for avoidance of triggers.

5. Sickle Cell Disease (SCD):

- **Screening Method:** Hemoglobin electrophoresis or High-Performance Liquid Chromatography (HPLC) from a blood sample.

- **Importance:** Early detection helps initiate preventive measures and early treatment to reduce complications.

6. **Thalassemia** (in some regions):

- **Screening Method:** Hemoglobin electrophoresis or HPLC to detect abnormal hemoglobin variants.

- **Importance:** Identifies carriers and affected individuals early, facilitating genetic counseling and appropriate management.

7. **Cystic Fibrosis** (in some regions):

- **Screening Method:** Measurement of immunoreactive trypsinogen (IRT) from a blood sample, followed by genetic testing if IRT levels are elevated.

- **Importance:** Early detection allows for early interventions and specialized care to improve outcomes.

Additional Considerations:

- **Data Collection and Reporting:** Ensuring accurate collection and reporting of screening results to healthcare providers and families.

- **Follow-up and Management:** Providing follow-up services for infants with positive screening results, including confirmatory testing and appropriate medical care.

February 2020

9. Management and Complication of Measles

- **Definition**

Highly contagious, acute viral exanthematous illness in children caused by Measles RNA virus.

It is transmitted by inhalation of respiratory droplets

- **Management**

There is no specific treatment for measles

Supportive therapy is necessary and most people recover spontaneously

Maintenance of hygiene and ensuring adequate fluid
Proper calorie intake with adequate quantities of Vitamin and minerals
Humidification and antipyretics if essential
Vitamin A administration single dose orally of 1,00,000 units Below 1 year and 2,00,000 units over 1 year is recommended to prevent complications, especially in malnourished children. In less than 6 month 50,000 IU of Vitamin A given.
-Ribavirin in immune compromised individuals
Secondary bacterial infections can be treated with antibiotics

- **Prevention**

Immediate protection by giving immunoglobulin within 72 hours - 6 days of exposure of disease
Active immunization, a single dose of vaccine given 8-9 months of age
MR vaccination campaign
It provides lifelong immunity

- **Complication**

Complications are more common in young, malnourished and immune compromised children

Respiratory Complications

- Pneumonia (Giant cell pneumonia)
- Croup, Tracheitis, Bronchitis
- Acute necrotizing Otitis media
- Sinusitis and mastoiditis
- Activation of Pulmonary Tuberculosis

CNS complications

- Febrile seizures ✓
- Transverse myelitis ✓
- Encephalitis
- Subacute sclerosing panencephalitis (common in children having measles below 2 years)

Gastrointestinal complications

- Persistent diarrhea
- Vomiting
- Hepatitis
- Appendicitis

Others

- Myocarditis
- Glomerulonephritis
- Thrombocytopenic purpura / Hemorrhagic measles / Black measles

September 2015

2. Dengue haemorrhage shock

Dengue hemorrhage fever is defined by following four WHO criteria:

1. Fever of recent h/o fever lastly 2-7 days.
2. Any hemorrhage manifestations (a positive tourniquet test), skin hemorrhage (petechiae hematoma), epistaxis (nose bleed), gingival bleeding (gum bleeding) and microscopic hematuria.
3. Thrombocytopenia.
4. Evidence of increased vascular permeability (elevated hematite $\geq 20\%$).

Dengue shock syndrome (DSS) is defined as any case that meet the four criteria for DHF and has evidence of circulatory failure manifested by

- i. Rapid, weak pulse and narrow pulse pressure.
- ii. Hypotension for age, resistance and cold clammy skin.

Investigation

- Hematocrit
- Platelet count
- Electrolyte
- Coagulation studies
- Liver enzymes
- Tourniquet test
- X-ray chest
- Dengue Ag NSI

Treatment

- For fever paracetamol given
- For pain analgesics given (not aspirin)
- For shock

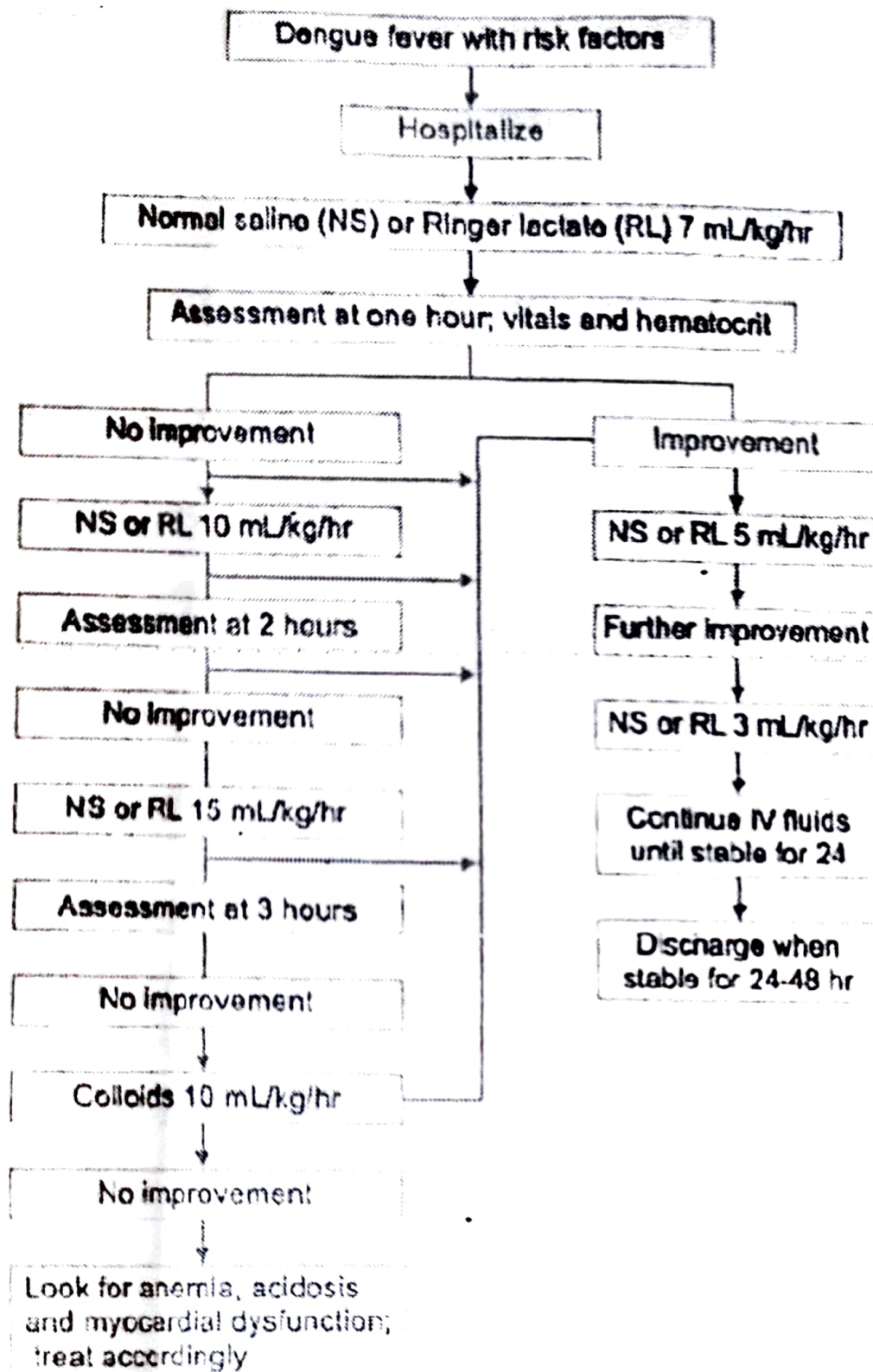


Fig. 11.9: Management of dengue fever with risk factors

August 2018

6. Laboratory diagnosis of Dengue

Ans Increased PCV & low PLT & leucocytes count with predominance of lymphocytes.

- Blood total protein and albumin - decreased
- Transaminase-increased
- Higher increase in SGOT than SGPT-dengue rather than other virus infection
- Hyponatremia and acidosis with increase in urea and creatinine- severe dengue
- X-ray chest-plural effusion common on Rt
- USG abdomen - Ascites and enlarged gallbladder.

Confirmation of diagnosis

1. Direct method

- Virus isolation by culture
- Genome detection by PCR
- NS antigen detection

2. Indirect method

- IgM detection. IgG detection

Virus isolation/PCR

Sample obtained within first 5 days of fever.

NS₁ antigen

- Conserved glycoprotein of dengue virus
- Seceded in initial phase of illness.
- It disappears as antibody appears
- Advanced

Advantages

Nearly 100% specificity

Sensitivity 90% (primary infection)

IgM detection