

2.5.3

Pediatrics department Reforms

2.5.3

Reforms in Evaluation

Blueprint



DR. VASANTRAO PAWAR MEDICAL COLLEGE,
HOSPITAL & RESEARCH C CENTRE,
VASANTDADA NAGAR, ADGAON, NASHIK – 422003

Department of Paediatrics

Post Graduation (Prelim)

Paper 1-

1) List of Topics

- Basic sciences of Anatomy
- Physiology related to genetics
- Correlation of Disease to Anatomy
- Pathophysiology of Disease

2) Skeleton of Assessment

Type	Number of Question	Marks	Marks with Options
LAQ	2	50 (25*2)	50
SAQ	5	50 (10*5)	60

3) Weightage of topic:

Number	Topics	Impact (I)	Frequency (F)	W= I * F (W)	Marks allotted
1	Basic sciences of Anatomy	2	2	4	20
2	Physiology related to genetics	3	2	6	25
3	Correlation of Disease to Anatomy	2	3	6	25
4	Pathophysiology of Disease	3	3	9	30
				25	100



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4) Type of Questions as per allotted marks:

Number	Topic	W= I * F	Marks allotted	SAQ	LAQ
1	Basic sciences of Anatomy	4	20	2	-
2	Physiology related to genetics	6	25	1	-
3	Correlation of Disease to Anatomy	6	25	2	1
4	Pathophysiology of Disease	9	30	1	1
		25	100	6	2

5) Level of assessment

Number	Topic	W= I * F	Marks allotted	SAQ	LAQ
1	Basic sciences of Anatomy	4	20	2(1R+1C)	-
2	Physiology related to genetics	6	25	1(C)	-
3	Correlation of Disease to Anatomy	6	25	2(1R+1C)	1C
4	Pathophysiology of Disease	9	30	1(A)	1A

R- Recall C- Comprehension A- Application



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Post graduate- Paper 2 Prelim

1. List of Topics

1) Neonatology

- a) Normal Newborn
- b) Prematurity and related problems
- c) Neonatal resuscitation
- d) Neonatal Sepsis
- e) Metabolic problems
- f) Neonatal systemic diseases
- g) Neonatal ventilation and newer modalities of treatment

2) Social sciences related to paediatrics

- a) Immunisation
- b) Fluid electrolyte abnormalities
- c) Adolescent health
- d) Child adoption
- e) Paediatric emergencies related to social sciences
- f) Nutrition
- g) National health programmes

2. Skeleton of Assessment

Type of Question	Number of Questions	Marks	Marks with options
LAQ	2	50	50
SAQ	5	50	60



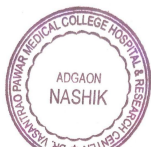
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3) Weightage of Topic

Number	Topic	Impact	Frequency	Weightage $W = I * M$	Marks alloted
	Neonatology				
1	a) Nomal Newborn	2	1	2	5
2	b) Prematurity and related problems	2	2	4	5
3	c) Neonatal resuscitation	3	3	9	12
4	d) Neonsatal Sepsis	2	3	6	10
5	e) Neonatal systemic diseases	2	3	6	8
6	f) Neonatal ventilation and newer modalities of treatment	3	1	3	9
	Social sciences related to paediatrics				
1	a) Immunisation	2	2	4	10
2	b) Fluid electrolyte abnormalities	2	2	4	5
3	c) Adolescent health	1	2	2	5
4	d) Child adoption	1	2	2	5
5	e) Paediatric emergencies related to social sciences	2	3	6	10
6	f) Nutrition	2	3	6	10
7	g) National health programmes	2	2	4	5



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4) Type of Questions as per allotted marks

5)

Number	Topic	W= I*F	Marks	SAQ	LAQ
1	Neonatology	34	50	3	1
2	Social sciences	28	50	3	1

6) Level of Assessment

7)

Number	Topic	W= I*F	Marks	SAQ	LAQ
1	Neonatology	34	50	3(2A+1C)	1A
2	Social sciences	28	50	3(2C+1R)	1C



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Post graduate – Prelim Paper 3

1) List of Topics

a) Systemic diseases

- CVS (Cardiology)
- Respiratory
- Neurology
- Hematology
- Nephrology
- Rheumatology
- GIT
- Immunology
- Metabolic

b) Endocrinology

c) Growth and Development

d) Miscellaneous

2) Skeleton of Assessment

Type of Question	Number of Questions	Marks	Marks with options
LAQ	2	50	50
SAQ	5	50	60

3) Weightage of Topic

Number	Topic	Impact	Frequency	Weightage $W = I * M$	Marks alloted
1	Systemic diseases	2	1	2	5
2	Endocrinology	2	2	4	5
3	Growth and Development	3	3	9	12
4	Miscellaneous	2	3	6	10



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4) Type of Questions as per allotted marks

Number	Topic	W= I*F	Marks	SAQ	LAQ
1	Systemic diseases	9	50	1	1
2	Endocrinology	4	20	2	1
3	Growth and Development	6	20	2	
4	Miscellaneous	4	10	1	

5) Level of Assessment

Number	Topic	W= I*F	Marks	SAQ	LAQ
1	Systemic diseases	9	50	1(1A)	1(1A)
2	Endocrinology	4	20	2(1R+1C)	1(1A)
3	Growth and Development	6	20	2(1C+1A)	
4	Miscellaneous	4	10	1(+C)	

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Post graduate- Prelim Paper 4

- 1) List of Topics
 - a) Recent advances in treatment
 - b) Newer guidelines
 - c) New drugs/ vaccines
 - d) New health programme
 - e) Current epidemic

2) Skeleton of Assessment

Type of Question	Number of Questions	Marks	Marks with options
LAQ	2	50	50
SAQ	5	50	60

3) Weightage of Topic

Number	Topic	Impact	Frequency	Weightage $W = I \times M$	Marks allotted
1	Recent advances in treatment	2	2	4	20
2	Newer guidelines	2	3	6	20
3	New drugs/ vaccines	2	2	4	15
4	New health programme	2	3	6	25
5	Current epidemic	3	3	9	20



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4) Type of Questions as per allotted marks

Number	Topic	W= I*F	Marks	SAQ	LAQ
1	Recent advances in treatment	4	20	1	1
2	Newer guidelines	6	20	1	1
3	New drugs/ vaccines	4	15	1	
4	New health programme	6	25	2	
5	Current epidemic	9	20	1	

5) Level of Assessment

Number	Topic	W= I*F	Marks	SAQ	LAQ
1	Recent advances in treatment	4	20	1(1C)	1(1A)
2	Newer guidelines	6	20	1(1A)	1(1A)
3	New drugs/ vaccines	4	15	1(1C)	
4	New health programme	6	25	2(1C+1R)	
5	Current epidemic	9	20	1(A)	



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Department of PAEDIATRICS

6TH Semester Examination

	LIST OF TOPICS
	General Pediatrics- Growth, Development, Nutrition,
1)	Immunization
2)	Neonatology
3)	Systemic
4)	Basic sciences and allied

B) Skeleton of Assessment

Question pattern/type	No. of Questions	Marks	Marks including options
MCQ	16	8	8
LAQ	1	6	6
SAQ	Any 3 of 4	6	8

C) Weightage of Topic

No.	Topic	Impact (I)	Frequency(F)	W= I*F	Marks allotted
1	General Paediatrics -Growth and Development -Nutrition -Immunization	2	3	6	8
2	Systemic	2	3	6	6
3	Neonatology	2	1	2	4
4	Basic sciences allied	1	2	2	4
	Total			16	22



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6TH Semester Examination

D) Type of Questions as per allotted marks

No.	Topic	W= I*F	Marks Alloted	MCQ	SAQ	LAQ
1	General Paediatrics -Growth and Development -Nutrition -Immunization	6	8	8	1	
2	Systemic	6	6	4	1	1
3	Neonatology	2	4	2	1	
4	Basic sciences allied	2	4	2	1	
	Total	16	22	16	4	1

E) Level of Assessment

No.	Topic	W=I*F	Marks	MCQ	SAQ	LAQ
1	General Paediatrics -Growth and Development -Nutrition -Immunization	6	8	8(2R+4C+2A)	1(C)	
2	Systemic	6	6	4(2C+2A)	1(A)	1A
3	Neonatology	2	4	2(2R)	1R	
4	Basic sciences allied	2	4	2(2R)	1R	

R= Recall , C= Comprehension, A= Application



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8th Semester Examination

A)	LIST OF TOPICS
	General Pediatrics- Growth, Development, Nutrition,
1)	Immunization
2)	Neonatology
3)	Systemic
4)	Basic sciences and allied

B) Skeleton of Assessment

Question pattern/type	No. of Questions	Marks	Marks including options
MCQ	16	8	8
LAQ	1	6	6
SAQ	Any 3 of 4	6	8

C) Weightage of Topic

No.	Topic	Impact (I)	Frequency(F)	W= I*F	Marks allotted
1	General Paediatrics -Growth and Development -Nutrition -Immunization	2	3	6	8
2	Systemic	2	3	6	6
3	Neonatology	2	1	2	4
4	Basic sciences allied	1	2	2	4
	Total			16	22

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2.5.3

Reforms in Evaluation

Workplace Based Assessment



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ENDOTRACHEAL INTUBATION

Checklist:

Steps	Yes/No/ Correct answer
Observe the vitals of the patient	
Is written consent taken from the patient?	
Are the materials required for the procedure collected?	
Is Hand wash done, Aseptic precaution taken?	
Proper position given to the patient	
Technique of inserting the ET through the laryngoscope	
Air entry checked ? Is the et in position?	
Observing the patients SF02 and other vitals .	
Fixing the ET in position	
Monitoring patient after procedure?	
Is the XRAY done	

- 1) The students are initially guided and explained by the teacher about the procedure.
- 2) Student observes teacher performing the procedure
- 3) Student performs procedure under teacher's guidance.
- 4) The student independently performs procedure while teacher observes.
- 5) Teacher finally gives feedback regarding the student's performance.



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Intercostal Drainage

Checklist:

Steps	Yes/No/ Correct answer
Greet the patient	
Is written consent taken from the patient?	
Is procedure explained to the patient?	
Is the Preparation done?	
Are the materials required for the procedure collected?	
Is Hand wash done, Aseptic precaution taken? Painting and Drapping done?	
Is Proper Position given to the patient?	
Selection of proper point for procedure, Inserting Trocar and cannula, connecting to ICD bag, fixing the ICD ?	
Applying proper dressing	
Monitoring patient after procedure?	
Is the XRAY done	

- 1) The students are initially guided and explained by the teacher about the procedure.
- 2) Student observes teacher performing the procedure
- 3) Student performs procedure under teacher's guidance.
- 4) The student independently performs procedure while teacher observes.
- 5) Teacher finally gives feedback regarding the student's performance.



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Lumbar Puncture

Checklist:

Steps	Yes/No/ Correct answer
Greet the patient	
Is written consent taken from the patient?	
Is procedure explained to the patient?	
Is the Preparation done?	
Are the materials required for the procedure collected?	
Is Hand wash done, Aseptic precaution taken? Painting and Drapping done?	
Is Proper Position given to the patient?	
Selection of proper point for procedure, piercing needle, collecting sample without multiple pricks done?	
Applying pressure after procedure?	
Monitoring patient after procedure?	
Sending sample in proper and aseptic manner?	

- 1) The students are initially guided and explained by the teacher about the procedure.
- 2) Student observes teacher performing the procedure
- 3) Student performs procedure under teacher's guidance.
- 4) The student independently performs procedure while teacher observes.
- 5) Teacher finally gives feedback regarding the student's performance.

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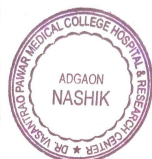
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Bone Marrow Aspiration.

Checklist:

Steps	Yes/No/ Correct answer
Greet the patient	
Is written consent taken from the patient?	
Is procedure explained to the patient?	
Is the Preparation done?	
Are the materials required for the procedure collected?	
Is Hand wash done, Aseptic precaution taken? Painting and Drapping done?	
Is Proper Position given to the patient?	
Selection of proper point for procedure, piercing needle, collecting sample without multiple pricks done?	
Applying pressure after procedure?	
Monitoring patient after procedure?	
Sending sample in proper and aseptic manner?	

- 1) The students are initially guided and explained by the teacher about the procedure.
- 2) Student observes teacher performing the procedure
- 3) Student performs procedure under teacher's guidance.
- 4) The student independently performs procedure while teacher observes.
- 5) Teacher finally gives feedback regarding the student's performance.



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Reforms in Evaluation
Skill Module



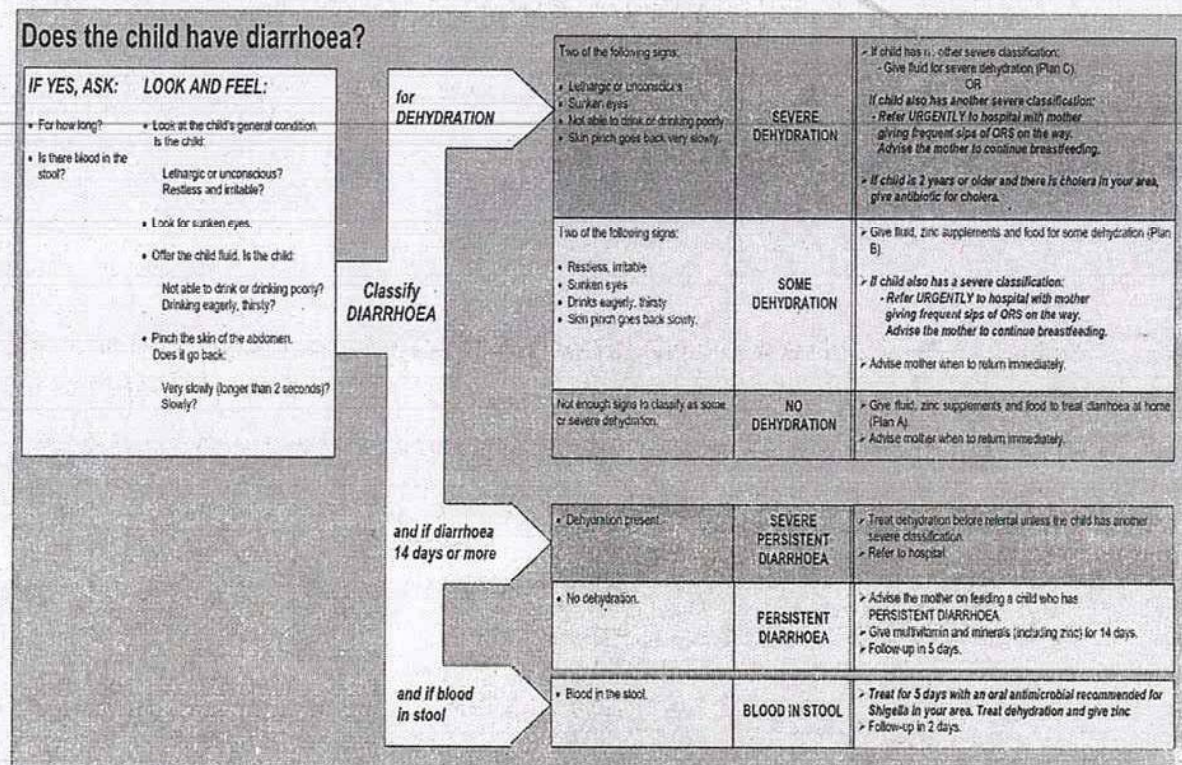
Dehydration

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How to assess the degree of dehydration

The table below describes what the health worker should ask and look for, and indicates which treatment plan to follow.



1. Ask About	liquid stools per day			longer than 3 weeks duration
Diarrhoea	Less than 4	4 to 10	More than 10	Chronic diarrhoea
Vomiting	None or a small amount	Some	Very frequent	Blood or Mucus in the stool
Thirst	Normal	Greater than normal	Unable to drink	
Urine	Normal	A small amount, dark	No urine for 6 hours	
2. Look At	liquid stools per day			Longer than 3 weeks duration
	Less than 4	4 to 10	More than 10	
Condition	Well, Alert	Unwell, sleepy or irritable	Very sleepy, unconscious, floppy or having fits	Severe undernutrition
Tears	Present	Absent	Absent	

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Eyes	Normal	Sunken	Very dry and sunken	
Mouth & Tongue	Wet	Dry	Very dry	
Breathing	Normal	Faster than normal	Very fast and deep	
3. Feel	liquid stools per day			Longer than 3 weeks duration
	Less than 4	4 to 10	More than 10	
Skin	A pinch goes back quickly	A pinch goes back slowly	A pinch goes back very slowly	
Pulse	Normal	Faster than normal	Very fast, weak, or you cannot feel it	
Fontanelle (in infants)	Normal	Sunken	Very sunken	
	liquid stools per day			Longer than 3 weeks duration
	Less than 4	4 to 10	More than 10	
4. Take Temperature				High fever - 38.5°C (or 101°F) or greater
5. Weigh, if possible	No weight loss during diarrhoea	Loss of 25-100 grams for each kilogram of weight	Loss of more than 100 grams for each kilogram of weight	
6. Decide	The patient has no signs of dehydration	If the patient has two or more of these signs, he has some dehydration	If the patient has two or more of these danger signs, he has severe dehydration	If the patient has chronic diarrhoea, severe undernutrition, or high fever treat or refer to the nearest health clinic for treatment. If there is blood or mucus in the stool and high fever, suspect dysentery and treat with antimicrobials.
	Use Plan A	Use Plan B	Use Plan C	

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GIVE EXTRA FLUID FOR DIARRHOEA AND CONTINUE FEEDING

(See FOOD advice on COUNSEL THE MOTHER chart)

Plan A: Treat Diarrhoea at Home

Counsel the mother on the 4 Rules of Home Treatment:
Give Extra Fluid, Give Zinc Supplements, Continue Feeding, When to Return

1. GIVE EXTRA FLUID (as much as the child will take)

TELL THE MOTHER:

- Breastfeed frequently and for longer at each feed.
- If the child is exclusively breastfed, give ORS or clean water in addition to breastmilk.
- If the child is not exclusively breastfed, give one or more of the following: ORS solution, food-based fluids (such as soup, rice water, and yogurt drinks), or clean water.

It is especially important to give ORS at home when:

- the child has been treated with Plan B or Plan C during this visit.
- the child cannot return to a clinic if the diarrhoea gets worse.

2. TEACH THE MOTHER HOW TO MIX AND GIVE ORS. GIVE THE MOTHER 2 PACKETS OF ORS TO USE AT HOME.

3. SHOW THE MOTHER HOW MUCH FLUID TO GIVE IN ADDITION TO THE USUAL FLUID INTAKE:

- Up to 2 years: 50 to 100 ml after each loose stool and between them
- 2 years or more: 100 to 200 ml after each loose stool and between them

Tell the mother to:

- Give frequent small sips from a cup.
- If the child vomits, wait 10 minutes. Then continue, but more slowly.
- Continue giving extra fluid until the diarrhoea stops.

4. GIVE ZINC SUPPLEMENTS

TELL THE MOTHER HOW MUCH ZINC TO GIVE:

- Up to 6 months: 1/2 tablet per day for 14 days
- 6 months or more: 1 tablet per day for 14 days

5. SHOW THE MOTHER HOW TO GIVE ZINC SUPPLEMENTS

- Infants: dissolve the tablet in a small amount of expressed breastmilk, ORS or clean water, in a small cup or spoon
- Older children: tablets can be chewed or dissolved in a small amount of clean water in a cup or spoon

6. REMIND THE MOTHER TO GIVE THE ZINC SUPPLEMENTS FOR THE FULL 14 DAYS

7. CONTINUE FEEDING

8. WHEN TO RETURN

See COUNSEL THE MOTHER chart

Plan B: Treat Some Dehydration with ORS

Give in clinic recommended amount of ORS over 4-hour period

DETERMINE AMOUNT OF ORS TO GIVE DURING FIRST 4 HOURS.

AGE*	Up to 4 months	4 months up to 12 months	12 months up to 2 years	2 years up to 5 years
WEIGHT	< 6 kg	6 - < 10 kg	10 - < 12 kg	12 - 19 kg
In ml	200 - 400	400 - 700	700 - 900	900 - 1400

* Use the child's age only when you do not know the weight. The approximate amount of ORS required (in ml) can also be calculated by multiplying the child's weight (in kg) times 75.

- If the child wants more ORS than shown, give more.
- For infants under 6 months who are not breastfed, also give 100-200 ml clean water during this period.

9. SHOW THE MOTHER HOW TO GIVE ORS SOLUTION.

- Give frequent small sips from a cup.
- If the child vomits, wait 10 minutes. Then continue, but more slowly.
- Continue breastfeeding whenever the child wants.

10. AFTER 4 HOURS:

- Reassess the child and classify the child for dehydration.
- Select the appropriate plan to continue treatment.
- Begin feeding the child in clinic.

11. IF THE MOTHER MUST LEAVE BEFORE COMPLETING TREATMENT:

- Show her how to prepare ORS solution at home.
- Show her how much ORS to give to finish 4-hour treatment at home.
- Give her enough ORS packets to complete rehydration. Also give her 2 packets as recommended in Plan A.
- Explain the 4 Rules of Home Treatment:

12. GIVE EXTRA FLUID

13. GIVE ZINC SUPPLEMENTS

14. CONTINUE FEEDING

15. WHEN TO RETURN

See Plan A for recommended fluids and
See COUNSEL THE MOTHER chart

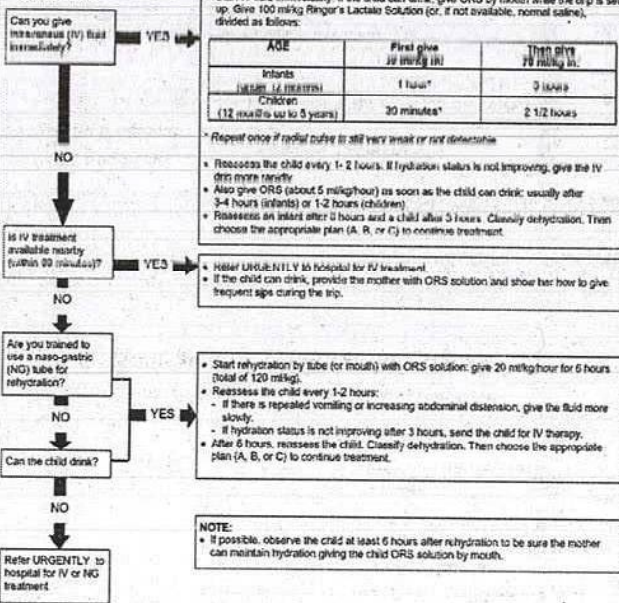
GIVE EXTRA FLUID FOR DIARRHOEA AND CONTINUE FEEDING

(See FOOD advice on COUNSEL THE MOTHER chart)

Plan C: Treat Severe Dehydration Quickly

* FOLLOW THE ARROWS IN ANSWERS "YES", GO ACROSS. IF "NO", GO DOWN.

START HERE



IMMUNIZE EVERY SICK CHILD, AS NEEDED

Plan A: for No Dehydration *

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The health worker should discuss home drinks with the mother feeding during diarrhoea and proper home hygiene. The mother should be given enough ORS packets for two days if:

- her child has been on Plan B.
- it is national policy to give ORS solution to all children who visit a health centre for diarrhoea treatment.
- the mother cannot come back if the diarrhoea gets worse.

Mothers given ORS packets to use at home must be carefully shown how to use them. The amount of ORS solution she should give is:

After Each Loose Stool:

- 50-100 ml ($\frac{1}{4}$ - $\frac{1}{2}$ cup) of ORS solution for a child less than 2 years old.
- 100-200 ml for older children. Adults can take as much as they want.

NOTE: Children receiving ORS solution must also be given the usual amount of ordinary drinks they take each day. *They should not also be given salt and sugar solution.*

Plan B: for Some Dehydration *

1. Use this table to see how much ORS solution is suitable for 4-6 hours treatment:

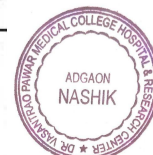
1. USE THIS TABLE TO SEE HOW MUCH ORS SOLUTION IS SUITABLE FOR 4-6 HOURS TREATMENT:

Patient's weight in kilograms	<div> <div>3</div><div>5</div><div>7</div><div>9</div><div>11</div><div>13</div><div>15</div><div>20</div><div>30</div><div>40</div><div>50</div> </div>										
Patient's age *	<div> <div>2</div><div>4</div><div>6</div><div>8</div><div>10</div><div>12</div><div>18</div><div>2</div><div>3</div><div>4</div><div>6</div><div>8</div><div>15</div><div>adult</div> </div> <div> <div>months</div><div>years</div> </div>										
Give this much solution for 4-6 hours	in ml:	200-400	400-600	600-800	800-1000	1000-2000	2000-4000				
	in local unit of measure:										

* Use the patient's age only when you do not know the weight.

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If the patient wants more ORS solution, five more. If the eyelids become puffy, stop and give other fluids. Use ORS solution again when the puffiness is gone. If the child vomits, wait 10 minutes and then continue slowly giving small amounts of ORS solution.

2. If the mother can remain at the health centre

- tell her how much ORS solution to give her child
- show her how to give it
- watch her give it


3. After 4-6 hours reassess the child. Then choose the suitable treatment plan.

NOTE: For children under 12 months continuing treatment plan B after 4-6 hours, tell the mother to give:

- breastmilk feeds between drinks of the ORS solution,
or
- 100-200 mls of clean water before continuing ORS if she does not breastfeed her child.

4. If the mother must leave any time before completing treatment plan B, tell here:

- to finish the 4-6 hours treatment as in 1. above
- to give the child as much ORS solution as he wants after the treatment
- to look for the signs of dehydration and, if the child has any, to return the next morning.


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Give her enough ORS packets for 2 days and show her how to prepare ORS solution.

Explain briefly how to prevent diarrhoea.

Plan C : for Severe Dehydration *		
Follow the arrows. If the answer to the question is Yes , go across. If it is no , go down.		
Start Here ↓		
Can you give intravenous (IV) fluids?	Yes →	<ol style="list-style-type: none"> 1. Give IV fluids. 2. After 4-6 hours, reassess the child and choose the suitable treatment plan.
No ↓		
Can the child drink?	Yes →	<ol style="list-style-type: none"> 1. Start treatment with ORS solution, as in Treatment Plan B 2. Send the child for IV treatment
No ↓		
Are you trained to use a nasogastric tube for rehydration?	Yes →	<ol style="list-style-type: none"> 1. Start rehydration using the tube 2. If IV treatment is available nearby, send the child for immediate IV treatment.
No ↓		
URGENT: Send the child for IV treatment		
Note: If there is a high fever, show the mother how to cool the child with a wet cloth and fanning.		

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GIVE FOLLOW-UP CARE

- Care for the child who returns for follow-up using all the boxes that match the child's previous classifications.
- If the child has any new problem, assess, classify and treat the new problem as on the ASSESS AND CLASSIFY chart.

PNEUMONIA

After 2 days:

Check the child for general danger signs.
Assess the child for cough or difficult breathing.

Ask:

- Is the child breathing slower?
- Is there less fever?
- Is the child eating better?

See ASSESS & CLASSIFY chart.

Treatment:

- If chest indrawing or a general danger sign, give a dose of second-line antimicrobial or intramuscular chloramphenicol. Then refer URGENTLY to hospital.
- If breathing rate, fever and eating are the same, change to the second-line antimicrobial and advise the mother to return in 2 days or refer. (If this child had measles within the last 3 months refer)

PERSISTENT DIARRHOEA

After 5 days:

Ask:

- Has the diarrhoea stopped?
- How many loose stools is the child having per day?

Treatment:

- If the diarrhoea has not stopped (child is still having 3 or more loose stools per day), do a full reassessment of the child. Give any treatment needed. Then refer to hospital.
- If the diarrhoea has stopped (child having less than 3 loose stools per day), tell the mother to follow the usual feeding recommendations for the child's age.

BLOOD IN STOOL

After 2 days:

Assess the child for diarrhoea. > See ASSESS & CLASSIFY chart.

Ask:

- Are there fewer stools?
- Is there less blood in the stool?
- Is there less fever?
- Is there less abdominal pain?
- Is the child eating better?

Treatment:

- If the child is dehydrated, treat dehydration.
- Continue giving zinc supplements for 14 days.
- If number of stools, amount of blood in stools, fever, abdominal pain, or eating is the same or worse, refer to hospital.
- If fewer stools, less blood in the stools, less fever, less abdominal pain, and eating better, continue giving the same antibiotic until finished.

FEVER

If fever persists after 2 days:

Do full reassessment of the child > See ASSESS & CLASSIFY chart
Assess for other causes of fever

Treatment:

- If the child has any general danger signs or stiff neck, treat as VERY SEVERE FEBRILE DISEASE.
- If the child has any apparent cause of fever, provide treatment.
- If fever has been present for 5 days, refer for assessment.
- If there is no apparent cause of fever and it has not been present for 5 days, advise mother to return in 2 days if fever persists. Make sure that the child is given increased amounts of fluid and offered food.

FLUID

Advise the Mother to Increase Fluid During Illness

FOR ANY SICK CHILD:

- Breastfeed more frequently and for longer at each feed.
- If not exclusively breastfed, increase fluid. For example, give soup, rice water, yoghurt drinks or clean water.

FOR CHILD WITH DIARRHOEA:

- Giving extra fluid can be lifesaving. Give fluid according to Plan A or Plan B on TREAT THE CHILD chart.

WHEN TO RETURN

Advise the Mother When to Return to Health Worker

FOLLOW-UP VISIT

Advise the mother to come for follow-up at the earliest time listed for the child's problems.

If the child has:	Return for follow-up in:
PNEUMONIA DYSENTERY FEVER, if fever persists MEASLES WITH EYE OR MOUTH COMPLICATIONS	2 days
PERSISTENT DIARRHOEA ACUTE EAR INFECTION CHRONIC EAR INFECTION FEEDING PROBLEM ANY OTHER ILLNESS, if not improving	5 days
PALLOR	14 days
LOW WEIGHT FOR AGE RICKETS	30 days

NEXT WELL-CHILD VISIT

Advise mother when to return for next immunization according to immunization schedule.

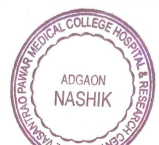


WHEN TO RETURN IMMEDIATELY

Advise mother to return immediately if the child has any of these signs:

Any sick child	<ul style="list-style-type: none"> Not able to drink or breastfeed Becomes sicker Develops a fever
If child has NO PNEUMONIA: COUGH OR COLD, also return if:	<ul style="list-style-type: none"> Fast breathing Difficult breathing
If child has Diarrhoea, also return if:	<ul style="list-style-type: none"> Blood in stool Drinking poorly

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Checklist

	Yes/No
List the causes of dehydration	
List the degree of dehydration	
Name the signs of dehydration	
What is the importance of ORS	
Preparation of ORS	

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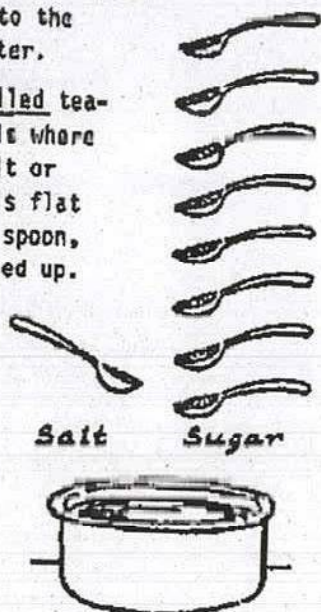
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How to Make Oral Rehydration Solution from Salt and Sugar

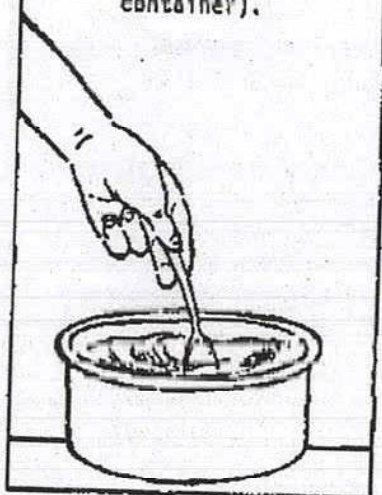
3. Measure ONE levelled teaspoon of SALT and EIGHT levelled teaspoons of SUGAR into the water.

A levelled teaspoon is where the salt or sugar is flat in the spoon, NOT piled up.



1. Wash Your Hands.
2. Measure One Litre of Drinking Water into a Clean Container.

4. Mix the salt and sugar into the water well (until you cannot see the salt or sugar at the bottom of the container).



5. Taste the solution. It should never taste very salty. DO NOT boil up this solution once it is made up.
6. Give the drink to the person with diarrhoea. A small child or adult should drink at least one quarter of a Tumpeco after each stool. A large child or adult should drink at least one half of a Tumpeco after each stool.



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Anthropometry

Parameters of anthropometry

Age dependent factors:-

- a) Weight
- b) Height
- c) Head circumference
- d) Chest circumference

Age independent factors:-

- a) Mid-arm circumference (1-5 years)
- b) Weight for height
- c) Skinfold thickness
- d) Mid upper arm/height ratio

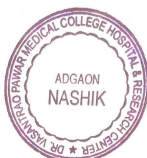
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WEECH'S FORMULA

a) 3 – 12 months

Expected weight(kg) = age (months) + 9 / 2

b) 1- 6 years

Expected weight(kg) = age (years) x 2 + 8

c) 7 – 12 years

Expected weight(kg) = age (years) x 7 - 5 / 2



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Classification of Malnutrition by Indian Academy of Pediatrics

Weight for age *	Grade of malnutrition
>80 %	Normal
71-80%	Grade 1 (Mild)
61-70%	Grade 2 (Moderate)
51-60%	Grade 3 (Severe)
<50%	Grade 4 (very severe)

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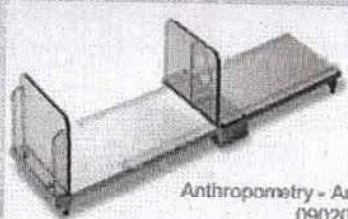


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Length or Height/Stature Measurement Technique

- Upto 2 years of age Recumbent Length is measured with the help of an Infantometer .
- In older children Standing Height or Stature is recorded. It is convenient to use an Inbuilt Stadiometer affixed on the wall which provides a direct read out of height with an accuracy of $\pm 0.1\text{cm}$.
- Nutritional deprivation over a period of time affects the stature or linear growth of the child .



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Technique of length measurement

- The infant is placed supine on the infantometer.
- Assistant or mother is asked to keep the vertex or top of the head snugly touching the fixed vertically plank.
- The leg are fully extended by pressing over the knee, and feet are kept vertical at 90° , the movable pedal plank of infantometer is snugly apposed against soles and length is read from scale.



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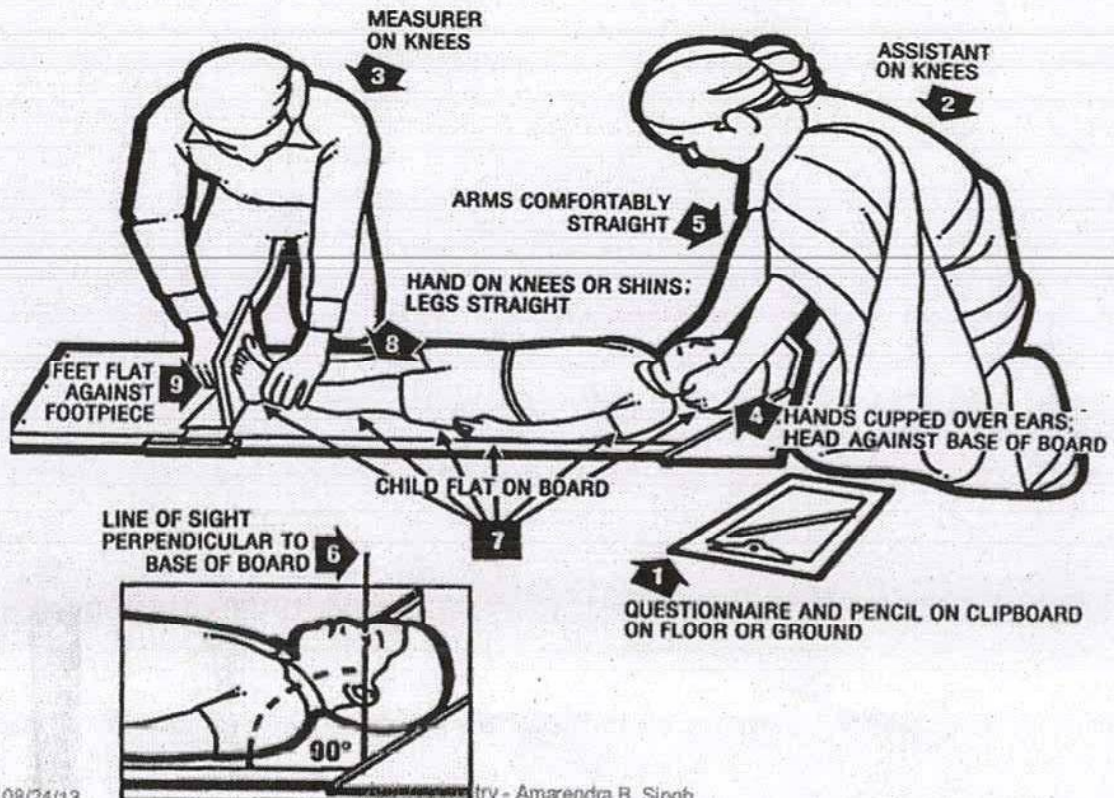
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Technique for height measurement

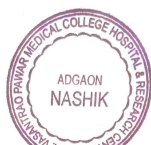
- In older children who can stand, height can be measured by the rod attached to the lever type machine or by stadiometer.
- Child should stand with bare feet on the flat floor against a wall with feet parallel and with heels, buttocks, shoulders and occiput touching the wall.
- Head should be kept in Frankfurt plane.
- With the help of a wooden spatula or plastic ruler, the topmost point of the vertex is identified on the wall.



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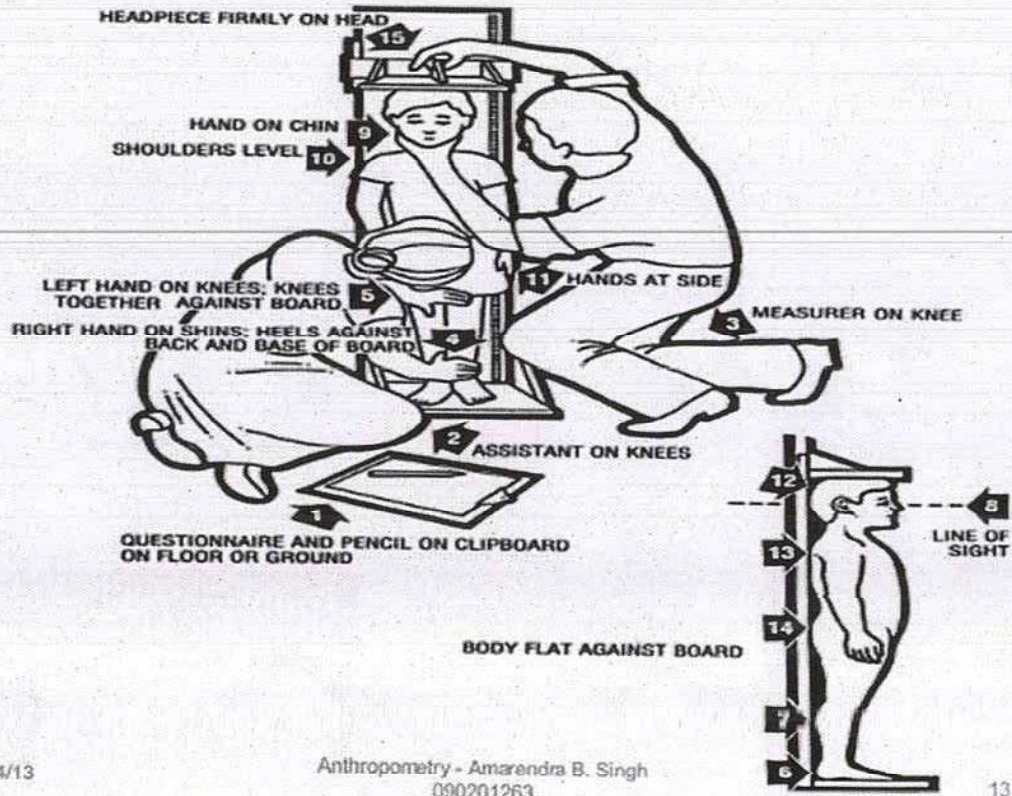
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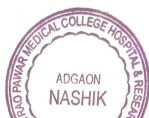


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B] Expected height upto 12 yrs

length or height (in cms) = age in years x 6 + 77 (Weech's formula)

C]] Prediction of adult height

- Parental height, Tanner's formula and Weech's formula are used.



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HEAD CIRCUMFERENCE

- Brain growth takes place 70% during fetal life, 15% during infancy and remaining 10% during pre-school years.
- Head circumference are routinely recorded until 5 years of age.
- If scalp edema or cranial moulding is present, measurement of scalp edema may be inaccurate until fourth or fifth day of life.
- The head circumference is measured by placing the tape over the occipital protuberance at the back and just over the supraorbital ridge and the glabella in front.

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Expected head circumference in children

Age	Head circumference (cm)
At birth	34 – 35
2 months	38
3 months	40
4 months	41
6 months	42 - 43
1 year	45 - 46
2 years	47 - 48
5 years	50 - 51

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Head Circumference Growth Velocity

Till 3 months	2 cm/month
3 months – 1 year	2cm/3 month
1 – 3 year	1cm/6 month
3 – 5 year	1cm/year

• During first year there is 12 cm increase in head circumference, while 1 – 5 year age, only 5 cm gain occur in head size.

• Adult head size is achieved between 5 to 6 years. The following formula (Dine's formula) is used for estimating the head circumference in the first year of life :-

$$\frac{(\text{length in cm} + 9.5) + 2.59}{2}$$

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❖ The term Macrocephaly refers to OFC of more than 2SD above the mean while Microcephaly refers to OFC more than 3SD below the mean for age, sex, height and weight.

Measurement of head circumference



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Chest circumference

- It is usually measured at the level of nipples, preferably in mid inspiration.
- Xiphisternum
- In children
 - ≤ 5 years - lying down position
 - > 5 years - standing position



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Relationship between head size with Chest Circumference:

- **At birth:** head circumference $>$ chest circumference by upto 3 cms.
- At around **9 months to 1 year** of age: head circumference = chest circumference,
- but **thereafter** chest grows more rapidly compared to the brain.



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- The head circumference is greater than chest circumference by more than 3 cms in :
 - a) preterms
 - b) small-for-date , &
 - c) hydrocephalic infants
- In malnourished children, chest size may be significantly smaller than head circumference because growth of brain is less affected by undernutrition. Therefore there will be considerable delay before chest circumference overtakes head circumference.



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AGE INDEPENDENT CRITERIA FOR ASSESSMENT OF NUTRITIONAL STATUS

- Mid-upper arm circumference
- Thickness of subcutaneous fat
- Body ratios
- Weight for height
- Body mass index
- Upper segment/ lower segment ratio
- Arm span
- Obesity



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- **Bangle test** – quick assessment of arm circumference. A fiber glass ring of internal diameter of 4 cm is slipped up the arm, if it passes above the elbow, it suggests that upper arm is less than 12.5 cm and child is malnourished.

- **Shakir tape** – is a fiber-glass tape with
red – less than 12.5 cm
yellow – 12.5- 13.5 cm
green – greater than 13.5 cm

shading so that paramedical workers can assess nutritional status without having to remember the normal limits of mid arm circumference.



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• **QUAC stick – Quaker Upper Arm Circumference Stick**

It is developed on the principle that acute starvation severely affects mid-arm circumference while height is unaffected.

- It is a height measuring rod, calibrated in MAC.
- Values of 80% MAC for Ht. are marked on stick at corresponding ht. levels
- The malnourished child would be taller than the anticipated height derived from the mid-arm circumference

MAC (cm)	Ht. (cm)
16.5	133.0
13.5	103.5
12.5	70.0

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Skinfold thickness

- Measured with Herpenden's caliper
- Triceps or subscapular region
- The skinfold with subcutaneous fat is picked up with thumb and index finger, and caliper is applied beyond the pinch.
- Fat thickness
 - >10mm - healthy children 1-6 years
 - <6mm - is indicative of moderate to severe degree of malnutrition



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Body ratios

- **Rao & Singh's weight-height index:**
$$= [\text{weight (kg)} / (\text{height})^2 \text{ cms}] * 100$$

normal index is more than 0.15

- **Kanawati index:** (during 3m to 4 years)
$$= \text{Mid-arm circumference} / \text{Head circumference}$$

Normal	0.331
Mild	0.310 – 0.280
Modreate	0.279 – 0.250
Severe	< 0.250

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WEIGHT-FOR-HEIGHT

Weight-for-height =

Weight of the patient (kg) X 100

Weight of normal child of same height

Weight-for-Height *	Nutritional Status	for-height: ____
>90%	Normal	
85-90 %	Borderline Malnutrition	
75-80 %	Moderate Malnutrition	
<75 %	Severe Malnutrition	

*Reference standard NCHS data

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Classification

- When malnutrition has been chronic, the child is "stunted",
weight-for-age is low/normal
height-for-age is low
weight-for-height is normal.
- In Acute malnutrition, the child is "wasted",
weight-for-age is low
height-for age is normal
weight-for-height is low

Waterlow's classification

H/A	W/H	> m - 2 SD	< m - 2 SD
> m - 2 SD	Normal	Wasted	
< m - 2 SD	Stunted	Wasted and stunted	

m=mean, SD=standard deviation

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Assessment of nutritional status

Waterlow classification

	Malnutrition			
	Normal	Mild	Moderate	Severe
Height for age (S)	95	90-95	85-90	85
Weight for age (W)	90	80-90	70-80	70

30

255

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BODY MASS INDEX (BMI)

$$\text{BMI} = \frac{\text{mass(kg)}}{(\text{height(m)})^2}$$

- A BMI-for-age of > 85th percentile is suggestive of Overweight.
- A BMI-for-age of > 95th percentile is or when it is associated with triceps or skinfold thickness-for-age of > 90th percentile, it is diagnostic of Obesity.

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ARM SPAN

• It is the distance between the tips of middle fingers of both arms outstretched at right angles to the body, measured across the back of the child.

• In under-5 children, arm span is 1 to 2 cm smaller than body length.

• During 10-12 years of age, arm span = height.

• In adults arm span is more in adults by 2 cm.



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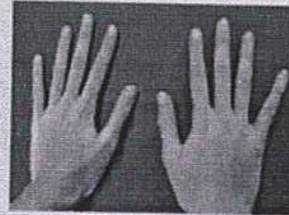


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• Abnormally **large** arm span is seen in patients with

- 1) Arachnodactyly (Marfan syndrome)
- 2) Eunuchoidism
- 3) Klinefelter's Syndrome
- 4) Coarctation of aorta



• Arm span is **short** compared to height in patients with :

- 1) Short limbed dwarfism
- 2) Cretinism
- 3) Achondroplasia



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ADVANTAGES OF ANTHROPOMETRY

- Less expensive & need minimal training
- Readings are reproducible.
- Objective with high specificity & sensitivity
- Measures many variables of nutritional significance (Ht, Wt, MAC, HC, skin fold thickness, waist & hip ratio & BMI).
- Readings are numerical & gradable on standard growth charts



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Checklist:

Steps	Yes/No/ Correct answer
Greet the patient	
Is consent taken from the patient?	
Is procedure explained to the patient?	
Is the Preparation done?	
Are the materials required for the procedure collected?	
Is Hand wash done, Aseptic precaution taken? Painting and Drapping done?	
Selection of proper point for procedure, proper technique of insertion of the needle?	
Injecting required amount of medication	
Withdraw the needle.	
Press with dry cotton.	

Requirements: . Disposable or sterile glass syringe with needle size 24 or 26 G , Gloves,
Spirit, Gauze/ cotton



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2.5.3

**Reforms in Evaluation
Skill Module**



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Asthma devices in children

- A) Inhalation Devices
 - MDI with/ without spacer
 - DPI
 - Nebuliser
- B) Diagnosis
 - Spirometry
 - PEFR

INHALATION DEVICES

1) Meter Dose Inhaler

- . Contains drug with HFA gas propellant at 400 KPa in aluminium canister
- . A fixed measured dose released within 0.1 sec of actuation.
- . Speed of release over 100 km/h
- . Many of them come with a dose counter and a visual indication about the doses left (preferred feature)

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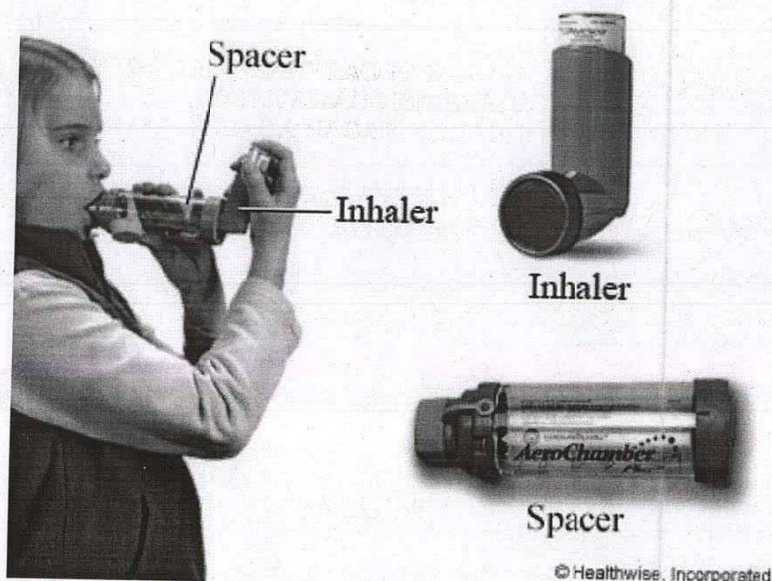
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Merits	Demerits
Portable	Needs breathing coordination
Quick Delivery	High oropharyngeal deposition
Economical	Cold freon effect
Wide range of formulations <ul style="list-style-type: none">- Beta2 Agonists eg. Salbutamol, Levosalbutamol, Terbutaline- Ipratropium bromide- ICS eg Beclomethasone, Budesonide- LABA + ICS various combinations	If cold/ refrigerated, pressure may not be enough to produce adequate doses or appropriate size particles



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Adding Spacer to overcome the demerits:

Why needed?

- MDI releases the drug at a very high speed, need to have breath actuation synchrony
- Larger particles immediately hit and deposit on the posterior pharyngeal wall leading to local adverse effects and systemic absorption

Effects of adding a spacer (volume holding device)

- Suspends the released particles for a while, thus slowing it, gives a little time for breathing in.
- As the propellant evaporates it decreases particle size.

Advantage

- Less oropharyngeal deposition (larger particles stay mainly in the spacer)
- Short delay/ asynchrony (1-2 sec after actuation) will not affect airway deposition as much as the plume slows down

Important tips for using MDI with spacer

- Remember, still there are only a few seconds duration available for the child to breathe after actuation
- Good seal is needed through the spacer
- If a child is young and not able to make a seal around the spacer, one can add mask to the spacer.



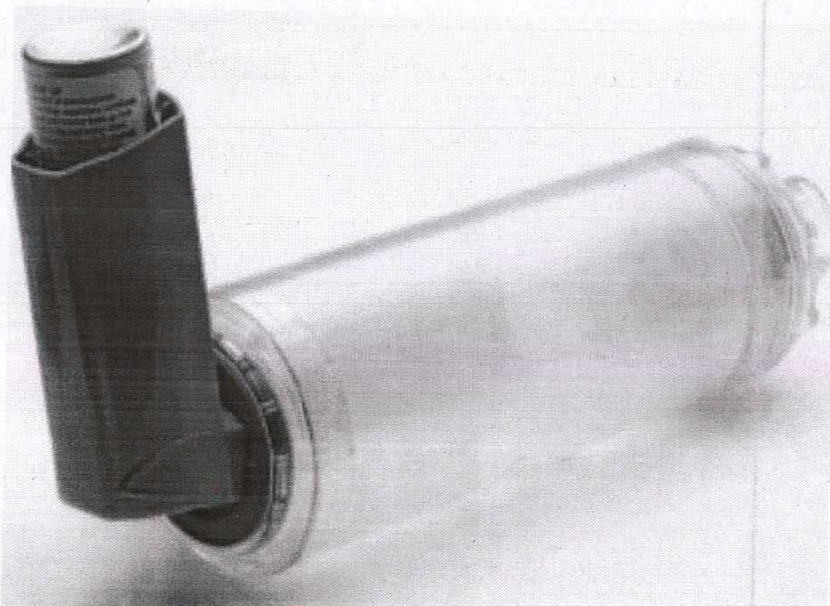
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2) Spacer



- Wash with warm water with or without mild detergent once a month
 - . Keep the mouth piece clean after each use
- Drip dry to avoid electrostatic charge
 - . Never polish it clean
 - . Upto 20 actuations can be needed to overcome the charge
- May be changed every year or earlier if broken / cracked or if valve gets sticky
- Follow manufacturer's recommendations



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3) Dry powder Inhalers (DPI)- Single and multi dose devices



Type of DPI

- Discharge type
 - . Single dose units (Rotahaler, Respihaler, Revoliser, Transhaler)
 - . Multiple dose units (Accuhaler, Multihaler)
- Reservoir type
 - Turbuhaler (Astra)



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Merits	Demerits
Portable (take to school)	Needs optimal flow rates Newer pin types need less flow rates to disaggregate but deposition is better with higher flow rates
Breath actuated so no coordination problems	Bad taste due to particles in mouth
Capsules forms may be more acceptable - Just ensure they do not intend swallowing it	High oropharyngeal deposition - Local and systemic side effects of steroids likely
Inhalation visualized	Humidity leads to agglutination - Child breathing into charged DPI will decrease drug availability
Fairly wide range of drugs available	

Steps to use:

- Insert capsule
- Check capsule is broken (some devices need manual rotation to break it while others have puncturing pins)
- Exhale out
- Put DPI to mouth
- Inhale forcefully
- Hold the breath
- Remove from mouth and exhale out fully
- Repeat steps 3 and 7 till all the powder is inhaled in
- Rinse mouth



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4) Peak Expiratory Flow



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Checklist

	Yes/ No
Recognising signs and symptoms of Asthma	
Treatment of Asthma according to the severity	

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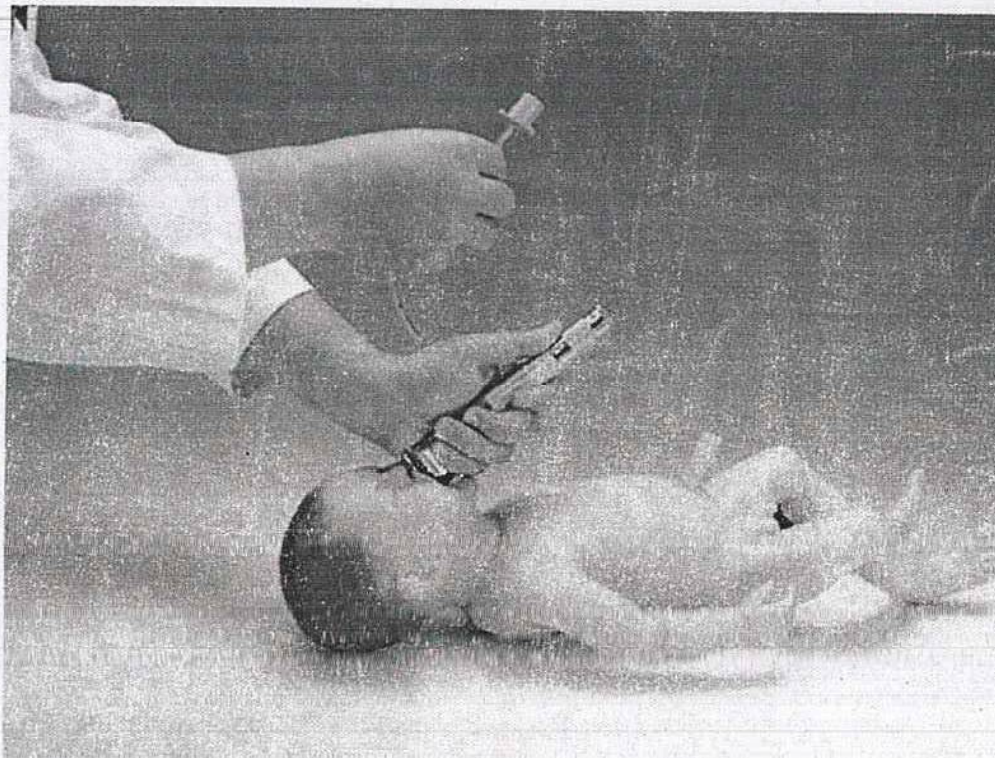
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WORK PLACE BASED ASSESSMENT

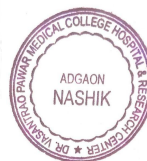
ENDOTRACHEAL INTUBATION

- Endotracheal Intubation means passing of endotracheal tube into the trachea through nose or mouth .



EQUIPMENT'S

- Laryngoscope & blades
- Endotracheal tubes
- Appropriate size resuscitation bags , masks & reservoirs
- Suction apparatus & material
- Magill's forceps
- Airways
- Shoulder pads
- Adhesive plaster



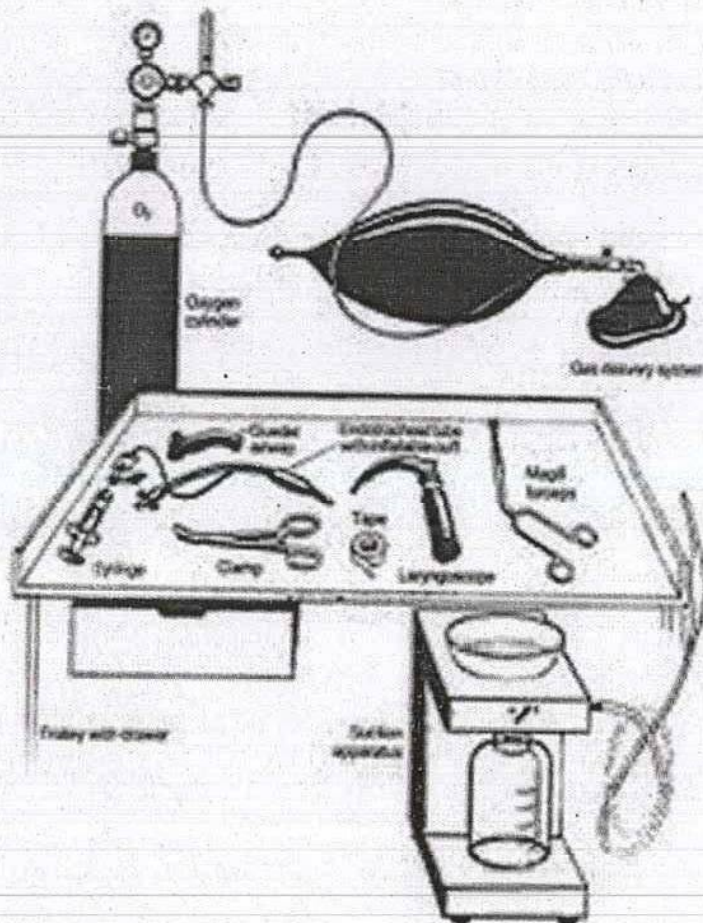
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- Extra syringes & needles
- Gloves, Gauze pieces



ANATOMICAL POSITION

- Give hyper extended position to the neonate with the help of shoulder pack.
- Stabilize head & provide cricoid pressure

TECHNIQUES

- Pre oxygenation with 100% oxygen
- Assessing of neonate throughout procedure e.g
- Hyper extended neck position of patient
- Place the laryngoscope in correct technique



Respiration, O₂ saturation.

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- Insert the endotracheal tube in proper position as per anatomy
- Check the position of tube
- Secure the endotracheal tube with adhesive
- Insert infant feeding tube to decompress the abdomen
- Do chest x- ray to look for position of tube

COMMON ERRORS

- Focus is placed on procedures not on patient
- Position of baby
- Excessive pressure
- Improper insertion of tube
- Intubating the active baby

POSTPROCEDURE NURSING CARE

- Position of patient
- Maintain proper position of endotracheal tube
- Watch & maintain an open airway
- Suctioning
- Infection control
- Oral hygiene
- Assessment of vital signs

COMPLICATIONS

- Infection
- Injury to associated organs
- Hemorrhage
- Laryngeal edema
- Pneumothorax
- Tracheal stenosis



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Checklist:

Steps	Yes/No/ Correct answer
Observe the vitals of the patient	
Is written consent taken from the patient?	
Are the materials required for the procedure collected?	
Is Hand wash done, Aseptic precaution taken?	
Proper position given to the patient	
Technique of inserting the ET through the laryngoscope	
Air entry checked ? Is the et in position?	
Observing the patients SP02 and other vitals .	
Fixing the ET in position	
Monitoring patient after procedure?	
Is the XRAY done	



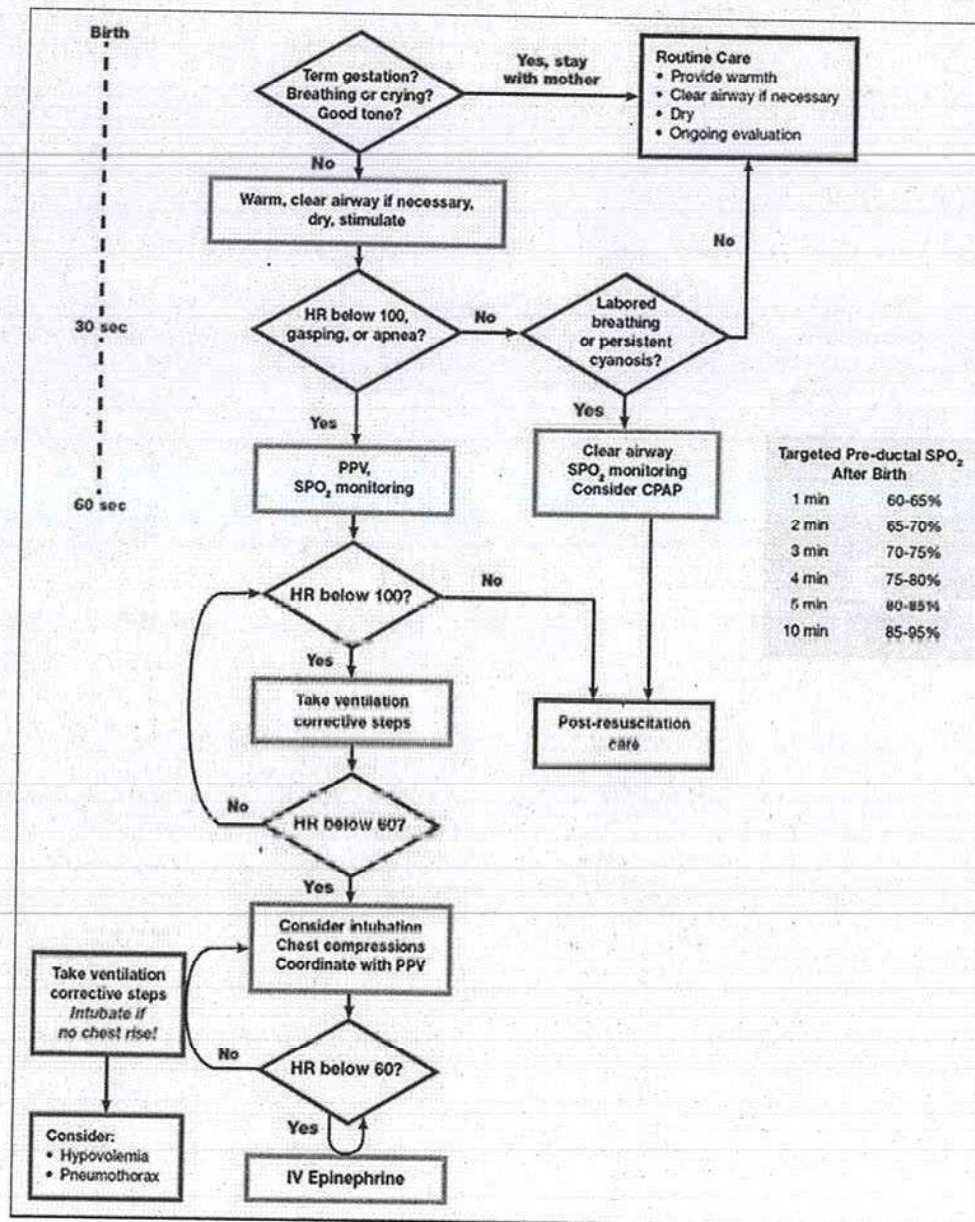
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NEONATAL RESUSCITATION



Keep Equipment



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PREPARATION FOR RESUSCITATION

Keep Equipment Ready For Use:

-Warmer



--Switch on warmer/ bulb(100 watt) before birth of the baby

-Prewarm the sheets



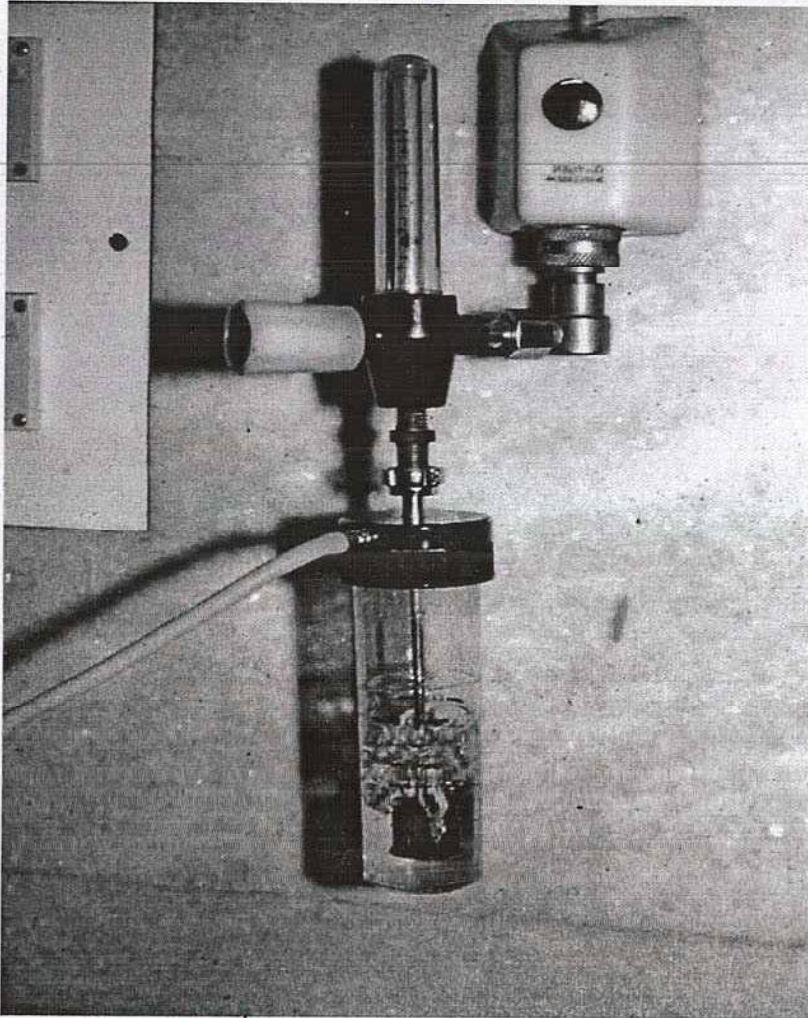
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-Humidified oxygen



-Suction machine

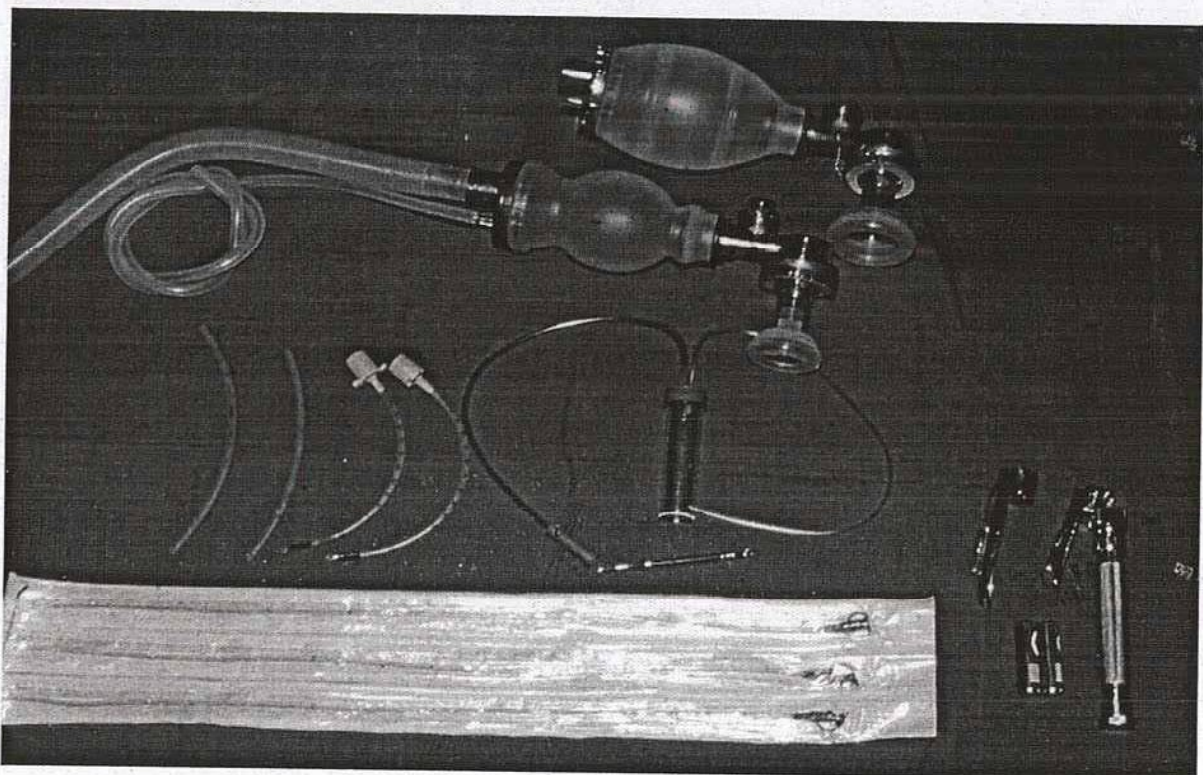


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Drug Tray



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Inj Epinephrine, 1:10,000

Normal saline

RESUSITATION

Evaluation primarily based on 3 signs

- RESPIRATION
- HEART RATE
- COLOUR

For All Babies At Birth Ask The Following:

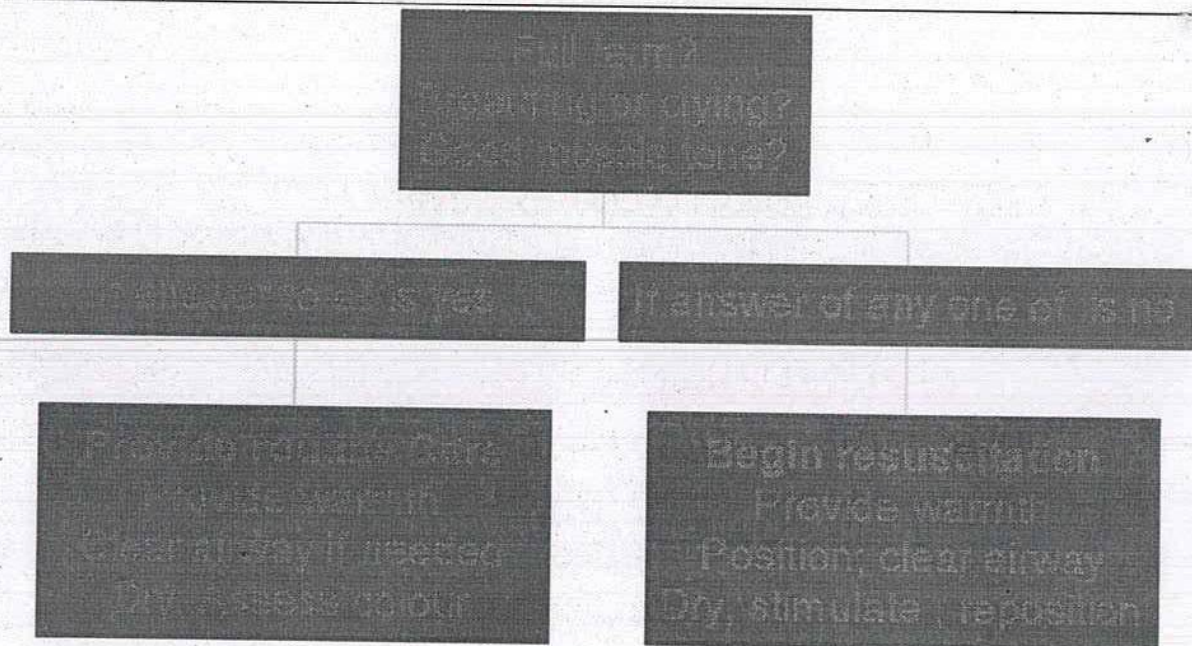


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INITIAL STEPS:


Provide Warmth & Establish an Open Airway

- Switch On Warmer Before Birth
- Prewarm the Sheets
- Place Baby Under Warmer

POSITION OF THE INFANT

- Slight head extension- sniffer position
- Use role beneath shoulder if needed

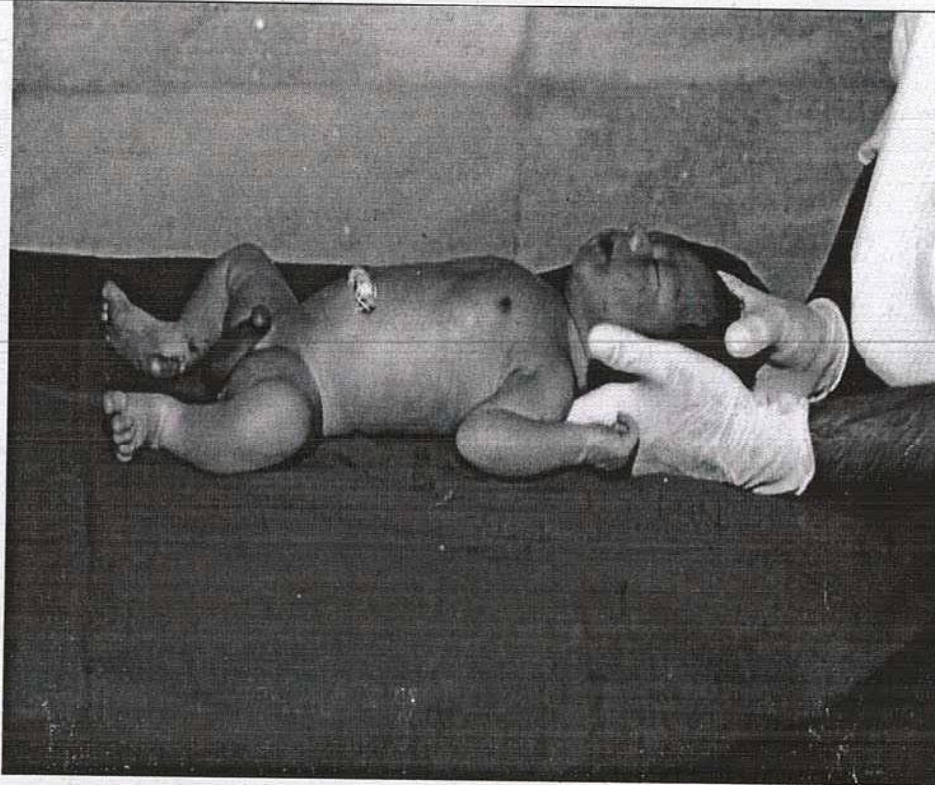



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Suction the mouth first & then

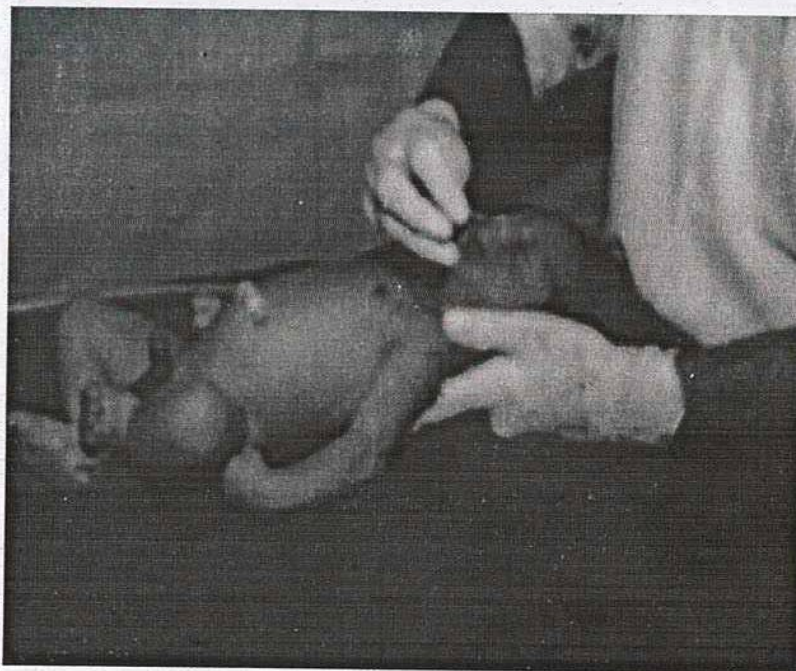


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Dry the baby

- Special attention to head (large surface area)
- & back (also provides stimulus for breathing)



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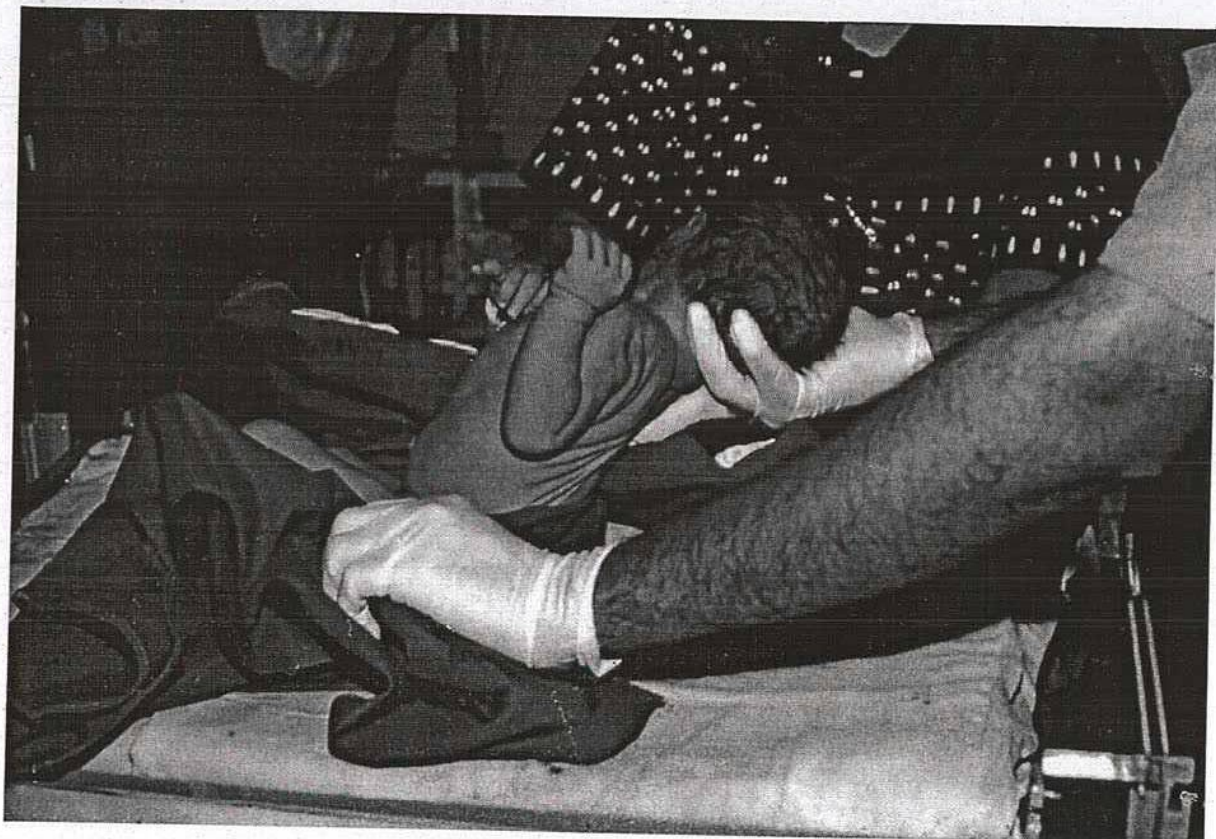


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Remove the wet sheet



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Provide tactile stimulation

-By rubbing the back or gently slapping the soles of the feet



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Special Situation : Meconium In The Amniotic Fluid

-Meconium In The Amniotic Fluid

Meconium In The Amniotic Fluid & Baby Not vigorous at Birth

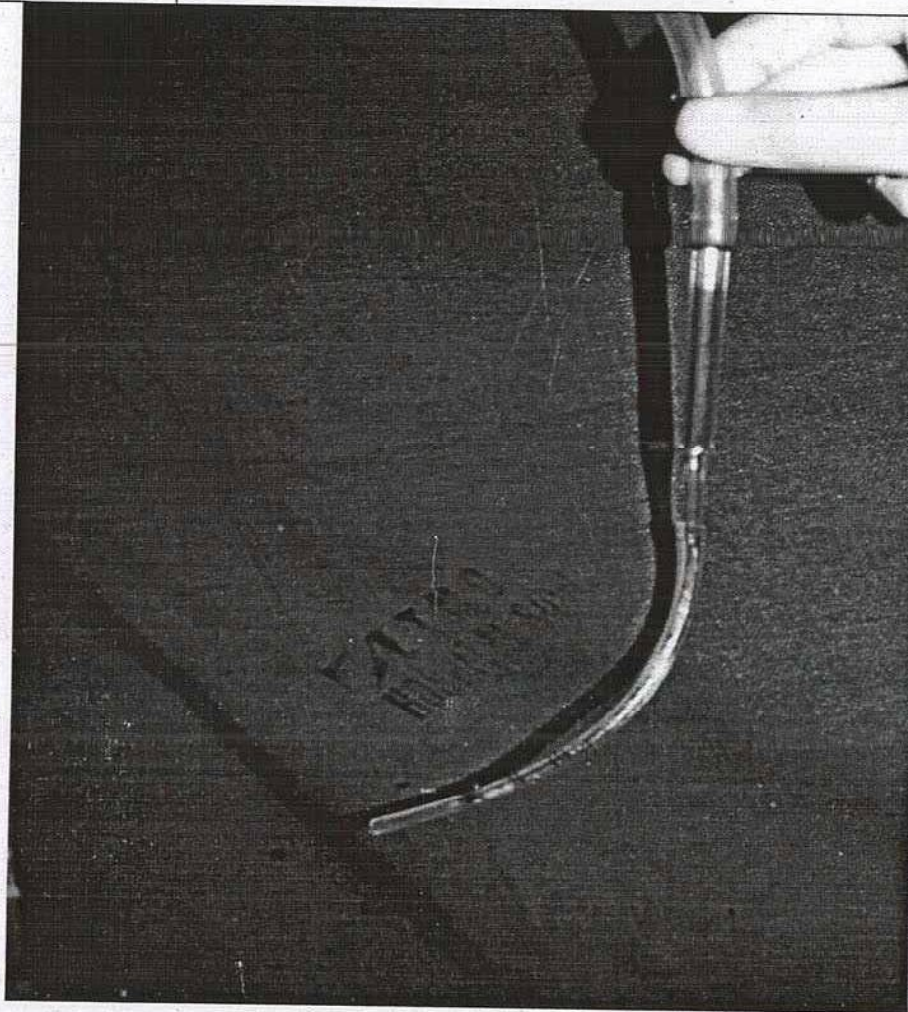


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Initial Steps: Summary

1. Airway
2. Breathing
3. Circulation

4. Disability
5. Exposure

6. Re-evaluate
7. Re-evaluate
8. Re-evaluate
9. Re-evaluate

Procedures should be completed in 30 seconds
Then evaluate respiration, heart rate colour
in the same order

Reevaluate after first 30 Seconds

1. Airway
2. Breathing
3. Circulation

4. Disability
5. Exposure

6. Re-evaluate
7. Re-evaluate
8. Re-evaluate

9. Re-evaluate
10. Re-evaluate
11. Re-evaluate

12. Re-evaluate
13. Re-evaluate
14. Re-evaluate

15. Re-evaluate
16. Re-evaluate
17. Re-evaluate

18. Re-evaluate
19. Re-evaluate
20. Re-evaluate

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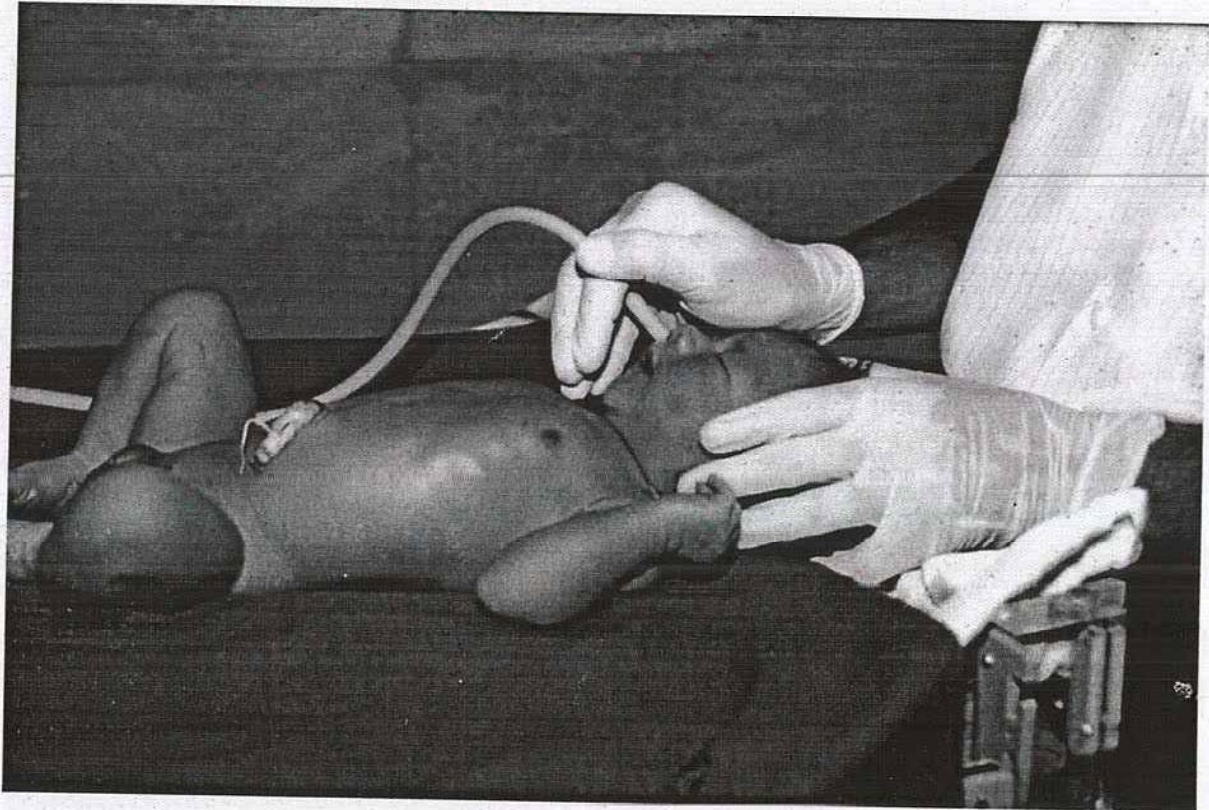
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Breathing, HR > 100, But cyanosed: Provide free flow oxygen

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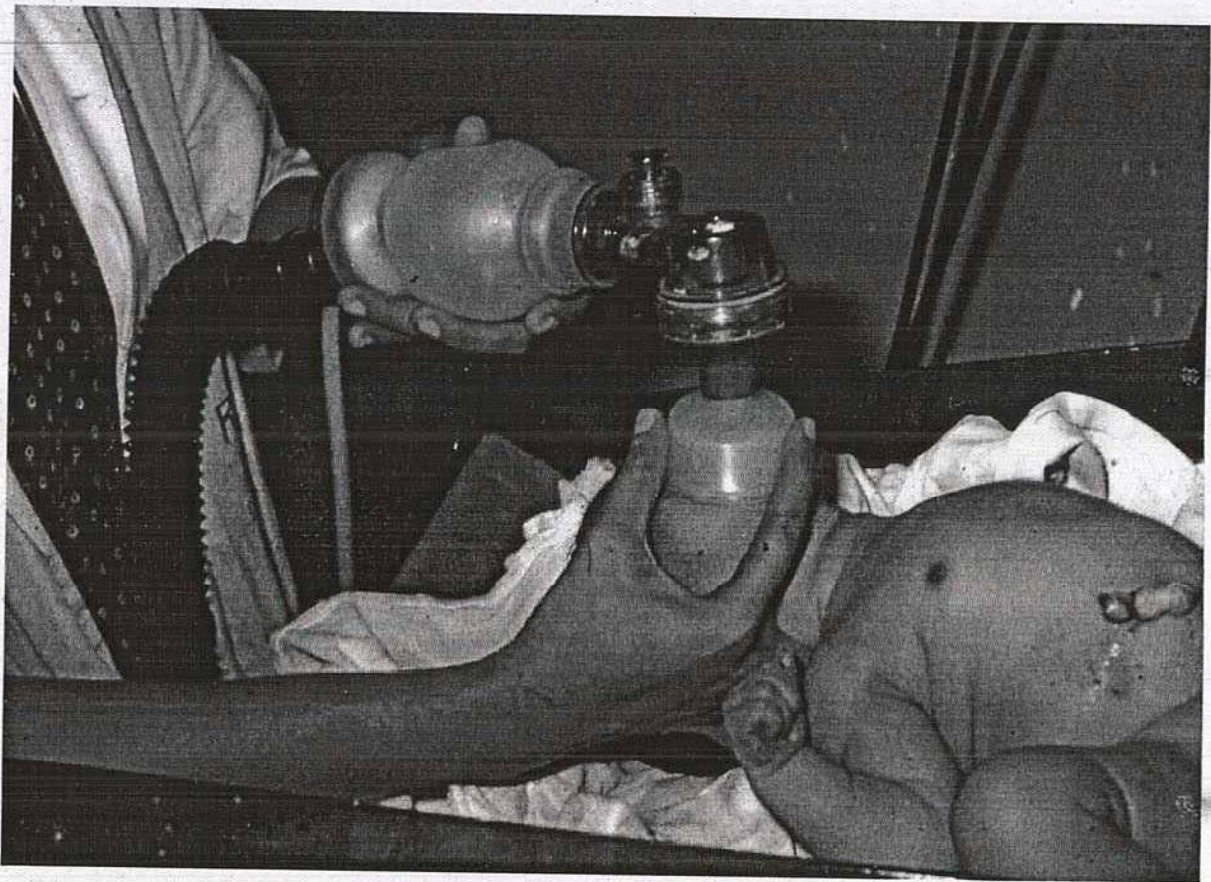




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Apnea, Heart rate < 100: Provide Bag & Mask Ventilation



BAG AND MASK VENTILATION

-Indications:

- Apnea or gasping respiration.
- Heart rate < 100 beats per minute.
- Persistent central cyanosis.
- Rate: 40-60 breaths / minute
- Should appear to have easy rise and fall of chest
- Reassess after 30 seconds, evaluate respiration, heart rate and color

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Bag & Mask Ventilation: Signs Of Improvement

- Increasing heart rate
- Improving color
- Spontaneous breathing
- Improving muscle tone
- If not improving/ no chest rise
- Inadequate Seal -reapply mask
- Blocked airway - position & suction
- Inadequate pressure- Increase

Reassess after 30 seconds

Reassess after 30 seconds, evaluate respiration, heart rate and colour
Count heart rate for 6 seconds

HR > 100/min	RR > 20/min	HR > 100/min
Spontaneous breathing	Spontaneous breathing	Spontaneous breathing
Spontaneous breathing	Spontaneous breathing	Spontaneous breathing

Spontaneous breathing	Spontaneous breathing
Spontaneous breathing	Spontaneous breathing
Spontaneous breathing	Spontaneous breathing

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CHEST COMPRESSIONS

- If HR < 60/min after 30 sec of Effective IPPV with O₂.
- Start Chest Compressions, Continue IPPV



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- Over lower third of sternum, immediately above the xiphoid
- Compress to a depth of one third the AP diam of chest.
- Coordinate one ventilation after every third compression,
- Total of 30 breaths & 90 compressions per min.
- Consider intubation
- Reassess after 30 seconds.



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ENDOTRACHEAL INTUBATION



Indication For Endotracheal Intubation

- To suction trachea in presence of meconium
- If bag and mask ventilation ineffective
- To facilitate coordination of chest compression and ventilation
- To administer epinephrine

MEDICATIONS

Indications for Epinephrine

-Hr < 60/min after 30 seconds of effective assisted ventilation and another 30 seconds of coordinated chest compression and ventilation.

- Dose:

0.1 –0.3 ml/kg IV, flush with 0.5-1 ml of saline

0.3-1 ml /kg intra –tracheal foll by PPV to ensure distribution.

- Continue chest compression & IPPV
- Reassess after 30 seconds.
- Repeat doses every 3-5 minutes till HR > 60/ min.

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Poor Response To Resuscitation

Heart rate persists <60 /minute despite

endotracheal intubation, effective ventilation, chest compression & medication:

Consider;

- Airway malformation
- Pneumothorax
- Congenital diaphragmatic hernia
- CHD
- Extreme prematurity

Post Resuscitation Care

- Close cardio-respiratory monitoring: SaO₂, HR, BP.
- Temperature control
- Monitor blood sugar
- Anticipate Complications:

Oliguria, seizures, altered sensorium, hemodynamic instability, respiratory distress

When to Withdraw Resuscitation

If no heart rate after 10 minutes of complete and adequate resuscitation efforts.



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Checklist:

Steps	Yes/No/ Correct answer
Perform all steps of routine care on the mannequin	
Initial steps of NRP on a mannequin	
Demonstrate method of counting heart rate on a neonate during resuscitation	
Demonstrate method of administering free flow oxygen	
Check function of all parts of self inflating bag, use appropriate size bag	
Demonstrate method of PPV	
Demonstrate method of placement of orogastric tube during PPV	
Demonstrate thumb technique or two finger technique for chest compressions	
Identify correct size of ET tube depending on gestation	
Demonstrate correct technique of Endotracheal intubation	
Monitoring patient after procedure?	



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Umbilical venous catheterisation

Background

The umbilical vein offers a technically easy, relatively safe and pain free portal for intravascular catheter access in the newborn. An umbilical vein catheter (UVC) provides a good alternative to a peripheral venous catheter that reduces the need for multiple procedures to maintain venous access while not being associated with greater risks of infection or necrotising enterocolitis.¹ When the catheter tip is in a good position a UVC can be left in place for at least 14 days without increased risk of complications and one study suggests up to 28 days is safe. Butler-O'Hara et al,² randomised UVC's inserted at birth to either be replaced with a PIC line at 7 to 10 days or to be left in for 28 days. There was a non-significant trend to a higher infection rate in the longer duration group but no difference in other complications.

Indications.

1. Venous access from early after birth in all very preterm babies and any other baby requiring respiratory support.
2. For urgent vascular access in resuscitation for administration of adrenaline or volume expansion.
3. Infusion of hypertonic solutions for example in resistant hypoglycaemia requiring more than 10% dextrose or TPN.
4. Exchange transfusion.





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Procedure for insertion of UVC

Clean Equipment	Sterile Equipment
<ul style="list-style-type: none"> • Clean dressing trolley with Lemex solution, leave one minute & wipe dry • Blue sterile plastic sheet to place under sterile drape. IV infusion pump (Allaris Signature) tape measure masks protective goggles if open care. 4 ampoules heparinised saline (50units / 5ml) unopened solutions for skin preparation (aqueous chlorhexidine) Comfeel Leukoplast (brown tape) 	<ul style="list-style-type: none"> • single lumen UVC (Argyle) double lumen UVC (Argyle) use <ul style="list-style-type: none"> ◦ for: infants <1000gms/28 weeks infants likely to require intropes meconium aspiration syndrome persistent pulmonary hypertension UVCs size 3.5Fg for all infants consider 5Fg single lumen for infants needing: exchange transfusion or large volume replacement sterile gown and two sets of sterile gloves sterile green drapes (incl fenestrated) dressing pack umbilical drip insertion set (scalpel blade / sutures included) • 3.0 silk suture / Scalpel • Blade sterile linen cord tie • additional gauze swabs • assorted needles / 5 mls • syringess 100 ml burette / IV giving set

Preparation

- Perform calculation and/or measurement to





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estimate insertion distance. An approximation of the insertion distance in cms can be derived from the formula:³
 $(1.5 \times \text{birth weight in kg}) + 5.5$.

Select size 3.5FG double or single lumen

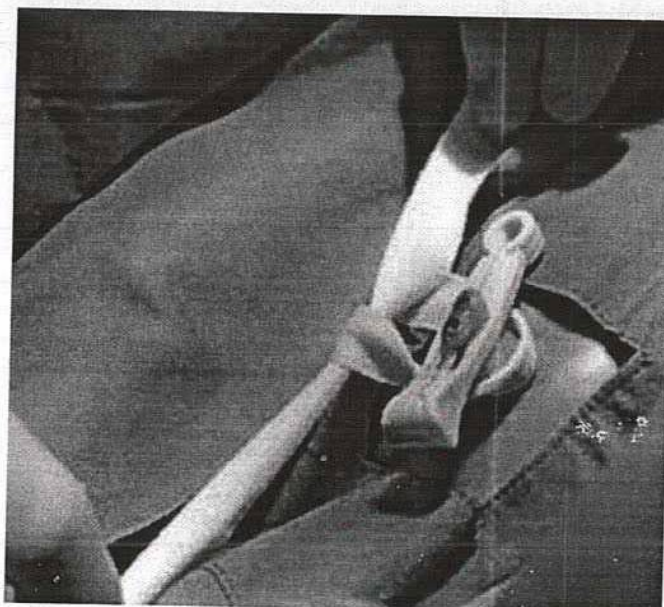
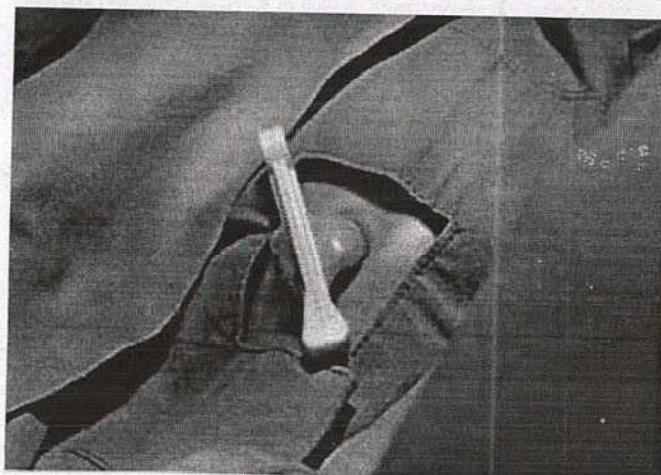
- UVC Use 5FG single lumen for exchange transfusion.

- Prime the umbilical catheter with 3-way tap attached using heparinised saline (50 units per 5ml) and leave syringe attached. Prime both lumens where appropriate.

- Sterilise the cord and area around the cord with aqueous chlorhexidine. Do not allow topical antiseptic to pool under the infant, allow to dry for 3 minutes, then drape the area around the cord as shown.

- Remove first set of gloves.

- Place sterile cord tie around the base of the cord and tie in a loop with moderate tension (this is to stop back bleeding).

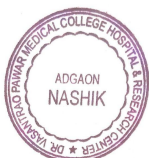




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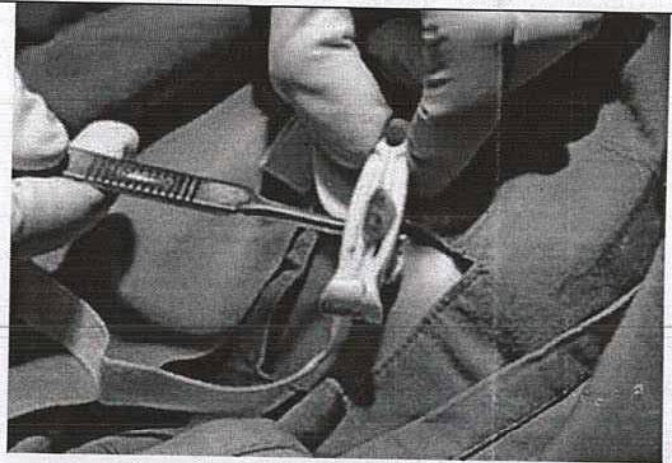
- Use the scalpel to cut the cord between the cord clamp and the skin at the base of the umbilicus. Cut away from you and close to the clamp. Do not cut flush with the skin as this will limit any further attempts.





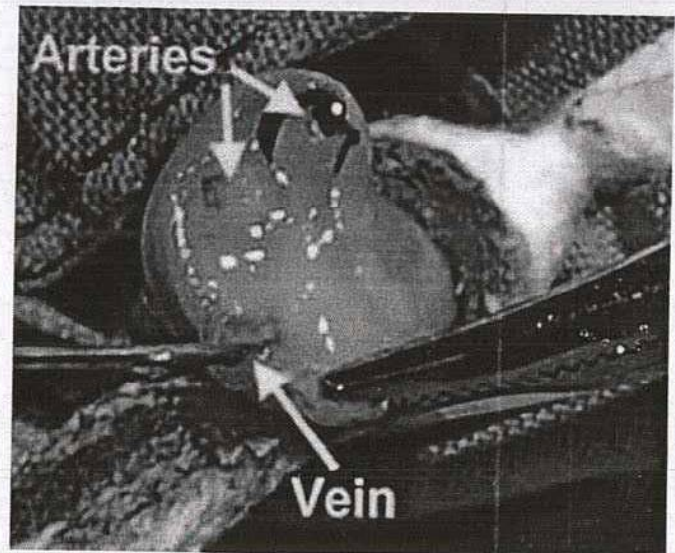
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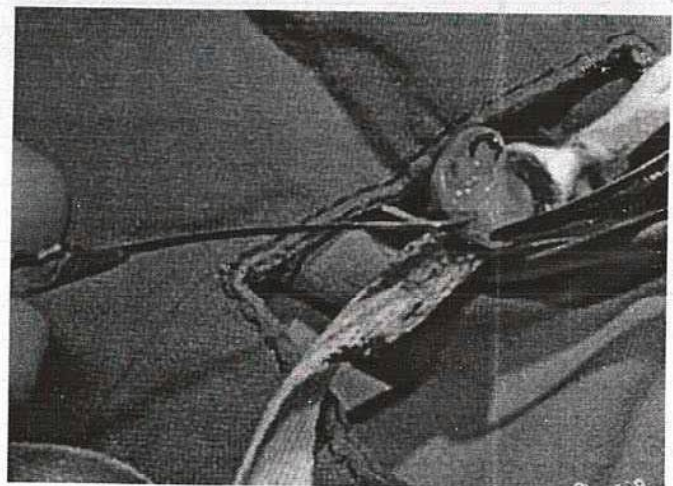


Identify the vessels and probe the vein

- Examine the cut end of the cord and identify the two arteries (small, thicker walled and constricted) and the single vein (more gaping and thin walled).



- Grasp the edge of the cord with the suture forceps and use the lacrimal probe or the fine toothed forceps to tease open the vein. It will usually open up easily.





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Introduce and advance catheter

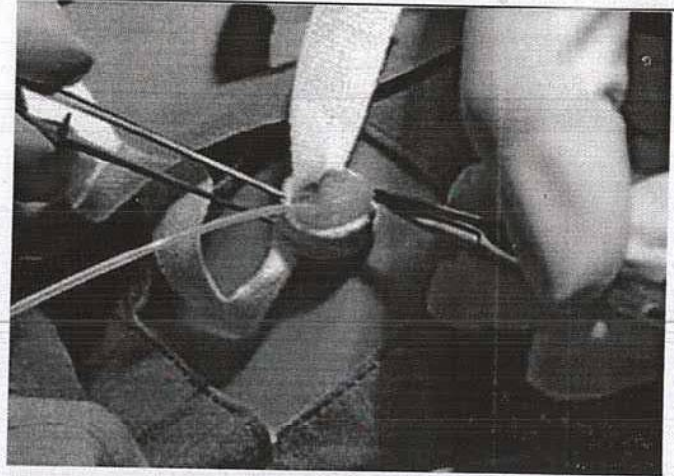
- Ease the catheter into the open vein and advance slowly to the estimated insertion distance. It will usually need only slight pressure to advance.



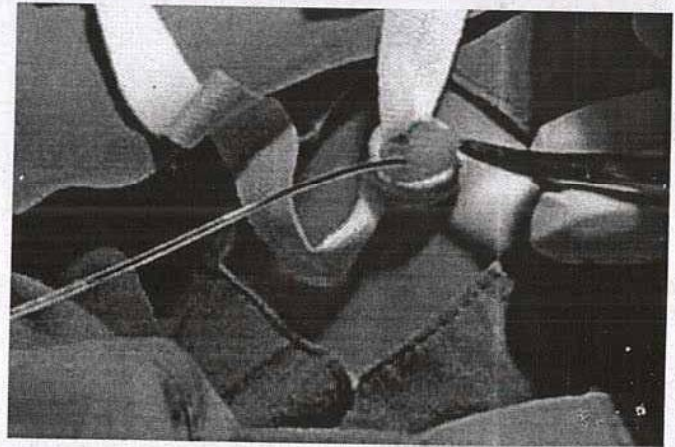


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- Withdraw on the syringe to test whether you can get free flowing withdrawal of blood. If you can't withdraw blood, it usually means the catheter tip is in the hepatic or portal veins, so withdraw the catheter slowly until you get free flow of blood.



Secure the catheter

-
-
-



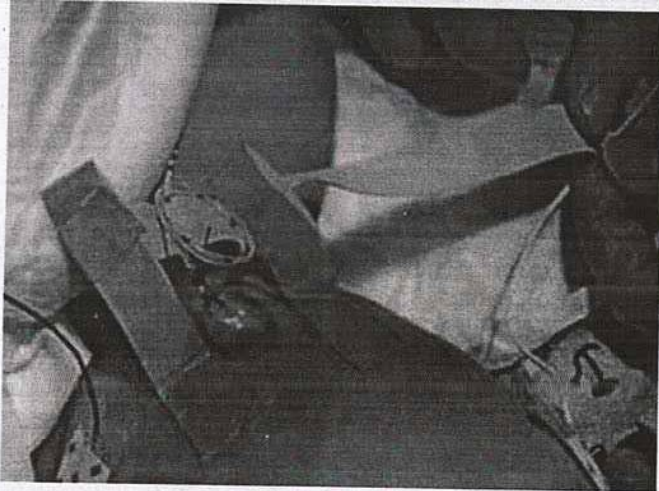
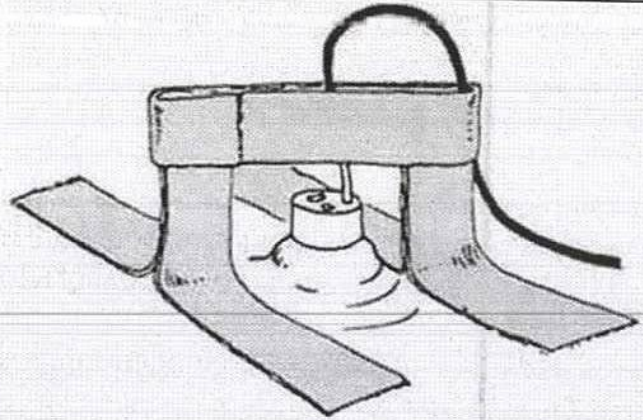
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Anchor catheter to base of the cord with a 3/0 silk suture.

Secure with 'goal post' tapes as shown using Comfeel®.

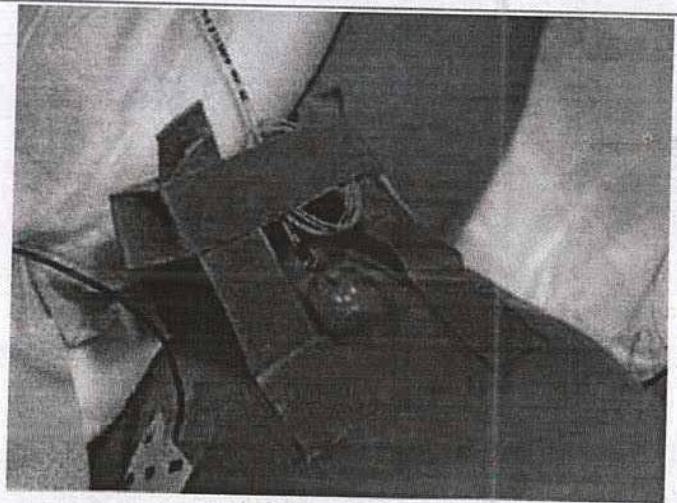
Connect catheter to infusion at 1ml/hr to keep catheter open until tip position confirmed with x-ray.





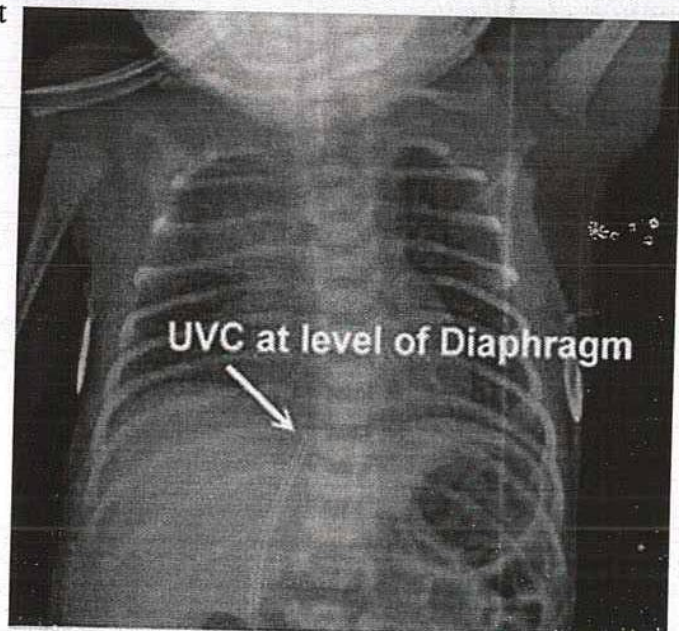
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Locate Catheter Tip on X-ray.

- Once secured, x-ray catheter to locate tip position. The ideal catheter tip position is at the junction of the ductus venosus and the inferior vena cava. On x-ray this has the appearance shown, with the UVC going straight up with the tip at the level of the diaphragm. This can be confirmed on ultrasound (see below)
- If the catheter tip is too far in and in the chambers of the heart, measure the distance for an ideal position, withdraw and re-xray or ultrasound to confirm position.





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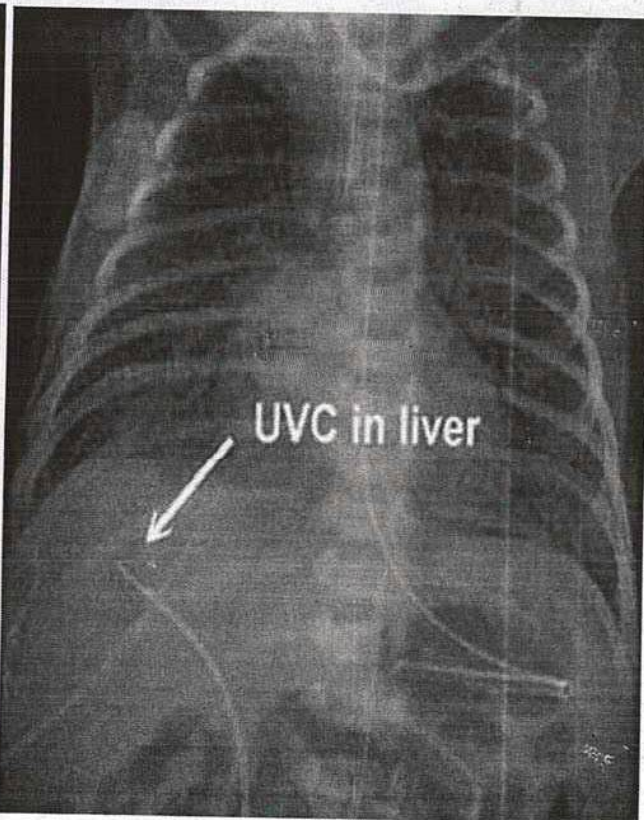
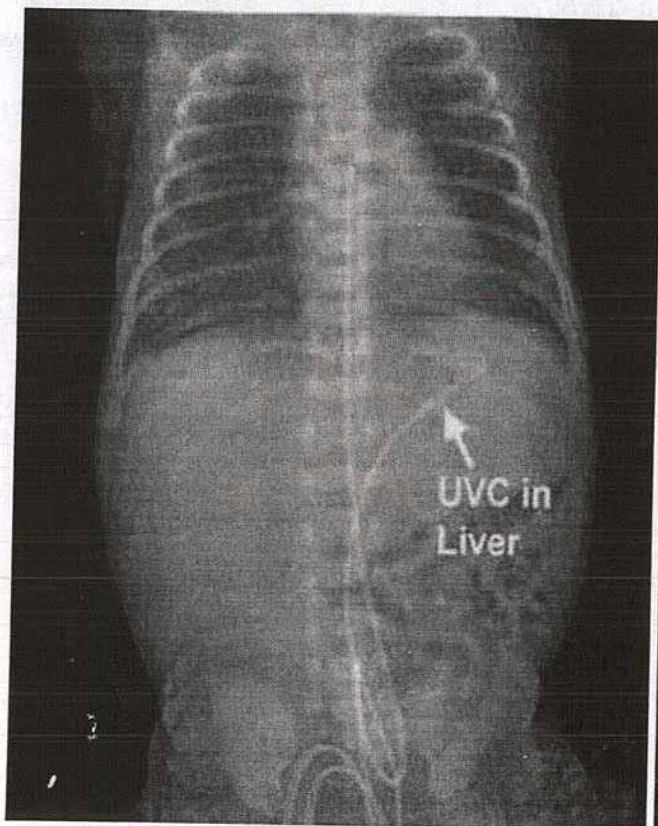
- About 50% of UVCs will not follow the path into the ductus venosus and instead follow the hepatic or portal veins into one of the lobes of the liver.
On x-ray, the catheter deviates off to one side into the liver as shown. In these situations, measure the distance to bring the catheter tip into a central position and withdraw.
- Catheters in an intermediate or low position should be replaced early (usually by 48 hrs) with a PICC line (see below)





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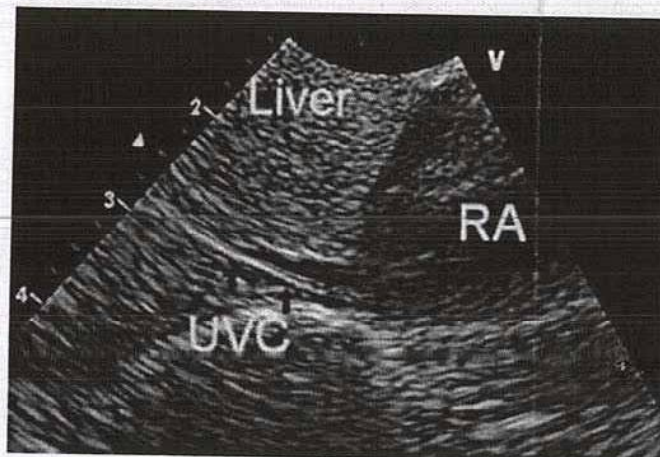


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Locating UVC tip with Ultrasound.

- If the UVC has deviated into the one of the lobes of the liver, the catheter is difficult to visualize on ultrasound because it is constantly changing direction and so not easy to catch with a linear beam. It's much easier to see when the UVC tracks up the ductus venosus as it follows a linear direction and can be seen in a subcostal true sagittal view. So if you can't see the UVC in the ductus venosus on ultrasound, the catheter has probably gone into the liver and that can be confirmed on x-ray. If it is in the Inferior Vena Cava, then ultrasound can be useful for localising the tip position.⁴



Duration of Catheterisation.

This will be determined by the clinical condition of the baby and availability of alternative venous access but in general terms:

- An UVC with the tip in a good position, e.g in the ductus venosus, IVC or low right atrium can be used for ongoing intravenous needs for up to 14 days. After this consideration for replacement with a PICC line should occur.
- An UVC with the tip in an intermediate or low position should not usually be left in situ for more than 48- 72 hours unless the clinical situation is critical and there is no alternative secure venous access.

UVC Complications.

Catheter Malposition and Extravasation:

These are the most serious complications and are potentially life-threatening. The two most serious extravasation sites are into the pericardium and within the liver.

Cardiac Tamponade from extravasation into the





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pericardium: While more commonly reported from PIC lines this can occur with UVCs.⁵ Reported mortality from this complication is 50% and the mortality results from lack of clinical recognition. It can result when catheter tips are left too far into the heart, particularly if the tip abuts against the myocardium. With the repeated movement of the heart beat, the tip works its way through the myocardium and fluid is infused into the pericardium with resulting tamponade if not recognised. Prevention comes from careful location of the catheter tip, as above, and withdrawing catheters that have been inserted too far.

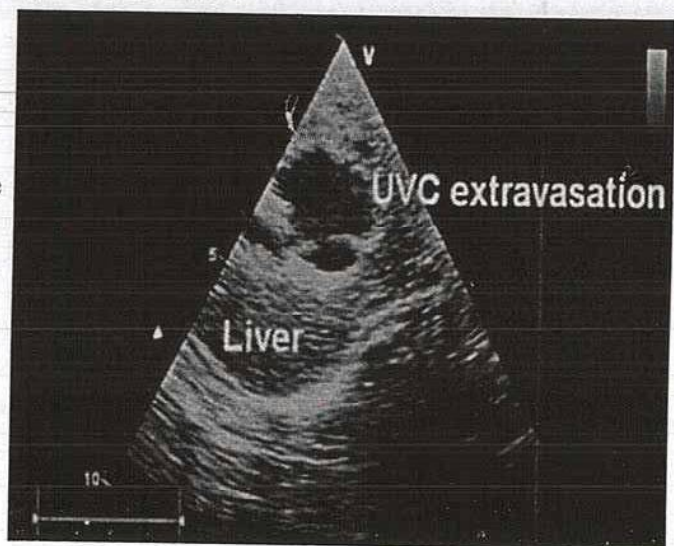


Recognition comes from a high level of clinical suspicion and immediate access to point of care ultrasound. Typically these babies present with a relatively quick cardio-respiratory deterioration that cannot be explained. They are often misdiagnosed as suspected sepsis. The chest x-ray may show a large heart shadow but ultrasound gives the diagnosis immediately with the characteristic echolucent fluid collection around the heart as shown.

Management includes immediate cessation of the infusion and removal of the UVC. If there is significant compromise, perform pericardocentesis from the sub-xiphisternal position. Ultrasound can be used to guide the needle during the procedure.

Extravasation in the Liver with Ascites:

This occurs when the UVC tip is in the lower position in the hepatic veins.^{6,7} Experience at RPAH would suggest that this occurs when the UVC is left too long in these positions. Because of this, we would usually not leave a UVC in this position for more than 48 hours unless there are real problems establishing an alternative venous access. The extravasation will initially develop in the parenchyma of the liver forming a fluid filled cyst. This fluid will eventually track through the liver parenchyma into the peritoneal cavity resulting in ascites.





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Prevention is based on trying to locate the UVC tip through the ductus venosus and, when that is not successful, removing UVCs sited in the lower positions within 48 hours of insertion.

The presentation of this is much more insidious than tamponade and will often present with mild abdominal distension in an otherwise well baby. The ascites may be apparent on x-ray but the problem is usually quite advanced by the time this becomes obvious. Early recognition depends again on a high index of suspicion and point of care ultrasound. Subcostal views of the liver show the typical echolucent fluid filled cyst, often with brightly echo dense edges as shown in the figure above.

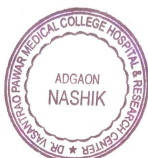
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Management is immediate cessation of the infusion and withdrawal of the UVC. Consider draining any ascites, particularly if there is a significant collection. If the infusate is hypertonic, then potentially this may draw fluid into the peritoneum from the vascular space, resulting in hypovolaemia.

Sepsis: This is an ever present risk for any indwelling long line or catheter. The risk management of this is the same as for all intravascular access e.g. strict aseptic insertion technique, minimizing line interruptions and strict aseptic technique for any line handling. Studies would suggest that use of well placed UVCs for up to 14 days is not associated with an increased rate of infection.¹

Thrombosis: Clinically significant thrombosis is uncommon but well recognised risk of UVC. Thrombosis of the inferior vena cava or the portal vein would create the greatest longer term risks. For this reason platelets or clotting factors should not usually be given through a UVC unless the situation is critical.

Using data from an RCT of duration of UVC placement,⁸ univariant risk factors for thrombosis included haematocrit above 55%, small for dates and maternal pre-eclampsia. Of these, only haematocrit greater than 55% remained a significant risk factor on multi variant analysis.





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Checklist:

Steps	Yes/No/ Correct answer
Greet the patient	
Is written consent taken from the patient?	
Is procedure explained to the patient?	
Is the Preparation done?	
Are the materials required for the procedure collected?	
Is Hand wash done, Aseptic precaution taken? Painting and Drapping done?	
Identifying the umbilical vessels and introducing the catheter into it. Calculating the length at which the catheter should be fixed	
Fixing the catheter. Securing the catheter	

Locating the catheter on an Xray	
Monitoring the patient	



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Self Assessment form for PG Medical students

Feedback form of PG Student for self assessment

1. Name of students: Dr. Neha Kulkarni
2. Subject:
 1. Insertion of intercostal drainage tubes
 2. Intubation
 3. Peripheral line insertion
 4. **Umbilical line Insertion**
 5. Exchange transfusion
 6. Lumbar puncture
 7. Bone marrow biopsy
 8. Pleural Tapping
 9. Ascitic Tapping

Checklist to be filled up after the procedure by the PG students:

1. Give the brief description of _Umbilical line Insertion_ process you have done?
Ans:- Proper consent was taken from the parents prior to the procedure. Under all aseptic precautions, an umbilical venous line was inserted.
2. What did you like about the procedure?
Ans:- It was challenging, and I also learned to expertise it.
3. Did you take written consent of the patient before the procedure?
Ans:- Yes, written consent was taken from the parents.
4. What were you able to do well?
Ans:- I was able to localize the umbilical vein and umbilical line was inserted with all the necessary precautions.
5. What difficulty did you arise?
Ans:- While inserting the umbilical line, after about 2-3 cm i could feel a resistance and the line couldn't pass further so i withdrew the line and re-inserted it.
6. What safety precautions did you take?
Ans:- Proper hand washing was done prior to the procedure, and the procedure was carried out with gloves. The baby was draped in sterile sheets and only the area around the umbilicus was exposed. The umbilicus was painted with the antiseptic solution.
7. How did you assess the patient before doing the procedure?
Ans:- The umbilicus was examined for any anomalies or signs of sepsis.
8. What did you learn about yourself cedure?



Ans:- The procedure was carried out well and without complications so it definitely developed confidence within me.

9. What was the situation of your mind during this procedure daily?

Ans:- I was calm, composed and confident about the procedure.

10. Are you afraid of this procedure?

Ans:- No.

11. Did you do this procedure under senior guidance?

Ans:- Yes.

12. How did you feel after the completion of the procedure?

Ans:- I felt confident.

13. What precautions did you take during the procedure?

Ans:- Proper hand washing was done prior to the procedure, and the procedure was carried out with gloves. The baby was draped in sterile sheets and only the area around the umbilicus was exposed. The umbilicus was painted with the antiseptic solution.

14. What instructions did you give the nurse after the procedure?

Ans:- The nurse was instructed to examine the site of umbilical line insertion for bleeding or surrounding area for signs of poor perfusion. Also any discoloration in the extremities was asked to be noted and informed.

15. Did you come across any complication during/ after the procedure?

Ans:- No.

16. How did you follow the patient after the procedure?

Ans:- Yes, I followed the patient for any signs of poor perfusion.

17. What did you learn from the procedure?

Ans:- As the procedure was carried with all aseptic techniques there was no post procedure complications.

18. Until now how many of these procedures have you done?

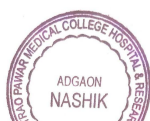
Ans:- 12 - 15.

19. Did you get confidence in doing this procedure?

Ans:- Yes.

20. How do you tackle the complication of the procedure?

Ans:- There was no complication, and the procedure was uneventful.



2.5.3

Reforms in Evaluation

OSCE UG



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OSCE UG



- Which syndrome has this genotype ? 2
- What is the phenotype ? 1
- State associated salient features. 2

Answer

- Klinefelter syndrome
- Male
- Hypogonadism, hypogonadism, tall stature, mental retardation and behavior concerns-aggressive behavior, antisocial acts, learning difficulties, anxiety

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4yr old child was followed by a paediatrician for a period of 1 year. He presented with haemoptysis, 1-2 episodes of malena.

O/E: B/L wheeze and coarse creps

Gen. Exam: Severe pallor, clubbing, cyanosis.

CBC showed Iron deficiency anaemia

- | | |
|---|---|
| A] What is the diagnosis? | 1 |
| B] What is the diagnostic investigation with findings? | 2 |
| C] Which heart condition can give rise to this condition? | 2 |

Answer

- A] Pulmonary haemosiderosis
- B] Bronchoalveolar lavage
Haemosiderin laden macrophages
- C] Mitral stenosis.

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GROWTH 3

Instructions to candidate	Keys to questions	Marks
1. Define Very low birth weight Extremely low birth weight	1. VLBW < 1500gm ELBW < 1000 gm	0.5 0.5
2. Give the formula for calculation of Ponderal Index	2. <u>Weight in gms X 100</u> C to H length (cm) ³	1
1. How do you interpret Ponderal Index?	1. P.I. < 2 or < 10 th Centile indicates asymmetric IUGR	1
2. Name any two etiological groups causing symmetrical IUGR	2. Chromosomal anomalies Syndromic associations Teratogens Intrauterine infections	1

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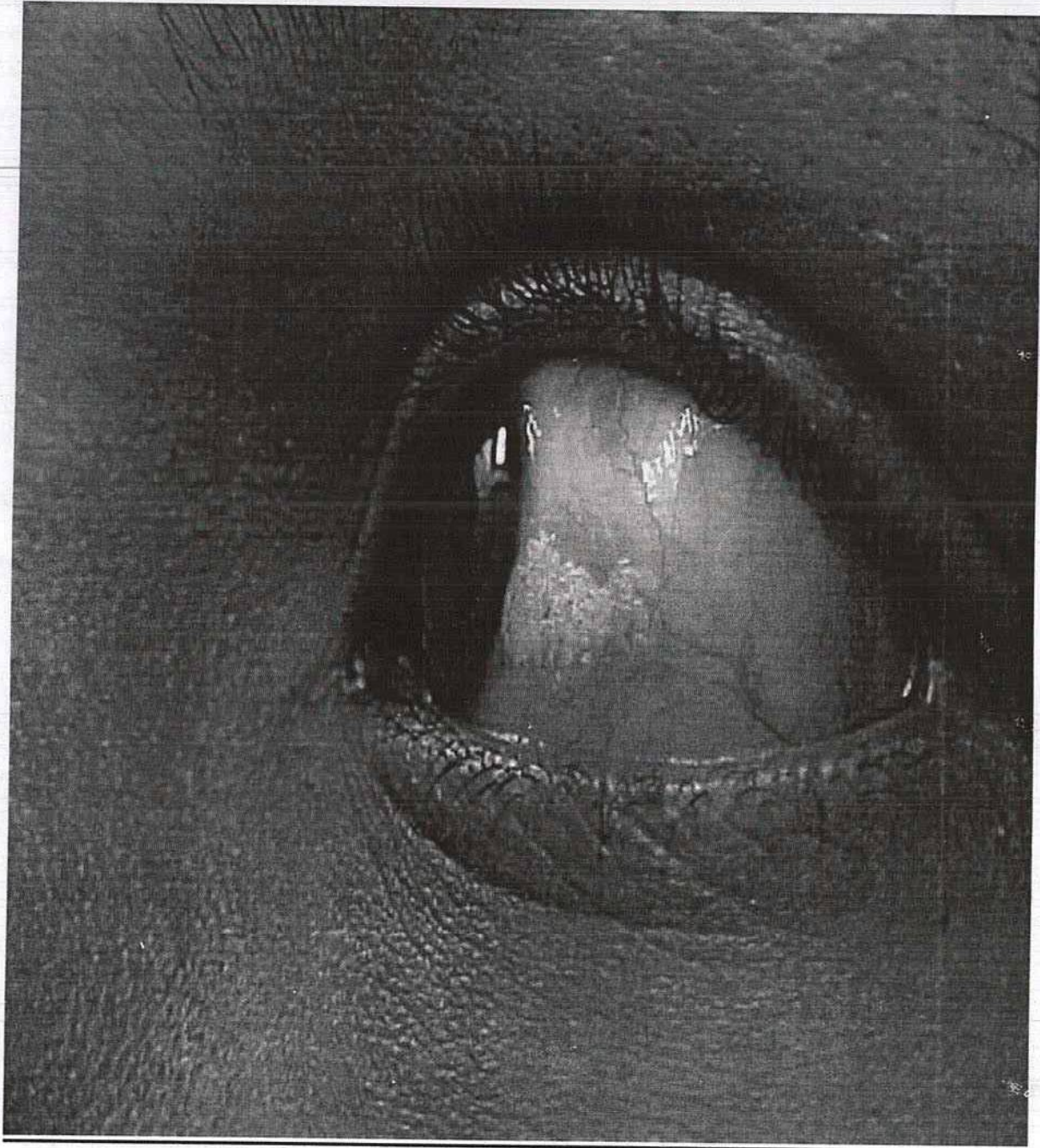




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NUTRITION



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NUTRITION 2

1. Name the lesion and etiology	1. Bitot's spots, Vit A deficiency	0.5
2. Give the classification of the disorder	2. XIA Conjunctival xerosis	2
3. Give the oral treatment schedule for a child above 1 year	X1B Bitot's spots X2 Corneal xerosis X3A Corneal ulceration 3B Keratomalacia XN Night blindness XF Fundal changes XS Corneal scarring	
4. Name two vegetarian food items which can prevent this disorder	3. 2 lakh IU on day 1, day 2 and at 4 weeks	1
	4. Carrot, papaya, pumpkin, mango	0.5

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Station 1: Calculate Liver Span

Checklist:

Steps	Yes/No/ Correct answer	Marks
Greet the patient		1/2
Is consent taken from the patient?		1/2
Is procedure explained to the patient?		1/2
Is hand warming done?		1/2
Is privacy of patient maintained?		1/2
Is proper position given to the patient?		1/2
Percussion of the patient done till Liver dullness is heard. Mark the position		1
Palpation of the liver done. Mark the position.		2
Using a measuring tape, measure the liver span.		2

Station Requirements: Examination table, measuring tape, Patient, pen and paper.

Time: 5-10 mins

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Station 1: Demonstration of 2nd Cranial Nerve

Checklist:

Steps	Yes/No/ Correct answer	Marks
Greet the patient		1/2
Is consent taken from the patient?		1/2
Is procedure explained to the patient?		1/2
Use of Snellen chart for distance vision, each eye assessed individually with one eye covered.		1/2
Colour perception tested by Ishihara chart		1/2
Testing of Visual fields in all 4 quadrants		1/2
Checking pupillary response		1
Interpretation		1

Station Requirements: Snellen chart, Ishihara chart, Cotton, pen and paper.

Time: 5-10 mins



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Station 1: Demonstration of Deep Tendon Reflexes


Checklist:

Steps	Yes/No/ Correct answer	Marks
Greet the patient		1/2
Is consent taken from the patient?		1/2
Is procedure explained to the patient?		1/2
Giving proper position to the patient.		1/2
Using a hammer to elicit to reflex		1
Grading of reflex by Deep Tendon Reflex scale		1
Interpretation		1

Station Requirements: Hammer, pen and paper.

Time: 5-10 mins




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OSCE

<u>Oral Polio Vaccine</u>	1. Give the dosage schedule	1. 0, 06, 10, 14 weeks	1
	2. Recommended storage temp for six months	Booster at 16, 18 months & 05 yrs	
	3. Schedule of collection and transportation of stool for AFP control	2. - 20°C	1
	4. Define polio eradication	3. Two "thumb sized" samples 24-48 hrs apart within 14 days of onset. Transport the samples at <8° C	1
		4. Zero reporting of cases for 3 yrs with absence of wild polio virus in the community.	1

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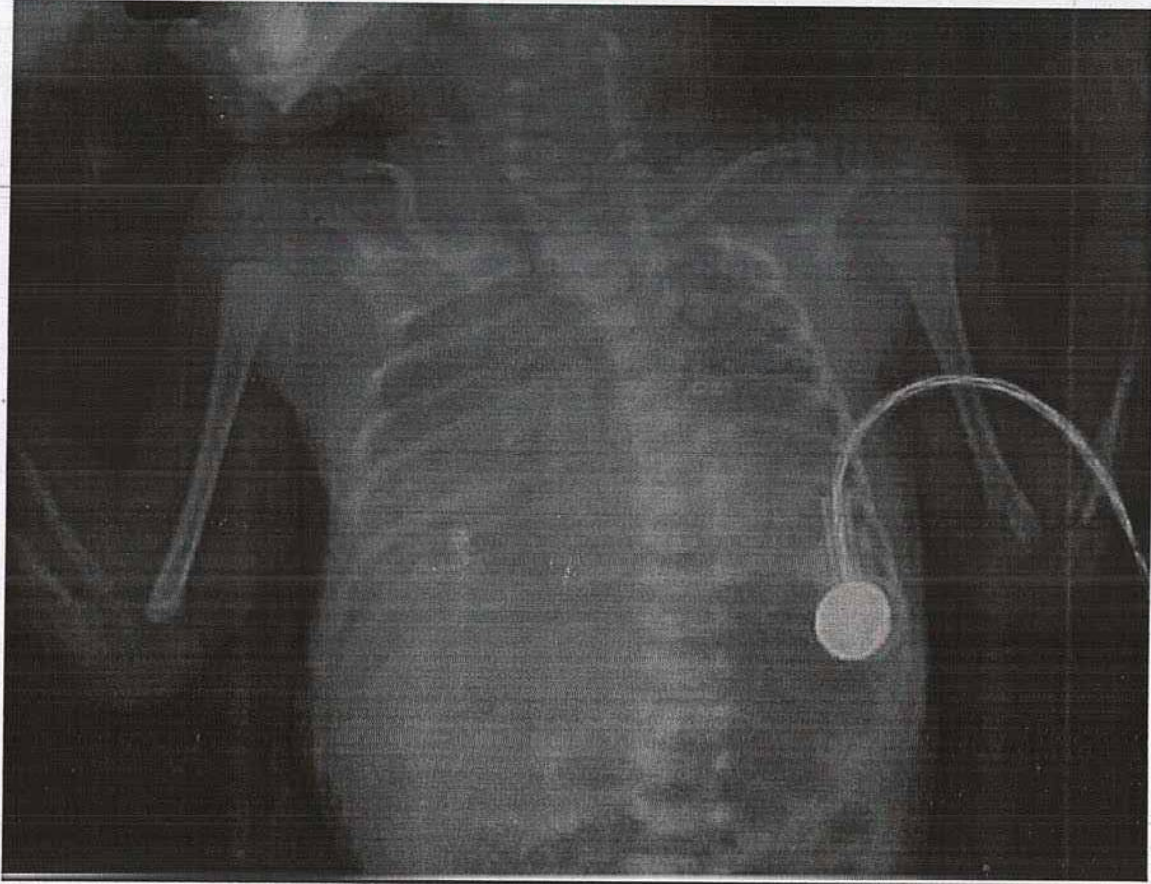




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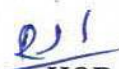
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Instructions to candidate	Keys to questions	Marks
1. What is the diagnosis?	1. Respiratory Distress Syndrome	1
2. Name four cardiopulmonary complications of the disease	2. Pneumonia, pneumothorax, bronchopulmonary dysplasia, patent ductus arteriosus, persistent pulmonary hypertension of the newborn, pneumopericardium	2
3. Give the preferred drug regime used in the prevention of this condition	3. Betamethasone: 12mg once a day for two days, administered to the mother in premature labour between 24-34 weeks.	1




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Reforms in Evaluation

OSCE PG



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OSCE PG


ARTERIAL BLOOD GAS

Arterial blood gas report:

pH	7.57
PaCO ₂	22 mmHg
PaO ₂	122 mmHg
HCO ₃	18 mEq/L
Base excess	-4

Instructions to candidate	Keys to questions	Marks
1. List the abnormalities giving normal reference values	1. pH: high (normal 7.35-7.45) PCO ₂ : low (normal 35-45mmHg) PO ₂ : high (normal 83- 108 mmHg) HCO ₃ : low (normal 21-28mEq/L)	1
2. What is the complete diagnosis?	2. Uncompensated respiratory alkalosis with hyperoxia	0.5
3. Describe the compensatory mechanisms that occur in acute and chronic forms of this condition	3. a) <u>Acute</u> : HCO ₃ falls by 2 mEq/L for each 10mmHg decrease in PCO ₂ b) <u>Chronic</u> : HCO ₃ falls by 4 mEq/L for each 10mmHg decrease in PCO ₂	2
4. Name any one condition associated with this abnormality	4. Hyperventilation with high FiO ₂ , hemodialysis, fever, anxiety with hyperventilation	0.5




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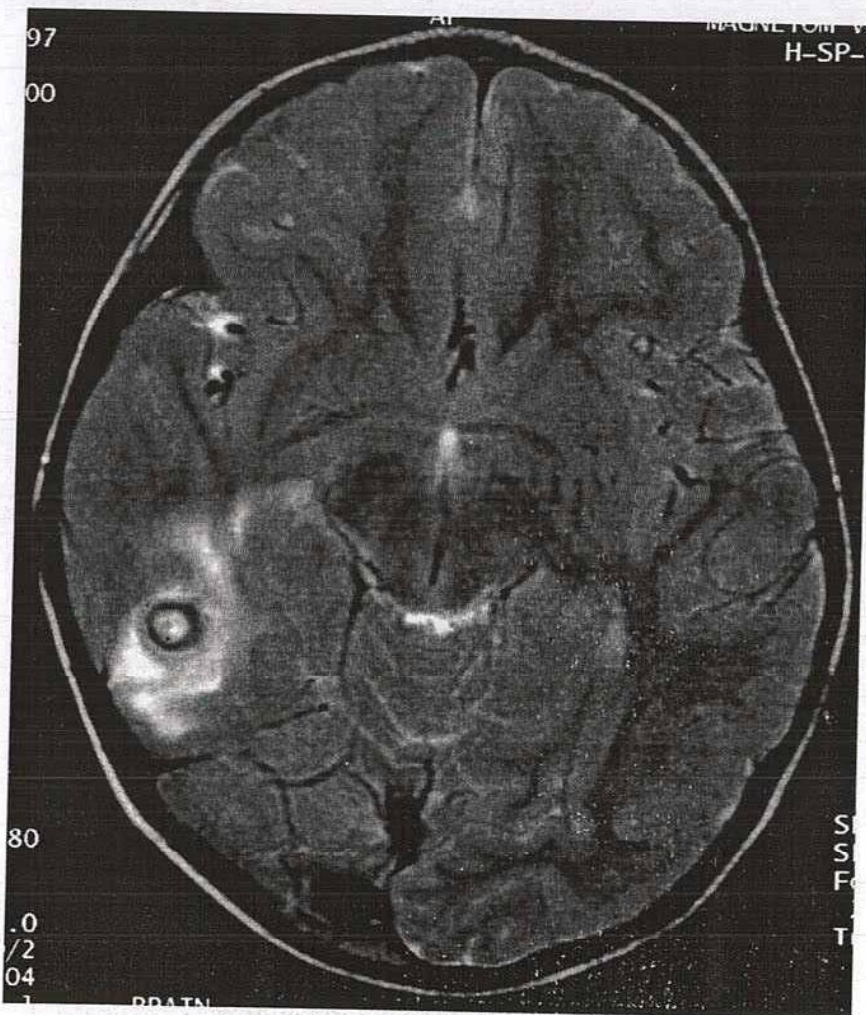


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2 yrs old child born prematurely [28wks] comes with complaint of delayed achievement of motor milestones. Examination shows hypertonia with brisk reflexes in all 4 limbs more marked in lower limbs.

- What is the diagnosis? Define. 2
- What is the MRI picture? 1
- What is the treatment and when do you start it? 1
- Name 2 conditions this child will be at risk for? 1



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Diagnosis

- 3 Differential diagnosis
- 3 differentiating features

Answer

- Ring enhancing lesion
- NCC, tuberculoma, toxoplasma,
- abscess, tumor
- Peripheral vs central
- single vs multiple
- perilesional edema
- smooth vs irregular
- Scolex seen
- Wall thickness
- Intensity of cystic material

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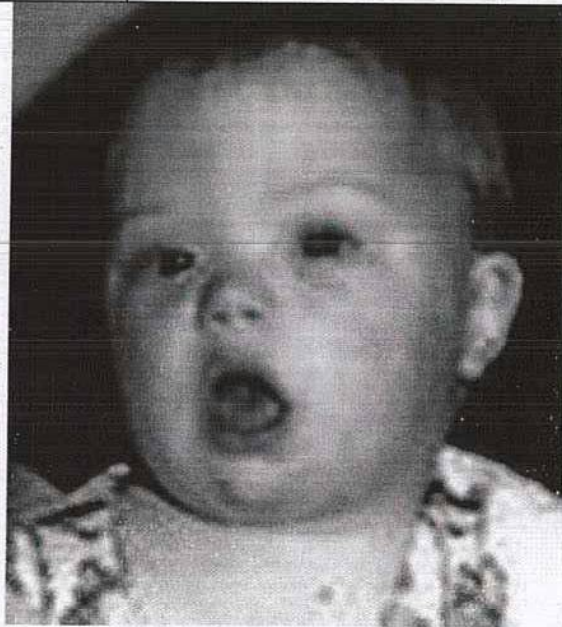
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- 39 year old female, 10 weeks pregnant, is concerned about Down's Syndrome . Which antenatal tests will you advise? 1
- Name some other antenatal markers used? 1
- If mother is a translocation carrier, how much is the risk to the offspring ? 1
- Name the associated chromosomes with translocation? 1
- Recurrence risk is highest with which translocation ? 1

Answer

- Chorionic villi sampling [10-12 wk], amniocentesis [16-20 wk], cordocentesis [20 wk]
- Triple test [2nd trimester]-low Serum alpha feto protein, low unconjugated estradiol, high levels of human chorionic gonadotropin. Fetal USG-Increased nuchal fold thickness, short femora.
- 10-15 %
- 14,15,21,22
- 21q/21q [100%]

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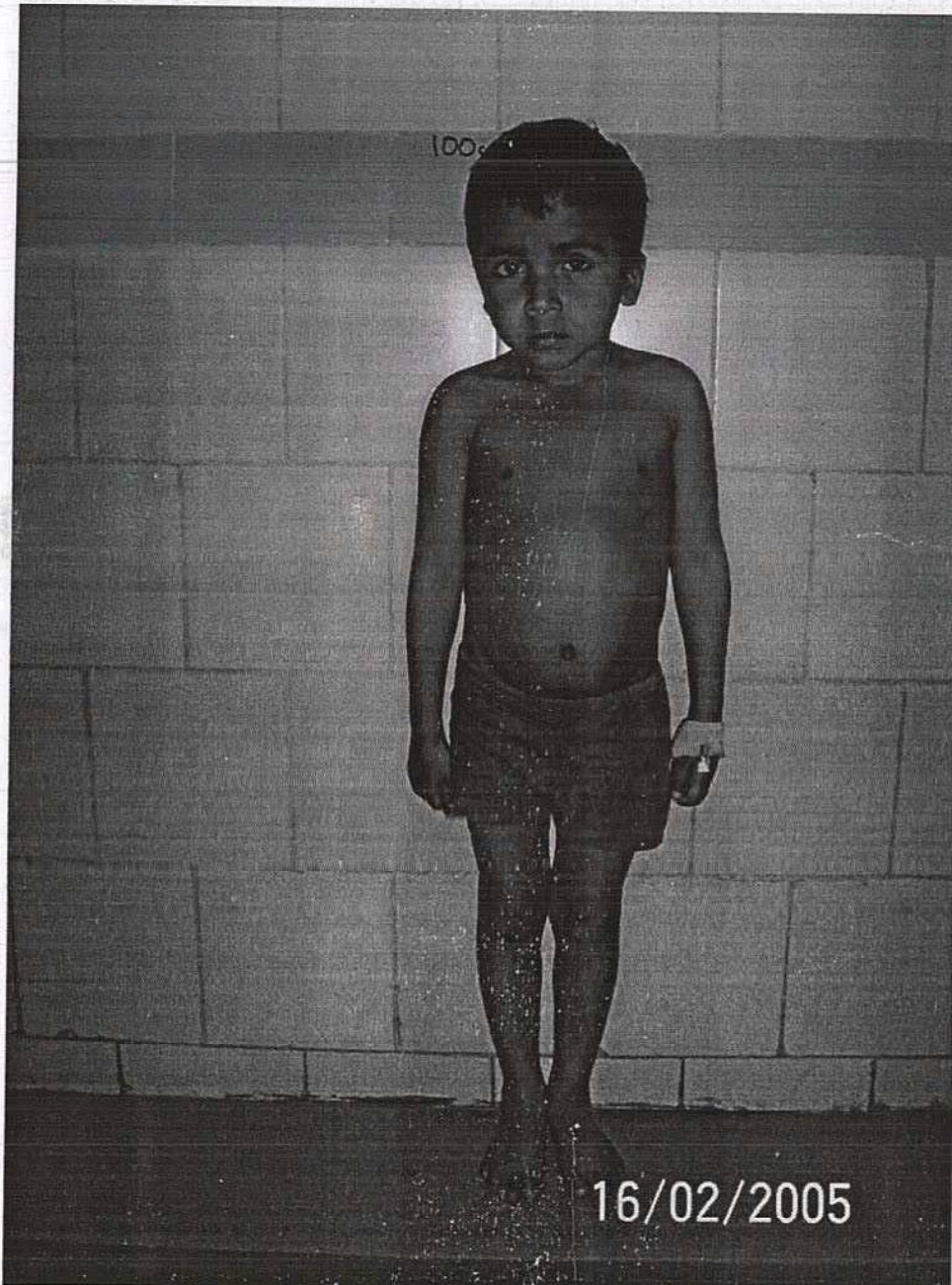




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GROWTH



Age: 9 years

Height 100cm

US:LS ratio 1:1

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GROWTH

1. Give the clinical diagnosis 2. Enumerate any 3 causes 3. Name 3 pharmacological agents used for stimulating GH production 4. What level of GH is diagnostic of deficiency in stimulation tests	1. Proportionate short stature	0.5
	2. Constitutional	1.5
	Nutritional IU infections Chromosomal (Turners) Chronic infections Endocrinal (GH deficiency)	
	3. Insulin, clonidine, arginine, L-Dopa, glucagon	1.5
	4. Less than 10µg/Liter or 10ng/ml	0.5

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NUTRITION

Instructions to candidate	Keys to questions	Marks
1. What is IAP classification of PEM	1. <u>Grade</u> Normal	1
2. Give any two age independent criteria for assessment of PEM	<u>% Wt for age</u> >80 %	
3. Give interpretation of Kanawati index	I 71-80 % II 61-70 % III 51-60 % IV <50%	
	2. Mid upper arm Circumference	1
	Weight for height	
	Mid arm circumference/ head	
	circumference	
	Skin fold thickness	2
	3. Normal > 0.32	
	Mild 0.28-0.32	
	Moderate 0.25-0.28	
	Severe <0.25	



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Station 1: A 32 weeker baby has just been delivered, baby has not cried after birth, is limp, Heart rate is around 60, cyanosis present. Demonstrate Endotracheal intubation in this child.


Checklist:

Steps	Yes/No/ Correct answer	Marks
Observe the vitals and appearance of the patient,		1/2
Are the materials required for the procedure collected?		1/2
Is Hand wash done, Aseptic precaution taken?		1/2
Proper position given to the patient		1/2
Technique of inserting the ET through the laryngoscope		1/2
Air entry checked ? Is the et in position?		1
Observing the patients SP02 and other vitals .		2
Fixing the ET in position		1
Monitoring patient after procedure?		1

Station Requirements: Endotracheal Tube, Neonatal mannequin Laryngoscope.
Stethoscope, Gloves , Dynaplast, ambu bag

Time: 5-10 mins




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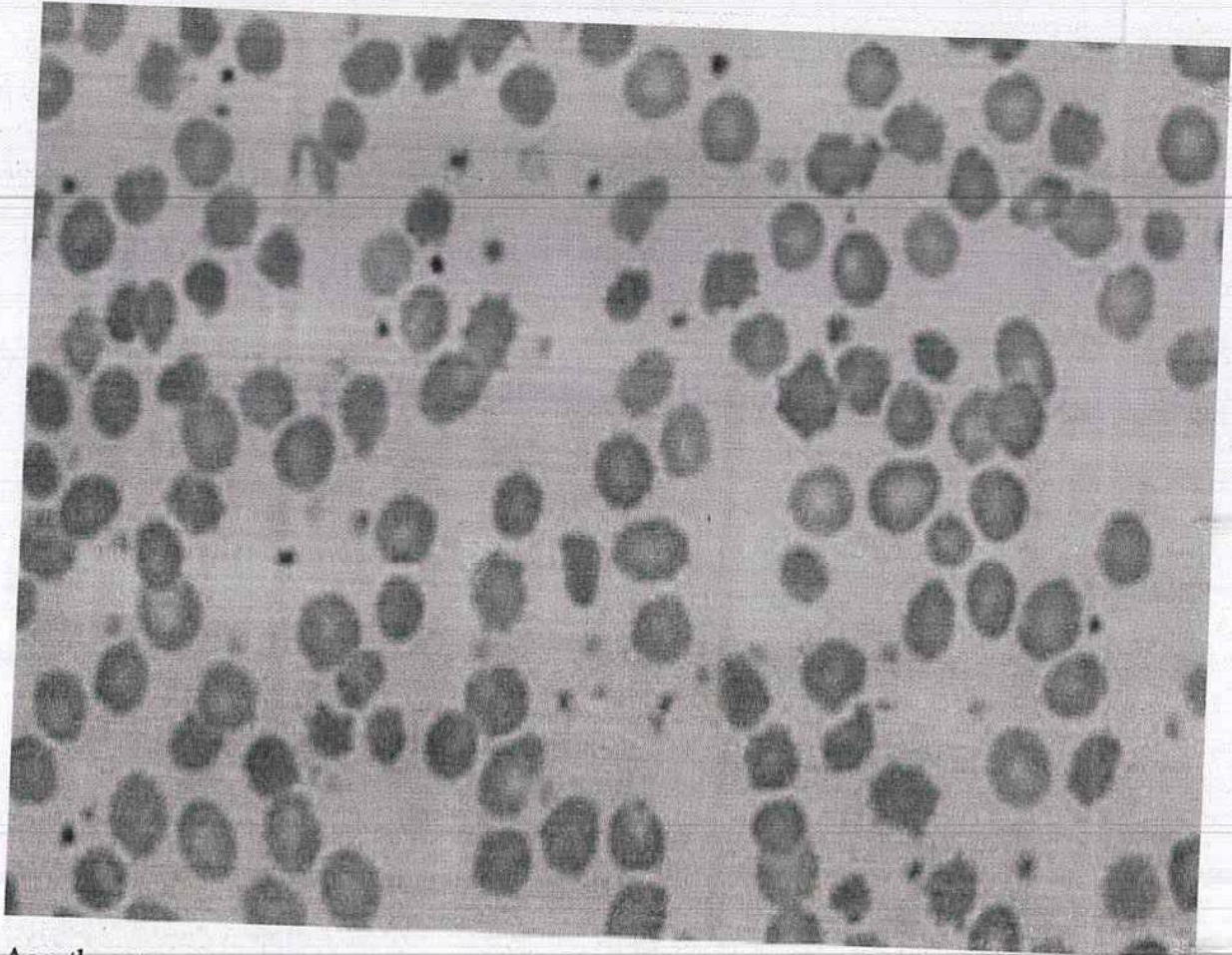
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- A) Identify the abnormality on peripheral smear?
B) Name 4 conditions where these cells can be seen.



Acanthocytes are seen in

Hereditary abetalipoproteinemia

- Hereditary acanthocytosis
- End stage liver disease
- Anorexia nervosa
- Malnutrition
- Post splenectomy



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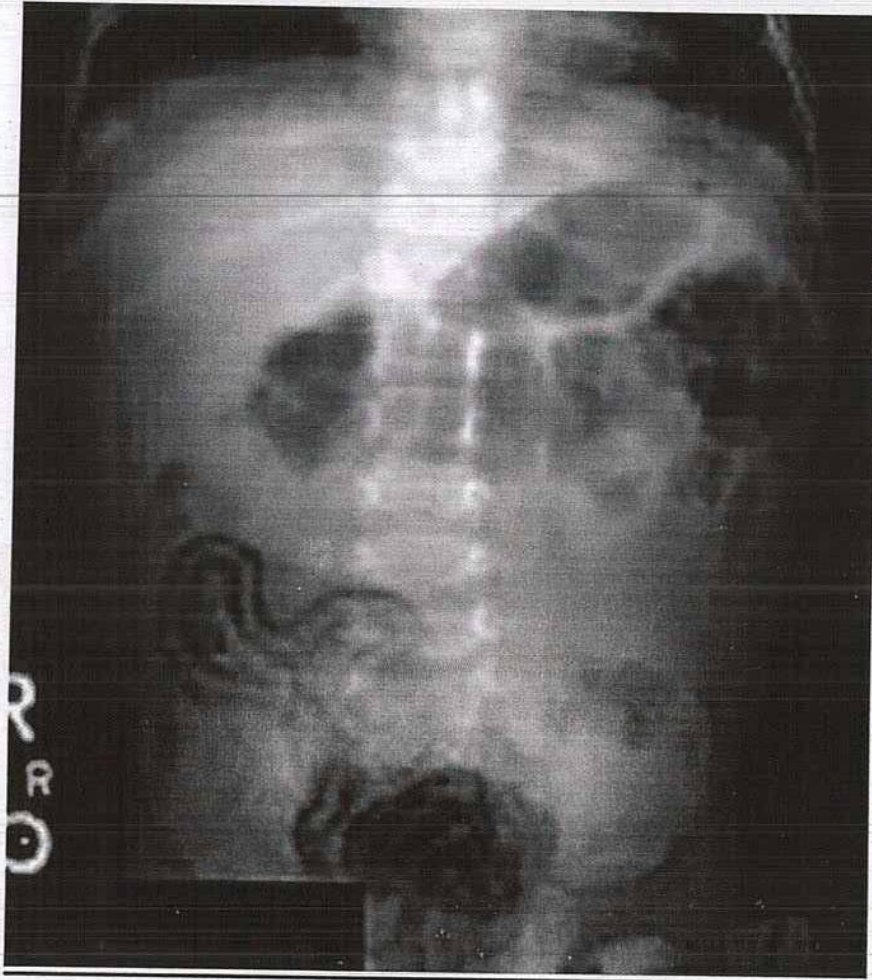
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Instructions to candidate	Keys to questions	Marks
1. What is the radiological diagnosis?	1. Pneumatosis intestinalis in	1
2. Name four factors in the pathogenesis of the disease	necrotizing enterocolitis	1
3. Name four abnormalities on laboratory tests performed on blood in this condition	2. Prematurity, oral feeding, pathogenic organisms, gut ischemia	1
4. Name four early clinical findings	3. Hyponatremia, metabolic acidosis, respiratory acidosis, thrombocytopenia, Disseminated intravascular coagulation, positive blood culture	1
	4. Feed intolerance, apnea, abdominal distension, absent bowel sounds, vomiting, change in stool pattern, abdominal tenderness, gross blood in stool	1

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2.5.3

Reforms in Evaluation

Competency Based

Teaching- UG



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I. INTRAMUSCULAR INJECTION

POINTS TO REMEMBER

Intramuscular injections are always given in the lateral aspect of thigh. **DO NOT USE GLUTEAL REGION** for intramuscular injections in children because unlike adults the risk of inadvertent injury to sciatic nerve resulting in paralysis of the limb is higher in children. More over gluteal muscles are under developed leading to poor absorption of medications in them.

DO NOT give IM injection in the gluteal region in children.

REQUIREMENTS

1. Disposable or sterile glass syringe with needle size 24 or 26 G 2. Cotton swabs 3. Alcohol / spirit

The steps are given in the box below:

Intramuscular injection

FOLLOW ASEPSIS ROUTINE AND UNIVERSAL PRECAUTIONS

1. Attach needle and load syringe with the required accurate dose.
2. Attach a fresh needle.
3. Restrain the baby.
4. Expose the thigh and identify injection site (lateral side of the thigh).
5. Cleanse the site with alcohol and wipe.
6. Grasp the muscle between thumb and finger of your hand and introduce the needle of the loaded syringe at right angles into the middle of vastus lateralis muscle
7. Aspirate the syringe to rule out that the needle is not in a blood vessel (if blood is aspirated take out the needle and prick again at another site).
8. Inject the required amount of medication.
9. Withdraw the needle.
10. Press with dry cotton.




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Checklist:

Steps	Yes/No/ Correct answer
Greet the patient	
Is consent taken from the patient?	
Is procedure explained to the patient?	
Is the Preparation done?	
Are the materials required for the procedure collected?	
Is Hand wash done, Aseptic precaution taken? Painting and Drapping done?	
Selection of proper point for procedure, proper technique of insertion of the needle?	
Injecting required amount of medication	
Withdraw the needle.	
Press with dry cotton.	

Requirements: . Disposable or sterile glass syringe with needle size 24 or 26 G , Gloves, Spirit, Gauze/ cotton.

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Intraosseous Access

Introduction

Establishing vascular access in a critically ill or injured child in shock can be difficult, but prompt IV or IO access is essential to administer needed fluids and medications. Few providers can perform advanced access techniques such as venous cutdown or central venous access quickly and safely. A delay in establishing vascular access can be life threatening. Delays can be avoided by use of IO cannulation.

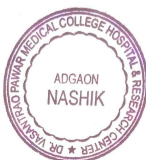
IO cannulation is a relatively simple and effective method of rapidly establishing vascular access when timely fluid or drug administration is needed and other means have failed or are outside the expertise of the provider. It provides access to a noncollapsible marrow venous plexus, which serves as a rapid, safe, reliable route for administration of drugs, crystalloids, colloids, and blood during resuscitation. IO access can be performed safely in

children of all ages, and it can often be achieved in 30 to 60 seconds. In certain circumstances (eg, severe shock with severe vasoconstriction or cardiac arrest), it may be the *initial* means of vascular access attempted. IO cannulation delivers fluid and medications to the central circulation within seconds.

Do not delay establishing IO access during the resuscitation of a critically ill or injured child if no IV access is already in place.

Sites

Many sites are appropriate for IO infusion. The proximal tibia, just below the growth plate, is often used. The distal tibia just above the medial malleolus, the distal femur, and the anterior-superior iliac spine are also used.



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Contraindications

Contraindications to IO access include

- fractures and crush injuries near the access site
- conditions in which the bone is fragile, such as osteogenesis imperfecta
- previous attempts to establish access in the same bone

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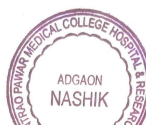
Procedure

You may use the following procedure to establish intraosseous access:

Step	Action
1	<ul style="list-style-type: none">• To establish access in the proximal tibia, position the leg with slight external rotation.• Identify the tibial tuberosity just below the knee joint. The insertion site is the flat part of the tibia, about 1 to 3 cm (about 1 finger's width) below and medial to this bony prominence (Figure 1). <p>Always use universal precautions when attempting vascular access. Disinfect the overlying skin and surrounding area with an appropriate agent.</p>
2	<ul style="list-style-type: none">• The stylet should remain in place during insertion to prevent the needle from becoming clogged with bone or tissue.• Stabilize the leg on a firm surface to facilitate needle insertion. Do not place your hand behind the leg. <p><i>Note:</i> If a standard IO needle or bone marrow needle is not available, a large-bore standard hypodermic needle can be substituted, but the lumen may become clogged with bone or bone marrow during insertion. Short, wide-gauge spinal needles with internal stylets can be used in an emergency, but they are not the preferred needles for IO use because they bend easily. A hemostat can be used to help control the needle during insertion. Use at least an 18-gauge spinal or hypodermic needle for this purpose.</p>

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3	<ul style="list-style-type: none">• Insert the needle through the skin over the anteromedial surface of the tibia in a direction perpendicular to the tibia. This directs the needle to avoid injury to the growth plate.• Use a twisting motion with gentle but firm pressure.• Continue inserting the needle through the cortical bone until there is a sudden release of resistance as the needle enters the marrow space. If the needle is placed correctly, it should stand easily without support.



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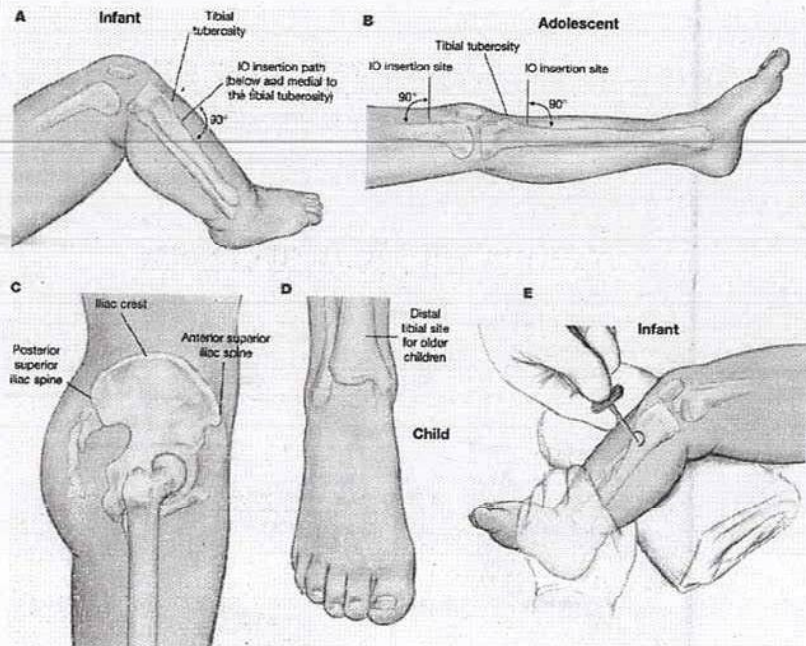


Figure 1. A, General landmarks for IO insertion in the leg of an infant. B, Locations for IO insertion in the proximal tibia and distal femur in older children. C, Location for IO insertion in the iliac crest. D, Location for IO insertion in the distal tibia. E, Technique for immobilizing the leg while twisting the IO needle into the leg of an infant.

4

- Remove the stylet and attach a syringe.
- Aspiration of bone marrow contents and blood in the hub of the needle confirms appropriate placement. Blood may be sent to the lab for study. (Note: Blood or bone marrow may not be aspirated in every case.)
- Infuse a small volume of saline and observe for swelling at the insertion site or posteriorly in the extremity opposite the insertion site. (Swelling will be observed if the needle has penetrated into and through the posterior cortical bone). Fluid should easily aspirate from the syringe.



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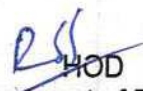


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5	There are several methods to stabilize the needle. You may place tape over the flange of the needle to provide some support and position gauze padding on both sides of the needle for additional support.
6	When connecting IV tubing, tape the tubing to the skin to avoid displacing the needle from tension placed on the tubing.
7	Volume resuscitation can be delivered via a stopcock attached to extension tubing or by infusion of fluid under pressure. When using a pressurized fluid bag, take care to avoid air embolism.




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After IO Insertion

After IO needle/catheter insertion keep the following points in mind:

- Check the site frequently for signs of swelling and needle displacement.
- Delivery of fluids or drugs through a displaced needle may cause severe complications, such as tissue necrosis or compartment syndrome.

IO needles are intended for short-term use, generally less than 24 hours. Replacement with long-term vascular access is usually accomplished in the intensive care setting.



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Checklist:

Steps	Yes/No/ Correct answer
Greet the patient	
Is consent taken from the patient?	
Is procedure explained to the patient?	
Is the Preparation done?	
Are the materials required for the procedure collected?	
Is Hand wash done, Aseptic precaution taken? Painting and Drapping done?	
Selection of proper point for procedure, proper technique of insertion of IO needle?	
Remove the stylet and attach a syringe. Aspiration of bone marrow contents and blood in the hub of the needle confirms appropriate placement	
Assessing the insertion site	
Maintaining asepsis at the site of insertion	

Requirements: IO needle , Gloves, Betadine , Spirit, Gauze, 3cc syringe, Normal saline



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Competency Based Assessment

Peripheral Intravenous Cannula (PIVC) Insertion and Management

Aim

- To gain peripheral venous access to administer fluids, blood products, medication and/or parenteral nutrition.
- To minimise the risk of complications of PIVC and intravenous therapy.

Site Selection

- Take time to choose site carefully.
- Veins in the hands and feet are preferable.
- Avoid sites near previous access, areas of bruising, erythema or loss of skin integrity.
- Avoid areas with flexion where possible as difficult to splint and increases the risk of extravasation.
- Avoid veins that may be used for percutaneous central venous catheters (PICC).
- Choose veins that run straight, full and empty and easy to splint. Equipment
- Sterile dressing pack
- Sterile gloves
- Skin preparation: Chlorhexidine 1% Alcohol/ 70% Swab > 27 weeks gestation or Povidone-iodine 10% Swab < 27 weeks gestation.
- 1 mL and 2 mL syringes and blunt drawing up needle
- Normal saline or prefilled normal saline syringe
- 24G cannula
- Needleless system/short extension



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2.5.3

Reforms in Evaluation

Competency Based

Teaching- PG



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Competency Based Assessment

Bone marrow aspiration (BMA)

Bone marrow aspiration (BMA) and bone marrow trephine biopsy are important procedures for the diagnosis of hematological malignancies and nonmalignant diseases in children. During BMA, bone marrow particles are obtained for analysis including microscopic morphologic evaluations and differential counts. During a trephine biopsy, a core of bone marrow is obtained and processed for the evaluation of marrow cellularity and to rule out marrow involvement by solid tumours, lymphomas or other processes. These invasive procedures should only be performed by a trained individual following a standard operating technique. There are no clear published guidelines in the paediatric literature. Hence, the purpose of the present article is to provide guidelines for the performance of BMAs and bone marrow trephine biopsies in children that will be useful for both general paediatricians and paediatric hematologists and oncologists.

COMMON CLINICAL INDICATIONS FOR BONE MARROW ASPIRATION

1. To investigate children with abnormal peripheral blood findings (eg, atypical cells [or blasts], pancytopenia, unexplained anemia, leukopenia or thrombocytopenia);
2. To diagnose malignant hematological disorders, hypoplastic anemias, inherited bone marrow failure syndromes and metastatic spread of tumours
3. To obtain microbiological cultures in children with fever of unknown origin;
4. For investigation of hypersplenism, lymphadenopathy, mediastinal or abdominal masses; and
5. For follow-up after chemotherapy or hematopoietic stem cell transplant



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TECHNIQUE

The preferred site for obtaining bone marrow in children is the posterior superior iliac crest because it contains the most cellular marrow, there are no vital organs in close proximity and it is a nonweight-bearing structure. The anterior iliac crest is preferable in very obese patients. In children younger than 18 months of age, the anteromedial face of the tibia is preferred for marrow aspiration; however, this site may fail to yield adequate samples when the procedure is performed by an inexperienced technician; there is also a risk of fracturing the bone. At The Hospital for Sick Children (Toronto, Ontario), the posterior superior iliac crests for all children, including small infants, is preferred.

Trephine biopsies are usually taken from the posterior superior iliac crest in children; however, a technique using the tibia has been described for small neonates. Bone marrow aspiration (BMA) and bone marrow trephine biopsy (BMTB) must be performed only by experienced health care providers who have been well-trained in the technique.

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CONTRAINDICATIONS

1. Hemorrhagic disorders such as congenital coagulation factor deficiencies (eg, hemophilia), disseminated intravascular coagulation and concomitant use of anticoagulants.

If a BMA or a BMTB is absolutely indicated in these patients, then factor replacement or cessation of anticoagulation should be considered before the procedure, and the patient should be closely monitored for 24 h postprocedure. Severe thrombocytopenia is not a contraindication to BMA, as long as prolonged pressure is applied to the site to prevent bleeding. For obese patients with severe thrombocytopenia, in whom a bone marrow biopsy is indicated, it is preferable to perform a platelet transfusion to raise the platelet count to over $15 \times 10^9/L$.

2. Skin infection or recent radiation therapy at the sampling site.
3. Bone disorders such as osteomyelitis or osteogenesis imperfecta.

PATIENT ASSESSMENT

1. Check primary diagnosis and treatment protocol to determine the need for the study and any special requirements (eg, flow cytometry, cytogenetic or molecular studies);
2. Obtain written consent from the guardian or the child, if deemed competent;
3. Assess need for sedation (eg, conscious sedation by an anesthesiologist [using intravenous propofol or inhaled nitric oxide] or general anesthesia). At The Hospital for Sick Children, children who weigh less than 10 kg and those with respiratory compromise undergo the procedure in an operating room (children with a mediastinal mass and those with severe respiratory distress should have an anesthesia assessment before the procedure);
4. Check the platelet count in all children, as well as the international normalized ratio and the partial thromboplastin time if the patient has a history of bleeding problems or is currently on anticoagulant therapy;
5. Assess skin at bone marrow site for signs of infection;
6. Check medical record for history of allergy to local anesthetics, iodine solutions or anesthetic medications;
7. Ensure all necessary personnel are present (eg, laboratory technician if cytogenetic studies are required);



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8. Confirm patient identity; and
9. Consider the application of a topical anesthetic cream to marrow sampling site 30 min to 60 min before procedure.

EQUIPMENT

Ensure that an adequate number of syringes (some heparinized as indicated for the specimens to be collected) are prepared, and that any transport tubes containing, for example, EDTA (necessary for flow cytometry and molecular studies) are also available.

PREPARATION

Position the child on the procedure table (prone or lateral decubitus for posterior superior iliac crest, or supine for the anterior iliac crest) and expose the iliac crest. Ensure that the child is appropriately immobilized and that the airway is not compromised by positioning. Remove any topical ointments and clean the skin; palpate the iliac crest and locate the site of aspiration. Open the tray using sterile techniques, and wash and dress as required for sterile procedure. Wash the puncture site with antiseptic solution using a circular motion from the inner to the outer area, repeating the wash three times. Place sterile drapes over the operative site. It is the standard of care to anesthetize the marrow site with 1 mL to 2 mL of local anesthetic (1% to 2% lidocaine without adrenaline). The initial injection of the anesthetic solution should be intradermal with the needle parallel to the skin (bevel up to produce a wheal if using the posterior superior iliac crest), then slowly inject more deeply into the periosteum. In some institutions, the intradermal injection is not required if a topical anesthetic has been applied,



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BMA

Puncture the skin with the BMA needle and advance to the periosteum, then enter the bone marrow space with a twisting motion until the needle is firmly anchored in the bone. Remove the stylet and attach a 5 mL syringe to the needle hub. Apply strong suction to obtain no more than 0.3 mL to 0.5 mL of bone marrow, disconnect the syringe from the needle and, if desired, reintroduce the stylet. Make or ask the technician to make smears from the aspirate immediately and verify that it contains particles. Using a new syringe, obtain additional samples as needed. Withdraw the aspiration needle and apply an adhesive bandage or pressure dressing. Document the procedure and any problems encountered in the patient's chart. After transfer of the patient to a recovery area, monitor the patient and procedure site carefully. In instances of prolonged bleeding at the site, check the platelet count and the international normalized ratio and the partial thromboplastin time; occasionally, platelet and/or fresh frozen plasma transfusion may be required. At discharge, instruct the patient or the family to not use ibuprofen or acetylsalicylic acid for pain at the procedure site (because these drugs can cause platelet dysfunction), but to give codeine orally. Also, instruct to remove the dressing over the procedure site within 12 h because it may cause skin infection if it is left on for too long.

INTERPRETATION OF RESULTS

The interpretation and reporting of marrow aspirates are the domain of qualified hematopathologists or hematologists. While some results from an aspirate may be available within hours, tests such as flow cytometry, molecular and cytogenetic analyses take longer. A bone marrow biopsy requires decalcification, and results will often only be available after two or more days

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Competency Based Assessment

Module of ICD Insertion for PG students

Introduction

Chest tube insertion is a common therapeutic procedure used to provide evacuation of abnormal collections of air or fluid from the pleural space. Tube thoracostomy may be indicated for pleural effusions associated with malignancy, infection, or hemothorax in the post-surgical setting. In these situations, drainage is imperative to allow for lung re-expansion.

2. Objectives:

By the completion of this module, the student will be able to:

- a. List the indications for ICD Insertion
- b. Select the equipment for and choose ICD of appropriate size
- c. Enumerate the risks associated with procedure
- d. Communicate to the patient about the procedure and care of ICD, including the need for aseptic care
- e. Demonstrate correct method of ICD Insertion with strict aseptic technique in patients.

Suggested Teaching Learning method: Observation of procedure performed by senior resident

Pre-requisites

Knowledge of safe triangle and anatomy of thorax

Knowledge of indications/ contraindications ICD

Knowledge of mechanism of drainage of fluid

At least 5 successful supervised observation of procedure.

Indications

1. Pneumothorax (especially if it is large or progressive, or if the patient is symptomatic).
2. Tension pneumothorax.
3. Penetrating chest trauma.
4. Hemothorax.
5. Chylothorax
6. Empyema.
7. Drainage of pleural effusions.
8. Prevention of hydrothorax after cardiothoracic surgery.
9. Bronchopleural fistula

Contraindications

- Anticoagulation of a bleeding dyscrasia.
2. Systemic anticoagulation.



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3. Small, stable pneumothorax (may spontaneously resolve).
4. Empyema caused by acid-fast organisms.
5. Loculated fluid accumulations

Equipments required:

1. Fentanyl or other pain medication
 2. 1% Lidocaine with Epinephrine, 10 ml syringe with 25 gauge needle
 3. Chloraprep
 4. Sterile gloves, masks, and hat (gown optional)
 5. Sterile tray to include:
 - a. 4 x 4's b. 2 x 2's c. Drapes
 - d. Curved mosquito hemostat e. Curved Kelly clamp
 - f. Scissors
 - g. Needle holder
 - 6 Sterile thoracotomy tube, Available sizes are 28 F, 32 F, or 36 F. Choose the tube best suited for the patient, or use a sterile 8.5 Fuhrman pigtail catheter if a pigtail catheter is indicated.
 7. Scalpel
 8. 4-0 silk suture on cutting needle
 9. Petroleum-soaked gauze
 10. Underwater sealed drainage system or a "Heimlich" valve.
- Clinical waste dustbin.

Steps in ICD insertion

Preparation

- Explain the procedure to the patient and the family without using technical jargon. Tell about the indication for procedure.
- Obtain informed or implied consent, following procedure discussion,
- risks, and benefits.
- Select the site to be punctured
- Physical examination
- Diagnostic – Chest X ray PA and Lateral to confirm
- Always apply universal precautions.
- Current CBC with platelets and differential, serum LDH, albumin, glucose, PT/PTT,
- Have all the equipments on an autoclaved tray.

Procedure

- Identify the insertion site, which is usually the fourth or fifth intercostal space in the mid-to-anterior axillary line (just lateral to the nipple in males), immediately behind the lateral edge of the pectoralis major muscle.
- Assemble the suction-drain system according to manufacturer's recommendations. Connect the suction system to a wall suction outlet. Adjust the suction as needed until a small, steady stream of bubbles is produced in the water column.
- Prep the skin with povidone-iodine or Chlorhexidine solution and allow to dry. Drape the site with fenestrated sheet. Using the 10 ml syringe and 25 gauge needle, raise a skin wheal at the incision area (in the interspace one rib below the interspace chosen for the pleural insertion) with 1% solution of Lidocaine with Epinephrine.
- Liberally infiltrate the subcutaneous tissue and intercostal muscles, including the tissue above the middle aspect of the inferior rib to the interspace where pleural entry will occur and down to the parietal pleura. Using the anesthetic needle and syringe, aspirate the pleural cavity, and check for



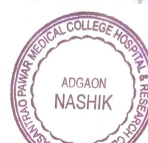
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the presence of fluid or air. If none is obtained, change the insertion site. Be careful to keep away from the inferior border of the rib to avoid the intercostal vessels.

- Make a 2 to 3 cm transverse incision through the skin and the subcutaneous tissues overlying the interspace. Extend the incision by blunt dissection with a Kelly clamp through the fascia toward the superior aspect of the rib above. After the superior border of the rib is reached, close and turn the Kelly clamp, and push it through the parietal pleura with steady, firm, and even pressure. Open the clamp widely, close it, and then withdraw it. Be careful to prevent the tip of the clamp from penetrating the lung, especially if no chest radiograph was obtained or if the x-ray film does not clearly show that the lung is retracted from the chest wall
- Insert an index finger to verify that the pleural space, not the potential space between the pleura and chest wall, has been entered. Check for unanticipated findings, such as pleural adhesions, masses, or the diaphragm.
- Grasp the chest tube so that the tip of the tube protrudes beyond the jaws of the clamp, and advance it through the hole into the pleural space using your finger as a guide. Direct the tip of the tube posteriorly for fluid drainage or anteriorly and superiorly for pneumothorax evacuation. Advance it until the last side hole is 2.5 to 5 cm (1 to 2 inches) inside the chest wall. Attach the tube to the previously assembled suction-drainage system. The chest tube should be inserted with the proximal hole at least 2 cm beyond the rib margin. Position of the chest tube with all drainage holes in the pleural space should be assessed by palpation. Confirm the correct location of the chest tube by the visualization of condensation within the tube with respiration or by drained pleural fluid seen within the tube. Ask the patient to cough, and observe whether bubbles form at the water-seal level. If the tube has not been properly inserted in the pleural space, no fluid will drain, and the level in the water column will not vary with respiration.
- Suture the tube in place with 1-0 or 2-0 silk or other nonabsorbent sutures. The two sutures are tied so as to pull the soft tissues snugly around the tube and provide an airtight seal. Tie the first suture across the incision, and then wind both suture ends around the tube, starting at the bottom and working toward the top. Tie the ends of the suture very tightly around the tube, and cut the ends.
- Place a second suture in a horizontal mattress or purse-string stitch around the tube at the skin incision site. Pull the ends of this suture together, and tie a surgeon's knot to close the skin around the tube. Wind the loose ends tightly around the tube, and finish the suture with a bow knot. The bow can be later undone and used to close the skin when the tube is removed. Alternatively, some choose to only use the purse-string to secure the chest tube. This usually involves wrapping the suture around the tube several more times than in the other method to ensure that the tube does not slip from location.
- Place petroleum gauze around the tube where it meets the skin. Make a straight cut into the center of two additional 4 X 4 inch sterile gauze pads, and place them around the tube from opposite directions. Tape the gauze and tube in place, and tape together the tubing connections. Obtain postero-anterior and lateral chest radiographs to check the position of the chest tube and the amount of residual air or fluid as soon as possible after the tube is inserted.
- Use serial chest auscultation, chest radiographs, volume of blood loss, and amount of air leakage to assess the functioning of the chest tube. If a chest tube becomes blocked, it usually may be replaced through the same incision. Chest tubes are generally removed when there has been air or fluid drainage of < 100 ml in 24 hours for more than 24 hours.

Complications

1. Injury to the heart, great vessels, or lung
2. Diaphragmatic perforation
3. Subdiaphragmatic placement of the tube



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4. Open or tension pneumothorax
5. Subcutaneous emphysema
6. Unexplained or persistent air leakage
7. Hemorrhage (especially from intercostal artery injury)
8. Recurrent pneumothorax
9. Empyema
10. Lung parenchyma perforation
11. Subcutaneous placement
12. Cardiogenic shock (from chest tube compression of the right ventricle)
13. Infection

Assessment:

The procedure is to be assessed by a faculty member using DOPS format and feedback provided.

Skill assessment:

- i. **Formative:** Demonstration of successful ICD insertion with all aseptic precautions in a patient under supervision of senior resident and lecturer.
- ii. **Summative:** Demonstration of successful ICD insertion with demonstration of all aseptic precautions during residency.

Suggested Reading:

Books Recommended (latest edition)

1. Fishman's textbook of pulmonary medicine
2. Textbook on Pulmonary disease by Fraser
3. Harrison's principles of internal medicine


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LUMBAR PUNCTURE IN PAEDIATRICS

Lumbar puncture may be performed as part of the initial work up of a sick child, or later in the course of an illness once the child has stabilised if there were initial contraindications. It is preferable to obtain a CSF specimen prior to antibiotic administration, however this should not be unduly delayed in a child with signs of meningitis or sepsis..

Indications:

- Suspected meningitis or encephalitis
- Suspected Sub-arachnoid haemorrhage with a normal CT

Contraindications:

Do not do a lumbar puncture if the child is so sick that you will give antibiotics for meningitis even if the CSF is normal on microscopy.

The clinical findings that suggest you should give dexamethasone and antibiotics immediately, and delay lumbar puncture for 1-2 days until the child is improving are.

- Coma: absent or non-purposeful response to painful stimulus - squeeze ear-lobe firmly for up to 10 seconds. A child over 3 months of age should push you away and seek a parent.
- Signs of raised intracranial pressure: eg drowsy, diplopia, abnormal pupillary responses, unilateral or bilateral motor posturing or papilloedema (NB papilloedema is an unreliable and late sign of raised ICP in meningitis; a bulging fontanelle in the absence of other signs of raised ICP, is not a contraindication).
- Cardiovascular compromise/ shock
- Respiratory compromise
- Focal neurological signs or seizures
- Recent seizures (within 30 minutes or not regained normal conscious level afterwards).
- Coagulopathy/thrombocytopenia
- Local infection (in the area where an LP would be performed)
- The febrile child with purpura where meningococcal infection is suspected.

Assessment prior to LP for contraindications?

CT Scans if focal neurological signs

- CT Scans are not helpful in most children with meningitis.
- A normal CT scan does not tell you that the patient does not have raised ICP.
- Herniation may occur even in the presence of a normal scan.



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- Don't delay antibiotics whilst waiting for a CT

Complications:

Informed verbal consent should be obtained. This should include a discussion of the benefits of the procedure in terms of possible diagnoses and potential complications. Complications of LP may include:

- Failure to obtain a specimen / need to repeat LP/ Traumatic tap (common)
- Post-dural puncture headache (fairly common) - up to 5-15%
- Transient/persistent paresthesiae/numbness (very uncommon)
- Respiratory arrest from positioning (rare)
- Spinal haematoma or abscess (very rare)
- Tonsillar herniation (extremely rare in the absence of contraindications above)

Analgesia, anaesthesia and sedation

- Non-pharmacological techniques should be used where possible, including explanation (in an older child), distraction, and the presence of a parent.
- All children should have some form of local anaesthetic for lumbar puncture.
 - Use topical anaesthetic cream (AnGEL) except where specimens are required urgently
 - Subcutaneous lignocaine should be used in addition to topical anaesthetic.
 - Up to 0.4ml/kg of 1% (4mg/kg)
- Oral Sucrose should be used for infants <3 months
- Sedation, including nitrous, should be considered for children older than 6 months with normal conscious state.

Monitoring:

- Monitor all sedated or seriously ill children with continuous pulse oximetry +/- ECG leads.

Equipment

- At least one trained assistant to hold the child
- Sterile gloves
- Sterile drapes and procedure tray
- Skin preparation: povidone iodine solution (Betadine) or chlorhexidine
- Local anaesthetic lignocaine, 2ml syringe, 25G needle
- CSF tubes (2)
- Spinal needle
- NB Spinal manometry is not routinely performed in children during lumbar puncture.



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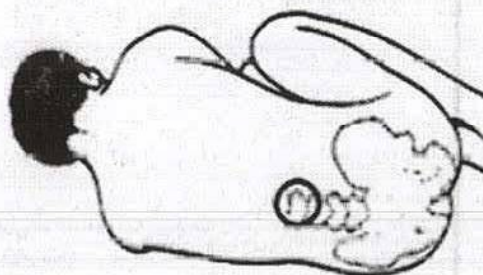
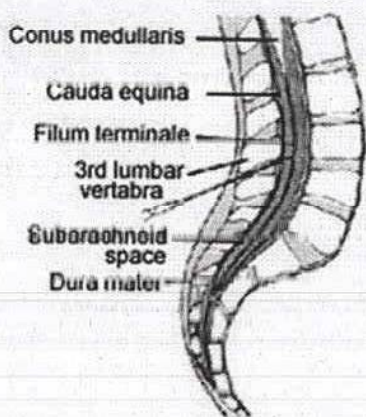
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Spinal Needles

- 22G or 25G bevelled spinal needles with stylet (the use of needles without a stylet has an associated risk (rare) of spinal epidermoid tumours)
- Consider 25G pencil point needles for older children/adolescents (eg Whitacre 25G 5cm, 9cm available in ED at RCH)
 - Pencil-point (blunt) needles reduce the risk of headache in adults, however the evidence is not convincing in children.

Procedure

The most important determinant of a successful lumbar puncture is a strong, calm, experienced assistant to hold the patient. Position of the patient is critical.



Position:

- Lumbar puncture may be performed with the child lying on their side or sitting up.
- Aim for maximum flexion of the spine (curl into fetal position), but avoid over flexing the neck, especially in infants as this may cause respiratory compromise. Ask an adolescent to slouch rather than bend from their hips.
- Ensure that the plane of the back is exactly at 90 degrees to the bed (ie. not leaning towards or away from you). Make sure the hips and shoulders are in line
- Draw an imaginary line between the top of the iliac crests. This intersects the spine at approximately the L3-4 interspace (mark this if necessary)
 - The conus medullaris finishes near L3 at birth, but at L1-2 by adulthood
 - Aim for the L3-4 or L4-5 interspace



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Preparation:

- Wash hands and aseptically put on sterile gloves
- Prepare the skin with povidone-iodine or chlorhexidine and set up sterile drapes.
- Allow adequate time for the skin preparation to dry
- Take the tops off the tubes, ensuring that they remain sterile.
- Infiltrate the skin with 1% lignocaine using a 25G needle

Lumbar Puncture:

- Position the needle in the midline with the bevel pointing towards the ceiling (lateral decubitus position) or to the side (sitting).
- Pierce the skin with the needle and pause. Wait for the child to stop wriggling
- Reorientate (ensure that back is vertical, needle is parallel to the bed and perpendicular to the back). Aim for the umbilicus (ie slightly cephalad).
- Advance the needle into the spinous ligament (increased resistance). Continue to advance the needle within the ligament until there is a fall in resistance. Remove the stylet. If CSF is not obtained replace the stylet and advance the needle slightly then recheck for CSF.
 - An alternative technique is to remove the stylet once the needle is in the ligament and advance very slowly without stylet watching for CSF to flow back. This has the advantage of making it harder to go unintentionally past the subarachnoid space.
 - If the needle meets resistance, withdraw the needle slowly whilst watching for CSF. If none is obtained, replace the stylet, re-orient the needle and re-try.
 - If blood stained fluid is obtained collect some for culture. If it clears it can be used for a cell count. If it fails to clear another attempt at a different level may be required.
- If CSF is flowing, collect into 2 numbered sterile tubes (5-10 drops each is usually adequate)
- Replace the stylet (this may reduce risk of headache), and remove the needle and stylet.
- Apply brief pressure to the puncture site
- Send specimens urgently to the lab for microscopy, protein, glucose, culture. (NB CSF glucose estimation is most useful if there is a synchronous plasma glucose). see CSF Interpretation

Post-procedure care

Cover the puncture site with a band-aid or occlusive dressing (eg Tegaderm)
Bed-rest following lumbar puncture is of no benefit in preventing headache in children.



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Thoracocentesis

A. DEFINITIONS:

This procedure includes needle thoracentesis (closed chest needle aspiration) to remove air or fluid from the pleural space, thereby improving ventilatory function. Emergency closed chest needle aspiration in the child may be required for relief of symptoms due to tension pneumothorax.

Pneumothorax, when under tension presents a life threatening emergency and thoracentesis must be performed immediately.

1. A child is unstable with the clinical signs of a tension pneumothorax
2. A child is stable and is intubated and has radiographic evidence of a pneumothorax

B. Indication

1. Symptomatic treatment of air or fluid accumulation in the pleural space

C. Contraindications

1. No absolute contraindications

D. Equipment

1. ECG/O₂ saturation monitors in place with alarms on
2. Antiseptic solution
3. 10cc syringe
4. Age appropriate needle or intracath number 14/18
5. 3-way stopcock
6. IV extension tubing
7. Tape

E. Essential steps for procedure/practice: Thoracentesis

1. Gather equipment
2. Connect the 3-way stopcock and syringe to IV extension tubing.
3. Turn the stopcock "off" to the remaining outlet (off to the atmosphere)
4. Position the child supine with affected side slightly elevated and restrain child's arms and legs.



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5. Take all aseptic precaution and prepare sterile area.
6. Locate nipple, sternum, and fourth and fifth intercostal space (ICS) mid axillary. Enter the 4th or 5th ICS with intracath pointed toward opposite shoulder. Enter just above the ribs or enter second ICS just above third rib mid clavicular. Steady the needle in this position and remove needle guide
7. Attach IV extension tubing with 3-way stopcock and syringe to the hub of the intracath. Pull syringe to aspirate air. Turn the stopcock off to the patient and expel air from the syringe. Repeat process until resistance is encountered
8. As you are aspirating air, observe child's heart rate. Listen for improvement in breath sounds. When no more air is obtained with aspiration, turn 3-way stopcock off to the patient
9. Tape the intracath in place and attach Heimlich valve to IV extension tubing. If air reaccumulates, continue to aspirate air from chest until a chest tube is inserted
10. Obtain a chest radiograph as soon as possible
11. Observe child's respiratory status, (color, rate, effort) before, during, and after procedure



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INSERTION OF FEEDING TUBE & ORO-GASTRIC TUBE FEEDING

PURPOSE

1. Insertion of feeding tube: For infants who - Require gastric decompression - Require gastric lavage
2. Oro-Gastric tube feeding: For infants who - Are unable to feed orally and need continuous or intermittent gavage feeding

INDICATIONS

1. Neonates who cannot feed orally e.g. preterm LBW infants, neurologically depressed.
2. Neonates with surgical conditions

EQUIPMENT

1. Feeding tube a. 8 French size for babies >2000g b. 5-6 French size for babies <2000g
2. Appropriate size syringe 3. Stethoscope 4. Scissors, tape

PROCEDURE

The procedure of insertion of feeding tube and oro-gastric tube feeding are given below:

1. Wash hands thoroughly
2. Position baby on right side or in a supine position with head elevated. Baby may also be held in a sitting position in mother's or nurse's arms.
3. Measure the length required for insertion: - Open the feeding tube package and starting at the tip of the tube, measure from the bridge of the nose to the tip of the ear lobe down to the tip of the xiphoid process - Mark the tube with tape or maintain measurement with thumb and finger
4. To insert an oral gastric tube: - Hold the feeding tube 1" - 2" from the tip - Use the natural bend of the tube to follow the natural curves of the mouth and throat - Insert the tube in the mouth and towards the back of the throat, gently pushing it down the oesophagus until it reaches the pre-measured mark on the tube Note: Use expressed breast milk (EBM) to lubricate the tube before insertion. Do not use oil or paraffin to lubricate the tube.
5. Establish correct placement of the feeding tube by either of the following methods: - Connect the syringe to other end of feeding tube and gently aspirate the contents. The aspiration would look like curdled milk, if the tube is in stomach - Disconnect syringe from the feeding tube and draw up 1-2 cc air. Reconnect the syringe to the tube. Inject the air into the stomach while auscultating. You should hear the air enter the stomach. Gently aspirate air before commencing feed

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6. Observe baby for choking, gasping or cyanosis during insertion of tube. Withdraw tube immediately if baby appears to be in any distress. 7. Tape the tube in place.

Checklist

Steps	Yes/No/ Correct answer
Greet the patient	
Is consent taken from the patient?	
Is procedure explained to the patient?	
Is the Preparation done?	
Are the materials required for the procedure collected?	
Is Hand wash done, Aseptic precaution taken?	
Choosing appropriate size of feeding tube	
Measuring the length to be inserted. Proper Insertion of feeding tube	
Establishing correct placement of the feeding tube	
Observe baby for choking, gasping or cyanosis during insertion of tube	

Requirement, 3cc syringe, Feeding tube, gloves, stethoscope



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