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Golden Notes for

Preventive and Social Medicine

As per the Revised Competency-based Medical Education Curriculum (NMC)



4th Edition

Parimal Patel
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16 CHAPTER

Case-based Discussion (Clinico-social Case Assessment)

PART I CASE STUDIES WITH ANSWERS

CASE STUDY 1: OUTBREAK INVESTIGATION

On 17 May 2002, the press reported a cluster of gastroenteritis in an area of Chennai, Tamil Nadu, India called Kalyanapuram. According to the report, 17 children presented with vomiting and diarrhea. The Anganwadi worker (community health worker) from the nearby ICDS center had alerted the local health post regarding the episode. Several patients were admitted for treatment at the local Government hospital, but no deaths and no severe dehydration episodes were reported. Quickly, the local health authorities visited the place. Their first observation was that the cluster affected adults as well as children.

Kalyanapuram is a slum located near to the Central Railway Station in Chennai. According to the local health facility, it had a population of 3,507 in 2002. It is a neighborhood densely populated with people of lower socioeconomic status (mostly agricultural laborers). With the exception of few buildings, housing consists in "kutcha" (made with mud walls and thatched roofs) that do not have a separate kitchen area. The residents use a common lavatory located near the entrance of the slum. The source of water is a common hand pump located near the lavatory. Buying foods from vendors is a common practice here, especially in the morning hours, as most people leave for work at dawn.

The investigators defined a case as the occurrence of vomiting or diarrhea in any person residing in the Kalyanapuram slum area between 10 and 19 May 2002. Faced with a number of options, the team decided to go for a complete a door-to-door search and identified 24 cases for which they collected the basic information presented on **Table 1**. In the meantime, information regarding population size was collected from the health center **(Table 2)**.

TABLE 1: Line listing of the 24 cases of gastroenteritis, Kalyanapuram, Chennai, Tamil Nadu, India, 2002.

ID	*Age*	*Sex*	*Vomiting*	*Diarrhea*	*Fever*	*Date of onset*	*Time of onset*
1	18 months	M	+	+	+	16-05-02	10:30
2	40 months	F	+	+		16-05-02	12:30
3	24 months	F	+	+		16-05-02	11:30
4	40 months	F		+		16-05-02	11:00
5	24 months	M	+	+	+	16-05-02	10:30
6	8 years	F	+			16-05-02	11:00
7	48 months	F	+			16-05-02	11:00
8	35 months	M	+			16-05-02	11:00
9	10 years	F	+	+		16-05-02	11:00
10	30 months	F		+		16-05-02	11:00
11	27 months	F	+			16-05-02	11:00
12	42 months	M	+	+		16-05-02	12:00
13	49 months	M	+	+	+	16-05-02	11:00
14	20 years	F	+	+	+	16-05-02	11:30
15	21 years	F	+			16-05-02	11:30
16	50 years	F	+	+		16-05-02	19:00
17	43 months	M	+	+		16-05-02	11:30

Contd...

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ID	*Age*	*Sex*	*Vomiting*	*Diarrhea*	*Fever*	*Date of onset*	*Time of onset*
18	19 months	F	+			16-05-02	10:30
19	25 months	F	+	+		16-05-02	10:30
20	26 months	F	+	+		16-05-02	11:30
21	38 months	F	+	+		16-05-02	13:00
22	54 months	M	+	+		16-05-02	08:30
23	48 months	M	+	+		16-05-02	12:30
24	7 years	F	+	+		16-05-02	08:30

TABLE 2: Distribution of population by age and sex, Kalyanapuram slum area, Chennai, Tamil Nadu, India, 2002.

	Population		
Age group	*Male*	*Female*	*Total*
1–3	91	55	146
3–5	75	66	141
5–6	32	39	71
6–10	141	131	272
10–14	121	130	251
>14	1467	1159	2626
Total	1927	1580	3507

Question 1

Use descriptive epidemiology based on the given information in above two tables to form the hypotheses.

Answer

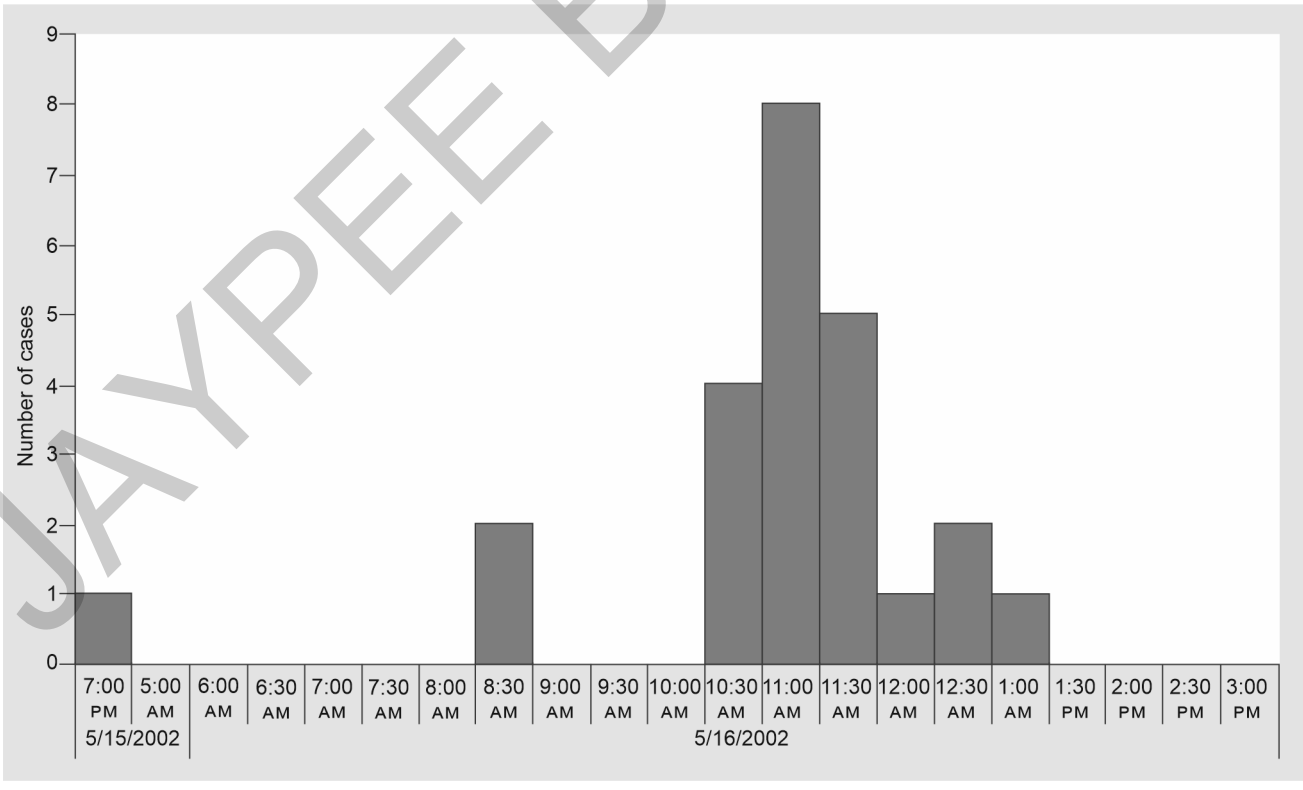

Fig. 1: Cases of gastroenteritis by time of onset, Kalyanapuram, Chennai, Tamil Nadu, India, 2002.

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TABLE 3: Attack rates of gastroenteritis by age and sex, Kalyanapuram, Chennai, Tamil Nadu, India, 2002.

Age group	*Cases*	*Total*	*Attack rate per 1,000 population*
1–3	9	146	62
3–5	10	141	71
5–6	0	71	0
6–10	2	272	28
10–14	0	251	0
>14	3	2,626	11
Male	8	1,927	4
Female	16	1,580	10
Total	24	3,507	6.8

Interpretation

The distribution of cases over time indicates a cluster around a few hours on 16 May 2002, suggesting a point source outbreak of a disease with a short incubation caused by an exposure that occurred in the morning, possibly during breakfast.

The incidence by age and sex indicates that there were cases among all age groups, but that children were more affected, suggesting that the exposure could have been more common in children (e.g., food item popular among children) or that the pathogen would lead to symptoms more commonly among children.

Question 2

What analytical interpretation can be done based on the data given after conducting case control study?

TABLE 4: Consumption of breakfast food items among cases and controls, gastrointestinal illness outbreak, Kalyanapuram, Chennai, May 2002.

Food item	*Cases*	*Controls*
Idiyappam	15	6
Idli	7	7
Pongal	1	5
Rice	2	6

Answer

Food item	*Cases (n = 25)*	*Controls (n = 25)*	*Odds ratio*	*CI (95%)*
Idiyappam	15	6	4.75	1.41–16.05
Idli	7	7	1.00	0.29–3.44
Pongal	1	5	0.17	0.02–1.55
Rice	2	6	0.28	0.05–1.53

Based on above findings highest odds ratio is for the food item "Idiyappam," so it is the most likely food item which led to the outbreak. Confidence interval of odds ratio of "Idiyappam" doesn't cross 1 which also proves the association is statistically significant.

CASE STUDY 2: RABIES

Scenario 1: Dr Suresh is veterinary doctor. He is immunized against rabies by taking preexposure prophylaxis. Currently, he is posted in the forest area. Yesterday evening, he was bitten by a bear. He is having deep wound with bleeding.

Questions

1. Explain wound management in this case.
2. What will be schedule of antirabies vaccine in this incidence of bear bite?
3. Write the name of action plan related to this scenario.

Answers

1. Proper wound toilet with soap and running water for at least 15 minutes. Then dressing with available virucidal like povidone iodine. Injection of TT/Td to be given. Antibiotics also will be given to prevent bacterial infection. As the wound is deep might require sutures but as far as possible will be avoided otherwise loose suturing to be done.
2. Anti-rabies vaccine will be given as re-exposure regime. Vaccine will be given on day 0 and day 3. Though the bear bite (wild animal) is of category three but pre-exposure prophylaxis was received so only ARV will be sufficient and there is no need of giving immunoglobulins.
3. National Action Plan for Dog Mediated Rabies Elimination (NAPRE) from India by 2030.

Scenario 2: A 40 kg schoolgirl was bitten by a stray dog on December 11, 2025, and was taken to a clinic that same day. Provide a date-by-date schedule for the anti-rabies vaccine, including the route and dose for each administration. Also, determine the required dose of Human Rabies Immunoglobulin for this patient, assuming the dog bite is classified as Category III.

Answer

Schedule:

Visit (Day)	*Date*	*Intradermal (ID)**	*Intramuscular (IM)*
Day 0	11 Dec 2025	0.1 mL in each arm (2 injections total)	1.0 mL in one deltoid
Day 3	14 Dec 2025	0.1 mL in each arm (2 injections total)	1.0 mL in one deltoid

Contd...

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Contd...

Visit (Day)	*Date*	*Intradermal (ID)**	*Intramuscular (IM)*
Day 7	18 Dec 2025	0.1 mL in each arm (2 injections total)	1.0 mL in one deltoid
Day 14	25 Dec 2025	NIL (No visit)	1.0 mL in one deltoid
Day 28	08 Jan 2026	0.1 mL in each arm (2 injections total)	1.0 mL in one deltoid
TOTAL		4 visits, 8 injections	5 visits, 5 injections

*As per NAPRE guideline intradermal route is recommended

- Human Rabies Immunoglobulin (RIG) Calculation: 20 IU per kg of body weight.
- Calculation for a 40 kg patient: 40 kg × 20 IU/kg = 800 IU
- The entire calculated dose of HRIG (800 IU) should be infiltrated deeply into and around all wound(s) to the anatomically feasible extent. Any remaining volume that cannot be infiltrated should be administered by intramuscular (IM) injection at a site distant from the vaccine injection site (e.g., the anterolateral thigh).

CASE STUDY 3: TETANUS

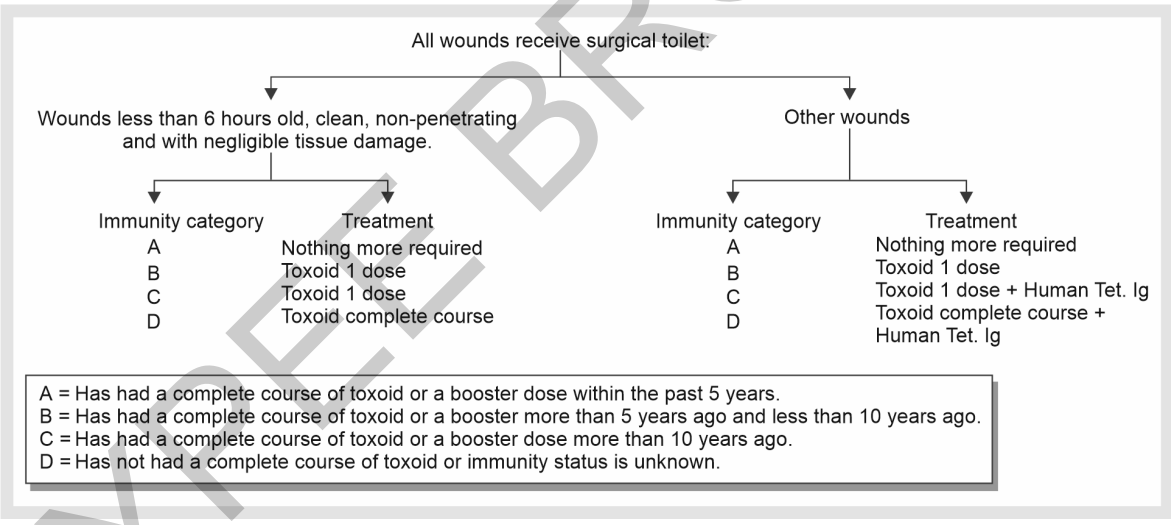
Scenario 1: A 22-year-old Suresh, son of farmer presents to the emergency room at 8 PM with a crushing injury of the index finger and thumb that occurred at 9 AM while he was helping his father with some machinery in the farm. Records show that he received Tetanus Toxoid when he was 16 years old at nearby PHC.

Questions

1. What is the management protocol of this condition?
2. Write the routine immunization schedule of tetanus vaccine.
3. What measures helped in elimination of maternal and neonatal tetanus elimination?

Answers

1. Management protocol:



Given wound comes under the category of other wounds and immunity category is B so along with wound management (debridement and antibiotics), the one dose of tetanus toxoid will be given.

2. Tetanus toxoid given as pentavalent at 6, 10 and 14 weeks while as DPT booster at 1.5 years and 5 years of age. Td is given at 10 and 16 years of age.
3. 2 dose of Td vaccine during pregnancy (Td as booster if last pregnancy was within three years and in that pregnancy both doses taken) and **"five cleans"** practice during delivery made the elimination of maternal and neonatal tetanus possible.

Another scenario might be given as tetanus disease as shown below.

Scenario 2: In emergency department, 22-year-old Ramesh presented with complains of dysphagia and difficulty in breathing. He developed generalized muscle spasm and severe body stiffness. He is not able to open his mouth. Ramesh had the history of road traffic accident before 7 days and at that time he did not visit any health facility and managed the injury at home. Except COVID-19 vaccine, Ramesh hasn't taken any vaccine in last 15 years.

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CASE STUDY 4: LEPROSY

Scenario 1: Sushma, a multipurpose health worker of a subcenter in your area informs you that an old woman, on treatment for leprosy, has been abandoned by the family members, and she (health worker), is unable to convince the family members to keep her in the house.

Questions

1. What are the possible reasons?
2. How would you solve the problem?
3. How such incidences can be prevented in future?

Answers

1. Poor awareness about the leprosy in the village.
2. Counseling of family members, peers, etc., personally by medical officer, intervention through local self government officials, administration, police, department of social welfare, etc. and temporary admission at health facility (as feasible) while administering initial therapy.
3. Plan and implements intensive IEC and BCC activities in the area and sensitize stakeholders. Stigma reduction strategy like spreading awareness to remove myths and misconceptions of disease. Intervention should be required at five levels: intrapersonal, interpersonal, community, organization and government level.

Scenario 2: Manoj Kumar, a 18-year-old motor mechanic, reported to the medical officer with complaints of, pain in the right elbow, weakness in right hand and a persisting bend in the little finger, of two months duration. On examination, the medical officer found thickened and tender right ulnar nerve, sensory impairment on ulnar side of right hand and clawing of right little finger. Apart from these signs, there were two big hypopigmented patches with four satellite lesions on right arm. On asking again, Manoj said that he had first noticed the patches one and half year ago, but did not seek any treatment for them.

Questions

1. What is the complete diagnosis? Why?
2. What is the prognosis for the patient?
3. What counseling should the patient and his family, receive?

Answers

1. Diagnosis: PB Leprosy, Neuritis (Rt. Ulnar), Rt. Claw hand, Grade 2 Deformity
2. Good prognosis, less than 6 months duration of neuritis, significant/total reversal can be expected.
3. Counsel about:
   - Potential damage untreated leprosy can cause
   - Leprosy has the potential to cause permanent and irreversible deformity and damage but can be treated with MDT and timely treatment can prevent permanent damage
   - Importance of regular and complete treatment with MDT and steroids
   - Care of insensitive and weak part of the body
   - Procedures of self-care
   - Healthcare workers should be reoriented/ supervised properly about leprosy management

CASE STUDY 5: SCRUB TYPHUS

A 65-year-old male agricultural laborer from Rajasthan was presented to the emergency department with fever of unknown origin, headache and loss of appetite for 4 days. He is not having other symptoms. Two weeks before presentation, he traveled to forest for collecting some plants. Patient took antipyretic medication from local practitioner but didn't help. On physical examination, purple-colored, nonpruritic eruptions were observed on his face, extremities and trunk. Necrotic lesion of the skin at the site of insect bite was observed in the left lower extremity. Tests of malaria and dengue were negative.

Questions

1. What is your probable diagnosis?
2. How will you treat the given disease?
3. What advice can be given to prevent such infection?

Answers

1. Scrub typhus. It is transmitted by trombiculid mite.
2. Doxycycline in a dose of 100 mg twice daily for 7 days. Azithromycin is the drug of choice for the pregnant women and given as 500 mg as single dose for 5 days. while for the children the dose of Azithromycin is 10 mg/kg body weight for 5 days.
3. Firstly, remove the mite infested areas as far as possible. Persons who cannot avoid infested terrain should wear protective clothing, impregnate their clothing and bedding with a miticide (e.g. benzyl benzoate) and apply a mite repellent (diethyltoluamide) to exposed skin. Chemoprophylaxis should also be considered. A single oral dose of chloramphenicol or tetracycline is to be given every 5 days for a total of 35 days, with 5 day non-treatment intervals.

CASE STUDY 6: HIV

A man was working as an electrician in a private company. He was hardworking and dedicated. Due to a health condition, he took leave from work.

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Unfortunately, his blood test confirmed that he had HIV. A few days later he got back to work. The management came to know of his HIV status and terminated him from the job.

Questions

1. In this case scenario, is there any violation of the HIV and AIDS Act? If yes, against which sections of the Act?
2. What is the remedy suggested in the Act?
3. What are the remedial steps you suggest?

Summary Points: It is a violation against one of the three principles mentioned in the HIV and AIDS Act, 2017 is nondiscrimination against people infected with and affected by HIV and AIDS and against the HIV and AIDS Policy for Establishments, 2022. As per the policy, a person should not be discriminated in the establishments on the basis of HIV status. Discrimination here includes the denial of, or termination from, employment and also unfair treatment at establishment. The employer may also provide a reasonable accommodation to the PLHIV if need be. Reasonable accommodation means minor adjustments to a job or work that enables a HIV positive person who is otherwise qualified to enjoy equal benefits or to perform the essential functions of the job or work.

CASE STUDY 7: VACCINE AND FAMILY PLANNING

Scenario 1: Female health worker visited one family in her area. In that family there are four members. Husband, Rakesh is 34-year-old and wife, Seema is 32-year-old. They have two daughters, Meena (4-year-old) and Tina (11-month-old). Upon inquiry FHW found that Tina hasn't received any vaccine yet since birth. This family resides in slum area and they are daily wage workers. FHW also came to know that they are in planning of third child. All these findings reported to you by FHW. Now as medical officer you are supposed to answer the following questions.

Questions

1. What is the type of family based on its composition?
2. What are the two major issues from public health's point of view?
3. What vaccines can be given now to Tina?
4. What is your advice to this family?

Answers

1. Nuclear family
2. Gender preference (male child) and unimmunized child.
3. Vaccines those, Tina can receive are: BCG, Pentavalent, bOPV, IPV, MR, RVV, PCV, JE (where applicable) and Vitamin A on the day of visit then after one month all the due second dose can be given.
4. Advice for Family Planning and Vaccination. Family should understand the importance of having timely vaccination for the prevention of deadly diseases. They should also understand the importance of small family norms and need to opt for permanent sterilization. The gap between two pregnancies should be at least 3 years so in case they are not opting for sterilization then at least they should wait for at least 2 years now onwards as Tina is just 11-month-old. As medical officer you may use the GATHER or Cafeteria approach for better counseling of the couple to take appropriate decision for the family planning.

Scenario 2: Rampratap has recently migrated to city X for the employment purpose. There are two children in the family. Their names and age are as follows: Rahul (2.5-year-old) and Shreya (6-year-old). None of these children ever received any vaccine. Now based on the National Immunization Schedule, what vaccines can be offered to them? Write whole schedule as per the guideline and age appropriate.

Answer

1. Rahul should be administered 3 doses of DPT, 3 doses of bOPV, 2 doses of MR and 2 doses of JE (where applicable) and 2 mL of vitamin A solution. These doses should be given at an interval of 4 weeks. Such a child will not receive BCG, Hepatitis B, Rotavirus, Penta, PCV and IPV. Give booster dose of bOPV/DPT at a minimum of 6 months after administering bOPV 3/ DPT 3.
   Note: If an unvaccinated child is more than 16 months of age remember the interval between MR 1 and MR 2 is 4 weeks and for JE 1 and JE 2 (where applicable) the interval is also 4 weeks.
2. Shreya should be administered DPT 1, 2 and 3 at four weeks intervals. Give booster dose of DPT at a minimum of 6 months after administering DPT 3 up to the age of 7 years.
   Note: In case the child is near to the 7th year, start with DPT. Once this child crosses 7 years, Td vaccine should be used in place of DPT for the remaining doses. Thereafter, this child continues to receive the Td vaccine at 10 years and 16 years as per the NIS.

CASE STUDY 8: ADVERSE EVENT FOLLOWING IMMUNIZATION

Scenario 1: In 1955, after administration of the polio vaccine manufactured by Cutter laboratory in the

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US, 40,000 people developed abortive polio; 200 were permanently paralyzed and 10 died. Investigations revealed that two production pools of 12,000 doses contained live virus. It was identified that the process of inactivation of live virus was defective.

Question

1. What kind of AEFI it is?

Answer

Vaccine quality defect-related reaction

Scenario 2: In 2016, in a hospital in country A, three neonates received BCG vaccine from the same vial. All of them collapsed a few minutes following immunization with BCG and expired in a short while. On investigation, muscle relaxant drugs were found in the refrigerator in which vaccines were also kept. It was concluded on case investigation that the probable cause of collapse of these infants was erroneous use of muscle relaxant drug as a diluent for BCG vaccine.

Question

1. What kind of AEFI it is?

Answer

Immunization error related reaction.

Scenario 3: In 2019, a school-based mass measles-rubella immunization campaign was conducted among 12–19 years old children in country D. On the first day, 44 children were hospitalized with either hyperventilation, vomiting or urticaria. Investigation revealed that two children had generalized urticaria and itching following vaccination. The remaining 42 children had hyperventilation and/or vomiting, suggestive of anxiety reaction. All children were discharged from hospital the same day.

Question

1. What kind of AEFI it is?

Answer

While urticaria in the two children was considered to be vaccine product related reaction, clinical features in other children were considered to be immunization triggered stress response (earlier immunization anxiety-related reactions).

CASE STUDY 9: VITAMIN A DEFICIENCY

Raju is residing in tribal hilly area of Maharashtra. There are two siblings in house. Raju is four years and Jitu is two years old. Raju had the complain of discomfort or pain when exposed to bright light before two months and mother have taken the child to local practitioner in her village. At that time, the Raju was diagnosed with styes and discharged home with warm compress. Currently Raju presents to PHC with the complain of decreased vision during low light. On examination, a small whitish triangular spot is seen on the bulbar conjunctiva of the right eye. Similar kind of presentation but less in severity found in left eye as well. There are no any other complaints. During history it was revealed that there was poor intake of food by Raju.

Questions

1. What could be the probable diagnosis?
2. How will you manage the given condition?
3. How can we prevent given condition in the community?

Answers

1. Vitamin A deficiency (Night blindness)
2. Therapeutic supplementation of vitamin A:
   - Raju must be treated as early as possible with following protocol:
     Administer 2,00,000 IU of vitamin A immediately after diagnosis and to be followed by 2,00,000 IU of vitamin A 1–4 weeks later.
3. There are two ways to prevent vitamin A deficiency in the given family and also in the community. First as vitamin A prophylactic supplementation as shown below and vitamin A rich fruits and vegetables usage in daily diet.
   Prophylactic vitamin A as per the following dosage schedule:
   - 1,00,000 IU at 9 months with MR vaccine
   - 2,00,000 IU at 16–18 months, with DPT booster
   - 2,00,000 IU every 6 months, up to the age of 5 years.
     - » Vitamin A bottle once opened should be consumed within 8 weeks.
     - » Vitamin A also can be supplemented as fortified food.
     - » Breastfeeding protects against vitamin A deficiency as colostrums rich in vitamin A.

CASE STUDY 10: IMNCI

Scenario 1: Mona, 4 weeks' old female has been brought by her mother Bimla due to difficulty in breathing. Mona has current weight of 3.5 kg. Mona's axillary temperature is 34.7°C. Bimla tries several times to put Mona on the breast but Mona did not attach at all. Bimla says that she has had no convulsions. You counted 45 breaths per minute. You observe Mona's breathing, her lower chest wall moves in

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quite severely when Mona breathes in. She does not have skin pustules. The umbilicus is not red or draining pus. When you move Mona's arm to stimulate her movements, Mona drops the arm when you release it. Mona is not having loose motion. Mona has received birth doses of BCG, OPV and Hepatitis-B.

Question 1

Classify Mona's illness as per IMNCI guideline.

Answer

MANAGEMENT OF THE SICK YOUNG INFANT AGE UPTO 2 MONTHS

Name: ____ Age: *4 weeks* Gender: *Female* Weight: *3.5* kg Temperature: *34.7*°C Date: *13/02/23*

ASK: What are the infant's problems? *Not breastfeeding well* Initial visit? ✓ Follow up visit? _____

ASSESS (Circle all signs present)		CLASSIFY
CHECK FOR POSSIBLE SERIOUS BACTERIAL INFECTION/JAUNDICE • Is the infant having difficulty in feeding? • Has the infant had convulsions?	• Count the breaths in one minute 45 breaths per minute Repeat if elevated . Fast breathing? • Look for severe chest indrawing • Measure axillary temperature (if not possible, feel for fever or low body temperature)- Is it < 35.5°C / 37.5 °C or above? • Look at young infant's movements. If infant is sleeping, ask the mother to wake him/her ⇨ Does the infant move only when stimulated but then stops? ⇨ Does the infant not move at all? • Look at the umbilicus. Is it red or draining pus? • Look for skin pustules?	*Possible Serious Bacterial Infection OR Very Severe Disease*
CHECK FOR JAUNDICE • If present - Ask when did jaundice appeared – First 24 hours / After 24 hours	• Look for jaundice (yellow skin) • Is the young infant's palms and soles yellow?	*No Jaundice*
DOES THE YOUNG INFANT HAS DIARRHEA? Yes No ✓	• Look at the young infant's general condition. ⇨ Does the infant move only when stimulated? ⇨ Does the infant not move at all? ⇨ Is the infant restless and irritable? • Look for sunken eyes. • Pinch the skin of the abdomen. Does it go back: ⇨ Very slowly (longer than 2 seconds)? ⇨ Slowly	
THEN CHECK FOR FEEDING PROBLEM & VERY LOW WEIGHT • Is there any difficulty in feeding? **Yes** ✓ **No** • Is the infant breastfed? **Yes** ___ **No** ___ If yes, how many times in 24 hours? ___ times • Does the infant usually receive any other foods or drinks? **Yes** ___ **No** ___ If yes, how many times in 24 hours? ___ If yes, what do you use to feed the infant ___	• Determine weight for age ⇨ Weight for Age (<- 3 SD) ⇨ Weight for Age (<- 2 SD) ⇨ Weight for Age (≥ -2SD) • Look for ulcers or white patches in the mouth (thrush)	
If the infant has any difficulty in feeding, is feeding <8 times in 24 hours, is taking any other food or drinks or is low weight for age (Weight for age <-2SD) , AND has no indications to refer urgently to hospital: ASSESS BREASTFEEDING		
ASSESS BREASTFEEDING: • If infant has not breastfed in the previous hour, ask the mother to put her infant to the breast. Observe the breastfed for 4 minutes.	• To check attachment, look for: ⇨ Chin touching breast Yes___No____ ⇨ Mouth wide open Yes___No____ ⇨ Lower lip turned outward Yes_No____ ⇨ More areola above than below the mouth Yes__No____ • Is the infant able to attach? ⇨ no attachment at all ⇨ not well attached ⇨ good attachment • Is the infant suckling effectively (that is, slow deep sucks, something pausing)? ⇨ not suckling at all ⇨ not suckling effectively ⇨ suckling effectively • Does the mother have pain while breastfeeding? If yes, then look for: ⇨ Flat or inverted nipples or sore nipples ⇨ Engorged breast or breast abscess	
CHECK THE YOUNG INFANT'S IMMUNIZATION STATUS Circle immunization needed today ✓ Birth ✓ BCG ✓ OPV 0 ✓ HEP-B 0 6 weeks Penta-1 OPV-1 Rotavirus-1 fIPV-1 PCV-1		Circle immunization needed today Return for next immunization on: ___(Date)

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Question 2

Identify treatment for Mona with doses of medicines.

Answer

According to IMNCI, Mona's condition classified as pink which requires urgent referral with following prereferral treatment as below:

- Give first dose of intramuscular ampicillin (1 mL) and gentamicin (0.8 mL of strength 20 mg/mL)
- Treat to prevent low blood sugar
- Advise the mother how to keep the infant warm on the way to the hospital
- Refer URGENTLY to hospital

Scenario 2: Jatin is 6 weeks old child with weight of 4.5 kg. His temperature is 37°C. The physician asked "What are the Jatin's problem?" The mother said "Jatin has diarrhea and a skin rash for the last 3 days". This is the initial visit for this illness.

The physician checks the young infant for signs of possible bacterial infection/jaundice. His mother says that Jatin has not had convulsions. The physician counts 55 breaths per minute. He finds no chest indrawing or nasal flaring and irritable. Jatin has no grunting. The fontanelle does not bulge. There is no pus in his ears. The umbilicus is normal. The body temperature is normal. There are 6 skin pustules. Jatin is not lethargic or unconscious, and his movements are normal. He does not have jaundice.

When the physician asks the mother about Jatin's diarrhea, the mother replies that it began 3 days ago, and there is no blood in the stool. Jatin is crying. He stopped once when his mother put him to the breast. He began crying again when she stopped breastfeeding. His eyes look normal, not sunken. When the skin of his abdomen is pinched, it goes back slowly. As treating doctor, you are supposed to know the answers of following questions:

Question 1

Classify correctly the two health problems of Jatin as per IMNCI guideline.

Answer

Name: _____ Age: *6 weeks* Gender: *Male* Weight: *4.5* kg Temperature: *37* °C Date: *10/02/23*

ASK: What are the infant's problems? *Diarrhoea and skin rash* Initial visit? *√* Follow up visit? _____

ASSESS (Circle all signs present)	CLASSIFY
CHECK FOR POSSIBLE SERIOUS BACTERIAL INFECTION • Is the infant having difficulty in feeding? • Has the infant had convulsions? • Count the breaths in one minute 55 breaths per minute Repeat if elevated _____. Fast breathing? • Look for severe chest indrawing • Measure axillary temperature (if not possible, feel for fever or low body temperature)- Is it < 35.5°C / 37.5 °C or above? • Look at young infant's movements. If infant is sleeping, ask the mother to wake him/her ⇨ Does the infant move only when stimulated but then stops? ⇨ Does the infant not move at all? • Look at the umbilicus. Is it red or draining pus? • Look for skin pustules?	*Local Bacterial Infection*
CHECK FOR JAUNDICE • If present - Ask when did jaundice appeared – First 24 hours / After 24 hours • Look for jaundice (yellow skin) • Is the young infant's palms and soles yellow?	*No Jaundice*
DOES THE YOUNG INFANT HAS DIARRHEA? Yes ✓ No ___. • Look at the young infant's general condition. ⇨ Does the infant move only when stimulated? ⇨ Does the infant not move at all? ⇨ Is the infant restless and irritable? • Look for sunken eyes. • Pinch the skin of the abdomen. Does it go back: ⇨ Very slowly (longer than 2 seconds)? ⇨ Slowly	*Some Dehydration*

Question 2

What is the treatment for Jatin's health problems as per the IMNCI guideline?

Answer

- Give oral amoxicillin for 5 days.
- ORS (plan B)

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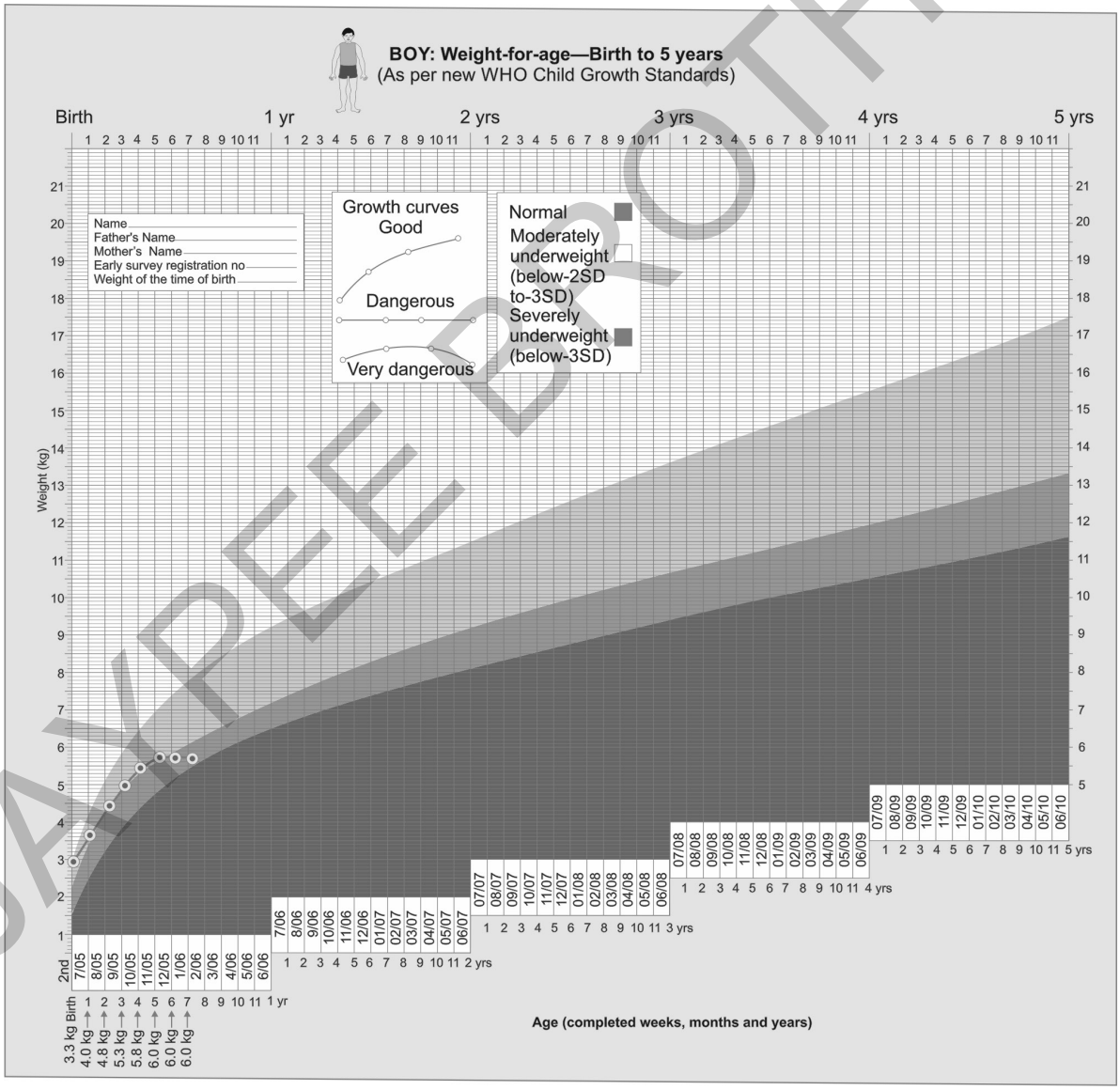
- Treat local infections by applying gentian violet or antibiotic ointments and teach the mother to do it at home.
- Advice for exclusive breastfeeding
- Advise mother when to return immediately and follow up after 2 days.

CASE STUDY 11: GROWTH CHART

Scenario 1: Dharam Pal was the son of Mohinder Singh and Rajwati. They have recently come to the Rampur village. ASHA worker visited them as a part of her routine survey. She asked his birthday to the parents and said he was born on 2nd July 2005. This was also confirmed from the papers of the hospital available. ASHA helped them to enroll Dharam Pal in nearby Anganwadi center where his weight was measured every month. Details of his weight is given below:

- July 2005: 3.3 kg
- August 2005: 4.0 kg
- September 2005: 4.8 kg
- October 2005: 5.3 kg
- November 2005: 5.8 kg
- December 2005: 6.0 kg
- January 2006: 6.0 kg
- February 2006: 6.0 kg

Plot these weights on his growth chart.



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Questions

1. What is the direction of the growth curve from birth until September 2005? What would you tell Dharam Pal's mother during this time?
2. What would you tell Dharam Pal's mother in December 2005?
3. What would you tell Dharam Pal's mother in January 2006?
4. What is Dharam Pal's nutritional grade in February 2006?
5. What would you do and say to Dharam Pal's mother in February 2006?

Answers

1. Upward. It is very good, because it shows that Dharam Pal is gaining weight and is growing. Show her the growth chart and tell her that her child is growing very well: ask her to continue breastfeeding the child, eating and drinking well herself, advice her about vaccines, i.e., BCG, DPT, polio and measles.
2. Show her the growth chart and tell her that her child is growing well; ask if Dharam Pal received vaccines. If not, ask the reasons for not getting immunized. Inform dates and place of vaccination so that they can be given at any early date; Counsel Rajwati about continuing breastfeeding for six months and eating well herself.
3. Show the mother the growth chart and tell her that Dharam Pal has not grown; ask her if she has reduced breastfeeding and has started giving water? If she has started, ask her to continue breastfeeding and give complementary food. Explain complementary food; find out if Dharam Pal had any illness; if child was immunized find out how many doses of immunizations; ask Rajwati to bring child for weighing.
4. He is moderately underweight.
5. Show Rajwati Dharam Pal's growth chart and tell her that he has not grown for 2 months and this has concerned you: visit to her house and see yourself the quantity of food she gives to the child along with breast milk as complementary feeding is essential. He should eat 4–5 times in a day; ask Rajwati to give food before giving breast milk; she can add some oil in the food to increase caloric content; continue breast feeding; ask her to get Dharam Pal weighed next month; if you find that Rajwati is feeding good quantity of food 4–5 times a day and there has been no illness in the child, then you can ask mother to show him to a doctor to find out the reasons for no growth for 2 months.

Scenario 2: A boy child named Sam who is 96.1 cm tall and 2 years and 4 months old. The median height of all boys measured who are Sam's age (2 years and 4 months) is 90.4 cm. The z-score of the reference population (an average of differences from the median for each member of the reference population) is 3.3.

Questions

1. Calculate Z score for height for age.
2. Plot the given parameters on the growth chart for height for age (boys)
3. Interpret both findings.

Answer

1. Calculation of Z-score (Height-for-Age)

$$Z = \frac{\text{Observed value} - \text{Median of reference}}{\text{Standard deviation}}$$

$$= \frac{96.1 - 90.4}{3.3}$$

$$= \frac{5.7}{3.3}$$

$$= +1.73$$

2. Plotting on growth chart (Height-for-Age, Boys)
   - X-axis: Age
   - Y-axis: Height
   - Median (reference): 90.4 cm
   - Sam's height: 96.1 cm

   On the WHO height-for-age growth chart for boys:
   - Sam's point lies above the median
   - Between +1 SD and +2 SD lines
3. Interpretation
   - Sam is taller than average for his age
   - He is not stunted
   - Height is well within normal limits

CASE STUDY 12: ADOLESCENT

Scenario 1: Raju is 14-year-old and lives in a village. Every morning he goes barefoot to the fields to defecate. He has upset stomach most of the times and passes loose motions. He dislikes vegetables, dal, etc. He also likes to eat chat/pakori sold in the market. He is feeling very weak and low for the last 15 days. His mother brings Raju to your health facility.

Questions

1. What do you think what has happened to Raju?
2. How will you treat him?
3. What advices can be given?

Answers

1. Anemia (soil transmitted helminths) and malnutrition (due to lack of vegetables, milk and pulses in daily diet).
2. IFA (60 mg iron and 500 μg folic acid) tablet to be given two times a day for the treatment of anemia. Biannual

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deworming to be done by giving albendazole (400 mg) tablet.
3. Advices related to use of sanitary latrine, use of footwear while going outside the house, hand hygiene to be given to prevent the infestation of soil transmitted helminths. Advices to the mother regarding diet rich in iron, calorie and protein to be given. Raju should be counselled to stop eating unhygienic street food.

Scenario 2: Sheela is a 15-year-old girl. Her family comprises of her parents, two brothers and a younger sister. Sheela goes to school and also helps her mother with all the household work. Her daily diet is made up of rice and watery dal twice a day. Vegetables are cooked once a while. As per the social custom in her family, Sheela and her sister eat after her father and brothers have eaten. Two months back, she suffered from malaria and since then has been feeling very weak and is always exhausted. She was brought to the PHC after she fainted on her way to school one day.

Questions

1. What do you think what has happened to Sheela?
2. How can her condition affect her future?
3. How can you help Sheela?

Answers

1. Sheela might be suffering from nutritional anemia due to lack of intake of healthy food and recent episode of malaria also might aggravated the underlying anemia.
2. Her current condition can affect her overall growth and development. It can affect her day-to-day life related task and education as well. If she doesn't get treated well now then upon her marriage, she will be underweight pregnant women and will give child with low birth weight and thus situation may go in generations.
3. IFA (60 mg iron and 500 µg folic acid) tablet to be given two times a day for the treatment of anemia. Along with that family should be counselled to ensure gender equality in every aspect right from food to all facilities. Sheela should receive adequate amount of vegetables, fruits and other nutrients rather than eating the monotonous food.

CASE STUDY 13: MEDICAL CERTIFICATION OF CAUSE OF DEATH (MCCD)

Scenario 1: A 67-year-old man admitted to the hospital with 6-day history of shortness of breath and dry cough. He felt "hot" and had night sweats. He has a past medical history of hypertension (10 years) and chronic renal insufficiency (6 years). The patient recently travelled from Pune to Mumbai two weeks ago when Mumbai was experiencing increases in COVID cases and deaths. The travel was necessary to see a specialist for Acute Myelogenous Leukemia (AML) diagnosed only 1 month ago.

The patient was admitted to the hospital with a fever of 103°C and transported to the medical unit. Chest X-ray indicated a bilateral pneumonia. He underwent a nasopharyngeal swab for COVID-19. The patient became worse overnight and required intubation. He spent 20 hours on the ventilator prior to death. The COVID-19 nasopharyngeal swab returned positive.

Question

1. How would you complete the MCCD form for this case?

Answer

CAUSE OF DEATH		Interval between onset and death approx.
I Immediate cause State the disease, injury or complication which caused death, not the mode of dying such as heart failure, asthenia, etc.	(a) ACUTE RESPIRATORY DISTRESS SYNDROME due to (or as a consequences of)	1 DAY
Antecedent cause Morbid conditions, if any, giving rise to the above cause, stating underlying conditions last	(b) PNEUMONIA due to (or as a consequences of)	1 DAY
	(c) COVID-19 CONFIRMED ACUTE MYELOGENOUS LEUKEMIA (AML – 1 month) HYPERTENSION (10 years) CHRONIC RENAL INSUFFIENCY (6 years)	7 DAYS
II Other significant conditions contributing to the death but not related to the disease or condition causing it		

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In this case, the immediate cause of death is Acute Respiratory Distress Syndrome with a time interval onset of 1 day prior to death. Acute respiratory distress syndrome was due to pneumonia with a time interval onset of 1 day prior to death. Pneumonia was due to confirmed COVID-19 with a time interval onset of 7 days prior to death. Confirmed COVID-19 is the underlying cause of death in this case and written on the lowest line used-line C.

The decedent has a 10-year history of hypertension and 1 month history of acute myelogenous leukemia which contributed to the death but was not a part of the causal sequence. Therefore, it is reported in part 2.

Scenario 2: 22-year-old female admitted to the hospital in unconscious stage and had history of vomiting. Patient was in shock and had systolic blood pressure 80 mm of Hg. She had H/o consumption of organophosphorus compound 6 hours back with intention of self harm showing pin point pupils, fasciculations. After 2 hours patient developed respiratory paralysis and pulmonary oedema. Patient was resuscitated but died 4 hours after admission. Body sent for autopsy.

Question

1. How would you complete the MCCD form for this case?

Answer

Incorrect Cause of Death

CAUSE OF DEATH		Interval between onset and death approx.
I		
Immediate cause State the disease, injury or complication which caused death, not the mode of dying such as heart failure, asthenia, etc.	(a) ***PM done*** Due to (or as a consequences of)	
Antecedent cause Morbid conditions, if any, giving rise to the above cause, stating underlying condition last	(b) _____ Due to (or as a consequences of) (c) _____	
II		
Other significant conditions contributing to the death but not related to the disease or conditions causing it	***Nil***	

Manner of Death –

1 Natural 2 Accident 3 Suicide 4 Homicide 5 Pending Investigation

Correct Cause of Death

CAUSE OF DEATH		Interval between onset and death approx.
I		
Immediate cause State the disease, injury or complication which caused death, not the mode of dying such as heart failure, asthenia, etc.	(a) ***Respiratory paralysis with pulmonary oedema*** Due to (or as a consequences of)	***2 hours***
Antecedent cause Morbid conditions, if any, giving rise to the above cause, stating underlying condition last	(b) **Poisoning by *consumption of organophosphorus compound*** Due to (or as a consequences of) (c) ***Intentional self-poisoning by pesticide (organophosphorous comp.)***	***8 hours***
II		
Other significant conditions contributing to the death but not related to the disease or conditions causing it	Nil	

Manner of Death –

1 Natural 2 Accident (3 Suicide) 4 Homicide 5 Pending Investigation

Scenario 3: 70-year-old female was admitted to the hospital for fracture neck femur 6 hours back due to fall in a bathroom. She was known diabetic for 10 years and hypertensive for 15 years. Open reduction of the fracture was advised but operative was delayed for fitness, as BSL was not within normal limits. On 6th day patient deteriorated becoming severe breathless and had sudden collapse showing signs of pulmonary embolism. Patient died after 5 hours.

Question

1. How would you complete the MCCD form for this case?

Answer

Incorrect Cause of Death

CAUSE OF DEATH		Interval between onset and death approx.
I		
Immediate cause State the disease, injury or complication which caused death, not the mode of dying such as heart failure, asthenia, etc.	(a) ***Fracture neck femur by fall*** Due to (or as a consequences of)	
Antecedent cause Morbid conditions, if any, giving rise to The above cause, stating underlying Condition last	(b) ***Pulmonary embolism*** Due to (or as a consequences of) (c) ***Diabetes mellitus and hypertension*** (d) ***H/o fall in bathroom***	
II		
Other significant conditions contributing To the death but not related to the disease Or conditions causing it	***Nil***	

Manner of Death –

1 Natural 2 Accident 3 Suicide 4 Homicide 5 Pending Investigation

Correct Cause of Death

CAUSE OF DEATH		Interval between onset and death approx.
I		
Immediate cause State the disease, injury or complication which caused death, not the mode of dying such as heart failure, asthenia, etc.	(a) ***Pulmonary embolism*** Due to (or as a consequences of)	***1 day*** ***2 days***
Antecedent cause Morbid conditions, if any, giving rise to the above cause, stating underlying condition last	(b) ***Fracture neck femur*** Due to (or as a consequences of) **(c) *Fall in bathroom***	***9 days back***
II		
Other significant conditions contributing to the death but not related to the disease or conditions causing it	***Diabetes mellitus and hypertension***	***10 yrs 15 yrs***

Manner of Death –

1 Natural (2 Accident) 3 Suicide 4 Homicide 5 Pending Investigation

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Scenario 4: A deceased male aged 64 years is found with a self-inflicted gunshot wound to the head made by a handgun. He was located at home and had a treatment history of depression and a history of adverse life events, including the recent death of his spouse and financial debt.

Answer

Part I:

a. Intracranial hemorrhage
b. Catastrophic temporal injury
c. Intentional self-inflicted gunshot (handgun) wound to the head

Part II: Depressive disorder and psychosocial stressors (recent bereavement and financial debt)

Manner of Death: Suicide

CASE STUDY 14: PARTOGRAPH

Radha (wife of Gangaram), 26 years of age, third gravida, was admitted in health center at 5:00 AM on 11 June 2009 with the complaint of labor pains since 2:00 AM. Membranes had ruptured at 4:00 AM. She has two children of the ages of 5 and 2 years. On admission, her cervix was 2 cm dilated.

Question

1. Plot the following findings on the partograph:

- **At 09:00 AM:**
  - The cervix is dilated 5 cm.
  - She had 3 contractions in 10 minutes, each lasting 20–40 seconds.
  - The FHR is 120 beats per minute.
  - The membranes have ruptured and the amniotic fluid is clear.
  - Her BP is 120/70 mmHg.
  - Her temperature is 36.8°C.
  - Her pulse is 80 per minute.
- **9:30 AM:** FHR 120, contractions 3/10 each 30 seconds, pulse 80/minute, amniotic fluid clear
- **10:00 AM:** FHR 136, contractions 3/10 each 35 seconds, pulse 80/minute, amniotic fluid clear
- **10:30 AM:** FHR 140, contractions 3/10 each 40 seconds, pulse 88/minute, amniotic fluid clear
- **11:00 AM:** FHR 130, contractions 3/10 each 40 seconds, pulse 88/minute, amniotic fluid clear
- **11:30 AM:** FHR 136, contractions 4/10 each 45 seconds, pulse 84/minute, amniotic fluid clear
- **12:00 noon:** FHR 140, contractions 4/10 each 45 seconds, pulse 88/minute, amniotic fluid clear
- **12:30 PM:** FHR 130, contractions 4/10 each 50 seconds, pulse 88/minute, amniotic fluid clear
- **1:00 PM:** FHR 140, contractions 4/10 each 55 seconds, pulse 90/minute, temperature 37°C, BP 100/70, amniotic fluid clear
- **At 1:00 PM:**
  - Cervix fully dilated
  - Amniotic fluid clear and BP 100/70 mmHg
- **1:20 PM:** Spontaneous birth of a live female infant weighing 2.85 kg.

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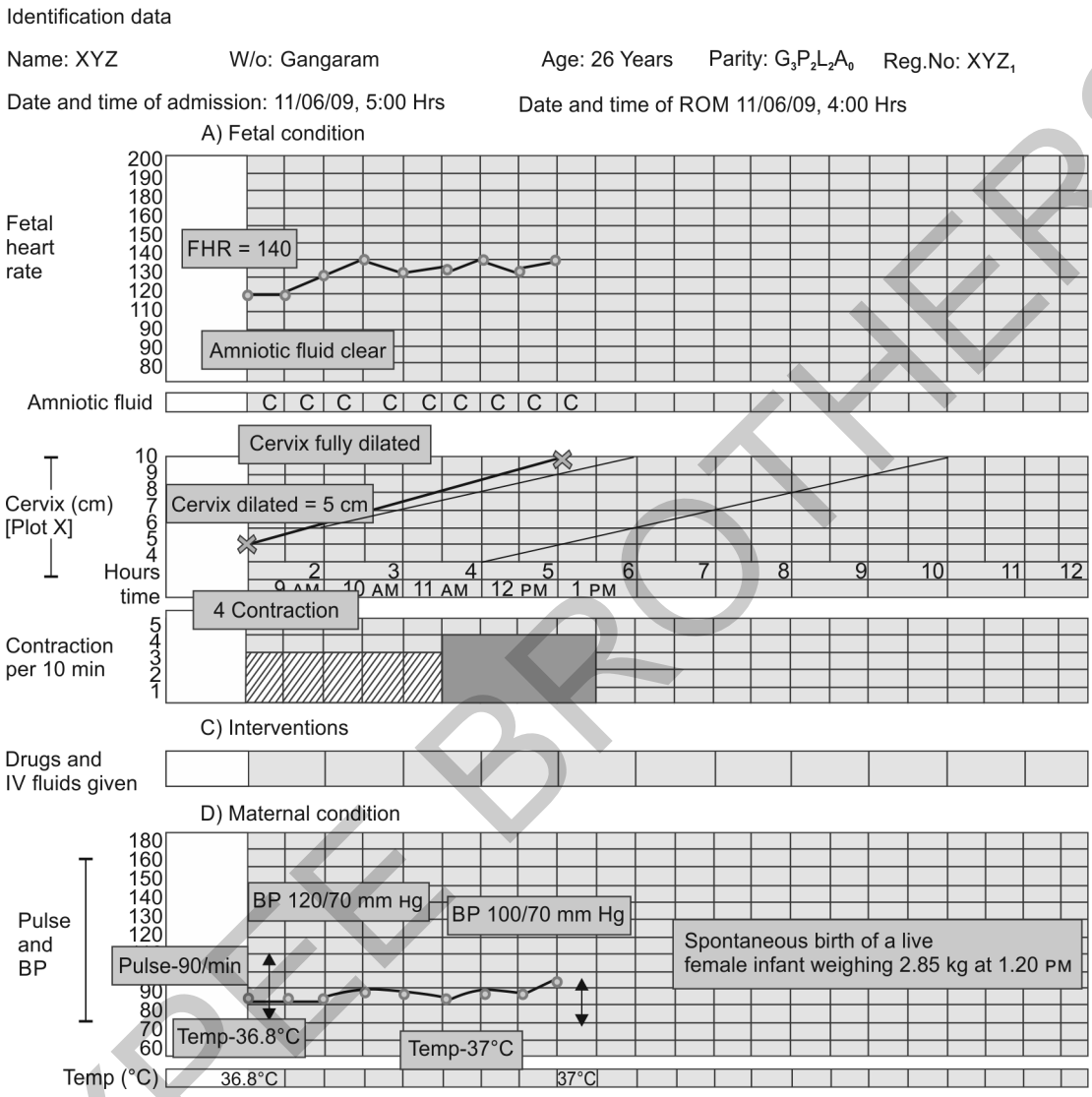
Answer

The simplified partograph



CASE STUDY 15: INVENTORY CONTROL

ABC-VED Matrix Table based on the number of drugs:

	V	E	D
A	3	34	10
B	2	38	33
C	19	88	98

Based on above table answer the following questions:

1. What do you understand by the ABC-VED matrix ?
2. Based on the given data how many drugs will be in the Category (class) 1, Category (class) 2 and Category (class) 3?

Answers

1. Always Better Control (ABC) analysis allow management to decide which items require most efforts and Vital Essential Desirable (VED) analysis based on criticality.
2. ❑ Category or Class 1: Total 68 drugs
   ❑ Category or Class 2: Total 159 drugs
   ❑ Category or Class 3: Total 98 drugs

The above case study can be understood better with help from the Chapters 13.6.

CASE STUDY 16: COMMUNICATION BARRIERS

There are two different situations which are commonly encountered by the grassroot healthcare workers

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particularly ASHA. So go through them and fine what are the possible barriers and the suggestive measures to overcome them.

Situation 1: Mira is a 19-year-old, who lives in a hamlet of about six households, which is 2 km away from the main village where ASHA lives. The tradition among these families is that for generations, women deliver in the home with the help of a dai or older women in the family. ASHA has come to know that Mira is pregnant. ASHA asks her son or husband to take her there by cycle so that she can tell her about the Janani Suraksha Yojana and the importance of hospital delivery for her and her baby's health. Even after she spend time explaining this, the older women are not convinced. This does take a lot of her energy and is time consuming. In the part of the village where ASHA lives there are three other pregnant women who ASHA has already motivated to go the health facility for delivery. They are ready to go and have promised to call ASHA when they need to go to the hospital. ASHA decides that Mira's family is not going to listen, and therefore she does not visit the hamlet again. Mira is the pregnant woman that will deliver at home, and if something should go wrong, will not likely seek care at the institution.

Situation 2: Consider for example ASHA's task of mobilizing children for the Village Health and Nutrition Day. As ASHA she come across the following situations:

- Shaila is the mother of two young children. The older one is three years old and the younger one is seven months old. Shaila is a daily wage laborer and the only adult earning member of the house. Bringing the child to the ANM for immunization means the loss of a day's wages.
- Munni is a young woman with a baby of five months. She has had an argument with the ANM when she last brought her baby to the VHND and has declared that she will not go there again.
- There are some more families who do not bring their children for immunization, because they may have actually experienced or heard of a case where the child developed fever after the vaccination, and think that all vaccines can cause sickness instead of preventing it.
- In all these cases the children of such families are deprived of vaccines, and are at higher risk of illness and death since these children also are malnourished and less likely to be taken to a health center for treatment.

Answer

There is strategy called The *EIGHT FOLD Path* which can help to overcome these barriers. The details of the strategy as follows:

1. **Mapping:** All grassroot health workers including ASHA must first of all map those households and families which are marginalized, where they know that such families do not access health services readily. Identify those habitations and households among whom social exclusion and lower health service use is concentrated.
2. **Prioritizing:** All grassroot health workers including ASHA must then prioritise home visits to such families. Ensure that they spend time in understanding specific constraints and help them to access healthcare services, especially for mothers and children.
3. **Communicating:** All grassroot health workers including ASHA should inform them about why these services are needed, where they are available, and what their health entitlements are.
4. **Understanding:** Often people have rational reasons and legitimate concerns for why they are not able to use health services. All grassroot health workers including ASHA should not assume that their attitudes are bad. They may have to explore options for changing the way existing services are being provided. For instance, in some cases the ANM will need to make a home visit to provide Antenatal and postnatal care, and immunization or the Anganwadi worker or her helper will have to deliver the take home rations to the household. Or it need to ensure that the medical mobile unit specifically visits hamlets and habitations rather than the main roadside village.
5. **Counseling:** All grass root health workers including ASHA must use the counseling skills in which they have been trained in Modules 5, 6 and 7. Listen to people's problems, build a relationship of trust, and work with them to find solutions. They could accompany them to the VHND or the health facility so that they feel comfortable and confident about accessing them on their own in the future.
6. **Persisting:** Changing behaviors is not very easy to do, especially among poor and marginalized families, who may not perceive the immediate gains or for whom there are other more important priorities. It needs repeated visits and counseling. Keep in mind that once the families overcome their reluctance to adopt preventive and promotive health behaviors and begin to access health services, the need for frequent visits will reduce.
7. **Coordinating:** It is quite likely that there still remain families, who despite persistent efforts will not access services. All grass root health workers including ASHA can ask members of the Village Health, Sanitation and Nutrition Committee, or request Facilitator or the ANM, who may be in a position to influence these families, to accompany on a home visit.

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