Epidemiological Exercises

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Case Management

Q1

A 20 year old patient comes to you with H/O high fever since 4 days. Severe headache, backache, joint pain, pain behind eyes & Bleeding from gums & nose. O/E his temperature is 103 F, RR = 34/min. Pulse =94/min, severe sweating, Nutritional Status appears normal, the patient is alert. Evaluate the case.

Q1 Answer

Clinical diagnosis: Suspect **Dengue Hemorrhagic Fever (DHF)**.

Symptoms: High fever (103°F), retro-orbital pain, joint pain, bleeding gums/nose.

Investigations: CBC (platelets <100,000/mm^3), hematocrit (>20% rise), NS1 antigen (day 1–5).

Monitor vitals 4-hourly; check BP for narrow pulse pressure (<20 mmHg).

Admit patient for close observation. Give oral fluids 60–80 ml/kg/day if tolerating orally.

If warning signs: IV crystalloids 5–7 ml/kg/hr initially.

Avoid NSAIDs and IM injections; use paracetamol 15 mg/kg/dose.

Platelet transfusion only if <10,000/mm^3 or active bleeding.

Notify health authorities and initiate vector control measures.

Program related to case = National Vector Born disease program

Q2

A 62-year-old male farmer was brought to the emergency unit in May afternoon after working in the field for 5 hours in 44°C temperature.

He had headache, dizziness, and vomiting followed by confusion and collapse.

On examination: Temperature = 41.5°C, Pulse = 128/min, BP = 90/60 mmHg, RR = 30/min.

Skin is hot and dry. He is disoriented and not responding appropriately.

No history of infection or chronic illness. What is the most likely diagnosis? Outline immediate management steps.

Q2 Answer

Diagnosis: **Classical Heat Stroke** (core temperature >40°C with CNS dysfunction).

Shift to shaded/cool environment immediately.

Start rapid cooling: remove clothes and spray tepid water with fan.

Apply ice packs to neck, axilla, and groin.

Target temperature reduction to <38.5°C within 30–60 minutes.

Start IV normal saline 20 ml/kg for hypotension.

Monitor vitals every 10 minutes.

Check electrolytes, renal function, CPK.

Avoid antipyretics (ineffective).

Educate on hydration: at least 250–500 ml water every 30 minutes during heat exposure.

Q3

Kusma, 4 years old child belonging to upper class family was brought to casualty by her mother with history of dog – bite 2 hrs. Before. Examination revealed a lacerated wound measuring 5x 1/2x1 cm, on the rt. Fore – arm. Write about Wound Management?

Q3 Answer

Immediate washing with soap and running water for **15 minutes**. Apply povidone iodine or 70% alcohol after washing. Do not suture immediately (delay primary closure if needed).

Rabies exposure wound categories: Category I (touching/feeding animals, intact skin), Category II (minor scratches/abrasions without bleeding), Category III (single/multiple transdermal bites, lacerations, mucosal contamination). Classify exposure: Category III (lacerated wound).

Give Rabies Immunoglobulin (RIG) **20 IU/kg (HRIG)** infiltrated locally.

Start Anti-rabies vaccine (Essen regimen) on days 0,3,7,14,28.

Give Tetanus toxoid 0.5 ml IM.

Start antibiotics (Amoxicillin-clavulanate 40 mg/kg/day).

Observe dog for 10 days if available.

Counsel regarding completion of full vaccine schedule.

Q4

A Patient with high fever & chills was admitted in a hospital. Blood smear examination showed infection with P. falciparum. How will you manage the case?

Q4 Answer

Confirm by peripheral smear/RDT.

Start Artesunate Combination Therapy (Artemether-Lumefantrine 6-dose regimen).

Dose as per body weight.

Give single dose Primaquine 0.75 mg/kg (if not G6PD deficient).

If severe → IV Artesunate 2.4 mg/kg at 0,12,24 hrs.

Then daily till oral tolerated.

Manage fever with Paracetamol 15 mg/kg.

Monitor Hb, glucose, renal function.

Treat complications (anaemia, hypoglycaemia).

Notify under NVBDCP.

Q5

A 12-year-old child presents with fever, joint pain, and history of sore throat 3 weeks back. On examination, migratory polyarthritis and a cardiac murmur are present. Identify the case and outline management as per public health guidelines.

Q5 Answer

Suspect **Acute Rheumatic Fever (ARF)** following untreated streptococcal pharyngitis.

Diagnose using **Revised Jones Criteria** (2 major or 1 major + 2 minor + evidence of strep infection).

Major criteria: carditis, polyarthritis, chorea, erythema marginatum, subcutaneous nodules.

Confirm strep infection by ASO titre >200 Todd units or throat culture.

Start **Benzathine Penicillin G** single IM dose (0.6 million units <27 kg; 1.2 million units ≥27 kg).

Give Aspirin 60–80 mg/kg/day in divided doses for arthritis.

If severe carditis → Prednisolone 1–2 mg/kg/day tapered over 2–3 weeks.

Advise bed rest until ESR/CRP normal.

Secondary prophylaxis: Benzathine penicillin 1.2 million units IM every 3 weeks.

Duration: 5 years or till 21 years (longer if carditis present); register and follow up regularly.

Q6

Smt. Padmamma, 45 years old uneducated coolie was admitted to female tuberculosis ward with history of massive hemoptysis & progressive dyspnea 6 days back. She was found to be sputum positive case of tuberculosis. Write Management of the case?

Q6 Answer

Baseline tests: CBNAAT, HIV testing, blood sugar, LFT as per NTEP protocol. Notify case on Ni-kshay portal and classify as microbiologically confirmed pulmonary TB under National Tuberculosis Elimination Program.

Start daily FDC regimen: Intensive phase (8 weeks) HRZE, followed by Continuation phase (16 weeks) HRE as per weight band.

Ensure Directly Observed Treatment (DOT) through treatment supporter (ASHA/health worker).

Provide Nikshay Poshan Yojana benefit ₹500 per month for nutritional support.

Counsel for adherence; minimum treatment duration 6 months (extend if indicated).

Follow-up sputum examination at end of IP (2 months) and end of treatment.

Advise cough hygiene: cover mouth with tissue/elbow, avoid spitting, dispose sputum safely.

Nutrition advice: 1.2–1.5 g protein/kg/day; 30–35 kcal/kg/day; include pulses, eggs, milk, groundnuts.

Screen household contacts and provide TB preventive therapy where eligible.

Investigation of Epidemic

Q7

Cases of acute diarrhoeal diseases / Cholera have occurred in a P.H.C. As a Medical Officer In charge, how will you investigate the outbreak?

Q7 Answer

Confirm diagnosis clinically (rice-water stools, dehydration) and by stool culture for *Vibrio cholerae*.

Verify existence of outbreak by comparing with previous baseline data.

Define a standard case definition (suspected and confirmed case).

Conduct active case search (house visits, hospital records).

Describe by time (epidemic curve), place (spot map), and person (age/sex).

Calculate attack rate and case fatality rate.

Develop hypothesis regarding source (water/food contamination).

Collect and test water samples; check residual chlorine level (≥0.5 mg/L).

Start immediate control: ORS 75 ml/kg in 4 hrs, IV RL 100 ml/kg in severe cases, doxycycline 300 mg single dose (adult).

Implement sanitation, chlorination, health education, and continue surveillance for 10 days.

Q8

78 people, out of 122 participating in a marriage feast, started suffering from vomiting and diarrhea. Describe how you will systematically investigate the outbreak?

Q8 Answer

Confirm diagnosis clinically (acute vomiting & diarrhea) and by stool examination/food sample culture.

Confirm outbreak: Attack rate = 78/122 ×100 = 63.9%, indicates common exposure.

This is a **Point Source (Common Source) Epidemic** due to single contaminated food item.

Develop a **case definition** and prepare line listing of all attendees.

Draw **epidemic curve** to confirm sharp single peak pattern.

Conduct **retrospective cohort study** to identify specific food responsible (food-specific attack rates).

Collect leftover food and water samples for laboratory analysis.

Inspect kitchen hygiene, food handling and storage practices.

Implement control: safe disposal of contaminated food, ORS 75 ml/kg in 4 hrs, hygiene education.

Submit outbreak report and recommend food safety measures.

Epidemiological Calculations

Q9

A circular well of 10 meter diameter with 15 meter depth of water is to be chlorinated. Horrock's test shows blue color in 3rd cup onwards. Calculate the quantity of bleaching powder ($CaOCl_2$) required to disinfect the well.

Explain the procedure of well disinfection.

Q9 Answer

Diameter = 10 m → Radius = 5 m; Depth of water = 15 m.

Volume of water = $\pi r^2 h = 3.14 \times 5^2 \times 15 = 1177.5\ m^3$.

In Liters: 1177.5 × 1000 = **1,177,500 L**.

Horrock's test shows blue in 3rd cup → 6 g bleaching powder per 455 L.

Number of 455 L units = 1,177,500 / 455 = 2587.91

Required bleaching powder = 2587.9 × 6 = 15.527 g ≈ 16 kg.

Make slurry of 16 kg bleaching powder with water and allow sedimentation.

Pour clear solution into the well and mix thoroughly by bucket method.

Keep contact period for at least 1 hour.

Ensure residual chlorine of **0.5 mg/L after 30 minutes** by Ortho Toluidine test.

Q10

As a Medical Officer In charge of a PHC CATERING TO A POPULATION OF 1 lakh you are responsible for providing 100% immunization. It is estimated that there will be 3,200 pregnant women & 3,000 infants in your area, calculate the vaccine doses requirement according to the number of expected beneficiaries for 1 year.

Q10 Answer

Pregnant women = 3200 → Td doses = 2 per woman.

Total Td doses = 6400 + 10% wastage = 7040.

Infants = 3000. BCG Vaccine = 3000 + 10% wastage = 3300 doses.

Hep B vaccine birth dose = 3000 +10% wastage = 3300 doses

Oral Polio Vaccine (3 doses) = 9000 + 25% wastage = 11250 doses

Pentavalent (3 doses) = 9000 + 10% wastage = 9900 doses

Fractional Inactivated Polio Vaccine(2 doses) = 6000 + 10% wastage = 6600 doses

Rota virus vaccine (2 doses) = 6000 + 10% wastage = 6600 doses

Pneumococcal conjugate vaccine (2 doses) = 6000 + 10% wastage = 6600 doses

Measles Rubella Vaccine = 3000 + 10% wastage = 3300 doses

Q11

Define ‘Incidence rate’. There were 50 cholera cases in a village with 8000 population in June 1988. 30 cases in July 1988 and 10 cases in August 1988. Calculate the incidence rates for each month and prevalence rate for the village. Give preventive and control measures.

Q11 Answer

Incidence rate = New cases ×1000 / Population

June = 50 ×1000/8000 = 6.25/1000

July = 30 ×1000/8000 = 3.75/1000

Aug = 10 ×1000/8000 = 1.25/1000

Total cases = 90

Prevalence = Total cases ×1000/ Population = 90 ×1000/8000 = 11.25/1000

Improve water chlorination 0.5 mg/L, Sanitation improvement

ORS distribution, Health education

Q12

An outbreak of cholera occurred in a village in a population of 1000. 250cases of cholera were detected of which there were 10deaths. Calculate Attack rate, case facility rate of cholera.

Q12 Answer

Population = 1000

Cases = 250

Deaths = 10

Attack rate = Cases * 100 / Population = 250×100/1000 = 25%

CFR = Deaths * 100 / Cases = 10×100/250 = 4%

High attack rate

Moderate fatality

Improve rehydration therapy

Ensure IV fluids 100 ml/kg

Strengthen surveillance

Q13

A case of measles was reported from a family consisting of 6 members (2 parents and 4 susceptible children), within a period of 5 days, 2 other children developed the disease. Calculate the secondary attack rate.

Q13 Answer

Total family members = 6

Primary case = 1

Susceptible contacts = 4 children

Secondary cases = 2

Formula: Secondary attack rate = (Secondary cases / Susceptible contacts) ×100

= (2 / 4) ×100

= 50%

Indicates high infectivity

Measles incubation period ≈ 10 days

Secondary attack rate = 50%

Thank you…