

COMMUNICABLE DISEASE TOOLKIT

SUDAN



World Health Organization

*Communicable Disease Working Group on Emergencies, WHO/HQ
WHO Regional Office for the Eastern Mediterranean (EMRO)
WHO Country Office, Khartoum*

COMMUNICABLE DISEASE TOOLKIT

SUDAN

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Further information is available at: CDS Information Resource Centre, World Health Organization, 1211 Geneva 27, Switzerland; fax: (+41) 22 791 4285, e-mail: [cgsdocs@who.int](mailto:cdsdocs@who.int)

PREFACE

The purpose of this *Communicable Disease Toolkit for Sudan* is to provide health professionals in United Nations agencies, nongovernmental organizations, donor agencies and local authorities working in Sudan with up-to-date guidelines and standards for controlling communicable diseases.

The *Communicable Disease Profile for Sudan* aims to provide up-to-date information on the major communicable disease threats faced by the population. The list of endemic and epidemic-prone diseases has been selected on the basis of the burden of morbidity and mortality, and includes acute lower respiratory tract infections, African trypanosomiasis, bacillary dysentery, cholera, HIV/AIDS, malaria, measles, tuberculosis and yellow fever. Diseases for which there are global eradication or elimination goals are also included. The document outlines the burden of communicable diseases in Sudan for which data are available, provides data on recent outbreaks in the country and presents disease-specific guidelines on the prevention and control of these diseases.

The *Health surveillance forms* and *Case definitions* have been developed to provide early warning of epidemics, but will also monitor acute lower respiratory tract infections, sexually transmitted infections, injuries/trauma and malnutrition.

The *Guidelines for outbreak control*, *Case management of epidemic-prone diseases*, *Guidelines for collection of specimens for laboratory testing* and *Outbreak investigation kit* are aimed at facilitating outbreak preparedness and response.

The control of communicable diseases represents a major challenge to those providing health care services in Sudan and neighbouring countries. It is hoped that the *Communicable Disease Toolkit for Sudan* will facilitate the coordination of communicable disease control activities among all agencies working in this region.

ACKNOWLEDGEMENTS

Edited by Dr Michelle Gayer, Dr Pamela Mbabazi, Dr Máire Connolly and Dr Albis Gabrielli of the Programme on Communicable Diseases in Complex Emergencies, WHO/CDS.

This Toolkit is a collaboration between the Communicable Disease Working Group on Emergencies (CD-WGE) at WHO/HQ, the Division of Communicable Disease Prevention and Control (DCD) at WHO/EMRO and the Office of the WHO Representative for Sudan. The CD-WGE provides technical and operational support on communicable disease issues to WHO Regional and Country Offices, ministries of health, other United Nations agencies, and nongovernmental and international organizations. This Working Group includes the Departments of Control, Prevention and Eradication (CPE), Surveillance and Response (CSR) in Communicable diseases (CDS), Roll Back Malaria (RBM), Stop TB (STB) and HIV/AIDS (HIV) in HTM; and the Departments of Child and Adolescent Health and Development (CAH), Immunization, Vaccines and Biologicals (IVB) and Health and Action in Crisis (HAC).

The following individuals at WHO/HQ, EMRO and the WHO Country Office in Khartoum contributed to the development of this document, and their technical input is gratefully acknowledged:

Dr Samira Aboubaker (FCH/CAH), Dr Roberta Andraghetti (CDS/CSR), Dr Hoda Atta (EMRO/DCD), Dr Samiha Baghdadi (EMRO/DCD), Dr Andrew Ball (FCH/HIV), Ms Rachel Bauquerez (CDS/CSR), Dr Claudio Beltramello (CDS/CPE), Dr Eric Bertherat (CDS/CSR), Dr Julian Bilous (HTP/IVB), Dr Sylvie Briand (CDS/CSR), Dr Philippe Calain (CDS/CPE), Dr Claire-Lise Chaignat (CDS/CPE), Dr Kabir Cham (HTM/RBM), Ms Claire Chauvin (HTP/IVB), Dr Ottorino Cosivi (CDS/CSR), Dr Denis Coulombier (CDS/CSR), Dr Philippe Desjeux (CDS/CPE), Dr Dirk Engels (CDS/CPE), Dr Suzanne Farhoud (EMRO/DHP), Dr Pierre Formenty (CDS/CSR), Dr Malgosia Grzemska (CDS/STB), Dr Zoheir Hallaj (EMRO/DCD), Dr Bradley Hersh (HTP/IVB), Prof Martin Hugh-Jones (WHO Collaborating Centre for Remote Sensing and Geographic Information Systems for Public Health, Louisiana State University, USA), Dr Yvan Hutin (HTP/BCT), Dr Frédérique Marodon (CDS/CPE), Mrs Gill Mayers (HTP/VAB), Dr François-Xavier Meslin (CDS/CPE), Dr Abraham Mnzava (EMRO/DCD), Dr Ezzeddine Mohsni (EMRO/DCD), Dr Antonio Montresor (CDS/CPE), Mr Altaf Musani (EMRO/EHA), Ms Kathy O'Neill (CDS/CSR), Dr Salah-Eddine Ottmani (HTM/STB), Dr Brian Pazvakavambwa (FCH/HIV), Dr William Perea (CDS/CSR), Dr Sergio Pièche (EMRO/DHP), Ms Claire Preaud (CDS/CSR), Dr Aafje Rietveld (HTM/RBM), Dr Mike Ryan (CDS/CSR), Dr Guido Sabatinelli (WHO/Khartoum), Dr Maria Santamaria (CDS/CSR), Dr Lorenzo Savioli (CDS/CPE), Dr Khalid Shibib (SDE/HAC), Dr Nadia Teleb (EMRO/DCD), Dr Williamina Wilson (CDS/CSR), Dr Nevio Zagaria (CDS/CPE).

We would like to thank the Government of Ireland and the Office of Foreign Disaster Assistance (OFDA) of the United States Agency for International Development (USAID) for their support in the development of this document.

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2. HEALTH SURVEILLANCE FORMS



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1. SUDAN SAMPLE MONTHLY MORBIDITY FORM

District: Province/County: Town/Village/Camp:
 Health facility: Supporting agency: Reporting period: From Monday/...../..... To Sunday/...../.....
 Catchment population: Under-5 population: Name of reporting officer:

DISEASE / SYNDROME	Week 1		Week 2		Week 3		Week 4		Total	
	< 5	≥ 5	< 5	≥ 5	< 5	≥ 5	< 5	≥ 5	< 5	≥ 5
* Acute watery diarrhoea										
* Bloody diarrhoea										
* VHF – suspected										
* Measles										
* Meningitis – suspected										
* AFP (suspected poliomyelitis)										
* Yellow fever – suspected										
ALRI / pneumonia										
Malaria – suspected										
Neonatal tetanus										
STIs										
Tuberculosis – suspected										
Fever of unknown origin										
Severe malnutrition (W/H <70%)										
Noncommunicable diseases										
Others										
TOTAL NUMBER OF CONSULTATIONS										

* Diseases with outbreak potential – report as soon as possible to your district surveillance officer and district medical officer or health coordinator using outbreak alert form. See alert thresholds in “Surveillance system guidelines and alert thresholds” (Annex 3).

For use by data management office: Form received: ___/___/___ Validated Entered Record number: ___

SUDAN SAMPLE MONTHLY MORTALITY FORM

District: Province/County: Town/Village/Camp:
 Health facility: Supporting agency: Reporting period: From Monday/...../..... To Sunday/...../.....
 Catchment population: Under-5 population: Name of reporting officer:

No.	First and middle names	Family name	Sex	Age (mth/yr)	Direct causes of death										Underlying causes of death			Date of death dd/mm/yy	Location of death HF= health facility C = community	Lab. S= sample taken C= confirmed		
					Fever	Watery diarrhoea #	Bloody diarrhoea	ALLRI/pneumonia	Trauma/Injury			Specify cause or main symptoms if unknown	Unknown	Neonatal death §	Maternal death §	Malnutrition	Other (specify)					
1																						
2																						
3																						
4																						
5																						
6																						
7																						
8																						
9																						
10																						

§ See case definitions list.

If this box is ticked, **also** specify cause in the “specify cause” column. Example: if cholera is suspected as the cause of the acute watery diarrhoea death, tick the acute watery diarrhoea column **and** write “cholera” in “specify cause” column.

For use by data management office: Form received: ___/___/___ Validated Entered Record number: _____

4. SUDAN SAMPLE OUTBREAK INVESTIGATION FORM

District: Province/County:
 Town/Village/Camp:
 Health facility: Supporting agency:
 Date:/...../.....
 Name of reporting officer:

1. PATIENT IDENTIFICATION

Case no: _____ Name : _____
 Location in village or site: _____
 Date of birth: ____ / ____ / ____ Age: _____ Sex: M F

2. CLINICAL DATA

Date of onset of illness: ____ / ____ / ____

- Acute watery diarrhoea
- Bloody diarrhoea
- Fever
- Rash
- Cough
- Vomiting
- Neck stiffness
- Jaundice
- Sore throat
- Bleeding
- Acute paralysis or weakness
- Other: _____

3. LABORATORY DATA

Sample: _____ Date taken: ____ / ____ / ____ Lab. received: ____ / ____ / ____
 Name of laboratory: _____
 Type of test: _____ Date of results: ____ / ____ / ____ Result: Pos. Neg.

4. FINAL CLASSIFICATION

Confirmed: Laboratory Date of final diagnosis: ____ / ____ / ____
 Clinical case Discarded final diagnosis: _____

5. FIELD INVESTIGATOR

Name: _____
 Position: _____ Signature: _____

NOTE: ONE FORM PER CASE INVESTIGATED

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3. SURVEILLANCE SYSTEM GUIDELINES AND ALERT THRESHOLDS



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PURPOSE

These surveillance forms are for use in Sudan in the emergency phase. Included are: a weekly morbidity form, a weekly mortality form and a case-based reporting form for alerts. They aim to provide early warning of outbreaks of the following major communicable diseases:

- bacillary dysentery/shigellosis
- cholera
- hepatitis
- malaria
- measles
- meningococcal meningitis
- poliomyelitis
- typhoid fever
- viral haemorrhagic fever
- yellow fever.

In addition to the above outbreak-prone diseases, the main health problems are likely to be:

- endemic malaria
- malnutrition
- acute lower respiratory tract infection/pneumonia

An Early Warning System for Internal Displaced Population¹ example for malaria has also been included in this section of the toolkit (see pages 5 - 9).

REPORTING MECHANISMS

In each health facility, a daily register of consultations should be kept. The following is a suggested layout of the register:

OPD no.	Date	Name	Location	Sex	DOB <5 years	DOB >5 years	New case/ Follow-up	Diagnosis	Treatment	Outcome

One person in each health facility should be identified as responsible for data collection and notification of potential epidemics to the district surveillance officer or district medical officer. One person should be responsible for compiling the data from the daily register for the weekly morbidity report.

The monthly morbidity report should be filled out on a weekly basis from Saturday to Friday and compiled by the officer in-charge in a timely manner.

HOW TO FILL IN THE WEEKLY MORBIDITY REPORT

- Data should be recorded in two age categories – under 5 years and 5 years and older.
- Only new cases/first consultations should be reported; follow-up visits for the same disease should not be reported.

¹ WHO/MoH document dated 29 May 2004.

- All cases attending the health facility should be recorded, including those who are subsequently referred to hospital.
- At the end of each week, the reporting officer must count up all the cases and deaths from each disease as recorded in the outpatient and inpatient records. The health worker must select the primary diagnosis for the consultation, i.e. one disease/syndrome for each case.
- If one of the diseases is marked with an asterisk [*] on the form, that disease should be recorded as the main reason for consultation.
- **Diseases for immediate reporting** are marked with an asterisk [*] on the morbidity form. They must be reported immediately to the health coordinator or supervisor using the case-based reporting form used for reporting the specific disease.
- Other diseases/syndromes must be alerted to your health coordinator or supervisor when the **weekly alert thresholds** specified in the box are reached. If alert thresholds are passed, surveillance activities may need to be enhanced. If the number of cases of a disease/syndrome increases – such as in the event of an outbreak of meningitis or cholera, for example – active case-finding and case definitions may need to be revised.

HOW TO FILL IN THE WEEKLY MORTALITY FORM

This form is a line-listing of all deaths. Fill in all the details as required for each case, including name, age, sex, date and place of death, and record a main cause of death for each entry even if “unknown”.

Calculations of mortality rates can be performed as follows:

Crude mortality rate (CMR):

(total no. of deaths for the week / total population at the end of the week) x 10 000 persons = deaths/10 000 persons per week.

Under-5 mortality rate (U5MR):

(no. of deaths of children <5 years for the week/under-5 year population at the end of the week) x 10 000 persons = deaths/10 000 persons per week.

Alert thresholds for mortality are shown in the box below.

DISEASES/SYNDROMES FOR IMMEDIATE REPORTING

ALERT THRESHOLDS PER WEEK

Acute watery diarrhoea:	5 cases in the 5 <u>years and over</u> age group (if cholera is suspected, one case is enough for reporting and further investigation)
*Bloody diarrhoea:	5 cases or 1.5 times the baseline
*Malaria:	1.5 times the baseline
*Measles:	1 case
*Meningitis - suspected:	5 cases or 1.5 times the baseline
*VHF - suspected:	1 case
*Yellow Fever - suspected:	1 case
*AFP (suspected poliomyelitis):	1 case
*Neonatal tetanus:	1 case
Fever of unknown origin:	1.5 times the baseline
Severe malnutrition:	3 cases

Baseline = average weekly number of cases of the disease calculated over the last 3 weeks.

Alert thresholds for deaths in displaced populations

⇒**CMR is >1/10,000/day**

⇒**U5MR is >2/10,000/day**

Use Alert form to report to District Surveillance Officer and district health authorities if one of these thresholds is reached in a week

**Diseases for immediate reporting are marked with an asterisk [*] on the morbidity form. They must be reported immediately to the health coordinator or supervisor using a case-based reporting form used for reporting the specific disease.*

Darfur humanitarian crisis - Early Warning System for malaria epidemics in the Internal displaced population (IDP)².

Alert threshold:

Clustering of malaria referrals/inpatients and deaths, especially among older children and adults, will require immediate investigation (within 24-48 hours) to determine the cause, effect and the potential magnitude of the epidemic. Control measures, notably improved access to free diagnosis and treatment with artemisinin based combination therapy (ACT), must be implemented immediately (within one week) if a falciparum malaria epidemic is confirmed.

Declaring an epidemic over:

The epidemic is declared over when a steady decline over a period of 4-6 weeks occurs, and the number of malaria referrals fall below the levels of the time the alert is given.

Suspected disease or condition	Diagnostic test	Specimen	When to collect	How to prepare, store and ship	Results
<p>Malaria</p> <p>REFERENCES: "Basic Laboratory Methods in Medical Parasitology" WHO, Geneva, 1991 "Malaria rapid diagnosis - making it work" (WHO, 2003), http://www.rbm.who.int</p>	<p>Presence of malarial parasites in thick or thin blood film</p> <p>OR</p> <p>Positive malaria rapid diagnostic test</p>	<p>Blood Usually finger-stick sample</p>	<p>To confirm diagnosis in suspected malaria cases; for patient management in severe malaria admissions; for follow up of suspected treatment failures (microscopy only),</p> <p>If case loads are too high to allow testing of all suspected patients, test a percentage of cases to monitor the slide/test positivity rate.</p>	<p><u>Blood smear:</u> Collect blood directly onto correctly cleaned and labeled microscope slides and prepare thick and thin smears.</p> <ul style="list-style-type: none"> • Allow smears to dry thoroughly. • Stain using the appropriate stain (Giemsa stain) and technique. • Store stained and thoroughly dried slides at room temperature out of direct sunlight. <p><u>Rapid diagnostic test:</u> according to manufacturer's instructions. Rapid diagnostic test should be stored and transported in a "cool chain". Temperature stability data should be requested from manufacturer before purchase.</p>	<p>Thick and thin smear results should be available within 1 hour of preparation.</p> <p>Microscopic examination of malarial slides may also reveal the presence of other blood-borne parasites.</p>

² WHO/MoH document dated 29 May 2004.

CONFIRMING MALARIA EPIDEMICS IN POPULATIONS WHERE NO HISTORIC RECORDS ARE AVAILABLE FOR COMPARISON³

(IDP POPULATIONS, DARFUR 2004)

1. Facilities with outpatient department only: Confirmation of a malaria epidemic can be done using a comparison of malaria case numbers (suspected and confirmed) by age grouping (children under 5 years, as compared to older children and adults) for the past 4-8 weeks.

An epidemic is declared when:

- total fever cases are increasing and the proportion of affected older children and adults is increasing or
- when in older children and adults the proportion of fever cases that are confirmed as malaria is steadily increasing in recent weeks despite the ratio of confirmed to suspected cases has not changed much in young children.

Examples are given below:

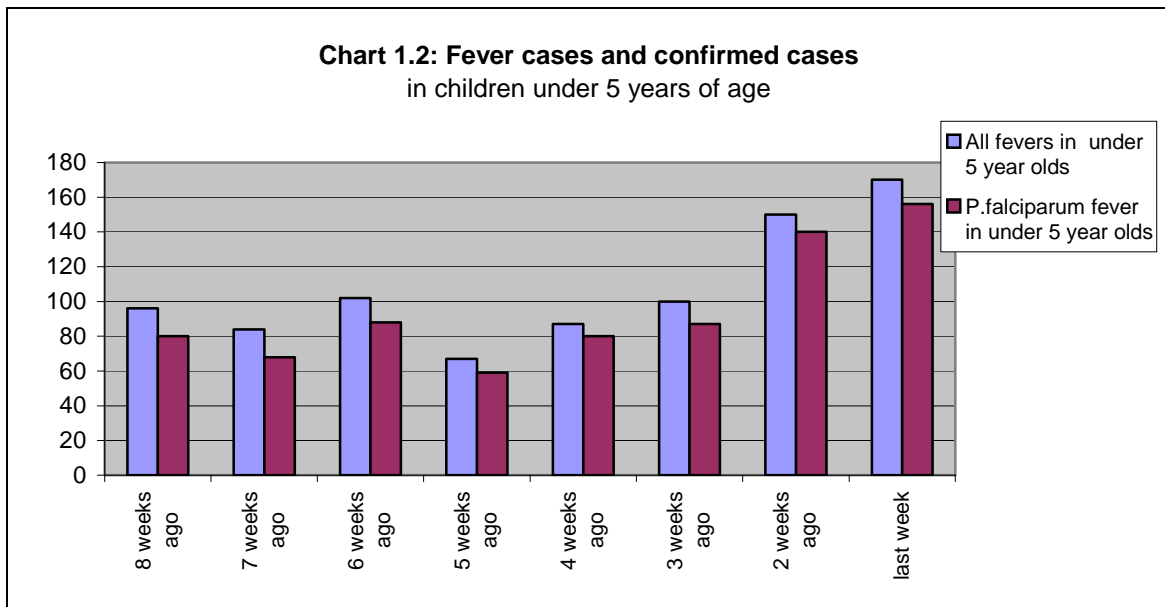
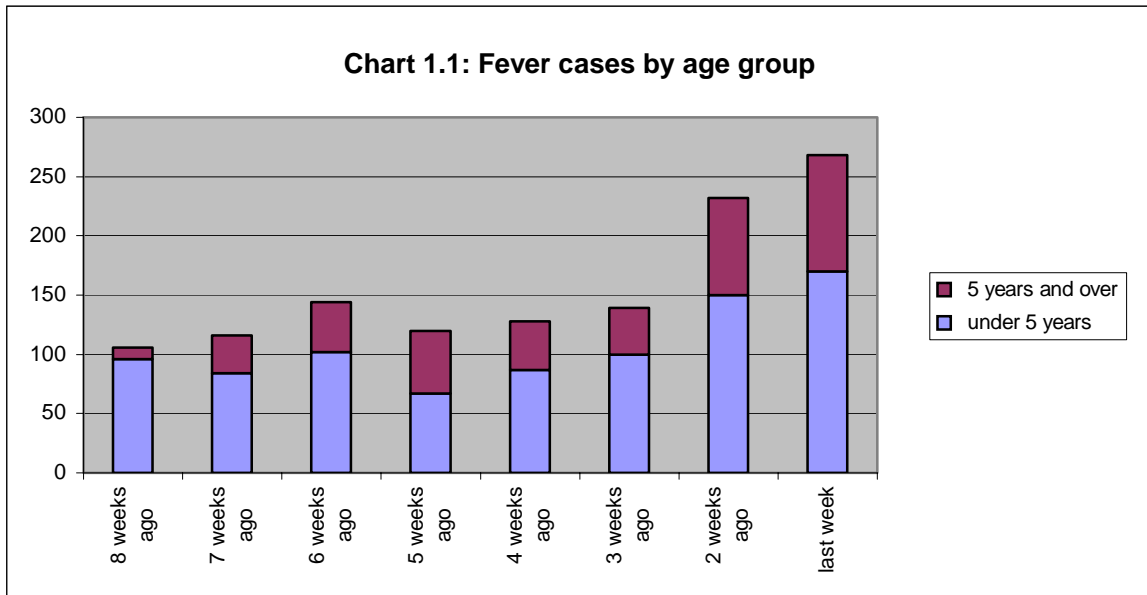
- Chart 1.1 : the total fever cases (clinical malaria cases), split by age grouping
- Chart 1.2 : the ratio of confirmed cases to fever cases in children under 5
- Chart 1.3 : the ratio of confirmed cases to fever cases in older children and adults

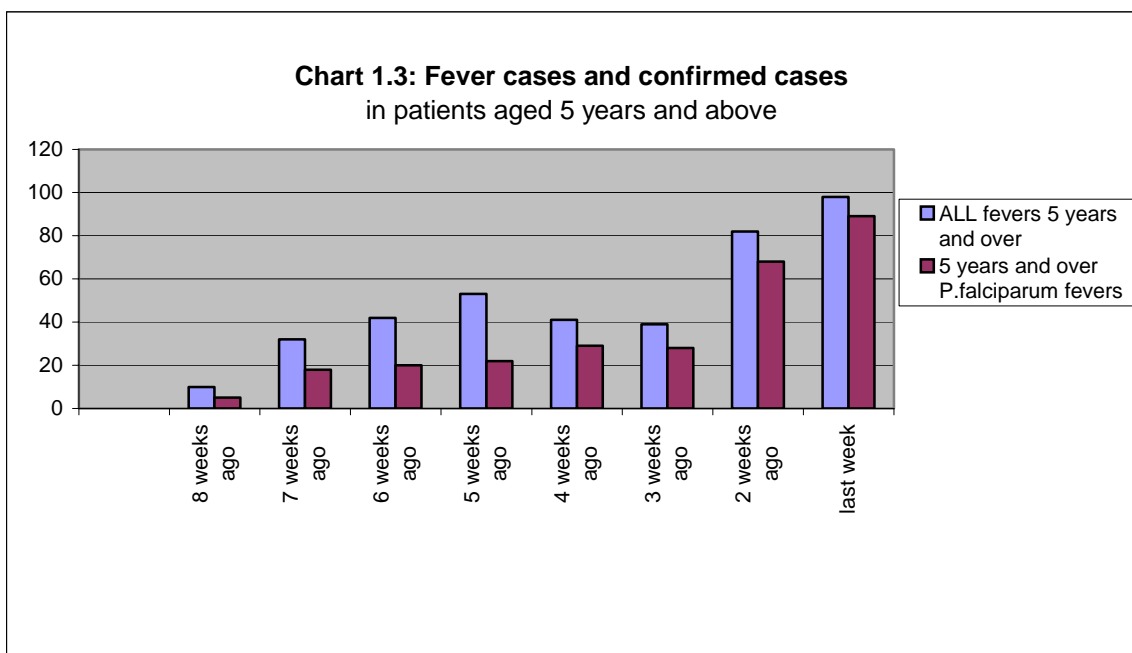
Rapid diagnostic tests can be used to confirm that the upward trend is due to malaria infection.

Example 1: Confirming malaria epidemics - facilities with outpatient department only

Age group	under 5 years		5 years and over	
	all fever cases	Confirmed malaria	all fever cases	Confirmed malaria
8 weeks ago	96	80	10	5
7 weeks ago	84	68	32	18
6 weeks ago	102	88	42	20
5 weeks ago	67	59	53	22
4 weeks ago	87	80	41	29
3 weeks ago	100	87	39	28
2 weeks ago	150	140	82	68
Last week	170	156	98	89

³ Source: Field Guide for Malaria Epidemic Reporting and Assessment, WHO/2004, <http://www.rbm.who.int>





2. Facilities with inpatient department: confirmation of a malaria epidemic can be done by comparing malaria hospital admissions, deaths and case-fatality rates by age grouping (children under 5 vs. older children and adults) for the past 4-8 weeks. During an epidemic the graphs generated using in-patient data show an obvious upward trend in hospital admissions and deaths attributed to malaria.

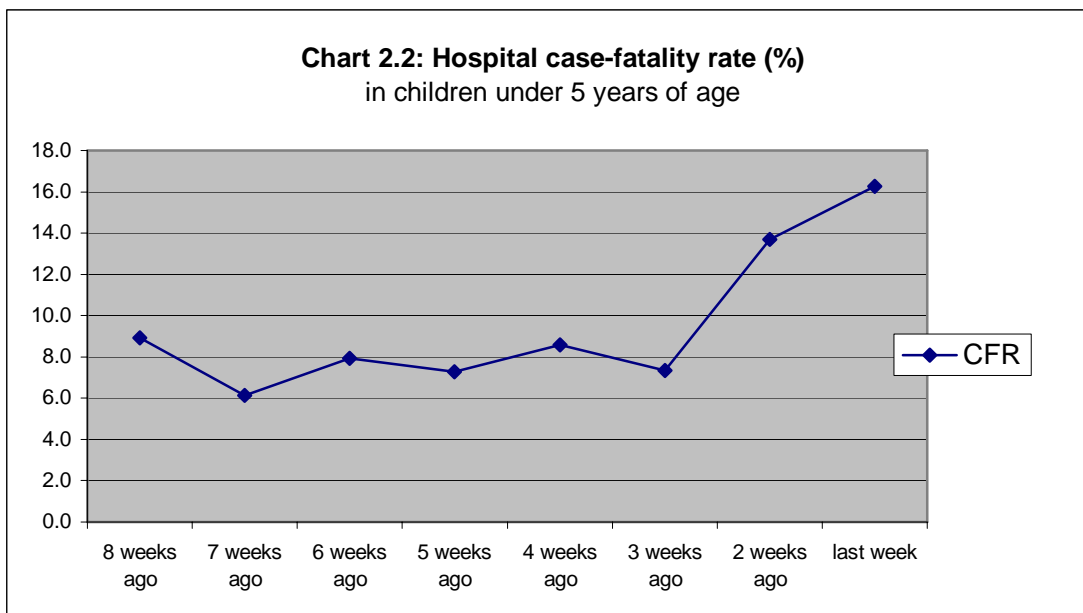
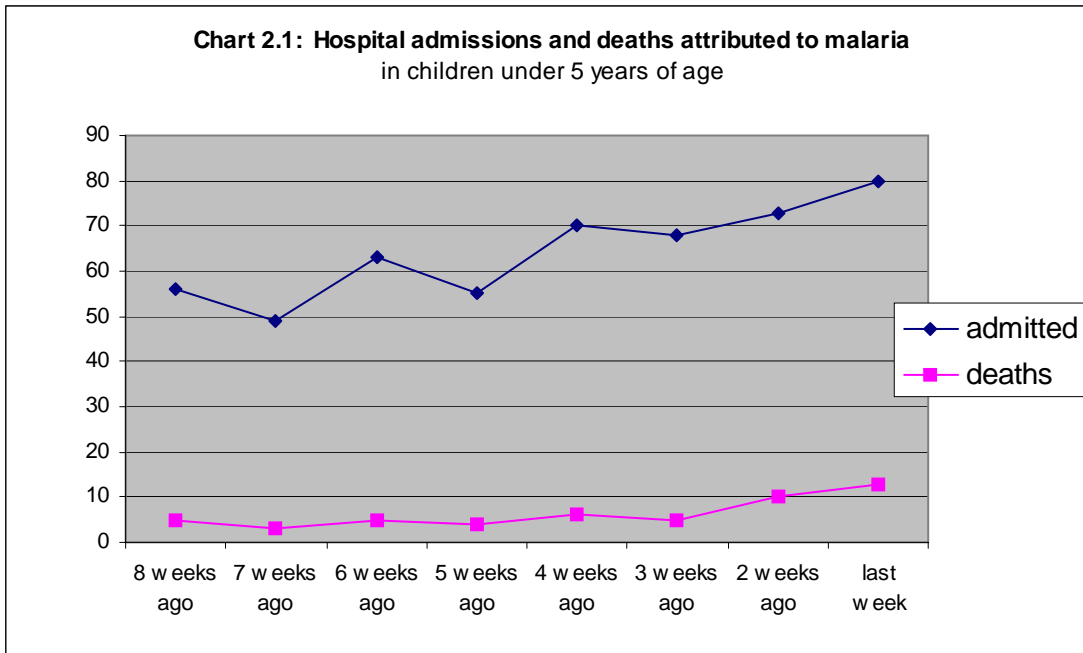
Examples are given below:

- Chart 2.1: hospital admissions and deaths attributed to malaria in children under 5 years.
- Chart 2.2: hospital admissions and deaths attributed to malaria in older children and adults.
- Chart 2.3: malaria deaths divided by malaria admissions (inpatient case fatality rate). The graph of the case-fatality rate (deaths/admitted) shows a sharp upward trend in the most recent weeks.

Example 2: Confirming malaria epidemics - facilities with inpatient department

Children <5: hospital malaria data			
	admitted	deaths	CFR* (%)
8 weeks ago	56	5	8.9
7 weeks ago	49	3	6.1
6 weeks ago	63	5	7.9
5 weeks ago	55	4	7.3
4 weeks ago	70	6	8.6
3 weeks ago	68	5	7.4
2 weeks ago	73	10	13.7
last week	80	13	16.3

*CFR - case fatality rate



Similar graphs can be made for older children and adults.

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4. CASE DEFINITIONS



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WHO/FMOH-RECOMMENDED CASE DEFINITIONS

ACUTE WATERY DIARRHOEA

Any person with 3 or more abnormally loose or fluid stools in the past 24 hours **with or without** dehydration.

Suspected cholera case:

- Person aged >5 years with severe dehydration or death from acute watery diarrhoea with or without vomiting.
- Person aged >2 years with acute watery diarrhoea in an area where there is a cholera outbreak.

Confirmed cholera case:

Isolation of *Vibrio cholera* O1 or O139 from diarrhoeal stool sample.

ACUTE BLOODY DIARRHOEA

Person with acute diarrhoea with visible blood in the stool.

Suspected shigellosis case:

Any person with acute diarrhoea, visible blood in the stool and fever.

Confirmed shigellosis case:

Isolation of *Shigella dysenteriae* type 1 through stool culture and serology from a suspected case.

ACUTE HAEMORRHAGIC FEVER SYNDROME

Any person with severe illness, acute onset of fever **and** at least one of the following:

- sore throat (found in Lassa fever only)
- bloody stools
- vomiting blood
- unexplained bleeding from any other site (gums, nose, vagina, skin, eyes).

ACUTE JAUNDICE SYNDROME (INCLUDING YELLOW FEVER)

Any person with acute onset of jaundice **with or without** fever **and** absence of any known precipitating factors.

Confirmed yellow fever case:

Presence of yellow fever-specific IgM or a fourfold or greater increase in serum IgG levels between the acute and convalescent serum samples. Yellow fever can also be confirmed by isolation of the yellow fever virus in blood or detection of yellow fever antigen in tissues by immunohistochemistry.

MEASLES

Any person with fever **and** maculopapular (i.e. non-vesicular) rash **and** cough, coryza (i.e. runny nose) or conjunctivitis (i.e. red eyes)

or

Any person in whom a clinical health worker suspects measles infection.

Confirmed measles case:

A case that meets the case definition and is laboratory-confirmed through serology (presence of measles-specific IgM antibodies) or linked epidemiologically to a laboratory-confirmed case.

MENINGITIS

Suspected meningitis case:

Any person with sudden onset of fever (>38 °C axillary) **and** one of the following:

- neck stiffness
- altered consciousness
- other meningeal sign **or** petechial/purpurral rash.

In children aged <1 year, meningitis is suspected when fever is accompanied by a bulging fontanelle.

Confirmed meningitis case:

A suspected case with laboratory confirmation through positive cerebrospinal fluid antigen detection **or** positive cerebrospinal fluid culture **or** positive blood culture.

ACUTE FLACCID PARALYSIS (SUSPECTED POLIOMYELITIS)

Acute flaccid paralysis (AFP) in a child aged <15 years, including Guillain - Barré syndrome **or** any paralytic illness in a person of any age.

Confirmed case:

An AFP case with laboratory-confirmed wild poliovirus in stool sample.

ACUTE LOWER RESPIRATORY TRACT INFECTION / PNEUMONIA IN CHILDREN AGED UNDER 5 YEARS

Cough or difficult breathing

and

Breathing 50 or more times per minute for infants aged 2 months to 1 year

Breathing 40 or more times per minute for children aged 1 to 5 years

and

No chest indrawing, no stridor, no general danger signs.

*Note: **Severe pneumonia** = cough or difficult breathing **plus** any general danger sign (unable to drink or breastfeed, vomits everything, convulsions, lethargic or unconscious) or chest indrawing or stridor in a calm child.*

MALARIA

Uncomplicated malaria

Patient with fever or history of fever within the past 48 hours (with or without other symptoms such as nausea, vomiting and diarrhoea, headache, back pain, chills and myalgia)

Severe malaria

Patient with symptoms as for uncomplicated malaria, plus drowsiness with extreme weakness and associated signs and symptoms related to organ failure (e.g. disorientation, loss of consciousness, convulsions, severe anaemia, jaundice, haemoglobinuria, spontaneous bleeding, pulmonary oedema and shock).

Confirmed malaria case (uncomplicated or severe):

Patient with uncomplicated or severe malaria with laboratory confirmation of diagnosis by malaria blood film or other diagnostic test for malaria parasites.

NEONATAL TETANUS

Suspected case:

Any neonatal death between 3 and 28 days of age in which the cause of death is unknown

or

Any neonate reported as having suffered from neonatal tetanus between 3 and 28 days of age but not investigated.

Confirmed case:

Any neonate with normal ability to suck and cry during the first 2 days of life but who, between 3 and 28 days of age, can no longer suck normally and becomes stiff or has convulsions (i.e. jerking of the muscles) or both.

Hospital-reported cases are considered as confirmed cases.

The diagnosis is entirely clinical and does not depend on bacteriological confirmation.

SEXUALLY TRANSMITTED INFECTIONS

Genital ulcer syndrome

Ulcer on penis or scrotum in men and on labia, vagina or cervix in women, with or without inguinal adenopathy.

Urethral discharge syndrome

Urethral discharge in men with or without dysuria.

Vaginal discharge syndrome

Abnormal vaginal discharge (amount, colour and odour), with or without lower abdominal pain or specific symptoms or specific risk factors.

Lower abdominal pain

Lower abdominal pain and pain during sexual relations, with examination showing vaginal discharge, lower abdominal tenderness on palpation or axillary temperature >38 °C.

TUBERCULOSIS

Suspected TB case:

Any person who presents with symptoms or signs suggestive of pulmonary TB, in particular cough of long duration (>2 weeks).

May also be coughing blood, have chest pain, shortness of breath, fever/night sweats, tiredness, loss of appetite and significant weight loss.

All TB suspects should have three sputum samples examined by light microscopy. Early morning samples are more likely to contain the TB organism than samples taken later in the day.

Pulmonary TB smear-positive (PTB+)

Diagnostic criteria should include:

- At least two sputum smear specimens positive for acid-fast bacilli (AFB)
or
- One sputum smear specimen positive for AFB and radiographic abnormalities consistent with active pulmonary TB
or
- One sputum smear specimen positive for AFB and a culture positive for *M. tuberculosis*.

Pulmonary TB smear-negative (PTB-)

A case of pulmonary tuberculosis that does not meet the above definition for smear-positive TB. Diagnostic criteria should include:

- At least three sputum smear specimens negative for AFB
and
- Radiographic abnormalities consistent with active pulmonary TB
and
- No response to a course of broad-spectrum antibiotics
and
- Decision by a clinician to treat with a full course of anti-TB chemotherapy.

FEVER OF UNKNOWN ORIGIN

Any person with fever (>38 °C axillary) in whom all obvious causes of fever have been excluded.

SEVERE MALNUTRITION

In children aged 6–59 months (65–110 cm in height):

- Weight-for-height (W/H) index < -3 Z-scores (on table of NCHS/WHO normalized reference values of weight-for-height by sex) (<70% of normal)
or
- Bilateral pitting oedema irrespective of W/H, in absence of other causes.

TRAUMA/INJURY

Any person who has sustained, either directly or indirectly, a fatal or non-fatal injury caused by:

- war: any weapons or explosion of a landmine or other unexploded ordnance (UXO).
- other: road traffic accidents, domestic violence, burns.

Note: Landmine injuries relate to buried mines (e.g. antipersonnel and/or antivehicle mines). UXO injuries arise from explosive objects/devices that are typically above ground at the time of detonation, such as cluster munitions that did not detonate on impact.

MATERNAL DEATH

Death of a woman while pregnant or within 42 days of termination of pregnancy, regardless of the site or duration of pregnancy, from any cause related to or aggravated by the pregnancy or its management.

NEONATAL DEATH

Death of a liveborn infant during the first 28 days of life. It is a classification by age, not cause.

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5. GUIDELINES FOR OUTBREAK CONTROL



World Health Organization

TABLE 1. STEPS IN MANAGEMENT OF AN OUTBREAK

<p>1. PREPARATION</p> <ul style="list-style-type: none"> • Health coordination meetings. • Surveillance system – weekly health reports to WHO. • Stockpiles – specimen kits, appropriate antibiotics, IV fluids. • Epidemic investigation kits. • Contingency plans for isolation wards in hospitals. • Laboratory support.
<p>2. DETECTION</p> <p>If a certain number of cases of any of the following diseases/syndromes is diagnosed (i.e. alert threshold is passed):</p> <ul style="list-style-type: none"> • acute watery diarrhoea. • bloody diarrhoea. • suspected cholera. • measles. • meningitis. • acute haemorrhagic fever syndrome. • acute jaundice syndrome. • acute flaccid paralysis (suspected poliomyelitis). • a cluster of deaths of unknown origin. <p>(Diseases/syndromes in list to be modified according to country profile).</p> <p>Inform your health coordinator as soon as possible. The health coordinator should inform the Ministry of Health and WHO.</p>
<p>3. RESPONSE</p> <p>Confirmation</p> <ul style="list-style-type: none"> • The lead health agency should investigate reported cases to confirm the outbreak situation – number of cases higher than expected for same period of year and population. Clinical specimens will be sent for testing. • The lead health agency should activate an outbreak control team with membership from relevant organizations: Ministry of Health, WHO and other United Nations organizations, nongovernmental organizations in the fields of health and water and sanitation, veterinary experts. <p>Investigation</p> <ul style="list-style-type: none"> • Confirm diagnosis (laboratory testing of samples). • Define outbreak case definition. • Count number of cases and determine size of population (to calculate attack rate). • Collect/analyse descriptive data to date (e.g. time/date of onset, place/location of cases and individual characteristics such as age/sex). • Follow up cases and contacts. • Determine the at-risk population. • Formulate hypothesis for pathogen/source/transmission. • Conduct further investigation/epidemiological studies (e.g. to clarify mode of transmission, carrier, infectious dose required, better definition of risk factors for disease and at-risk groups). • Write an investigation report (investigation results and recommendations for action). <p>Control</p> <ul style="list-style-type: none"> • Implement control measures specific for the disease and prevent exposure (e.g. isolation of cases in viral haemorrhagic fever outbreak). • Prevent infection (e.g. immunization in measles outbreak). • Treat cases as recommended in WHO guidelines.
<p>4. EVALUATION</p> <ul style="list-style-type: none"> • Assess timeliness of outbreak detection and response, cost. • Change public health policy if indicated (e.g. preparedness). • Write outbreak report and disseminate.

TABLE 2. RESOURCES NEEDED FOR OUTBREAK RESPONSE

- Personnel (trained staff)
- Supplies (e.g. oral rehydration salts, intravenous fluids, water containers, water purifying tablets, drinking cups, vaccines, vitamin A, monitoring forms, vaccination cards, tally sheets)
- Treatment facilities (location, beds available, stocks of basic medical supplies)
- Laboratory facilities (location, capacity, stocks of reagents, etc.)
- Transport (sources of emergency transport and fuel, cold chain)
- Communication links (between health centres; between Ministry of Health, nongovernmental organizations and United Nations agencies)
- Computers
- In an outbreak requiring an immunization campaign:
 - safe injection equipment (e.g. auto-destruct syringes and safety boxes (puncture-resistant boxes),
 - immunization facilities (location, capacity),
 - cold-chain equipment (number and condition of refrigerators, cold-boxes, vaccine carriers, ice-packs).

TABLE 3. RISK FACTORS FOR OUTBREAKS IN EMERGENCY SITUATIONS

Acute respiratory infections	<p>Inadequate shelter with poor ventilation</p> <p>Indoor cooking, poor health care services</p> <p>Malnutrition, overcrowding</p> <p>Age group under 1 year old</p> <p>Large numbers of elderly</p> <p>Cold weather</p>
Diarrhoeal diseases	<p>Overcrowding</p> <p>Inadequate quantity and/or quality of water</p> <p>Poor personal hygiene</p> <p>Poor washing facilities</p> <p>Poor sanitation</p> <p>Insufficient soap</p> <p>Inadequate cooking facilities</p>
Malaria	<p>Mass population movement with increased vulnerability of displaced populations because of malnutrition, concomitant diseases, settlement in marginal areas close to mosquito breeding sites, housing in temporary shelters with increased exposure to mosquito bites, increased population density promoting malaria transmission.</p> <p>Poor access to health care (curative and preventive), combined with breakdown of health services, existing health facilities overwhelmed.</p> <p>Interruption of vector control activities</p> <p>Environmental degradation encouraging vector breeding</p>
Measles	<p>Measles immunization coverage rates below 80% in country of origin</p> <p>Population movement</p> <p>Overcrowding</p>
Meningococcal meningitis	<p>Meningitis belt</p> <p>Dry season</p> <p>Dust storms</p> <p>Overcrowding</p> <p>High rates of acute respiratory infections</p>

TABLE 3 (continued)

Viral haemorrhagic fever	<p>Lack of hygiene, poor sanitation, contact with objects/food contaminated with rodent excreta; unsafe food handling and storage practices (Lassa fever)</p> <p>Population displacement with subsequent overcrowding</p> <p>Poor access to health services, poor isolation and protection measures (barrier nursing)</p> <p>Tick-infested areas (Crimean–Congo haemorrhagic fever)</p> <p>Handling or eating ill or dead infected primates (Ebola) or rodents (Lassa fever)</p>
Yellow fever	<p>Unvaccinated people moving to areas of endemicity are at risk.</p> <p>Overcrowding</p> <p>Open water storage provides favourable habitat for <i>Ae. aegypti</i></p> <p>Old tyres, old water containers increase vector breeding sites</p> <p>Poor drainage leading to pools and open channels of water) may increase vector breeding opportunities.</p>

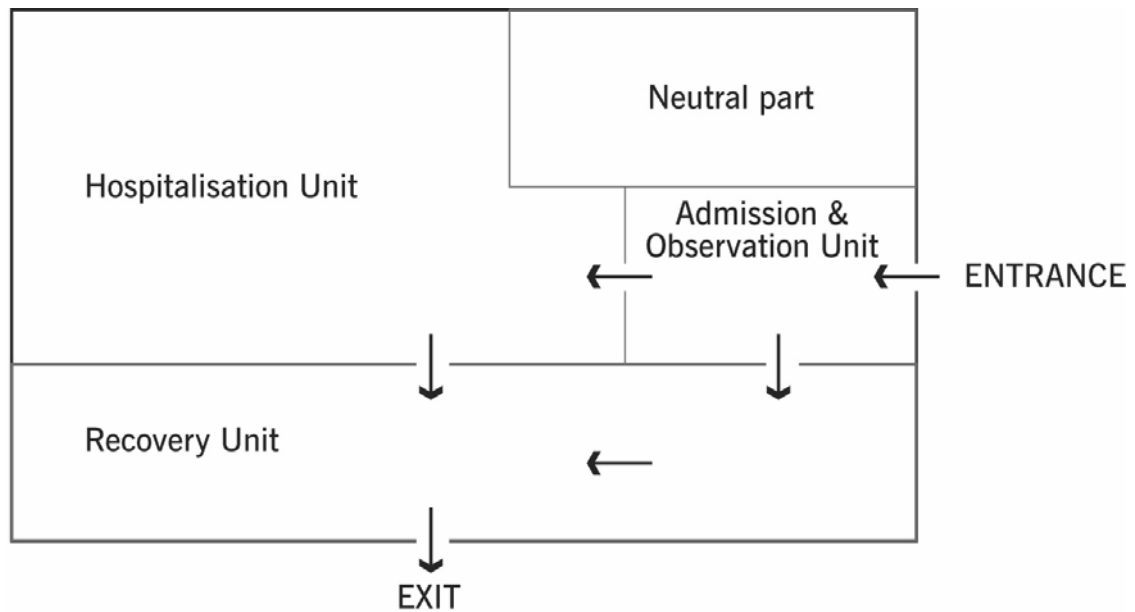
TABLE 4. ESSENTIAL HYGIENE RULES IN A CHOLERA TREATMENT CENTRE

Mode of transmission	Essential rules in the unit	Additional recommended rules
People	<ul style="list-style-type: none"> • Access limited to patient + one family member + staff • One-way flow of people 	<ul style="list-style-type: none"> • Ideally, only one carer per patient • Three separate spaces within unit (see Figure 1)
Water	<ul style="list-style-type: none"> • Safe water (chlorination concentration according to specific use; see <i>Table 5</i>) • Large quantity needed (minimum 10 litres/person per day) 	<ul style="list-style-type: none"> • Ideally 50 litres/patient per day
Hands	<ul style="list-style-type: none"> • Hand-washing stations with safe water and soap in sufficient quantities • Wash hands with water and soap <ul style="list-style-type: none"> – before and after taking care of patients – after using the latrines – before cooking or eating – after leaving the admission ward 	<ul style="list-style-type: none"> • Cut and clean nails
Food	<ul style="list-style-type: none"> • Cooked food • Health care workers should not handle food or water 	<ul style="list-style-type: none"> • Food provided by the unit (preferably not by families) • Large stocks of food may be "tempting "and may lead to security problems
Clothes	<ul style="list-style-type: none"> • Wash clothes and linen with the appropriate chlorine solution 	<ul style="list-style-type: none"> • If no chlorine available, wash clothes with soap and dry them in the sun
Environmental contamination (faeces and waste)	<ul style="list-style-type: none"> • Ensure exclusive latrines for the unit • Disinfect buckets, soiled surfaces and latrines regularly with the appropriate chlorine solution (see <i>Table 5</i>) • Incinerator for medical waste 	<ul style="list-style-type: none"> • Latrines at least 100 metres away from wells or surface sources • Special cholera beds
Corpses	<ul style="list-style-type: none"> • Separate morgue • Disinfect corpses (see <i>Table 5</i>) 	<ul style="list-style-type: none"> • Find ways to have safe burial practices • Bury corpses as soon as possible

Developed by the WHO Global Task Force on Cholera Control.

Figure 1:

Organization of an emergency treatment centre and patient-flow



Four **separate** spaces:

- Admission and observation unit
- Neutral part: staff office and staff rest room, hospital kitchen, store rooms
- Hospitalisation unit: reserved for severe patients with IV fluids
- Recovery unit: oral rehydration space

In each space. Ensure exclusive latrines, washing areas, large quantity of water and safe disposal of waste

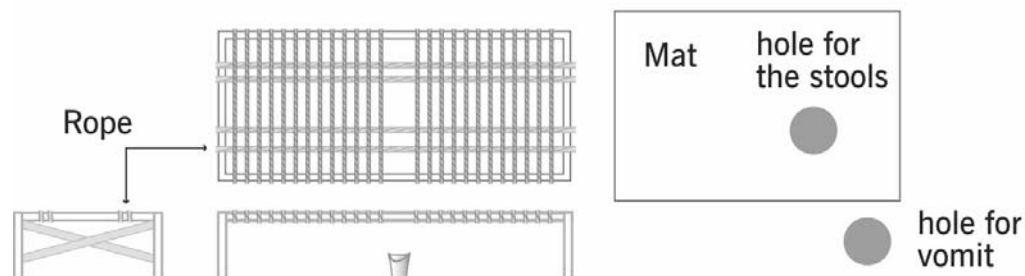


TABLE 5. PREPARATION AND USE OF DISINFECTANTS

Starting with	2% solution	0.2% solution	0.05% solution
<u>Calcium hypochlorite</u> at 70% active chlorine ("high-test hypochlorite", "HTH")	30 g/litre or 2 tablespoons/litre	30 g/10 litres or 2 tablespoons/10 litres	7 g/10 litres or ½ tablespoon/10 litres
<u>Chlorinated lime</u> at 30% active chlorine ("bleaching powder")	66 g/litre or 4 tablespoons/litre	66 g/10 litres or 4 tablespoons/10 litres	16 g/10 litres or 1 tablespoon/10 litres
<u>Sodium hypochlorite solution</u> at 6% active chlorine ("household bleach")	333 ml/litre or 22 tablespoons/litre	333 ml/10 litres or 22 tablespoons/10 litres	83 ml/10 litres or 5 tablespoons/10 litres
USE FOR DISINFECTION OF	Excreta Corpses Shoes	Floor Utensils Beds	Hands Skin Clothes

Developed by the WHO Global Task Force on Cholera Control.

Approximate measurements:

1 teaspoon = 5 ml

1 tablespoon = 15 ml, or 3 teaspoons

Do not use metallic buckets for preparation and storage of chlorinated solutions.

TABLE 6. CHOLERA TREATMENT SUPPLIES PER POPULATION**How to estimate the initial amount of supplies needed for a cholera outbreak:**

(0.2% of the population expected to fall ill initially).

The table below gives an estimate of the amount of supplies you will need according to the number of people in your area. To find the amounts needed for each item, look in the column under the approximate population of your catchment area (to the nearest 5000). You may add several columns (e.g. if your health facility serves 35 000 people, add the amounts in the 10 000 and 5000 columns to those in the 20 000 column). Write the amount needed at your health facility in the empty column on the right.

On the basis of drug resistance in your area, choose only one of the antibiotics.

Item	Population (+ numbers expected to fall ill)						Your area
	5000 (10)	10 000 (20)	15 000 (30)	20 000 (40)	50 000 (100)	100 000 (200)	
Rehydration supplies							
ORS packets (for 1 litre each)	65	130	195	260	650	1300	
Nasogastric tubes (adults) 5.3/3.5 mm (16 Flack) 50 cm	1	1	1	2	3	6	
Nasogastric tubes (children)	1	1	1	2	3	6	
Ringer's lactate bags, 1 litre, with giving sets	12	24	36	48	120	240	
Scalp vein sets	2	3	4	5	10	20	
Antibiotics							
Doxycycline, 100 mg (adults)	6	12	18	24	60	120	
Erythromycin 250 mg (children)	24	48	72	96	240	480	
Other treatment supplies							
Large water dispensers with tap (marked at 5–10 litres)	1	1	1	2	2	4	
1-litre bottles for ORS solution	2	4	6	12	20	40	
0.5-litre bottles for ORS solution	2	4	6	12	20	20	
Tumblers, 200 ml	4	8	12	16	40	80	
Teaspoons	2	4	6	8	20	40	
Cotton wool, kg	1/2	1	1 1/2	2	5	10	
Adhesive tape, reels	1	1	1	2	3	6	

Developed by the WHO Global Task Force on Cholera Control.

TABLE 7. DYSENTERY TREATMENT SUPPLIES PER POPULATION

How to estimate the amount of supplies needed for a dysentery outbreak:
(0.2% of the population expected to fall ill initially).

The table below gives an estimate of the amount of supplies you will need according to the number of people in your area. To find the amounts needed for each item, look in the column under the approximate population of your catchment area (to the nearest 5000). You may add several columns (e.g. if your health facility serves 35 000 people, add the amounts in the 10 000 and 5000 columns to those in the 20 000 column). Write the amount needed at your health facility in the empty column on the right.

On the basis of drug resistance in your area, choose only one of the antibiotics.

Item	Population (+ numbers expected to fall ill)						Your area
	5000 (10)	10 000 (20)	15 000 (30)	20 000 (40)	50 000 (100)	100 000 (200)	
Rehydration supplies							
ORS packets (for 1 litre each)	10	20	30	40	100	200	
Ringer's lactate bags, 1 litre, with giving sets	2	4	6	8	20	40	
Scalp vein sets	1	1	2	2	5	10	
Antibiotics							
Ciprofloxacin, 500 mg	100	200	300	400	1000	2000	
Other treatment supplies							
Large water dispensers with tap (marked at 5–10 litres)	1	1	1	1	1	2	
1-litre bottles for ORS solution	1	1	2	2	5	10	
0.5-litre bottles for ORS solution	1	1	2	2	5	10	
Tumblers, 200 ml	1	2	3	4	10	20	
Teaspoons	1	1	2	2	5	10	
Cotton wool, kg	1/2	1	1 1/2	2	5	10	
Adhesive tape, reels	1	1	1	2	3	6	
Hand soap, kg	2	4	6	8	20	40	
Boxes of soap for washing clothes	3	6	9	12	30	60	
1-litre bottle of cleaning solution (2% chlorine or 1–2% phenol)	1	1	1	1	2	4	

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TABLE 8. TYPHOID FEVER TREATMENT SUPPLIES PER POPULATION**How to estimate the amount of supplies needed for a typhoid outbreak:**

(0.2% of the population expected to fall ill initially).

The table below gives an estimate of the amount of supplies you will need according to the number of people in your area. To find the amounts needed for each item, look in the column under the approximate population of your catchment area (to the nearest 5000). You may add several columns (e.g. if your health facility serves 35 000 people, add the amounts in the 10 000 and 5000 columns to those in the 20 000 column). Write the amount needed at your health facility in the empty column on the right.

On the basis of drug resistance in your area, choose only one of the antibiotics.

Item	Population (+ numbers expected to fall ill)						Your area
	5000 (10)	10 000 (20)	15 000 (30)	20 000 (40)	50 000 (100)	100 000 (200)	
Rehydration supplies							
ORS packets (for 1 litre each)	10	20	30	40	100	200	
Ringer's lactate bags ^a , 1 litre, with giving sets	1	2	3	4	10	20	
Scalp vein sets	1	1	2	2	5	10	
Antibiotics							
Chloramphenicol, 250 mg	2500	5000	7500	10 000	25 000	50 000	
Amoxicillin, 500 mg	1680	3360	5040	6 720	16 800	33 600	
Co-trimoxazole, (SMX 400 mg + TMP 80 mg)	840	1680	2520	3 360	8 400	16 800	
Cefixime, 200 mg ^b	840	1680	2520	3 360	8 400	16 800	
Other treatment supplies							
Large water dispensers with tap (marked at 5–10 litres)	1	1	1	1	1	2	
1-litre bottles for ORS solution	1	1	2	2	5	10	
0.5-litre bottles for ORS solution	1	1	2	2	5	10	
Tumblers, 200 ml	1	2	3	4	10	20	
Teaspoons	1	1	2	2	5	10	
Cotton wool, kg	1/2	1	1 1/2	2	5	10	
Adhesive tape, reels	1	1	1	2	3	6	
Hand soap, kg	2	4	6	8	20	40	
Boxes of soap for washing clothes	3	6	9	12	30	60	
1-litre bottle of cleaning solution (2% chlorine or 1–2% phenol)	1	1	1	1	2	4	

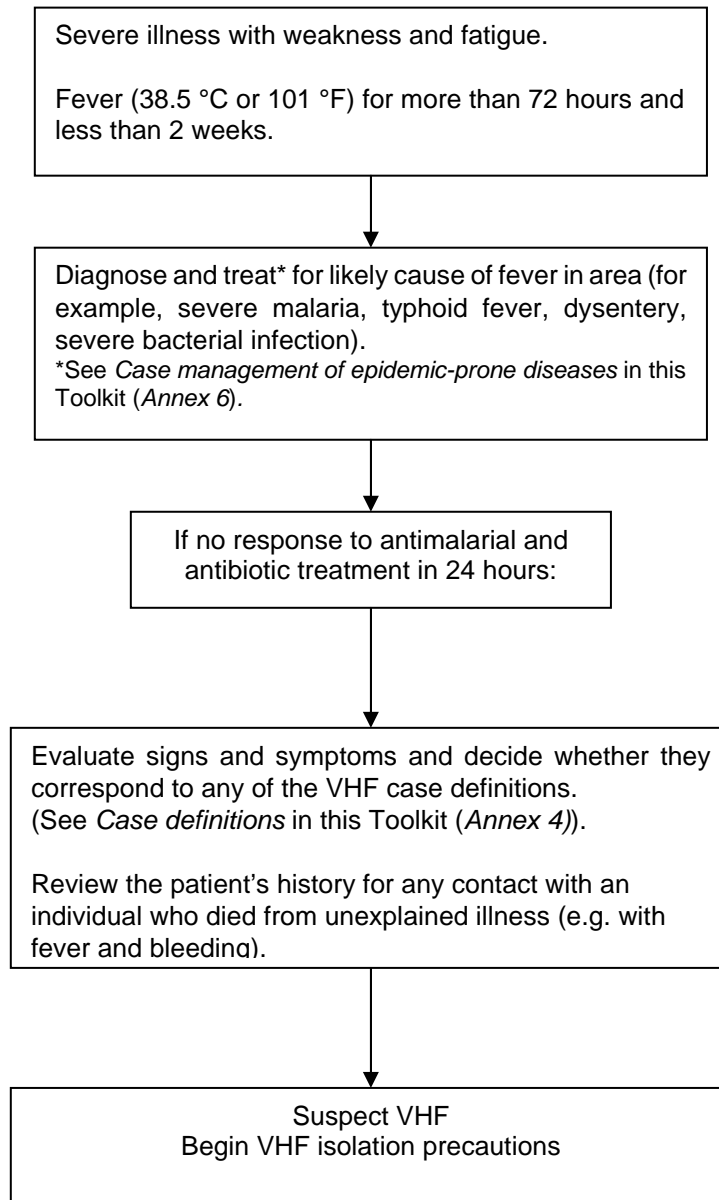
^aConsidering that less than 50% of the patients need IV rehydration.

^bIn case of multidrug resistance to above antibiotics, choose cefixime.

Developed by the WHO Global Task Force on Cholera Control.

APPENDIX 1: VIRAL HAEMORRHAGIC FEVER OUTBREAK CONTROL

Identify suspected cases of viral haemorrhagic fever (VHF).



Note: The above flowchart applies to the first steps for VHF outbreak investigation.

As soon as a VHF is suspected, VHF isolation precautions should begin. This will help to reduce the number of people exposed to the disease.

USE INFORMATION FROM PREVIOUS OUTBREAKS TO ASSESS RISK OF A VHF OUTBREAK

Talk with the district or national surveillance officer about VHFs that have been reported in your area. Report suspected cases of VHF according to national surveillance guidelines to the corresponding health authorities.

Begin VHF isolation precautions

- Adapt VHF isolation precautions as needed.
- Designate the health officer who will coordinate VHF isolation precautions. As soon as a health care worker suspects a VHF, he or she should notify the health facility administrator and the VHF coordinator who will:
 - refer the patient to the isolation area and take the necessary steps to begin VHF isolation precautions as described below;
 - limit the number of health facility staff and visitors in the patient's room;
 - limit the use of invasive procedures and reduce the number of injectable medications.

Important: Between the time when VHF is suspected and the time when the patient is received in the isolation area, there is a risk for disease transmission from the patient's blood and other body fluids (stool, urine, vomitus). Prevent disease transmission to other patients, visitors and health staff in the waiting area by placing the suspected VHF patient apart from other patients. Make every effort to reduce this waiting time.

➤ *Reinforce standard universal precautions in the health centre/hospital.*

VHF isolation precautions

Isolation precautions can be started even if the diagnosis has not been laboratory-confirmed.

- Isolate the patient.
- Wear protective clothing in the isolation area, in the cleaning and laundry areas and in the laboratory. Wear a scrub-suit, gown, apron, two pairs of gloves, mask, headcover, eyewear and rubber boots.
- Clean and disinfect spills, waste and reusable equipment safely.*
- Clean and disinfect soiled linens and laundry safely.*
- Use safe disposal methods for non-reusable supplies and infectious waste.
- Provide information about the risk of VHF transmission to health facility staff. Reinforce the use of VHF isolation precautions with all health facility staff.
- Provide information to families and the community about prevention of VHFs and care of patients.

* Pour or soak in 0.5% chlorine solution; see *Guidelines for collection of specimens for laboratory testing* in this Toolkit (*Annex 7*).

See: Appendix 2: *Select the isolation area*, below.

Identify patient's contacts and travel history

Ask the patient (or a family member who can answer for the patient) questions on the following topics:

- Place where currently living.
- Other persons with the same symptoms in the family or village.
- Places the patient has visited in the past 3 weeks.

Use the answers to identify contacts. Provide contacts with information about VHF and when to seek care.

Specimen samples for laboratory confirmation

According to the suspected VHF, obtain specimens for confirmation of diagnosis. (See *Guidelines for collection of specimens for laboratory testing* in this Toolkit (*Annex 7*) for specific techniques for collecting blood and other specimens from suspected VHF cases and their method of transport).

All suspected cases should be reported and laboratory specimens given to the corresponding health authority (surveillance officer or WHO officer) or person responsible for coordinating epidemic control and transporting/shipping of specimens to the appropriate reference laboratory and for follow-up of results.

Alert health facility staff about specific risks for VHF transmission

- As soon as a VHF is suspected, alert the relevant health staff to begin using VHF isolation precautions. This applies especially to:
 - doctors or nurses providing direct patient care;
 - cleaning, laundry and waste disposal staff who clean and disinfect contaminated material and supplies;
 - laboratory staff who handle samples from the suspected VHF cases;
 - medical or support staff who prepare or handle the bodies of deceased VHF patients.
- Explain how VHF transmission can occur in the health facility and the risks to health facility staff. Remind the staff that VHF is a highly infectious disease. They must use VHF isolation precautions whenever they have contact with a VHF patient, the patient's blood or other body fluids, or contaminated supplies and equipment.

APPENDIX 2: SELECT THE TREATMENT ISOLATION AREA

Establish a barrier between the VHF patient and uninfected patients, other health facility staff and visitors.

Description

- A single room with an adjoining toilet or latrine.
- A separate building or ward that can be used for VHF patients only (especially if Ebola haemorrhagic fever is suspected, or if there is a large number of patients).
- An area in a larger ward that is separate and far away from other patients in the ward.

Important: There should be an isolated toilet, adequate ventilation and screened windows.

Place a security barrier around the isolation area and restrict access. Place signs around the isolation area clearly stating that access is restricted.

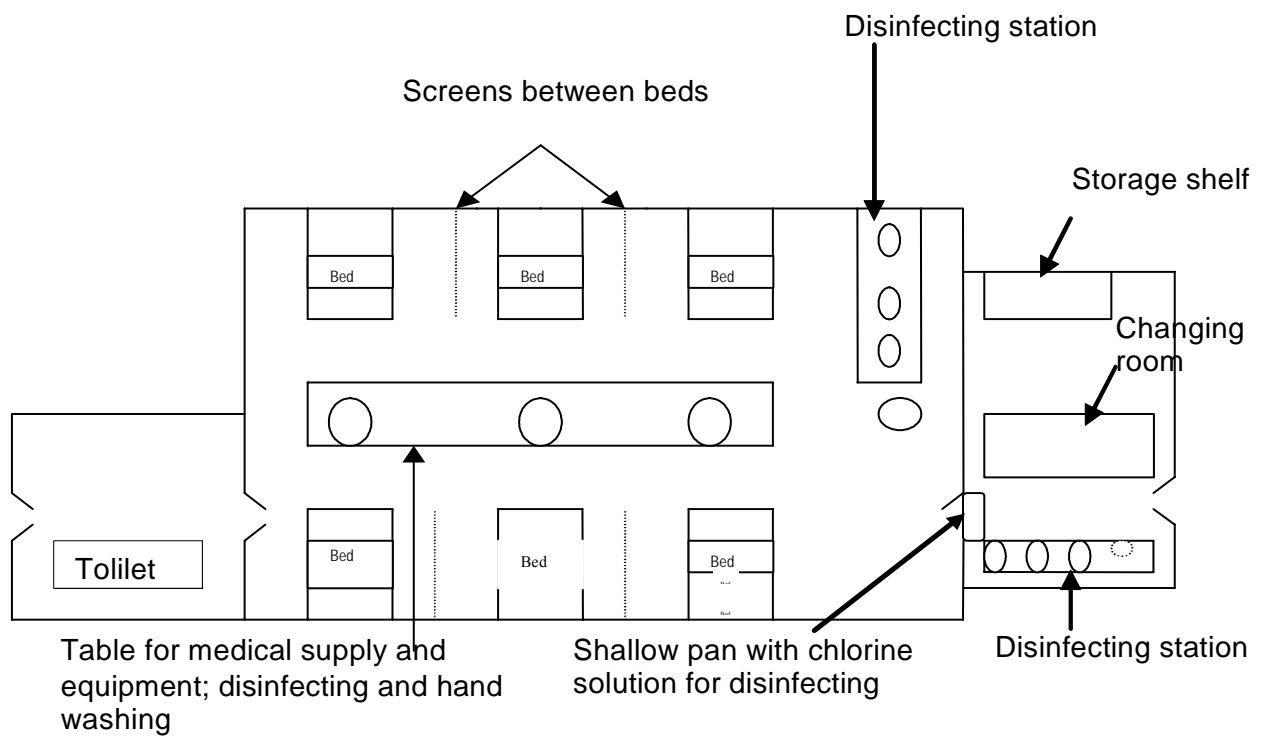
Set up changing rooms for staff providing patient care

One changing room is needed outside the patient isolation area. This is where health care workers will put on protective clothing. Contaminated clothing and supplies remain in the changing room until cleaning staff – trained to use VHF isolation precautions – take the VHF-contaminated items to the laundry or disposal site.

If there are family members who will assist with direct patient care, give them information and training about:

- the risk of VHF transmission and the reason for protective clothing;
- how to wear gloves, gowns and a mask;
- how to remove gloves, gowns and mask, and store or dispose of them safely.

FIGURE 2. EXAMPLE OF VIRAL HAEMORRHAGIC FEVER (VHF) TREATMENT ISOLATION AREA



APPENDIX 3: SAFE BURIAL PRACTICES

The bodies and body fluids of deceased VHF patients remain contagious for several days after death. Family and community members are also at risk if funeral practices involve touching and washing the body.

Prepare the body safely

The burial should take place as soon as possible after the body is prepared in the health facility. Health facility staff should:

- prepare the body safely;
- be aware of the family's cultural practices and religious beliefs, and help the family to understand why some practices cannot be observed because they place the family or others at risk for exposure and death.

To prepare the body in the health facility:

1. Wear protective clothing as recommended for staff in the patient isolation area. Use thick rubber gloves as the second pair (or outer layer) of gloves.
2. Spray the body and the area around it with a 0.5% chlorine solution.*
3. Place the body in a body bag (mortuary sack) and close it securely. Spray the body bag with a 0.5% chlorine solution.*
4. If a body bag is not available, wrap the body in two thicknesses of cotton cloth soaked with a 0.5% chlorine solution*. Then wrap the body in plastic sheeting. Seal the wrapping with plastic tape. Spray the body bag as in Step 3. Place the body in a coffin if one is available.
5. Transport the body to the burial site as soon as possible. Assign a health officer or a member of the health facility staff to accompany the body to ensure that the safety precautions continue to be observed during the journey.

Prepare burial site

- The grave should be at least 2 metres deep.
- Carefully explain to the family the reason for limiting attendance at the funeral ceremony to family only.

Disinfect the vehicle after transporting the body

- The staff member who disinfects the vehicle must wear protective clothing.
- Rinse the interior of the vehicle in which the body was carried with a 0.5% chlorine solution* and let it soak for 10 minutes.
- Rinse well with clean water and let the vehicle air-dry.

* See Appendix 8 of *Guidelines for collection of specimens for laboratory testing* in this Toolkit (Annex 7).

COMMUNICABLE DISEASE TOOLKIT

SUDAN

6. CASE MANAGEMENT OF EPIDEMIC-PRONE DISEASES



World Health Organization

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- ASSESSMENT AND TREATMENT OF DIARRHOEA.....19**

1. BACILLARY DYSENTERY (SHIGELLOSIS)

Basic facts

- Bacillary dysentery is an acute bacterial disease involving the large and small intestines.
- It is the most important cause of acute bloody diarrhoea.
- Two-thirds of cases and most deaths occur in children aged under 10 years.
- Of the four *Shigella* serogroups (*S. dysenteriae*, *S. flexneri*, *S. sonnei* and *S. boydii*), *S. dysenteriae* type 1 (Sd1) causes the most severe disease and is the only cause of large-scale epidemics.

Shigella dysenteriae type 1:

- Most severe in young children, the elderly and malnourished individuals.
- Displaced populations are at high risk in situations of overcrowding and poor sanitation/water.
- Transmission is by the faecal–oral route from person-to-person and through contaminated food and water.
- Highly contagious: as few as 10–100 bacteria have caused disease in volunteers.
- Treatment is with antimicrobials, which reduce severity and duration of illness.
- Not usually associated with marked loss of fluid and electrolytes.
- Without prompt, effective treatment, the case-fatality rate may be as high as 10%.
- As infectious dose is low, shigellosis is associated with high secondary attack rates.

Clinical features

- Causes bloody diarrhoea, often associated with fever, abdominal cramps and rectal pain.
- Incubation period usually 1–3 days, but may be up to 1 week.
- Complications include sepsis, rectal prolapse, haemolytic uraemic syndrome, seizures.
- Is diagnosed by observing blood in a fresh stool specimen or asking the patient or mother of a child whether the stools are bloody.

Diagnosis

- Collect specimens from case with current bloody diarrhoea and onset of illness <4 days who has not been given antimicrobials for this illness.
- Fresh stools in sterile container must be kept at 4 °C and must reach the laboratory within 12 hours of collection. If fresh stools samples are not refrigerated they must reach the laboratory for culture.
- Where transport to the laboratory will take longer, Cary-Blair transport media must be used.
- Transport container should be well insulated with freezer packs or wet ice.
- Transport must not take more than 3 days.

Case management

Clinical case definition: acute bloody diarrhoea.

Laboratory criteria: Isolation of *Shigella dysenteriae* type 1 (Sd1) from stool samples.

Table 1. High-risk patients

- | |
|--|
| <ul style="list-style-type: none">• Children aged under 5 years, but especially infants, severely malnourished children and children who have had measles in the past 6 weeks• Older children and adults who are obviously malnourished• A patient who is severely dehydrated, has had a convulsion, or is seriously ill when first seen• Adults aged 50 years or older |
|--|

Standard treatment regimens:

A. Rehydrate with ORS or IV solution depending on severity, and monitor the hydration status frequently. (See Appendix for assessment and treatment of diarrhoea and dehydration.)

- Refer seriously ill or severely malnourished patients to hospital immediately.

B. Give antibiotics

- Antibiotics are essential and should be selected on the basis of susceptibility testing of the organisms grown from patients affected by the disease. The drugs must be effective against the local Sd1 strains.
- If an antimicrobial is effective, clinical improvement should be noted within 48 hours. If there is no improvement, treat with second-line drug, if available, for 5 days; otherwise, continue full 5-day course of first-line drug. Use only one of the following antibiotics:

Antibiotic	Dose	Children		Adults
		< 1 year	1–5 years	
Ciprofloxacin 500 mg	30 mg/kg divided 2 times/day for 3 days	½ tablet 2 times/day for 3 days	1 tablet 2 times/day for 3 days	1 tablet 2 times/day for 3 days

Note: Do not give antimicrobials that are known to be ineffective. When the supply of an effective antimicrobial is limited, priority should be given to high risk patients (see Table 1).

Do not forget:

- In health facilities
 - strengthen sanitary and hygiene measures in general;
 - implement disinfection measures in wards.
- In affected areas
 - ensure access to safe water (adequate quality and quantity);
 - strengthen health education on hygiene and disinfection measures;
 - set up surveillance for early detection of cases and monitoring of outbreak.

See *Guidelines for outbreak control* in this Toolkit (Document 5) for organization of an emergency treatment centre (Figure 1), essential hygiene rules in a cholera treatment centre (Table 4), preparation and use of disinfectants (Table 5) and calculation of treatment supplies for dysentery (Table 7).

This section was developed by the WHO Global Task Force on Cholera Control.

2. CHOLERA

Basic facts

- Cholera is an acute bacterial enteric disease with profuse watery stool.
- It is caused by a Gram-negative bacillus, *Vibrio cholera*, which produces a powerful enterotoxin that causes copious secretory diarrhoea.
- Transmission is by the faecal–oral route. Infection results from ingestion of organisms in food and water, or from indirect person-to-person contamination (unwashed hands).
- Acute carriers, including those with asymptomatic or mild disease, are important in the maintenance and transmission of cholera.
- Cholera is asymptomatic in more than 90% of infected cases.
- Attack rates in displaced populations can be as high as 10–15%; in normal situations, estimated at 1–2%.
- Case–fatality rates are usually around 5% but have reached 40% in large outbreaks in refugee camps.
- With appropriate treatment (with ORS in most cases), the case-fatality rate can be reduced to 1%.

Clinical features

- Incubation period is 1–5 days.
- Onset of symptoms is abrupt, with copious watery diarrhoea, classic “rice-water” stool with or without vomiting.
- Fluid loss can lead to rapid and profound dehydration, low serum potassium and acidosis.
- Fever is unusual, except in children.
- Vomiting without associated nausea may develop, usually after the onset of diarrhoea.
- Severe dehydration leads to loss of skin turgor, malaise, tachypnoea and hypotension.

Early detection of cholera cases is important to ensure prompt treatment and reduction of environmental contamination. Cholera should be suspected when:

- a patient aged over 5 years develops severe dehydration from acute watery diarrhoea (usually with vomiting)
or
- any patient aged over 2 years has acute watery diarrhoea in an area where there is an outbreak of cholera.

Diagnosis

- Fresh stools in sterile container if transport time is less than 2 hours.
- In alkaline peptone water if transport time is less than 24 hours.
- Cary-Blair transport media.
- Media previously cooled for 1 hour.
- Transport container well insulated.
- Transport within for 7–14 days after collection.

Case management

Clinical case definition: acute watery diarrhoea with or without vomiting, with or without severe dehydration, once cholera has been confirmed.

Laboratory criteria: Isolation of *Vibrio cholerae* O1 or O139 from stools

The prevention and treatment of dehydration are the mainstays of cholera management:

- STEP 1 Assess for dehydration (see Appendix)
- STEP 2 Rehydrate and monitor frequently
- STEP 3 Maintain hydration: replace ongoing fluid losses until diarrhoea stops
- STEP 4 Give oral antibiotics to patients with severe dehydration
- STEP 5 Feed the patient:
 - ensure normal intake of food as soon as possible;

– breastfeeding for infants and young children should continue.

Standard treatment regimens:

A. Rehydrate with ORS or IV solution depending on severity, and monitor the hydration status frequently. (See Appendix for assessment and treatment of diarrhoea and dehydration.)

- For severe dehydration, give IV fluid immediately to replace fluid deficit. Use Ringer’s lactate or Hartmann’s solution or, if not available, normal saline solution.
Plain glucose solutions are ineffective and should not be used.

B. Give antibiotics for severe cholera cases only.

Antibiotic	Dose	Children			Adults	Pregnant women
		Under 1 year	1–5 years	5–15 years		
Erythromycin 250 mg	30 mg /kg divided, 4 times/day for 3 days	¼ tablet 4 times/day for 3 days	½ tablet 4 times/day for 3 days	1 tablet 4 times/day for 3 days	2 tablets 4 times/day for 3 days	2 tablets 4 times/day for 3 days
Doxycycline 100mg	300 mg single dose				3 tablets	

- **Antibiotic therapy is not essential** to the management of cholera. **Effective rehydration therapy is life-saving.** In emergencies, systematic administration of antimicrobials is justified only for severe cases and in situations where bed occupancy, patient turnover or stocks of IV fluids are expected to reach critical levels in respect of case management capacity.
- An antibiotic sensitivity profile of the outbreak strain must be available as soon as possible to decide on the possible choice of antibiotic. Only oral antimicrobials must be given, and only once the patient has been rehydrated (usually in 4–6 hours) and vomiting has stopped.

Do not forget:

- In health facilities
 - strengthen sanitary and hygiene measures in general
 - implement disinfection measures in cholera wards
 - implement special funeral practices:
disinfect corpses with 2% chlorine solution;
fill the mouth and anus of the corpse with cotton wool soaked with 2% chlorine solution;
wash hands with soap after touching the corpse;
disinfect the clothing and bedding of the deceased by stirring them in boiling water or by drying them thoroughly in the sun.
- In affected areas:
 - ensure access to safe water (adequate quality and quantity);
 - strengthen health education on hygiene, disinfection measures and food safety;
 - set up surveillance for early detection of cholera cases and monitoring of outbreak.
- Chemoprophylaxis and quarantine measures are not effective in containing the spread of cholera.

See *Guidelines for outbreak control* in this Toolkit (Annex 5) for organization of an emergency treatment centre (Figure 1), essential hygiene rules in a cholera treatment centre (Table 4), preparation and use of disinfectants (Table 5) and calculation of treatment supplies for cholera (Table 6).

This section was developed by the WHO Global Task Force on Cholera Control.

3. TYPHOID FEVER

Basic facts

- Typhoid fever is a serious systemic infection caused by the enteric bacillus *Salmonella enterica* serovar Typhi (S.Typhi)
- Transmission is via the faecal–oral route, mainly from ingestion of organisms in food and water contaminated by faeces and urine of patients and carriers, or indirectly from person-to-person (unwashed hands).
- 2–5% of infected cases remain carriers for several months, and are highly involved in the spread of the disease.
- Without proper treatment case-fatality rate is high (10–20%).
- With appropriate antibiotic therapy, case-fatality rate can be reduced to 1%.
- Relapses occur in 3–4% of cases.
- Some strains of S.Typhi are resistant to antibiotics.
- Mass immunization may be a valuable adjunct for the control of typhoid fever during a sustained, high-incidence epidemic.
- A parenteral vaccine containing the polysaccharide Vi antigen is the vaccine of choice for displaced populations; a single injection provides effective protection, and adverse reactions are minimal.

Clinical features

- Incubation period is usually 8–14 days, but may vary from 3 days to as much as 1 month.
- Mild or inapparent forms are common, especially in endemic areas, and present with low-grade fever and malaise.
- Severe symptoms begin with the sudden onset of sustained fever, severe headache, nausea and loss of appetite, sometimes accompanied by hoarse cough and constipation or diarrhoea.
- Complications of intestinal ulceration can include intestinal perforation or haemorrhage.

Diagnosis

- Isolation of S.Typhi from blood culture early after disease onset, or from stool culture after the first week.
- Because of limited specificity and sensitivity, serological tests are generally of little diagnostic value.

Case management

Clinical case definition: acute or insidious onset of sustained fever, headache, malaise, anorexia, relative bradycardia, constipation or diarrhoea and non-productive cough (but many mild and atypical infections also occur).

Laboratory criteria: isolation of relevant serovars of S.Typhi from stool or blood of patient.

Standard treatment regimens:

Rehydrate with ORS or IV solution, depending on severity. (See Appendix for assessment and treatment of diarrhoea and dehydration).

Give antibiotics

Antibiotics are essential and should be selected on the basis of susceptibility testing of the organisms grown from patients affected by the disease. Only one of the following antibiotics should be used:

Susceptibility	Antibiotic	Daily dose	Days
Fully sensitive	Chloramphenicol	50–75 mg/kg	14–21
	Amoxicillin	75–100 mg/kg	14
	Co-trimoxazole	8–40 mg/kg	14
Multidrug-resistant	Cefixime	15–20 mg/kg	7–14
	Azithromycin	8–10 mg/kg	7

Treatment of complications

Treatment for complications may include rest, diuretics, ionotropes, and anti-arrhythmic drugs for myocarditis, replacement blood components for bone marrow suppression and blood transfusion for the haemorrhagic problems. Surgery is necessary in case of intestinal perforation.

Vaccination

Vaccination against typhoid fever during an outbreak should be considered: please contact the WHO Global Task Force on Cholera Control (e-mail: cholera@who.int).

Do not forget:

- In health facilities
 - strengthen sanitary and hygiene measures in general;
 - implement disinfection measures in wards;
 - implement special funeral practices.
- In affected areas
 - ensure access to safe water (adequate quality and quantity);
 - strengthen health education on hygiene and disinfection measures;
 - set up surveillance for early detection of cases and monitoring of outbreak.

See *Guidelines for outbreak control* in this Toolkit (Annex 5) for organization of an emergency treatment centre (Figure 1), essential hygiene rules in a cholera treatment centre (Table 4), preparation and use of disinfectants (Table 5) and calculation of treatment supplies for a typhoid outbreak (Table 8).

This section was developed by the WHO Global Task Force on Cholera Control.

4. EBOLA VIRAL HAEMORRHAGIC FEVER (VHF)

Basic facts:

- Ebola haemorrhagic viral fever (VHF) is an acute viral illness caused by the Ebola virus which belongs to the *Filovirus* group.
- It is transmitted from person to person by direct contact (spread) by droplets onto mucous membranes) or indirectly by infected blood, secretions, organs, semen and vomit. Under natural conditions, airborne transmission among humans has not been documented. Nosocomial infections have been frequent.
- The reservoir is not known, and is therefore difficult to evaluate the risk of transmission. The implementation of control measures can be difficult due also to cultural reasons, such as the custom of eating primate meat.

Clinical Features

- **Incubation period is usually for Ebola VHF is 2 to 21 days**
- Presentation may be very non specific. Initial symptoms include acute fever, diarrhoea that can be bloody (referred to as *diarrhée rouge* in francophone Africa) and vomiting. Headache, nausea and abdominal pain are common. Conjunctival injection, dysphagia and hemorrhagic symptoms (nosebleeds, bleeding gums, vomiting of blood, blood in stools, purpura) may further develop. Some patients may show a maculopapular rash on the trunk. Dehydration and significant wasting occur as the disease progresses.
- At a later stage, there is frequent involvement of the central nervous system, manifested by somnolence, delirium or coma.
- The case-fatality rate ranges from 50% to 90% according to the virus.

Case classification

Suspected: a case that is compatible with the clinical description.

Probable (in epidemic situation):

- Any person having had contact with a clinical case and presenting with acute fever, **or**
- Any person presenting with acute fever and 3 of the following: headache, vomiting/nausea, loss of appetite, diarrhoea, intense fatigue, abdominal pain, general or articular pain, difficulty in swallowing, difficulty in breathing, hiccoughs, **or**
- Any unexplained death

Confirmed: Any suspected or probable case that is laboratory-confirmed.

Contact (in epidemic situation): An asymptomatic person having had physical contact within the past 21 days with a confirmed or probable case or his/her body fluids (e.g. care for patient, participation in a burial ceremony, handling of potentially infected laboratory specimens).

Diagnosis

This can **only** be done in a laboratory of biosafety level 4 reference laboratory.

Specific diagnosis of VHF can be made in the following ways:

- isolating the virus from blood, urine or throat swabs and other tissues;
- Positive ELISA antigen detection or IgM capture, or
- Positive virus isolation (only in a laboratory of biosafety level 4), or
- Positive skin biopsy (immunohistochemistry), or
- Positive reverse transcriptase/polymerase chain reaction or immunohistochemistry (post-mortem diagnosis (PCR) with sequence confirmation.

The most common diagnostic test is the enzyme-linked immunosorbent assay (ELISA), which can detect IgM antibody (acute infection) and IgG antibody (recent infection) as well as the virus antigen.

Case management

There is no specific therapy currently available for filoviral infections

Supportive treatment includes the use of

- Analgesic drugs
- Antimicrobial drugs (to avoid secondary infections)
- Fluid replacement with careful maintenance of fluid and electrolyte balance, circulatory volume, blood pressure. Most of the fluid replacement should be done orally.
- oxygenation,
- treatment of any other complicating infection (e.g. malaria, measles)
- Mechanical ventilation, renal dialysis, and anti-seizure therapy may be required.

Remember: All medication should be given by the oral or intravenous route. Intramuscular and subcutaneous injections are contraindicated because of the risk of hematomas.

Implementation of barrier nursing practices is of crucial importance when managing VHF patients. In order to prevent secondary infections contact with the patient's lesions and body fluids should be minimized using standard isolation precautions:

- Isolation of patients
- Restriction of access to patients wards
- Use of protective clothing
- Safe disposal of waste
- Disinfection of all non-disposable supplies and equipment
- Safe burial practices

These can be implemented despite problems due to limited resources (see WHO/CDC. Infection control for viral hemorrhagic fevers in the African care setting. Geneva: WHO, 1998. WHO/EMC/EST/98.2)

Protective measures

Patients with probable or confirmed VHF should be isolated and cared for using **barrier-nursing techniques**. Isolation precautions to reduce the risk of transmission of Lassa fever in the health care setting should follow the guidelines developed by WHO/CDC. **Universal precautions** must be observed when handling specimens of blood or tissues, and when disposing of waste material, needles, and other sharp instruments.

See:

-*"VHF outbreak control"* in *Guidelines for outbreak control, in this Toolkit* (Annex 5)

-*Infection Control for Viral Haemorrhagic Fevers in the African Health Care Setting, available online at: http://www.who.int/emc-documents/haem_fever/whoemcesr982c.html*

-*"Prevention"* in *Section 7, HIV/AIDS in the Communicable Disease Profile of this Toolkit.*

-*ANNEX 8 in Guidelines for collection of specimens for laboratory testing, in this toolkit.*

Hospital control

Basic barrier nursing methods (gloves, gowns and masks) are highly effective in preventing secondary spread of the infection. Strict isolation with rigorous barrier nursing should be combined with full medical care, to ensure the safety of the staff and survival of the patient.

Epidemics of the disease in health care institutions with poor hygiene standards can be dramatically amplified through contact with patients or body fluids from infected patients (blood, vomit, urine, stools, semen, saliva). The potential for explosive nosocomial infections constitutes the main threat to public health posed by the disease. Strict adherence to isolation precautions with all patients has been shown to reduce the risk of transmission, as was observed during the May to June 2004 Ebola hemorrhagic fever outbreaks in Yambio county, Southern Sudan. A total of 17 cases and 7 deaths of Ebola VHF were reported. Thirteen of the cases were laboratory-confirmed and 4 cases epidemiologically linked. The rapid containment of this outbreak was a tremendous success for the health authorities, WHO, and the international community involved in the control operations.

The following will help prevent explosive epidemics in areas potentially subject to Ebola disease:

- Social mobilization and health education of the community.
- Advance training of health workers on the use of isolation precautions, proper barrier nursing methods and the regular consistent practice of universal precautions.

5. MEASLES

Basic facts

- Measles is a highly communicable viral infection transmitted through airborne spread of respiratory droplets from person to person, or by direct contact with nasal and throat secretions of infected persons or via objects that have been in close contact with an infected person.
- It is a severe disease caused by the rubeola virus, which damages epithelial surfaces and the immune system.
- Measles can increase susceptibility to other infections such as pneumococcus and Gram-negative bacteria.
- It can lead to or exacerbate vitamin A deficiency, increasing the susceptibility to xerophthalmia, blindness and premature death.
- The most vulnerable age group is children aged between 9 months and 5 years in developing countries, but this depends on the immunization coverage rates.
- Deaths are mostly the result of complications such as pneumonia, croup and diarrhoea and are frequently associated with malnutrition.

Note: While this section details diagnosis and case management of measles, immunization remains the most important strategy for measles control. Measles immunization campaigns are one of the highest priorities in displaced populations. The recommended age group for immunization is 6 months to 15 years, with vitamin A supplementation for children aged 6–59 months. Those vaccinated between the ages of 6 and 9 months must have another dose on reaching 9 months of age.

Clinical features

- Incubation period from exposure to onset of fever is usually 10 days.
- Initial symptoms and signs are high fever, runny nose, coryza, cough, red eyes and Koplik spots (small white spots on the buccal mucosa).
- Characteristic erythematous (red) maculopapular (blotchy) rash appears on the third to seventh day, starting behind the ears and on the hairline and then spreading to the rest of the body.
- Temperature subsides after 3–4 days; the rash fades after 5–6 days.
- Measles is highly infectious from the start of the prodromal period until approximately 4–5 days after the rash appears.
- Case–fatality rates are estimated to be 3–5% in developing countries but may reach as much as 10–30% in displaced populations.

Complications

- Complications develop in 5–10% of measles cases.
- Complications occurring in the first week of illness, such as croup, diarrhoea and pneumonia, are usually due to effects of the measles virus and are rarely life-threatening.
- Later complications are usually due to secondary viral or bacterial infections – post-measles pneumonia, diarrhoea and croup are the most common life-threatening complications.
- Pneumonia: usually severe, Gram-negative or staphylococcal.
- Diarrhoea: either due to virus or to a secondary infection, e.g. *Shigella*.
- Malnutrition: precipitated by anorexia, stomatitis, fever, vomiting, diarrhoea and other complications.
- Stomatitis: compromises sucking and eating.
- Vitamin A deficiency: keratoconjunctivitis. Measles increases the need for vitamin A and often precipitates xerophthalmia.
- Encephalitis: caused by the measles virus itself, occurs on about the 5th day of the rash.
- Otitis media, croup.
- Blindness due to scarring, as a result of vitamin A deficiency and/or conjunctivitis.

Case management

Take a history from the mother and examine the child for the following:

Symptoms	Signs
Ability to take feeds of fluids	Nutritional status
Cough and difficult breathing	Breathing rate, chest indrawing, stridor
Diarrhoea or blood in stools	Dehydration and fever
Sore mouth, eyes or ears	Mouth ulcers, sore and discharging ears and eyes, white spots on eyes
	Level of consciousness

Case management of uncomplicated measles – health centre

Most children will have uncomplicated measles and require supportive care as outpatients. Good supportive care can improve a child's outcome. Isolation of patients with measles is not indicated in emergency situations. All children with measles in these settings should have their nutritional status monitored and be enrolled in a feeding programme if necessary.

Nurse the child in a shaded and well ventilated area, which is generally more comfortable – sunlight can hurt the eyes, and a cool environment can help keep the body temperature down.

- Control the fever by tepid sponging and giving paracetamol.
- Maintain good hydration: treat diarrhoea with ORS.
- Observe closely for complications.
- Give prophylaxis against xerophthalmia: vitamin A on day 1 and day 2

	Day 1	Day 2
Infants <6 months	50 000 IU	50 000 IU
Infants 6–11 months	100 000 IU	100 000 IU
Children >11 months	200 000 IU	200 000 IU

- Maintain adequate protein–calorie intake: tell mothers to give frequent small meals.
- Continue breastfeeding.
- Provide supplementary feeding, if available. The diet must be soft, with a high calorie density so that small portions go a long way. Unless in the form of egg, protein is unlikely to be eaten – *remember the child has a sore mouth and poor appetite.*
- Do not admit children with measles to *general* feeding centres until after infectious period.
- If there are high numbers of cases, it may be necessary to set up a small unit for children with measles, as these children and their mothers need considerable supportive care.
- Use antimicrobials only when indicated.
- Active case-finding during epidemic if practical (home visits).

Case management of complicated measles – hospital

- Control fever, provide nutritional support and vitamin A therapy as for uncomplicated measles.
- Antimicrobials should be given only if there is a specific indication such as pneumonia, otitis media or dysentery.
- Prophylactic antimicrobials should be given to children at significant risk of secondary bacterial infection – such as children with severe malnutrition, HIV infection or xerophthalmia. A broad-spectrum antibiotic such as ampicillin or co-trimoxazole should be used.
- Pneumonia: cough and rapid breathing (40 breaths/minute or more if aged over 1 year; 50 breaths/minute if aged under 1 year). Give an antibiotic such as ampicillin, amoxicillin or co-trimoxazole. If the child's condition does not improve after 24–48 hours, change the antibiotic to an antistaphylococcal drug such as cloxacillin or chloramphenicol.
- Diarrhoea: three or more loose or watery stools in 24 hours. Assess for associated dehydration. If there is blood in the stool, the child has dysentery. The commonest cause of dysentery is *Shigella* (see “Bacillary dysentery/Shigellosis” for case management).

- Eye problems: the major eye problems in measles are conjunctivitis or keratitis, and corneal damage due to vitamin A deficiency. Red and watery eyes are the result of conjunctivitis (inflammation of the conjunctiva): no treatment is necessary.
- Sticky eyes or pus in the eyes are caused by a secondary bacterial infection: clean the eyes at least three times a day with cooled boiled water, using cotton wool or a clean cloth. Use tetracycline ointment three times a day for 7 days. NEVER use steroid eye ointments. Ensure that vitamin A has been given; if there is vitamin A eye disease, a third dose must be given 4 weeks later.

6. MENINGITIS

Basic facts

- Meningitis is an acute inflammation of the meninges that can be caused by bacteria or viruses.
- Transmission is through direct contact with respiratory droplets.
- Large outbreaks of meningitis are mainly due to meningococcus (*Neisseria meningitidis*, serogroups A, C and W).
- *N. meningitidis* also causes meningococcal septicaemia – this is a less common but very severe disease with acute fever, purpura and shock.
- *N. meningitidis*, *Streptococcus pneumoniae* and *Haemophilus influenzae* account for 80% of all cases of bacterial meningitis.
- Viral meningitis is rarely serious and may be due to a number of viruses such as Coxsackievirus or Enterovirus.
- Displaced populations are at increased risk of meningitis due to overcrowding, poor hygiene and poor access to health care.
- Epidemics in refugee camps have mainly been due to *N. meningitidis* serogroup A.
- 80% of cases of meningococcal meningitis occur in those aged under 30 years.
- Without appropriate treatment, case–fatality rates in meningococcal meningitis can be as high as 50%. This can be reduced to 5–15% by correct treatment.
- Vaccines are available against *N. meningitidis* serogroups A, C and W135 and are very effective in controlling epidemics. In rapid mass campaigns, vaccination can contain an outbreak within 2–3 weeks. For individuals aged over 2 years, vaccine efficacy is 90% one week after injection.

Diagnosis

- Ask about: sudden onset of intense headache, fever, nausea, vomiting, photophobia, stiff neck.
- Examine for:
 - meningeal rigidity, i.e. neck stiffness
 - lethargy, delirium, coma
 - purpura – characteristic sign of meningococcal septicaemia
 - symptoms of shock – low blood pressure.
- In a child <1 year, classic signs are rare, look for:
 - fever, diarrhoea, vomiting, drowsiness
 - convulsions
 - bulging fontanelle

Lumbar puncture is necessary to determine whether acute meningitis is bacterial and should be done as soon as meningitis is suspected, before starting antimicrobials. In bacterial meningitis, CSF is usually cloudy or purulent (but may be clear or bloody). Basic laboratory examination consists of white cell count (WCC), protein and Gram stain.

Bacterial meningitis if:

WCC measurement: >1000 cells/mm³ (<3 in normal CSF) with >60% polymorphs

Protein: >0.80 g/litre (<0.60 g/litre in normal CSF)

Gram stain: Gram-negative diplococci in 80% of cases not previously treated

Differential diagnosis of bacterial meningitis

Viral meningitis: do lumbar puncture and examine CSF

Case management

- Bacterial, particularly meningococcal, meningitis is potentially fatal and is a medical emergency.
- Viral meningitis is rarely serious and requires supportive care, but a lumbar puncture is necessary to differentiate from bacterial meningitis.
- Admit all suspected meningitis cases to hospital for diagnosis and case management.
- Perform lumbar puncture and give antimicrobials immediately without waiting for results.
- Do not delay treatment with antimicrobials if lumbar puncture cannot be done.

Table 1. Initial empirical antimicrobial therapy for presumed bacterial meningitis

Age group	Probable pathogen	Antimicrobial – first choice	Alternative
In epidemic situations: all age groups	<i>N. meningitidis</i>	Oily chloramphenicol	Ampicillin Ceftriaxone or Cefotaxime Co-trimoxazole Benzylpenicillin
In non-epidemic situations: adults children >5 years	<i>N. meningitidis</i> <i>S. pneumoniae</i>	Benzylpenicillin or oily chloramphenicol	Ampicillin Ceftriaxone or Cefotaxime Co-trimoxazole
children 1 month – 5 years	<i>H. influenzae</i> <i>S. pneumoniae</i> <i>N. meningitidis</i>	Ampicillin or amoxicillin Chloramphenicol	Ceftriaxone or Cefotaxime
neonates	Gram-negative bacteria Group B streptococci <i>Listeria</i>	Ampicillin and gentamicin	Ceftriaxone or Cefotaxime Chloramphenicol

- IV benzylpenicillin, ampicillin, ceftriaxone or cefotaxime is recommended for bacterial meningitis; however, ceftriaxone and cefotaxime are very expensive.
- In patients who cannot be given drugs IV, oral administration is acceptable but higher doses are necessary.
- During large epidemics in refugee/displaced populations, a single IM dose of oily chloramphenicol has been used.
- In meningococcal septicaemia with purpura and shock, treat shock by restoring blood volume; give IV dexamethasone to reduce cerebral oedema.
- Chemoprophylaxis of contacts is not recommended in emergency situations.
- Supportive therapy: maintain hydration and adequate nutrition.
- Treat convulsions by giving diazepam IV or rectally.
- Nurse patients in a shaded and well-ventilated area. The unconscious or semiconscious patient should be nursed on his or her side. Turning every 2–3 hours can prevent pressure sores.

Table 2. Antimicrobials to treat bacterial meningitis

Agent	Route	Daily dose for adults	Daily dose for children	Duration (days)	Cost ^a
Benzylpenicillin	IV	3–4 Million Units 4–6 times	400 000 U/kg	>4	low
Ampicillin/ amoxicillin	IV	2–3 g twice	250 mg/kg	>4	medium
Amoxicillin	Oral	2–3 g twice	250 mg/kg	>4	high
Chloramphenicol	IV	1 g 2–3 times	100 mg/kg	>4	medium
Chloramphenicol (oily)	IM	3 g single dose	100 mg/kg	1–2	low
Cefotaxime	IV	2 g twice	250 mg/kg	>4	very high
Ceftriaxone	IV	1–2 g once or twice	50–80 mg/kg	>4	low
Ceftriaxone	IM	1–2 g, single dose	50–80 mg/kg	1–2	low
Co-trimoxazole	IV/IM	2 g SMZ ^b twice	100 mg/kg	>4	medium
Co-trimoxazole	Oral	2 g SMZ ^b twice	100 mg/kg	>4	low
Sulfadiazine	IV	1 g six times	200 mg/kg	>4	low

^a Guide to cost of full treatment: low <US\$ 10; medium US\$ 10–50; high US\$ 50–250, very high >\$250.

^b Sulfamethoxazole.

7. YELLOW FEVER

Basic facts

- Yellow fever is a viral haemorrhagic fever transmitted by mosquitoes infected with the yellow fever virus. The incubation period is 3–7 days.
- Mosquitoes are infected by feeding on patients in the first 3–4 days of illness, when the virus is circulating in the blood.
- The disease is untreatable, and case–fatality rates in severe cases can exceed 50%.
- Yellow fever can be prevented by immunization with the 17D yellow fever vaccine. The vaccine is safe, inexpensive and reliable – a single dose provides protection against the disease for at least 10 years and possibly for life.
- Any person who is not immunized against yellow fever is at risk for the disease.
- An outbreak of yellow fever is defined as at least one confirmed case.
- In an outbreak situation, the target population for emergency immunization is the general population living or working in the same area as the patient. If initial resources are limited, the primary target population is children aged 9 months up to 14 years.

Clinical features

- An *acute phase* lasting 4–5 days and presenting with:
 - sudden onset of fever
 - headache or backache
 - muscle pain
 - nausea
 - vomiting
 - red eyes (injected conjunctiva).

Because jaundice may not be present in less severe (or mild) cases of yellow fever, this phase of the disease can be confused with other diseases that also present with fever, headache, nausea and vomiting. The less severe cases are often non-fatal.

- A temporary *period of remission* follows the acute phase in 5–20% of cases and lasts for up to 24 hours.
- A *toxic phase* can follow the period of remission and present with:
 - jaundice
 - dark urine
 - reduced urine production
 - bleeding from the gums or nose or in the stool
 - vomiting blood
 - hiccups
 - diarrhoea
 - slow pulse in relation to fever.

WHO case definition for yellow fever surveillance

Suspected case: an illness characterized by an acute onset of fever followed by jaundice within 2 weeks of onset of the first symptoms AND one of the following: bleeding from the nose, gums, skin or gastrointestinal tract OR death within 3 weeks of the onset of illness.

Confirmed case: a suspected case that is confirmed by laboratory results or linked to another confirmed case or outbreak.

Outbreak: an outbreak of yellow fever is at least one confirmed case.

Diagnosis

- Laboratory analysis of blood or tissue samples (usually liver) is needed to confirm a case of yellow fever. Two blood samples must be taken.
- Yellow fever is confirmed if laboratory results show:
 - isolation of the yellow fever virus, or
 - presence of yellow fever-specific IgM, or
 - a fourfold or greater rise in serum IgG levels between the acute and convalescent serum samples,OR
 - positive postmortem liver histopathology, or
 - detection of yellow fever antigen in tissues by immunohistochemistry, or
 - detection of yellow fever virus RNA genomic sequences in blood or tissues.

Note: Liver samples are taken from fatal cases only.

Case management

- No specific treatment is available for yellow fever. In the toxic phase, supportive treatment includes therapies for treating dehydration and fever. In severe cases, death can occur 7–10 days after onset of the first symptoms.
- For fever: give paracetamol.
- For dehydration: give ORS solution or IV fluids depending on the assessment of dehydration.
- For restlessness: give diazepam.
- For malaria: give an antimalarial recommended for your area.
- For bacterial infections: give antibiotics recommended for your area.

APPENDIX

ASSESSMENT AND TREATMENT OF DIARRHOEA

Table A1. Assessment of diarrhoeal patients for dehydration

First assess your patient for dehydration			
	PLAN A	PLAN B	PLAN C
1. Look at general condition	Well, alert	*Restless, irritable*	*Lethargic or unconscious; floppy*
eyes ^a	Normal	Sunken	Very sunken and dry
tears	Present	Absent	Absent
mouth and tongue ^b	Moist	Dry	Very dry
thirst	Drinks normally, not thirsty	*Thirsty, drinks eagerly*	*Drinks poorly or not able to drink*
2. Feel skin pinch ^c	Goes back quickly	*Goes back slowly*	*Goes back very slowly*
3. Decide	The patient has <i>no signs of dehydration</i>	If the patient has two or more signs, including at least one *sign* there is <i>some dehydration</i>	If the patient has two or more signs, including at least one *sign* there is <i>severe dehydration</i>
4. Treat	Use Treatment Plan A	Weigh the patient if possible and use Treatment Plan B	Weigh the patient and use Treatment Plan C URGENTLY

^a In some infants and children the eyes normally appear somewhat sunken. It is helpful to ask the mother whether the child's eyes are normal or more sunken than usual.

^b Dryness of the mouth and tongue can also be palpated with a clean finger. The mouth may always be dry in a child who habitually breathes through the mouth. The mouth may be wet in a dehydrated patient owing to recent vomiting or drinking.

^c The skin pinch is less useful in infants or children with marasmus (wasting) or kwashiorkor (severe malnutrition with oedema) or in obese children.

Source: *The treatment of diarrhoea: a manual for physicians and other senior health workers*. Geneva, World Health Organization, 1995 (WHO/CDR/95.3).

Treatment plan A: to treat diarrhoea at home

Use this plan to teach the mother to:

- continue to treat her child's current episode of diarrhoea at home; and
- give early treatment for future episodes of diarrhoea.

Explain the three rules for treating diarrhoea at home.

A. Give the child more fluids than usual to prevent dehydration

- Use recommended home fluids. These include ORS solution, food-based fluids (such as soup, rice water and yogurt drinks) and plain water. Use ORS solution as described in the box below.

Note: If the child is under 6 months of age and not yet taking solid food, give ORS solution or water rather than food-based fluid.

- Give as much of these fluids as the child will take. Use the amounts shown below for ORS as a guide.
- Continue giving these fluids until the diarrhoea stops.

B. Give the child plenty of food to prevent malnutrition

- Continue to breastfeed frequently.
- If the child is not breastfed, give the usual milk.
- If the child is 6 months or older, or already taking solid food:
 - also give cereal or another starchy food mixed, if possible, with pulses, vegetables and meat or fish; add one or two teaspoonfuls of vegetable oil to each serving;
 - give fresh fruit juice or mashed banana to provide potassium;
 - give freshly prepared foods; cook and mash or grind food well;
 - encourage the child to eat: offer food at least six times a day; and
 - give the same food after diarrhoea stops, and give an extra meal each day for 2 weeks.

C. Take the child to the health worker if he or she does not get better in 3 days or develops any of the following:

- many watery stools
- repeated vomiting
- marked thirst
- eating or drinking poorly
- fever
- blood in the stool

Children should be given ORS solutions at home if:

- they have been on Treatment Plan B or C;
- they cannot return to the health worker if the diarrhoea gets worse; or
- if it is national policy to give ORS to all children who see a health worker for diarrhoea.

If the child is to be given ORS solution at home, show the mother how much ORS to give after each loose stool and give her enough packets for 2 days.

Age	Amount of ORS solution to be given after each loose stool	Amount of ORS solution to provide for use at home
Under 24 months	50–100 ml (¼ – ½ cup)	500 ml/day
2–10 years	100–200 ml (½ – 1 cup)	1000 ml/day
10 years or older	as much as wanted	2000 ml/day

- Describe and show the amount to be given after each stool, using a local measure.

Show the mother how to mix and to give ORS

- Give a teaspoonful every 1–2 minutes for a child aged under 2 years.
- Give frequent sips from a cup for older children.
- If the child vomits, wait 10 minutes. Then give the solution more slowly (for example, a spoonful every 2–3 minutes).
- If diarrhoea continues after the ORS packets are used up, tell the mother to give other fluids as described in rule A above or return for more ORS.

Treatment plan B: to treat dehydration

Table A2. Approximate amount of ORS solution to give in the first 4 hours

	Age ^a					
	<4 months	4–11 months	12–23 months	2–4 years	5–14 years	15 years +
Weight	0 – <5 kg	5–7.9 kg	8–10.9 kg	11–15.9 kg	16–29.9 kg	30 kg +
In ml	200–400	400–600	600–800	800–1200	1200–2200	2200–4000

^a Use the patient'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 patient's weight (in grams) by 0.075.

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

Observe the child carefully and help the mother give ORS solution.

- Show her how much solution to give the child.
- Show her how to give it – a teaspoonful every 1–2 minutes for a child aged under 2 years, frequent sips from a cup for an older child.
- Check from time to time to see whether there are problems.
- If the child vomits, wait 10 minutes and then continue giving ORS, but more slowly; for example, a spoonful every 2–3 minutes.
- If the child's eyelids become puffy, stop the ORS and give plain water or breast milk. Give ORS according to Plan A when the puffiness is gone.

After 4 hours, reassess the child using the assessment chart, then select Plan A, B or C to continue treatment.

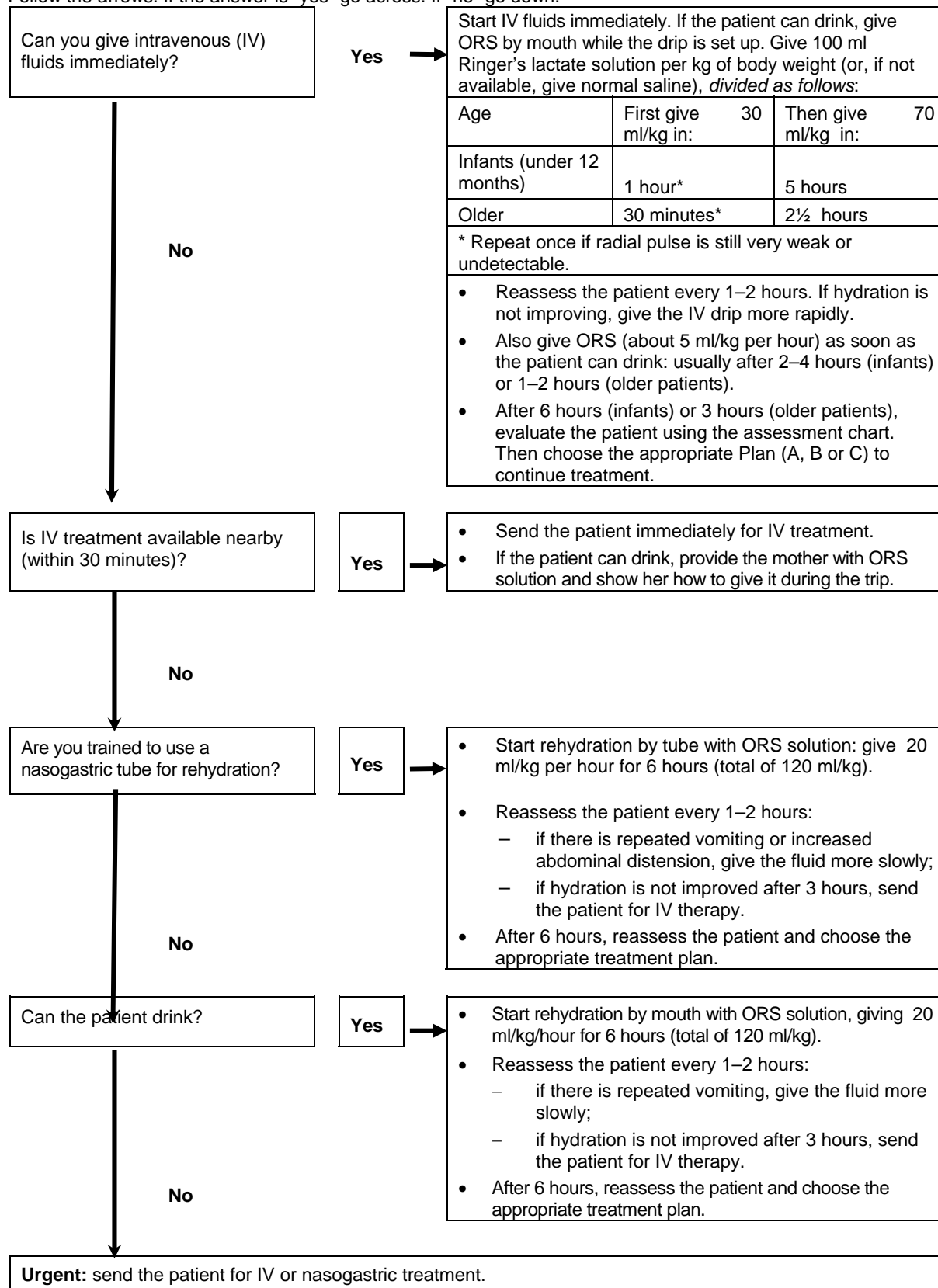
- If there are no signs of dehydration, shift to Plan A. When dehydration has been corrected, the child usually passes urine and may also be tired and fall asleep.
- If signs indicating some dehydration are still present, repeat Plan B but start to offer food, milk and fruit juice as described in Plan A.
- If signs indicating severe dehydration have appeared, shift to Plan C.

If the mother must leave before completing Treatment Plan B:

- show her how much ORS to give to finish the 4-hour treatment at home;
- give her enough ORS packets to complete rehydration, and for 2 more days as shown in Plan A;
- show her how to prepare ORS solution; and
- explain to her the three rules in Plan A for treating her child at home:
 - to give ORS or other fluids until diarrhoea stops
 - to feed the child
 - to bring the child back to the health worker, if necessary.

Treatment plan C: to treat severe dehydration quickly

Follow the arrows. If the answer is “yes” go across. If “no” go down.



If possible, observe the patient for at least 6 hours after rehydration to be sure the mother can maintain hydration giving ORS solution by mouth. If the patient is older than 2 years and there is cholera in the area, give an appropriate oral antibiotic after the patient has become alert.

COMMUNICABLE DISEASE TOOLKIT

SUDAN

7. GUIDELINES FOR COLLECTION OF SPECIMENS FOR LABORATORY TESTING



World Health Organization

INTRODUCTION

There is a high risk of communicable disease outbreaks in emergency situations. Outbreaks must be recognized and controlled rapidly in order to minimize their impact. **Effective containment of an outbreak depends on:**

- **early detection and reporting of suspect cases**
- **rapid epidemiological investigation**
- **rapid laboratory confirmation of the diagnosis**
- **implementation of effective control measures.**

Rapid identification of the causative agent and the likely source or mode of transmission is essential. The initial investigation involves two important processes: collection of information on suspect cases and collection of clinical specimens for laboratory diagnosis. **Successful laboratory confirmation of a disease depends on:**

- **advance planning**
- **collection of appropriate and adequate specimens**
- **correct packaging of specimens and rapid transport to an appropriate laboratory**
- **the ability of the laboratory to carry out the diagnostic tests**
- **proper biosafety and decontamination procedures to reduce the risk of further spread of the disease.**

The purpose of this document is to ensure that the correct specimens are collected, packaged and transported in a safe and standardized manner during a field investigation of an outbreak in Sudan or its neighbouring countries.

This document is adapted for emergency situations from *Guidelines for the collection of clinical specimens during field investigation of outbreaks*. Geneva, World Health Organization, 2000 (WHO/CDS/CSR/EDC/2000.4).

1. Planning for specimen collection

Once a suspected outbreak has been detected and reported, an epidemiological investigation must be quickly organized. The materials and procedures required for efficient specimen collection and their transport to the laboratory for testing are outlined below.

1.1 Define the possible causes of the outbreak

An assessment of current clinical and epidemiological information is the starting point for considering the potential etiology of the outbreak. The historical knowledge of regional endemic and epidemic diseases, as well as their seasonality, further defines the possible causes. Since a variety of infectious agents can present with a similar clinical picture, the outbreak should be approached in a syndromic manner to obtain the differential diagnosis. One or more specimen types may be required to define the cause of the outbreak.

1.2 Decide which clinical specimens are required to confirm the cause of the outbreak

After defining the clinical syndrome and suspect pathogen(s), decide on the clinical specimens to be collected for appropriate laboratory diagnosis.

1.3 Laboratory for specimen testing

In the event of an outbreak, WHO will coordinate the transport of specimens and follow up on result of laboratory tests.

1.4 Collecting the specimens

For stools, the health worker should collect the sample, place in cold-box and inform WHO. Transport to the laboratory should be done as soon as possible. For CSF, the admitting physician should conduct the lumbar puncture and obtain the sample. Blood samples should be taken by the health worker.

2. Specimen collection and processing

Investigation should start as early as possible after a suspected outbreak has been notified. Specimens obtained in the acute phase of the disease, preferably before administration of antimicrobial drugs, are more likely to yield detectable concentrations of antibody, antigen or infective pathogen. Before beginning specimen collection, explain the procedure to the patient and relatives. When collecting the specimen, avoid contamination and take a sufficient quantity of material (as guided by the laboratory tests). Follow the appropriate precautions for safety during collection and processing of specimens.

2.1 Labelling and identification of specimens

In an outbreak investigation, the information contained in the case investigation and laboratory request forms is collected along with the specimen. Each patient should be assigned a unique identification number by the collection team. This is the link between the laboratory results on the line listing form, the specimens and the patient, which guides further investigation and response to the outbreak. This unique identification number and the patient's name should be present on all specimens, epidemiological data forms and the laboratory request and should be used as a common reference.

2.2 Labelling specimen container/slide

Labels must always be used. The label should be very clearly written and permanently affixed to the specimen container.

It should contain the:

- patient name
- unique identification number
- specimen type and date and place of collection
- name or initials of specimen collector.

2.3 Case investigation and laboratory forms

A case investigation form should be completed for each patient at the time of specimen collection. The original case investigation form remains with the investigation team, and should be kept together for analysis and later reference. A laboratory form must also be completed for each specimen. The epidemiological and clinical data gathered in the investigation can later be easily tied to the laboratory results for analysis.

The form includes:

- patient information: name, age (or date of birth), sex, complete address.
- clinical information: date of onset of symptoms, clinical and immunization history, risk factors, antimicrobials taken before specimen collection
- laboratory information: acute or convalescent specimen, other specimens from the same patient.

The form records the date and time when the specimen is received and the name of the person collecting the specimen.

3. Storage of specimens

To preserve bacterial or viral viability in specimens for microbiological culture or inoculation, they should be placed in appropriate media and stored at recommended temperatures. These conditions must be preserved throughout transport to the laboratory and will vary according to the nature of specimens and pathogens (sensitivity to desiccation, temperature, nutrient and pH) and the time required to transport the specimens to the laboratory.

Many specimens taken for viral isolation are viable for 2 days if maintained in type-specific media at 4–8 °C. Freeze these specimens in accordance with expert advice, as infectivity may be altered.

Specimens for bacterial culture should be kept in appropriate transport media at the recommended temperature. This ensures bacterial viability while minimizing overgrowth of other microorganisms. With the exception of CSF, urine and sputum, most specimens may be kept at ambient temperature if they will be processed within 24 hours. For longer delays, storage at 4–8 °C is advisable except in the case of particularly cold-sensitive organisms, such as *Shigella*, *Meningococcus* and *Pneumococcus*. Longer delays are not advisable as the yield of bacteria may fall significantly.

Specimens for antigen or antibody detection may be stored at 4–8 °C for 24–48 hours or at –20 °C for longer periods. Sera for antibody detection may be stored at 4–8 °C for up to 10 days. Although not ideal, sera stored at room temperature may still be useful for antibody testing even after prolonged periods (weeks). Therefore, sera that have been collected should not be discarded simply because no refrigeration facilities are available.

APPENDIX 1: LABORATORIES FOR CONFIRMATION OF PRIORITY DISEASES IN SUDAN

Suspected organism/disease	Laboratory
<i>Vibrio cholera</i> O1: stool	<ul style="list-style-type: none"> • WHO accredited laboratories in the region. • Institut Pasteur, Paris, France for confirmation
<i>Shigella dysenteriae</i> type 1: stool	<ul style="list-style-type: none"> • WHO accredited laboratories in the region. • Institut Pasteur, Paris, France for confirmation
Meningitis: cerebrospinal fluid	<ul style="list-style-type: none"> • Rapid tests for meningococcal serotypes A, C, W135 available with some NGOs (e.g. MSF). • WHO accredited laboratories in the region. • Transport for culture to Institut Pasteur, Paris, France.
Measles, yellow fever (2 tubes): blood, serum	<ul style="list-style-type: none"> • WHO accredited laboratories in the region.
Acute flaccid paralysis: stool	<ul style="list-style-type: none"> • WHO accredited laboratories in the region.
Haemorrhagic fevers: blood, urine	<ul style="list-style-type: none"> • WHO accredited laboratories in the region.

APPENDIX 2: BLOOD SPECIMEN COLLECTION

Blood and separated serum are the most common specimens taken in outbreaks of communicable disease. Venous blood can be used for isolation and identification of the pathogen in culture and by inoculation, or separated into serum for the detection of genetic material (e.g. by polymerase chain reaction), specific antibodies (by serology), antigens or toxins (e.g. by immunofluorescence). For the processing of most specimens for diagnosis of viral pathogens, serum is preferable to unseparated blood except where otherwise directed. When specific antibodies are being assayed, it is often helpful to collect paired sera, i.e. an acute sample at the onset of illness and a convalescent sample 1–4 weeks later. Blood can also be collected by finger-prick for the preparation of slides for microscopy or for absorption onto special filter-paper discs for analysis. Whenever possible, blood specimens for culture should be taken before antibiotics are administered to the patient.

Venous blood samples

Materials for collection

- Skin disinfection: 70% alcohol (isopropanol, ethanol) or 10% povidone iodine, swabs, gauze pads, adhesive dressings.
- Disposable latex or vinyl gloves.
- Tourniquet, vacutainer or similar vacuum blood collection devices, or disposable syringes and needles.
- Vacutainer or sterile screw-cap tubes (or cryotubes if indicated), blood culture bottles (50 ml for adults, 25 ml for children) with appropriate media.
- Labels and indelible marker pen.

Method of collection

Full infection control measures must be taken, with gowns, gloves, masks and boots for suspected viral haemorrhagic fever such as Lassa fever or Ebola (see *Appendix 7*).

- Place a tourniquet above the venepuncture site. Disinfect the tops of blood culture bottles.
- Palpate and locate the vein. The venepuncture site **must** be meticulously disinfected with 10% povidone iodine or 70% alcohol by swabbing the skin concentrically from the centre of the venepuncture site outwards. Let the disinfectant evaporate. Do not repalpate the vein. Perform venepuncture.
- If using conventional disposable syringes, withdraw 5–10 ml of whole blood from adults, 2–5 ml from children and 0.5–2 ml from infants. Using aseptic technique, transfer the specimen to relevant capped transport tubes and culture bottles. Secure caps tightly.
- If using a vacuum system, withdraw the desired amount of blood directly into each transport tube and culture bottle.
- Remove the tourniquet. Apply pressure to site until bleeding stops, and apply dressing.
- Label the tube, including the unique patient identification number, using indelible marker pen.
- Do not recap used sharps. Discard directly into the sharps disposal container.
- Complete the case investigation and the laboratory request forms using the same identification number.

Handling and transport

- Blood specimen bottles and tubes should be transported upright and secured in a screw-cap container or in a rack in a transport box. They should have enough absorbent paper around them to soak up all the liquid in case of spillage.
- For serum samples (e.g. measles, yellow fever, HIV), the blood cells must be separated from serum. Let the clot retract for 30 minutes, then centrifuge at 2000 rpm for 10–20 minutes and pour off serum. If no centrifuge is available, place sample in refrigerator overnight (4–6 hours) and pour off the serum for transport in a clean glass tube.
- Do **not** attempt this in case of suspected viral haemorrhagic fever unless you are a clinician/laboratory technician experienced in management of the disease. Full protection and infection control measures must be taken (see *Appendix 7*).
- If the specimen will reach the laboratory within 24 hours, most pathogens can be recovered from blood cultures transported at ambient temperature. Keep at 4–8 °C for longer transit periods, unless the bacterial pathogen is cold-sensitive.

APPENDIX 3: CEREBROSPINAL FLUID (CSF) SPECIMEN COLLECTION

The specimen must be taken by a physician or a person experienced in the lumbar puncture procedure. CSF is used in the diagnosis of viral, bacterial, parasitic and fungal meningitis/encephalitis.

Materials for collection

Lumbar puncture tray that includes:

- Sterile materials: gloves, cotton wool, towels or drapes.
- Local anaesthetic, needle, syringe.
- Skin disinfectant: 10% povidone iodine or 70% alcohol.
- Two lumbar puncture needles, small bore with stylet.
- Six small sterile screw-cap tubes and tube rack.
- Water manometer.
- Microscope slides and slide boxes.
- Trans-Isolate media if available (must be kept at 4–8 °C *while in storage*; allow to reach room temperature before introducing the CSF).

Method of collection

- As only experienced personnel should be involved in the collection of CSF samples, the method is not described in this document. CSF is collected directly into the screw-cap tubes. If the samples will not be transported immediately, separate tubes should be collected for bacterial and viral processing.
- If Trans-Isolate media is available, first ensure that the media has reached to room temperature, draw the collected CSF from the sterile tube and inject into the vacuum-sealed Trans-Isolate bottle. The bottle must be kept for at least 3 days at more than 25 °C to allow incubation.

Handling and transport

- In general, specimens should be delivered to the laboratory and processed as soon as possible.
- CSF specimens for bacteriology are transported at ambient temperature, generally without transport media. They must never be refrigerated as these pathogens do not survive well at low temperatures. If Trans-Isolate medium is available, follow the instructions on the packaging precisely.
- CSF specimens for virology do not need transport medium. They may be transported at 4–8 °C for up to 48 hours or at –70 °C for longer periods.

APPENDIX 4: FAECAL SPECIMEN COLLECTION

Stool specimens are most useful for microbiological diagnosis if collected soon after onset of diarrhoea (for viruses <48 hours and for bacteria <4 days) and preferably before the initiation of antibiotic therapy. If required, two or three specimens may be collected on separate days. Stool is the preferred specimen for culture of bacterial, viral and parasitic diarrhoeal pathogens. Rectal swabs showing faeces may also be taken from infants. Rectal swabs are not useful for the diagnosis of viruses.

Materials for collection

- Tubes with Cary-Blair transport medium.
- Clean, dry, leak-proof screw-cap container and tape if Cary-Blair transport medium is not available.
- Appropriate bacterial transport media for transport of rectal swabs from infants (ideally Cary-Blair).
- Parasitology transport pack: 10% formalin in water, polyvinyl isopropyl alcohol (PVA).

Method of collecting a stool specimen

If Cary-Blair transport medium is available:

- Place sterile swab in freshly passed stool to allow it to soak up stool.
- Place swab in the Cary-Blair transport medium inside the tube.
- Break off the top part of the stick without touching the tube and tighten the screw-cap firmly.
- Label the specimen tube.

If Cary-Blair transport medium is not available, collect freshly passed stool, 5 ml liquid or 5 g solid (pea-size), in a container. Label the container.

Method of collecting a rectal swab from infants

- Moisten a swab in sterile saline.
- Insert the swab tip just past the anal sphincter and rotate gently.
- Withdraw the swab and examine to ensure that the cotton tip is stained with faeces.
- Place the swab in sterile tube/container containing the appropriate transport medium.
- Break off the top part of the stick without touching the tube, and tighten the screw-cap firmly.
- Label the specimen tube.

Handling and transport

- For suspected **shigella** cases, stool specimens should be transported in a cold-box at 4–8 °C. Bacterial yields may fall significantly if specimens are not processed within 1–2 days of collection. *Shigella* is particularly sensitive to elevated temperatures. If transport medium is not available, do not allow the specimen to dry – add a few drops of 0.85% sodium chloride solution.
- For suspected **cholera** cases, take 10-20 stool samples to confirm the epidemic.
 - Stool samples should be taken with a rectal swab and transported in sterile Cary Blair medium. The sample needs to reach the laboratory within 7 days; refrigeration is **not** necessary. Cary Blair medium can be stored at ambient temperature for 1–2 years (should not be dried out or discoloured).
 - If Cary Blair transport medium is not available, a cotton-tipped rectal swab can be soaked in liquid stool, placed in a sterile plastic bag, tightly sealed, and sent to the laboratory within 2 *hours* OR strips of blotting or filter paper can be soaked with liquid stool and placed in a sealed tube or bag with 2–3 drops of normal saline (NaCl 9%). Refrigeration is **not** necessary.
- Specimens to be examined for parasites should be mixed with 10% formalin or PVA, 3 parts stool to 1 part preservative. Transport at ambient temperature in containers sealed in plastic bags.

APPENDIX 5: RESPIRATORY TRACT SPECIMEN COLLECTION

Specimens are collected from the upper or lower respiratory tract, depending on the site of infection. Upper respiratory tract pathogens (viral and bacterial) are found in throat and nasopharyngeal specimens. Lower respiratory tract pathogens are found in sputum specimens. Culture of certain organisms, such as *Legionella*, is difficult, and diagnosis is best based on the detection of antigen excreted in the urine.

When acute epiglottitis is suspected, no attempt should be made to take throat or pharyngeal specimens since these procedures may precipitate respiratory obstruction. Epiglottitis is generally confirmed by lateral neck X-ray, but the etiological agent may be isolated on blood culture.

Materials for collection

- Transport media – bacterial (TransAmies) and viral (Cellmatics)
- Dacron and cotton swabs
- Tongue depressor
- Flexible wire, calcium alginate-tipped swab (for suspected pertussis)
- Nasal speculum (for suspected pertussis – not essential)
- Suction apparatus or 20–50-ml syringe
- Sterile screw-cap tubes, and wide-mouthed clean sterile jars (minimum volume 25 ml)

Upper respiratory tract specimens

Method of collecting a throat swab

- Hold the tongue down with the depressor. Use a strong light source to locate areas of inflammation and exudate in the posterior pharynx and the tonsillar region of the throat behind the uvula.
- Rub the area back and forth with a Dacron or calcium alginate swab. Withdraw the swab without touching cheeks, teeth or gums and insert into a screw cap tube containing transport medium.
- Break off the top part of the stick without touching the tube, and tighten the screw cap firmly.
- Label the specimen containers.
- Complete the laboratory request form.

Method of collecting nasopharyngeal swabs (for suspected pertussis)

- Seat the patient comfortably, tilt the head back and insert the nasal speculum.
- Insert a flexible calcium alginate/Dacron swab through the speculum parallel to the floor of nose without pointing upwards. Alternatively, bend the wire and insert it into the throat and move the swab upwards into the nasopharyngeal space.
- Rotate the swab on the nasopharyngeal membrane a few times, remove it carefully and insert it into a screw-cap tube containing transport medium.
- Break off the top part of the stick without touching the tube, and tighten the screw-cap firmly.
- Label the specimen tube, indicating left or right side.
- Complete the laboratory request form.
- Repeat on the other side.

Lower respiratory tract specimens

Method of collecting sputum

- Instruct the patient to take a deep breath and cough up sputum directly into a wide-mouthed sterile container. Avoid saliva or postnasal discharge. Minimum volume should be about 1 ml.
- Label the specimen containers.
- Complete the laboratory request form.

Handling and transport

- All respiratory specimens except sputum are transported in appropriate bacterial/viral media.
- Transport as quickly as possible to the laboratory to reduce overgrowth by commensal oral flora.

- For transit periods up to 24 hours, transport bacterial specimens at ambient temperature and viruses at 4–8 °C in appropriate media.

APPENDIX 6: URINE SPECIMEN COLLECTION

Material for collection

- Sterile plastic cup with lid (50 ml or more).
- Clean, screw-top specimen transport containers ("universal" containers are often used).
- Gauze pads.
- Soap and clean water (or normal saline) if possible.
- Labels and indelible marker pen.

Method of collection

- Give the patient clear instructions to pass urine for a few seconds, and then to hold the cup in the urine stream for a few seconds to catch a mid-stream urine sample. This should reduce the risk of contamination from organisms living in the urethra.
- To reduce the risk of contamination from skin organisms, the patient should be directed to avoid touching the inside or rim of the plastic cup with the skin of the hands, legs or external genitalia. Tighten the cap firmly when finished.
- For hospitalized or debilitated patients, it may be necessary to wash the external genitalia with soapy water to reduce the risk of contamination. If soap and clean water are not available, the area may be rinsed with normal saline. Dry the area thoroughly with gauze pads before collecting the urine.
- Urine collection bags may be necessary for infants. If used, transfer urine from the urine bag to specimen containers as soon as possible to prevent contamination with skin bacteria. Use a disposable transfer pipette to transfer the urine.
- Label the specimen containers.

Handling and transport

- Transport to the laboratory within 2–3 hours of collection. If this is not possible, do not freeze but keep the specimen refrigerated at 4–8 °C. Keeping the specimen refrigerated will reduce the risk of overgrowth of contaminating organisms.
- Ensure that transport containers are leak-proof and tightly sealed.

APPENDIX 7: SAMPLE COLLECTION FOR VIRAL HAEMORRHAGIC FEVER (VHF) INVESTIGATION

All invasive procedures and investigations should be minimized until the diagnosis of VHF is confirmed or excluded. Only the specific diagnostic samples needed should be obtained from acutely ill humans.

Other routine blood samples should be avoided when investigating a case of VHF.

The blood samples should be kept in their original tube (sealed, sterile, dry tubes, monovette or vacutainer type).

Do not attempt to separate serum or plasma from blood clots in the field – this is highly risky in case of VHF. If these procedures are needed they should be performed at the reference laboratory.

Each collected sample must be marked with “high risk”. Labels prepared in advance for both specimens collected and laboratory request forms should bear the name of the patient, the date of collection and a coded link to the corresponding record of the case.

Precautions for sampling

In addition to basic safety precautions, certain other specific precautions and additional safety equipment are essential when investigating cases of VHF to protect skin and mucous membranes against the pathogens.

Blood specimens should be taken by a doctor or nurse experienced in the procedure. Urine samples should also be handled carefully: a 20-ml syringe may be used to transfer urine from a bedpan to the specified container.

Protective clothing should always be worn when handling specimens from suspected VHF cases:

- protective gown
- waterproof protective apron
- two pairs of latex gloves
- particulate filter face mask
- goggles
- rubber boots.

Method of collection

- Observe all the basic safety precautions when obtaining specimens samples from suspected VHF cases.
- For taking blood samples, it is advisable to use a vacuum blood sampling system (Monovette or vacutainer); however, you may use the equipment and procedure you are most familiar with to avoid the risk of accidents or spills.
- Withdraw 5–10 ml of whole blood from adults, 2–5 ml from children and 0.5–2 ml from infants, directly into the transport tube (blood sample tube).
- Avoid the use of disposable alcohol swabs to apply pressure to venepuncture wounds; it is advisable to use dry cotton wool balls or gauze swabs.
- After taking the sample, the blood sample tube should be externally disinfected by wiping with 0.5% hypochlorite solution (see *Appendix 8*).

Removing protective clothing

- When the procedure is finished, remove the apron. Before removing the outer pair of gloves, wash your hands with soap and water and rinse them in 0.5% hypochlorite solution (see *Appendix 8*) for 1 minute.
- Keep the inner gloves on while removing goggles, mask, anything used to cover the head and the external gown; before removing boots soak, them in 0.5% hypochlorite solution). Finally, remove the gloves and the inner gown. Then wash your hands thoroughly with soap and water and disinfect them with 70% isopropyl alcohol or povidone iodine.

- Dispose of all protective clothing, gloves and materials in a plastic bag and incinerate everything.
- Remember never to recap used sharps. Discard directly into a sharps disposal container for later incineration.

Handling and transport of samples from suspected VHF cases

Particular care to prevent external contamination of specimen containers during specimen collection is critical.

A triple packaging system is used:

- The blood sample tube should be transported upright and secured in a leak-proof secondary container with a screw-on cap and sufficient absorbent material to absorb all the contents should leakage occur. Ensure that the cap is screwed tight and the container labelled (specimen record). The secondary container should be externally disinfected by wiping with 0.5% hypochlorite solution (see *Appendix 8*).
- Specimen data forms, letters and information that identifies or describes the specimen and also identifies the shipper and receiver should be taped to the outside of the secondary container.
- The secondary container is then placed in a third container – the transport box. The outer part of the transport box should be clearly marked with the biohazard symbol and should bear an address label that clearly identifies the specimen, the shipper and the receiver (see section 2.2 above).

If the blood sample cannot be processed the same day, ice packs must be placed in the transport box in order to keep the sample cold (4–8 °C). Whole blood samples should not be frozen.

Note: All materials needed for the sample handling and transport are included in the “Specimen transport module” of the *Outbreak investigation kit in this Toolkit (Annex 8)*.

APPENDIX 8: CHEMICAL DISINFECTANTS

Chlorine is the recommended disinfectant for use in field outbreak investigations. An all-purpose disinfectant should have an available chlorine concentration of 0.1% (= 1 g/litre = 1000 ppm); a stronger solution of 0.5% (= 5 g/litre = 5000 ppm) should be used in situations such as suspected Lassa fever and Ebola virus outbreaks.

In preparing appropriate dilutions, it is important to remember that different products have different concentrations of available chlorine. The manufacturer may provide appropriate instructions for the preparation of solutions with the above concentrations. Otherwise, the guidelines provided below may be used. Chlorine solutions gradually lose strength, and so fresh solutions must be prepared daily. Clear water should be used because organic matter destroys chlorine.

Commonly used chlorine-based disinfectants include:

Sodium hypochlorite

Commercial liquid bleaches, such as household bleach (e.g. Chlorox, *eau de javel*), generally contain 5% (50 g/litre or 50 000 ppm) available chlorine.

To prepare a 0.1% chlorine solution: make a 1 in 50 dilution, i.e. 1 part bleach in 49 parts water, to give a final concentration of available chlorine of 0.1%. (For example, add 20 ml of bleach to approximately 1 litre of water.)

To make a 0.5% chlorine solution: make a 1 in 10 dilution, i.e. 1 part bleach in 9 parts water, to give a final concentration of available chlorine of 0.5%. (For example, add 100 ml of bleach to 900 ml water.)

Chloramine powder

While the bleach solution described above may satisfy all disinfection needs, chloramine powder may prove convenient for disinfecting spills of blood and other potentially infectious body fluids. It may also be useful under field conditions because of ease of transport. It contains approximately 25% available chlorine.

In addition to its use for spills, chloramine powder may be used to prepare liquid chlorine solutions. The recommended formula is 20 g of chloramine powder in 1 litre of clean water.

Decontamination of surfaces

Wear an apron, heavy-duty gloves and other barrier protection if needed, and wipe surfaces clean with an absorbent material. Disinfect surfaces by wiping with a 1:10 dilution of household bleach, and then incinerate all absorbent material in heavy-duty garbage bags.

Decontamination of blood or body fluid spills

Spills should be very liberally sprinkled with chloramine granules to absorb the liquid, and left for at least 30 minutes. If chloramine powder is not available, absorbent materials may be used to soak up most of the fluid before disinfection with 0.5% liquid bleach. These absorbent materials must then be disinfected in bleach before disposal.

Sterilization and reuse of instruments and materials

In a field outbreak situation, it is not advisable to consider sterilization and reuse of any instruments or materials. Sterilization techniques are therefore not required, and are not described in this document.

Disinfection of hands

The principal means of disinfecting hands is thorough washing with soap and water. If available, commercial hand disinfectants such as chlorhexidine or povidone iodine may be used.

COMMUNICABLE DISEASE TOOLKIT

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8. OUTBREAK INVESTIGATION KIT



World Health Organization

OUTBREAK INVESTIGATION KIT

Item	Unit	Quantity/kit
1. Basic consumables module		
Cotton wool, 100%, surgical quality	roll of 500 g	
Ballpoint pen		5
Pencil		5
Eraser		5
Felt-tip pen (waterproof)		5
Marking pen, water-resistant ink, black and blue		5
Notebook (A4, hard cover, squared paper)		5
Labels (blank, self-adhesive)	series	5
Ruler		5
Calculator		5
Scissors		5
Thermometer		5
Torch light		5
Sealing tape	roll	5
Normal saline (0.9%)	500 ml	5
Sharps container for disposal of needles and syringes, of about 3 litres capacity.		5
Chlorine granules, 500 mg / container		5
2. Common consumables for collection of all specimens		
Gauze swabs, 10 x 10 cm, 100% cotton, 12-ply, 17-thread, sterile	100 pieces/box	5
Disinfecting swabs, impregnated with 70% isopropyl alcohol	100 pieces/box	5
Microscope slides, 76 x 26 mm, cut edges	50 pieces/box	5
Cover glasses, 22 x 22 mm	1000/box	5
Storing box for slides, wooden frame, for 25 slides each	10 boxes/pack	5
Universal containers, 70 ml, 55 x 44 mm, reliable sealing and polyethylene cap, machine sterile with standard label	1000/pack	5
Braunoderm (alcohol + PVP-IOD) for surgical scrub, against bacteria, fungi, viruses (incl. hepatitis B and HIV)	1 litre/cont'r	5
Povidone iodine solution	500-ml/cont'r	5
Disinfecting solution for hands		5
3. Blood module		
Blood lancets, sterile, disposable	pack of 200	5
Monovettes (orange cap, 10 ml)	pack of 100	1
Monovettes (red cap, EDTA, 3 ml)	pack of 100	1
Needles for Monovettes 21G	pack of 100	1
Needles for Monovettes 23G	pack of 100	1
Butterfly needles for blood culture 21G	pack of 100	1
Disposable soft transfer pipettes	pack of 1000	1
Racks for blood tubes		5
Adhesive bandages (small)	pack	5
Blood culture bottles (Hemoline performance DUO, children)	12 vials/pack	5
Blood culture bottles (Hemoline performance diphasic)	12 vials/pack	5
Tourniquets with clip		5

Item	Unit	Quantity/kit
4. Respiratory module		
Tongue depressor	pack of 100	5
Flexible wire calcium alginate-tipped swab (for pertussis)	pack of 100	1
Syringe for suction, 50–60-ml, with catheter tip	pack of 60	2
Transport swabs with TransAmies transport medium	pack of 1000	1
Virus transport medium (Cellmatics)	pack of 50	1
5. Urine module		
Urine container with boric acid, with screw cap, 30 ml (sterile)	400/pack	1
6. Stool module		
Rectal swabs for adults		25
Rectal swabs for infants		25
Stool collection tubes with spoon	pack of 400	1
Tubes with Cary-Blair transport medium		100
7. CSF module		
Sterile cotton swab	100/pack	5
Bottle with Trans-isolate media		100
Spinal needle, 25G x 3.5	25/box	5
Spinal needles, 23G x 3.5	25/box	5
Needle for transfer into medium, 21G	100/box	
Microtube 2.0 ml, with mouth screw cap and skirted base	50/bag	
Local anaesthetics (lidocaine 2%, 2 ml), 25G needle, 5-ml syringe		100
8. Self-protection module		
Disposable surgical gowns		10
Disposable surgical face masks	50 pieces/box	5
Disposable gloves: sizes S, M, L	100 pieces/box	5
Goggles		10
Face mask		10
Disposable surgical caps, size M	50 pieces/box	5
Rubber surgical boots	Pair, size 42	5
Disposable impermeable shoe cover, length 38 cm	100 pieces/bag	5
Impermeable aprons, 90 cm x 112 cm		5
Visors/face-shields		5
9. Specimen transport module		
Specimen carrier (cool-box)		5
Icepacks	set of 24	5
Microcentrifuge tube rack		5
Complete combination packaging for infectious substances, BioPack 2 with 1.5-litre BioJar		5
CL-4 thermal control unit, polystyrene box set in fibreboard case with all labels and instructions		5