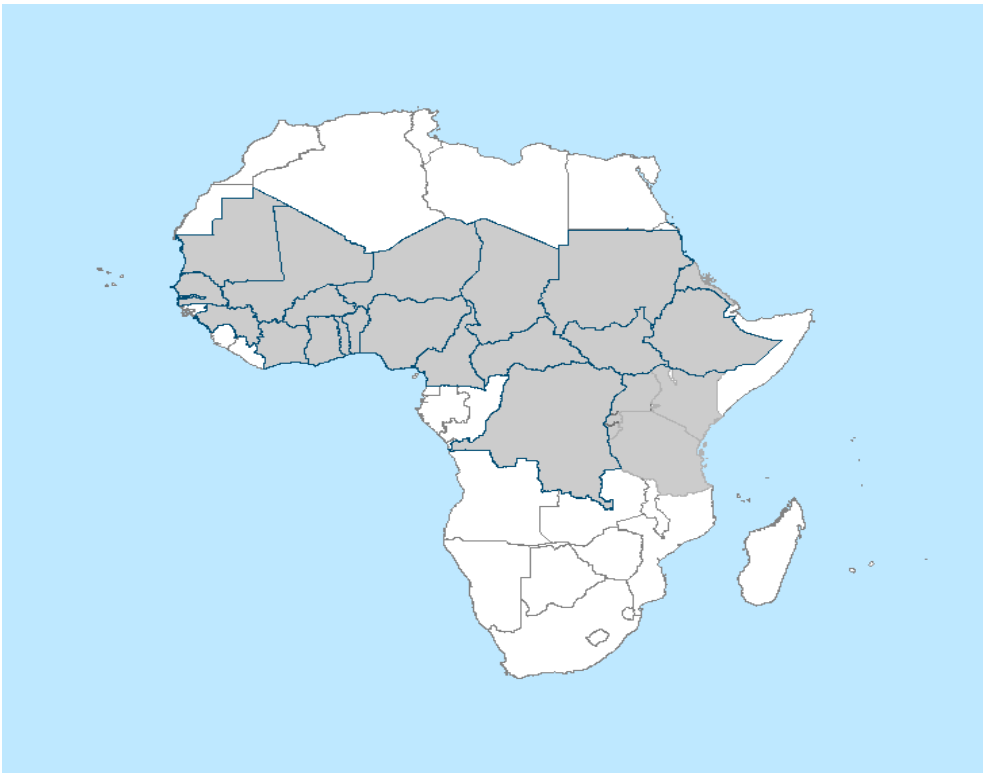
World Health Organization

REGIONAL OFFICE FOR AFRICA

Standard Operating Procedures for Enhanced Meningitis Surveillance, Preparedness and Response to Meningitis Epidemics in Africa



Version November 2016

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FOREWORD

The second edition of the Standard Operating Procedures for enhanced meningitis surveillance in Africa has been enriched with the Revised Guidance on Meningitis Outbreak Response in Sub-Saharan Africa. Since the introduction of vaccines in the meningitis belt against the most common meningitis-causing bacteria (Seroroup A *Neisseria meningitidis* conjugate vaccine, *Haemophilus influenzae* B vaccine and *Streptococcus pneumoniae* conjugate vaccine), significant epidemiological changes have occurred prompting WHO guidelines revised in to revise the 2000[1].

The revision process started with the collection of information and its assessment by a group that developed the guidelines. Draft recommendations were examined by external experts. The final version of this second edition was reviewed by an ad-hoc Committee.

In summary, the revision of the 2009 standard operating procedures for enhanced surveillance incorporates a new chapter on preparedness and response to epidemics, a reviewed definition of epidemiological thresholds (alert threshold and epidemic threshold), a reviewed decision tree for the selection of vaccines, adjust antibiotic treatment during epidemics and includes a new item on chemoprophylaxis for contacts living in the patient's household in accordance with WHO's revised guidance on meningitis outbreak response in sub-Saharan Africa [2][3].

We invite all actors of health at all levels to appropriate this document with a view to a relevant practice of the activities of surveillance, preparation and response to epidemics of meningitis.

[1] World Health Organization. Weekly epidemiological record. Detecting meningococcal meningitis epidemic in highly endemic African countries.. No. 75, 2000, vol.75, pp 306-309. http://www.who.int/docstore/wer/pdf/2000/wer7538.pdf

[2] World Health Organization 2014. http://www.who.int/wer/2014/wer8951_52/en/

[3] World Health Organization. Weekly epidemiological record. Preparedness for outbreaks of meningococcal meningitis due to Neisseria meningitidis serogroup C in Africa: recommendations from a WHO expert consultation. No. 47, 2015, 90, 633–644. http://www.who.int/wer/2015/wer9047/en/

ACRONYMS

AFP	-	Acute flaccid paralysis
CERMES	-	Centre de Recherche Médicale et Sanitaire
CSF	-	CerebroSpinal Fluid
DNA	-	DeoxyriboNucleic Acid
DPC	-	Disease Prevention and Control
EPR	-	Epidemic Preparedness and Response
ICG	-	International Coordinating Group
IDSR	-	Integrated Disease Surveillance and Response
IM	-	Intra Muscular
IST-WA	-	Inter country Support Team for West Africa
IV	-	Intra Venous
MenAfriVac®	-	serogroup A meningococcal conjugate vaccine
Nm	-	*Neisseria meningitidis*
NmA	-	*Neisseria meningitidis* serogroup A
NmC	-	*Neisseria meningitidis* serogroup C
NmW	-	*Neisseria meningitidis* serogroup W
NmX	-	*Neisseria meningitidis* serogroup X
NmY	-	*Neisseria meningitidis* serogroup A
NRL	-	National Reference Laboratory
PCR	-	Polymerase Chain Reaction
RDTs	-	Rapid diagnostic tests
RRT	-	rapid response team
SOPs:	-	Standard Operating Procedures
TI	-	Trans Isolate
WHO	-	World Health Organization

1. BACKGROUND

Epidemic meningococcal disease is a major public health challenge in the African 'meningitis belt', an area that extends from Senegal to Ethiopia with an estimated total population of 500 million. Since 2002, the World Health Organization (WHO), in collaboration with its collaborating centres for meningitis, has progressively supported countries in implementing a strategy of enhanced surveillance of meningitis. Starting initially in three countries (Burkina Faso, Mali and Niger) in 2010, the strategy is now actively being implemented in 19 countries of the meningitis belt (Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Côte d'Ivoire, Democratic Republic of the Congo, Ethiopia, Gambia, Ghana, Guinea, Mali, Mauritania, Niger, Nigeria, Senegal, South Sudan, Sudan and Togo).

Until 2010 most epidemics have been due to *Neisseria meningitidis* serogroup A (NmA), with others due to serogroups W, X and C. Since 2010, countries in the extended meningitis belt have started to introduce a new serogroup A meningococcal conjugate vaccine (MenAfriVac®) through mass campaigns. Therefore, since 2010 almost 60% decline in incidence of meningitis (suspected cases), 99% decline in incidence of NmA meningitis (confirmed cases) and about 60% decline in risk of epidemics between 2003 and 2015, the proportion of cases due to NmW, NmX and *Streptococcus pneumoniae* has risen[4],[5]. Thus, in 2015 we reported the following rates: NmC (43%), S.p (24%), NmW (19%), and NmA (<1%)[6]**.** Again, the proportion of suspected cases with laboratory confirmation across the belt has been rising (from 2–3% in 2003 to 6–7% in 2013), but is still at a relatively low level.

Timely containment and adequate case management of epidemics depend on accurate diagnosis of the disease and laboratory confirmation of the causal organism. Enhanced epidemiologic and laboratory surveillance enable early detection of epidemics, identification of the serogroup responsible and the use of the appropriate vaccine to protect the population, thus preventing further spread of the disease, deaths or disabilities.

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[4] Lingani, C., Bergeron-Caron, C., Stuart, J. M,, Fernandez, K., Djingarey, M. H,, Ronveaux, O,…Perea, W. A. (2015). Meningococcal meningitis surveillance in the African meningitis belt, 2004-2013. Clin Infect Dis, 61(S5), S410-5.

[5] Diomandé , F. V., Djingarey, M. H., Daugla, D. M., Novak, R. T., Kristiansen, P. A., Collard,J-M.,…Greenwood, B. (2015). Public health impact after the introduction of PsA-TT: The first 4 years. Clin Infect Dis, 61(S5), S467-72.

[6] World Health Organization. Weekly feedback bulletin on cerebrospinal meningitis. Week 40-44, October 2015. http://www.who.int/csr/disease/meningococcal/Bulletin_Meningite_40_44_2015.pdf?ua=1

Lessons learned from the implementation of the enhanced surveillance of meningitis highlight that putting in place adequate laboratory reagents, equipment and materials, training of health personnel as well as clear operating procedures are critical for the containment of meningitis epidemics.

Many of the meningitis belt countries have national plans for integrated disease surveillance and response (IDSR), which include meningitis. Continuing to expand enhanced surveillance into more countries, improving quality of surveillance, and progressive introduction of case-based surveillance are important to detect changing epidemiological patterns of meningitis following the introduction of MenAfriVac® and to initiate reactive vaccination responses as early as possible in epidemics. These measures will help improve the timeliness of response and lower the alert threshold, which were two of the recommendations in the 2014 revised WHO guidance for meningitis outbreak response.

The WHO surveillance strategy is to develop and expand case-based surveillance across the meningitis belt countries in order to analyze the evolution of meningitis and evaluate the impact of MenAfriVac® and other new vaccines. The main distinguishing feature of case-based surveillance is that epidemiological and microbiological data are collected and linked for each case of meningitis, whereas enhanced surveillance relies on speedy reporting and analysis of numbers of cases by week to prepare for and respond promptly to epidemics. Case-based surveillance does not cover all districts in all countries and may not be timely enough to detect an epidemic and launch a rapid response; therefore it does not replace the need for universal enhanced surveillance.

2. PURPOSE OF THE DOCUMENT

The aim of these standard operating procedures for Preparedness and Response to Meningitis Epidemics in Africa is to guide health personnel from various levels of the health system in the implementation of enhanced surveillance of meningitis, preparedness and response to epidemics in Africa. There is a separate document of the Standard Operating Procedures for Enhanced Meningitis Surveillance, Preparedness and Response to Meningitis Epidemics in Africa version November 2016.

3. OBJECTIVES

3.1. General objective

To contribute to the reduction of morbidity and mortality of meningitis through the strengthening of detection systems, confirmation and rapid response to meningitis epidemics in Africa

3.2. Specific Objectives

- To detect promptly meningitis cases from the health facilities;
- To report systematically meningitis cases to the higher level
- To analyze systematically surveillance and laboratory data at all levels;
- To use this information for immediate public health control measures;
- To monitor the epidemiology of meningitis including serogroup shifts;
- To conduct rapid laboratory confirmation of causal pathogens;
- To monitor the antibiotic susceptibility of identified bacteria;
- To elaborate an adequate preparation and response plan to meningitis epidemics.

4. DEFINITIONS

4.1 Case definitions for bacterial meningitis

Suspected meningitis case:

Any person with sudden onset of fever (>38.5 °C rectal or 38.0 °C axillary), and neck stiffness or other meningeal signs, including bulging fontanelle in infants.

Probable meningitis case:

Any suspected case with macroscopic aspect of cerebrospinal fluid (CSF) turbid, cloudy or purulent; or with a CSF leukocyte count >10 cells/mm^3 or with bacteria identified by Gram stain in CSF.

In infants: CSF leucocyte count >100 cells/mm^3; or CSF leucocyte count 10–100 cells/mm^3 and either an elevated protein (>100 mg/dl) or decreased glucose (<40 mg/dl) level.

Confirmed meningitis case

Any suspected or probable case that is laboratory confirmed by culturing or identifying (i.e. polymerase chain reaction, immunochromatographic dipstick or latex agglutination) a bacterial pathogen (*Neisseria meningitidis*[*], *Streptococcus pneumoniae, Haemophilus influenzae type b)* in the CSF or blood.

[*]If *N. meningitidis* is confirmed, the serogroup should be identified to guide vaccine decisions.

4.1. Epidemiological thresholds[7]

Alert threshold

For populations between 30 000 and 100 000 inhabitants: an attack rate of 3 suspected cases per 100 000 inhabitants per week (minimum of 2 cases in one week). For populations less than 30 000 inhabitants: an incidence of 2 suspected cases in one week or an increase in the number of cases compared to the previous non-epidemic years (see Annex 1)[1].

Epidemic threshold

For populations between 30 000 and 100 000 inhabitants: an attack rate of 10 suspected cases per 100 000 inhabitants per week. For populations less than 30 000 inhabitants: an incidence of 5 suspected cases in one week, or the doubling of the number of cases over a three-week period (see Annex 1)[1]**.**

Note: For district populations with more than 100 000 inhabitants, it is recommended to calculate attack rates by sub-districts containing 30 000 to 100 000 inhabitants.

5. ENHANCED MENINGITIS SURVEILLANCE PREPAREDENESS AND RESPONSE

Early detection of meningitis outbreaks and prompt laboratory confirmation of circulating pathogens depend on effective implementation of surveillance activities at all levels. The level of preparedness and the public health measures for epidemic meningitis control vary throughout the year and should be intensified as the epidemic season approaches.

[7] For more detail on alert and epidemic thresholds refer to: World Health Organization. (2014) Weekly epidemiological record. Revised guidance on meningitis outbreak response in sub-Saharan Africa. No.51/52, 2014, vol.89, pp 580-586. http://www.who.int/wer/2014/wer8951_52/en/

During the epidemic season different procedures need to be established for districts that have crossed the alert and epidemic thresholds and those that have not. These procedures also vary depending on hyper-endemic countries (within the meningitis belt) and other countries (outside the meningitis belt).

Therefore, for the purposes of meningitis surveillance, preparedness and response, four different epidemiological phases are discussed: pre-epidemic, epidemic, post-epidemic and inter-epidemic. Specific procedures for data collection and specimen collection for laboratory confirmation will be indicated for each of these phases.

5.1. Pre-epidemic phase

This phase can be sub-divided into two phases: pre-alert and alert.

A district is in pre-alert phase when the weekly attack rate is below the alert threshold. All suspected cases need to be investigated and laboratory confirmed. For any suspected case where a lumbar puncture is performed, a case-based form should be completed (Annex 2) and the CSF sent to the nearest reference laboratory for bacteriological tests. Every meningitis case should be treated with recommended antibiotics according to the national treatment protocols. Presumptive antibiotic treatment should be started without delay as soon as the CSF is collected, and before the laboratory returns the results.

For each **district in alert phase**, detailed data on the suspected cases should be recorded on a line list. CSF sample collection should be strengthened and samples sent to the nearest reference laboratory accompanied by an IDSR case-based form for bacteriological tests **(see Box 1)**. It is recommended to get at least 10 samples that are positive for a bacterial pathogen, including serogroup if a meningococcus is identified (See Annex 3 for corresponding performance indicators). This will help in making a rapid decision as to the need for vaccination and the type of vaccine to be used in case the district reaches the epidemic threshold, as well as orienting the clinicians so they can provide effective case management. Hence, it is important to strengthen laboratory capacity and in particular the use of rapid diagnostic tests and culturing specimens. For every district in alert phase, follow the steps in box 1 below.

Box 1: *Checklist of what should be done during the alert phase:*

1. Immediately alert the health officers in the next higher level.
2. Record cases on a line listing form with: residence, age, sex, vaccination status, outcome, laboratory results, etc.
3. Make use of rapid diagnostic tests to give an early indication of the pathogen(s) and serogroup responsible.
4. Collect and send specimens immediately to the nearest reference laboratory for bacteriological analysis and determination of causal pathogen. Be sure that samples are labelled with patient ID and have an IDSR case-based form completed.
5. Test as many samples as possible for bacterial pathogens. At least 10 positive samples are recommended per surveillance unit (district or sub-district) for decision-making about the appropriate vaccine to be used.
6. Samples should be sent using adequate media: TI bottles (for culture) and cryotubes for PCR.
7. Continue data analysis, graphing and mapping.
8. Treat all suspected cases with antibiotics as recommended by the national treatment protocol.
9. Prepare to initiate request for vaccines (See Annex 4).

Note: Action thresholds were developed for the African meningitis belt countries.

5.2. Epidemic phase

A district or sub-district is in epidemic phase when the attack rate reaches the epidemic threshold. For districts with large populations (above 100 000 inhabitants), it is recommended to calculate the weekly attack rates by sub-districts (surveillance zones or health facility catchment's area) of 30 000 to 100 000 inhabitants in order to detect localized epidemics.

As soon as the epidemic threshold is reached in a district or sub-district, and if the epidemic is due to NmA, NmC, NmW or NmY, a mass immunization campaign should be conducted in the population of that district or sub-district using multivalent polysaccharide vaccine (or in NmA epidemics with MenAfriVac®) **(see Annex 9).** Depending on the age groups affected, the campaign may be targeted for example at those aged 2–29 years old. It is also recommended to include any contiguous district or sub-district that is considered to be at risk (i.e. in the

absence of a relevant vaccination programme, if cases occur early in the dry season, in crowded populations).

The speed of response is critical. In order for mass vaccination to be effective in preventing a substantial number of cases before the epidemic is over, vaccination should commence as soon as possible and within four weeks of crossing the threshold.

A micro-plan and budget for each area targeted for mass vaccination should be quickly finalized. Sufficient vaccine must be immediately requested from either the ministry of health, which maintains the national stocks, or from the International Coordinating Group (ICG) on Meningitis Vaccine Provision which manages the international emergency stockpile (Annex 4). Once vaccine supplies have been confirmed, a public information campaign must be launched to inform all the communities in the target areas of the coming campaign.

CSF samples should continue to be collected and sent to the reference laboratory to monitor the characteristics of the causal pathogens (serogroups, antibiotic sensitivity). Box 2 summarizes the specific actions recommended during the epidemic phase.

Box 2. *What should be done during the epidemic phase:*

1. If the epidemic is due to NmA, NmC, NmW or NmY, make immediate preparations for mass vaccination in the epidemic district, as well as any contiguous district if the population is considered to be at risk.
2. Vaccinate using vaccines from national contingency stocks. If not available, prepare a request to the ICG for meningococcal vaccine supplies as soon as new districts or sub-districts cross the epidemic threshold. In order for the ICG to evaluate a country's request, attack rates by district and sub-district, by week and by age group, and identification of causal pathogens are needed (See Annex 4).
3. Continue data collection, transmission and analysis.
4. Maintain regular collection of CSF specimens throughout the epidemic season in the epidemic districts in order to detect any shifts in the serogroup.
5. Treat all cases with the appropriate antibiotic as recommended by the national protocols.

For longitudinal surveillance purposes, regular collection of CSF samples should be maintained in all epidemic districts for monitoring the circulating serogroups, antibiotic

susceptibility testing, as well as any shifts in the serogroup during the epidemic period. Note that before sending a specimen to the reference laboratory, it should be adequately labelled using the IDSR case-based form (Annex 2).

A rapid response team (RRT) from central or regional/provincial level should be sent to the affected areas to support surveillance and laboratory activities. In the event of an NmA outbreak in a population vaccinated with MenAfriVac® the RRT should conduct a thorough investigation (See Annex 8). The team should evaluate vaccine coverage, the collection, analysis and transmission of data, as well as lumbar puncture practices, the use of trans-isolate medium and all laboratory results and procedures (e.g. Gram stain, cytology, latex agglutination tests, etc.). It is particularly important to verify laboratory results and procedures in order to ensure the identification of the Nm serogroup is reliable. Vaccination status of the cases should also be verified and a copy of the vaccination card, if available, should be collected.

5.3. Post-epidemic phase

The post-epidemic phase corresponds to the first four weeks after the end of an epidemic. The end of a meningitis epidemic is declared when the attack rate in the epidemic district descends below the alert threshold for two consecutive weeks. During this phase it is recommended to:

- evaluate the detection and response/management of the epidemic to outline the gaps, strengths, lessons learned in while implementing the action plan, and make recommendations for their improvement
- conduct a vaccine coverage survey if a vaccination campaign was implemented
- mobilize adequate resources to conduct these evaluations, which are essential in order to improve control and response measures during future epidemics.

In order to enable these evaluations, good documentation is essential. At the end of the response, the district health management team should:

- Collect all the documents including minutes of the meeting, activity, process, epidemic report, evaluation report and other relevant documents.
- Prepare a coversheet listing of all the above documents.

This will become an essential source of data for evaluating the response.

Nota bene: For the evaluation to be successful, it is important to set up a system for the collection and archiving of information/data during the pre-epidemic, epidemic and post-epidemic phases

5.4. Inter-epidemic phase

The inter-epidemic phase extends from the end of an epidemic season to the beginning of the next season. In this phase the epidemiological profile of the causal pathogens may be different from the epidemic phase. Therefore, the identification of prevailing germs is important to better understand and guide future control of meningitis epidemics in Africa. During this phase it is recommended to:

- Facilitate strong collaboration among the surveillance officers, clinicians and the national reference laboratory officers in order to ensure a comprehensive sample collection and confirmation mechanism;
- Continue surveillance and laboratory confirmation of suspected meningitis cases in all national, regional and district hospitals.
- Ensure new staff are trained in relevant meningitis surveillance protocols and procedures such as lumbar puncture

5.5. Data management

Data collection and transmission

Some basic patient information is required for all suspected meningitis case; use the IDSR line list form in Annex 5 to record this information. .

Suspected cases and deaths should be recorded and transmitted weekly to the district surveillance officer. Data should be immediately compiled and transmitted by the quickest means available (e.g. radio, telephone/SMS, fax, email) to provincial and national levels. Weekly notification should be done throughout the season/year. Districts should report weekly, even when no cases are recorded (i.e. 'zero reporting') (See Annex 3 for corresponding performance indicators). Moreover, in case of epidemics, the reporting of cases and deaths should be done on a daily basis.

The line list should be completed at the health facility level, compiled at district level and a copy sent to the regional and national levels, on a weekly basis. For each suspected

meningitis case with CSF specimen, fill an IDSR case-based form (Annex 2). Provide a unique identifier [Epid Number: Country code (3 letters)-Province or Region code (3 letters)-District code (3 letters)-Year code (2 digits)-Case Number (4 digits): CCC-PPP or RRR-DDD-YY-NNNN] to link the laboratory results with the patient clinical/epidemiological records. Keep a copy of the IDSR case-based form at the district level, and send the other copy together with the CSF specimen to the national reference laboratory. This Epid Number is assigned at district level.

Data entry

At district level

District surveillance officers will enter into a computer programme (e.g. Excel, Epi Info) the case forms received from peripheral health facilities. They will also enter the laboratory data and tests results in the same software, completing the database. The data will be sent to the regional/national level on a weekly basis.

At regional/provincial level

A database similar to that used at district level will be made available to the regional laboratory. The data received from the districts will be merged by the regional surveillance officer into a single database (e.g. using Excel or Epi Info), and sent to national level on a weekly basis. When patients are seen directly at the regional hospital without being referred by a district, the epidemiologist at the regional hospital will also enter the laboratory results produced by the regional hospital by assigning an Epid Number. The epidemiologist should inform his or her counterpart at the district level about these cases, including the Epid Number of each patient, so they can be recorded at district level. This interaction is crucial in order to avoid double entries.

At central/national level

The central level monitoring team should develop a standardized data entry form (Excel or Epi Info) and share it with all regions and ensure that it is understood by all users.

The data received from the regions or districts will be merged into a single national database (e.g. using Excel or Epi Info), before they are sent to WHO and partners on a weekly basis.

At the national reference laboratory

The data from the national reference laboratories will be computerized using Excel or Epi Info, then sent to the national surveillance/epidemiology unit, where they will be linked to the clinical data using the Epid Number. The results will then be sent to the regions and districts where the specimen originated. The data manager at the national surveillance unit should check for data entry flaws and resolve any anomalies in the database on a weekly basis. S/He should make sure that clinical and laboratory data of each patient are linked, before any detailed data analysis.

It is important to have the quality data that the national coordination of surveillance activities focus on strengthening the capacities of providers and supervisors on integrated supportive supervision and data validation at all levels.

Data analysis

The disease surveillance officers at each level should analyze their data. The supervisors at regional and national levels should ensure that all districts keep an up-to-date weekly epidemic trend (curve) of meningitis cases with the alert and epidemic thresholds shown. Every week, the data manager of the national surveillance unit should make a standard map showing the alert and epidemic districts, as well as the laboratory results by district, and for the country. Central teams are also advised to integrate the meningitis data into the integrated epidemiological bulletins they regularly publish.

5.5. Specimen collection, storage, transportation and processing

Before the beginning of the epidemic season, each country should:

- procure an adequate stock of lumbar puncture kits, color gram kits, rapid diagnostic tests, anti-sera (monovalent), trans-isolate (TI) media, cryotubes and triple packaging box for specimen transport;
- pre-position these materials at provincial and district levels under the responsibility of the provincial and district disease surveillance and laboratory officers.

Note bene: TI media should be stored and used according to the manufacturer's guidelines (see Annex 6 for instructions on using TI media).

- Depending on the epidemic situation and resources available, WHO and/or other technical and financial partners, may supply the countries with TI media and other laboratory consumables on a case-by-case basis.

Sample collection

Health personnel or rapid response teams in the field should systematically collect CSF specimens for laboratory confirmation before the start of antibiotic therapy. At least 10 positive samples per district (or sub-district) are needed to determine the circulating causal pathogens and decide on the need for vaccination and the appropriate vaccine (see Annex 9). It is estimated that the collection of 20 to 30 CSF samples per district (or sub-district) are sufficient, but in some cases the collection of more than 30 samples per district may be necessary. If possible, perform antibiotic susceptibility testing (the best methods are the E-test or Minimal Inhibitory Concentration) to guide the use of appropriate antibiotic treatments for case management. The quicker these samples are tested at the reference laboratory the better.

Once an epidemic has been declared in a district/sub-district, regular collection of a few CSF specimens should be maintained in that district throughout the epidemic season, in order to monitor circulating pathogens. However, for the purposes of enhanced surveillance, the systematic collection of CSF from every single suspected case is not necessary while the epidemic lasts. Health personnel at health facilities should be trained on the lumbar puncture technique, specimen collection, TI utilization and handling, and specimen transportation to the reference laboratory. Additionally, laboratory technicians should be trained on how to perform Gram stains and rapid latex agglutination (Pastorex kits), or dipsticks.

Where the CSF volume is <3 ml, the CSF should be collected in one dry tube (Tube 1); 0.5 ml should be inoculated from this tube into the TI medium and priority tests should be done according to laboratory level (Annex 7). Where CSF volume is >3 ml, CSF should also be collected into a cryotube (Tube 2).

Utilization of TI bottles

The TI bottles are stored between 4 °C and 8 °C in the refrigerator. Before using a TI bottle, keep it at room temperature and away from direct sunlight and protected from dust for 30 minutes before adding the CSF. From each suspected meningitis case, 0.5 ml of CSF should

be injected aseptically into TI media. After the CSF has been injected, the TI medium should be vented with a sterile needle and kept at room temperature away from direct sunlight or dust until it is sent to the reference laboratory. The inoculated TI medium should not be refrigerated (see Annex 6 for instructions on using TI media).

Transportation of CSF specimen

For culture:

The inoculated TI media should be sent from the health facility to the district within 24 hours. The district should send the inoculated TI media to the national/state reference laboratory at least twice a week. Inoculated TI media are sent (triple packaging) without venting needle and without ice packs. Once inoculated, TI media should be kept at room temperature.

For other bacteriological tests:

Any remaining CSF in Tube 1 should be kept at room temperature and transported rapidly (within two hours) to higher-level laboratories for additional bacteriological tests.

For polymerase chain reaction (PCR):

If Tube 2 (cryotube) is available, this should be sent to a national-level laboratory, along with TI media for PCR testing. Unlike inoculated TI media, cryotubes should be refrigerated or frozen during storage and transported to the reference laboratory under reverse cold-chain system.

Specimen processing

The identification of causal pathogen is essential to confirm the nature of the meningitis epidemic and implement control measures. Therefore, laboratory confirmation of suspected meningitis cases should be a standard practice during the meningitis epidemic season. The following laboratory tests should be conducted, depending on the health services or organizational levels (national, regional, district) and the technical capacity of the laboratory at that level (Annex 7):

- Gram stain and cell counts at district laboratory or health facility with appropriate equipment.
- Rapid diagnostic tests (RDTs) at health facility and district laboratory level. Note that the use of a RDT capable of identifying NmW and NmC is highly recommended during the

initial phase of an outbreak. RDTs can be used at field level and substantially reduce the delay in bacteriological confirmation and decision-making. Latex tests (e.g. Pastorex®, Directigen®) and dipsticks (CERMES) are suitable tests. It is important to confirm serogroup results at a reference laboratory before decisions are taken on vaccination.

- Culture and identification of serogroup at national or regional reference laboratories.
- Antibiotic susceptibility pattern should be conducted for all specimens received at national reference laboratory.
- DNA detection by polymerase chain reaction (PCR) at national level to confirm the causal agent by biomolecular (DNA) test. PCR can be used to confirm the germ on negative TI (no growth by culture).

  For PCR testing, CSF specimens could be stored in cryotubes preferably in a freezer (-20°C) or in sterile dry tubes in the refrigerator (+4°C) and shipped in a cool box to the national or regional reference laboratory.

Turn-around time of laboratory results

The laboratory results should be sent to the surveillance units (district, regional and national) and to the facility that sent the sample(s) as per the below timelines:

- District laboratories: within 48 hours upon reception of the sample(s)
- Provincial/Regional laboratories: within 5 days upon reception of the sample(s)
- National level laboratories: within 7 days upon reception of the sample(s).

  (See Annex 3 for respective performance indicators).

Quality control and sequence-type

For quality control and sequence-type, 10 to 20% of isolates obtained at national level should be regularly sent to the Regional Office for Africa's Inter-country Support Team for West Africa (AFRO-IST) for quality control and to WHO collaborating centres[8] for genotypic characterization. This will allow for monitoring of epidemiological trends of serogroups and

[8] The current list of WHO Collaborating Centres (WHOCC) for Meningitis, as of December 2014, is:
- National Institute of Public Health, Department of Bacteriology, P.O. Box 4404 Torshov, 0403 Oslo, Norway.
- Centres for Disease Control and Prevention, Meningitis and Special Pathogens Branch, 1600 Clifton Road, C-09, Atlanta, GA 30333, United States.
- Institut Pasteur. Unité des infections bactériennes invasives. 28, Rue du Dr Roux. Paris 75724, France.

genotypes and a better understanding of the spreading patterns of *Nm* epidemic complexes in the African region.

6. PREPAREDNESS AND RESPONSE PLAN[9]

The purpose of the plan is to strengthen the ability of the district to respond promptly when an acute meningitis outbreaks detected. This plan should:

- Be based on district risk assessments, and should specify the resources available for epidemic preparedness and response;
- Take into account diseases with epidemic potential in the district and in neighboring districts;
- Provide estimates of the population at risk for epidemic-prone diseases and other public health emergencies;
- Clearly indicate for each suspected outbreak which reference laboratory will be used for confirmation;
- Provide estimates of quantities of drugs, vaccines and supplies for each epidemic-prone disease likely to occur in the district;
- Plan to be tested before implementation;
- Include standard operating procedures, preparedness and response to meningitis outbreaks in Africa in the training plan.

Key sections of the epidemic preparedness and response plan should include:

1. Designated coordination committees at all levels
2. Epidemiology and surveillance including data management
3. Steps for carrying out a risk communication strategy including social mobilization
4. Operational actions according to expected phases of the epidemic
5. Laboratory: specimen collection, handling, transportation and processing
   Case management,
6. Case management including treatments (antibiotics) and other consumables
7. Pre- and post-exposure prophylaxis treatment (not during epidemics)
8. Immunization strategies

[9] WHO. (2010). Technical Guidelines for Integrated Disease Surveillance and Response in the African Region.

9. Capacity building including required training, sensitization meetings and simulation
10. Logistics including supply lists
11. Enhanced surveillance during epidemics
12. Operational research and the documentation of the response
13. Risk communication
14. Monitoring/evaluation
15. Coordination

7. REACTIVE VACCINATION AND VACCINE SELECTION

The decision on the type of vaccine to be used (see decision tree in Annex 9) should be based on the results from at least 10 positive specimens. In order to obtain that number of positive specimens, it is estimated that 20 to 30 CSF specimens should be collected from the affected area. Efforts should be made to collect and test CSF specimens in the field as early as possible. In the absence of laboratory evidence that a specific *Nm* serogroup is causing the epidemic, the use of meningococcal vaccines should be strongly discouraged.

In all situations, and especially where the number of available positive specimens is lower, the decision tree should be used flexibly to guide the decision, taking into account all epidemiological and laboratory information available in the country. In particular, the following should be considered:

- Analysis of geographic distribution can orientate more targeted actions.
- Analysis of affected age groups is important and could lead to different age groups being targeted for vaccination or the use of different vaccines for different age groups.
- Status of the MenAfriVac® introduction roll-out is key:
    - If a MenAfriVac® campaign is planned, preference might be given to MenAfriVac® vaccine;
    - If a MenAfriVac® campaign has already been conducted and MenAfriVac® is identified, an investigation should be launched including sending CSF samples for reference laboratory confirmation**.**
- In special situations (e.g. displaced persons, refugee camps, closed institutions), different decision criteria can be applied.

- The success of a vaccination campaign depends to a relevant planning

8. CASE AND CONTACT MANAGEMENT

8.1. Case management

Treat all cases of meningitis as quickly as possible, using adequate antibiotics according to national treatment protocols. If a lumbar puncture is to be performed, do so before the antibiotic treatment. Treat the patient with presumptive antibiotics without waiting for laboratory results.

Recommended treatment of suspected cases of bacterial meningitis during epidemics of meningococcal meningitis

- In children aged 0–2 months, ceftriaxone 100mg/kg per day IM or IV once a day for 7 days.
- In children aged over 2 months, ceftriaxone 100mg/kg per day once a day (maximum 2g) IM or IV for 5 days.
- In children aged >14 years and adults ceftriaxone 2g/day once a day IM or IV for 5 days.

Patients in health centres should be transferred to hospital if there is no improvement within 48 hours, or if exhibiting convulsions or coma.

In challenging situations of confirmed meningococcal meningitis such as large-scale epidemics, very remote areas or weak infrastructure, single-dose ceftriaxone treatment protocols may be implemented. However, it is essential to ensure community follow-up of cases after 24 hours and refer to hospital care when needed.

Outside epidemics, the recommended length of treatment for children of all ages and adults is 7 to 10 days.

8.2. Contact management

Prophylaxis for household contacts of a case is not advised during epidemics for logistical reasons and because of the uncertainty of additional benefit. Outside epidemics, household contacts of cases of probable or confirmed meningococcal meningitis are advised to receive chemoprophylaxis with a single dose of either ciprofloxacin (500 mg single dose orally in teenagers and adults; 15 mg/kg orally in children <12 years) or ceftriaxone (250 mg single

dose IM in adults; 125 mg IM in children <12 years). Rifampicin is not advised in the meningitis belt because of the risks of antibiotic resistance. Prophylaxis should be given as soon as possible (ideally within 1–2 days) after diagnosis in order to reduce the risk of further cases in the household.

Note: Ciprofloxacin is available as tablets (250 mg) or as syrup 50 mg/ml (WHO children formulary 2010).

9. RISK COMMUNICATION

Risk is the element that has the strongest influence on people's behavior and decision-making. It seems obvious today that one cannot manage public health risks without communication. More and more, communication is considered as an essential tool that allows people and organizations, including Governments, to manage risks effectively.

A strategic approach to risk communication, i.e., taking the risk into account before it leads to a crisis, could help reduce the costs of communication if the latter is integrated to the whole process and planned.

Taking into account risk communication helps to reach at least three goals if policies are well implemented. These are:

- preventing and reducing risks;
- promoting ways of life that are conducive to health;
- Integrating prevention, health promotion and protection in any public health approach.

During meningitis outbreaks, communication is designed to bridge the gap between the definition of risk by experts on the one hand, and its perception by the public on the other hand. As a rule, it is established that the perception of risk may however vary between experts and those who "face a risk". For technical experts, a risk is directly related to the nature and extent of the **HAZARD**. For the public (or other persons concerned) a risk is perceived in relation to many other factors and their ability to generate a feeling of indignation (fear, concern, intense emotional investment). This is illustrated in this formula **RISK = HAZARD + INDIGNATION**[10]

[10] Peter Sandman in Responding to community outrage. Strategies for effective risk communications. First edition published in 1993 by the American Industrial Hygiene Association. Copyright transferred to the author, Peter M. Sandman, in 2012. http://psandman.com/media/RespondingtoCommunityOutrage.pdf.

To implement risk communication that is relevant to the context of preparedness and response of meningitis outbreaks, it is essential to work upstream to come up with communication responses based on the 4 strategies of risk communication.

1. Identify potential risks;
2. Identify the groups to monitor (population through the media, experts and donors).
3. Prepare messages adapted to the context and to targets with clear evidence. Messages must take account of the cultural context;
4. Ensure the credibility: of the spokesperson and the Organization;
5. Track communication monitoring data to identify signs of outrage and respond as soon as possible to the latter (before the situation turns into outrage management);
6. Communicate rapidly and regularly (to be done as soon as the event or the crisis has been announced);

The above elements must be put in place before moving on to the stage of implementation of the following 4 risk communication strategies in a sequenced manner, depending on the level of the meningitis outbreak and the perception obtained from the population:

Strategy no. 1 – health education (and relations with stakeholders and partners): applicable when the hazard (meningitis outbreak) is relatively low and the emotional investment is reduced, or in case of indifference.

Strategy no. 2 – preventive awareness-raising (or advocacy for prevention): applicable when the hazard (meningitis outbreak) is serious but does not give rise to great concern or outrage among people, who can be indifferent to the problem.

Strategy no. 3 – outrage management: applicable when the hazard (meningitis outbreak) is low (or non-existent) but there is widespread outrage or concern, or disproportionate response compared to the actual risk.

Strategy no. 4[11] – Communication in case of crisis: applicable when the hazard (meningitis outbreak) is serious or imminent, giving rise to a high level of fear.

[11] Stratégies de communication des risques. Global Communication Forum Annual meeting, WHO HQ Geneva

10. OPERATIONAL RESEARCH AND DOCUMENTATION OF THE RESPONSE

To pursue meningitis eradication strategies in Sub-Saharan Africa, priority research areas must be developed. This research must involve several areas including surveillance, diagnostic tests, and resistance to antibiotics. They can be tailored to each country.

The information from this research may serve as a basis for developing the guidelines.

Further, resources should be mobilized to conduct key operational researches and the results used for improving the control of epidemic meningitis in Africa.

At the end of the response, the district health management team should collect all the documents relevant to the documentation and evaluation of the epidemic response. This should include minutes of the meetings, activity, process, epidemic report, evaluation report and other relevant documents. Further, prepare a coversheet listing of all the above documents. This will become an essential source of data for evaluating the response. The local team can conduct the assessment of the response itself (internal assessment) or be supported by other levels and partners in the response.

11. COORDINATION

Overall planning and coordination should take place at the **national, regional/provincial and district levels**. It is the responsibility of the health authorities but requires the input of a wide range of partners. Establishing a committee for epidemic preparedness and response (EPR Committee) well in advance of the epidemic season is the most effective way to plan, coordinate and supervise the activities of multiple partners to ensure outbreaks are detected early and an appropriate response is launched promptly. The EPR Committee should be led by representatives from the ministry of health, and should include staff from key national, regional and hospitals, reference laboratories and other partners who may be involved in treating patients and monitoring outbreaks. The EPR Committee should meet regularly – before and throughout the epidemic season.

The role of the EPR Committee is to:

- Ensure the surveillance system is in place for the epidemic season and covers the entire nation, region/province or district, and that health workers receive training in the

detection of cases, collection, reporting, analysis and monitoring of data as they become available;

- Ensure that information, training and medical supplies are made available to provide the best possible treatment for patients in the most remote health centres;
- Ensure the distribution of appropriate vaccines as needed, and coordinate vaccination campaigns;
- Disseminate information to the general public on the risks of meningitis, where and how to seek treatment and any plans for vaccination campaigns.

The Public health emergency management committee (PHEMC) must ensure that meningitis is integrated into the national health plan for emergency and disaster management.

12. MONITORING AND SUPERVISION

12.1. District level

The district medical officer will ensure during supervisory activities that the personnel of health facilities have been fully briefed on the process. For health facilities known to be in areas at risk of meningitis epidemics, personnel there should be trained on lumbar puncture techniques as well as how to handle and transport CSF specimens. In addition, health personnel should be trained in proper case management, alert and epidemic thresholds, as well as data analysis and reporting using appropriate IDSR forms.

During the epidemic season, the EPR Committee of the district should be reactivated (if not already functioning) for decision-making. Regular weekly meetings are advised.

12.2. Regional/Provincial level

Surveillance officers at regional level should help to conduct and supervise enhanced epidemic meningitis surveillance at district levels. The other focal points for the surveillance of vaccine preventable diseases (polio, measles and yellow fever) will be called in support for enhanced meningitis surveillance. Resources from the acute flaccid paralysis (AFP) surveillance will be of great input (logistics) for enhancing the meningitis surveillance in line with the IDSR strategy.

The surveillance officer at regional/provincial level should set up a mechanism to monitor districts in alert or epidemic phases. The officer should ensure that CSF is collected for laboratory confirmation, and determine whether samples from districts in alert or epidemic phase have been sent to the national or regional laboratory, as well as the return of laboratory results.

During the epidemic season, the EPR at provincial level should be reactivated (if not functioning) to enhance decision-making and management and coordination of response to potential meningitis outbreaks and to provide support to districts. Regular weekly meetings are advised. Continuous supportive supervision from the national level is necessary at this stage.

12.3. National surveillance unit

Each week during the epidemic season, the national surveillance officer should monitor if any districts have reached the alert threshold. For those that have, the officer should then check with the laboratory to determine if TI media or cryotubes (CSF samples) have started arriving from that district. If samples have not arrived, a means of supporting the district to achieve laboratory confirmation of samples should be sorted out without delay.

Other important activities to be conducted at this level include:

- monitoring vaccine supply;
- monitoring drug supply;
- provision of data management tools;
- evaluation of performance indicators.

The national EPR should be reactivated for situational analysis, recommendation of proper control measures and enhanced management of potential meningitis outbreaks. Regular weekly meetings should be conducted to analyze the epidemiological and laboratory data, upon which, supervision and monitoring actions are decided to support the regions and districts. The national EPR should also advocate for resource mobilization (funds, drugs, laboratory reagents, vaccines and logistics).

A rapid response team (RRT) should be designated at national level including partners for field investigation and rapid implementation of control measures. For the composition of the EPR and RRT refer to the IDSR guidelines[12] and ministry of health documents on the matter.

12.4. National reference laboratory

The director of the national reference laboratory (NRL) through the CSM laboratory focal officer should ensure the high-quality testing of CSF specimens in the laboratory and the prompt reporting of results back to districts. The director should provide regular feedback on samples collected and processed, in order to minimize contamination and handling/transportation problems. In addition the director should organize regular training and supervision of provincial and district laboratories, and ensure that reagents and laboratory equipment are available. S/He should also ensure that 10–20% of positive isolates are transported to WHO collaborating centres for quality assurance and control (in accordance with international standards) for genotyping and sequence typing.

12.5. National technical coordinating group

In each country a national coordinating body comprising the head of the national surveillance unit, the head of the national public health laboratory and the WHO disease prevention and control (DPC) officer will be put in place. Through weekly meetings this group will monitor and manage the implementation of activities related to enhancing meningitis surveillance.

The group will ensure that partners' contributions are taken into account and that all activities are well coordinated. This group is responsible for feedback and reporting of surveillance performance to all involved actors as well as the final evaluation report on the country's response to epidemics.

13. FEEDBACK

Reports, bulletins, annual statistical reports, websites, etc. will be used as feedback tools (see Annex 3, performance indicators).

[12] Kasolo F, Roungou J-B, Perry H. *Technical guidelines for integrated disease surveillance and response in the African region.* 2010. http://www.afro.who.int/en/clusters-a-programmes/dpc/integrated-disease-surveillance/features/2775-technical-guidelines-for-integrated-disease-surveillance-and-response-in-the-african-region.html

The IST-WA produces a weekly bulletin (shown below) presenting a synthesis of all data collected and reported by the countries in the meningitis belt; it is available at http://www.who.int/csr/disease/meningococcal/epidemiological/en .

World Health Organization
Africa

Meningitis Weekly Bulletin

Inter country Support Team - West Africa

Semaine/Week: 40-44
Octobre /October 2014

Bulletin Hebdomadaire de retro-information sur la méningite cérébrospinale
Weekly feedback bulletin on cerebrospinal meningitis

03 au 30 November 2014

I - SITUATION EPIDEMIOLOGIQUE DE LA SEMAINE 45-48 ***EPIDEMIOLOGICAL SITUATION OF WEEK 45-48***

Table 1 : Situation épidémiologique / *Epidemiological Situation*

Pays *Country*	Cas *Case*	Décès *Death*	Létalité (%) *Letality (%)*	District en Alerte *District in Alert*	District en Epidémie *District in Epidemic*	Complétude (%) *Completeness (%)*

ANNEXES

Annex 1: Incidence thresholds for detection and control of epidemic meningococcal meningitis in the meningitis belt countries in Africa[1]

	Population	
Intervention	30 000–100 000	Under 30 000
Alert threshold – Inform authorities – Strengthen surveillance – Investigate – Confirm (including laboratory) – Prepare for eventual response	• 3 suspected cases / 100 000 inhabitants / week (Minimum of 2 cases in one week)	• 2 suspected cases in one week *Or* • An increased incidence compared to previous non-epidemic years
Epidemic threshold – Mass vaccination within 4 weeks of crossing the epidemic threshold – Distribute treatment to health centres – Treat according to epidemic protocol – Inform the public	• 10 suspected cases / 100 000 inhabitants / week	• 5 suspected cases in one week *Or* • Doubling of the number of cases in a three-week period[2]
	If a neighbouring area to a population targeted for vaccination is considered to be at risk[3], it should be included in a vaccination programme.	
	In special situations such as mass gathering refugees displaced persons or closed institutions, two confirmed cases in a week should prompt mass vaccination.	

1. Revised guidance on meningitis outbreak response in sub-Saharan Africa. World Health Organization. Weekly epidemiological record.. No.51/52, 2014, vol.89, pp 580-586.
2. For example, *week 1*: 1 case, *week 2*: 2 cases, *week 3*: 4 cases
3. Epidemic risk factors: cases early in the dry season; no recent relevant vaccination campaign; high population density.

Annex 2: WHO generic case-based reporting form (clinical and laboratory information)

_____ Reporting Health Facility

_____ Reporting District

Generic Reporting Form – from Health Facility/Health Worker to District Health Team

☐ AFP ☐ Cholera ☐ Diarrhoea with Blood/Shigella ☐ Dracunculiasis ☐ Neonatal Tetanus ☐ Measles ☐ Meningitis ☐ Plague ☐ Viral Haemorrhagic Fever ☐ Yellow Fever _____ Other

Assigned by **District:**

EPID Nº:___ ___ - _____ - _____ - _____ __ (Province - District - Year - Case nº) Date received at regional level: __/__/__ __ Date received at National lab: __/__/__

Name(s) of Patient: _____ **Date of Birth:** _____/_____/_____ **Age:** _____ _____ _____ (**If DOB unknown**) **years** (If <12 months) **months** (NNT only) **days**

Patient's Residence: Village/Neighborhood _____ **Sex:** ☐ M=Male F=Female

Town/City: _____ **District of residence:** _____ ☐☐ U=Urban R=Rural **Urban/Rural**

Locating Information: _____

If applicable, Name of mother and father if neonate or child

For cases of Measles, NT (TT in mother), Yellow Fever, and Meningitis:

Date Seen at Health Facility: _____/_____/_____ **Number of vaccine doses received** ☐ 9=unknown

Date Health Facility Notified District: _____/_____/_____ For Measles, TT, YF- documented by card. For Meningitis, history.

Dates of Onset: _____/_____/_____ **Date of last vaccination:** _____/_____/_____ (Measles, Neonatal Tetanus (TT in mother), Yellow Fever, and Meningitis only)

Blank variable #1_____ **In/Out patient:** ☐ 1=In-patient 2=Out-patient **Outcome** ☐ 1=Alive 2=Dead 9=unknown

Blank variable #2_____ **Final Classification:** ☐ 1=Confirmed 2=Probable/Compatible 3=Discarded 4=Suspected

Person Completing Form **Name:** _____ **Signature:** _____ **Date Sent Form to District:** _____/_____/_____

Email/Phone no.: _____

If laboratory specimen collected:

For Health Facility: If laboratory specimen is collected, complete the following information. And send a copy of this form to the laboratory with the specimen.

Date of specimen collection: _____/_____/_____ Specimen source: Stool Blood CSF _____

Date Specimen sent to lab: _____/_____/_____
Other

For the Lab: Complete this section and return the form to district team and clinician

Date laboratory specimen: _____/_____/_____ Specimen Condition: Adequate Not adequate

Disease/ Condition	Type of test	Results (P = pending)	Disease / Condition	Type of test	Results	
Cholera	Culture	+ - P	Yellow Fever	IgM	+ - P	
	Direct Exam	+ - P _____ Method used for Direct Exam	Measles	IgM	+ - P	
Meningitis			Rubella	IgM	+ - P	**Virus Detection**
N. meningitidis	Culture	+ - P	RVF	IgM	+ - P	+ - P
S. pneumoniae	Culture	+ - P	Ebola	IgM	+ - P	+ - P
H. influenzae	Culture	+ - P	CCHF	IgM	+ - P	+ - P
N. meningitidis	Latex	+ - P	Lassa	IgM	+ - P	+ - P
S. pneumoniae	Latex	+ - P	Marburg	IgM	+ - P	+ - P
H. influenzae	Latex	+ - P				
Shigella Dysenteriae	Culture	SD type 1 Other shig No shig				
Plague	Culture	+ - P				
	IFA>1: 64	+ - P				
	PCR					

Other laboratory results:

_____

_____

Date laboratory sent results to district: _____/_____/_____

_____

Name of laboratory sending results:_____ Other pending tests: _____

Date district received laboratory results: _____/_____/_____ Date laboratory results sent to clinician by district: _____/_____/_____

NOTE: District is responsible for ensuring laboratory results get to clinicians. Failure to do so will undermine cooperation with clinicians on reporting of cases in the future

Annex 3: Performance indicators for SOPs

1) Reporting: Per cent (%) of districts that have reported weekly meningitis cases and deaths on time. **Target:** 80% of districts.

2) Investigation-Field: Per cent (%) of alert or epidemic districts which have been investigated and documented within the 48 hours after reaching the alert or epidemic threshold. **Target:** 80%

3) TI transportation: Per cent (%) of districts in alert or epidemic phase that have sent at least 10 TI bottles to the national reference after reaching the alert threshold. **Target**: 80% of alert or epidemic districts.

4) Laboratory - Confirmation: Per cent (%) of epidemic districts that have confirmed the serogroup of at least 10 suspected meningitis cases within 7 days of surpassing the alert or epidemic threshold. **Target:** 80% of alert and epidemic districts.

5) Feedback-Lab: Per cent (%) of alert and epidemic districts that have received results from the samples sent to the national reference laboratory within 7 days of receiving the TI bottles by the laboratory. **Target:** 80% of districts sending TI bottles.

6) Negative specimen: Per cent (%) of culture-negative samples among samples received per week by the reference laboratory. **Target:** <20% of samples during the week.

7) Contaminated specimen: Per cent (%) of contaminated samples among samples received per week by the reference laboratory. **Target:** <20% of samples received during the week.

8) Reporting to WHO: Per cent (%) of countries which have reported on time weekly data (surveillance and laboratory results) to WHO. **Target:** 80% of countries.

9) Feedback: Per cent (%) of weekly meningitis bulletins produced by WHO (and sent to countries, WHO/AFRO/HQ and partners). **Target:** 80% timeliness.

Annex 4: Preparing for ICG vaccine request

To access the ICG emergency vaccine stockpile, countries must:

- Provide evidence of a meningococcal disease outbreak
- Provide laboratory confirmation of the *Nm* serogroup responsible
- Develop and provide plan(s) of action for the vaccination campaign(s)
- Provide proof of necessary storage and transportation resources to ensure the safe and effective delivery and maintenance of the vaccines to the area affected.

A micro-plan must be prepared for every district targeted for a vaccination campaign. It is the responsibility of the district health authorities to complete and submit the plan in order to prepare thoroughly for the campaign and to secure the necessary vaccines.

The micro-plan should include:

- the names of sub-districts targeted for vaccination;
- the total population currently present in the target areas;
- the population targeted for vaccination;
- the type and quantity of vaccine needed;
- the quantity of additional supplies needed– AD syringes, safety boxes, dilution syringes (10 ml), cotton wool, gloves;
- the number of teams conducting the campaign (each team requires vaccinators, recorders, crowd controllers and a supervisor);
- the number of supervisors – at team, district, provincial and central levels;
- the mechanism for training the vaccination teams;
- logistic needs – cold chain equipment, vehicles;
- the mechanism for managing waste resulting from the campaign;
- the plans for vaccination campaign coverage surveys.

The budget should include:

- allowances for members of the vaccination team;
- social mobilization costs (including allowances for staff);
- costs of logistic equipment;
- costs of waste management;
- costs of coverage survey.

The email address of the ICG is ICGsecretariat@who.int

The form is available at: http://www.who.int/csr/disease/meningococcal/icg/en/

Annex 5: WHO generic line list for reporting from health facility to district (during outbreak)

Health Facility: _____ Date received at District: _____

District: _____ Disease/Condition: _____

	EPID Number (CCC-PPP-DDD-YY-NNNN)	**(O)ut / (I)n Patient**	**Name**	**Village or Town and Neighborhood**	**Sex**	**Age**	**Date seen at health facility**	**Date of onset of disease**
(1)								
(2)								
(3)								
(4)								
(5)								
(6)								
(7)								

Generic line list (continued)

	Immunization status (specify vaccine type)	Blank variable	Blank variable	Laboratory tests		Outcome (A)live (D) dead	Comments
				Specimen taken (Yes/No) If yes, date collected	Laboratory results		
(1)							
(2)							
(3)							
(4)							
(5)							
(6)							
(7)							

Annex 6: Instructions on using trans-isolate (TI) bottles

How to use the Trans-Isolate (TI) system for isolation and transport of meningococci and other agents causing bacterial meningitis from CSF

1. Procedure for inoculating TI medium for transporting meningococci and other agents causing bacterial meningitis from CSF:

1.1 Remove a vial of Trans-Isolate (TI) medium from refrigerator at least 30 minutes before inoculating it with the specimen. Allow the vial to warm to room temperature, which is more favourable for growth of the organism.

1.2 Before inoculating the vial, check to see if there is any visible growth or turbidity. If there is visible growth or turbidity, discard the vial, because it may be contaminated.

1.3 Lift up the small lid in the middle of the metal cap on top of the TI vial.

1.4 Disinfect the top of the TI vial with 70% alcohol or iodine. Allow to dry (usually 30 to 60 seconds).

1.5 Use a sterile syringe and sterile needle preferably 21G, 0.8 mm. to aspirate 500 microliters (one-half of an ml) of cerebrospinal fluid (CSF) from the tube containing CSF.

1.6 Inject the CSF into the TI vial through the disinfected dry stopper on the top of the TI vial.

2. Transport and incubation of TI vials, and inoculation of the culture media:

The procedures to follow depend upon how promptly the TI vials can reach the laboratory of reference that will perform culture and isolation.

<u>If TI vials **cannot** reach the laboratory of reference within 24 hours:</u>

- Label the TI vial with the date, name of the patient, and any other necessary identifiers.
- Ventilate the TI vial with a sterile cotton plugged needle. The Needle should not dip into the culture media (broth).
- Store the ventilated TI vial in an upright position at room temperature. Make sure it is away from excessive heat, direct sunlight, and dust.
- Before transporting the vial, remove the ventilating needle from the top of the TI vial. This will prevent leakage and contamination during shipment.
- Transport the TI vial in a sealed plastic bag to minimize the risks of contamination and attach the case report form

<u>If TI vials **can** reach the laboratory of reference within 24 hours:</u>

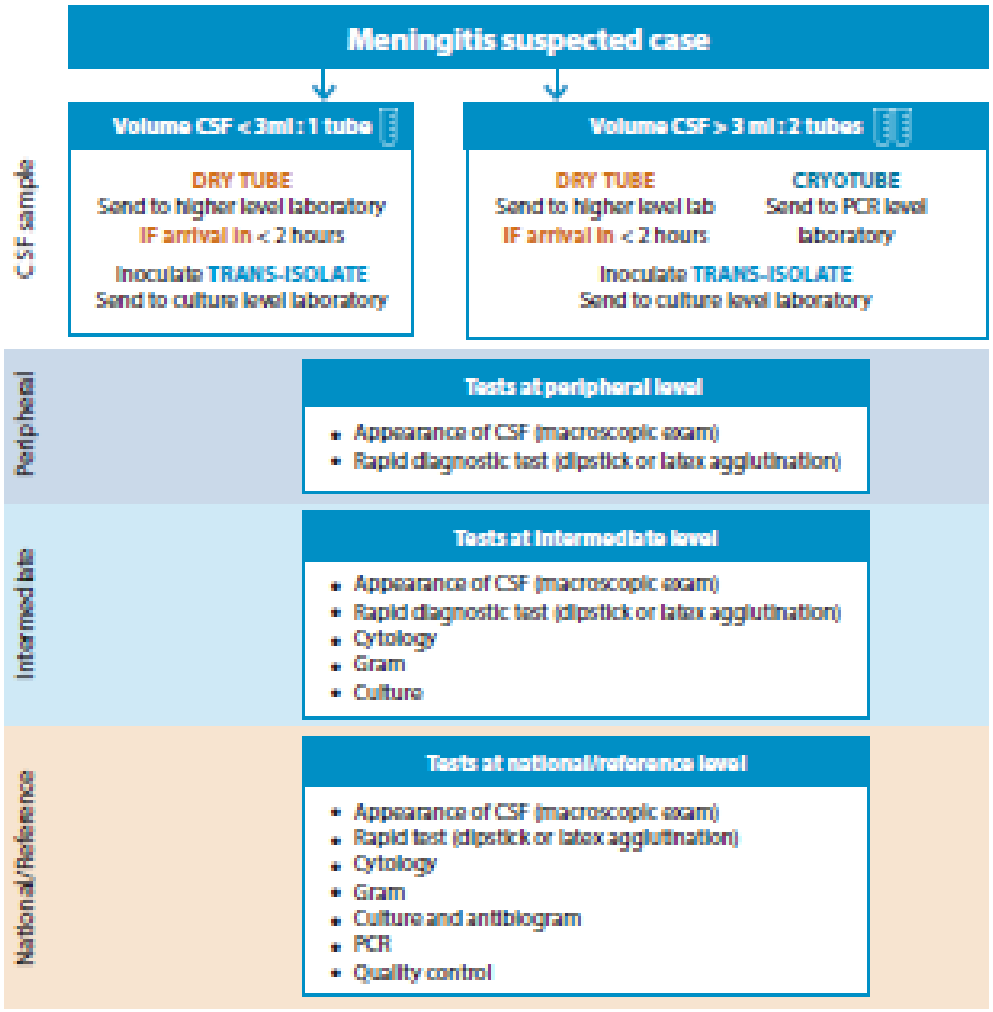
- Label the TI vial with the date, name of the patient, and any other necessary identifiers.
- Ship the TI vials without ventilation.
- Transport the TI in a sealed plastic bag to minimize the risk of contamination and attach the case report form.

3. Additional recommendations about the proper use of TI vials and ventilating the inoculated TI vials:

- The TI vials can be used for at least 1 year after the date of production provided that they are stored in the refrigerator.
- Freezing TI vials destroys the TI medium.
- Non-inoculated TI vials should be packed in cold packs for shipment to the laboratory of reference.
- In previous studies[13], cultures on ventilated TI vials 2 to 4 weeks after inoculation with CSF (from patients with acute bacterial meningitis), incubation and transport resulted in a loss of growth in only 20 to 25% of inoculated vials. Without ventilation the losses were much greater.
- Contamination is the single most problematic point with the system. Aseptic measures and understanding the risks are necessary to achieve good recovery of the isolates.

[13] Référence Ajello GA, Feely JC, Hayes PS, Reingold AL, Bolan G, Broome CV, and Phillips CJ. Trans-isolate medium: a new medium for primary culturing and transport of *Neisseria meningitidis*, Streptococcus pneumoniae, and Haemophilus influenzae. J Clin Microbiol. 1984;20(1):55–58.

Annex 7: Laboratory investigation of CSF samples



ANNEX 8: Template report on investigation of epidemics at district level

Adapted from IDSR technical guidelines

- Title/Description (include the disease or condition being investigated)
- Period
- Location (Villages, Neighbourhood, District, Province)
- Executive summary

INTRODUCTION

- Background:
- Reason for investigation (public-health significance, threshold exceeded, etc.)
- Specific objectives of the investigation and preparation for epidemic response:

METHOD

- Dates of investigation:
- Site(s) of investigation (health facilities, villages, other):
- Case detection (indicate what has been done to detect cases, e.g. examination of medical records, on-site investigation, alerting other health facilities, etc.)
- Laboratory specimens collected:
- Describe response and intervention (give dates)
- Describe method of data analysis.

RESULTS

- Date and localization of index case:
- Date and health facility where index case entered the health system.
- Results of supplementary case investigation:
- Laboratory results and data analysis:
- Describe parameters in terms of time, place and persons
- Display detailed results graphically by parameters of time (epidemic curve), place (map), and persons (table).
- Outcome of response and proof that response interventions have had an impact

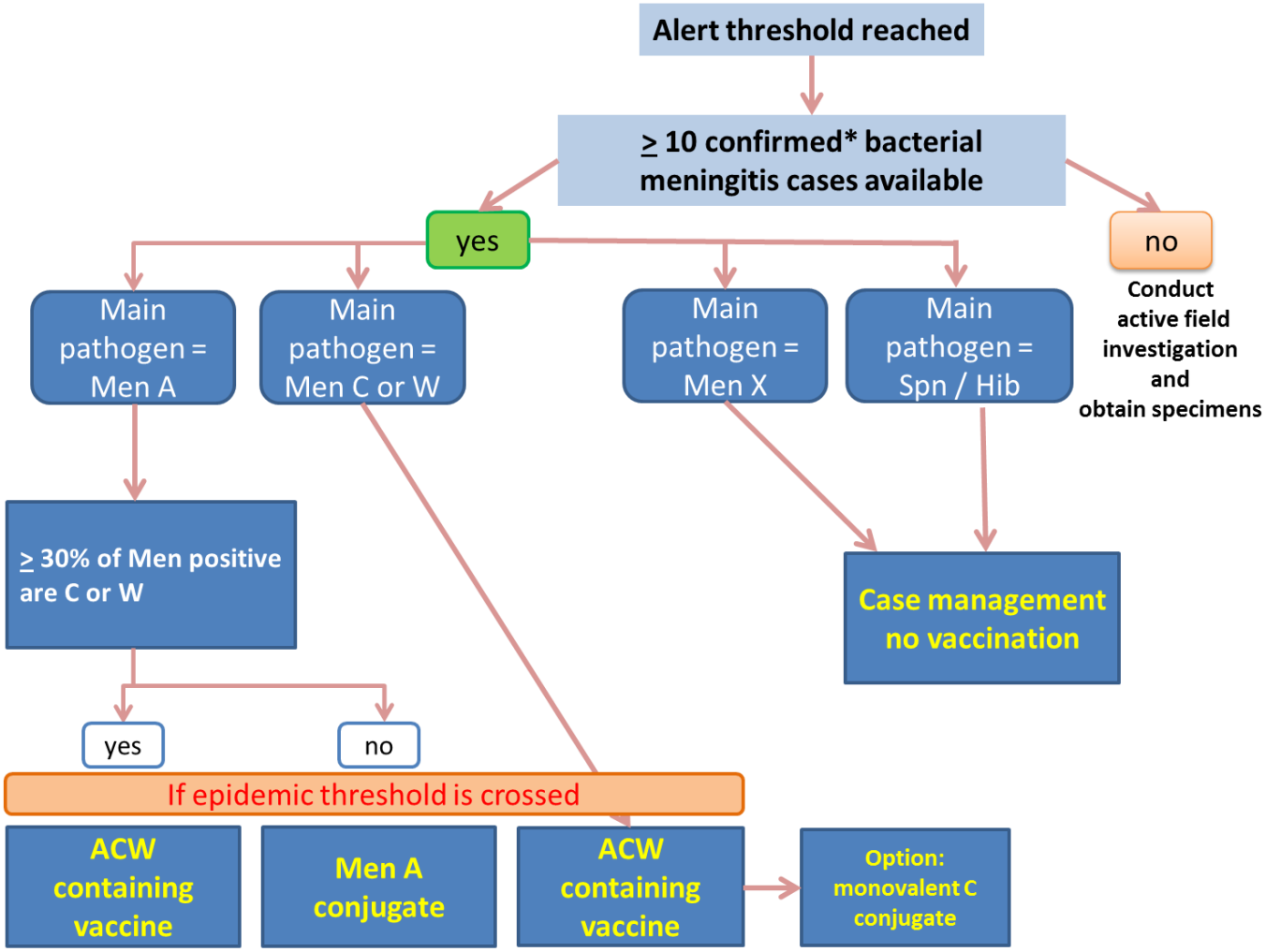
DISCUSSION

- Discuss key outcomes
- Compare with the literature
- Discuss whether or not the starting objectives or hypotheses have been met
- Discuss any new hypothesis arising in the course of the investigation or while interpreting the results

CONCLUSION

- Draw a conclusion as to whether or not the objectives have been met or the results achieved
- Learn any lessons

Annex 9: Indicative decisional tree for meningitis vaccine choice in a reactive vaccination campaign



* **Confirmation includes a positive result from culture, polymerase chain reaction or rapid diagnostic test.**

Annex 10: Standardized Excel data collection tool for enhanced surveillance of meningitis

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
1	Surveillance renforcée de la méningite en Afrique																								
2	Pays:	Bénin			2015																				
3																									
4	Region	District	Isocode	Année	Population	Semaine 1				Semaine 2				Semaine 3				Semaine 4				Semaine 5			
5						cas	décès	Taux d'attaque	Létalité	cas	décès	Taux d'attaque	Létalité	cas	décès	Taux d'attaque	Létalité	cas	décès	Taux d'attaque	Létalité	cas	décès	Taux d'attaque	Létalité
6	REGION	DISTRICT	ISOCODE	AN	POP	CAS01	DCD01	TAX01	LET01	CAS02	DCD02	TAX02	LET02	CAS03	DCD03	TAX03	LET03	CAS04	DCD04	TAX04	LET04	CAS05	DCD05	TAX05	LET05
75		Lalo	BJP00600500000000000	2015	121 415	0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0	
76		Toviklin	BJP00600400000000000	2015	92 808	0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0	
77	Total Couffo			2015	799 306	0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0	
78		Athieme	BJP00900500000000000	2015	60 157	0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0	
79		Bopa	BJP00900200000000000	2015	107 067	0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0	
80	Mono	Come	BJP00900100000000000	2015	88 977	0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0	
81		Grand-Popo	BJP00900400000000000	2015	61 458	0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0	
82		Houeyogbe	BJP00900600000000000	2015	113 503	0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0	
83		Lokossa	BJP00900300000000000	2015	117 423	0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0	
84	Total Mono			2015	548 584	0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0	
85		Adja-Ouere	BJP01100200000000000	2015	124 176	0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0	
86		Ifangni	BJP01100300000000000	2015	109 105	0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0	
87	Plateau	Ketou	BJP01100500000000000	2015	153 129	0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0	
88		Pobe	BJP01100100000000000	2015	126 329	0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0	
89		Sakete	BJP01100400000000000	2015	107 579	0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0	
90	Total Plateau			2015	620 318	0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0	
91		Adjarra	BJP01000200000000000	2015	91 592	0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0	
92		Adjohoun	BJP01000900000000000	2015	86 020	0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0	
93		Aguegues	BJP01000500000000000	2015	40 606	0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0	
94	Oueme	Akpro-Misserete	BJP01000100000000000	2015	110 699	0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0	
95		Avrankou	BJP01000600000000000	2015	122 508	0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0	
96		Bonou	BJP01000700000000000	2015	45 187	0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0	
97		Dangbo	BJP01000300000000000	2015	100 647	0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0	
98		Porto-Novo	BJP01000800000000000	2015	340 624	0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0	
99		Seme-Kpodji	BJP01000400000000000	2015	175 587	0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0	
100	Total Oueme			2015	1 113 469	0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0		0	0	0.0	
101	TOTAL GENERAL				10 315 244	8	0	0.1	0.0	5	0	0.0	0.0	8	0	0.1	0.0	7	1	0.1	14.3	10	2	0.1	20.0