



WORLD HEALTH ORGANISATION REGIONAL OFFICE FOR AFRICA

Standard Operating Procedures For Enhanced Meningitis Surveillance in Africa

African 'Meningitis Belt'



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1. BACKGROUND

Epidemic meningococcal disease remains 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. The estimated number of cases of meningitis for the last 15 years was more than 700,000 of whom about 10% died and more than 20% with serious sequels. Epidemics in the meningitis belt are traditionally associated with *Neisseria meningitidis* serogroup A. However in 2002 Burkina Faso experienced the largest ever recorded meningitis epidemic due to serogroup NmW135, which was followed in 2003 by an outbreak with mixte aetiology (*Neisseria meningitidis* serogroup A and W135). In 2006 *Neisseria meningitidis* serogroup X was isolated as the cause of the outbreak in the districts of the western part of Niger, bringing in new threats for the meningitis belt countries.

During the 2001-2002 epidemic season, following the emergence of meningitis epidemics due to serogroup NmW135 from the 2000 pilgrimage in Saudi Arabia, WHO, in collaboration with its collaborating centres for meningitis, has progressively supported countries in implementing the strategy of enhanced surveillance of meningitis. Starting initially from three countries (Burkina Faso, Mali and Niger), the strategy is now actively being implemented in 14 countries of the meningitis belt (Benin, Burkina Faso, Cameroon, Central Africa, Chad, Cote d'Ivoire, Democratic Republic of Congo, Ethiopia, Ghana, Mali, Niger, Nigeria, Togo and Sudan).

Between 2003 and 2009, the 13 countries under enhanced surveillance of meningitis (Sudan excluded) reported to WHO more than 271 275 cases and 24 901 deaths due to meningitis. The repartition of causal pathogens is as follow: 58% *Neisseria meningitidis* A, 6% *Neisseria meningitidis* W135, 21% *Streptococcus pneumoniae* and 6% *Hemophilus influenzae* b.

Containing the epidemics on time and ensuring an adequate case management depend on accurate diagnostic of the disease and laboratory confirmation of the causal organism. Enhanced epidemiological and laboratory surveillance enable early detection of epidemics, identification of the serogroup in cause and the use of the appropriate vaccine to protect the population, thus preventing further spread of the disease, deaths or disabilities.

When no vaccine is available, the control of meningitis epidemics will rely on enhanced surveillance, rapid and effective case management. This could happen when the country has no contingency stocks, or for serogroups for which no vaccine exists, or when the cost of the vaccine is unaffordable.

Lessons learnt from the 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 selected countries have national plans for integrated disease surveillance and response (IDSR), which include meningitis. However there is a need for the surveillance systems to be strengthened in order to detect changing epidemiological patterns of meningitis epidemics in a timely manner and provide evidence to guide case management and epidemic response. This is achieved only through an adequate funding of the epidemic preparedness and response plans.

The aim of these standard operating procedures is to guide health personnel from various levels of the health system in the implementation of enhanced surveillance of meningitis epidemics.

2. OBJECTIVES

2.1 General objective

To promptly detect, confirm, and respond appropriately to meningitis epidemics in the belt.

2.2 Specific Objectives

- To detect promptly meningitis cases from all health facilities
- To report systematically meningitis cases to the higher level
- To conduct rapid laboratory confirmation of causal pathogens
- To analyze systematically surveillance and laboratory data at all levels
- To use this information for immediate public health control measures
- To monitoring the situation including serogroup shifts throughout the year.

3. DEFINITIONS

3.1. Case definitions

3.1.1. Suspected meningitis case :

- Any person with sudden onset of fever (>38.5 C rectal or 38.0 C axillary) and one of the following signs: neck stiffness, altered consciousness or other meningeal signs.
- Any toddler with sudden onset of fever (>38.5 C rectal or 38.0 C axillary) and one of the following signs: neck stiffness, or flaccid neck, bulging fontanel, convulsion or other meningeal signs.

3.1.2. Probable meningitis case:

Any suspected case with macroscopic aspect of its CSF turbid, lousy or purulent; or with microscopic test showing Gram negative diplococcus, Gram positive diplococcus, Gram positive bacillus; or with leukocytes count more than 10 cells/mm³.

3.1.3. Confirmed meningitis case :

Isolation of the causal pathogens (*N. meningitidis*, *Streptococcus pneumoniae*, *Haemophilus Influenzae b...*) from the CSF of a suspected/probable case or by hemoculture or PCR.

3.2. Intervention thresholds

3.2.1. Alert threshold (see Annexe 2)¹:

For populations between 30,000 and 100 000 inhabitants: an attack rate of 5 cases per 100,000 inhabitants per week.

For populations less than 30,000 inhabitants: an incidence of 2 cases in one week or an increase in the number of cases compared to the previous non-epidemic years.

3.2.2. Epidemic threshold (see Annexe 2)¹:

For populations between 30 000 and 100 000 inhabitants: an attack rate of 15 cases per 100 000 inhabitants per week. When the risk of epidemic outbreak is high (no epidemic for the last 3 years, alert threshold reached early in the dry season) the recommended epidemic threshold is 10 cases per 100 000 inhabitants per week.

For populations less than 30 000 inhabitants: an incidence of 5 cases in 1 week or, the doubling of number of cases over a 3-week period.

4. METHODOLOGY

The surveillance system in the countries will be enhanced with particular emphasis on strengthening laboratory capacity for confirmation of causal agents. This will contribute to proper case management and appropriate choice of vaccine.

4.1 Enhancing Meningitis Surveillance

Early detection of meningitis outbreaks and prompt laboratory confirmation of circulating pathogens depend on effective implementation of surveillance activities at all levels. Epidemic meningitis surveillance is not a linear activity. The level of preparedness and the public health measures for epidemic meningitis control varies throughout the year and should be intensified as the epidemic season approaches. 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 non-endemic countries (outside the meningitis belt).

¹ For complementary criteria on alert and epidemic thresholds refer to: Detecting meningococcal meningitis epidemics in highly-endemic African countries. *Weekly Epidemiological Record*, 75, 306-309

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

4.1.1. Pre-epidemic phase

This phase can be sub-divided into 2 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 as they are recruited at health facility level. For any suspected case where a lumbar puncture is performed, a case-based form should be filled and the CSF sent to the nearest reference laboratory for bacteriological tests. Treat every single meningitis case with recommended antibiotics according to the treatment protocols. Start the presumptive antibiotic treatment without delay, as soon as the CSF is collected, and before the laboratory results are out.

A district is in alert phase, when the weekly attack rate reaches 5 cases per 100 000 inhabitant as defined above.

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 for bacteriological tests. It is recommended to get at least ten (10) *Neisseria meningitidis* positive samples. This will help in making a rapid decision as to the type of vaccine to be used in case the district reaches the epidemic threshold, as well as orienting the clinicians for an effective case management.

Hence, it is important to strengthen laboratory capacities at district levels to perform Gram stain, and regional levels to perform culture.

For every district in alert phase, do the following in box 1 below :

Box 1: What should be done during the alert phase:

1. Alert immediately 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. 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 filled.
4. Confirm at least 10 positive samples for *Neisseria meningitidis* per surveillance unit (district or sub-district) for decision making about the appropriate vaccine to be used.
5. Samples should be sent using adequate media: TI bottles (for culture) and cryotubes for PCR.
6. Continue data analysis, graphing and mapping.
7. Treat all suspected cases with antibiotics as recommended by the national treatment protocol.

Note: Action thresholds were developed for the African meningitis belt countries. The situation in the other countries should be analyzed based on previous experience and on a case by case basis.

*For countries outside the meningitis belt (non-endemic countries), suspected cases of meningitis in a district/sub-district, should be sampled whenever possible for laboratory confirmation of causal pathogens and antibiotic sensitivity. The predominance of *Neisseria meningitidis* among the isolated germs indicates the risk of a meningitis outbreak. This will allow implementing prompt response measures (adequate vaccine and antibiotic choice)*

4.1.2. Epidemic phase:

A 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. *[Attack Rate = (No of cases per week / population of sub-district) x 100,000]*

As soon as the epidemic threshold is reached in a district or sub-district, it is recommended to conduct mass immunization campaign targeting the entire district, using the appropriate polysaccharide bivalent (AC) or trivalent (ACW) vaccine, and immunize all 2-30 years old population of the district. It is also recommended to vaccinate any contiguous district in alert phase.

Continue collecting CSF and sending samples to the reference laboratory to monitor the characteristics of the causal pathogens (serogroups, antibiotic sensitivity). Box 2 below summarizes the specific actions recommended during the epidemic phase:

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

- 1. Vaccinate immediately the epidemic district with the appropriate vaccine as well as any contiguous district in alert phase.*
- 2. Continue data collection, transmission and analysis.*
- 3. Maintain regular collection of 5 to 10 CSF specimen per week throughout the epidemic season in the epidemic districts in order to detect any serogroup shift.*
- 4. Treat all case with the appropriate antibiotic as recommended by the National protocols.*

For longitudinal surveillance purposes, regular collection of at least 5 to 10 CSF samples will be maintained in all epidemic districts for monitoring the circulating serogroups, antibiotic susceptibility testing, as well as any serogroup shift during the epidemic period.

A Rapid Response Team (RRT) from central or regional/provincial level should be sent to the affected areas to support surveillance and laboratory activities. The team should evaluate the data collection, analysis and transmission, as well as lumbar puncture practices, the use of trans-isolate medium and all laboratory procedures (eg, Gram stain, cytology, latex agglutination tests, etc).

Note that before sending a specimen to the reference laboratory, it should be adequately labelled using the IDSR case-based form.

4.1.3. Post-epidemic phase

The post epidemic phase corresponds to the first 4 weeks after the end of an epidemic. The end of a meningitis epidemic is declared when the attack rate in the last epidemic district descends below the alert threshold for two consecutive weeks. During this phase it is recommended to :

- Evaluate the response/management of the epidemic to outline the gaps, lessons learnt and make recommendations for a better control of future meningitis epidemics.
- Conduct an external evaluation (all the system, vaccine coverage survey)

These evaluations are conducted in order to draw lessons and make recommendations for a better control of future epidemics. Adequate resources should be mobilized to conduct these evaluations.

4.1.4. Inter-epidemic phase

The inter-epidemic phase extends from the end of an epidemic season to the beginning of the next season. Sometimes it includes the post-epidemic phase. In this phase the epidemic 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 :

- Establish a strong collaboration among the surveillance officers, clinicians and the national reference laboratory officers in order to undertake a comprehensive sample collection and confirmation mechanism.
- Continue surveillance and laboratory confirmation of suspected meningitis cases in all the national, regional and district hospitals.

4.2. Data management

4.2.1 Data collection and transmission

For all suspected meningitis cases, some basic patient information will be collected using the IDSR Line List form (See annex 4).

The suspected cases and deaths should be recorded and transmitted weekly to the district surveillance officer. Data should be immediately compiled and transmitted either by radio, telephone/SMS, fax, email (or the quickest means available) to provincial and national levels. Weekly notification should be done throughout the season/year. Districts should report weekly, even when no cases are recorded (“Zero reporting”).

Moreover, in case of epidemics, the reporting of cases and deaths can 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 3). Provide a unique identifier (Epid Number: Countrycode(3 letters)-Provincecode(3 letters)-Districtcode(3 letters)-Yearcode(2 digits)-CaseNumber(4 digits): CCC-PPP-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.

4.2.2. Data entry

4.2.2.1. At district level

The line lists sent by peripheral health facilities to the district will be entered into a computer programme (Excel preferably or Epi Info) by the district surveillance officers. They will also enter the laboratory data and tests results on the same software. The completed data base will then be sent to the regional/national level on a weekly basis in case of epidemics, or on a monthly basis when there is no epidemic.

4.2.2.2. At regional level

The data bases received from the districts will be appended by the regional surveillance officers into a single database using preferably Excel software (or Epi Info), and sent to the national level on a weekly basis during epidemics or on a monthly basis when there is no epidemic.

The laboratory results produced by the regional hospital will also be entered using the Epid-number. The regional surveillance officers should make sure that the districts received the laboratory results of the specimen they've sent.

4.2.2.3. At central/national level

The data bases received from the regions or districts will be appended into a single national database using preferably Excel (or Epi Info), before sending it to WHO and partners on a weekly basis during epidemics and on a monthly basis when there is no epidemic.

4.2.2.3. 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 came from.

The data manager at the national surveillance unit should check the data entry flaws and clean the data base on a weekly basis. He should make sure that clinical and laboratory data of each patient are linked, before any detailed data analysis.

4.2.3. Data analysis

The disease surveillance officers at each level should analyse 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.

4.3 Specimen collection, storage, transportation and processing

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

- Procure an adequate stock of lumbar puncture kits, Rapid latex kits (Pastorex), anti sera (monovalent), Trans-isolate (TI) media, cryotubes, and triple packaging box for specimen transport.
- Preposition these materials at provincial and district levels under the responsibility of the provincial and district disease surveillance and laboratory officers.

Note:

- TI media should be stored and used according to the manufacturer's guidelines (see Annex 5 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.

4.3.1 Sample Collection

Health personnel or Rapid Response Teams on the field should systematically collect CSF specimens for laboratory confirmation before the commencement of antibiotics therapy. It is estimated that 20 to 30 CSF samples per district are sufficient to determine the circulating causal pathogens and guide the choice of the appropriate vaccine (AC or ACW). Ensure that at least 10 of the samples collected are positive for a better decision on the situation in a district. If not, collect more samples from that district. Perform antibiotic susceptibility testing to guide the use of appropriate antibiotic for case management. The quicker these samples are obtained at the reference laboratory the better.

Once an epidemic has been declared in a district, regular collection of CSF specimens should be maintained in that district throughout the epidemic season, in order to monitor circulating pathogens. However the systematic collect of CSF from each patient is not recommended. The number of CSF to be collected per week should be 5-10.

Health personnel at health facility should be trained on lumbar puncture technique, specimen collection, TI utilisation, handling and transportation to the reference laboratory. The laboratory technicians should be trained on how to perform Gram stains, rapid latex agglutination using Pastorex kits, or dipsticks.

4.3.2 Utilisation of TI bottles

The TI bottles are stored between 4°C and 8°C in the refrigerator. Before using a TI bottle, it will be sorted and kept at room temperature 30 minutes before adding the CSF. From each suspected meningitis case, 1 ml of CSF should be injected aseptically into a TI media. After the CSF has been injected, the TI medium should be vented and kept at

room temperature away from direct sunlight or dust. The inoculated TI medium should not be refrigerated (see Annex 5 for instructions on using TI media).

4.3.3 Transportation of CSF specimens

For culture:

The inoculated TI medium 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 TIs are sent without venting needle and without ice packs. Once inoculated, TI media should be kept at room temperature.

For PCR (Polymerase Chain Reaction):

One (1) to two (2) ml of CSF should also be collected in cryotubes and sent along with TIs, 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. PCR can detect etiological pathogens even where there was no growth from the specimens sent by TI.

4.3.4. Specimen processing

The identification of causal pathogen is essential to confirm the nature of the meningitis epidemic and institute 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 organisational levels (national, regional, district) and the technical capacity of the laboratory at that level:

- Gram stain and cell counts at district laboratory or health facility with appropriate equipment
- Rapid latex tests at district laboratory level. (Note that the use of a latex test (Pastorex®) capable of identifying *Nm* W135 is highly recommended during the initial phase of an outbreak. Pastorex can be used at field level and substantially reduce the delay for bacteriological confirmation and decision making).
- Culture and serogroup at national or regional reference laboratories.
- Antibiotic susceptibility pattern should be conducted for all specimens received at national reference lab.
- DNA detection: 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).

Note that several countries in the region now have access to PCR. 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) for some weeks, and shipped in a cool box to national or regional reference laboratory.

4.3.5. Turn-around time of laboratory results:

The laboratory results should be sent by the CSM laboratory focal officers to the highest level and to the facility that sent the sample(s) within 48 hours upon completion:

- Districts: within 48 hours upon reception of the sample(s)
- Province/Region: within 5 days upon reception of the sample(s)
- National level: within 7 days upon reception of the sample(s)

4.3.6. 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 WHO collaborating centres⁵ (Marseille, Oslo, Atlanta) for genotypic characterization. This will allow monitoring epidemiological trends of serogroups and genotypes and a better understanding of the spreading patterns of *Nm* epidemic complexes in the African region.

5. CRITERIA FOR VACCINE CHOICE

The decision on the type of vaccine to be used (See Decisional Tree in Annex 6) should ideally be based on the results from at least 10 *Nm* positive specimens. In order to obtain that number of *Nm* 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.

The proportion of *Nm* W135 required warranting the use of ACW trivalent vaccine could be defined according to the number of *Nm* positive samples available from a given affected area.

The following criteria could be suggested:

- ≥ 30% of W135 out of 10-19 *Nm* positive samples
- OR
- ≥ 20% of W135 out of 20 or more *Nm* positive samples.

In the total absence of laboratory evidence of *Nm* W135 the use of trivalent ACW vaccine should be strongly discouraged.

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- Centres for Disease Control and Prevention, Meningitis and Special Pathogens Branch, 1600 Clifton Road, C-09, Atlanta, GA 30333, United States, Tel. +1 404 639 3158/4721, Fax +1 404 639 0817, email: BAP4@CDC.GOV.

In the above-mentioned situation, vaccination with bivalent AC vaccine should be recommended (provided that some laboratory evidence of *Nm A* is available).

In situations where a full blown epidemic is reported and where the minimum percentage of *Nm W135* was not reached, the identification of one or more *Nm W135* in the concerned area(s) and concurrent W135 epidemic in contiguous area(s) will justify the use of the trivalent vaccine.

In any other situation, decisions to use vaccine, should be evaluated on a case-by-case basis and should take into account all epidemiological and laboratory information available in the country.

6. CASE MANAGEMENT

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

7. COMMUNICATION

The following communication strategies should be implemented at all levels:

- Advocacy
- Social mobilization
- Communication for behaviour change

Key sensitization messages should be broadcast for an early treatment seeking by patients.

8. RESEARCH

Research topics should be identified according to countries priorities. Resources should be mobilized to conduct key operational researches and the results used for improving the control of epidemic meningitis in Africa.

9. MONITORING AND SUPERVISION

9.1 District level

The District Medical Officer will ensure during supervisory activities that personnel of health facilities have been fully briefed on the process. For health facilities identified at risk of meningitis epidemics, the personnel should be trained on Lumbar puncture techniques as well as how to handle and transport CSF specimens. Train also the health

personnel on the proper case management, on alert and epidemic thresholds as well as data analysis and reporting using appropriate IDSR forms.

The Epidemic Management Committee (EMC) of the district should be reactivated (if not functioning) for decision making and better management of the situation. Regular weekly meetings are advised.

9.2 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 AFP 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. He should make sure that CSF is collected for laboratory confirmation, and 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.

The Epidemic Management Committee at provincial level should be reactivated (if not functioning) for decision making and better management of the situation. Regular weekly meetings are advised. Supervision and monitoring of the situation should be conducted to support the districts. Continuous supportive supervision from the National level is necessary at this stage.

9.3 National Surveillance Unit

Each week during the Epidemic season, the national surveillance officer should monitor if any districts have reached the alert threshold, and check with the laboratory if TI media (CSF samples) have started arriving from that district, otherwise, means of supporting the district for laboratory confirmation should be sorted out without delay.

Other important activities to be conducted at this level:

- Vaccine supply,
- Drugs supply,
- Provision of data management tools,
- Evaluation of monitoring indicators.

The National Epidemic Management Committee (EMC) should be reactivated for situational analysis, recommendation of proper control measures and better management of the situation. Regular weekly meetings should be conducted to analyse the epidemiological and laboratory data, upon which, supervision and monitoring actions are decided to support the regions and districts. The national EMC should also advocate for resource mobilisation (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 EMC and RRT refer to the IDSR guidelines and MoH documents on the matter.

9.4 National Reference Laboratory

The Director of the National Reference Laboratory (NRL) through the CSM laboratory focal officer should ensure that high-quality testing of CSF specimens in the laboratory and results are sent promptly to districts. He should provide regular feed back on samples collected and processed, in order to minimise contamination and handling/transportation problems. He should organise regular training and supervision of provincial and district laboratories, and ensure that reagents and laboratory equipment are available. He should also ensure that 10 to 20% of positive isolates are transported to WHO Collaborating Centres for QA/QC (in accordance with international standards) and for genotyping and sequence-typing.

9.5 National Technical Coordinating Group

In each country a national co-ordinating body comprising the head of the National Surveillance Unit, the Head of National public health Laboratory and the WHO Disease Prevention and Control Officer (DPC) will be put in place. This group will monitor through weekly meetings the implementation of activities related to enhancing the Meningitis surveillance.

The group will ensure that partners contribution are taken into account and that all activities are well co-ordinated. This group is responsible for regular updates on surveillance activities as well as the final evaluation report on the country's response to epidemics.

The members of this coordinating body will be orientated on the implementation of enhanced surveillance of meningitis.

Members of the coordinating group are the core members of the national epidemic management committee.

9.6 WHO, Collaborating Centres and other Partners

At Country level, support for these activities will be co-ordinated by the Disease Prevention and Control Officer (DPC) under supervision of the WR.

At sub-regional level, WHO with its collaborating centres and other partners will provide technical, financial and logistics support to countries.

10. FEED BACK

Reports, bulletins, annual statistical reports, websites etc... will be used as feedback tools.

ANNEX 1: PERFORMANCE INDICATORS FOR SOPs

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

2) Investigation-Field: Percent (%) 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: Percent (%) 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: Percent (%) 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: Percent (%) of alert and epidemic districts that have received results from the samples sent to the national reference laboratory within 7 days of receiving the TIs by the laboratory. **Target:** 80% of districts sending TI bottles.

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

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

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

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

ANNEX 2: Incidence thresholds for detection and control of epidemic meningococcal meningitis in highly endemic countries in Africa¹

Intervention	Population	
	Over 30,000	Under 30,000
Alert threshold ➤ Inform authorities ➤ Investigate ➤ Confirm ➤ Strengthen surveillance ➤ Prepare	<ul style="list-style-type: none"> 5 cases / 100,000 inhabitants / week 	<ul style="list-style-type: none"> 2 cases in one week <p><i>Or</i></p> <ul style="list-style-type: none"> An increase in the number of cases compared to previous non-epidemic years
Epidemic threshold ➤ Mass vaccination ➤ Distribute treatment to health centres ➤ Treat according to epidemic protocol ➤ Inform the public	<ul style="list-style-type: none"> 15 cases / 100,000 inhabitants / week <p><i>Or if there has been no epidemic for three years and if vaccination coverage is < 80%²</i></p> <ul style="list-style-type: none"> 10 cases / 100,000 inhabitants / week 	<ul style="list-style-type: none"> 5 cases in one week <p><i>Or</i></p> <ul style="list-style-type: none"> Doubling of the number of cases in a three-week period³ <p><i>Or</i></p> <ul style="list-style-type: none"> Other situations should be studied on a case-by-case basis^{2,4}
<p><i>If there is a meningitis epidemic in a neighbouring area</i></p> <ul style="list-style-type: none"> the alert threshold becomes the epidemic threshold 		

1. Detecting meningococcal meningitis epidemics in highly-endemic African countries. WHO- *Weekly Epidemiological Record*, 75 , 306-309.
2. Other epidemic risk factors: reaching the alert threshold early in the dry season; poor vaccine coverage or last mass immunization campaign > 3 years; high population density.
3. For example, *week 1*: 1 case, *week 2*: 2 cases, *week 3*: 4 cases.
4. For mass gatherings, refugees and displaced persons, two confirmed cases in a week should prompt mass immunization campaign in this population.

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	Measles	IgM	+ - P
Meningitis		Method used for Direct Exam	Rubella	IgM	+ - P
N. meningitidis	Culture	+ - P	RVF	IgM	+ - P
S. pneumonia	Culture	+ - P	Ebola	IgM	+ - P
H. influenza	Culture	+ - P	CCHF	IgM	+ - P
N. meningitidis	Latex	+ - P	Lassa	IgM	+ - P
S. pneumonia	Latex	+ - P	Marburg	IgM	+ - P
H. influenza	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 4: WHO Generic Line List – for Reporting from Health Facility to District and for Use during Outbreaks

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 Neighbourhood	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)ead	Comments
				Specimen taken (Yes/No) If yes, date collected	Laboratory results		
(1)							
(2)							
(3)							
(4)							
(5)							
(6)							
(7)							

ANNEX 5: Instructions on Using Trans-Isolate (TI) Bottles

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

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

- 1.1 Remove a vial of Trans-Isolate (T-I) 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 T-I vial.
- 1.4 Disinfect the top of the T-I 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 T-I vial through the disinfected dry stopper on the top of the T-I vial.

2. Transport and incubation of T-I 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.

If T-I vials **cannot** reach the laboratory of reference within 24 hours:

- Label the T-I vial with the date, name of the patient, and any other necessary identifiers.
- Ventilate the T-I vial with a sterile cotton plugged needle. **The** Needle should not dip into the culture media (broth).
- Store the ventilated T-I 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 T-I vial. This will prevent leakage and contamination during shipment.
- Transport the T-I vial in a sealed plastic bag to minimize the risks of contamination and attach the case report form

If TI vials **can** reach the laboratory of reference within 24 hours:

- Label the T-I vial with the date, name of the patient, and any other necessary identifiers.
- Ship the T-I 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 T-I vials and ventilating the inoculated T-I vials:

- The T-I vials can be used for at least 1 year after the date of production provided that they are stored in the refrigerator.
- Freezing T-I vials destroys the T-I medium.
- Non-inoculated T-I vials should be packed in cold packs for shipment to the laboratory of reference.
- In previous studies (*Ajello et al* below), cultures on ventilated T-I 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.

Reference: 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 6: Decisional tree for Bivalent (AC) or Trivalent (ACW) polysaccharide (PS) Vaccine use

