

Meningitis outbreak response: how a mobile laboratory helps save lives

Getting diagnostic services to where disease outbreaks are is of critical importance when fast treatment is needed. Natalya Nepomnyashcha reports

Nigeria is currently experiencing its largest outbreak of meningitis since 2009. According to the Nigerian Centre for Disease Control (NCDC), there have been 14 005 suspected cases of meningitis reported and 1114 meningitis deaths between 13 December 2016 and 26 May 2017.¹ These cases have been reported from 226 Local Government Areas (LGAs) across 23 States and the Federal Capital Territory of Nigeria.¹

What is meningitis?

Meningitis is an inflammation of the protective layer around the spinal cord and brain.³ There are several types of meningitis, including bacterial, viral and non-infectious.³ *Neisseria meningitidis* serogroup C (also referred to as NmC) is responsible for the vast majority of laboratory confirmed cases in this outbreak.² One of the main reasons for the disease's spread is that it's severely undervaccinated in the affected areas. Barriers to increased vaccinations for NmC is that the vaccine is extremely expensive (US\$50 per dose),² there are an insufficient number of vaccines in Nigeria, and the healthcare system in Northern Nigeria is strained.

The disease usually occurs in the so-called African meningitis belt region of sub-Saharan Africa during the dry season from December to June. Young children and the elderly are at an especially high risk of catching the disease. Typical symptoms include fever, vomiting and a stiff neck. If left untreated meningitis has a fatality rate of 50%. Yet, when adequate treatment is provided quickly, only 5–10% of patients die within one or two days.² The greatly reduced fatality rate associated with receiving treatment first requires rapid meningitis diagnostics.

How are mobile labs supporting the response?

Timely treatment is not possible without a quick and reliable system for diagnosing suspected disease cases and the specific strain of meningitis. In north-western

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Nigeria, where most of the suspected cases occurred, no appropriate diagnostic laboratories existed prior to this 2017 outbreak. In the beginning of the outbreak, blood samples from northern Nigeria were transported to Abuja or Lagos, or even as far as the Norwegian capital of Oslo, for diagnostic testing. This resulted in severe delays in determining true disease cases and strain types.

To solve this problem, eHealth Africa (eHA), a Nigeria based social enterprise, constructed a mobile biosafety level 1 laboratory to be able to test samples in the immediate vicinity of the suspected cases. The lab was constructed in Sokoto State, which experienced a particularly high number of suspected cases.

If needed, the lab can be easily transported to other States.

Constructed within just 23 days, the lab is housed in a thermal insulated 40 foot shipping container. The lab contains medical diagnostic equipment, an incubator, a centrifuge, a water distiller, an autoclave, and tools for electronic data capture. Power, water, and internet connectivity were installed to enable full lab functionality. All surfaces are chemical- and water-resistant.



Results and recommendations

As of May 2017, two medical laboratory scientists employed by the Sokoto State Government, jointly trained by the University of Nebraska Medical Centre and eHA are operating the lab. During the 2017 outbreak, the lab tested almost 450 cerebrospinal fluid (CSF) samples. Out of

these, 111 cases of NmC were confirmed and patients were referred to partner organisations for treatment.

These mobile labs can ensure that cases of many bacterial diseases can be diagnosed effectively and timely, including diseases beyond meningitis like typhoid or septicaemia. Thus, they can help epidemics in underserved regions of Africa be responded to more efficiently which helps reduce injuries and save lives.

References

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