





Left. Lab Wad Kowli, Ethiopia. Here in the laboratory wooden tables had to be built, reagents prepared and English speaking Ethiopians trained. Each patient had a medical card and on this the laboratory results were placed. Photo by Warren Johns.

EMERGENCY AND DISASTER SITUATIONS

Warren Johns is one of the authors of the WHO book: *Health laboratory facilities in emergency and disaster situations*. He talks about his experiences, followed by a review of the book by **Neil Bentley OBE** from the National Infection Services.

Q In what aid or refugee camp situation did you find the use of the laboratory very important?

It was detecting which Cambodians had *Plasmodium falciparum*, leading to establishing a correct diagnosis of malaria and treatment of each patient. This was in 1980. Diagnosis of malaria based on clinical symptoms alone is not reliable – it can result in unnecessary expenditure and inappropriate use of antimalarial drugs and a delay in establishing a correct diagnosis and treatment of a patient. The use of the laboratory made a considerable difference to the quality of the health care of Cambodian refugees in 1980.

Q What were the circumstances like?

There were five villages, 40 kilometres south of Aranyaprathet, on the Thailand/Cambodian border. The area was known as Ta Prik. In June 1980, 3,000 Cambodians from the Sakeo Holding Centre were resettled in the villages

bringing the total population to 10,000. There were two hospitals, at Ta Prik: Hospital 550 just across the border and further inside Cambodia, Hospital 88.

Blood slide positivity rates exceeded 90% for the Ta Prik hospitals. A survey of non-symptomatic people from Village 3 indicated that over 50% were positive for malaria. In the five villages of Ta Prik, 70% of the 10,000 were infected with *falciparum* malaria.

Q What action was taken?

At the end of August the International Committee of the Red Cross (ICRC) gave the go ahead for the Ta Prik malaria control knock-down project. Control measures to reduce transmission included: mosquito bed nets, DDT residual spraying, fogging with Malathion, and drug therapy.

Local Cambodian health workers were trained to make thick and thin blood smears. Each smear was attached by tape

Below. Patients with malaria; mother and baby, Ta Prik, Cambodia.

Overleaf. Microscopists at the Ta Prik lab, Cambodia. Photos by Warren Johns.



Ten deaths occurred during this period. The previous year, 1,000 people died of malaria.

to a small card bearing the patient's name, age, sex and location — there was a place to write the blood smear result. The other side had space for details of treatment, the number of days and a space for the signature of the drug administrator. Blood smear kits were prepared and distributed to workers in each village.

ICRC had its main laboratory located in the Thai border town of Aranyaprathet. A small laboratory was built near Hospital 550 and a dust free staining area was made out of plastic, bamboo and wire. Each day, the medical laboratory scientists visited the site and began training the Cambodian volunteers. Blood films were stained using a quick Giemsa technique.

Q Was the programme successful?

The problem was to control the population, the vector (mosquitoes), the malaria and how the malaria drugs were administered and monitored. The aim was to set up a network that would take care not only of malaria, but of other health needs.

The malaria eradication programme began on 8 September 1980 when 68 people from Village 1 were started on treatment.

Previously out of a total population of 10,000 some 3,000 were infected and 7,000 exhibited symptoms. When the programme came to an end after six weeks, only 30% were symptomatic. In all 10 deaths occurred during this period. The previous year 1,000 people in Ta Prik died of malaria.

Q Have there been any occasions where things have gone wrong?

On 31 January 1985 I phoned a recruiting agency in London and was told about a request that had just come in. Save the Children needed a laboratory technician for six weeks to work in refugee camps in Sudan. I got the job and arrived in Sudan on February 14. This six week job turned out to be six months.

Q What happened?

On arrival in a remote area with poor

roads and no telephone, I found the UNHCR/WHO emergency kits were poorly prepared. Essential stains and methanol were missing. Only 300 slides were provided. A Sahli haemoglobin kit (known to be not accurate) was included (without reagents). I could not understand why ESR racks had been included. Clearly, I could not do any lab work. I returned to Khartoum and purchased the missing items.

Q Did this inspire you to write manuals and books?

Yes, I sat down and asked myself "what is necessary and should be included in an emergency laboratory kit?" Later I wrote a manual for Save the Children, *Establishing a Refugee Camp Laboratory* (1987).

The Introduction from that book states: "A refugee camp laboratory [...] does not need to be sophisticated or able to perform a large range of tests. All that is required is a small number of basic tests which are done well and which contribute medically and epidemically useful information."

Q So, what happened in Sudan?

We established three labs, two in the east of Sudan (Wad Kowli and Safawa) and one in the west (Umbala), with a total staff of nine. In Sudan, early 1984, Save the Children had one expatriate staff member and nine local staff. By mid 1985, there were 80 expatriate staff and 1,000 local staff. By February Wad Kowli, the reception camp just 12 km from Ethiopia had a population of 100,000. Between 3,000 and 5,000 people arrived there each day.

Q Aside from your book, what else would you recommend?

Two books that were indispensable to me during my time in Sudan were *District Laboratory Practice in Tropical Countries Vols 1 & 2*, by Monica Cheesbrough.

Warren Johns is a medical laboratory scientist who has worked for the Red Cross and Save the Children, among others. He has co-authored a number of books.

Many countries are vulnerable to disasters and emergencies, moreover infectious diseases do not respect regional and country boundaries within our global village. In recent times the world has witnessed and responded to large scale incidents of international concern, such as Zika virus in Brazil (2015), Ebola in West Africa (2014) and the current Ebola outbreak “at time of writing” in DRC Central Africa. The WHO works with partners to improve outcomes of emergencies and disasters and to manage the health risks associated with them. A rapid response to detect, prevent and manage disease is required to minimise loss of life, limit the economic impact in fragile regions, and control the spread of disease.

This WHO regional publication: *Health laboratory facilities in emergency and disaster situations* provides a complete 368-page guide to establishing testing facilities in an emergency. The book begins with the initial assessment of needs and continues to guide through the selection of required facilities, equipment and supplies alongside useful checklists. There is consideration of scenarios faced in emergency situations, including portable, mobile, temporary and established laboratory facilities and the equipment that can be used in each. The essential selection criteria for laboratory staff is considered. It is often not possible to recruit sufficient numbers of trained staff and volunteers in emergency situations. The publication does not refer to the management of these situations.

Generic competency checklists for basic procedures, to ensure quality results, and safety of personnel could be included in supplementary annexes. Such a list should include: “Understands health and safety procedure for tests, knows sample requirements, knows which samples to reject, has a copy of procedural instructions



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in operators first language, knows how to interpret or forward results, knows procedure to record results”.

The publication includes health and safety guidelines for the safe handling and disposal of samples. In recent disasters, laboratory-acquired infections have claimed the lives of laboratory and healthcare personnel. Annex 16 states that preparation and use of bleach is a very important addition that will contribute to the safety of laboratory personnel. Establishing temporary testing facilities in resource-poor settings with challenging healthcare and transport infrastructure is considered in this publication. This latest edition recognises common issues and recommends options that are realistic and can be safely sustained in the short-

term without information technology, reliable mains electrical supplies and piped water. Annex 3 includes a check list for laboratory suppliers. This could be enhanced to include explicit advice on selecting commercial kits with heavy consideration of the performance characteristics

and manufacturers established history for supplying quality materials, possibly without the need for a cold supply chain. In resource-poor countries, internal laboratory quality control testing can be minimal, and cost driven. It is important that the tests performed are reliable and accurate and the limitations are understood. Purchasers need to interpret quality performance characteristics, which include sensitivity and specificity of the test prior to the selection and procurement of reagents and supplies.

This book is recommended as an ideal reference guide when developing diagnostic laboratory services at pace in difficult field conditions. It is clearly laid out in a progressive step-wise style and uses plain language suitable for those for whom English is not a first language. The book is intended for use in emergency situations, by local or international managers with existing laboratory and public health experience, but not necessarily in an emergency capacity. In such situations, access to functioning computers, internet and resources, such as printers and paper, may be scarce. For this book to be utilised in such a situation, printed copies would be essential. Printed copies would enable this publication to be used as a handbook where notes can be made to reflect the local situation and decisions.

This review covers the laboratory sections of the book (and not the water sections).

Neil Bentley OBE is Head of Technical Services, National Infection Services, Public Health England.