

World Health Organization activities on anthrax surveillance and control

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P.C.B. TURNBULL, M.E. HUGH-JONES AND O. COSIVI. 1999. The achievements of a World Health Organization Anthrax Working Group, established in 1990, have been the production of two editions of guidelines on anthrax surveillance and control and the formulation of templates to assist countries in the construction of their surveillance and control programmes. The latter was made possible by the active participation of the Department of Animal Production and Health, Ministry of Agriculture, Food and Fisheries, Zambia and the Livestock Development Programme, Mongu, Western Province, Zambia in a model country programme designed by the Working Group for the purpose. This paper elaborates on these achievements, particularly the lessons learned from the experience of Western Province, Zambia.

INTRODUCTION

From its establishment in 1948, the World Health Organization (WHO) has been promoting activities on anthrax control and research. In 1990 the former Veterinary Public Health Unit, now the Zoonotic Diseases Unit of the Division of Emerging and Other Communicable Diseases Surveillance and Control, established a WHO Working Group on Anthrax Control and Research comprising a group of international experts on this subject. The group has produced two editions of guidelines for the surveillance and control of anthrax (Turnbull *et al.* 1993, 1999) and initiated a long-term three-phase 'model country programme'. The purpose of the latter was to formulate the design and method of practical implementation of a surveillance and control programme in certain 'model countries' and then to put this programme forward as a template to assist other countries in the formulation of their own national anthrax surveillance and control policies. This is now included in the WHO anthrax guidelines (Turnbull *et al.* 1999).

There remains an important role for the Working Group into the foreseeable future to stimulate continued awareness in ministries of agriculture and health, or their equivalents, throughout the world of the need to maintain their surveillance and control capabilities with respect to anthrax.

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ACHIEVEMENTS

The principal achievements of the Working Group have been the production of two editions of WHO anthrax guidelines and the model country programme. These both centred around the following list of criteria seen to encapsulate what is needed for anthrax control:

- 1 detection, diagnosis and identification;
- 2 surveillance, reporting and epidemiology;
- 3 disposal, disinfection and decontamination;
- 4 treatment and prophylaxis and
- 5 education, training and information.

The first of the editions of the WHO anthrax guidelines (Turnbull *et al.* 1993) updated the earlier edition (Whitford 1987).

The model country programme

The model country programme was designed to address the need for improved surveillance and control globally. The approach taken was to: (1) identify a number of model countries representing anthrax endemic, sporadic and free situations; (2) collect and analyse relevant information within these countries and (3) use the resulting information to formulate a model for global use.

Participating model country. In the event, the challenge was only taken up by the Department of Veterinary and Tsetse

Control Services (now the Department of Animal Production and Health, Ministry of Agriculture, Food and Fisheries), Zambia, in its Western Province, aided by the Dutch Government-sponsored Livestock Development Project Phase II, with commendable results. Templates for anthrax control programmes have been constructed for the benefit of other countries. These are based on the experiences gained in Western Province relating to: (1) resistance on the part of owners to correct disposal of anthrax carcasses; (2) resistance of owners to vaccination; (3) the problems of ensuring correct diagnosis, surveillance and reporting and (4) the use of educational approaches to attack the many problems involved in implementing all aspects of control.

Information obtained and problems highlighted. It was quickly established at the outset that most countries have the appropriate legislation in place and that the problems lie in implementing the legislation. In Western Province, Zambia, this proved to be due to four quite definable reasons which are probably representative of corresponding reasons in other countries that suffer from frequent outbreaks of anthrax. Tradition lay behind the first reason. When an animal is being looked after on behalf of its absent owner and it dies, the caretaker must keep the head and other parts until the return of the owner to show that the animal was not sold and to prove its identity. With increasing mobility and movement to the cities for work, caretaking and the duration of owners' absences have both increased in recent years. Secondly, meat is a valuable commodity and is infrequently available to the villager. If an animal dies suddenly, the meat looks perfectly good. Owners want to minimize their losses as far as possible by taking advantage of the carcass, eating the meat and using the other parts, such as the hide and bones, to maximum benefit. This can lead to lack of co-operation with regard to reporting cases when they occur. Thirdly, even when there is complete willingness to report cases, the remoteness of many rural communities, together with lack of transport for veterinary officials, make visiting the site of the case(s) and collection and transport of specimens to the laboratory very difficult. A fourth reason is lack of laboratory resources. Once a specimen has been brought to the laboratory, it is generally easy to confirm the diagnosis of anthrax, given that a few basic essentials are on hand. The laboratory in Western Province suffered from intermittent electricity and water supplies making it difficult to maintain a good supply of distilled water for media and to keep the fridge, incubator and water-bath operating correctly. Shortage of Petri dishes, diagnostic phage, penicillin discs, polychrome methylene blue (M'Fadyean stain) and even a thermometer all made it difficult to carry out the relatively simple diagnostic procedures. Other laboratories have been visited which lacked a functional microscope, another essential for anthrax diagnosis.

The numbers of confirmed cases in a year in enzootic areas with these types of problems and reasons fall well short of

the number suspected. In addition, resistance to vaccination is the last, but not least, reason for breakdown in control. Anthrax is perceived by ministries of agriculture as more of a nuisance than as an economically important disease. However, occasionally people do die and the authorities must then be seen to be taking action, principally instigating free vaccination campaigns. A cascade of negative sequelae may result; because vaccines are issued free to combat an outbreak when it occurs, owners wait for such an event before vaccinating their livestock. The result is that only retrospective vaccination takes place. Animals continue to die and there is a loss of confidence in the vaccine. Vaccination is also perceived as making the animal unwell and unfit for ploughing. Clearly pro-active vaccination at a time of year when ploughing does not take place should be the aim.

A more detailed description of the envisaged model country programme has been published (Anon. 1994).

Message transfer. The messages from the experience of Western Province, Zambia have been used to make simple templates for each of the control topics. These, two of which are shown in Tables 1 and 2, have been included in the WHO anthrax guidelines (Turnbull *et al.* 1999) for other countries to use in designing their own control programmes.

Education. Education is an essential part of any control programme for anthrax, as for any infectious disease. Clearly this has to be pitched at different levels within different societies and social groups. Once again, however, an excellent model

Table 1 Template for surveillance

Ideal	Western Province situation	Our situation
All unexplained livestock deaths or suspected anthrax cases must be investigated with laboratory support	The term 'all' is unachievable, but it should be possible to achieve many more	
Constraints	Distances involved Remoteness in some cases Lack of transport Delays in specimen delivery Laboratory materials unavailable	
Importance	Confusion as to cause of death is avoided Demonstration that control measures are working	

Table 2 Template for vaccination

Ideal	Western Province situation	Our situation
A vaccine meeting acceptable standards should be available	Variable and inadequate vaccine coverage	
Field officers should have the necessary storage facilities	Intermittent supply of the vaccine	
A contingency stock should be readily available	Limited storage facilities at field level	
	Inadequate duration of vaccine campaigns	
Constraints	Perceived cost	
	Free vaccination → retroactive immunization → perceived failure → loss of confidence in vaccination on the part of the stock owner	
Importance	Vaccination is the hub of anthrax control, at least in endemic areas	

of what can be achieved was established in Western Province, Zambia with material prepared to help villagers understand the nature of anthrax, the reasons for the need to control it and the methods by which to do so (Dietvorst 1996).

FURTHER WORLD HEALTH ORGANIZATION ANTHRAX WORKING GROUP ACTIVITIES

Laboratory-supported surveillance of anthrax in many parts of the world remains far from adequate and there is reason to believe that the disease is seriously under-reported. The effectiveness of training efforts only lasts for short periods as initial enthusiasm at the time of training wanes, trained people move to other jobs and reagents run out or deteriorate without being replaced. There will continue to be an important potential role for the Anthrax Working Group in revitalizing interest, re-training staff, re-stocking essential reagents and generally trying to maintain a philosophy around the world that veterinary and public health services should remain

ready, willing and able to recognize the disease and its causative agent wherever it occurs.

To encourage these objectives, workshops and consultancies for veterinary and public health officials have taken place in Changping, Beijing, China (1992), Mongu, Western Zambia (1992, 1997), Kathmandu, Nepal (1997) and Almaty, Kazakhstan (1997). Future workshops are being planned to take place in North America, Central and South America, western and eastern Europe and Asia. The workshops have greatly facilitated the acquisition of field isolates of *Bacillus anthracis*. This is essential for the development of strain identification and differentiation methodology which, in turn, is an essential prerequisite for proper epidemiological investigations and understanding of anthrax. An important new and exciting tool for tracing the sources and histories of anthrax outbreaks is emerging from this work (Keim *et al.* 1997). Training sessions relating to the application of this new technology are being developed.

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