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A strategy to speed the eradication of dracunculiasis

In Pakistan the adoption of a case-containment strategy holds out the prospect that the country's Guinea-Worm Eradication Programme will reach its goal several years earlier and at a lower cost than would otherwise be possible.

Dracunculiasis is caused by the guinea-worm, *Dracunculus medinensis*, and is associated with stagnant water. Copepods ingest free-swimming guinea-worm embryos that have been released into water from persons with active guinea-worm lesions. The copepods are subsequently swallowed by people who drink the water. However, infection of humans can only occur after the embryos have moulted and developed for more than a week in the copepods.

Eradication programme

The guinea-worm eradication programme in Pakistan began in 1987 with the aim of eradicating dracunculiasis from the country

by the end of 1990 (1). Following a nationwide search for cases (Fig. 1), a surveillance and control programme was conducted by village implementers in approximately 400 villages known to have been affected by the disease. A national coordinator, a small headquarters staff, and a regional manager for each of the three provinces with endemic disease were appointed.

The village implementers undertook surveillance and carried out control measures that reached every household. The main measures were health education, the distribution of synthetic cloth filters to each household in villages where a case had occurred recently, and the treatment of unsafe drinking-water sources with temephos (Abate) so as to destroy the copepod hosts without making the water unsuitable for drinking. (see Fig. 2). Field workers from local health departments were trained to apply temephos. The implementers visited the villages monthly, recorded and reported cases of dracunculiasis, distributed cloth filters and monitored their use, and provided basic information on the prevention of the disease.

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Independent evaluations after the transmission seasons of 1988 and 1989 checked the accuracy of case reports, assessed the adequacy of control efforts, and sought to discover any previously unrecognized foci of endemic dracunculiasis. After the end-of-year evaluation in 1988, sector supervisors were trained, and one was made responsible for up to 20 village implementers.

The number of cases fell from approximately 2400 in 1987 to 1110 in 1988, and there was a further drop to 534 in 1989. Following the deployment of sector supervisors in 1989, there was a further decline to 160 cases in 1990.

Case containment

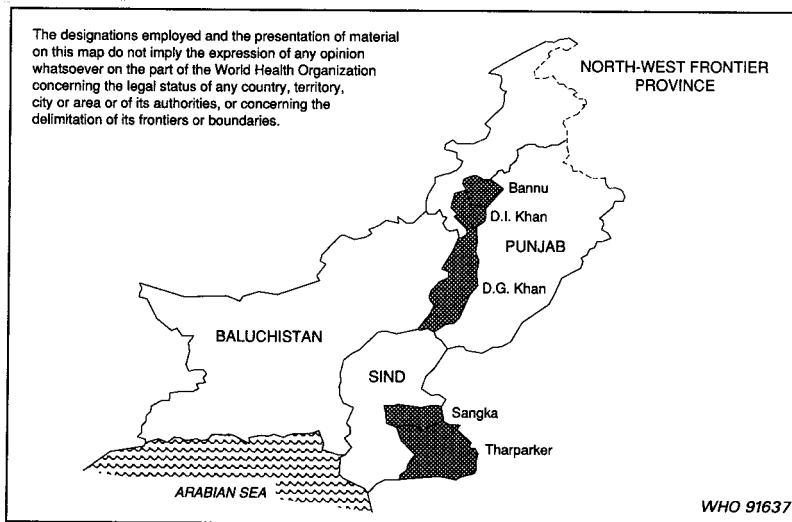
As a result of the evaluation carried out after the end of the 1989 season, case containment was introduced with the objective of maximizing the effectiveness of surveillance and control efforts and ending

the transmission of dracunculiasis completely so as to meet the target of eradication by 1990.

The basic operational elements of the case-containment strategy are indicated below.

- Identification of all cases not more than 24 hours after worm emergence.
- Management of each case by application of topical antiseptics, occlusive bandages and health education in order to reduce opportunities for contamination of drinking-water sources.
- Obtaining a history of travel and activities during the period of worm emergence so as to identify any source of drinking-water contaminated by affected persons.
- Mobilization of the community to undertake preventive measures.
- Reporting of cases to sector supervisors and regional managers to permit confirmation of each case within a week of worm emergence.

Fig. 1. National survey of cases of dracunculiasis, Pakistan, July 1987



*Shaded areas represent affected districts

Case containment was put into effect at the beginning of 1990 after forms had been developed and field-tested and personnel had been trained in their use. Job descriptions and investigation forms were modified to support the strategy. The villages given the highest priority for control were those in which cases had occurred during the previous season and those at high risk from introduced infection. Guidance on the strategy began to be given in February 1990, two months before the onset of the transmission season, when a workshop was organized for regional managers. The headquarters staff and regional managers then conducted retraining workshops for the sector supervisors and village implementers.

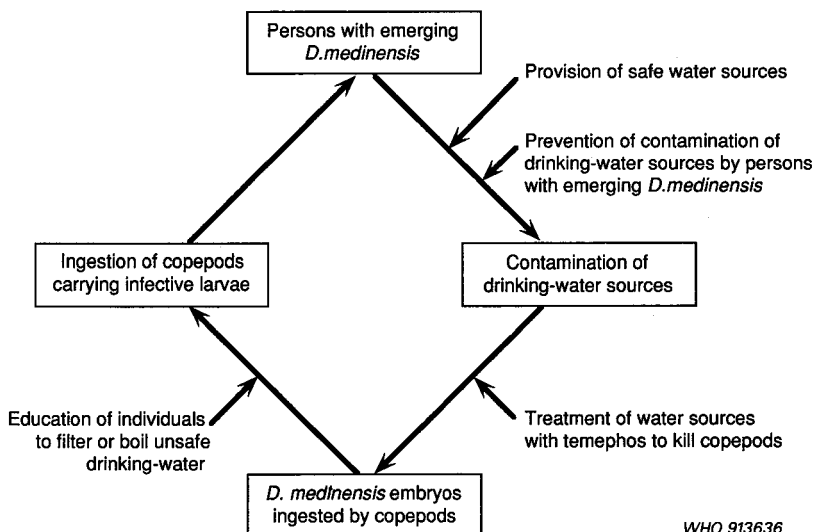
Separate case investigation forms were developed for literate and illiterate village implementers (see Fig. 3) and for sector supervisors, and a summary form was devised for regional managers and the eradication programme's headquarters staff. The patients were all questioned to determine where they had become infected

the preceding year and whether they had contaminated any sources of drinking-water since the worms emerged. The forms served as check-lists of control measures to be undertaken whenever a case occurred, and focused the attention of programme staff on the need for rapid detection of and response to each new case.

Case verification was based on evidence that the village implementer or other trained person either saw an emergent guinea-worm or verified a recent emergence by physical examination. These criteria accord with the World Health Organization's case definition for purposes of surveillance: a person exhibiting or having a history of a skin lesion with emergence of a guinea-worm during the past year.

Revised performance criteria require the village implementers to detect cases within 24 hours of worm emergence and, as quickly as possible, to notify the sector supervisor and begin containment measures, including alerting the villagers and reminding them to

Fig. 2. Interventions against dracunculiasis



WHO 913636

Fig. 3. Case investigation form for illiterate village implementers

1	
2	
3	4
5	6
7	

WHO 91049

The numbered sections concern the following matters.

1. Case identification and demographic data (to be added by the sector supervisor).
2. Whether the case has contaminated a pond, draw well, or step well.
3. Whether filters have been provided to all households in the village.
4. Whether the patient's lesion has been treated and bandaged.
5. Whether the other villagers have been warned of the case.
6. Whether the village's water sources have been treated with temephos.
7. A reminder to the village implementer to report the case to the sector supervisor immediately.

filter their drinking-water. Working together, the village implementers and sector supervisors apply topical antiseptics and occlusive bandages to patients' lesions to reduce the probability of contaminating water sources; the patients are informed about dracunculiasis and it is explained to them why they must not enter sources of drinking-water; the importance of filtering drinking-water is indicated to villagers; filters are distributed and advice is given on how to use them; and an effort is made to ensure the treatment of water sources with temephos at the earliest opportunity. The sector supervisors are responsible for confirming diagnosis, making sure that appropriate containment measures are in place, and reporting cases to the regional manager as soon as possible. The sector supervisors hold a supply of filters and bandages in case of need at short notice, and are trained to monitor those field workers who apply temephos and to apply it themselves if necessary.

The duties of the regional managers were also modified. In addition to their continuing responsibilities for supervising

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the staff of the eradication programme in their area and communicating with headquarters, they are now required to confirm each new case as soon as possible by visiting the person in question, to make any corrections needed, and to report their findings promptly to headquarters. The

regional managers abstract the key information from the forms prepared by their sector supervisors, tabulate the data, update maps showing the locations of cases, and forward detailed monthly reports to the national programme coordinator. The form for headquarters staff and regional managers was designed to help them to maintain a picture of the number, location and status of control measures for each case.

The major change for headquarters staff was an increased emphasis on the monitoring of field activities: meetings were held with each of the regional managers at least once a month during the transmission season, and visits were made to villages where the disease was endemic so that the management of each case could be reviewed on the spot. During the monitoring of cases in 1990, minor problems in communication or in the execution of operations were corrected.

Approximately 86% of cases were confirmed and contained by the village implementers within one day after worm emergence. The sector supervisors confirmed 65% and 83% of cases within one and four days, respectively, after worm emergence, and regional managers visited 82% of cases within a week after worm emergence.

* * *

For case containment to be effective, all villages with endemic dracunculiasis have to be identified and action has to be taken rapidly to prevent transmission to humans. The eradication programme in Pakistan was already village-based so the implementation of case containment only required increased emphasis on the timing and completeness of surveillance and control measures; no extra staff were needed, and the only additional materials were bandages and antibiotics.

A rapid response by the village implementers to each new case is vital, since this eliminates the possibility of further transmission by preventing the patient from contaminating water. That control measures were begun within 24 hours in 86% of cases augurs well for the success of the case-containment strategy and gives grounds for hoping that there will be no indigenous cases in Pakistan during 1991. Slower responses by sector supervisors and regional managers are to be expected because of the delays associated with notification from the village implementers and the need to travel, often to remote villages. Fortunately, an interval of several days for supervisory staff to reach a case is acceptable because secondary control measures to protect villagers can be fully effective if implemented within a week after a water source has been contaminated.

If resources permit, case containment can be employed at any point in national dracunculiasis eradication programmes. To be effective it requires a high probability of

early detection and intervention to stop transmission from each new case. It is most likely to be feasible in a region or country where fewer than about 1000 cases are expected in a year. The strategy may be appropriate, for example, in Cameroon, where fewer than 1000 cases have been reported annually since 1984. It may also be applicable in India, and in certain states of Nigeria and regions of Ghana if the likelihood of reestablishment of infection from other areas of endemicity is low. □

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Reference

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Dracunculiasis—a traditional view from Mali

In Songo, a village in the Bandiagara district of Mali, many diseases are thought to be the result of an evil destiny. Yet, the notion of contagion in the spread of guinea-worm disease is deeply rooted in the minds of the people—for example, a result of direct contact with wounds or soiled dressings or from drinking water from “bad” wells.

A few years ago a charlatan, passing through Songo and preying on people’s fear of dracunculiasis, sold a black powder to nearly every adult. A single dose, sold for an exorbitant price, had to be taken with curdled milk and was supposed to confer lifelong protection against guinea-worm disease. Needless to say, the charlatan was never seen again!

Some of the traditional ways of treating infected sores in Songo are very effective. The healer fits round the ankle a cord in which ritual knots have been tied. As the worm emerges it is twisted round the anklet by the patient himself. The wound is washed with a decoction of tamarind leaves and then covered with boiled tamarind leaves; this lessens the discomfort as well as keeps the wound clean.

– Extracted from “*Dracunculiasis in Mali: an epidemiological survey in two villages in the District of Bandiagara*” by Issa Sagou Degoga (thesis, National School of Medicine and Pharmacy of Mali, 1977, in French).