

from sexual intercourse and therefore the avoidance of close contact during the initial phase of treatment may be a useful public health measure, particularly in patients with smear-positive PTB who may remain infectious for several weeks while on treatment. Smear-positive PTB patients submit sputum samples for smear examination at 2 months, and if sputum smears are negative patients are discharged home to start the continuation phase of therapy. Abstinence from sexual intercourse during the continuation phase is not necessary, and may lead to a breakdown in personal relationships. Several patients stated that they would recommence sexual relationships only upon the advice of a clinician. There is rarely, if any, discussion about sexual matters at the time of the patient's discharge. Our study suggests that it is important to discuss sexual matters openly with patients, and it is an excellent opportunity to talk about safe sexual behaviour, treatment of sexually transmitted infections and use of condoms. This is pertinent as 65–75% of TB patients in Malawi are HIV-seropositive (HARRIES *et al.*, 1995).

#### Acknowledgements

We thank all the TB officers and nurses at central, district and mission hospitals who assisted with the structured interviews. The Department for International Development funded this study as part of its support for operational research in tuberculosis to the Malawi Government.

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Received 11 November 1999; revised 23 December 1999; accepted for publication 10 January 2000

TRANSACTIONS OF THE ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE (2000) 94, 251–252

### Short Report

## Evaluation of surveillance thresholds for prediction of meningitis epidemics using ongoing surveillance data at the district level, in Niger

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**Keywords:** meningitis, *Neisseria meningitidis*, epidemics, surveillance, threshold, prediction, evaluation, Niger

In the African 'meningitis belt', epidemics of meningococcal meningitis occur at yearly intervals against a background of seasonal hyperendemic disease (LAPEYS-

SONNIE, 1963). In 1996 over 180 000 cases were reported to the World Health Organization (WHO), representing the largest epidemic ever recorded (WHO, 1997). While awaiting the availability of a new meningococcal conjugate vaccine, some attempts are being made to develop alternative prevention strategies with the current vaccine (CHIPPAUX *et al.*, 1998; HASSAN *et al.*, 1998). However, the control of epidemics is still currently based on early detection and initiation of mass vaccination campaigns. The success of such an approach depends on the capacity to launch an early alert and to organize a fast response to the epidemic. To achieve this, WHO has proposed the setting up of surveillance systems and has promoted the use of weekly threshold rates to predict annual epidemics (OMS, 1995). Those thresholds were based on evaluation of dispensary data from Burkina Faso (MOORE *et al.*, 1992). However, experts have suggested that, to assess the effectiveness of the method in the field, threshold rates need to be tested using ongoing surveillance data at the district level (KANINDA *et al.*, 1997; PERKINS *et al.*, 1997).

We reviewed data from the 7 health districts in the department of Maradi (Niger), reported through the national emergency mandatory surveillance system during 1990–98. Local health workers used a clinical definition of meningitis. The fact that meningococcal

**Table.** Capacity of four weekly threshold rates to classify meningococcal meningitis in Maradi (Niger, 1990–98) as epidemic or not, as measured by sensitivity, specificity, and positive and negative predictive values

		Threshold criterion							
		15/100 000 over 2 weeks (A)		5/100 000 over 3 weeks (B)		Doubling over 3 weeks (C)		Tripling compared to same week in previous year (D)	
TP	FP	27	0	29	4	11	5	23	7
FN	TN	3	26	1	22	19	21	7	19
Sensitivity		0.90		0.97		0.37		0.77	
Specificity		1		0.85		0.81		0.73	
PPV		1		0.88		0.69		0.77	
NPV		0.90		0.96		0.53		0.73	

The data were collected from 7 districts during 56 'district-years' (see the text for details). The predictions of the weekly thresholds were compared to retrospective annual data. TP, true positive; FP, false positive; FN, false negative; TN, true negative; PPV, positive predictive value; NPV, negative predictive value.

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meningitis is the only cause of meningitis epidemics in the meningitis belt justified this approach. We defined a 'district year' (DY) as 52 consecutive weeks from the 26th week of one year to the 25th of the next year, and an epidemic DY as one in which the annual incidence exceeds 100 cases per 100 000. Four candidate weekly thresholds were tested: (A) the WHO standard of 15 cases/100 000 averaged over 2 weeks; (B) 5/100 000 over 3 weeks; (C) doubling of cases over 3 consecutive weeks; (D) tripling of cases compared with the same week of the previous year. The (C) and (D) thresholds are second-choice candidates recommended by WHO when no relevant census is available; the (B) threshold has already been tested in sub-Saharan Africa, but the data have not been published. We used official demographic data. In each DY, we compared the prediction of the weekly threshold to the retrospectively observed annual rate. We classified the predictions as true positive (TP), false positive (FP), true negative (TN), false negative (FN). As for the evaluation of a diagnostic test, we calculated sensitivity =  $TP/(TP+FN)$ , specificity =  $TN/(TN+FP)$ , predictive positive value (PPV) =  $TP/(TP+FP)$ , negative predictive value (NPV) =  $TN/(TN+FN)$ .

Reporting occurred during 2836 weeks out of 2912 (97.4%), with a total of 34 113 cases. Out of 56 DYs, 30 (53.6%) resulted in annual epidemic rates, with 30 839 (90.4%) cases occurring during these district epidemics. The sensitivity, specificity, PPV, and NPV of the candidate thresholds are shown in the Table. The results suggest that, when no census data exist, priority should be given to the (D) candidate threshold (tripling of cases compared to previous year) because it exhibits better sensitivity (0.77) and NPV (0.73) than the (C) criterion (0.37 and 0.53 respectively). In our study population, the use of the (B) criterion would have identified 2 more DY

epidemics than the use of the (A) criterion [and 18 more than the use of the (C) criterion]. The real benefit of this fact must be evaluated through further studies taking account of the level of epidemics, of the objectives of the surveillance, and of the possibilities of action.

#### Acknowledgements

We are grateful to the personnel of the Niger Ministry of Public Health who permit regular and good data collection.

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Received 23 June 1999; revised 30 September 1999; accepted for publication 29 November 1999

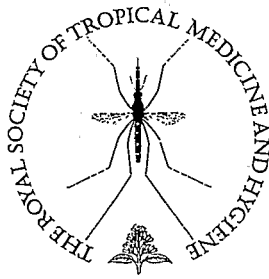
### Announcement

#### ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE Denis Burkitt Fellowships

The Denis Burkitt Fund was set up by his family in memory of Denis Burkitt, FRS, who died in 1993; it is administered by the Royal Society of Tropical Medicine and Hygiene.

One Fellowship (maximum value £7000) or two separate Fellowships (of £3500 each) are awarded annually for practical training, travel, or direct assistance with a specific project (preferably clinico-pathological, geographical or epidemiological studies of non-communicable diseases in Africa).

Applications must be made at least six months before the commencement of the proposed study (by 15 March or 15 September in each year). A short report on the study should be submitted, within 3 months of the recipient's return. Application forms are available from the Administrator, Royal Society of Tropical Medicine and Hygiene, Manson House, 26 Portland Place, London, W1N 4EY, UK; fax +44 (0)20 7436 1389, e-mail mail@rstmh.org



Zonae Torridae Tutamen

Vol. 94 No. 3, pp. 233-352  
May-June 2000

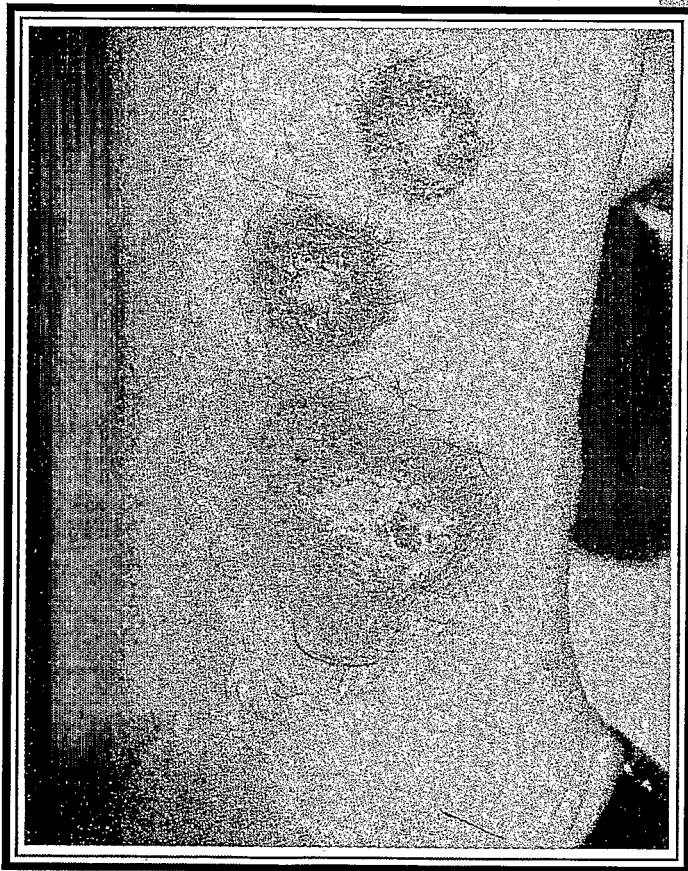
ISSN 0035-9203

*Transactions of the*

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*Royal Society of  
Tropical Medicine and Hygiene*

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Printed by the Queen

PM 80  
26 JUN 2000  
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