

Investigation of Suspected Meningococcal Meningitis at RVNAF
Recruiting, Induction, and Training Centers

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INTRODUCTION: Outbreaks of meningitis had occurred at twelve recruit training centers of the Republic of Vietnam Armed Forces from March through September 1972. During this period 1371 cases of suspected meningitis, including 338 deaths (case fatality ratio = 24.6%) were reported. *Neisseria meningitidis* was reportedly isolated from 28 of these cases. All recruits routinely received sulfadiazine prophylaxis (2 grams per day for 3 days) at the Induction Center and again at the Reception Center. Group-specific polysaccharide vaccine had not been employed.

The principal investigators were requested for this study by the Office of the Command Surgeon, Headquarters, Military Assistance Command, Vietnam.

OBJECTIVE: To verify that the disease reported as "suspected meningococcal meningitis" was caused by infection with *N. meningitidis*; to isolate and characterize strains of *N. meningitidis* causing disease and circulating in the population in which disease was prevalent; to study the variables contributing to the outbreak and severity of disease, and to make recommendations appropriate to the further study and control of these outbreaks.

DESCRIPTION: Centers at which cases were still a frequent occurrence and medical facilities serving these Centers were visited. These included, in the Third Military Region, the Quang Trung Training Center (44 cases and 7 deaths in September 1972). Cong Hoa Hospital, and the Third Induction Center, adjacent to Quang Trung. In the Fourth Military Region, The Fourth Induction Center, Can Tho (24 cases, 6 deaths), Chi Lang Training Center (49 cases, 3 deaths) and Phan Thanh Gian Hospital were visited.

At each Center, following a briefing, the dispensaries, barracks complexes, and training areas were seen. Many of the physicians and training cadre were questioned. Units in which we wanted to determine the prevalence of *N. meningitidis* carriers were placed at our disposal. The procedures employed involved swabbing the posterior nasopharynx with bent wire Calcium Alginate swabs, streaking the swab contents on chocolate agar, placing the streaked plates immediately into CO₂ cans, and incubating at 35—37C, as soon as possible after the cultures were taken.

At the dispensaries and hospitals, recruits admitted and treated for suspected meningococcal meningitis were examined. Where spinal fluid or petechial isolates were available, the organism was subcultured for later studies.

PROGRESS: Overcrowding of the barracks and mess hall facilities was observed at all Centers. Unit integrity was maintained during training sessions, but opportunities to interact with recruits from other units

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occurred in and around the mess hall, during the nighttime political indoctrination sessions, and during sick call. The number of cadre with each recruit company varied considerably. Cadre at all Centers appeared to be well sensitized to the problem of meningitis. Screening of recruits reporting sick was performed by battalion aid-men. All recruits with febrile upper respiratory conditions were reportedly hospitalized. Therapy routinely consisted of penicillin, 20 million units per day IV drip, occasionally with chloramphenicol, 4 grams per day, added. Shock was treated with volume replacement, Solucortef, Isuprel, and bicarbonate. The majority of hospitalized recruits reportedly recovered rapidly on this regimen. Those who recovered appeared to do so completely.

Spinal fluid isolates from five patients whose disease coincided with our visit were subcultured. Patients CSF 1-3 are from Phan Thanh Gian Hospital; CSF 4-5 are from Cong Hoa Hospital. A sample of healthy recruits in the Induction and Reception Centers was swabbed. *Neisseria meningitidis* was isolated from 115 of 209 specimens obtained (Table 1). These and the five case isolates were sero-grouped (Table 2) and sulfadiazine sensitivities determined (Table 3). These data indicate that carrier rates were high, that sero-groups "B and C" were most common and similar in prevalence, and that most strains were sulfadiazine sensitive. Four of the five case isolates were serogroup "B" and all were sulfadiazine sensitive.

RECOMMENDATIONS:

1. That bacteriologic capability to confirm a greater proportion of suspected cases from Induction and Training Centers and to support a system for surveillance of new outbreaks be established.
2. That the provision of adequate sleeping space, well ventilated billets, adequate nutrition, adequate periods of sleep, alternating head and foot sleeping arrangements, avoidance of overfatigue, and the importance of early diagnosis and treatment receive increasing command interest.
3. That the training schedule provide for adequate numbers of cadre, for the maintenance of unit integrity, and for adequate numbers of daily formations at which ill recruits could be identified.
4. That sick call and hospital admission policies remain liberal and all febrile URI patients should continue to be hospitalized.
5. That the apparent ineffectiveness of sulfadiazine may be due to sulfadiazine whose activity has decayed or to imperfect discipline. Both these possibilities needed to be studied further.
6. That utilization of Group C meningococcal vaccine was not indicated at the time, since the case strains isolated were predominantly Group B.

Table 1.
 Recovery of *Neisseria meningitidis* from N/P Swabs
 From ARVN Recruits (25 September - 5 October 1972)

Specimen Source	Total Specimens	Positive <i>N. meningitidis</i>
Quang Trung, 3 days following Sulfadiazine prophylaxis	29	18 (62.06%)
Quang Trung, completing first week of training	30	21 (70.00%)
Quang Trung, received the previous day from Huang Hai Province Recruiting Station	30	2 (06.66%)
Fourth Induction Center	30	26 (86.66%)
Fourth Induction Center, held for physical re-evaluation	30	11 (36.66%)
Chi Lang, completing third day of Sulfadiazine prophylaxis	30	15 (50.00%)
Chi Lang, completing first week of training	30	22 (73.33%)

Table 2.
 Serotypes of *Neisseria meningitidis* Isolated
 From ARVN Recruits (25 September – 5 October 1972)

Specimen Source	Serotypes (WRAIR Antisera)			
	A	B	Bo	C
Quang Trung, 3 days following Sulfadiazine prophylaxis	1	7	1	9
Quang Trung, completing first week of training	0	4	5	12
Quang Trung, received the previous day from Huang Hai Province Recruiting Station	0	2	0	0
Fourth Induction Center	0	16	1	9
Fourth Induction Center, held for physical re-evaluation	0	8	0	3
Chi Lang, completing third day of Sulfadiazine prophylaxis	0	8	1	6
Chi Lang, completing first week of training	0	7	1	14
Case Isolates (4) Quang Trung, occurring at different times	0	3	0	1
Case Isolate (1) Can Tho	0	1	0	0

Table 3.
Sulfadiazine Sensitivity Profiles of 120 Isolates of *Neisseria meningitidis*
Recovered from ARVN Recruits and Patients

Specimen Source	Sulfadiazine Sensitivity		
	Sensitive	Reduced Sensitivity	Resistant
Quang Trung, 3 days following Sulfadiazine prophylaxis	14	3	1*
Quang Trung, completing first week of training	20	1	0
Quang Trung, received the previous day from Huang Hai Province Recruiting Station	2	0	0
Fourth Induction Center	26	0	0
Fourth Induction Center, held for physical re-evaluation	11	0	0
Chi Lang, completing third day of sulfadiazine prophylaxis	15	1	0
Chi Lang, completing first week of training	17	5	0
Case Isolates (5)	5	0	0

* Tube dilution revealed MIC for this isolate to be 400 mcg/ml.