The silent epidemic: screening for chlamydia in a military population

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CHLAMYDIA TRACHOMATIS is the most common sexually transmitted bacterial infection in Australia. Notifications have been rising by 20% per year over the past 5 years. In 2003, more than 30 000 infections were reported.[1] The highest rates of notification were in the under 30 years age group. Chlamydia is the primary aetiological factor for epididymitis, which can cause sterility in men,[2] and pelvic inflammatory disease,[3] tubal infertility,[4] and ectopic pregnancy in women.[5] It is regarded as the major cause of preventable infertility.[4]

Unfortunately, it is a silent epidemic, as 50% of men and 80% of women are asymptomatic.[6] As a result, infections can persist for months, resulting in a long period of potential transmission.[7] Risk factors for infection have been identified as acquiring a new partner, having more than one partner, having sex with someone who has had other partners, and young age.[8] The use of barrier contraception such as condoms has been promoted extensively as an effective public health measure.

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Abstract

- **Aims:** To determine the prevalence of genital *Chlamydia trachomatis* infection in young military personnel and to assess possible risk indicators based on age, sex, and sexual behaviour.
- **Design, setting and participants:** Sexual behaviour questionnaire and polymerase chain reaction chlamydia screening of first-catch urine specimens from 103 military personnel aged 18–29 years presenting to military health facilities at Gallipoli Barracks. An age- and sex-matched civilian group was recruited from an urban sexual health clinic.
- **Outcome measures:** Prevalence of positive screening results; self-reported symptoms and sexual behaviour (overseas sexual activity; number of sexual partners in previous 12 months; condom use).
- **Results:** Of the 103 people tested, two (1 man, 1 woman) were positive for *C. trachomatis*. More men reported having sex overseas and more than five partners in the previous year. Younger subjects were more likely to have sex overseas, have more than five partners, and use condoms more often. No condom use was associated with monogamy, but three-quarters of those with multiple partners reported regular condom use.
- **Conclusion:** A larger, more comprehensive tri-Service survey is needed to assess the prevalence of chlamydia and sexual risk behaviour, the consequences on fertility, the impact of doxycycline regimens on infection prevalence, and the efficacy of screening programs for Defence personnel.

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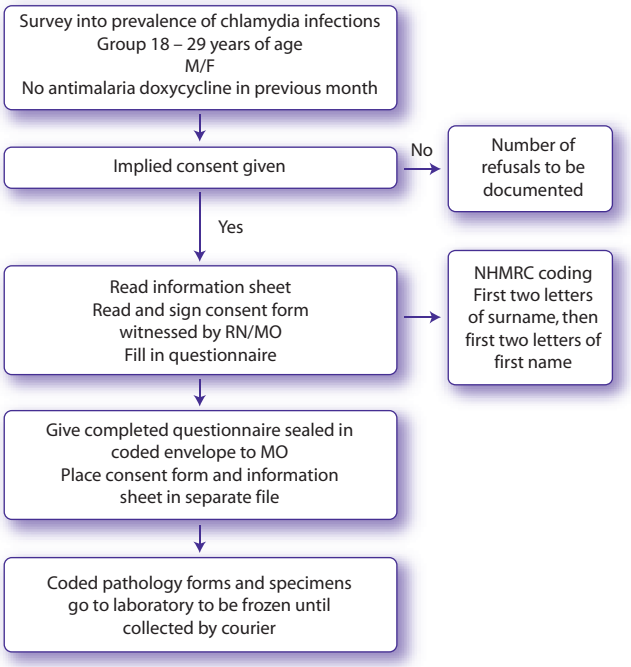
Studies on asymptomatic military personnel have identified infection rates of 10%–12% in Sweden and Austria,[9] 6.6% in Norway,[10] 7.9% in Denmark,[11] and, in the United States, 7% in Marines[12] and 9.2% in female recruits.[13] No published data on the prevalence of chlamydia in a military population in Australia could be found.

The Commonwealth Government has identified chlamydia as one of the most significant reproductive health issues facing young adults today.[14] A national screening program is currently under consideration. Since the advent of non-invasive testing,[15] the Sexual Health and AIDS Service has conducted screening programs in Brisbane targeting young people in a variety of settings, such as high schools,[16] universities,[17] and gay venues.[18]

1 Study protocol



Following on from these surveys, the Defence Infertility Prevention Study was piloted to assess the prevalence of chlamydia within the military. This group essentially comprises healthy young adults, who, like their counterparts in the general population, would be at risk of infection. However, their risk is further increased because they are often deployed to countries with high endemic rates of chlamydia.[12] Identifying other risk factors within this group, based on age, sex, and sexual behaviour would help the Australian Defence Force develop a health policy to monitor the infection status of ADF personnel and prevent serious long-term sequelae.

Methods

Military personnel aged 18–29 years presenting for any reason to a military health facility at Gallipoli Barracks were asked to participate in the study. Staff involved followed the protocol of a flow sheet (Box 1). Any person who had been on antimalarial doxycycline within the previous month was excluded.

Written information regarding chlamydia and the study was given to patients, and a member of the medical staff was available to answer questions. Those who were willing to participate signed a standard consent form, witnessed by medical staff. Participants were given a brief questionnaire with questions on history of symptoms, overseas sexual contact, numbers of sexual partners, and condom use in the previous 12 months. The questionnaire was completed in private and sealed in an envelope. It was then coded and locked in a secure cupboard to maintain privacy.

The chlamydia test was performed on a first-catch urine specimen, which was defined as the first part of the urine flow. The samples were coded to secure confidentiality, and a list of names was recorded and kept in a separate locked area. Specimens were sent to the Division of Microbiology, Royal Brisbane Hospital, for polymerase chain reaction (PCR) analysis.

Coded results were sent to the principal doctor responsible for the security of the information. Patients who tested positive were contacted personally by the doctor and treated with a single dose of azithromycin 1 g orally. Counselling was given and contact tracing was advised.

A comparison group of civilians, matched for age and sex, was recruited from people attending an urban sexual health clinic.

Ethical approval

The Australian Defence Human Research Ethics Committee in Canberra approved the proposal for this pilot study.

2 Characteristics of military subjects, and comparision group of civilian clinic attendees

Military subjects	Abdominal pain	Discharge	Urine pain	Overseas sexual activity	Number of partners				Condom use			
					0	1	2–5	> 5	Always	Often	Sometimes	Never
Women 32 (32%)	4 (13%)	3 (9%)	3 (9%)	3 (9%)	1 (3%)	16 (50%)	14 (44%)	1 (3%)	6 (19%)	11 (34%)	6 (19%)	8 (25%)
Men 69 (68%)	8 (11%)	1 (1%)	4 (6%)	10 (14%)	4 (6%)	30 (44%)	21 (31%)	12 (17%)	14 (20%)	20 (30%)	10 (14%)	23 (34%)

Civilian clinic attendees	Symptoms (any)	Overseas sexual activity	Number of partners				Condom use
			0	1	2–5	> 5	Always
Women 30 (30%)	3 (10%)	0	1 (4%)	15 (50%)	14 (46%)	0	10 (33%)
Men 70 (70%)	4 (6%)	8 (11%)	3 (5%)	16 (23%)	40 (56%)	11 (16%)	35 (50%)

Results are self-reported for the 12 months before survey.

3 Comparision of age groups

Age (years)	Number (%)	Men	Women	Overseas sexual activity	Number of partners				Condom use			
					0	1	2–5	> 5	Always	Often	Sometimes	Never
18–24	53 (53%)	40 (75%)	13 (25%)	8 (15%)	5 (9%)	19 (36%)	20 (38%)	9 (17%)	14 (26%)	22 (42%)	9 (17%)	8 (15%)
25–29	48 (47%)	29 (60%)	19 (40%)	5 (10%)	0	28 (58%)	12 (25%)	2 (4%)	6 (13%)	8 (17%)	7 (15%)	24 (50%)

Not all participants completed the survey, so some results may not total 100%. Results are self-reported for the 12 months before survey.

4 Comparison of those who have had sex overseas and those who have not

Overseas sexual activity	Number (%)	Male	Female	Symptoms	Number of partners				Condom use			
					0	1	2–5	>5	Always	Often	Sometimes	Never
Yes	13 (13%)	10 (77%)	3 (23%)	2 (15%)	0	0	9 (69%)	4 (31%)	4 (31%)	8 (62%)	0	1 (7%)
No	88 (87%)	59 (67%)	29 (33%)	14 (16%)	5 (6%)	47 (53%)	27 (31%)	9 (10%)	16 (18%)	24 (27%)	16 (18%)	30 (34%)

Not all participants completed the survey, so some results may not total 100%. Results are self-reported for the 12 months before survey.

Results

Characteristics of subjects and comparison with civilians

Over a 2-year period, 103 military personnel (32 women; 71 men) were recruited for PCR testing and sexual history assessment. The self-reported survey concerning sexual behaviour was completed by 101 subjects.

Of the 103 people tested, one woman and one man were positive for *C. trachomatis*.

Men and women reported similar rates of symptom presentation, although more women noted a recent history of discharge (Box 2). More men reported overseas sexual activity and more than five partners in the previous 12 months. Condom use was similar, but more men reported never using condoms.

Prevalence of symptoms was similar for military and civilian women, but more military men reported symptoms compared with male clinic attendees. Overseas sexual contact was similar in both groups of men, but more frequent in military women than civilian women. The number of sexual partners for women was similar in the military and civilian populations, but more civilian men reported 2–5 partners per year and fewer single partners. The proportion with no partners or more than five per year were similar across all groups. Fewer civilians than military personnel reported sex without condom use in the previous year.

Age

In the military group, the younger age groups were more likely to have engaged in overseas sexual activity, to have had more than five partners in the previous year, and to have used condoms more often (Box 3). There was a tendency for increased monogamy with increasing age.

Overseas sexual activity

Military personnel who had engaged in sexual activity overseas (Box 4) were more likely to be male, to have had multiple partners (none reported having a single partner only), and to use condoms more often ($P = 0.002$). Similarly, those reporting overseas sexual activity were less likely to report never using condoms. The prevalence of symptoms was similar across both groups.

Number of partners

More men than women reported having more than five sexual partners in the previous year (Box 5). As the number of sexual partners increased, symptoms increased, overseas sexual activity became more likely, and condom use increased in those who claimed to use condoms often ($P < 0.001$). Only 15% of people reporting more than five sexual partners always used condoms. More than half of those with only one sexual partner never used condoms.

Condom use

Subjects who always used condoms reported the fewest symptoms, and those who used condoms only sometimes had the most symptoms ($P = 0.035$) (Box 6). Greater condom use was associated with overseas sexual experiences, with 20%–

25% of those having overseas sexual activity using condoms always or often ($P = 0.002$). A significantly greater proportion of subjects who had only one sexual partner reported no condom use (84%), compared with none who had more than five partners and only 6% of those reporting 2–5 partners in the previous year ($P < 0.001$).

Discussion

The prevalence of chlamydia infection (2%) in our study was much lower than rates found in military personnel in other countries.[9-13] However, it was similar to the pattern of prevalence (2%–5%) identified in Queensland high school students,[16] university students,[17] men who have sex with men,[18] adult attendees at an inner city Sexual Health Clinic (unpublished data), and young people attending GP clinics.[19] Young Indigenous populations and other young disadvantaged people appear to be disproportionately affected, with significantly higher rates of infection.[20]

There were a number of limitations with our study:

- the sample size was small, and predominantly male (70%);
- testing occurred mainly in a hospital GP clinic, selecting those already presenting with a health concern;
- testing was done at one centre, so possibly excluding other populations at greater risk from overseas exposure;
- testing was voluntary, so those who considered themselves at risk may have refused to participate; and
- the questionnaire on sexual behaviour was self-reported and participants may have given false responses out of fear of weakened confidentiality or potential repercussions.

With these biases, caution must be exercised when interpreting the significance of the low rate of infection and the sexual behaviour identified. The risk for sexually transmitted infections (STIs) in the military may be no greater than in other adult populations. Low rates of infection could be due to social–sexual networking and partner selection against a background of low prevalence, or because of safer behaviour (condom use, low rates of partner change, limited partner concurrency).

However, a significant feature unique to military life is the frequent use of the antibiotic doxycycline for the prevention of malaria before deployment and for eradication after deployment. This antibiotic also has a therapeutic effect on chlamydia. Consequently, any person receiving doxycycline in the previous month was excluded from the study. This may have biased sampling. Furthermore, this study was conducted at a time of significant overseas activity for the services, so a significant minority of personnel was being medicated with doxycycline at any one time, making sampling difficult. These issues raise the possibility that higher infection rates may have been masked as a result of opportunistic treatment.

In addition, participant recruitment became progressively difficult with the introduction of random urine drug testing within the service, generating even greater reluctance by personnel to volunteer specimens.

5 Comparison of those reporting different numbers of sexual partners

Number of partners	Number	Men	Women	Symptoms	Overseas sexual activity	Condom use			
						Always	Often	Sometimes	Never
0	5	4 (80%)	1 (20%)	0	0	1 (20%)	1 (20%)	0	3 (60%)
1	47	31 (66%)	16 (34%)	5 (11%)	0	7 (15%)	6 (13%)	6 (13%)	27 (57%)
2–5	36	22 (61%)	14 (39%)	7 (19%)	9 (25%)	10 (28%)	17 (47%)	6 (17%)	2 (6%)
> 5	13	12 (92%)	1 (8%)	3 (23%)	4 (31%)	2 (15%)	8 (62%)	3 (23%)	0

Not all participants completed the survey, so some results may not total 100%. Results are self-reported for the 12 months before survey.

6 Comparison of military subjects reporting varying condom use

Condom use	Number (%)	Men	Women	Symptoms	Overseas sexual activity	Number of partners			
						0	1	2–5	> 5
Always	20	14 (70%)	6 (30%)	1 (5%)	4 (20%)	1 (5%)	2 (10%)	10 (50%)	7 (35%)
Often	32	21 (66%)	11 (34%)	6 (19%)	8 (25%)	1 (3%)	6 (19%)	17 (53%)	8 (25%)
Sometimes	16	10 (63%)	6 (37%)	4 (25%)	0	0	6 (38%)	7 (44%)	3 (19%)
Never	32	24 (75%)	8 (25%)	5 (16%)	1 (3%)	3 (9%)	27 (84%)	2 (6%)	0

Not all participants completed the survey, so some results may not total 100%. Results are self-reported for the 12 months before survey.

Excluding the reports of abdominal pain by men (not a symptom suggestive of STI), there was still a high rate of symptom reporting by women, similar to that found in the group of women accessing a sexual health clinic. Although we cannot determine whether any of the symptoms reported in military personnel indicate an STI, the level of morbidity does warrant further investigation.

The proportion of subjects reporting multiple sexual partners overall was similar in men and women in the military, and higher than the rates reported in a 2001–2002 national telephone study of 10 173 men and 9134 women.[21] In that study, 15.1% of men and 8.5% of women reported multiple sexual partners in the previous year.[21] However, that sample included a much broader age range. In a 2003 study of 125 men and 155 women aged 21 years and younger, 32% reported multiple sexual partners.[22] The proportion reporting multiple partners in the military cohort was similar to that among the population attending an urban sexual health clinic. This suggests that the sexual behaviour in military personnel may be similar to the higher risk behaviour of sexual health clinic attendees. More research is needed to determine whether the military cohort engages in greater sexual risk behaviour than the general population.

Civilians accessing the sexual health clinic reported higher rates of always using condoms (civilians, 50%; military, 20%). However, this could reflect the lower levels of monogamous relationships among clinic men (23% v 44%). Comparing this to the national 2001–2002 study of 10 173 men and 9134 women,[21] less than 50% of the sample had used condoms in the previous year. The national figures are similar to our results among military personnel, although the national survey distinguished between casual and regular partners; it is a weakness of our study that we did not make this distinction.

Men overall tended to report higher risk behaviour — more than five partners in the past year, and overseas sexual activity — but also reported higher levels of condom use. No difference was reported by men and women with respect to condom use, although more men did report never using condoms. Low or negligible condom use was associated with monogamous relationships, whereas 77% of those reporting more than five partners and 75% of those reporting 2–5 partners used condoms often or always. Therefore, three-quarters of those with multiple sexual partners reported regular condom use.

Conclusions

The limitations of this study suggest that a larger, more widespread survey should be considered in all three Services, across a range of facilities, and including a sample of overseas-deployed personnel. Overseas sexual contact, particularly within South-East Asia, does pose an increased risk for chlamydia and other STIs, and military personnel may serve as a bridge for the transmission of these infections into Australia. Further study of overseas sexual behaviour should be done to define this risk.

The positive, although unintended, effect of prophylactic doxycycline regimens on chlamydia prevalence in service personnel should be further investigated to assess its potential use as a public health strategy in other populations at high risk of chlamydia infection.

Undetected chlamydia not only affects the health outcomes of the personnel and their partners, but also threatens military readiness.[12] Given the serious pathological consequences of chlamydia on fertility, further research should be conducted to investigate the significance of reproductive morbidity in the ADF. Infertility treatment is costly. Studies have shown that the long-term cost savings from reducing infertility far outweigh the cost of screening.[23]

Given the global trend of increasing chlamydia infection among young people, and that for every case of chlamydia diagnosed there is at least one case going undiagnosed,[24] there is now strong evidence to support community screening programs to reduce the prevalence of infection and decrease the morbidity.[25] Screening programs may need to be implemented in the ADF, as part of a periodic or opportunistic medical examination of military personnel.

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Competing interests

None identified.

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