Surveillance of HIV in the army of the Republic of Cyprus (SHARC); rationale, design, and implementation of an inexpensive system

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METHODS
In collaboration with the health authorities and the National Guard, a 4 year HIV surveillance system was established. Since an incident case requires documentation of a previous negative test, results from this project could only provide estimates of incidence. This surveillance system could provide valid information about the HIV infection rates among this subset of the male population of Cyprus.

The primary intent of the “Surveillance of HIV in the Army of the Republic of Cyprus” project (SHARC) was to provide timely information in a small subset of the population that is potentially at high risk of exposure to HIV infection.

Population definition
In Cyprus, all males (females do not serve) at the age of 18 are required to serve in the National Guard for 26 consecutive months. The sample is a cross section of the population, as deferments are given only after consideration by a military board and no deferments are given for educational reasons. Recruitment is semiannual, in summer and winter. The two recruit classes differ in their educational and socioeconomic status, factors that might be associated with HIV infection risk. Males are required to join the ranks at the beginning of the calendar year in which they turn 18. Individuals who are still in high school are allowed to finish their schooling and then join the ranks in the summer immediately following their graduation; these comprise the summer recruit class. All others (almost exclusively those not in school) join the ranks in the winter. Thus, the educational status of the two recruit classes, and by extension, their socioeconomic status, differ.

To assess HIV prevalence, we designed a system that uses the unlinked anonymous screening (UAS) methodology as described by the World Health Organization. Our project was initially designed for 4 years, which would allow screening of randomly selected recruits when they join the army as well as when they complete their service. The standard methodology to be used throughout the project would help assess temporal changes in HIV infection rates.

Sample size calculations
The number of recruits needed to be screened each year was calculated (based on the formula derived by Kish and Leslie) using spss-sqo 6 (Centers for Disease Control and Prevention, Atlanta, GA, USA). Prevalence of HIV infection in this population is assumed to be 0.271% as of the 1996 WHO estimate. Based on sample size calculations we decided to test a total of 1650 recruits annually: 1300 recruits during the summer recruiting period and 350 recruits during the winter one. When combining the estimated population sizes for the two recruitment periods of each year (a total of 1650 recruits) we are able to detect HIV-1 infections (worst acceptable prevalence 0%) with close to 99% confidence.

Specimen collection and HIV testing
Samples were collected at recruitment centres and then shipped to the facilities of the virology laboratory where they were stored and batch tested. We incorporated (fig 1) ABO blood group typing and hepatitis testing as potential sources for residual unlinked sera.

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HIV screening at recruitment
Every new recruit has ABO blood group typing by finger stick. For every third (the decision to screen every third patient was made based on the sample size estimates) recruit, an additional two blood drops were placed in two circular spots on filter paper cards (FP, 5 mm × 30 mm, Nobuto filter paper strip, Roshi Kaisha Ltd, Japan), which was dried and processed according to the manufacturer’s instructions at the central referral laboratory. Specimens that produced equivocal and reactive results were further tested by an additional ELISA (Genscreen-Pasteur) and a confirmatory western blot format assay (Inno-EIA, Innogenetics). Unused eluate was stored for future use. There was no identifying information on the filter papers where the blood drops were collected.

HIV screening at dismissal
After a 26 month service, recruits are dismissed from active military duty. The military and health authorities intended to establish a hepatitis B education prevention screening (HeBEPS) campaign that would incorporate education, counselling, and voluntary hepatitis testing and would be confidential. A sample of individuals who would attend the hepatitis campaign and were due for dismissal from the ranks in the subsequent 3 or 4 month period would be randomly selected (every third eligible recruit) and invited to participate. in an anonymous hepatitis screening study (in the event of refusal to participate the unit physician would proceed to the next eligible recruit and invite him to participate in the hepatitis screening). The HIV surveillance project would use residual blood from the hepatitis screening; HIV screening would once again be unlinked and anonymous. HeBEPS was intended to be operational in the summer of 2000 in order to screen the recruits of summer 1998 upon exit from the ranks.

Table 1 HIV-1 screening results

<table>
<thead>
<tr>
<th></th>
<th>Recruits screened</th>
<th>Positive (%)</th>
<th>Negative (%)</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer 1998</td>
<td>1300</td>
<td>0 (0)</td>
<td>1300 (100)</td>
<td>0%</td>
</tr>
<tr>
<td>Winter 1999</td>
<td>356</td>
<td>0 (0)</td>
<td>356 (100)</td>
<td>0%</td>
</tr>
<tr>
<td>Summer 1999</td>
<td>1502</td>
<td>0 (0)</td>
<td>1502 (100)</td>
<td>0%</td>
</tr>
<tr>
<td>Winter 2000</td>
<td>265</td>
<td>0 (0)</td>
<td>265 (100)</td>
<td>0%</td>
</tr>
<tr>
<td>Total</td>
<td>3423</td>
<td>0 (0)</td>
<td>3423 (100)</td>
<td>0%</td>
</tr>
</tbody>
</table>
RESULTS
The HIV sentinel surveillance project was initiated during the summer of 1998 and continued to the end of winter 2000. A total of 3423 recruits were tested during these four recruitment seasons and all were negative for HIV-1 (table 1). The second component of SHARC that would allow for HIV screening at exit from the ranks did not materialise for logistical reasons. Owing to a delay in the set up and organisation of the HeBEPS component, it was logistically impossible to screen close to 1600 recruits (who joined in the summer of 1998) upon their exit from the ranks in the summer of 2000.

DISCUSSION
The total number of HIV-1 infections in Cyprus (population = 778 000) is conservatively estimated to be between 500–1000. Heterosexual transmission accounted for 44% of the infections; 45% of the infections were in men who have sex with men; and 2% of the infections were related to injecting drug use. A national AIDS programme must incorporate periodic assessment of HIV infection rates in an attempt to monitor the epidemic’s trends over time and across different risk groups and geographic regions. The SHARC programme provides accurate cross sectional prevalence estimates, which at this time are low. The annual cost of the first component of SHARC (at entry HIV screening) was less than £5000 CY (current exchange rate: £1 CY = $1.5 US). HIV surveillance of selected segments of the population, like the military recruits, can provide cost efficient and timesaving alternatives to large, countrywide HIV infection surveys. Even though such a system might not lend itself to the provision of accurate estimates of true incidence of HIV infection in the general population, it can prove to be useful in indicating the HIV trends in this selected subset of the population.

ACKNOWLEDGEMENTS
This project would not have been successfully carried out without the collaboration of the military physicians stationed at the recruitment centres, the scientists at the virology laboratory, and most importantly the recruits who donated their blood specimens for testing.

This project has been solely funded by the Ministry of Health, Cyprus. This project was initially approved in 1998 and is undergoing annual review by the institutional review board, Yale University.

CONTRIBUTORS
TCK, project design and supervision, manuscript preparation; LP, project design and supervision; NM, project set up and supervision in the military units; AE, laboratory supervision, HIV assay performance.

REFERENCES