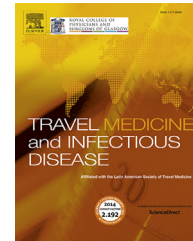




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Malaria protection in Sierra Leone during the Ebola outbreak 2014/15; The UK military experience with malaria chemoprophylaxis Sep 14–Feb 15



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Summary *Background:* The UK deployed a task force to Sierra Leone to assist in ending the 2014/15 Ebola outbreak. Malaria protection was based on existing Defence Policy which saw a wide range of bite prevention measures deployed. Atovaquone/Proguanil ("A/P"), Doxycycline ("D") and Mefloquine ("M") were the chemoprophylactic medications that were prescribed. A survey was undertaken to audit the Adverse Effect (AE) burden experienced by the population. *Method:* A questionnaire based survey was administered that sought information on individuals' experiences with malaria chemoprophylaxis.

Results: 337 personnel were eligible to take part and 151 (46.3%) individuals returned questionnaires. The reported AE rates for the three drugs were "A/P" 28% of the respondents, "D" 25% and "M" 23.1%. 24 individuals (15.9%) reported 1 AE while 34 (22.5%) reported multiple AEs. Eight (5.3%) individuals changed medication (Five "A/P", two "M" and one "D") because of unacceptable AE but no significant neuro/psychological conditions were reported. The malaria attack rate for the deployed population was 0.4 cases per thousand person weeks which is very low when compared to other military deployments to the West African Area.

Conclusion: UK Defence policy is effective in the way it balances the risk of malaria with that of AE due to chemoprophylaxis. "M" remains an acceptable chemoprophylactic agent for a section of the population.

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Malaria remains a disease of global importance. In 2013; 97 countries were assessed as having persistent malaria transmission; there were an estimated 207 million cases of malaria and; there were an estimated 627,000 deaths [1]. The UK experiences its own malaria burden; all of it imported. In 2014 there were 1586 imported cases of malaria into the UK of which 1169 were *Plasmodium falciparum*. There were three deaths [2].

In 2014, the UK deployed a Joint Inter Agency Task Force to Sierra Leone to assist the Government and people in combatting the Ebola outbreak. Health protection advice for the deployed force concerning malaria was firmly couched in terms of an ABCD approach [3] where A is disease awareness, B is bite avoidance, C is Chemoprophylaxis and D is early detection. However, the importance of commanders in encouraging deployed troops to comply with health protection advice should not be underestimated [4,5].

Chemoprophylaxis for the population was based on individual risk assessments with primary care advice being based on extant policy. More detailed discussions concerning Adverse Effects (AEs) were based on the then current edition of the British National Formulary (BNF) [6]. Three drugs were used: Doxycycline Monohydrate ("D"), Atovaquone/Proguanil ("A/P") and Mefloquine ("M"). The mainstays for the operation were "D" and "A/P" with "M" being retained as an alternative. "M" is a drug that occupies a particular place in the malaria chemoprophylaxis space. Its side effects profile has resulted in considerable debate on its risks and benefits and this has resulted in changes in the way "M" is prescribed that might see it used far less frequently in the future [7] and the UK House of Commons Defence Select Committee has released a report recommending changes in the way "M" is used by the armed forces [8].

After anecdotal evidence began to emerge concerning AEs of malaria chemoprophylaxis, senior deployed military medical personnel sought to identify the extent of the problem. It was decided to undertake a questionnaire based survey on the deployed population to audit the degree to which the population was experiencing AEs of their chemoprophylaxis.

1. Aims

The aims of this audit were to analyse how malaria chemoprophylaxis AEs affected the deployed population and compare the UK experience in Sierra Leone in 2014/2015 with other published evidence.

2. Methods

A questionnaire based survey was offered to all individuals in the land-based population that sought information concerning AE and compliance with chemoprophylaxis. The questionnaire survey was administered over the period 15–22 Feb 15. The survey was advertised widely at the daily operations briefing, by flyers posted in the communal spaces and reminders being given by medical staff to members of the population as opportunity allowed.

Questionnaires were available in all the communal spaces and were hand delivered to each bed space in the accommodation areas. The questionnaire was anonymous but sought specific information concerning malaria chemoprophylaxis: which drug, compliance and whether medication had been changed. Respondents were also asked to list the AEs that they had experienced in a table based on the AEs described in the BNF. There was also space for individuals to write in free text any notes concerning additional perceived AEs not listed in the BNF.

In order to contextualise the issue of Chemoprophylaxis AEs and possible non-compliance, routine data were also analysed that looked at the malaria experience of the deployed population.

3. Results

3.1. Audit data

The land-based population was 337 and all were invited to take part. 151 (46.3%) individuals returned survey forms. Free text boxes were used not only to generate further observations concerning malaria chemoprophylaxis but also to provide handwriting samples to identify potential multiples responders. There appeared to be no multiple responders. The numbers of individuals who reported AE are summarised in Table 1 below. The table also provides data on how many individuals experienced multiple AEs.

Comparing those that reported 1 or more AE with those that reported no AE for each drug, it would appear that drugs were equally tolerated with no significant difference detectable concerning AE reporting (Fisher Exact Probability Test, chi-square 0.2, 2 degrees of freedom, $P = 0.90$).

Individual compliance is summarised as follows; D 75% fully compliant, M 100% fully compliant and A/P 78.8%. Eight individuals (5.0%) had their medication swapped because of unacceptable AEs. Five were taking "A/P", 2 were taking "M" and one was taking "D". There were no presentations of significant neurological/psychological conditions.

While 110 of the 151 (72.8%) respondents reported no AE, Table 2 below summarises the AE reported by the 27.2% of individuals who did experience them. It should be remembered that some individuals reported multiple AE which resulted in an inability to undertake a statistically meaningful analysis of the raw data.

3.2. Malaria experience of the population

In the time leading up to the execution of the audit, there had been 3 cases of malaria reported in the force with an accumulated exposure of 7195 person weeks exposure (attack rate of 0.4 cases per thousand person weeks exposure.) Previously reported attack rates for military populations deployed in West Africa were (depending on location, activity and geographical location) from 3.64 to 41.6 per thousand person weeks exposure in Sierra Leone [17] and 44.4 cases per thousand person weeks exposure in Liberia [18].

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