Compliance of basic health staff on national anti-malarial treatment guideline in selected townships of upper Myanmar

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Basic health staff (BHS) are frontline workers to carry out management of malaria at the community level. The objective of this study was to assess compliance level of BHS with national antimalarial treatment guideline (NAMTG). A cross-sectional analytic study was conducted from June 2006 to September 2007 at Singu, Thabeikkyin, Patheingyi, and Moegoke townships. A total of 144 BHS participated in this study. Among them, 71.5% had good-knowledge and 78.5% well complied with NAMTG. The rapid diagnostic test (RDT) allotment for each BHS was fifteen kits which ranged from zero to twenty-eight per month. Approximately two-third (68.8%) of BHS received enough RDT. Median ACT allotment for each BHS was two blisters which ranged from zero to fifteen per month. All BHS received enough ACT. In multivariate analysis, if BHS having good-knowledge were supplied with adequate RDT and ACT, they were very likely to become effective healthcare providers.

INTRODUCTION

In Myanmar, malaria is one of the priority diseases. It is a re-emerging public health problem due to climatic change, uncontrolled population migration, ecological changes, existence of multidrug-resistant *P. falciparum* parasite, appearance of insecticide resistant vector and change in behavior of vector [1]. About 70% of the populations are residing in malarious areas [2]. People residing in low or no risk areas may also contract malaria infection through migration on socio-economic reasons and easily develop severe form of disease leading to high mortality, unless they receive prompt appropriate effective treatment. The Government of the Union of Myanmar laid down the latest National Antimalarial Treatment Guidelines (NAMTG) in September 2002 with the aim to provide safe and rapidly effective antimalarial treatment to all patients with malaria and to prevent the emergence and spread of drug resistance [3]. Out of total 325 townships, the implementation has been started as pilot project in 12 townships in May 2004. It was extended to 100 townships in 2006, including advocacy, training and distribution of Rapid Diagnostic Test (RDT) kits and antimalarials including Artemisinin-based Combination Therapy (ACT). In 2007, case management with ACT was practiced in all 325 townships [1]. The implementation of NAMTG is depending upon the health professionals, health workers, and all those involving in delivering the antimalarial treatments. Basic Health Staff (BHS) are frontline taskforces to combat malaria at the community level. Therefore, training on management of malaria according to latest NAMTG was given to BHS countrywide. Despite the training, the adherence of BHS on latest NAMTG has not been properly investigated. In this paper, the compliance of BHS with NAMTG was investigated.

MATERIALS AND METHODS

A cross-sectional analytic study was carried out from June 2006 to September 2007 at Singu, Thabeikkyin, Patheingyi, and Moegoke based on number of BHS trained and availability of RDT and ACT. It included all BHS giving antimalarial treatment: Health Assistant (HA); Township Health Nurse (THN); Lady Health Visitors (LHV); Public Health Supervisor I (PHSI); Midwives (MW); and Public Health Supervisor II (PHSII). A total of 144 BHS who has been working at least one year duration in recently assigned health facility, and who has not taken a long leave e.g. maternity leave, medical leave etc, within one year duration before this study were included in the study. Clients who were taking anti-malaria treatment at the respective facility at the time of survey or one week before survey were also interviewed. For data collection, knowledge of BHS on NAMTG was assessed using pre-tested self-administered questionnaire. Diagnosis and treatment practice were determined by patient records review. Check-list for healthcare facilities was used to assess the adequacy of diagnostic and treatment facilities. Face-to-face interview with clients was conducted using pre-tested semi-structured questionnaire to cross-check the responses of BHS regarding antimalarial treatment. .

RESULTS

Background characteristics of BHS

The mean age of BHS was 36.2 years. The youngest and oldest BHS were 22 and 59 years respectively. Most of the BHS were females (79.2%). Male to female ratio was 1:3.8. The studied BHS have been working as government servant for up to 10 years (37.5%), followed by 10- 19 years (34.0%), 20-29 years (21.5%) and over 30 years (6.9%). Regarding educational status, 41.7% were educated up to high school level while 46.5% were attending university, and 11.8% were graduates. The majority (64.6%) was MWs. HA and PHSII were accounted for 10.4% each. Remaining 9.7% were LHVs. This study also included four PHSI (2.8%) and three THN (2.1%). A total of 144 BHS were studied (Table 1).

Table 1. Background characteristics of BHS

Variables	Frequency	Percent
Age (Years)		
20 – 29	58	40.3
30 – 39	33	22.9
40 – 49	30	20.8
50 – 59	23	16
Mean ±SD	36.2 ± 10.7	22 to 59
Gender		
Male	30	20.8
Female	114	79.2
Service (years)		
<10	54	37.5
10 – 19	49	34
20 – 29	31	21.5
30 – 39	10	6.9
Mean ± SD	13.6 ± 10.5	1 to 35
Education		
High school	60	41.7
University	67	46.5
Graduate	17	11.8
Post		
THN	3	2.1
HA	15	10.4
PHSI	4	2.8
LHV	14	9.7
MW	93	64.6
PHSII	15	10.4

THN = Township Health Nurse
HA = Health Assistant
PHSI = Public Health Supervisor I
LHV = Lady Health Visitor
MW = Midwife
PHSII = Public Health Supervisor II

Training, supplies, knowledge and treatment practice of BHS

All BHS had been received training on NAMTG at least one time (Table 2). Approximately, half (49.3%) of the BHS has attended training for two times. Malaria Control Program made RDT and ACTs available down to Subcenter (SC) level where MWs are working. Therefore, distribution pattern of RDTs and ACTs was analyzed based on quotas for BHS at SCs (MWs, and PHSIIs). Only few BHS (10.4%) working at Township Health Department (THD), Urban Health Centers, and Maternal and Child Health Centre did not get RDT and ACT supply. The median

RDT allotment of each BHS was 15 kits per month. However, BHS needed about 17 RDT kits per month to confirm malaria among clinically suspected malaria (CSM) cases. RDT adequacy was calculated by subtracting number of CMS cases from RDT supply. Approximately, two-third (68.8%) of BHS received RDT adequately. The ACT allotment for each BHS was two blisters (one-adult course) per month with a range of zero to fifteen blisters. The median ACT usage per BHS was one blister per month with a range of zero to twelve blisters. The majority (86.1%) of BHS received ACT more than enough. Only 13.9% of BHS used all issued ACT every month (Table 2).

Knowledge level of BHS on NAMTG

A self-administered knowledge assessment questionnaire comprising of 25 variables was used to assess the knowledge level. Most of the BHS (94.4%) knew *Plasmodium falciparum* as the causal organism of severe and complicated malaria. *P. vivax* was regarded as benign form of non-falciparum malaria by 86.1% of BHS. However, only 36.1% knew all non-falciparum species including *P. vivax, P. ovalae, and P. malariae*. The incubation periods of *P. falciparum* and *P. vivax* could be written down by 74.3% and 64.6% of BHS respectively. Almost all BHS (96.5%) could enumerate 'signs and symptoms' of uncomplicated malaria and 84% knew at least three important signs and symptoms of severe and complicated malaria. Approximately three-fourth (71.5%) of BHS knew at least three correct differential diagnoses of uncomplicated malaria, and 79.2% knew three differential diagnoses of cerebral malaria. All BHS knew standard methods of malaria diagnosis as Blood for MP, and RDT. Almost all (98.6%) BHS could enumerate the drugs used in uncomplicated *P. falciparum* malaria. The treatment of mixed infection was correctly described by 75.7% of BHS. Regarding referral, 93.1% of BHS could mention at least three correct criteria and 89.6% of BHS has knowledge to give a stat dose of injection artemether at the time of referral.

Table 2. Training, supplies, knowledge and treatment practice of BHS

Variables	Frequency	Percent
No of training		
1	33	22.9
2	71	49.3
3	25	17.4
4	15	10.4
Median (Range)	2	(1 to 4)
RDT supply		
< 10	51	35.4
15	32	22.2
16-20	15	10.4
21 -25	41	28.5
26 and above	5	3.5
Median (Range)	15	(0 to 28)
No of CSM cases		
< 10	43	29.9
15	28	19.4
16-20	22	15.3
21 -25	38	26.4
26 and above	13	9
Median (Range)	17	(0 to 55)
RDT adequacy		
Yes	99	68.8
No	45	31.3
ACT supply		
≥ 5	135	93.8
6 & above	9	6.3
Median (Range)	2	(0 to 15)
ACT utilization		
≥ 5	130	90.3
6 & above	14	9.7
Median (Range)	1	(0 to 12)
ACT adequacy		
Yes	124	86.1
No	20	13.9
Knowledge level (Ordinal scale)		
Poor	18	12.5
Fair	51	35.4
Good	75	52.1
Knowledge level (Dichotomous scale)		
Poor	41	28.5
Good	103	71.5
Diagnosis practice		
Clinically	5	3.5
Microscopy	8	5.6
RDT	131	91
Treatment practice		
Non-falciparum	8	5.6
ACT	136	94.4
Practice level (Ordinal scale)		
Poor	13	9
Fair	42	29.2
Good	89	61.8
Practice level (Dichotomous scale)		
Poor	31	21.5
Good	113	78.5

The correct dosage (number of tablets) and course of ACT containing 'artesunate plus mefloquine' for patients aged 15 years and above, between 10 to 14 years, between 5 to 9 years, between 1 to 4 years, and under 1 year of age were mentioned by 92.4%, 89.6%, 91.7%, 77.8%, and 77.0% of total BHS respectively. The correct dosage and course of ACT containing "artesunate plus lumefantrine (Coartem)" for patients aged 15 years and above, between 10 to 14 years, between 5 to 9 years, between 1 to 4 years, and under 1 year of age were written down by 98.6%, 97.2%, 93.0%, 97.9, and 100% of BHS respectively. The anti-malaria treatment for pregnant mother was correctly described by 64.4% of BHS.

The mean knowledge score of 32.5 and SD of 3.2 were used as parameters. BHS who achieved knowledge score below 29.3 (Mean–SD) were regarded as poor knowledge, from 29.4 to 35.6 (Mean ± SD) as fair knowledge, and more than 35.7 (Mean + SD) as good-knowledge on NAMTG.

The results revealed the proportions of BHS who had good, fair, and poor knowledge on NAMTG were 52.1%, 35.4%, and 12.5% respectively. Data were again categorized into dichotomous scale by using mean knowledge score as cut-off point. Results found that 71.5% had good-knowledge and 28.5% had poor-knowledge on NAMTG.

Diagnosis and treatment practice

RDT was used to confirm malaria among CSM cases by 91% of BHS. Microscopic diagnosis was done by eight BHS working at Rural Health Centers (RHCs). Only five BHS clinically diagnosed CSM case. BHS treated all confirmed *P. falciparum* malaria patients (n=136) with ACT. Non-falciparum malaria treatment was given to clinically diagnosed patients (n=8).

Cross check on methods of diagnosis, treatment, and treatment completion

BHS responses regarding diagnosis, treatment category, and treatment completeness were cross-checked with patients' responses using Kappa statistic and highly significant agreements were found ($p<0.001$). An absolute agreement between BHS and patients was found on 'clinical diagnosis' (n=5). However, two out of eight patients said they were clinically diagnosed while BHS said they used microscopy. Among 131 patients whom diagnosed by RDT according to BHS words, 16 patients said they were diagnosed clinically, and 2 patients said they were diagnosed by microscopy (Kappa value= 0.455, $p<0.000$). Absolute agreements on giving ACT to RDT positive cases and giving non-falciparum treatment to RDT negative cases were found between BHS and patients' response.

Compliance of BHS on NAMTG

Practice scores were given for the number of *P. falciparum* malaria patients diagnosed by RDT or microscopy (during last month), the number of patients treated using a complete course of ACT(during last month), and the number of patients referred to hospital (during last year). The mean score of 6.3 and SD of 4.3 were used as parameters. BHS who achieved practice score below 2.0 (Mean – SD) were regarded as poorly-complied, between 2.0 to 10.6 (Mean ± SD) as fairly-complied, and more than 10.6 (Mean+ SD) as well-complied with NAMTG. The results revealed the proportions of BHS who poorly-complied, fairly-complied, and well-complied with NAMTG were 9.0%, 29.2%, and 61.8% respectively. Data were again categorized into dichotomous scale by using mean practice score as cutoff point. The results determined the proportions of BHS who 'well-complied' and 'poorly-complied' with NAMTG were 78.5% and 21.5% respectively.

Factors responsible for compliance of BHS on NAMTG

In bivariate analysis (crude analysis): male BHS were 4.8 times more complied with NAMTG compared to females. University attending or graduate BHS were 1.7 times more likely to adhere on NAMTG in comparison to less educated BHS. BHS working at THD or RHCs were 4.3 times more complaint on NAMTG compared to those working at more peripheral levels. If BHS thoroughly knew the essence of NAMTG, those were 16.7 times more likely to be well-complied compared to BHS with poor knowledge. If BHS were supplied with RDT and ACT adequately, they were 15.2 times more likely to be efficient in malaria treatment compared to those receiving insufficient supplies.

In multiple logistic regression analysis: the combined effect of gender, education, post, knowledge, and ACT supply status was highly significant on likelihood of BHS compliance with NAMTG (R^2=0.35, p<0.000). If BHS with good knowledge on NAMTG (Adjusted OR =12.2) were supplied with adequate RDT and ACT (Adjusted OR=14.5), they were very likely to be effective healthcare providers in management of malaria according to NAMTG (Table 3).

Table 3. Factors responsible for compliance of BHS on NAMTG

Factors	Poorly complied (no.)	Well complied (no.)	Crude OR (95%CI)	P	Adjusted OR (95%CI)	P value
Age						
Young <35 *Yrs*	19	65	1.2	0.706*	NA	-
Old ≥35 *Yrs*	12	48	(0.5- 2.9)			
Service						
<13*Yrs*	18	62	1.1	0.751*	NA	-
≥13*Yrs*	13	51	(0.5 -2.8)			
Gender						
Female	28	85	4.8	0.026**	1.1	0.082
Male	2	29	(1.1- 3.5)		0.9- 2.9	
Education						
≤ high school	16	44	1.7	0.020*	2.4	0.131
≥univer-sity	15	69	(1.2- 4.0)		0.8- 7.4	
Post						
LHV,MW, PHSII	17	25	4.3	0.000*	9.1	0.052
THN, HA, PHSI	14	88	(1.7- 10.7)		0.9- 4.7	
Training						
1 time	6	27	1.3	0.594*	NA	-
≥2 times	25	86	(0.5- 4.3)			
Knowledge						
Poor	15	6	16.7	0.000*	12.2	0
Good	16	107	(5.1-57.5)		10.2-18.9	
Supply						
Not-adequate	23	8	15.2	0.009*	14.5	0.001
Adequate	18	95	(5.4-44.2)		2.9-65.1	

* Pearson's chi-square, ** Fisher's Exact test

THN = Township Health Nurse
HA = Health Assistant
PHSI = Public Health Supervisor I
LHV = Lady Health Visitor
MW = Midwife
PHSII = Public Health Supervisor II

DISCUSSION

The Government of the Union of Myanmar adopted a new anti-malaria treatment policy and laid down the latest NAMTG in September 2002, which superseded the previous national anti-malarial drug guidelines to provide safe and rapidly effective antimalarial treatment to all patients with malaria and to prevent the emergence and spread of drug resistance [3]. The change of policy was a long and complex process involving key stakeholders and decision-makers [4] as well as frontline workers at the community level. This study assessed the level of compliance whether BHS has already known and accepted the new guideline or defiant somehow four years after implementation. In Tanzania, a study was conducted how communities in a Tanzanian rural district adopted the new policy less than a year after the implementation of a new first line antimalarial drug [5].

Results of this study show that majority of BHS have good-knowledge and well-complied with NAMTG. Similar finding was reported in Cambodia study, where village malaria workers and malaria outreach team workers generally prescribed ACT according to blood test results done by RDT [6]. In our study, good-knowledge and supplementation of RDT and ACT were determined as significant factors influencing well-compliance with NAMTG. Evidence on improvement in basic health services through supplying training and diagnostic equipments was reported in Myanmar. Japan International Cooperation Agency implemented a 5-year long bilateral technical cooperation project. The project conducted a series of refresher trainings for BHS of project areas to improve the basic health services for 3 years (2001-2003) and found improvement of services at township level hospitals through supply of microscope and microscopic training on leprosy, malaria, and TB [7]. A study conducted in the remote malarious north western Thai-Myanmar border reported the early detection of malaria by trained village volunteers, using rapid diagnostic tests and treatment with mefloquineartesunate was feasible and reduced the morbidity and mortality of multidrug-resistant *P. falciparum* [8].

RDT and ACT were distributed from THD to RHCs on monthly basis. Number of RDT and ACT to be distributed was estimated based on previous month utilization. HA is responsible for distributing RDT and ACT from RHC sub-stock to SCs. MWs need to return 'used RDT strips' and 'used ACT blisters' to confirm the actual utilization. Majority of LHVs and BHS at SCs were receiving an adequate amount of RDTs and ACTs without interruption. However, in malaria season (June–October) some highly endemic areas e.g. Thabeikkyin, the case load overshot the supply. BHS used up almost all issued RDTs but they could not use all ACTs. The reason was they were unable to wise enough to differentiate malaria and non-malaria fevers. As a result, yield of RDT to identify the malaria cases was reduced. Although they used almost all of RDTs, they didn’t get enough falciparum positive malaria cases to use ACT. ACTs were left in their hands. BHS revealed that they used to give non-falciparum treatment to RDT negative but highly suspicious malaria cases.

Technical and operational problems on using RDT and ACT were reported from many developing countries. In Cambodia, after switching antimalarial drug policy to use RDT and ACTs, one study reported that the coverage rates of appropriate diagnosis and treatment of malaria were very low (only 11% of adults and 2% of children under five years) and authors concluded that it was due to the fragmented nature of Cambodia's health system in remote areas [6]. A study in Thailand reported that changes in diagnostic tools from microscopy to a rapid test (that detects *P. falciparum* only) underestimated the number of *P. vivax* cases [8]. A study in sub-Saharan Africa suggested that a reliable supply of ACT to facilities where most patients are seeking treatment for malaria-like symptoms was essential for proper policy implementation [9].

Basing on the townships of our study we concluded that provision of effective on-job trainings for healthcare providers down to grass-root levels supported by adequate and uninterrupted diagnostic and treatment facilities (RDT and ACT) will ensure the proper implementation of the national anti-malarial treatment policy at the community level.

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