Discrepancies, deficiencies and suggested amendments in 'Guidelines for Diagnosis and Treatment of Malaria in India 2011'

Gumashta R.[1],[*] Gumashta J.[2]

[1] Department of Community Medicine, N.K.P. Salve Institute of Medical Sciences and Research Centre, Nagpur, Maharashtra, India
[2] Department of Physiology, People's College of Medical Sciences and Research Centre, Bhopal, Madhya Pradesh, India

ABSTRACT

Introduction: 'Guidelines for Diagnosis and Treatment of Malaria in India 2011' and its earlier edition have highlighted clinical issues pertaining to conceptual, practical and challenging scenarios in diagnosis cum treatment of common malaria parasites.
Purpose: To critically analyze 'Guidelines for Diagnosis and Treatment of Malaria in India 2011' and its edition of year 2009 for their contents, quality, comparison, drug dosage schedules, discrepancies, guiding principles and deficiencies for suggestive timely remedial measures.
Materials and methods: Steps included statistical analysis of each recommended antimalarial tablet against its universally accepted drug dosage, comparative study of 'guideline 2011' with 'guideline 2009', development of new user friendly simplified tables for suggested inclusion in new/revised edition of 'guideline 2011' and making specific recommendations for evidence based corrective measures cum policy initiatives.
Results: Critical scientific analysis of these guidelines illustrate greater need of efforts for learning, expertise, experience, research and shared knowledge based amendments thereby enabling those entrusted to deal with routine and critical care of malaria patients as well as prevention among those likely to be exposed to such infections.
Conclusion: Study has underlined (a) avoidable discrepancies in therein applied principles of drug dosage and related recommended scheduling for various age groups; (b) deficiencies in the guidelines; and (c) study based recommendations for observing consensus based approach and inclusion of agreed necessary changes in amended 'guidelines 2011' or its new edition for better clinical decision making in the larger interest of malaria patients in India after due consideration and rigorous examination of the points of concern and suggested amendments through multidisciplinary consultative process.
Key words: amendments; diagnosis; guideline; India; malaria; treatment

***Corresponding author:**
Department of Community Medicine
N.K.P. Salve Institute of Medical Sciences and Research Centre
Nagpur, Maharashtra, Pin 441110, India
Tel.: +91-8149929994; 9425324588
Email: rgumashta@yahoo.com (Raghvendra Gumashta)

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INTRODUCTION

Malaria is the third leading cause of death due to infectious diseases affecting around 243 million people, causing 863,000 deaths each year, and is a major public health problem. Most of the malarial deaths occur in children below 5 years and is a major contributor of under-five mortality. Resistance to antimalarials is a major challenge to malaria control and there are new drug developments, new approaches to treatment strategies, combination therapy to overcome resistance and progress in vaccine development [1].

National Institute of Malaria Research, New Delhi and National Vector Borne Disease Control Programme, Delhi have, on behalf of Government of India, issued second edition (published in June, 2011) of 'Guidelines for Diagnosis and Treatment of Malaria in India 2011'. These guidelines, aimed to guide the medical professionals on the current methods of diagnosis and treatment, are stated to have been revised from the first edition (published in April, 2009) in the light of changed national drug policy in 2010. In view of its purpose and intended wide spread circulation among the health care functionaries, it is utmost necessary and desirable that the guidelines should be self speaking, clear, complete, concise and unambiguous in terms of content, concept and clarity.

Past efforts at disease eradication, successful or otherwise, have highlighted the importance of sustained commitment from local communities, civil society, policy leaders, and the scientific community to implement research in the context of the desired integration of services, sector wide approaches, harmonization of activities, and long-term funding commitment [2]. Since there are variations in distribution of different human-parasites and different vectors, variation in drug resistance traits, and multiple forms of clinical presentations [3], the gigantic task of issuing a new edition of guidelines generally requires widespread consultations not only among the program managers based at premier administrative, research and health institutions but also with not so well connected but conscious important stakeholders rich in experience, expertise and entrusted professional competence. Hence, a bottom up approach prior to issuance of revised edition of these guidelines would have yielded better fruits for minimizing the disparities, incompleteness and apparent deficiencies; and, therefore only adding few amendments to the first edition may have been conveniently avoided while reshaping its second edition. Answer to excellence lies in thorough review of the provisions of first edition, study of present world scenario in the field of diagnosis and treatment and justified application of multidisciplinary scientific approach for qualitative enhancement in these guidelines.

METHODS

'Guidelines for Diagnosis and Treatment of Malaria in India 2011' (publication: June, 2011) and 'Guidelines for Diagnosis and Treatment of Malaria in India 2009' (publication: April, 2009) were critically studied and analyzed for their contents, quality, comparison, drug dosage schedules, scientific basis, changes, differences, inherent discrepancies, guiding principles and deficiencies for suggestive timely remedial measures.

To ensure the above said purposes, (a) simple statistical analysis for each recommended anti malarial tablet was done against its universally accepted drug dosage schedule prescribed as per body weight in kilogram. Thereafter, a comparison of 'considered weight of patient (in kilogram)' for all the recommended important drugs identified under the said guidelines for Plasmodium vivax and Plasmodium falciparum malaria was done as per standard base drug weight per tablet (in mg). In addition, a comparative study of 'guideline 2011' with 'guideline 2009' was also done. (b) In view of thus made observations and the text information contained therein in the 'guideline 2011', new user friendly simplified and amended tables were developed, for suggested inclusion in the amended 'guideline 2011' or its new edition, aiming at quantitatively enhanced clinical capacity building initiatives.

Based on (a) and (b) above, specific recommendations have been made herein for large scale clinical, program planning and management focused discussions yielding a consensus and evidence based corrective measures cum policy initiatives for ensuring national concerted actions so as to prevent morbidities and mortalities due to malaria through use of simplified and well reasoned self explanatory guidelines.

RESULTS

Although the 'Guidelines for Diagnosis and Treatment of Malaria in India 2011' discuss, in brief, about the present scenario, clinical features, diagnosis, treatment of uncomplicated malaria, treatment failure/drug resistance, treatment of severe malaria and chemoprophylaxis, the following issues need thorough revisit of these guidelines for clarifying the issues, in general, and philosophy of the treatment protocols, in particular:

I. 'Guideline 2011' states that 'no part of this document can be reproduced in any form or by any means without the prior permission of the

Director, National Institute of Malaria Research, Sector 8, Dwarka, New Delhi'. A review for discontinuation of this policy may be appropriate to ensure its uninhibited reprinting and circulation by all the stakeholders working for the diagnosis and treatment of malaria in India.

II. While referring to point number 4.1 of the guidelines, no mention has been made for chloroquine resistant cases of Plasmodium vivax infection who are not suffering from severe malaria.

III. No justification has been mentioned for giving Primaquine on second day of treatment in P. vivax infection.

IV. Global malaria elimination programs are mobilized against *P. falciparum*, most likely because of the greater mortality rates associated with it, and draw resources away from *P. vivax* even though vivax malaria is harder to prevent, diagnose, and treat, and both species are co-endemic [4]. While referring to point number 6.5 (Severe malaria due to P. vivax) of the guidelines, the mention *'severe malaria caused by Plasmodium vivax should be treated like severe Plasmodium falciparum malaria'* has not been clarified since the commonest queries related to the use of Primaquine dose to be necessarily given, surely after due stabilization of the clinical condition in such cases of severe malaria caused by Plasmodium vivax, may go unanswered.

Table 1. Calculation sheet for considered weight of patient for Chloroquine @ 25mg/kg in 'guideline 2011' for various age groups

Age in years	Number of Chloroquine tablets						Total tablets (in numbers)	Total drug base (in mg)	Considered weight of patient (in kg), @ 25 mg/kg Chloroquine base
	Day 1 (10 mg/kg)		Day 2 (10 mg/kg)		Day 3 (5 mg/kg)				
	Tablet (in number)	Drug base (in mg)	Tablet (in number)	Drug base (in mg)	Tablet (in number)	Drug base (in mg)			
<1	½	75	½	75	¼	37.5	1¼	187.5	7.5
1 - 4	1	150	1	150	½	75	2½	375	15
5 - 8	2	300	2	300	1	300	5	750	30
9 - 14	3	450	3	450	1½	450	7½	1125	45
15 and above	4	600	4	600	2	300	10	1500	60

Note: Shaded areas in Table 1 depict the information as given in table 1 titled 'Chloroquine for P. vivax' published in 'guideline 2011'.*

**'guideline 2011', in this article, is abbreviation for 'Guideline for diagnosis and treatment of malaria 2011', whereas by 'guideline 2009' is abbreviation for 'Guideline for diagnosis and treatment of malaria 2009'.*

V. The guideline nowhere states that the prescribed dosage schedule of chloroquine (for 3 days) and primaquine (for 14 days) should be started concurrently.

Table 2. Calculation sheet for considered weight of patient for Primaquine @ 0.25mg/kg in 'guideline 2011' for various age groups

Age in years	Daily dosage (in mg base)	No. of Primaquine tablets (2.5 mg base)	Considered weight of patient (in kg), @ 0.25 mg/kg Primaquine base
<1	Nil	Nil	N.A.
1 – 4	2.5	1	10
5 – 8	5.0	2	20
9 – 14	10.0	4	40
15 and above	15.0	6	60

Note: Shaded areas in Table 2 depict the information as given in table 2 titled 'Primaquine for P. vivax (Daily Dosage for 14 days)' in 'guideline 2011'.*

VI. Calculation sheets for considered weight of patient for Chloroquine @ 25mg/kg (Table 1), Primaquine @ 0.25mg/kg (Table 2), Artesunate Combination Therapy [(i) Artesunate @ 4 mg/kg daily for 3 days; and (ii) Sulphadoxine @ 25mg/kg body weight and Pyrimethamine @ 1.25 mg/kg body weight] (Table 3) for the prescribed drug dosage schedules of various age groups in the 'guideline 2011' are summarized herein through comparative study of 'considered weight of patient' for recommended anti-malarial drugs (Table 4). There is observed range of 'considered weight' for chloroquine, primaquine, artesunate and sulphadoxine-pyrimethamine from 0 to 7.5 kg in <1year, 10 to 20 kg in 1 to 4 year, 20 to 30 kg in 5 to 8 year, 37.5 to 45 kg in 9 to 14 years and 50 to 60 Kg in ≥15 years age group.

VII. A table depicting comparative major changes in the guidelines of year 2009 and 2011 would have clarified many aspects with greater ease for proper and complete understanding and

remembering the 2011 guidelines (Table 5).

The vast majority of people experiencing malaria, those resident in endemic zones, do so repeatedly and very often with the involvement of two or more species and stages of parasite. Silent forms of these infections—asymptomatic and beyond the reach of diagnostics—may accumulate to form substantial and unchallenged reservoirs of infection. In such settings treating only the species and stage of malaria revealed by diagnosis and

Table 3. Calculation sheet for considered weight of patient for ACT† (Artesunate Combination Therapy) in 'guideline 2011' for various age groups

Age in years		Number of tablets					
		1st Day	Considered weight of patient (in kg) for ACT†	2nd Day	Considered weight of patient (in kg) for ACT†	3rd Day	Considered weight of patient (in kg) for ACT†
<1	AS‡ SP§	½ ¼	6.25 5	½ Nil	6.25 Nil	½ Nil	6.25 Nil
1 - 4	AS SP	1 1	12.5 20	1 Nil	12.5 Nil	1 Nil	12.5 Nil
5 - 8	AS SP	2 1½	25 30	2 Nil	25 Nil	2 Nil	25 Nil
9 - 14	AS SP	3 2	37.5 40	3 Nil	37.5 Nil	3 Nil	37.5 Nil
15 and above	AS SP	4 3	50 60	4 Nil	50 Nil	4 Nil	50 Nil

Note: Shaded areas in Table 3 depict the information as given in table 3 titled 'ACT (Aretsunate + SP) dosage schedule for P. falciparum' in 'guideline 2011'. † (i) Artesunate @ 4 mg/Kg daily for 3 days; and (ii) Sulphadoxine @ 25mg/kg body weight and Pyrimethamine @ 1.25 mg/kg body weight; ‡ AS: Artisunate; § SP: Sulphadoxine Pyrimethamine combination.*

not others may not be sensible or appropriate. Developing therapeutic strategies that address all species and stages independently of diagnostic evidence may substantially improve the effectiveness of the control and elimination of endemic malaria [5]. A user friendly table, is being suggested for inclusion in the amended 'guideline 2011' or its new edition, showing the day wise treatment schedule for various malarial infections. It shall give a bird's eye view to the drug scheduling in P. vivax, P. falciparum and Mixed infections (Table 6).

Table 4. Comparative table$^{\Psi}$ depicting unexplained differences in 'considered weight of patient' for various anti-malarial drugs in 'guideline 2011' as per their universally accepted and fixed drug dosage requirements

Drug → Particulars ↓	Chloroquine (CHQ)	Primaquine (PQ)	Artesunate (AS)	Sulphadoxine (S) Pyrimethamine (P)
Standard base drug weight per tablet (in mg)‖	150	2.5 (Pv) ** 7.5 (Pf) ††	50	500 (S) 25 (P)
Standard drug dose (in mg) per kg b.w.¶	25	0.25	4	25 (S) 1.25 (P)
Age ↓	Considered weight of patient (in kg) ↓			
<1	7.5	N.A.	6.25	5
1 – 4	15	10	12.5	20
5 – 8	30	20	25	30
9 – 14	45	40	37.5	40
15 and above	60	60	50	60

*‖ (in mg): in milligram; ¶ Kg b.w.: Kilogram body weight; (Pv)**: Plasmodium vivax; (Pf) ††: Plasmodium falciparum; ‡‡ comparison drawn from considered weight (in Kg) as inferred in Table I, II and III, above.; N.A.:Not Applicable*

VIII. The urgency to identify efficacious drugs and/or new strategies to prevent malaria in pregnancy remains as great as ever [6]. A user friendly table as per text of 'guideline 2011', is being suggested for inclusion in the amended 'guideline 2011' or its new edition,\ showing treatment of malaria in pregnancy (Table 7).

IX. In the same manner as above a user friendly table, is being suggested for inclusion in the amended 'guideline 2011' or its new edition, showing chemoprophylaxis schedules (Table 8).

X. The possible risk of concurrent dengue and malaria infections should always be kept in mind in endemic areas for early diagnosis employing modern technology and prompt and effective treatment to avoid serious complications [7]. Drug interaction studies are urgently required to assess the safety of managing patients with TB and malaria within endemic, resource-poor settings where programmatic management and low-cost monitoring are essential for effective implementation of public health strategies [8]. The 'guideline 2011' doesn't mention about the drug interactions or precautions to be exercised in cases of combination of mixed infections like Malaria and Dengue together/ Malaria treatment in cases already on anti-tubercular treatment (ATT).

XI. The RTS,S/AS01 vaccine provided protection against both clinical and severe malaria in African children [9]. The guideline is surprisingly totally silent about the new perspectives and approaches adopted or being taken up for development of new malaria vaccines.

Table 5. The appreciable changes in 'guideline 2011' from 'guideline 2009'

S.	Particulars	Guideline 2009	Guideline 2011	Observation
1	Basis of guideline	Based on 'National Drug Policy 2008'	Based on 'National Drug Policy 2010'	Timely revision of the guideline is appreciable
2	Main diagnostic criteria	Identifies no role of presumptive and radical treatment, while laying foundation of renewed malaria diagnosis and treatment policy initiatives	While continuing with 'Guideline 2009', this 'Guideline 2011' relies exclusively on 'Microscopy' and 'Rapid Diagnostic Tests'	More scientific approach
3	Treatment of Plasmodium falciparum (Pf)	Categorized as per listed areas (with treatment by ACT 3 days + PQ single dose) and non listed areas (with treatment by CQ 3 days + PQ single dose)	CQ-PQ combination has been abolished for treatment of Pf. Uniform treatment policy of treatment (by ACT 3 days + PQ single dose) adopted	Simplification of treatment schedule has focused on delinking Pf treatment with listed/ non listed area status
4	Treatment of mixed infections	Mixed infections with Pf should be treated as falciparum malaria	Mixed infections with Pf should be treated as falciparum malaria. However, anti-relapse treatment with PQ can be given for 14 days, if required	In mixed infections, importance of anti-relapse treatment (to be decided by clinician) has been stressed.
5	Blister pack availability	-	Details of recently formulated blister packs for different age groups has been given as annexure	Quite useful for understanding of the age group wise available packaged anti-malarial drugs.
6	Treatment failure/drug resistance	Not described	Described in detail mentioning 'Early Treatment Failure' (ETF), 'Late Clinical Failure' (LCF) and 'Late Parasitological Failure (LPF)	Very useful for better clinical decision making related to the critical issues of case management
7	Characteristics of 'Severe Malaria'			
a	Circulatory shock	Sys BP <80 mm Hg, <70 mm Hg in children	Sys BP <80 mm Hg, <50 mm Hg in children	Criteria changed for children
b	Hyperthermia	> 104^0F	>106^0F	2^0F higher temperature now being considered
c	Hyperparasitaemia	<5% parasitized RBCs in low endemic and >10% in hyper endemic area	>5% parasitized RBCs	Uniformity in criteria brought in; differentiation between low and hyper endemic area abolished

Shaded area of this user friendly table, is suggested for inclusion in the amended 'guideline 2011' or its new edition, showing the changes in 'guideline 2011' from 'guideline 2009'

XII. It has been observed from one of the commercially available retail packaged chloroquine drug that even the chloroquine strip (as DS – Double Strength packs containing 5 tablets in each strip)

manufactured in year 2012 is showing the printed schedule of the drug dosage as first dose being 2 tablets of 500 mg Chloroquine Phosphate, followed by 1 tablet after 6 hours (on Day 1), 1 tablet 24 hours after the 1st dose (Day 2) and again 1 tablet 48 hours after the first dose. This dosage schedule has been changed with the introduction of 'Guidelines for Diagnosis and Treatment of Malaria in India 2011', but the norms set in the new guidelines require wider circulation, which state to prescribe chloroquine dosages as 4 tablets (250 mg each) or 2 tablets double strength (500 mg each) on Day 1, 4 tablets (250 mg each) or 2 tablets double strength (500 mg each) on Day 2 and 2 tablets (250 mg each) or 1 tablets double strength (500 mg each) on Day 3.

DISCUSSION

National guidelines are national guidelines and should not be limited or prohibited by any instructions, whatsoever, for its use, dissemination or reproduction in any form or by any means. No rules, regulations or precedence should come in the way of uninhibited diagnosis, treatment and control of malaria. Unhindered dissemination of 'guideline 2011' should not be denied despite of having legitimate copyrights of the developed guidelines by any agency/program in the national interest and for serving its purpose in word and spirit.

Although the 'guideline 2011' mentions in point number 5 that the treatment failure with choloroquine in Plasmodium vivax malaria is rare in India, a line or two about the treatment option is such cases may be discussed therein.

It would have been better if a clinical justification of giving Primaquine on the second day (and not on the first/third day) would have been mentioned in point number 4.2 (Treatment of P. falciparum malaria) of the guidelines. The treating physician, if made aware of scientific basis of the treatment, naturally becomes more confident in his prescription writing.

The guideline should also provide justified clarification for the need, dosage, timing and schedule of Primaquine in cases of severe malaria in *P. vivax* cases, which is recommended vide 'guideline 2011' to be treated like severe Plasmodium falciparum malaria.

Not mentioning the timing of the first dose of Primaquine in P. vivax cases, the guideline leaves ground for confusion among the practitioners. Some may think of starting the primaquine only after completion of the dosage schedule of chloroquine i.e. starting Primaquine from the 4th day of treatment.

A statistical matching is a must between the drug dosage schedules recommended for pre identified age groups against the universally accepted and practiced norms of drug requirements per kilogram of body weight; or else some pharmacologically justified and universally acceptable explanation should be mentioned within the published guideline itself to avoid confusion and discrepancies. (Table 4) Comparison of major changes in the 'guideline 2009' and 'guideline 2011' shall be helpful to readers for better, proper and complete understanding of the 'guideline 2011'. A suggestive table is given herein. (Table 5) The suggested table mentioning 'drug scheduling in P. vivax, P. falciparum and Mixed infections' may be considered for publication in revised 'guideline 2011'or its new edition (Table 6).

Table 6. New user friendly table, suggested for inclusion in the amended 'guideline 2011' or its new edition, showing the day wise treatment schedule for various malarial infections

Day	Plasmodium vivax (Pv)	Plasmodium falciparum (Pf)	Mixed infections
1	CHQ + PQ	AS + SP	AS + SP + PQ*
2	CHQ + PQ	AS + PQ	AS + PQ
3	CHQ + PQ	AS	AS + PQ*
4	PQ		PQ*
5	PQ		PQ*
6	PQ		PQ*
7	PQ		PQ*
8	PQ		PQ*
9	PQ		PQ*
10	PQ		PQ*
11	PQ		PQ*
12	PQ		PQ*
13	PQ		PQ*
14	PQ		PQ*

PQ : Primaquine to be given, if indicated; CHQ: Chloroquine; PQ: Primaquine; AS: Artisunate; SP: Sulphadoxine Pyrimethamine combination*

The suggested table mentioning 'treatment of malaria in pregnancy' may be considered for publication in revised 'guideline 2011'or its new edition. (Table 7)

Table 7. New user friendly table, suggested for inclusion in the amended 'guideline 2011' or its new edition, showing treatment of malaria in pregnancy

Type of malaria → Pregnancy ↓	Plasmodium vivax (Pv)	Plasmodium falciparum (Pf)
First trimester	CHQ	QU
Second trimester	CHQ	ACT (AS + SP)
Third trimester	CHQ	ACT (AS + SP)

CHQ: Chloroquine; QU: Quinine; ACT: Artesunate combination therapy; AS: Artisunate; SP: Sulphadoxine Pyrimethamine combination

The suggested table mentioning 'chemoprophylaxis schedules' may be considered for publication in revised 'guideline 2011'or its new edition (Table 8).

Table 8. New user friendly table, suggested for inclusion in the amended 'guideline 2011' or its new edition, showing chemoprophylaxis schedules

Chemoprophylaxis options → Criteria and drug usage ↓	**Short term chemoprophylaxis**	**Long term chemoprophylaxis**
Duration of visit	< 6 weeks	>6 weeks
Drug of choice	Doxycycline (DXY)	Mefloquine (MFQ)
Dosage for adults	100 mg/day	Upto 250 mg/week
Dosage for children < 8 years	1.5 mg/kg body weight	5 mg/kg body weight
Drug Administration	2 days before travel + During travel + 4 weeks after leaving malarious area	2 weeks before travel + During travel + 4 weeks after leaving malarious area
Contraindications	▪ Pregnant women ▪ Lactating women ▪ Children < 8 years	▪ Convulsions ▪ Neuropsychiatric problems ▪ Cardiac conditions

The guideline need to inform about the use of anti malarials in mixed infections of 'Malaria and Dengue' as well as in persons on 'anti-tubercular treatment' (with or without HIV infection) and such combination of other clinical situations. The ray of hope generated by the largest malaria vaccine trial (prime boost immunization in RTS, S phase III trial) [9] for the malaria vaccine developed by Glaxo Smithkline, (which may come in year 2015, if the efficiency, duration and safety of this vaccine is judged to be satisfactory) may have been mentioned therein to make the program implementers and beneficiaries aware about the recent research works having the potential of long term scenario change in prevalence of malaria cases around the world, especially in Asia and Africa. The Drug Controller of India and the subsidiary organizations in States may like to instruct drug manufacturers to mention the correct dosage schedule (as per 'guideline 2011' or its suggested new version), if drug manufacturers continue to print the dosage schedule on the packaging of the chloroquine tablets. Otherwise, the old treatment schedule still being found printed on the label of commercially available double strength chloroquine shall continue to confuse people about the correct dosage of the drug to be taken for *P. vivax* infection.

Table 9. New user friendly table, suggested for inclusion in the amended 'guideline 2011' or its new edition, showing types of treatment failure/drug resistance

Type → Day↓	**Early Treatment Failure (ETF)**			**Late Clinical Failure (LCF)**			**Day**	**Late Parasitological Failure (LPF)**		
	Danger signs/ Severe Malaria	Parasitaemia	Axilla Temp	Danger signs/Severe Malaria	Parasitaemia	Axilla Temp		Danger signs/ Severe Malaria	Parasitaemia	Axilla Temp
Day 1	√	+	N/+	Nil	Nil	Nil	1	Nil	Nil	Nil
Day 2	√		N/+	Nil	Nil	Nil	2	Nil	Nil	Nil
Day 3	√	+/++	>37.5^0 C	Nil	Nil	Nil	3	Nil	Nil	Nil
Any day between day 4 and day 28 (max. up to 42 days)				√	+	N/+	4 to 6	Nil	Nil	Nil
				Nil	+	>37.5^0 C	7 to 28	Nil	+	<37.5^{0}C

√ : 'presence'; + : 'observed presence'; ++ : 'higher concentration of observed presence'; N : 'normal'; axilla temp: 'axillary temperature'

Tabular comparison of treatment failure/drug resistance [early treatment failure (ETF), late clinical failure (LCF) and late parasitological failure (LPF)] etc would be highly beneficial for proper categorization of such cases and information sharing among the peers.

A suggested comparison table is given herein (Table 9),

Some graphics may enhance the understanding of 'guidelines 2011', for example the graphical presentation of life cycle of malaria parasite with prominently highlighted intervention levels of individual drugs. There have been observations that CQ is no longer appropriate by itself or in combination. These findings influenced the replacement of CQ with SP+AS for first-line treatment of uncomplicated falciparum malaria in the WHO Eastern Mediterranean Region [10]. Therefore, re-evaluation of the chloroquine usage in the national guidelines may again be looked into. The recommendations derived from logically and geographically planned nation- wide consultative workshops involving stakeholders from a spectrum of health care providers, including but not limited to those from 'tertiary-secondary-primary' health care axis and 'government-semigovernment-private' teaching, training, medical care and research institutions, will enrich the guidelines through incorporation of thoughtfully devised and carefully noted observations and suggestions.

There is urgent requirement of adequate information dissemination and training based on 'guideline 2011' among health care providers of all levels, competence and inherent limitations so as to build their diagnosis and treatment capabilities. Therefore, vigorous efforts are required by national health planning and implementation agencies for translation of 'guidelines 2011' into action.

Confirmed malaria cases in Bhutan have declined by 98.7% from 1994 to 2010. The majority of indigenous cases were due to Plasmodium vivax (59.9%) and adult males are most at-risk of malaria. Access to malaria diagnosis in treatment was expanded throughout the country and evidence-based case management, including the introduction of artemisinin-based combination therapy (ACT) for *P. falciparum*, increasing coverage of high risk areas with Indoor Residual Spraying, insecticide-treated bed nets, and long-lasting insecticidal nets are likely to have contributed to the decline alongside enabling factors such as economic development and increasing access to health services [11]. We need to learn from the best practices example set in by Bhutan, our neighboring country – a proponent of 'Happiness Index', towards elimination of malaria for alleviating sufferings of malaria infected and affected families.

Limitations of the study

Each point of concern and suggested amendments for the 'Guidelines for Diagnosis and Treatment of Malaria in India 2011', as mentioned in this study, must be rigorously examined through a wide scale multi-disciplinary consultative process essentially involving but not limited to the policy makers, health administrators, malariologists, pharmacologists, community medicine experts, general medicine experts, international and national public health interventionists, field personnel, consultants etc. This shall not only ensure the desired qualitative enhancement, clarity and user friendliness of these guidelines in best interest of the patients of malaria in India, but may also get highly enriched through the fresh and all inclusive contributions made by the spectrum of varied experienced and expert stakeholders.

CONCLUSIONS

Since National Vector Borne Disease Control Program (NVBDCP) and National Institute of Malaria Research (NIMR) are contributing for excellence in information, education, communication, prevention, training, treatment, capacity building, control, research and inter agency dialogue for comprehensive, result oriented, modernized cum evidence based actions, it would be highly appreciable if the 'Guidelines for Diagnosis and Treatment of Malaria in India 2011', are made clearer, all inclusive and user friendly.

The observations and recommendations made in this article may be considered as a trigger point for thorough discussion on 'guideline 2011' by learned clinicians, pharmacologists, public health specialist, program managers and other health care service providers. It is sure that the country shall benefit with rich dividends through such efforts in terms of achieving the Millennium Development Goal for fulfillment of world health priorities, in general and improvement of country's health scenario, in particular.

Conflicts of interest

None of the authors have any conflicts of interest.

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