breeding sites are few and easily destroyed.Mobilising communities to clean up their compounds may be justified on public health grounds BUT not specifically for malaria control.

- The cutting of vegetation around houses has no impact on malaria and there is published evidence dating back over years (Ribbands, 1946) to support this. Once again, some may feel that there is public health justification for promoting this behaviour to communities (e.g. reduce the proximity of snakes to houses) but it is important to understand that malaria transmission willremain entirely unaffected by such behaviour.

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Availability and use of sulphadoxine-pyrimethamine (SP) in pregnancy in Blantyre District

A Safe Motherhood and BIMI Joint Survey

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Introduction

In Africa over 24 million pregnancies every year are affected by malaria, with less than 5% of pregnant women able to access treatment or effective interventions (USAID). The Malawi National Malaria Control Programme established by the Ministry of Health and Population (MOHP) implemented a policy that all pregnant women should receive two doses of sulphadoxine-pyrimethamine (SP). This has become known as the intermittent presumptive treatment with SP (IPT-SP) policy. According to the guidelines, the first dose should be given *"during the first antenatal visit occurring after the first trimester of pregnancy is complete"*, and the second dose *"at the beginning of the third trimester (between 28 and 34 weeks)"* (MOHP, 1997).

Several studies have been conducted in Malawi to determine the proportion of women receiving IPT-SP according to the policy guidelines. In Blantyre a random sample of 1,080 households yielded 391 recently pregnant women, of whom 76% had taken their first dose of IPT-SP, but only 37% the second dose. This low administration of two doses of IPT-SP occurred despite 88% of women reporting attendance at two or more ANC visits during their pregnancy, and 87% reporting their first visit attendance during the first or second trimester of pregnancy (Holtz et al, 2000). Many of the women interviewed knew of the dangers of malaria in pregnancy and of the importance and benefits of taking SP. A second facility-based research at the Queen Elizabeth Central Hospital in Blantyre (Ngoma, 1999) demonstrated lower proportions of SP use: 51% of women received 1 dose, 14% received 2 doses, and 35% received no SP (n=301). Potential reasons provided by the author for the low uptake of SP were: inadequate drug availability, late presentation of women for ANC visits, certain cultural beliefs, and clinic staff not following the malaria policy guidelines accurately. We conducted a survey between May 21st and July 18th 2001 in Southern Malawi, in order to determine the level of implementation of the national IPT-SP policy and to explore factors affecting that implementation.

Methods

We visited 19 health centres in Blantyre District, where routine antenatal clinics are conducted. We interviewed all health personnel (n=41) available on the day of the survey, using a topic guide. We interviewed antenatal mothers (n=287) using a separate topic guide and we checked their antenatal cards against their verbal responses. We explored the availability of SP by checking pharmacy stocks and using a simple calculation: this predicted drug requirements according to the patient load expected before the date of the next delivery of drugs. We compared drugs needed against the stock actually available.

We entered quantitative data into EPI-Info 2000 for later analysis by a statistician. Qualitative data were collected, transcribed and grouped into the following themes: health personnel's knowledge regarding timing of SP, ANC women's perceptions, beliefs and knowledge regarding the benefits of taking SP, drug availability, compliance, and directly observed therapy (DOT).

Results

General Study Characteristics:

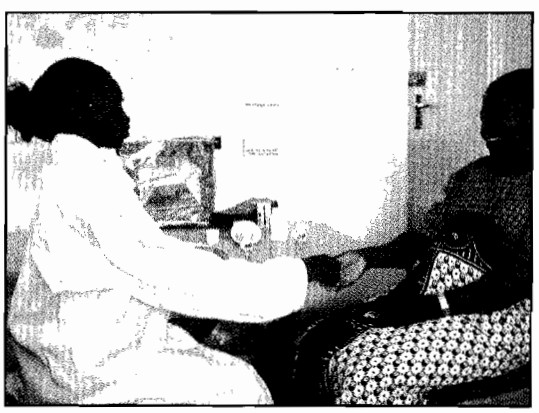
■ Number of ANC attendees	287
■ Number of primagravidae	89
■ Mean gravidity	2.64
■ Mean gest. age at 1st ANC visit	21.6 wks
■ Mean number of ANC visits	4.5

SP availability

- 95% of health centres in Blantyre had adequate stocks of SP; while 79% had enough to treat all antenatal women prophylatically plus extra supplies for treatment of suspected malaria in febrile antenatal women. [Central Medical Stores has since stated that there have been severe shortages of SP since this study was done]
- Of the 41 health personnel interviewed, only 2 said there had been SP shortages over the preceding 6 months.

Compliance

- The majority of ANC women had received their first IPT-SP dose (see figure). Uptake of the second dose was significantly less ($p<0.005$).



- The ANC fee at CHAM facilities varies (between 75MK to 500MK). This fee only entitles a woman to receive the first dose of ITP-SP – she will have to pay separately for the second

dose. This could contribute to the very low second SP administration (17%) in these facilities.
- There was no association between gravidity and the number of SP doses taken.
- 12% of the primagravidae did not receive any IPT-SP.

Health Staff

General Knowledge from ANC nurses' interviews

- ANC nurses had good knowledge of the need for pregnant women to receive two SP doses during pregnancy.
- Medical assistants had good knowledge of the need for SP in pregnancy but many were unsure of the number of doses needed, when and how to give the drug.
- Most personnel knew that SP is given for the prevention of malaria, abortion and premature labour. There was some confusion whether the premature labour and abortion was an effect of malaria or something that SP could prevent aside from malaria. It took some time to clarify this issue and this was reflected in answers from women in the ANC clinic.
- There was much confusion over the timing of SP and the reasons why SP should not be given before 20 weeks or after 34 weeks gestation.
- The National Malaria Guidelines (1997) were found to be unclear by a majority of staff. The use of trimesters confused many midwives who were unable to accurately state in which week the second trimester starts. The guidelines state that the 2nd IPT-SP dose should be given between 28 and 34 weeks. Many staff interpreted this literally, to mean that a patient attending for the first time after 28 weeks should not be given any dose at all, since she has missed her first dose, and therefore could not be given a 'second' dose.

Staff's perceived barriers to women receiving their second dose of SP IPT

- Women come in too late
- Women can't take SP on empty stomachs!
- Women get dizzy when they take SP
- Women hate the taste
- Some women deliver prematurely and do not present in time for their second dose
- Women don't feel sick so don't see the need to take any medicine
- Lack of SP in the ANC stores
- Lack of DOT results in women not taking the prescribed SP dose
- Staff are too busy to prescribe SP

- Most health staff felt that the explanation for the lower second dose of SP was explained by the late presentation of the antenatal women. However, quantitative data contradict this, as the first mean ANC visit is at 21.6 weeks gestation, and theoretically as many as 4 doses could be given to most women before 34 weeks gestation.
- One nurse said most of the midwives concentrate only on administering the first SP dose and forget the second one. Also complaints of critical staff shortages were lodged, contributing to the difficulties in administering SP to antenatal women.

Timing of SP Doses

From ANC Cards

- The mean timing of the first SP dose was at 22.8 weeks of gestation; and the second SP dose was 31.1 weeks gestation.
- There was a strong association between first SP dose and timing of first ANC visit.
- There was an equally strong association between timing of second SP dose and the second ANC visit.
- According to ANC cards, 20% of clients received an SP dose at the incorrect time (13% before 16 weeks when the patient was unlikely to have felt any fetal movement; and 7% after 34 weeks).
- There was general confusion among many staff interviewed over the spacing of drugs and timing for last dose, which contributes to low uptake of the 2nd IPT-SP dose.
- One key informant had given a dose of SP to a woman of 15 weeks gestation who came back the same night with a spontaneous abortion which she attributed to the early dose of SP.
- Some staff had very low knowledge regarding timing of SP and 2 out of 3 staff could not correctly determine trimesters. Even under observation following the staff interviews during which expectations and appropriate procedures were explained, women who were due their 2nd IPT-SP dose left the consultation room empty-handed, despite the availability of the SP already sorted into envelopes. No DOT was performed at this clinic and staff were unaware of the need to conduct DOT or of the National Malaria Guidelines.

ANC Records

- Often the ANC card recording of SP IPT administration and the verbal description given by the client differed. There were some inaccuracies on the cards as to when women had been given SP and when they reported having taken it. For example, one women had SP recorded on her card but when asked she had not taken it that day, but the week before.
- The second SP dose is often withheld, as the midwife does not check the ANC cards properly and often miscounts the weeks, and mistakenly calculates that it is too soon for the second dose. One nurse explained that certain well-informed patients are aware of the need for 2 doses of SP and sometimes ask for the missed dose but this angers the nurses who then refuse to supply the drug.

Drug Ordering

- Many staff said they were restricted in ordering adequate amounts of SP for IPT use because the standardised drug order form stipulates a maximum amount of SP that cannot be exceeded, regardless of individual clinic's needs.
- Staff say they are not ordering based on need or use but simply receive a routine order despite its' inappropriateness for their patient/case load and diagnosis.

Directly Observed Therapy (DOT)

- Just over half the antenatal women surveyed (56.4%) said they were observed taking SP at the clinic; 26.5% said they took it at home; and the remainder were unsure.
- The majority of health personnel interviewed were aware of the need to conduct DOT but some lacked amenities (e.g. cups or sinks); while others claimed staff shortages proved a major barrier.
- Those ANC attendees who took SP under observation were more likely to receive both SP doses (p=0.005).
- Many staff and some patients believed SP should be taken on a full stomach which is not the case, which meant most staff considered their clients ineligible for DOT.

ANC clients' knowledge and beliefs

- Only half the women correctly identified the main reasons/ benefits for taking SP IPT.

- In well-run health centres, many women correctly stated that the SP was given to prevent and treat malaria in pregnancy. One woman thought it was to prevent malaria in the unborn child but was unaware of the potential hazards of the illness to herself, and two women thought that SP could also prevent abortion and premature labour (but not that these were a result of malaria). Other women stated that it prevented abortion and premature labour because it prevented malaria and malaria causes them.
- Many women when asked directly what they thought of having to take SP said that they had no problems with it and did not mind taking it, as it would help them stay strong.
- Four women reported side effects from taking SP in the form of nausea or rashes:
- Staff recognize that clients' beliefs can affect the taking of SP.

"Many women fear SP, as they say it causes dizziness and they cannot then walk home...we tell them to rest here awhile but although some take it, still others refuse!"
Enrolled nurse-midwife

"Women are afraid of SP, and we have scandals despite our being observant. They put it in their bag or even the top of their dress when they think we are not watching"
Community health nurse

"Most people fear SP for its side effects: dizziness, more sickness than before, vomiting. Most say the dizziness. Some say it causes abortions and some fear the rashes. Some like it and others don't. Usually the less educated fear it the most!"
ANC client

- Some women refuse the dose because they have heard from elders that it can cause abortion or deformities in their unborn baby.
- One primagravida refused to take SP on religious grounds.

Discussion

We found that a majority of ANC attendees currently received their first dose of IPT-SP. Like other investigstors in Malawi, we have demonstrated a much lower uptake of the second IPT-SP dose. The main reasons put forward to account for this are: lack of drugs, shortage of staff, ANC attendees presenting late for their first visit, and women refusing to take SP on an empty stomach. However these reasons are unconvincing, as they should also apply to the first dose, yet we found very good uptake of the first dose. We found that 95% of the clinics had adequate supplies, and that even some clinics that were very short-staffed were still managing to perform DOT and successfully administer SP. The mean gestational age at which women made their first ANC visit was 21.6 weeks, implying that most women do attend in time to receive two or more SP doses. Some ANC attendees said that they sometimes felt dizzy and wanted to wait until after breakfast before taking the SP, but the vast majority stated they had no problems taking the drug.

Many problems were revealed when we looked into the health personnel's interpretation of the National Malaria Guidelines. Most clinic staff appeared knowledgeable about the benefits of SP for pregnant women, and very clear on when to administer the first IPT-SP dose, but they were much less clear on when to give the second dose. Problems with correct identification of trimesters, accurate counting and recording, and confusion over what happens when the first SP dose is given late were key barriers. Many were unaware of the time interval required between SP doses and thought it was much longer than 4 weeks, resulting in a reluctance to administer the second IPT-SP dose.

Twelve percent of primagravidae, one of the most vulnerable groups, failed to receive a single IPT-SP dose. When this was discussed with staff, some said that cultural barriers prohibit primagravidae from attending ANC visits in time to receive a dose of SP. This study did not show this to be the case. Further studies could explore in more detail the problems with primagravidae accessing SP.

CHAM facilities provide an important service to many Malawians. The current ANC package on offer in many centres fails to include the second IPT-SP dose, resulting in a much lower second dose uptake in these centres (17% versus the government's 40% uptake of SP 2). In some areas, health personnel fail to mention the need for a second SP dose to women presenting for repeat ANC visits because they think the women cannot afford to pay for it.

Data from this study suggest that when DOT is conducted effectively by skilled staff with a clear understanding of the Guidelines, it is feasible to provide two doses of IPT-SP to a vast majority of ANC attendees.

Recommendations

Since conducting the above study, we have used various methods to address the problems we encountered. We recommend the following approaches toward improving the correct application of IPT-SP policy:

1. Tailored Feedback to Clinics

Staff can be encouraged to change their practices through discussion of their own observed habits and through the suggestion and demonstration of alternative methods - e.g. showing how DOT could take place given the resources and infrastructure of a particular clinic. This type of focussed peer feedback has been shown to be more effective than 'blanket' messages.

2. Communication Materials

- **For staff in health centres, provide:**
  - Fact sheets and posters detailing the correct doses and timing of SP and iron for pregnant women, and the rea sons why timings should be as stated.
  - Gestational calendars highlighting in red those weeks when women can receive SP
- **For women attending ANCs**, exhibit posters explaining the reasons why SP and iron are important in pregnancy, and the need to comply with the doses [this can be combined with urging people to buy and use insecticide-treated bednets].
- **Radio spots** have been aired to address the importance of taking IPT-SP while pregnant, using humorous skits to convey simple messages.

3. For CHAM units:

Most CHAM institutions include the cost of the first dose of SP in the antenatal package but not the second dose, and iron is often not part of the package. Inclusion of these items in the antenatal package would have a minimal impact on the price.

4. National Guidelines

The national guidelines on the management of malaria (1997) are accurate, but many staff currently misinterprets the wording. These guidelines should be reviewed and clarifications made regarding dosing and timing of SP. The wording could be improved to make it clear that:

- One dose, even if late, is better than none, and the 'second dose' can be given to a woman who missed the first
- A minimum of 2 doses should be given
- The interval between doses can be as little as 4 weeks
- Monthly SP dosing after quickening should be considered
- SP should not routinely be given before quickening although it is not a disaster if it is administered in error

5. Drug Supply

Despite concerns expressed by ANC nurses regarding the frequent shortages of SP for IPT, at the time the study was conducted drug shortages were only reported in one health centre. For that facility, shortages were due to discrepancies in ordering (the client numbers had increased but the drug order had remained the same) and these issues were addressed during the feedback sessions. Some health personnel claimed to experience drug shortages in their ANC clinics, but when probed it was revealed that SP was stored in the Outpatients Department and was easily accessible. Since the time of the study, SP shortages have been documented in a number of health centres in the Southern Region and further collaboration with the Central Medical Stores and District Pharmacists is recommended.

The way forward

A change in the national IPT-SP policy is being considered, by which SP will be offered monthly between 20 and 34 weeks of pregnancy. We plan a pilot study to assess this regimen: if successful, the new regimen may be extended to the rest of the country, with the aim of lowering the burden of malarial disease in this vulnerable population. Meanwhile, we hope that the recommendations arising from the study described above may help ante-natal clinics to implement the current national policy as fully as possible.

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The pattern of bacteraemia in children with severe malaria

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Abstract

Bacteraemia is a recognised complication of severe malaria and may increase mortality. We determined 1) the rate and pattern of bacteraemia in children with severe malaria; 2) the impact of bacteraemia on case-fatality rate; and 3) the rate and pattern of bacteraemia in following blood transfusion for severe malarial anaemia. For the first two objectives, a prospective study was undertaken involving children admitted consecutively to the Malaria Research Project ward between February 1996 and June 1999. Blood culture was performed on admission. Independent associations with bacteraemia and mortality were determined by logistic regression. Of 701 children with a final diagnosis of severe malaria, 36 (5.1%) had bacteraemia. A wide range of bacteria was isolated and the commonest was non-typhoidal *Salmonella* (NTS: n=18 or 50% of all isolates). The rate of bacteraemia was significantly higher in children with severe malarial anaemia without coma (11.2%) than in children with cerebral malaria without anaemia (3.2%) and this was due to the significant association of NTS bacteraemia with severe malarial anaemia (p<0.001). The overall case-fatality rate was 15% and was higher in children with bacteraemia (22%) but this difference was not significant. For the third objective, data were collected retrospectively of all children who received a blood transfusion in the paediatric department from March 1996 until May 1997 inclusive. A total of 1712 children received a blood transfusion. Of these, 243 (14.2%) had a blood culture taken for the investigation of fever following transfusion; a pathogen was grown from 60 (24.7%). NTS bacteraemia accounted for 76.3% of all bacteraemia cases. NTS bacteraemia is a common complication of severe malarial anaemia.

Introduction

It has been recognised for a long time that malaria may be complicated by bacteraemia due to *Salmonella*, and it was also noted thirty years ago in Nigerian children that "the development of fever after transfusion is a useful diagnostic pointer to the enteric fever" due to *Salmonella* species.[1,2] However, only recently have prospective studies reported the incidence and aetiology of bacteraemia in large numbers of children with severe malaria.[3,4] Bacteraemia rates in these two studies were 5% and 7.8%, infections were due to a diversity of organisms and, in the study of Kenyan children,[4] bacteraemia was associated with a threefold risk of death. There has been no study of the causes of bacteraemia in African children who develop fever following transfusion.

Non-typhoidal *Salmonella* (NTS) is the commonest cause of childhood bacteraemia in studies from tropical Africa, including Malawi.[5-8] Malaria parasitaemia or severe anaemia are significantly more common in children with NTS bacteraemia compared to other causes of bacteraemia such as *Streptococcus pneumoniae*.[5,6,9] It was surprising therefore that NTS bacteraemia was uncommon in the prospective studies of children with severe malaria from the Gambia and Kenya. However, these studies mostly included children with cerebral malaria.[3,4]