A cost comparison of approaches to sexually transmitted disease treatment in Malawi

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Since syndromic management of STDs requires treatment with at least two antibiotics per patient, one of the concerns raised by adoption of the syndromic approach is the cost of drugs, especially for developing countries with limited drug budgets. The objective of the current study is to compare the cost-effectiveness of syndromic management to current national practice for the management of STDs in Malawi.

The actual cost of observed antibiotic treatment for 144 patients receiving same day treatment for two STD syndromes in Malawi was determined using prices from the Malawi government supply catalogue. This was then compared to the calculated cost of treatment had the same patients been managed syndromically according to national guidelines. The cost of drug treatment under current practice was similar to the cost of syndromic treatment. However, at least one-third of observed patients did not receive effective treatment for either likely cause of their STD syndrome and wastage accounted for 54% of total observed drug cost.

Overall, syndromic management of STDs in Malawi would result in more effective treatment of STDs at no additional cost. Since the indirect costs of low treatment efficacy were not taken into account in this analysis, a net saving is likely to be realized with the adoption of syndromic management.

Introduction

Effective and early sexually transmitted disease (STD) treatment has become a priority in HIV prevention programmes worldwide since it has been shown that sexually transmitted infections facilitate the sexual transmission of HIV. A recent community-based trial in rural Tanzania further demonstrated that improved STD case management results in a striking reduction of HIV incidence.

Malawi has both high HIV and STD rates. National AIDS Control Programme surveillance indicates an HIV prevalence among urban antenatal women ranging from 23–32% and a syphilis seroprevalence of 1–8%. In 1989, 42% of urban antenatal clinic attenders were diagnosed with at least one STD. Rates of HIV infection among STD patients range from 53–83%. As part of a national STD control programme, Malawi has developed new STD treatment guidelines based on clinical antibiotic efficacy studies and the syndromic approach to STD case management as recommended by the World Health Organization (WHO). At the time of this survey, no training in syndromic management had yet been carried out although the guidelines had been distributed to all health care providers nationwide.

One of the major concerns raised by the adoption of the syndromic management of STDs is the cost of drugs. In the syndromic approach, each STD syndrome is treated with at least two antibiotics for the most frequent causative organisms. In many cases where a single organism is responsible for the presenting signs and symptoms, one drug is required.
for a clinical cure and the other is not. A decision tree analysis carried out by WHO indicated that when considering only the cost of drugs, syndromic diagnosis is 50–100% more expensive per patient cured than when making a diagnosis based on clinical impression with or without laboratory confirmation.16

However, clinical diagnosis has been shown to be unacceptably inaccurate, even in the hands of STD specialists,17,18,19 and laboratory diagnosis is not feasible in a setting of chronic shortages of staff and reagents. Nevertheless, policy-makers may feel some resistance to the higher drug cost per patient cured associated with syndromic management in comparison to the etiology-specific treatment of correctly diagnosed cases. In a setting of limited resources and chronic drug shortages, the immediate policy question is whether the overall drug cost of syndromic management is higher than for current practice management of STD patients. This paper does not suggest that this consideration should replace longer-term and more comprehensive arguments of the overall improved cost-effectiveness of syndromic management.16 However, it does attempt to answer the question of whether or not syndromic management of STDs increases the total amount spent on drugs, even in the short-term. Other published studies have considered the cost and efficacy of STD case management,20,21 but to date, there are no published studies comparing the treatment cost of syndromic management to usual national practice.

Methods

Data on drug prescription practices in STD patients were obtained as part of a nationwide survey to establish a baseline for WHO/Glbal Programme on AIDS (GPA) prevention indicators PI-6 (% of selected STD patients managed appropriately according to national guidelines) and PI-7 (% of selected STD patients receiving advice on condom use and partner notification).22 The study design was based on a WHO protocol23 and a detailed description has been published elsewhere.24

Health care providers were observed at randomly chosen clinics and hospitals throughout Malawi, including those operated by the Ministry of Health and Population, religious organizations, and the commercial sector. Due to programmatic considerations, projected STD treatment pilot sites for the National AIDS Control Programme (four hospitals and one health centre) were forced into the study and it was predetermined that seven clinics would be randomly selected from the commercial sector. In order to observe the required number of study subjects within a reasonable period of time, only larger health centres were considered in the randomization. Observations were limited to initial visits for two STD syndromes: genital ulcers (both male and female patients) and urethral discharge (males only). A minimum of two and maximum of ten cases were observed per provider over a period of one to three days. Information was collected on presenting symptoms, drug therapy and laboratory investigations.

Correct antibiotic treatment using syndromic management was defined as following the Malawi national guidelines in both choice of drugs and dosages (Table 1)12,15 Alternative effective therapy was determined according to WHO recommendations25 and antibiotic efficacy studies previously carried out in Malawi.10,11

Data were entered into Epi Info and analyzed in STATA.26,27 Additional cost calculations were carried out using Excel spreadsheets.

Results

Fifty-four providers were observed managing 150 STD patients presenting with urethral discharge or genital ulcers at 39 health care facilities nationwide (25 hospitals, 14 health centres, and 7 commercial sector clinics). Seventy-one per cent of observed patient-provider encounters were conducted by medical assistants (three-year certificate programme), 17% by clinical officers (four-year diploma programme) and 13% by nurses (three-year certificate or four-year diploma programme). During the period of observation, a tally of all new STD patient consultations was kept at each facility visited. Fifty-one per cent of STD patients were eligible for the study as patients presenting with genital ulcers accounted for 29% and patients with urethral discharge accounted for 22%. Other presenting STD syndromes included vaginal discharge (16%), pelvic inflammatory disease (11%), inguinal bubo (9%), genital warts (7%), and scrotal swelling (3%).

Treatment was prescribed at the first visit for 144 patients. The six patients who did not receive treatment at the first visit were excluded in the analysis. Three of those patients presented with urethral discharge and three were women presenting with genital ulcers. The reasons given for no treatment
Table 1. National STD treatment recommendations in Malawi and associated cost in US dollars.

<table>
<thead>
<tr>
<th>Syndrome</th>
<th>Treatment*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genital ulcer disease (GUD)</td>
<td>Syphilis: benzathine penicillin 2.4 MU IM single dose (US$0.67) &amp; Chancroid: erythromycin 250 mg every 8 hours × 5 days (US$0.56)</td>
</tr>
<tr>
<td>Urethral discharge (UD)</td>
<td>Gonorrhea: gentamicin 240 mg IM single dose (US$0.55) &amp; Nongonococcal urethritis: doxycycline 100 mg every 12 hours for 7 days (US$0.23)</td>
</tr>
</tbody>
</table>

* Cost of treatment includes needle and syringe (US$0.07) where applicable.

Details of observed patient management are presented elsewhere. In the 144 patient-provider encounters considered here, 13% (19/144) of STD cases were treated syndromically, with exact drugs and dosages according to the Malawi Standard Treatment Guidelines (MSTG) as outlined in Table 1. Another 56% (80/144) received effective treatment for one disease in the syndrome. The remaining 31% (45/144) received ineffective treatment for any disease in the syndrome.

The average number of drugs prescribed per patient was 1.5. Overall, 47% (67/144) of patients received one drug, 52% (75/144) received two drugs, and 1% (2/144) received three drugs. Neither of the patients receiving three-drug therapy presented with more than one syndrome. The five most common drugs prescribed were: doxycycline (53% of patients), benzathine penicillin (35%), gentamicin (26%), trimethoprimsulfamethoxazole (19%), and erythromycin (12%).

Cost of current STD treatment

Based on the April 1995 Malawi government supply catalogue, the theoretical average cost per case following national guidelines is US$0.78 for urethral discharge and US$1.23 for genital ulcers. The actual cost of treatment for the 144 observed patients is shown in Table 2.

Figure 1 shows a comparison of the total cost of observed treatments to the calculated cost of syndromic treatment according to national guidelines of the same 144 STD patients. Although syndromic treatment costs would be approximately the same as

Table 2. Cost (in US$) of observed treatment in 144 STD patients, based on the April 1995 Malawi government supply catalogue

<table>
<thead>
<tr>
<th></th>
<th>Urethral discharge (n=63)</th>
<th>Genital ulcer disease (N=75)</th>
<th>Both syndromes (N=6)</th>
<th>All cases (N=144)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of correct treatment according to national guidelines</td>
<td>0.78</td>
<td>1.23</td>
<td>2.01</td>
<td>1.07</td>
</tr>
<tr>
<td>Average cost/patient of observed drug treatment</td>
<td>0.80</td>
<td>1.26</td>
<td>1.26</td>
<td>1.06</td>
</tr>
<tr>
<td>± Standard deviation</td>
<td>±0.56</td>
<td>±0.84</td>
<td>±0.76</td>
<td>±0.76</td>
</tr>
<tr>
<td>Range</td>
<td>0.10–2.52</td>
<td>0.20–4.50</td>
<td>0.24–2.20</td>
<td>0.10–4.50</td>
</tr>
</tbody>
</table>
current treatment, the slightly lower total cost of current treatment is largely due to the gross undertreatment of patients presenting with both urethral discharge and genital ulcers. In the six patients presenting with both syndromes, none received syndromic treatment for both syndromes, although four received effective treatment for one disease in each syndrome. When considering only the 138 patients presenting with one STD syndrome, the total cost of the observed treatment was US$145.13 (average $1.05 per patient), slightly higher than the projected cost of US$141.64 (average $1.03) if those 138 patients had been treated syndromically according to national guidelines.

Wastage of drugs, defined here as ineffective treatment (either ineffective drugs or ineffective dosage of effective drugs prescribed) or overdosage of effective drugs, accounts for US$82.79 or 54.2% of the total drug cost of observed treatment. This amount is the minimum cost of drug wastage since an unknown proportion of the remaining 45.8% receiving effective drugs for at least one disease in the presenting syndrome were not treated for the actual etiology of their disease, but were treated for another cause of the syndrome instead.

Figure 2 shows further details of drug wastage. Overdosage of effective drugs included more than 14 tablets (range 16–45) of doxycycline 100 mg for treatment of urethral discharge, more than 15 tablets (range 21–112) of erythromycin 250 mg or more than a single vial (range 2–3) of benzathine penicillin 2.4 million units for treatment of genital ulcers. Ineffective drugs prescribed for urethral discharge included benzathine penicillin, trimethoprim, metronidazole,
and potassium citrate. Ineffective drugs for genital ulcers included gentamicin, doxycycline, tetracycline, trimethoprim/sulfamethoxazole, metronidazole, chloramphenicol, nystatin, and ampicillin.

Ineffective dosage of effective drugs referred to both insufficient duration (days) or insufficient dosage (mg). For urethral discharge, this included trimethoprim/sulfamethoxazole (less than 10 tablets per day for 3 days for treatment of gonococcal urethritis), erythromycin (less than 500 mg every 6 hours for 7 days for non-gonococcal urethritis) and doxycycline (less than 100 mg every 12 hours for 7 days duration for non-gonococcal urethritis). For genital ulcers, doxycycline was considered in this category if the dosage and duration were less than 100 mg every 12 hours for 14–15 days for treatment of syphilis.

Use of laboratory testing (in this section, all 150 observed patients are considered)

Laboratory tests were ordered in 26% (39/150) of all patient encounters. Two laboratory tests were ordered for five patients, giving a total of 44 tests ordered. Results were available the same day as the consultation in 45% (20/44) of tests ordered. The most common laboratory test requested was VDRL serology. Of the 20 VDRL tests ordered, 18 were in patients presenting with GUD only, one for a patient presenting with both syndromes, and one for a patient with urethral discharge. VDRL was the least likely test result to be available on the same day as the consultation with only 30% (6/20) of results complete. Gram stains were ordered in 13 patients, including five patients presenting with GUD only. Results of 46% (6/13) were available the same day. Other laboratory tests ordered were urinalysis in nine patients, a wet mount in one patient, and a stool sample in one patient.

Discussion

We found that although syndromic management calls for an increased number of drugs prescribed per patient, the total cost of drug treatment using the syndromic approach would be nearly the same as for current (non-syndromic) antibiotic management in Malawi. The observed average cost per patient is US$1.06 with current practice and would have been $1.07 per patient if syndromic treatment were used in accordance with national guidelines. However, under current management practices, patients presenting with more than one STD syndrome were grossly under-treated. Correct treatment of these few patients accounts for all of the slightly increased cost of syndromic management. When considering only patients with one syndrome (either genital ulcers or urethral discharge), the average cost of syndromic treatment drops to $1.03, below the observed average per patient cost of $1.05.

It is of interest that slightly over half of all patients are already being treated with two drugs under current management. Although the average number of drugs prescribed was 1.5, less than would be prescribed using syndromic management, the cost of the two approaches was similar. This was largely due to overdosage of drugs. For example, presumed primary syphilis is often treated with three weekly doses of benzathine penicillin rather than the recommended single dose. Presumably, training in correct prescription of antibiotics could reduce these costs substantially, independent of the type of treatment approach in use.

Nearly one-third of patients did not receive effective treatment for either of the two most likely causes of the presenting syndrome and ineffective prescribing accounted for 30% of all drug costs. Although lack of availability of recommended drugs could possibly explain this, interviews carried out at the time of the survey showed that providers, when asked their preferred choice of drugs for prescription for specific STDs, were unable to correctly state the recommended treatment for common specific STD diagnoses, suggesting that knowledge of correct practice was low. In addition, the five most commonly prescribed antibiotics during the survey included all of the recommended drugs for the observed STD syndromes.

Although Malawian clinicians had been trained in etiologic diagnosis, relatively few laboratory tests were ordered and fewer were available at the time of antibiotic prescription. This suggests that clinical diagnosis, without laboratory determination, is the most common approach to STD management. Since this survey was not designed to give information on the accuracy of clinical diagnoses made during the observation period, we cannot evaluate whether the 56% of patients classified as receiving effective treatment for one likely cause of their presenting syndrome were treated for the actual etiology of their symptoms. Studies carried out in Kenya, Rwanda, and South Africa have shown that the accuracy of clinical diagnosis for genital ulcer disease is low (38–68%), even in the hands of specialists.
Therefore, it is likely that more than 31% of patients were treated ineffectively in the Malawi survey, with
the actual proportion falling between 31% and 87%.

Overall, the combined cost of drug waste due to
both overdosage of effective drugs and ineffective
prescriptions accounted for over half of observed
drug costs during the survey. However, the
methodological limitations described above suggest
that this figure is substantially lower than the actual
proportion of wastage. Indeed, higher rates have been
observed in other countries in sub-Saharan Africa and
it has been estimated that cost savings of 60–75% could be possible with improved prescription
practices. 18

It is of note that this study only considered patients
presenting with genital ulcers and urethral discharge,
accounting for roughly half of all new STD patients
presenting to the study sites during the period of
observation. This was because the study was designed
to measure WHO prevention indicators PI-6 and PI-7
which exclusively relate to these two syndromes
which have more straightforward management
algorithms than the other STD syndromes. This may
bias the study results towards a lower drug cost of
syndromic management since the recommended
number of drugs is higher for vaginal discharge and
PID. 20 Providers may be more likely to under-
 prescribe relative to the guidelines when more drugs
are recommended, as was observed in this study when
patients who presented with two syndromes
simultaneously were still only treated with one or two
drugs.

Another possible source of bias was the over-
representation of hospitals and commercial sector
clinics relative to health centres. In reference to
the large number of hospitals included in the sample, proportionally larger numbers of STD patients are treated
at the larger centres, and therefore, their practice pat-
terns would influence the drug usage and costs more
than the small centres. However, no differences in
treatment effectiveness were found among different
categories of health care facilities in the study. 21

The cost of current treatment is actually substantially
higher than presented here since this analysis only
takes drug costs into account. Other costs incurred
with current management that would be likely to
change with the adoption of syndromic management
are the direct costs of laboratory testing and the in-
direct costs of low treatment efficacy. Since most
diagnoses in Malawi are based on clinical impression,
laboratory costs are minimal due to low usage rates.
However, the indirect costs resulting from the high
rates of ineffective treatment are substantial. These
include increased costs due to the need for re-treat-
ment of the primary disease, treatment of complica-
tions and sequelae of STDs, as well as costs incurred
as a result of increased transmission of HIV.

Although this study was not able to specifically
measure the cost-effectiveness of current management
of STDs in Malawi, we were able to show that the
drug cost of current treatment and the projected cost
of syndromic management of those same patients
would be nearly the same. Since adoption of syn-
dromic management would substantially reduce the
high proportion of patients treated ineffectively under
current practice while keeping drug costs roughly the
same, we can infer that cost-effectiveness would be
increased. A net savings would likely be demonstrated if all factors could be taken into account
in the cost analysis. Indeed, a WHO analysis found
syndromic management to be two to three times less
expensive than clinical diagnosis and three to four
times less expensive than laboratory-based etiologic
diagnosis when all direct costs were considered. 16
These cost savings of syndromic management in
Malawi would not be due to laboratory and personnel
 savings, seen in more developed countries who start
with etiologic, laboratory-based diagnosis and change
to syndromic diagnosis. Cost savings for resource-
constrained countries who are currently using clinical
diagnosis are largely due to improved efficacy of treat-
ment. Syndromic diagnosis offers a short-cut to
improved care with no increased cost for developing
countries.

References

1. Merson MH. Slowing the spread of HIV: agenda for the
2. Lagu M, Diallo MO, Baue A. Inter-relationship of sexually
transmitted diseases and HIV: where are we now? AIDS 1994;
8: S119–24.
3. Clotey C, Dallabetta G. Sexually transmitted diseases and
human immunodeficiency virus: epidemiological synergy? In-
fec tious Disease Clinics of North America 1993; 7: 753–70.
4. Dallabetta G, Dismi MC. Treating sexually transmitted
diseases to control HIV transmission. Current Opinion of In-
fec tious Diseases 1997, in press.
Treatment of urethritis reduces HIV-1 in semen: Importance
treatment of sexually transmitted diseases on HIV infection
in rural Tanzania: randomised controlled trial. Lancet 1995;
346: 530–36.
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