

## Measuring schistosomiasis case management of the health services in Ghana and Mali

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### Summary

The World Health Organization recommends passive case detection by regular health services as a minimum strategy for schistosomiasis morbidity control. To evaluate preparedness of the health systems in Ghana and Mali, we presented four clinical scenarios, two with blood in urine (main early symptom of *Schistosoma haematobium*) and two with (bloody) diarrhoea (main early symptom of *S. mansoni*), to health workers. We requested the health personnel for an initial diagnosis and case management strategy without providing information about our primary interest in schistosomiasis. The information was used to determine the chance that a person reporting with symptoms that might have been caused by schistosomiasis would receive praziquantel. All selected health workers participated. Their initial diagnosis was frequently *S. haematobium* for both scenarios with blood in urine. For the two scenarios with (bloody) diarrhoea, only few mentioned *S. mansoni*. At health centre level, case management in Mali mainly consisted of direct prescription of medication, whereas in Ghana health workers often referred to a hospital or directed a diagnostic test. The ultimate probability of prescribing praziquantel was relatively high for the scenarios with blood in urine, 60% in Ghana and 75% in Mali, but very low for both scenarios with (bloody) diarrhoea (<20%). Of those health care facilities that would prescribe praziquantel, 60% (Ghana) and 80% (Mali) had it in stock. In conclusion, the clinical scenario study showed that patients reporting with blood in urine will be treated with praziquantel at approximately half of the health care facilities, whereas of those presenting with (bloody) diarrhoea only few would receive treatment with praziquantel. Considering these facts, it is questionable if passive case detection is a sufficient basis for effective schistosomiasis morbidity control, especially for *S. mansoni* infection.

**keywords** schistosomiasis, disease control, primary health care, integration, passive case detection, Ghana, Mali

### Introduction

Schistosomiasis is one of the parasitic infections with a serious impact on public health in Africa. Recently, it has been estimated that the urinary type (*Schistosoma haematobium*) causes haematuria in 70 million and major bladder wall pathology in 18 million individuals in sub-Saharan Africa (Van der Werf *et al.* 2003). *Schistosoma mansoni*, the intestinal type, is responsible for blood in stool in an estimated 4.4 million individuals, and 8.5 million were estimated to have hepatomegaly because of the infection (Van der Werf *et al.* 2003). Since the introduction of the effective and safe single dose drug praziquantel, WHO has advocated morbidity control (WHO 1985). The initial strategy was community wide

disease specific treatment campaigns with active diagnosis and treatment (vertical approach). In 1991, the emphasis shifted to a more horizontal approach, i.e. control integrated in the Primary Health Care services (WHO 2002).

An essential component of the integrated approach is clinical care for patients who visit health care facilities with complaints related to infection with schistosomes (passive case detection) (WHO 1998; Engels *et al.* 2002). This recommendation requires health workers who can diagnose patients on recognition of the main symptoms of infection (WHO 2002). Identified patients should receive prescriptions for praziquantel, and the drug must be available. Also, the use of sensitive diagnostic tests in health care facilities with laboratory facilities is

advocated, especially for patients with dysenteric symptoms (bloody diarrhoea), as the differential diagnosis is extensive. Studies in Ghana, Mali and Senegal have demonstrated that there is a considerable difference in complying with these recommendations (Van der Werf *et al.* 2002; Landouré *et al.* in press; Van der Werf *et al.* in press). However, even if prerequisites for case management are met, i.e. health workers have adequate knowledge of the symptoms that may raise suspicion of the disease, are acquainted with treatment options and the prescribed drugs are available, it does not necessarily mean that patients presenting symptoms compatible with schistosomiasis will receive treatment for the infection. They may not be suspected of schistosome infection because the presenting symptoms could be due to other diseases. For example, patients presenting with bloody diarrhoea can also receive diagnoses of other infections common in developing countries, such as amoebiasis, trichurias or bacterial infection (Manson-Bahr & Bell 1987). Therefore, we studied the case management of patients presenting with blood in urine or (bloody) diarrhoea to identify bottlenecks in the process and opportunities for improvement.

Insight into the case management process can be obtained by observation of health care provider–patient contacts. This has been performed for diseases such as sexually transmitted infections (STIs) (Voeten *et al.* 2001), childhood diarrhoea (Cutts *et al.* 1988; Nizami *et al.* 1996) and malaria (Font *et al.* 2001). However, apart from being time-consuming and expensive, this method is also prone to bias because of changes in behaviour of health workers in the presence of observers (Beullens *et al.* 1997; Béria *et al.* 1998). Use of simulated or standardized patients does not have this disadvantage, but it requires extensive training of volunteers in simulating diseases (Woodward *et al.* 1985; Rethans & van Boven 1987). Moreover, we were advised not to use the latter method because doctors would consider it intrusive and offensive and merely a test of their competence. We therefore presented to health workers hypothetical clinical scenarios of patients with blood in urine (main early symptom of *S. haematobium*) and (bloody) diarrhoea (main early symptom of *S. mansoni*). For four scenarios, we assessed the initial diagnosis and the case management process (direct treatment, request of a diagnostic test or referral to another health care facility). The outcomes were used to determine the chance of treatment for schistosomiasis (prescription of praziquantel) in case such clinical scenarios would present at a health care facility. This approach was applied for the health systems in Ghana and Mali, two countries with a different organization of the health system (based on British and French system) and a different history of schistosomiasis control.

## Methods

### Background information

Ghana and Mali are West African countries with medium sized populations: Ghana 20 and Mali 11 million inhabitants. Ghana gained independence from Great Britain in 1957 and is now a member of the Commonwealth. Mali is part of francophone West Africa and became independent in 1960. Schistosomiasis (urinary and intestinal) is known to be endemic in both countries. In Ghana, areas with high prevalences of schistosomiasis exist in the north, south and around lake Volta (Paperna 1968, 1969; Lyons 1974; Scott *et al.* 1982; Wen & Chu 1984; Mott *et al.* 1985; Ofori-Adjei *et al.* 1986; Klumpp & Webbe 1987; Zijlmans *et al.* 1989; Amankwa *et al.* 1994; Bosompem *et al.* 1996; Wagatsuma *et al.* 1999). In Mali, high prevalence areas are in Office du Niger, Pays Dogon and Baguineda, an irrigated area near the capital Bamako (Traoré 1989; Werler 1989; De Clercq *et al.* 1994; Kardorff *et al.* 1994; Dabo *et al.* 1995; Traoré *et al.* 1998).

In Ghana, a schistosomiasis control programme which delivered praziquantel mass treatment in affected villages was started to control the increase of schistosomiasis after the completion of the Akosombo dam in the Volta Region in 1964. In other parts of the country no official control programmes exist. In Mali, control efforts started in 1982 with the establishment of a national schistosomiasis control programme (Brinkmann *et al.* 1988). After 1987, activities were decentralized to the district and regional health teams and schistosomiasis control was integrated in primary health care (Traoré 1996).

In Ghana and Mali, governmental health services are based on principles of primary health care and the Bamako Initiative (WHO 1978; Garner 1989; Biritwum 1994). Details of both health systems are provided in van der Werf *et al.* (in press) and Landouré *et al.* (in press). Although praziquantel is not on the essential drug list in Ghana, it is expected to be available at all levels of the health system. In Mali, praziquantel is on the essential drug list and should therefore be available at all times in adequate amounts and in the appropriate dosage forms, at a price that individuals and the community can afford (<http://www.who.int/medicines/organization/par/edl/infedlmain.shtml>, accessed on 7-10-2002).

### Interviews and data collection

We surveyed health care facilities in four areas with different levels of schistosomiasis endemicity in Ghana and in Mali (for details see Van der Werf *et al.* in press and Landouré *et al.* in press). In total, 70 health care facilities were surveyed in Ghana and 60 in Mali. They were

grouped into first level (health centres, mission clinics and private clinics) and hospitals (district hospitals and mission hospitals). In each facility we interviewed the person in charge, or, if this person was not present, the second in command. If there was no health worker present at the time of our visit, we returned later. All selected health care facilities participated in the study.

After a short introduction which did not reveal our special interest in the management and control of schistosomiasis, we presented in random order four clinical scenarios, A and B with the main early symptom of *S. haematobium* (blood in urine) and C and D with the main early symptom of *S. mansoni* [(bloody) diarrhoea], see Box 1 for a description of cases A, B, C and D. These scenarios were developed by the authors after consultation of experts. We asked the respondents for their case management if a patient with such symptoms would present at their health care facility; their initial diagnosis (working diagnosis) and usual action. We were especially interested in (1) if a diagnostic test would be requested and if so, which test, (2) if there was referral for a diagnostic test or treatment, (3) to which health care facility patients would be referred, (4) what the action would be after a test positive for schistosome eggs and after a test with no abnormalities (negative test), and (5) which treatment would be prescribed. After discussing the clinical scenarios we asked the respondent if *S. haematobium* and *S. mansoni* were endemic in the coverage area of the health care facility. Thereafter, respondents from areas with reported schistosomiasis were interviewed using a structured questionnaire, which included questions about knowledge of symptoms and prescription of drugs for treatment of schistosomiasis including the prescribed dosage, and availability and costs of diagnostic tests and praziquantel. The results of these interviews were published elsewhere (Van der Werf *et al.* 2002, in press; Landouré *et al.* in press). We used the data about the availability of praziquantel in the health care facility for calculating the probability that a clinical scenario would receive praziquantel.

### Analysis

By multivariate logistic regression (SPSS) we assessed whether the frequency of schistosomiasis as initial

#### Box 1 Clinical scenarios

- (A) 10-year-old girl with blood in urine
- (B) 40-year-old man with blood in urine and painful urination
- (C) 10-year-old boy with abdominal discomfort and bloody diarrhoea
- (D) 30-year-old woman with diarrhoea and abdominal discomfort

diagnosis and direct prescription of praziquantel differed between both countries, health care facility level (first level *vs.* hospital) or reported endemicity. Other replies were statistically compared using the Exact Chi-square test (SAS). A *P*-value <0.05 was considered significant.

The probability of receiving a prescription for praziquantel was calculated by considering all situations where prescription of praziquantel is the outcome of the case management process: (1) direct prescription, (2) after a positive diagnostic test, (3) after a negative diagnostic test (after a positive second diagnostic test, after referral, or directly without a second test or referral), and (4) referral of patients to hospitals. Probabilities were calculated for all health care facilities, irrespective of reported presence of infection. This was because *S. haematobium* was reported in most situations (>70%) and health workers were often not aware of the existence of *S. mansoni* in their coverage area (Danso-Appiah personal communication). As not all referred hospitals were included in our study, we used the average case management strategy of all visited hospitals in the country considering (1), (2) and (3) as above. If a diagnostic test was requested, we took into account that not all infected individuals will be found positive for schistosomiasis by the test. After studying the literature we assumed that 50% of the urine diagnostic tests would give positive result for a case with blood in urine because of *S. haematobium* infection (Van der Werf 2003). The same percentage was found to be applicable for a blood in stool case because of *S. mansoni* infection diagnosed by direct faecal smear test.

The eventual probability of receiving praziquantel for a patient reporting at a health care facility with symptoms comparable with scenario A, B, C or D was based on the probability of receiving a prescription of praziquantel and the proportion of health care facilities, among those prescribing, that had it in stock. The proportion having praziquantel in stock was weighed according to the probability that a visit would lead to a prescription, so e.g. 50% after a diagnostic test and the average probability for hospitals after referral.

### Results

Eighty-three per cent of the surveyed health care facilities in Ghana and 93% in Mali were first level health care facilities. In Mali, 83% of the respondents reported presence of *S. haematobium* infection in their coverage area and 70% in Ghana. *Schistosoma mansoni* infection was also more often reported by health workers from Mali (37%) than Ghana (17%). In Ghana, 21% of the health workers could not recall about the existence of *S. mansoni* and were therefore unaware of the presence of *S. mansoni* in their coverage area.

There was a wide variety in the reported initial diagnosis for the four clinical scenarios in both Ghana and Mali, especially for scenario C and D (Table 1). For scenario A, health workers almost uniquely mentioned schistosomiasis as initial diagnosis, whereas for scenario B also urinary infection and STI were reported. For scenario C and D, <15% of the health workers mentioned schistosomiasis as initial diagnosis. In Ghana, 10 and 20% of the health workers from first level health care facilities could not mention an initial diagnosis for respectively scenarios C and D. Most of them (50% and 77% respectively) would prescribe direct treatment with oral rehydration salts (ORS), antibiotics or metronidazole (data not shown). There was no significant difference in the frequency of schistosomiasis as initial diagnosis between Ghana and Mali, and between different health care facility levels. Only for scenario B in Mali, schistosomiasis was more often reported as initial diagnosis in areas endemic for *S. haematobium*. Approximately one-quarter of the health workers also mentioned a second possible diagnosis. The diversity of second diagnoses was comparable with the first initial diagnosis, only urinary bacterial infection was more often mentioned as second diagnosis for scenario A and B.

About 7% of the health centres in Ghana and 5% in Mali would request a diagnostic test, irrespective of the clinical scenario presented (Figure 1). In fact, all health care facilities with laboratory facilities in Ghana (20% of the surveyed health care facilities) and all but one in Mali (8%), would request a diagnostic test for two or more of the clinical scenarios (not shown). All laboratories used the urine centrifugation test for the diagnosis of *S. haematobium* infection and simple direct faecal smear test for the diagnosis of *S. mansoni* infection. In Ghana,

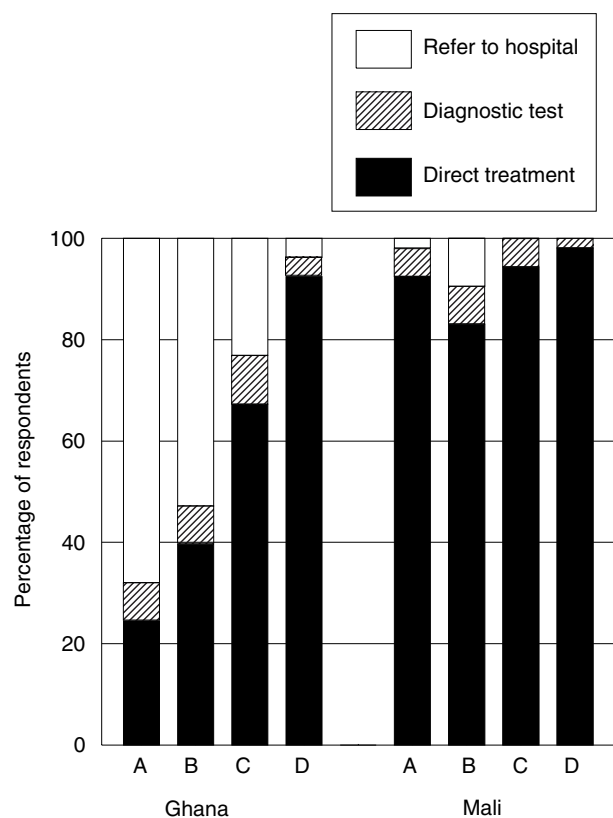
about 60% of the health workers in health centres reported to refer clinical scenario A and B, mainly because they believed that they were not allowed to treat cases suspected of *S. haematobium* infection themselves.

Almost all health workers in health centres in Mali would prescribe direct treatment for the four presented clinical scenarios (Figure 1). In Ghana, fewer health workers performed direct treatment, especially for scenario A and B (25% and 40% respectively). In both countries, the scenarios with blood in urine would more often receive a prescription for praziquantel than the scenarios with (bloody) diarrhoea (Table 2). Furthermore, Malian health workers would more frequently prescribe praziquantel than Ghanaian health workers for all four clinical scenarios ( $P < 0.05$ ). Seventy-five per cent of the health workers in Ghana who mentioned urinary schistosomiasis as the first diagnosis for scenario A and B and 98% in Mali would prescribe praziquantel alone or in combination with other drugs (in particular antibiotics) if the patient was not referred. Approximately 30% of the health workers in Ghana would prescribe a combination of three drugs, in Mali this was 15–20%.

Figure 2 shows the probability that patients comparable with the clinical scenarios would receive a prescription for praziquantel, accounting for referral and assuming 50% positive after diagnostic testing. In both countries, scenario A and B had a much higher chance of receiving a prescription for praziquantel (about 60% for Ghana and 75% for Mali) than scenario C and D (both about 12%). The total probability was comparable between the two countries, but in Ghana most praziquantel prescriptions (especially for scenario A and B) were after referral, whereas this was direct treatment in Mali.

**Table 1** Initial diagnosis for four clinical scenarios, A and B with blood in urine (indicator of *Schistosoma haematobium*) and C and D with (bloody) diarrhoea (indicator of *S. mansoni*), as reported by health workers from Ghana ( $n = 70$ ) and Mali ( $n = 60$ ). See Box 1 for description of clinical scenarios. Values are percentages

A		B		C		D					
Diagnosis	Ghana	Mali	Diagnosis	Ghana	Mali	Diagnosis	Ghana	Mali	Diagnosis	Ghana	Mali
Schistosomiasis	91	92	Schistosomiasis	57	57	Bacterial infection	44	25	Food poisoning	14	37
Urinary infection	4	7	Urinary infection	29	18	Amoebiasis	14	32	Parasitic infection	20	28
Trauma	0	2	Sexually transmitted infection	10	18	Parasitic infection	21	22	Bacterial infection	17	13
Diabetes	1	0	Prostatitis	0	2	Schistosomiasis	3	15	Malaria	19	5
Black water fever	1	0	Renal infection	0	2	Malaria	4	2	Viral infection	9	2
Unknown	1	0	Neoplasm	0	2	Food poisoning	0	5	Amoebiasis	1	10
			Enlarged prostate	1	0	Lack of water/food	1	0	Schistosomiasis	0	2
			Unknown	3	2	Viral infection	1	0	Vaginal infection	0	2
						Unknown	10	0	Cholera	0	2
									HIV infection	1	0
									Unknown	19	0



**Figure 1** Reported case management by health workers in health centre in Ghana ( $n = 53$ ) and Mali ( $n = 53$ ) for four clinical scenarios, A and B with blood in urine (indicator of *Schistosoma haematobium*) and C and D with (bloody) diarrhoea (indicator of *S. mansoni*). See Box 1 for description of clinical scenarios. The drugs prescribed in case of 'direct treatment' are given in Table 2.

The eventual probability of receiving praziquantel for a patient reporting at a health care facility with symptoms comparable with scenario A, B, C or D is presented in Table 3. Within both countries, the availability of praziquantel appears to increase with the decreasing probability of prescription over scenarios. This is mainly because hospitals (which usually have praziquantel in stock) make the largest part of situations where praziquantel is less often prescribed. Overall, praziquantel was more commonly available in Mali than in Ghana. The average availability of the drug in each health system will be lower than the values in Table 3, as presence of the drug will lead to prescription, or vice versa. For example, for scenario C in Ghana, three of five hospitals that prescribed praziquantel had it in stock, while this was one of five of those which did not prescribe. In agreement with the probability of prescription, the eventual probability of receiving

praziquantel is higher for clinical scenario A and B (30% and 60% respectively) than for C and D (both 10%).

## Discussion

All selected health workers agreed to participate in our study, suggesting that our research methodology was highly acceptable. We also had a strong impression that the respondents enjoyed answering the questions; especially health workers from first level health care facilities were pleased about our interest in their daily work. It was feasible to present the clinical scenarios to all professional levels, including health workers with limited training. We consider these important observations because cooperation of health workers is essential to come to reliable answers. In hospitals, there were more health workers performing case management than doctors only. Initially, we interviewed different health workers (of different professional levels) in hospitals to gain insight into case management of hospitals. However, when interviewing several persons in one health care facility, it was difficult to keep the subject of the research project hidden for the next respondents, with a risk of introducing responding bias. Therefore, we only presented the results from the interview with the first person, who was the one in charge of the health care facility or his/her representative.

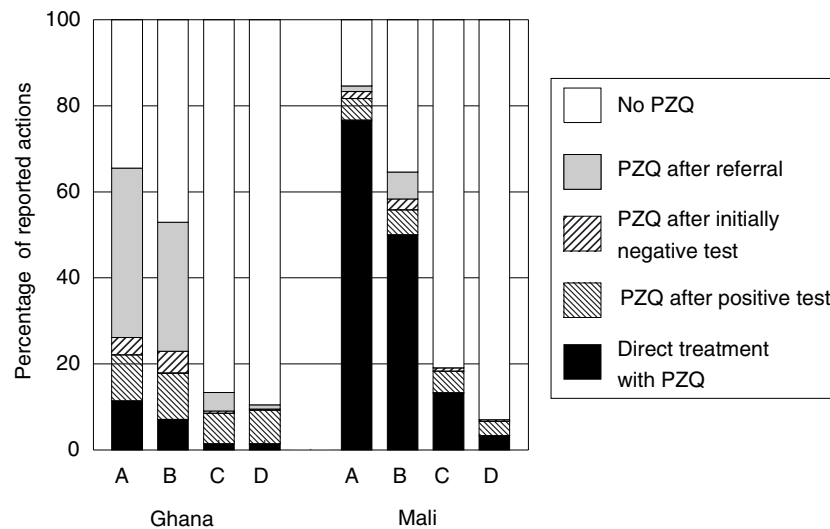
Our experiences with the research methodology were more positive than those of researchers who used other methods for studying case management. Studies using simulated patients caused high refusal to participate (8–32% of the selected group) because, contrary to our experiences with the clinical scenarios, the method was disliked by the respondents (Rethans & van Boven 1987; Russell *et al.* 1991; Bowman *et al.* 1992; Tamblyn *et al.* 1992). Also, a number of participants (4–26%) unmasked the simulated patient (Woodward *et al.* 1985; Rethans & van Boven 1987; Russell *et al.* 1991; Tamblyn *et al.* 1992). In general, quality of health worker performance is often less favourable (i.e. compared with standards) if measured by simulated patients or observation studies compared with questionnaire surveys or clinical scenarios (Rethans & van Boven 1987; Russell *et al.* 1991; Kopelow *et al.* 1992; Nizami *et al.* 1995; Ofori-Adjei & Arhinful 1996; Voeten *et al.* 2001). This can be explained by the fact that health workers probably give socially desirable answers in questionnaire surveys. We believe that in our study there was no reason nor pressure for this, because the subject of our mission (schistosomiasis case management) was only revealed after the clinical scenarios were presented. To test the validity of the clinical scenario method, it would be interesting to compare it with observations of health

**Table 2** Reported direct treatment for four clinical scenarios, A and B with blood in urine (indicator of *Schistosoma haematobium*) and C and D with (bloody) diarrhoea (indicator of *S. mansoni*), as reported by health workers from Ghana and Mali. See Box 1 for description of clinical scenarios. Values are percentages

Treatment	A		B		Treatment	C		D	
	Ghana (n = 15)	Mali (n = 53)	Ghana (n = 23)	Mali (n = 47)		Ghana (n = 41)	Mali (n = 54)	Ghana (n = 55)	Mali (n = 54)
Praziquantel	47	83	13	51	Praziquantel	0	6	0	0
Praziquantel + antibiotics	7	4	4	13	Praziquantel + antibiotics	0	2	0	0
Praziquantel + other*	0	0	4	0	Praziquantel + metronidazole	0	4	0	4
Antibiotics	20	9	57	32	Praziquantel + antibiotics + metronidazole	2	4	2	0
Antibiotics + other*	13	2	22	4	Antibiotics	12	7	4	0
Other*	13	2	0	0	Metronidazole	22	30	5	17
					Antibiotics + metronidazole	10	24	0	15
					Antibiotics + metronidazole + other†	10	6	0	17
					Metronidazole + other†	12	15	14	20
					Antibiotics + other†	20	4	9	13
					Other†	12	0	65	15
Total praziquantel	54	87	21	64	Total praziquantel	2	16	2	4

\* Other includes: chloroquine, metrifonate, pain treatment, mebendazole, metronidazole, quinton and potassium solution.

† Other includes: oral rehydration salts, pain treatment, chloroquine, antispasmodic, antacids, multivitamins, immodium, kaolin suspension, salt infusion and sulfaterazol.



**Figure 2** Percentage (%) of reported actions ending in prescription of praziquantel (PZQ) by health workers in the Ghanaian ( $n = 70$ ) and Malian ( $n = 60$ ) health system for four clinical scenarios. The category 'No PZQ' comprises all situations where PZQ was not prescribed: prescription of other drugs related to a different initial diagnosis or diagnostic test, with or without referral to hospital.<sup>1</sup>

provider-patient contacts or to the results of simulated patients.

Figure 2 shows that patients with blood in urine and especially patients with (bloody) diarrhoea have a rather limited prospect for prescription of praziquantel if they report at a health care facility. It should be noted that limited prescription of praziquantel does not necessarily indicate low quality of case management, as the scenarios might very well not represent patients with schistosomiasis.

Especially (bloody) diarrhoea is not uniquely caused by *S. mansoni* infection (Gryseels 1992; Guyatt *et al.* 1995). Therefore, depending on the epidemiological situation in the coverage area of the health care facility, it could in fact

<sup>1</sup> One Ghanaian health worker had never seen a patient like scenario C and could therefore not answer the questions. In Mali, one health worker reported for scenario D to wait for 2 days if the symptoms would disappear.

**Table 3** The probability of receiving praziquantel (PZQ) for patients comparable to clinical scenario A, B, C or D, based on the probability of receiving a prescription of PZQ (from Figure 2) and the proportion of health care facilities among those prescribing that had it in stock

Clinical scenario	Ghana			Mali		
	PZQ prescribed (%)	PZQ in stock (%)	Receiving PZQ (%)	PZQ prescribed (%)	PZQ in stock (%)	Receiving PZQ (%)
A	66	47	32	85	72	61
B	53	56	30	65	83	54
C	13	74	10	19	74	14
D	11	92	10	7	88	6

be the best clinical practice to treat these scenarios as other diseases, e.g. amoebiasis. As blood in urine is a more specific symptom (Lengeler *et al.* 2002) and a well-known indicator of *S. haematobium* infection (Van der Werf *et al.* in press; Landouré *et al.* in press), alternative diagnoses were not often mentioned and praziquantel was often (directly) prescribed. If direct treatment was the initial action, praziquantel would significantly more often be directly prescribed for clinical scenario A and B by health care facilities in areas reported endemic for *S. haematobium*. This could not be tested for clinical scenario C and D as only very few health workers prescribed praziquantel directly. The quality of the management of the clinical scenarios could be assessed by relating the answers from the respondents to case management guidelines or to the judgement of experts. For example, by means of the Delphi method experts can come to a group consensus on which reported case management policies were adequate for the clinical scenarios, given a reasonable knowledge about the epidemiological situation of different diseases which may cause the presented scenarios (Milholland *et al.* 1973).

The probability of receiving a prescription for praziquantel as presented in Figure 2 is the most favourable in the sense that it can only be obtained if all patients comply with referral and buy the prescribed medication. Most likely, not all patients will comply with referral (and visit another health care facility for diagnosis or treatment) because of time and money constraints. Also, not all patients who receive a prescription for praziquantel will be able to buy the drug, as it is still relatively expensive (c. 1 euro for the normal dose of four tablets for adults) and not always available in the health care facilities where it is prescribed.

It follows from our study that patients with symptoms similar to scenario A, B, C and D have a low probability of treatment with praziquantel. For scenario C and D, the low rate of prescription (mainly because of low alertness for *S. mansoni*, see above) is the limiting factor. For scenario A and B, both prescription and availability of the drug limit the probability of receiving praziquantel. It is a subject of further study to find out whether this probability can best be improved by changing the procedures of the health systems (by training of health workers in

identifying schistosomiasis patients or changing diagnostic algorithms) or making praziquantel available at larger scale. Higher availability may increase the number of prescriptions, and higher awareness of schistosomiasis may increase procurement of praziquantel. As said above, especially for scenario C and D, changing the procedures does not necessarily result in the best strategy, as other causes than *S. mansoni* may be more likely explanations of the symptoms. In endemic areas, it is always recommendable to have some praziquantel available in the health system.

In conclusion, the use of clinical scenarios is a valuable additional research method for the assessment of case management and provides a quantitative description of the process of diagnosis and treatment. It is a simple and fast method and it is well accepted by health workers at different levels of the health care system. If the presented clinical scenarios with distinct and less distinct symptoms were really caused by schistosome infection, most health care facilities in Mali (60%) and about 30% in Ghana would (eventually) prescribe praziquantel for *S. haematobium* patients and also have it in stock. Patients presenting with (bloody) diarrhoea would only rarely receive a prescription for praziquantel (<15%). Moreover, only a minority of the individuals with blood in urine or (bloody) diarrhoea will visit the regular health services for treatment (15%), Danso-Appiah (unpublished results). Therefore, passive case detection is probably only an effective method for morbidity control in areas with very high endemicity of schistosome infection where most cases with blood in urine or (bloody) diarrhoea are caused by schistosome infection. In these situations health workers can be trained in prescribing praziquantel and the population sensitised to seek health care (e.g. outbreak area in Northern Senegal). Otherwise additional measures might be necessary.

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