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Compliance to the Primary Health Care Treatment Guidelines and the Essential Medicines List in the Management of Sexually Transmitted Infections in Correctional Centres in South Africa: Findings and Implications

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Abstract

Background: The emergence of antimicrobial resistance (AMR) is a global concern and a growing health crisis. Additionally, evidence has shown that non-compliance to treatment guidelines, especially in the management of communicable diseases such as sexually transmitted infections (STIs), has the potential of further enhancing AMR rates. Data on the extent of these challenges in Primary Health Care (PHC) facilities in correctional centres in South Africa (SA) is limited. Hence this study was conducted to determine the level of compliance with the 2008 PHC Standard Treatment Guidelines and Essential Medicines List (PHC STGs/EML) in the management of STIs, and to identify potential factors contributing to the compliance and non-compliance to guide future strategies.

Method: An investigational descriptive study, including retrospective and prospective data, was conducted over an eight month period. **Results:** Male urethritis syndrome, lower abdominal pain and genital ulcer syndrome were the three most common STIs. Doxycycline, ciprofloxacin and metronidazole were prescribed for most of the STIs. Overall compliance to the 2008 PHC STGs/EML was low for all STIs. **Conclusion:** The study highlights the need to implement antimicrobial stewardship programmes, including educational activities, to promote the rational use of antimicrobials and monitor their use in PHCs in SA.

1. Introduction

Globally, sexually transmitted infections (STIs) are among the most common acute conditions with significant public health concerns [1, 2]. The World Health Organization (WHO) [3] estimated that 291 million women are infected with the human papillomavirus (HPV). The current annual incidence of STIs in Africa is 92.6 million, including 8.3 million, 21.1 million, 3.4 million and 59.7 million cases respectively for *Chlamydia trachomatis*, *Neisseria gonorrhoeae*, *Treponema pallidum* and *Trichomonas vaginalis* [4]. Approximately 1 million women die from STI infections in Africa annually, and STIs are the second leading cause of loss of healthy life years for women aged 15-44 years [5]. Consequently, a growing concern. The three most common STIs, chlamydia, gonorrhoeae and syphilis, are increasingly proving difficult to treat, prompting the WHO to recently implement new guidelines [6].

A study conducted in Kwazulu-Natal, South Africa, with a sample size of 5 748, reported a high STI prevalence rate of 13% with an incidence rate of 20 per 100 women years [1]. A comparative study conducted in South Africa (SA) and Zimbabwe reported the incidence rate of *Neisseria gonorrhoeae* to be higher in SA, accounting for 3.7 per 100 women years against 1.3 per 100 women years in Zimbabwe [4]. Consequently, an appreciable public health concern in South Africa.

Primary health care (PHC) is the cornerstone of the public health system and essential health service delivery in SA [7]. This is in line with the requirements of the National Drug Policy (NDP) to provide access to quality, safe and affordable medicines to all citizens in SA [8]. The PHC system is based on the principles of scientific evidence for care, practicality in clinical settings, social acceptability and use of new technologies to guide health service provision [9]. These principles also apply to PHC facilities in correctional centres. This was highlighted in a recent speech where the National Commissioner for the Department of Correctional Services (DCS) highlighted that the DCS ensures that inmates are provided with access to PHC services in line with international and national protocols, guidelines and standards [10]. Currently, there are 243 correctional centres across SA, with only two being public/ private partnerships, with the DCS accredited by the Director General of Health to provide PHC facilities. Patients needing secondary or tertiary care are subsequently referred to appropriate Department of Health facilities.

Standard Treatment Guidelines (STGs) are useful tools that can be used to guide decision making in health care provision. STGs reduce the variations in prescribed medicines, and guide prescribers on appropriate medicines for their patients, thereby improving the quality of health care provided [11, 12]. However, a recent study from Botswana showed that STGs were not always available in public PHC facilities impacting on the delivery of health care [12]. Although the availability of STGs alone cannot improve the appropriate use of medicines due to variable adherence rates, they are a good start [13-16]. If STGs are not adhered to, patients may be prescribed incorrect treatments and sub-optimal doses as well as the incorrect duration of treatment [17]. This is particularly important for infectious diseases where incorrect treatment increases antimicrobial resistance (AMR) and the associated morbidity, mortality and costs [12, 13]. However, a study conducted by Gustafsson *et al.* (2011) among PHC facilities in Stockholm, Sweden, found high adherence rates to a recommended list of medicines (approximately 200) as well as treatment guidance at 80 – 90% of prescriptions [18]. This was helped by evidence-based principles for developing treatment guidance and physician trust in colleagues developing the formularies [18, 19].

In SA, Standard Treatment Guidelines and the Essential Medicines Lists (STGs/EML) are available for ambulatory and hospital care of patients. In terms of the hospital level guideline, provision is made for both adults and children as treatments are not necessarily the same for these patients [20]. A list of tertiary and quaternary medicines for use in academic health institutions was also published in 2012 [21]. Typically, SA uses the WHO guidelines in developing the criteria for selecting medicines for inclusion in the STGs/EML. Certain variables are assessed in order to ensure that the optimal medicine is included in the STGs/EML. These include scientific evidence of safety, efficacy, cost implications and, most importantly, public health relevance [22]. At PHC facilities flowcharts (algorithms), which are available in the PHC STGs/EML, are also used to guide health workers on the optimal management of health conditions [23].

The management of STIs requires that a proper diagnosis is made to facilitate appropriate treatment [2]. This necessitates immediate identification and treatment as soon as possible for the patient's immediate relief and, most importantly, to prevent the spread of infection. This is particularly important for patients with STIs with concomitant HIV [17]. The approach requires identification and prompt treatment of a group of signs and symptoms most commonly found in STIs, including the pathogens responsible for the given STI syndromes [24]. The success of STI management further requires that all sexual partners of patients presenting with STIs be identified in a timely fashion and treated properly. Reducing the period of infection is also important if the goal of adequate control of STIs, which is to prevent the increase in STIs, is to be achieved [17].

However, among PHC facilities in developing and transitional countries there is generally suboptimal or poor compliance to prescribing guidelines and practices. Treatment prescribed according to STGs was only 40% in public facilities and less than 30% among private facilities across countries [25].

Whilst it is possible to extrapolate the findings of studies conducted globally on the management of STIs to gain an understanding of the situation among PHC facilities in correctional centres, this approach is not ideal. The reason being a greater prevalence of STIs in correctional centres because of current practices compared to the general population, hence the findings might be different [7]. However, undocumented reports indicate low compliance levels with STGs/EML in correctional centre PHC facilities in the management of medical conditions necessitating further investigation.

Consequently, we sought to determine the current level of compliance with the 2008 PHC STGs/EML in the management of STI syndromes among correctional centre PHC facilities in SA, as well as potential factors contributing to compliance and non-compliance with STGs/EML. As a result, future initiatives to improve compliance to STGs/ EML will be recommended. Additionally, the results of the study can be used as a baseline for undertaking future studies among PHC facilities in SA looking at compliance to optimise the future management of patients with infectious diseases including STIs.

2. Patients and Methods

2.1 Study setting and design

An investigational descriptive study, including retrospective and prospective data, was conducted at two correctional centres in the North West Province of SA. One centre is a male only facility with a capacity of approximately 1 500 inmates, while the other centre, with a capacity of approximately 1 400, houses both male and female inmates as well as awaiting trial detainees. Consequently, providing a broad population base representational of correctional centres in South Africa when combined. Both correctional centres have PHC facilities, providing comprehensive PHC services for the management of sick inmates with referral to external public sector facilities of the Department of Health for secondary and tertiary health care.

We started with correctional centres as they are likely to have a higher prevalence of STIs than the normal population in view of current practices [26]. As a result, if there are issues with current STI management, these would be highlighted in this study. The findings of this study can form the basis of future studies among PHC facilities across SA.

2.2 Data collection

The Medicine Accounting Registers (MAR) were used to identify STI prescriptions for data collection. The MAR is used by prescribers to document the medicines issued to patients during consultations, date of consultation as well as the patients' unique registration number. STI medicines, as outlined in the 2008 PHC STGs/EML, were identified in the MAR and used to select the relevant STI files. The determination of whether a specific STI is a new infection or recurrence was undertaken by the main researcher (TBM) upon checking all previous prescriptions for the same patient. The data were collected over a period of eight months (October 2014 to March 2015). Prescriptions for STIs were retrospectively reviewed to determine the level of compliance with the 2008 PHC STGs/EML. Only STI prescriptions written between January 2013 and March 2015 were considered for the study. This process was followed until a sample size of 385 was reached. Sample size estimation was undertaken using nQuery Advisor Release 7.0. With a sample size of 385 STI prescriptions, a two sided 95% confidence interval for the true (unknown) percentage of compliant prescriptions, will be within $\pm 5\%$ of the percentage that will be calculated from the sample, assuming a 50% compliance rate (which we believed was the worst scenario).

Medicines were recorded by the INN (international non-proprietary name) in line with guidance to PHCs as medicines are procured by the Department of Health by their INN name.

Face-to-face interviews were conducted by the principal researcher (TBM) initially targeting all authorised prescribers at the two correctional centres using a standard questionnaire (see Appendix 1). The questionnaire was derived by the researchers based on their experience with and previous

research using semi-structured interviews to determine the various factors leading to either compliance with, or deviation from the 2008 PHC STGs/EML in the treatment of STIs [27]. The questionnaire was piloted for feasibility, and amended prior to the full study being conducted.

In SA, prescribing is regulated in terms of the Medicines and Related Substances Control Act (101 of 1965). All 13 prescribers were approached. However, four declined to be interviewed and one had resigned from one of the facilities before data collection, leaving eight to be interviewed. Out of the eight interviewed prescribers, one was a medical practitioner and seven were PHC trained nurses. Five of the authorised prescribers were male and all eight had more than 10 years' experience. Six prescribers were above the age of 40. One of the nurse prescribers had a Bachelor of Nursing Science qualification while the others had a Diploma in Nursing.

2.3 Data analysis

Data were entered on Microsoft Excel® spreadsheets, verified for correctness and analysed descriptively using SAS® Release 9.2. Frequency percentages were used to summarise categorical variables. The prevalence of the different STIs treated at the centres was determined, followed by the frequency of the different antibiotics prescribed. Thereafter, the appropriateness of the prescribed antibiotic treatment was evaluated against the PHC STGs/EML [22]. A prescription was deemed fully compliant to the guidelines, if the combination of drugs prescribed for the particular STI, the dosages, the dosage interval and the duration of treatment were correct when compared with the treatment as outlined in the 2008 PHC STGs/EML. For the purpose of this study, all the aspects i.e. name of the medicine, dosage, dosage interval and duration of treatment, were given equal weight because they are seen to be equally important to treat identified STIs and data on how these should be weighted differently could not be found in the literature.

Microsoft Excel® was used for a thematic analysis of the responses from the prescriber interviews to allow for narrative description and counting of responses within categories where possible.

2.4 Ethical considerations

Ethical clearance for the study was granted by the Medunsa Research Ethics Committee of the University of Limpopo (now Sefako Makgatho Health Sciences University) (MREC/H/25/2014.PG). Permission to conduct the study was granted by the Research and Ethics Committee at the Department of Correctional Services before commencement of the study. The study sites were informed of the study in writing and written informed consent was obtained from all interviewees. No personal information was recorded and all data were treated with the strictest confidentiality. Data collection sheets will be kept in a safe place for a period of five years, with access to the principal author only (TBM).

3. Results

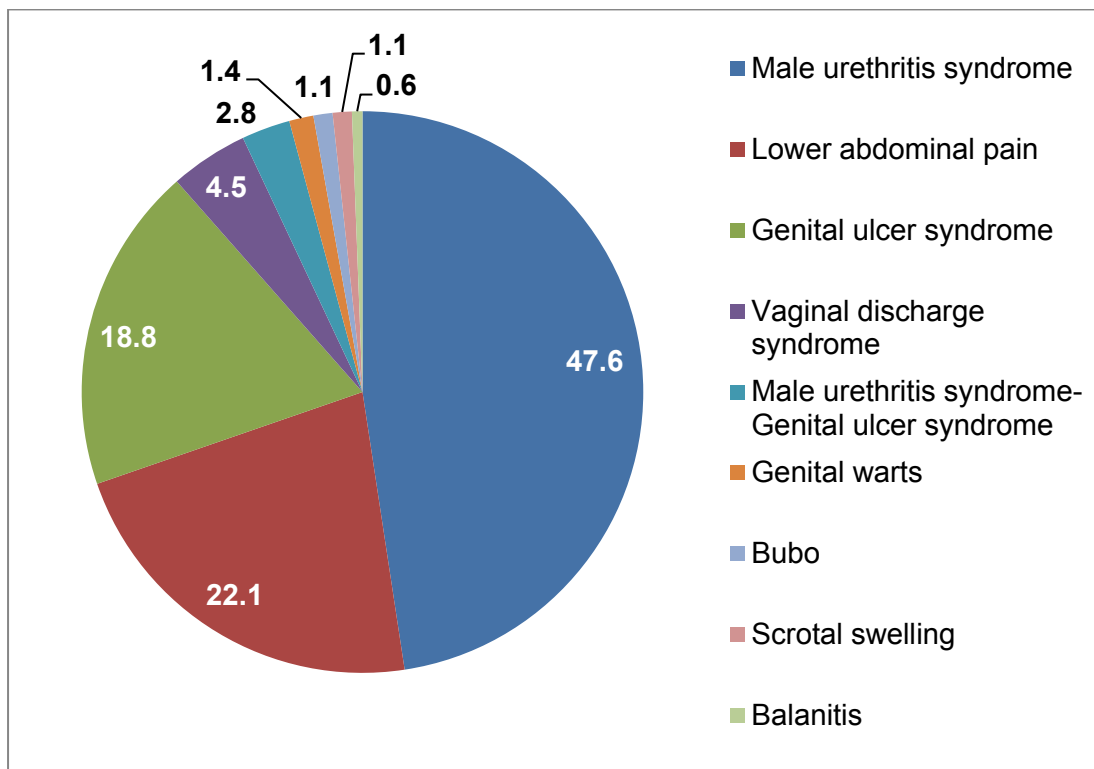
3.1 Prescriptions for STIs

The final sample included 357 prescriptions. Twenty eight (7.3%) of the 385 initially sampled prescriptions were not evaluable. The diagnosis indicated on these prescriptions did not match the STIs specified in the 2008 PHC STGs/EML and could therefore not be evaluated in terms of compliance with the 2008 PHC STGs/EML.

3.2 Sexually transmitted infections (STIs) treated

The frequency of the different STIs treated is summarised in Figure 1. From the 357 analysed prescriptions, the most common STI was male urethritis syndrome (MUS) which accounted for 170 (47.6%) of the prescriptions, followed by lower abdominal pain (79; 22.1%) and genital ulcer syndrome (GUS) (67; 18.8%). The STI which occurred least often was balanitis (2; 0.6%).

Figure 1: Frequency (%) of different STI syndromes treated at the two correctional centres (n=357)



Based on the 357 prescriptions analysed, a total number of 804 medicines were prescribed, which indicated an average of 2.28 medicines prescribed per prescription.

Figure 2 shows the different antibiotics prescribed for the treatment of STIs within the 357 prescriptions. A third of all prescriptions contained doxycycline (278; 32.5%), followed by ciprofloxacin (212; 24.8%) and metronidazole (111; 12.9%). Other antibiotics prescribed were cloxacillin and flucloxacillin although these are not recommended to treat any of the STIs; consequently, these were not analysed further.

Further analysis of prescribed antibiotics indicated that a majority were in the therapeutic category tetracyclines (36.6%) followed by fluoroquinolones (26.6%) and nitroimidazoles (14.6). The least prescribed category was macrolides, which made up of only 1.2% of antibiotics prescribed (Table 1).

Table 1: Percentage utilisation of antibiotics versus all medicines prescribed and broken down by ATC class

Medicine	Antibiotic classification	ATC code	Number of antibiotics within the total medicines prescribed*	% of antibiotics prescribed against total antibiotic usage (n=759) by ATC class
Azithromycin	Macrolides	J01FA	9 (1.1%)	1.2%
Ceftriaxone	Cephalosporin	J01DB/C	14 (1.6%)	1.8%
Penicillin G	Penicillins	J01CA	24 (2.8%)	3.2%
Erythromycin	macrolides	J01FA	26 (3.0%)	3.4%
Cefixime	Cephalosporins	J01DB/C	85 (9.9%)	11.2%
Metronidazole	Nitroimidazoles	P01AB	111 (12.9%)	14.6%
Ciprofloxacin	Fluoroquinolone	J01MA	202 (24.8%)	26.6%
Doxycycline	Tetracycline	J01AA	278 (32.5%)	36.6%

NB. % = % of prescriptions (n=357) containing the designated antibiotic

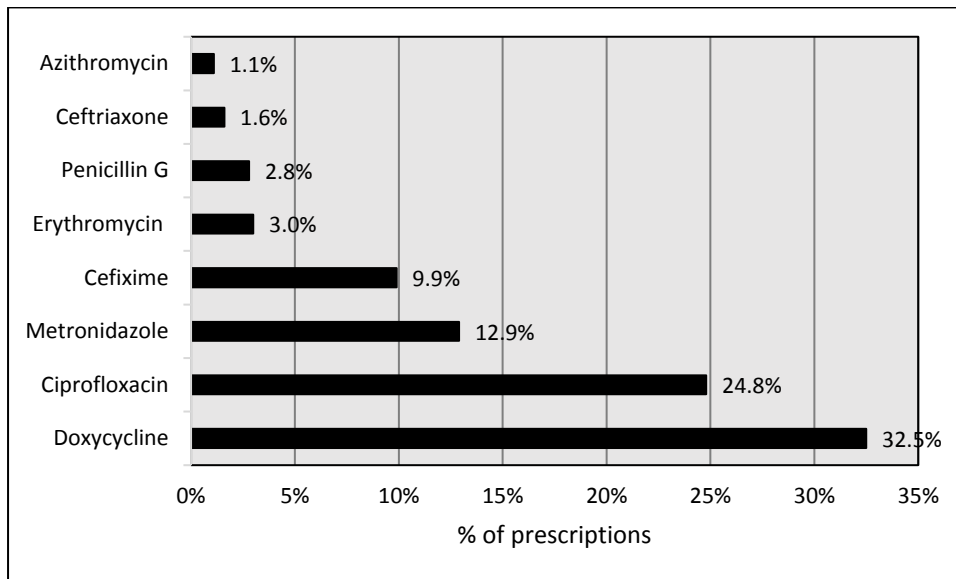
Additional to antibiotics, other medicines prescribed included paracetamol (19; 2.4%), ibuprofen (17; 2.1%) and other medicines (15; 1.9%) such as potassium citrate mixture, chlorpheniramine and vitamin B complex. Acyclovir (26; 3.2%) was the only antiviral prescribed and clotrimazole (16; 2.0%) was the only antifungal prescribed. Table 2 provides recommendations on the suggested treatment approaches to STIs as stipulated in the 2008 STG/ EML [22].

Table 2: Sexually transmitted infections and the management thereof as stipulated by the PHC STGs/EML

Condition	Treatment
MUS	Cefixime, oral, 400mg as a single dose and doxycycline, oral, 100mg 12 hourly for 7 days
SSW	Ceftriaxone, IM, 250mg as a single dose and doxycycline, oral, 100mg 12 hourly for 14 days
GUS	Benzathine benzylpenicillin, IM, 2.4MU single dose plus erythromycin, oral, 500mg 6 hourly for 7 days plus acyclovir, oral 400mg 8 hourly for 7 days
Bubo	Doxycycline, oral, 100mg 12 hourly for 14 days and ciprofloxacin 500mg 12 hourly for 3 days
Balanitis	Clotrimazole cream, applied 12 hourly for 7 days
Syphilis	Benzathine benzyl penicilin 2.4mu as a single dose
GW	Podophyllin solution 20%
PL	Benzyl benzoate 25%
LAP	Ceftriaxone, IM, 250mg single dose and doxycycline, oral, 100mg 12 hourly for 14 days and metronidazole, oral, 400mg 12 hourly for 14 days
VDS	Cefixime, oral, 400mg as a single dose and doxycycline, oral, 100mg 12 hourly for 7 days and metronidazole, oral, 2g as a single dose
MC	Iodine tincture

Source: 2008 PHC STGs/EML [22]

Figure 2: Antibiotics prescribed for STIs



NB. % = % of 357 prescriptions containing the designated antibiotic

3.3 Compliance of individual drugs with the 2008 PHC STGs/EML

Each individual medicine prescribed for the treatment of the specific STI indicated by the diagnosis, was evaluated for compliance with the 2008 PHC STGs/EML (Table 2). This was undertaken by determining whether the medicine, the dosage, the dosage interval and the duration of treatment were compliant with the recommendations (see Table 3).

Doxycycline, the most commonly prescribed antibiotic, was prescribed as an individual item according to the 2008 guideline in 95.0% of the prescriptions, ciprofloxacin in 90.6% of prescriptions, metronidazole in 90.1% of prescriptions and cefixime in 82.4% of prescriptions (Table 3). Other medicines included acyclovir with 25 out of the 26 prescriptions being compliant with the treatment in the 2008 guideline, clotrimazole with 14 out of the 16 being compliant and podophyllin being compliant in all 3 prescriptions for genital warts.

In 688 (80.5%) of the medicines prescribed, the dosage was compliant with the 2008 guideline, the dosage for 82 (9.6%) drugs was non-compliant and for 34 (3.9%) medicines, no dosage was indicated (Table 3).

The duration of treatment was compliant and non-compliant with the 2008 guidance in 346 (40.5%) and 110 (12.9%) of the prescriptions respectively, and was not indicated in 348 (40.7%) of the medicines prescribed. Lastly, the interval was compliant and non-compliant in 637 (74.5%) and 134 (15.6%) of the medicines prescribed according to the 2008 guideline respectively.

Table 3: Compliance of individual drugs prescribed for the treatment of STI syndromes with the 2008 STGs/EML

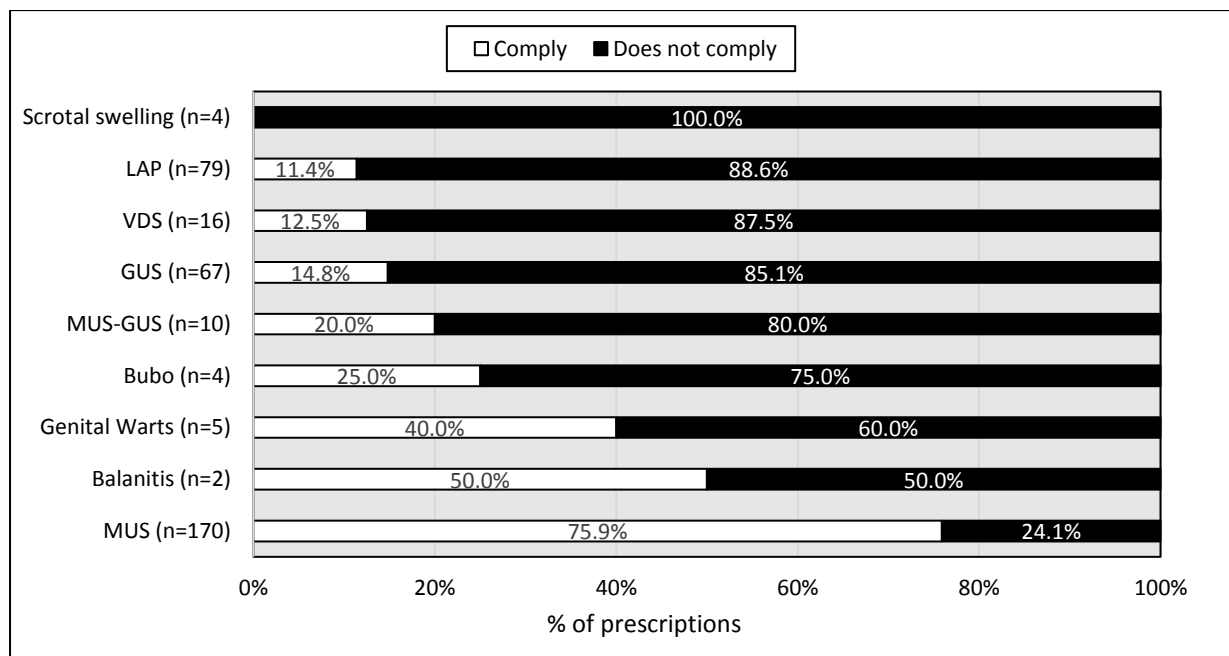
Antibiotic prescribed	Drug		Dosage			Dosage interval			Duration of treatment			Overall compliance (combining all factors)
	Compliant	Non-compliant	Compliant	Non-compliant	No information	Compliant	Non-compliant	No information	Compliant	Non-compliant	No information	
Doxycycline	264 (95.0%)	14 (5.0%)	260 (93.5%)	15 (5.4%)	3 (1.1%)	252 (90.6%)	15 (5.4%)	11 (4.0%)	65 (23.4%)	16 (5.6%)	197 (70.9%)	60 (21.6%)
Ciprofloxacin	192 (90.6%)	20 (9.4%)	188 (88.7%)	20 (9.4%)	4 (1.9%)	165 (77.9%)	45 (21.2%)	2 (1.0%)	124 (58.5%)	47 (22.2%)	41 (19.3%)	118 (55.7%)
Metronidazole	100 (90.1%)	11 (9.9%)	88 (79.3%)	20 (18.0%)	3 (2.7%)	67 (60.4%)	42 (37.8%)	2 (18.0%)	35 (31.5%)	21 (18.9%)	55 (49.5%)	31 (27.9%)
Cefixime	70 (82.4%)	15 (17.6%)	68 (80%)	15 (17.6%)	2 (1.8%)	68 (80%)	15 (13.5%)	2 (2.4%)	64 (75.3%)	15 (17.6%)	6 (7.1%)	62 (72.9%)
Acyclovir	25 (96.2%)	1 (3.8%)	16 (61.5%)	1 (3.8%)	9 (34.6%)	20 (76.6%)	1 (3.8%)	5 (1.9%)	11 (42.3%)	1 (3.8%)	14 (53.8%)	10 (38.5%)
Benzathine benzylpenicillin	22 (91.7%)	2 (8.3%)	22 (91.7%)	2 (8.3%)	0	20 (83.3%)	2 (8.3%)	2 (8.3%)	20 (83.3%)	2 (8.3%)	2 (8.3%)	15 (62.5%)
Erythromycin	21 (80.8%)	5 (19.2%)	21 (80.8%)	5 (19.2%)	0	19 (73.1%)	5 (19.2%)	2 (7.7%)	5 (19.2%)	5 (19.2%)	16 (61.5%)	3 (11.5%)
Clotrimazole	14 (87.5%)	2 (12.5%)	6 (37.5%)	3 (18.8%)	7 (43.8%)	4 (25.0%)	8 (50.0%)	4 (25.0%)	1 (6.3%)	2 (12.5%)	13 (81.3%)	1 (6.3%)
Ceftriaxone	13 (92.9%)	1 (7.1%)	10 (71.4%)	1 (7.1%)	3 (21.4%)	13 (92.6%)	1 (7.1%)	0	13 (92.6%)	1 (7.1%)	0	7 (50.0%)
Azithromycin	9 (100.0%)	0	9 (100.0%)	0	0	9 (100.0%)	0	0	8 (88.9%)	0	1 (11.1%)	8 (88.9%)
Podophyllin	3 (100.0%)	0	0	0	3 (100.0%)	0	0	3 (100.0%)	0	0	3 (100.0%)	0

3.4 Compliance to the 2008 PHC STGs/EML for STI treatment

Although individual antibiotics prescribed typically complied with the 2008 PHC STGs/EML (Table 3), compliance levels for combined treatment for specific STI diagnoses were variable (Figure 3). As mentioned, all aspects of compliance, i.e. the name of medicine, dosage, dosage interval and duration of treatment, have been equally weighted to arrive at a conclusion as to whether the prescription is compliant or not.

Compliance with the 2008 PHC STGs/EML for MUS prescriptions was 75.9% (129 prescriptions, 95% confidence interval (CI) 68.9% - 81.7%), for lower abdominal pain (LAP) compliance was 11.4% (9 prescriptions, 95% confidence interval (CI) 6.1% - 20.3)) and 14.9% (10 prescriptions, 95% confidence interval (CI) 8.3% - 25.3%) for genital ulcer syndrome (GUS). Confidence intervals for VDS, MUS-GUS, Bubo, Balanitis and Genital Warts were not documented as they were not reliable due to very small sample sizes.

Figure 3: Percentage of prescriptions compliant to the 2008 PHC STGs/EML for the treatment of different STIs (n=357)



NB: Lower abdominal pain (LAP); vaginal discharge syndrome (VDS); genital ulcer syndrome (GUS); male urethritis syndrome (MUS)

3.5 Compliance to the 2008 PHC STGs/EML for MUS prescriptions

The 2008 PHC STGs/EML specifies cefixime and doxycycline as first line treatment for MUS with the addition of metronidazole for recurring cases of MUS infection. Ciprofloxacin is indicated in patients with a known allergy to cefixime. Table 4 documents current compliance rates to the 2008 PHC STGs/EML.

Table 4: Compliance with 2008 PHC STGs/EML of antibiotics prescribed for MUS (n=170)

Compliant			Non-compliant	
Medicine	First encounter	Recurrent	Medicine	No (%)
	No (%)	No (%)		
cefixime + doxycycline	26 (15.3%)		doxycycline	2 (1.2%)
cefixime + doxycycline + ibuprofen	1 (0.6%)		doxycycline + metronidazole +	2 (1.2%)
cefixime + doxycycline + potassium citrate mixture	1 (0.6%)		doxycycline + metronidazole + paracetamol	1 (0.6%)
cefixime + doxycycline + metronidazole		9 (5.3%)	cefixime + metronidazole	1 (0.6%)
cefixime + doxycycline + metronidazole + paracetamol		1 (0.6%)	erythromycin + acyclovir topical	1 (0.6%)
ceftriaxone + doxycycline	2* (1.2%)		azithromycin + ceftriaxone +metronidazole	2(1.2%)
Sub-total	30 (17.6%)	10 (5.9%)	azithromycin + ceftriaxone + metronidazole	2 (1.2%)
	40 (23.5%)			
Ciprofloxacin + doxycycline	78 (45.9%)		Benzathine benzylpenicillin + erythromycin + paracetamol	2 (1.2%)
Ciprofloxacin + doxycycline + metronidazole		11 (6.5%)	Benzathine benzylpenicillin + erythromycin	1 (0.6%)
Sub-total	78 (45.9%)	11 (6.5%)	Others	23 (13.5%)
	89 (52.4%)			
Total	108 (63.5%)	21 (12.4%)	Total	41 (24.1%)
Grand total	129 (75.9%)		41 (24.1%)	

* Therapeutic alternative

Table 4 shows that only 38 (22.4%) MUS prescriptions containing cefixime complied with the 2008 PHC STGs/EML, signifying low compliance. However, assuming that all patients allergic to cefixime were prescribed ciprofloxacin, the compliance of MUS prescriptions increases to 129 (75.9%) combined with two prescriptions containing ceftriaxone, as a therapeutic alternative to cefixime.

3.6 Compliance with the 2008 PHC STGs/EML for LAP prescriptions (n=79)

The 2008 PHC STGs/EML outlines ceftriaxone, doxycycline, and metronidazole as first line treatment for LAP which is the second most common STI in the study and accounted for (79; 22.1%) of prescription. Patients allergic to penicillin might also react to cephalosporins such as ceftriaxone and should be treated with ciprofloxacin. Table 5 documents the prescribed antibiotics for LAP. The analysis of the prescribed antibiotics shows that only 11.4% (9 prescriptions) of LAP prescriptions complied with the treatment as outlined in the 2008 PHC STG/EML signifying low compliance levels.

Table 5: Antibiotics prescribed for LAP (n=79)

Medicine	No	Medicine	No
Cefixime	1	Ciprofloxacin + Doxycycline + Metronidazole	6
Cefixime + Doxycycline + Metronidazole	15	Ciprofloxacin + Ibuprofen	6
Ceftriaxone + Doxycycline	2	Ciprofloxacin + Metronidazole	4
Cefixime + Doxycycline + Metronidazole + Mist Pot Cit	1	Ciprofloxacin + Mist Pot Cit	1
Ciprofloxacin	12	Ciprofloxacin + Paracetamol	5
Ciprofloxacin + Clotrimazole + Doxycycline + Metronidazole	1	Ciprofloxacin + Vitamin B Co	1
Ciprofloxacin + Doxycycline	8	Doxycycline	1
*Ciprofloxacin + Doxycycline + Metronidazole	9 (11.4%)	Flucloxacillin + Metronidazole	1
Ciprofloxacin + Erythromycin	1	Erythromycin + Metronidazole	4

3.7 Compliance to the 2008 PHC STGs/EML for GUS prescriptions

For GUS, the third most common STI, accounting for (67; 18.8%) of all STI prescriptions, Benzathine benzylpenicillin, erythromycin, plus acyclovir are recommended as first line treatment in the 2008 PHC STGs/EML. From the total of 29 different antibiotic combinations, only 14.9% (10 prescriptions) were compliant with the treatment as indicated in the 2008 PHC STG/EML.

3.8 Perceptions of prescribers on factors contributing to compliance with, or deviations from the 2008 STGs/EML

3.8.1 Responses by prescribers on the use of the 2008 PHC STGs/EML

All eight prescribers interviewed indicated that they used the 2008 PHC STGs/EML when treating STIs. Six prescribers' reason for using the 2008 guidance when treating STIs was because it was a national guideline, two indicated that they use it because there was no alternative and the guideline contained the treatment they use for different diseases. Only one prescriber indicated that it was the most cost-effective way to treat STIs.

Although only one of the prescribers indicated the cost-effectiveness of using the 2008 guidance in treating STIs, when a direct question was posed to all prescribers as to whether they thought the guidelines was the most cost-effective way to treat STIs, they all agreed with this statement.

The prescribers further provided the following reasons as to why they thought that the guidelines were cost-effective:

- Most of the treatments are available
- General measures such as health education are also included
- Most of the medicines in the 2008 PHC guidance are not costly and actually do work
- Proper management that prevents additional costs associated with referrals

- Standard treatment for more common conditions and therefore only needed to keep required stock
- Treatment always has positive outcomes
- Medicines are well researched by experts

Although prescribers indicated that they use the 2008 PHC STGs/EML when treating STIs, two prescribers specified that there are instances where they are unable to fully utilise it such as when certain medicines used to treat STIs are not available.

3.8.2 Induction on the use of the 2008 PHC STGs/EML

Five prescribers reported that they were inducted on the use of the 2008 PHC STGs/EML and that the induction was useful, while three of the prescribers reported that they were not inducted. One out of the five prescribers indicated that the induction took place in 2008 when the 2008 PHC STGs/EML was launched while the rest reported that their induction took place only at a later stage after the 2008 PHC STGs/EML was launched, i.e. between 2009 and 2011.

Specific reasons provided as to why they thought the induction was useful included the following:

- Provided guidance on how STI and HIV contacts can be traced and assisted with counselling and how to better manage STIs and HIV
- Enabled one to do a proper diagnosis and choose the correct treatment
- Explained the details and the step by step management
- New information was included and had to be implemented
- Theory was translated to practice, build intelligence and assist in reaching the goal of clinical care

3.8.3 Performance of self-audits

When the eight interviewed prescribers were asked whether they performed self-audits to check if they complied with the 2008 PHC STGs/EML when managing STIs, four prescribers indicated that they do not, while the other four confirmed that they do perform self-audits.

The reasons provided by those who performed self-audits as to why and how they do the audits, included the following:

- During consultation with the patients there is no time to look at the guidelines and performing self-audits later on provides information on whether the correct treatment was issued to the patient
- To verify if the correct treatment was provided during consultation with the patient
- Use own knowledge when consulting patients and only refer to the 2008 PHC STGs/EML when there is a need to double check
- To check how many patients were treated according to the 2008 PHC STGs/EML

The reasons provided by those who did not perform self-audits included limited time and shortage of staff, which makes it impossible to perform the audits. The sessional medical practitioner indicated that there is no time, as they are only at the facility two days per week, for a maximum of two hours per day.

3.8.4 Compliance to the 2008 PHC STGs/EML as part of performance evaluation

Five prescribers mentioned that compliance to the 2008 guidance forms part of their performance evaluation and this encouraged them to use the guidelines, while three said it did not form part of their performance evaluation.

3.8.5 Training in effective prescribing and rational medicines use

The medical practitioner was the only prescriber who reported to have been trained in effective prescribing and rational medicines use. This was despite five prescribers indicating that they have been inducted in the use of the 2008 PHC STGs/EML, which could be viewed as training on rational medicines use.

3.9 Concomitance of HIV and how it affects the diagnosis and treatment of STIs

The prescribers were further asked if they thought diagnosing STIs in patients with concomitant HIV infection was difficult or not. Although they indicated that concomitant HIV infection does not affect the

ease of diagnosing STIs, they also believed that cases are different and they provided the following reasons:

- Certain patients in correctional centres do not provide accurate information or they do not disclose all the information, making it difficult for proper diagnosis
- Some HIV positive patients present with opportunistic infections which can be misdiagnosed as STIs
- STIs present differently in males and females
- STIs are complicated in immunocompromised patients
- Additional medicines might be required in patients having other HIV related opportunistic infections
- Patients that are non-compliant with their antiretroviral treatment do not respond well to STI treatment requiring additional medicines to be added

4. Discussion

The results showed generally low compliance levels with the 2008 guidelines in the management of STIs among correctional facilities in SA. However, this was variable (Figure 2). Compliance levels were 14.8% for GUS, 12.5% for VDS and 11.4% for LAP; however 75.9% for MUS (Table 4.5; Figure 2). These findings are similar to those of Igbojiaku *et al.* (2013) in a regional hospital in Kwazulu-Natal where low compliance levels with diabetic guidelines was reported [28]. Another study conducted in Kwazulu-Natal found only 38% of prescriptions were compliant with the guidelines [27]. However, different to the findings of Sooruth *et al.* where professional nurses working in PHCs in Kwazulu-Natal appeared to be prescribing rationally according to the 2008 STG/ EML; although, concerns with scheduling and administration of medicines [29].

However, there were typically higher compliance levels with the 2008 PHC STGs/EML when assessing individual antibiotics when managing specific STIs (Table 3). Azithromycin was prescribed according to the 2008 PHC STGs/EML in 100% of the prescriptions, doxycycline in 95%, followed by ceftriaxone with 92.9% and erythromycin in 80.8% of prescriptions. These findings are contrary to those of Wang *et al.* (2014) reporting on antibiotics prescribed in Chinese PHC facilities [30], which is encouraging.

There were concerns with the duration of treatment in our study, where in 40.5% of occasions this was inappropriate (Table 2). However, the interval was compliant in 74.5% and the dosage compliant in 80.5% of antibiotics prescribed respectively. This shows that although the appropriate antibiotic was prescribed, prescribers sometimes failed to prescribe the appropriate duration, interval and dosage.

Even though the prescription analysis showed compliance to the 2008 PHC STGs/EML was typically low, prescribers stated in the interviews that they utilised the guideline when managing STIs (Section 3.8.1). This reflects findings among PHC facilities in Botswana where STI STGs were generally available compared with STGs and documents for other disease areas [12]. Prescribers further stated that they have been inducted on the use of the guidelines, and this was useful (Section 3.8.2), compliance formed part of their performance evaluation and that regular self-assessments were conducted. However, differences between beliefs and the current situation needs to be investigated further to reduce the threat of AMR [6]. This is because whilst the eight prescribers interviewed indicated they had received training on the utilisation of the 2008 PHC STGs/EML, and that the training was useful (Section 3.6), this was only conducted later after the implementation of the 2008 PHC STGs/EML and this might have contributed to their low compliance levels.

Two barriers appeared to negatively impact on compliance with the 2008 PHC STGs/EML. These included the non-availability (shortage) of certain STI medicines and the fact that some of the STI medicines were not kept as clinic stock. This is similar to the findings of Engelbrecht (2010) [31] and Mash *et al.* [7]. In addition, according to Engelbrecht [31], lack of training on the importance of and implementation of guidelines also contributes to their non-compliance.

4.1 Limitations

We recognise that a major limitation of this study is that it was only conducted in two correctional centre PHC facilities. Furthermore, sampling STI prescriptions utilising medicines in the MAR might have led to some prescriptions being missed if these were not recorded in the MAR. In addition, patient factors such as allergy status were not always recorded. We are also aware that the 2008 PHC STGs/EML was reviewed and the 2014 edition was published in 2015 after data collection was complete. The new edition makes reference to the inclusion of the level of evidence and practice implications as decision-making criteria for inclusion of medicines in the guidelines. These changes however did not have any meaningful impact on the findings of this study.

Consequently, we believe our findings are robust in view of the characteristics of the correctional centres chosen. In addition, the differences between the findings from the treatment charts and prescriber feedback are worth future investigation. Consequently, further research will be conducted across the country in different PHC facilities to further assess compliance with STGs/EML when treating infectious diseases such as STIs to develop additional recommendations to enhance the management of patients with STIs across SA, thereby reducing AMR rates. These will build on the recommendations that can already be made following this research.

4.2 Recommendations

In order to improve compliance with the PHC STGs/EML, we believe it is important that health professionals, especially clinical nurse practitioners are inducted on the use of STGs/EML as soon as possible after their finalisation and publication. This sentiment has been echoed by the National Commissioner of DCS when he highlighted the need to provide health care workers with the necessary training to enable them to execute their duties appropriately [10]. We believe regular refresher training courses should also be conducted to ensure prescribers are continuously sensitized on using the PHC STGs/EML. This is especially important in the PHC model that places clinical nurse practitioners at the centre of health provision [29], similar to other countries [13].

We also believe in view of our findings that communication between prescribers and pharmacists must be strengthened so that its clear which STIs are being treated so that the appropriate recommended medicines are readily available. To address stock outs, pharmacists and pharmacy support personnel should undergo regular refresher training on medicine supply management. In addition, we believe the introduction of a managerial monitoring tool to assess future prescribing patterns should also be implemented. The findings should be utilised by operational and regional managers to further improve future prescribing. This has worked well in other countries [18, 19].

Pharmacists can also play a leading role in promoting the use of STGs/EML in PHC facilities, conducting drug utilisation reviews and using the findings to stimulate discussions to further enhance the rational use of medicines among PHC facilities in SA. Antimicrobial stewardship programmes can also be implemented across sectors in order to improve antibiotic prescribing, monitor antimicrobial usage and implement interventions to optimise antimicrobial use to reduce antibiotic resistance. Pharmacists and other healthcare professionals can play a leading role in this. The success of these interventions in improving compliance rates has been seen in countries [18, 19].

Key points

- Globally, sexually transmitted diseases are among the most common acute conditions with significant public health concerns, with STIs being the second leading cause of health life years among women aged 15 – 44 years in Africa
- Consequently, correct treatment is important especially as sub-optimal treatment will increase antimicrobial resistance. This is particularly important in Primary Health Care centres in Africa including South Africa, especially correctional centres with a greater prevalence of STIs

- Male urethritis syndrome, lower abdominal pain and genital ulcer syndrome were the three most common STIs found among inmates in correctional centres in SA, with doxycycline, ciprofloxacin and metronidazole the most prescribed antibiotics
- Overall compliance to the 2008 PHC STGs/EML was low for the STIs, although doses were compliant in over 80% of prescriptions. There is a need to improve this through educational and other activities

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Author contributions

TBM, EH and JCM conceptualized the study and devised the protocol. TBM collected the data under the supervision of EH and JCM. TBM and JCM analysed the data in consultation with a statistician. TBM wrote the first draft of the manuscript. All authors were involved in data interpretation and critiquing the first and subsequent drafts of the manuscript. All authors approved the final submission.

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(* = of importance, ** = of considerable importance)

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Appendix

Appendix 1 - Compliance to the Primary Health Care Treatment Guidelines and Essential Medicines List in the Management of Sexually Transmitted Infections

Date: _____

TICK (✓) THE APPROPRIATE BOX BELOW

Qualification:

MBCHB	
B Curr	
Other	

Gender:

Male	Female

Age:

≤ 20 years	21-30 years	31-40 years	≥40 years

Years of experience:

<1 year	1-5 years	5-10 years	>10 years

1. Do you use the 2008 PHC STGs/EML in the treatment of STIs in the clinic?

[Please tick (✓) the correct answer]

Yes	No
-----	----

If yes, can you please explain why?

.....

If not, please explain why you are not using it?

.....

2. Were you ever inducted on the use of the 2008 PHC STGs/EML?

[Please tick (✓) the correct answer]

Yes	No
-----	----

If yes, please indicate when you were inducted.

.....

Was the induction useful?

[Please tick (✓) the correct answer]

Yes	No
-----	----

Please motivate your answer.

.....

.....

If no, would you be interested in attending such training?

[Please tick (✓) the correct answer]

Yes	No
-----	----

Please motivate your answer.

.....

.....

3. Which other guidelines are you using for the management of STIs in the clinic?

.....

.....

In what way do these guidelines differ from the 2008 PHC STGs/EML, please explain your answer?

.....

.....

4. Do you think the 2008 PHC STGs/EML is the most cost-effective way to treat STIs?

[Please tick (✓) the correct answer]

Yes	No
-----	----

Please motivate why you think so.

.....

5. Please explain what do you understand by the word “compliance”?

.....

.....

6. Please explain what you understand by “Compliance to PHC STGs/EML”?

.....

.....

7. In your opinion, do you think that you comply with the 2008 PHC STGs/EML when treating patients with STIs?

[Please tick (√) the correct answer]

Yes	No
-----	----

Please motivate your answer.

.....
.....

8. What do you think affects your compliance to the 2008 PHC STGs/EML when treating patients with STIs?

.....
.....

Please explain why you think so.

.....
.....

9. Do you ever perform a self-audit to assess you compliance to the 2008 PHC STGs/EML?

[Please tick (√) the correct answer]

Yes	No
-----	----

If yes, please explain why?

.....
.....

How do you perform this self-audit?

.....
.....

If no, please explain why you are not?

.....
.....

10. Does your compliance to the 2008 PHC STGs/EML form part of your performance evaluation?

[Please tick (√) the correct answer]

Yes	No
-----	----

If yes, please state how it influences your compliance.

.....
.....
11. Did you attend the following training sessions in the past twelve months?

[Please tick (√) the applicable one]

Rational Medicines Use	
Effective Prescribing	

12. Have you had any formal training in Primary Health Care?

[Please tick (√) the correct answer]

Yes	No
-----	----

If not, what type of training have you received?

.....
13. Do you experience any difficulty in diagnosing STIs?

[Please tick (√) the correct answer]

Yes	No
-----	----

If yes, what do you think is the cause of that?

.....
14. How does the concomitance of HIV affect the ease of diagnosis of STIs?

.....
15. How does the concomitance of HIV affects the treatment of STIs?

.....
THANK YOU FOR YOUR TIME

