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Factors influencing antibiotic prescription for respiratory tract infections among prescribers in Jinja City, Uganda: a qualitative study

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Abstract

Background Inappropriate antibiotic prescription for respiratory tract infections (RTIs) is a major driver of antimicrobial resistance (AMR). In Uganda, 40–80% of RTI patients receive antibiotics (ABs) despite most of them being viral and self-limiting. Few studies have explored the multifaceted factors influencing prescribing behavior among Ugandan healthcare providers. This study aimed to identify factors influencing antibiotic prescription (ABP) for RTIs among prescribers in Jinja City, Uganda.

Methods We conducted an exploratory qualitative study using face-to-face in-depth interviews with 16 prescribers (10 medical clinical officers, 5 nurses, 1 medical officer) from 10 purposively selected public health facilities in Jinja City during June–July 2023. Interview topics included knowledge of RTI etiology, antibiotic (AB) prescribing practices, availability of standard treatment guidelines (STGs) and diagnostics, and continuous education on AB use. Audio-recorded responses were transcribed verbatim, coded, and analyzed thematically using the Social Ecological Model to identify multilevel factors influencing prescribing decisions.

Results The factors influencing ABP for RTIs were categorized into individual, interpersonal, institutional, community and ministry of health (MOH) and government policy factors. Individual-level factors included prescriber related factors and state of the patient considerations. Interpersonal factors involved prescriber–patient relationship and interactions with drug sales representatives. Institutional factors included initiatives to promote rational AB use by the facility's management. Community-level factors included AB access and socioeconomic environment. Ministry of health and government policy factors included healthcare delivery infrastructure, educational and training programs, STGs, enforcement of regulations for prescription and dispensing.

Conclusions Multiple interrelated factors at individual, interpersonal, institutional, community, and policy levels contribute to inappropriate AB prescribing for RTIs in Jinja City. Addressing this challenge requires multipronged interventions. These findings provide actionable evidence for developing context-specific interventions to promote rational AB use and combat ABR in Uganda and similar low-resource settings.

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Keywords Antibiotic prescribing, Respiratory tract infections, Antimicrobial resistance, Prescriber behavior, Antibiotic stewardship

Introduction

Forty to eighty% (40–80%) of the patients with RTIs continue to receive ABs in low- and middle-income countries [1]. This is not different in Uganda where the proportion of encounter with ABP among RTI patients is 40–80% [2, 3]. The high rates are influenced by the fear among clinicians of the repercussions for withholding or delaying ABs and the fact that there has been reduction in hospitalization from pneumonia when ABs are not delayed among patients with RTIs [4]. Health settings in low- and middle-income countries have limited point of care diagnostic tests (POCTs) leaving clinicians to rely on clinical presentation of the patients. This presents uncertainty for delaying ABs and contributes to their persistent inappropriate use [5–7]. The factors that influence ABP lead to their inappropriate use that is signified by rates exceeding 20–30% among RTIs [8, 9]. Studies indicate that about 30–50% of ABs used globally are prescribed inappropriately [10–12]. Respiratory tract infections constitute the highest morbidity in which ABs are prescribed inappropriately. In UK alone, general practitioners on average prescribed ABs to 52% of patients with self-limiting RTIs including common cold, acute cough, bronchitis, otitis media, sore throat and rhinosinusitis [13].

Most respiratory tract diseases are predominantly viral and do not require treatment with ABs [14]. According to World Health Organization (WHO), misuse and overuse of ABs are the main drivers of antibiotic resistance (ABR) [15]. Misuse and overuse of ABs are also associated with unnecessary high health expenditure and poor treatment outcomes [16]. Overuse and misuse of ABs can be partly caused by non-adherence to STGs [17]. Bacterial ABR caused 1.27 million death in 2019, and this is estimated to rise to 10 million yearly in 2050s [18]. Respiratory tract infections are morbidities of high prevalence consisting of 42.8% of the global burden of disease [19] and 29.8% of out-patients in Uganda [20]. This calls for greater attention to them in the bid to fight ABR.

The benefits of withholding/delaying ABs for RTIs outweigh the risks that may arise from their misuse [4, 13]. The National Institute of Health and Clinical Excellence (NICE) clinical guidelines describe the circumstances in which ABs can be withheld/delayed or prescribed for self-limiting RTIs in an effort to reduce AB [21]. The World health organization's Global Action Plan on Antimicrobial resistance (AMR) and the Uganda's AMR National Action Plan 2018–2023 [22, 23] triggered studies in Uganda that determined the prevalence of ABP among RTIs patient. The prevalence of AB use for RTIs (40–80%) found by these

studies was high [3, 24–26]. Few studies have been done in Uganda to understand the factors that continue to influence AB prescription for RTIs. We set out to study the factors that influence prescription of ABs for RTIs in Jinja City.

Methods

Study setting

Jinja City is found in the Eastern region of Uganda. It has 26 public health facilities: 13 health centers (HCs) II, 8 HCs III, 4 HCs IV and 1 Regional Referral Hospital [27]. Uganda's health system consists of facility service levels with increasing complexity in volume and specialized services across the hierarchy to allow referral of patients from lower to higher facility service levels. The lowest level is the HCs I at village level, consisting of village health team, followed by HCs II at parish level, HCs III at sub county level, HCs IV at county level and general hospital at district level. The region is served by a regional referral hospital and the national referral hospitals serves the whole nation. The study was conducted in purposively selected health facility service levels, namely: regional referral hospital, HCs IV and HCs III to get a significant number of participants involved in prescribing at outpatient departments.

Out patients in public health facilities in Jinja City and elsewhere in Uganda are attended to for diagnosis and prescribing by prescribers whose professional category depend on the health facility level and the policies put in place by the facility in-charge. At regional referral hospitals and HCs IV, the designated prescribing cadres are Medical Officers holding Bachelor of medicine and Bachelor of Surgery (MBChB) degrees and Medical Clinical Officers (MCOs) with diplomas in clinical medicine and community health. Health centers III have MCOs as the designated prescribers. In some HCs IV and HCs III, Nurses with various levels qualification have been found prescribing. The various nursing professional qualification levels for nurses in Uganda include: Enrolled nurse who have a certificate, assistant nursing officers have diplomas and nursing officers have a bachelor's degree in nursing. The cost of medicines in public health facilities is met by the government of Uganda and patients don't pay for them. Uganda Clinical Guidelines (UCG) are the recommended STGs among all age groups but integrated management for child hood illness is also used when managing child hood illnesses including RTIs.

Study design and participants

We used the exploratory qualitative study design for our study. An in-depth interview guide (S1 File) was developed based on literature search [28–31] and adapted to the local context. All Health workers who participated in prescribing at outpatient departments in selected public health facilities were eligible for participation. The participants were from 10 of the 11 public health facilities that had been purposively selected in order to get at least 30 prescribers as per preliminary survey conducted. These included 1 regional referral hospital, 4 HC IV, 6 HC IIIs. Jinja Regional Referral Hospital (RRH) was selected for being the only public RRH in Jinja City with the highest number of prescribers. All the four HC IVs were included for their high number of prescribers. Six out of eight HC IIIs in Jinja City were selected by simple random sampling. Prescribers from one of the six selected HC IIIs opted not to be interviewed. HC IIs were excluded because of having few prescribers, very limited drug classes and low cadre of health professionals.

Data collection

An in-depth interview guide (S1 File) was developed based on literature search and adapted to the local context. The guide was pre-tested with 3 prescribers in June 2023 to familiarize the interviewer with the questions, refine questioning techniques, adjust the flow and structure of questions, and practice recording and saving of audio responses. Based on the pre-testing, the interview guide was adjusted accordingly before the main data collection phase.

Face to face interviews were conducted with 16 prescribers after which saturation, when no new information was received from respondents was achieved [32–34]. The interviews were conducted in a private consultation room having only the interviewer and the participant. Each interview took an average of 25 min. The first cycle of interviews included one prescriber from each of the 10 facilities to ensure representation from all selected facilities.

Participants were visited by the first author (ZKI) physically at the facility in the consultation room from which they prescribed, for their recruitment. Their telephone contacts were obtained and appointments for face-to-face interviews were secured. Most prescribers opted to be interviewed during the morning before starting the day's work, while few opted to be interviewed during lunch break or beyond 4:00 PM after completing their work.

The first author (ZKI) conducted all interviews in private consultation rooms and recorded the voice responses. The interview began with general questions

to help reduce anxiety from respondents. Open-ended questions were asked during the interview to which responses were given. Probing questions were used to encourage prescribers to elaborate on factors they had initially left out as part of their responses. Efforts to trigger honest responses were ensured by building relationship with prescribers during abstraction of data that has been used for a different article. Each respondent was identified by a specific unique code. A total of 16 prescribers were interviewed.

Data analysis

ZKI (a senior pharmacist and masters of public health student) listened to the voice audio recording captured from each prescriber and transcribed it into a written text. The written transcript (S2 File) from all the audio interviews was analyzed manually by ZKI following steps of thematic analysis with an inductive approach and basing on the social ecological model [35, 36]. ZKI and EB read the transcript several times on separate days so as to get familiar with all responses and developed meanings from which codes, subthemes and themes were generated. The audio recordings, transcript and analyzed data were shared with JK (an experienced qualitative researcher) to do the refining. Analysis was repeatedly discussed between ZKI, EB and JK until consensus was reached.

Results

The demographic characteristics of 16 prescribers whose views were obtained were summarized by age, professional category and sex (Table 1). They consisted of male 12 and females 4 and by profession Medical Clinical Officers 10, medical officer 1 and nurses 5. Thematic analysis following the social ecological model revealed multi-level influences on prescribing behavior that were grouped into five levels ranging from individual level factors to broader MOH and government policies that influenced ABP for RTIs in Jinja City (Table 2).

Individual level

At the core of the model, individual-level factors represent the most proximate influences on AB prescribing decisions. These factors are divided into two themes: prescriber-related factors and state of the patient considerations. The prescriber related factors included knowledge of pathogenesis of RTIs, fear of repercussions of delaying an AB, prescribing practices evolving with experience and skepticism toward STGs. State of the patient considerations included the severity of the condition, prolonged symptoms and re-attendance, age of the patient and perceived immune status.

Table 1 Socio-demographics of participants

Code	Age	Sex	Professional category	Health facility level
HC4MOCID1	37	male	Medical officer	HC4
HC4MCOID1	28	male	Medical clinical officer	HC4
HC4MCOID2	29	male	Medical clinical officer	HC4
RRHCOID3	41	male	Medical clinical officer	RRH
HC4MCOID4	48	male	Medical clinical officer	HC4
RRHMCOID5	37	male	Medical clinical officer	RRH
HC4MCOID6	42	male	Medical clinical officer	HC4
HC3MCOID7	42	male	Medical clinical officer	HC3
HC3MCOID8	46	male	Medical clinical officer	HC3
RRHMCOID9	32	male	Medical clinical officer	RRH
HC4MCOID10	44	female	Medical clinical officer	HC4
HC306ENID1	32	male	Enrolled nurse	HC3
HC3ANOID1	32	female	Assistant nursing officer	HC3
HC3ANOID2	39	male	Assistant nursing officer	HC3
HC4ANOID3	36	Female	Assistant nursing officer	HC4
HC3NOID1	36	female	Nursing officer	HC3

HC3 Health Center III, HC4 Health Center IV, RRH regional referral hospital DOC medical officer, MCO medical clinical officer, EN enrolled nurse, ANO assistant nursing officer, NO nursing officer, ID interview number

Table 2 Summary of themes and subthemes of factors influencing antibiotic prescription for RTIs using the social ecological model

Level	Themes	Sub-themes
individual	prescriber related factors	knowledge of pathogenesis of RTIs fear of repercussions of delaying an AB prescribing practices evolving with experience skepticism toward standard treatment guidelines (STGs)
	state of the patient considerations	severity of the condition, prolonged symptoms and re-attendance age of the patient and perceived immune status
interpersonal	prescriber-patient relationship	patient pressure/demand and desire
institutional	interactions with drug sales representatives.	information/incentives/pressure
	initiatives to promote rational AB use by the facility's management.	prescribing monitoring and support supervision professional development and information dissemination to health workers information dissemination to the community
community	AB access	self-medication behavior
MOH and government policies	socioeconomic environment	socioeconomic status affecting access
	healthcare delivery infrastructure	limited diagnostic testing capacity drug stock-outs
	educational and training programs	public sensitization on AB use
	standard treatment guidelines	accessibility to standard treatment guidelines user-friendliness of STGs
	enforcement of regulations for prescription and dispensing	unregulated access to ABs from private drug outlets.

Prescriber-related factors

Knowledge of pathogenesis of RTIs

Healthcare providers demonstrated varying levels of knowledge regarding RTI pathogenesis. Most prescribers demonstrated good knowledge of etiology of RTIs as they were able to state correctly the viral RTIs. The prescribers were able to correctly state at most four viral RTIs, most of which belonged to the upper RTIs such as otitis media, pharyngitis, common cold, coryza, rhinitis and tonsillitis.

Some prescribers generalized lower RTIs as being caused by bacteria.

"I suspect that common cold, tonsillitis, Laryngitis, pharyngitis on a large percentage are due to viral infection because they can clear without AB." HC4MCOID10, female, aged 44, MCO.

"Tonsillitis, pharyngitis and LRTIs are viral RTIs, generally, I consider all LRTI as bacterial infections,

if I don't do other investigations like CBC" HC3E-NID1: male, aged 32, Enrolled nurse.

Despite the awareness that most upper RTIs were viral, most prescribers were more likely to prescribe for them ABs except common cold, rhinitis and coryza. This because of variable feelings among the prescribers that RTIs can present as mixed infections. Few prescribers relied on physical examination for evidence of inflammation as a criterion for confirming bacteria association with the RTIs and consequently as a basis for ABP. Few prescribers were also likely to prescribe ABs for RTIs presenting with severe fever symptoms such as severe flu and cough.

"I would consider not prescribing ABs for rhinitis, common cold and some coughing. Other than rhinitis and common cold, I prescribe ABs to other RTIs and my patients improve." RRHMCOID3: male aged 41, MCO.

"I give ABs for tonsillitis, pharyngitis, sinusitis upon finding evidence of bacterial infection or inflammation during physical examination, I can delay ABs in bronchitis, and I can't give ABs in rhinitis." HC3NOID1: female, aged 36, nursing officer.

Fear of repercussions of delaying an antibiotic

Fear among prescribers emerged as a dominant driver for prescribing ABs. Prescribers express multiple fears that lead to unnecessary AB use. There is fear of repercussions for delaying ABs in suspected viral RTIs mainly triggered by lack of diagnostic tests to rule out bacterial infection. Prescribers perceived patients as un-cooperative in such a way that if they withheld ABs, patients may not report back if they improved or will change to another prescriber if their condition worsened. To some prescribers the occasions towards public holidays and weekends triggered ABP.

"Fear of repercussions for not prescribing an AB especially towards the weekend or holiday. Sometimes you chip an AB just to cover." RRHMCOID9, male, aged 32, MCO.

Some prescribers had concerns about patient non-compliance with supportive treatments. They thought that if patients are told to use non-drug treatment like honey and lemon they would not comply and this may lead to severe symptoms or development of a bacterial co-infection.

"If you tell a patient to use supportive treatment e.g. lemon juice, honey they may not do it and they may

come back with high fevers."HC4MCOID10, female aged 44 MCO.

Perhaps most significantly, was the fear of being perceived as incompetent by patients if they were not given ABs and didn't recover. Prescriber feared that if patients didn't recover, they would lose trust and seek treatment from another facility or clinician. This influenced prescribers to give ABs given the uncertainty created by limited diagnostic facilities in the public health facilities.

"When you delay ABs there's treatment failure; most patients will not come back to you. They label you as a bad doctor. So, I always prescribe an AB not because I want but because of fear that just in case something happens." HC4MCOID2, male, 29 MCO.

Prescribing practices evolving with experience

Professional experience appears to influence prescribing practices over time. More experienced prescribers have reported evolution in their approach: Many years of working in the medical field contributed to prescribing fewer or no ABs. Prescribers expressed that over time they come to understand a specific drug that works for each disease and diseases that don't require treatment with ABs. However, most prescriber attributed more years of practice to be associated to resistance to learn new things from trainings and support supervision.

"I started prescribing as certificate holder and by then I would even prescribe an AB for all mild coughs, but now I can just first give an antihistamine e.g. Cetirizine."HC3NOID1, female aged 36, nursing officer.

"When I had just started practicing, I used to prescribe two or three ABs but currently I prescribe only one AB and am more specific on which AB to prescribe for each type of RTIs" HC4MCOID6, male aged 42 MCO.

Skepticism toward standard treatment guidelines

Some prescribers had no belief in UCG. They thought that UCG was not regularly updated to accommodate the ever-evolving AB resistance patterns that affects geopolitical areas differently.

" Standard treatment guidelines have issues, there is a lot of ABR to some drugs and depending on the geographical area where the patient lives, so it influences whether to stick on the guidelines or not depending on my experience." HC404MCOID4, male aged 48, MCO.

State of the patient considerations

Severity of the condition, prolonged symptoms and re-attendance

Severity of the RTIs determined how most prescribers prescribed ABs. Severity was perceived when patients presented with difficulty in breathing, wheezing, highly disturbing cough and high-grade fever. An AB would be prescribed in these situations. Few prescribers asserted that they would also prescribe an AB for heavy flu. They reasoned that severe RTIs are usually bacterial and if viral, they will be associated with a secondary bacterial infection. Even if the prescriber highly suspected a viral infection, few of them didn't want to take chances of a missed underlying bacterial infection. Few prescribers would prescribe an AB to re-attending patients and those with prolonged symptoms who would have been initially managed with supportive treatment. Severity also largely influenced the class and dosage form of the ABs prescribed. Amoxicillin was more likely to be prescribed to patients with mild symptoms while Ceftriaxone, ampicillin injection and gentamycin injections and other Watch group ABs were more likely to be prescribed to patients with severe symptoms and those re-attending.

"Presentation of the patient like clinical signs and symptoms, severity and duration of the symptoms, re-attendance with same symptoms force me to prescribe an AB. I prescribe an antibiotic to patients with a bad cough or to those who initially had not been given an AB when they come back." HC3MCOID8: male aged 46, MCO.

"Duration of symptoms and non-responsiveness to supportive treatment will influence me to prescribe ABs because at this facility we use clinical diagnosis, there are no diagnostic tests. If I have tried non-AB treatment and it has failed, I have to just give an AB" HC3NOID1, female aged 36, nursing officer.

"If the child is coughing and has fast breathing, I give an Injectable ABs while I give syrups, capsules and tablets among those who are able to swallow." HC4ANOID3, female, aged 36, assistant nursing officer.

Age of the patient and perceived immune status

To a small extent the patients' age, immune status, comorbidity, duration of the disease influenced practitioners' ABP for RTI patients. Health workers mainly viewed the young and elderly, those with comorbidities and chronic diseases as patients with low immune system or having a high chance of progressing to severe disease. Prescribers felt obliged not to delay prescription of ABs for them.

"...the young and elderly tend to progress to severe disease and may not require delaying ABs." HC4ANOID1: female, aged 32, assistant nursing officer.

Interpersonal level

The interpersonal level involves the immediate social environment surrounding prescribing decisions particularly patient-prescriber relationships which includes patient pressure/demand and desire. It also involves interactions with drug sales representatives which includes information, incentives and pressure.

Patient-prescriber relationships

Patient pressure/demand and desire

These represent a significant influence on prescribing behavior. The desire to meet patient expectations often overrides clinical reasoning, with prescribers acknowledging that they sometimes prescribe to satisfy patients' expectations rather than based on medical necessity. Prescribers thought that patients take ABs to be superior medicines that can treat many diseases and some patients directly demanded for them. Prescribers also thought or were told by some patients that they would buy an AB elsewhere it was not prescribed. Few prescribers accepted being influenced by patient desire and pressure.

"There are patients who say that doctor this what make me become better. When you write for them Ciprofloxacin they will say doctor you have made me happy." HC404MOID1: male aged 37, medical officer.

"Patient desire does not influence me. "Patients with cough always demand for ABs but if as per my assessment no AB is required, I educate and reassure them" HC302MCOID7: Male, aged 42, MCO.

Interaction with drug sales representatives

Information/incentives/pressure

Pharmaceutical promotion activities create additional pressure on prescribing decisions. Representatives of pharmaceutical companies are given sales targets by their employers. They use various approaches like providing information, incentives, and social interactions to influence selection of their brands or type of medicines by the prescribers. Whereas most prescribers interviewed denied any influence, some attested that pharmaceutical companies influenced their prescription behavior.

"They [drug promoters] come around in the middle of prescription, take us for dinner, give prescription reminders like pens, talk a lot of pharmacology and

somehow influence you to prescribe their drugs.” RRHMC0ID9: male, aged 32 MCO.

Institutional level

Healthcare facility characteristics and management practices significantly impact prescribing behavior through various initiatives to promote rational AB use by the facility's management and these include, prescribing monitoring and support supervision, professional development and information dissemination to health workers and the community.

Prescribing monitoring and support supervision

Institutional support for rational prescribing varies considerably across facilities. Majority of the prescribers revealed that there was no system for auditing their prescribing practices by the facility in-charges or from a designated health facility team. No feedback was given about the quality of the prescriptions. There was no equivalent program from the district health office and MOH headquarters. They also appreciated that prescribing monitoring and support supervision would significantly improve AB use and health care delivery. Few prescribers asserted prescribing audit and support supervision would be more welcomed from external teams rather than from the staff they work with.

“Programs that were being monitored by the supervisor or focal person were doing better than those that were not being monitored. Management of RTIs was not supervised” HC3NOID1: female, aged 36, nursing officer.

“Monitor our prescriptions. I have some colleagues who prescribe five ABs for a simple disease... there is a need to check us.” RRHMC0ID3, male, aged 41, MCO.

Professional development and information dissemination to health workers

The majority of the prescribers felt that their health facility administration, district health office and MOH had neglected the need for providing opportunities for continuous medical education. Where this was provided, the focus on AB use and ABR were not prioritized. Most prescribers except those from the children's hospital of Jinja regional referral hospital regional had not received such trainings. Most asserted that the knowledge they had on AB use and ABR resistance was accessed from other platforms through self-initiative.

“There are no updates on various research findings on AMR patterns but if they were existing, they would help me to select the ABs that work better. I get updates on AMR from other forums and social

media. There is no opportunity to get such updates from my health facility administration, district health office or MOH.” HC3MCOID8: male, aged 46, MCO.

Information dissemination to the community

Information dissemination regarding AB use and self-limiting diseases would reduce the demand for ABs and reduce pressure on prescribers to prescribe irrationally. With a liberalized economy there were very many private drug outlets in the community where ABs can be accessed even without a prescription. Patients keep empty bottles and packets or they have crammed the names of ABs. This has increased self-medication and patient demand for ABs. There is a missed free opportunity at the public health facility where village health teams talk to patients on various health issues. The health facility administration has not empowered village health teams with information on AB use and its dissemination.

“Village health teams always teach patients as they wait in the queue to see the clinician, wait for laboratory results or to get drugs but topics related to AB use are not covered. There is need to empower them with knowledge on proper use of ABs so that they can educate waiting patients in the morning.” male aged 37, medical officer.

Community level

Community level influences operate through AB access and socioeconomic environmental factors that shape both the prescriber's and patient's behavior. The AB access factors include self-medication behavior while socioeconomic environment include socioeconomic status affecting access.

Antibiotic access

Self-medication behavior

Prescribers noted that there has been proliferation of private drug shops in many trading centers and villages. Some of these drug shops are manned by personnel with no background professional training in the medical field or if they are medical professional they belong to the category not professionally trained or legally authorized to prescribe. These drug shops stock prescription only medicines including ABs which the prescribe irrationally or dispense freely as per patient demand. These issues have fueled self-medication. With self-medication patients buy under doses or ABs for self-limiting diseases. This has partly complicated efforts to control ABR.

“Patients keep prescription papers, empty bottles and strips to go back to private drug outlets which these days are so many, so they need to be educated

to reduce self-medication." RRHMC0ID9, male, aged 32 MCO.

"The purchase of incomplete doses or a wrong drug for the disease from private drug shops by patients or their caregivers is among the causes for AMR" HC301MCOID8, male, aged 46. MCO.

Socioeconomic environment

Socioeconomic status affecting access

Economic and social status disparities create systematic prescribing inequities. Some prescribers prescribed relatively expensive ABs to patients who can afford them. Others first ask the patient to identify whether they can afford to buy a certain AB or brand. Some prescribers perceived that some patients/caretakers always feel over exploited by health workers if they write for them prescriptions and they come to realize that their prices are too high. Other prescribers revealed that they mostly deviate from the essential drug list or first line treatment when prescribing for the elite patients. Some prescribers believed that low social economic settings are associated with poor sanitation and high predisposition to bacterial infection. Therefore, it would not be ideal to delay ABs in RTI patients from such settings.

"Patients who can afford and having a high status [economic], am more likely to prescribe for them Azithromycin and those of low status am likely to prescribe for them Amoxicillin" HC4COID6, male, aged 42, MCO.

"For patients who can afford, I can prescribe such a broad-spectrum AB like Azithromycin because we don't have it at the facility but most patients at this facility are poor so when you prescribe for them to buy you will be sending them to die." HC404MOID1: male aged 37, medical officer.

Ministry of health and government policies

The outermost level involved healthcare delivery infrastructure, educational and training programs, STGs, enforcement of regulations for prescription and dispensing that create the context for all prescribing decisions. Healthcare delivery infrastructure included limited diagnostic testing capacity and drug stock-outs. Education and training programs included public sensitization on AB use. Standard treatment guidelines included accessibility to STGs and ease of use of STGs. Enforcement of regulations for prescription and dispensing included unregulated access to ABs from private drug outlets.

Healthcare delivery infrastructure

Limited diagnostic testing capacity

Limited diagnostic testing capacity forces reliance on clinical diagnosis, creating uncertainty that often resolves

in favor of AB prescription. Point of care diagnostic tests for RTIs have been developed in some health care systems to guide health worker to rule out or confirm bacterial involvement in RTIs. This is because some RTIs classified as viral may turn out to be associated with a bacterial infection. All prescribers reported unavailability of POCTs to guide them on how to manage RTIs. These tests were also not specified for use in any guideline or policy. Due to the high prevalence of RTI, and unavailability of facilities at lower health facility service levels, the use of other conventional diagnostic tests like complete blood count, chest x-ray, swabs was not feasible. This reportedly brought a lot of uncertainty among the health workers as to whether they are dealing with a bacterial or viral infection. Most also believed that availability of POCTs would give them a bargaining edge against patient demand for ABs if a viral infection was confirmed.

"At this facility we use clinical diagnosis, there is no diagnostic tests. If I have tried non-antibiotic treatment and it has failed, I have to just give an AB." HC3NOID1, female aged 36, nursing officer.

Drug stock-outs

Limited availability of essential drugs at the facility was reported to emanate from limited supply from the central medical store of the MOH probably due to inadequate funding. However, lack of system to eliminate drug theft from the health facilities can also lead to drug shortage and frequent stock out. Stock out of first line treatment drug for RTIs "amoxicillin" influenced prescribers to deviate from UCG and prescribe available alternatives. It was noted that there was a shift from prescribing Access to Watch group of ABs during stock out.

"If the drug of choice is amoxicillin but it is not available you may end up prescribing what is available." HC3MCOID7: male, aged 42, MCO.

"Some patients say Doctor, now that amoxicillin that am supposed to get for free is not available don't prescribe the same for me to go and buy, am prompted to change to Azithromycin" HC4MOID1: male aged 37, medical officer.

Educational and training programs

Public sensitization on antibiotic use

Prescribers noted MOH didn't have a program of sensitizing the public on AB use and self-limiting diseases. Such program would change the public attitude and belief that ABs are strong medications that can cure all diseases. This would reduce public use of ABs through self-medication and demand and consequently contribute to controlling ABR.

“Educating patients about AB use would avoid the patients putting me under pressure to prescribe a certain AB.” HC3ENID1: male, aged 32, Enrolled Nurse.

Standard treatment guidelines

Accessibility to standard treatment guidelines

Standard treatment guidelines are meant to give guidance to health workers to arrive at the diagnosis, classification of illness and prescription. Most of the prescribers didn't have any standard reference guideline in the consultation room. One had integrated management for childhood illness while another had UCG. Health workers acknowledged that while the demand for UCG was high among health workers, there were few copies at the facilities. This made it difficult for prescribers to maintain them without being stolen or borrowed by fellow health workers.

“UCG are not readily available, “I don't know the current up to date version. Here you may hardly trace one at the facility. Some staff at this facility have soft copies on their phones but they are not user friendly like hard copies.” HC401ANOID1 female, aged 32, assistant nursing officer, aged 32.

“.....when you leave a hard copy of UCG in the clinical room, you will never find it again. The MOH should increase access to UCG to all health workers including those in the private.” HC4COID10: female, aged 44, MCO.

User-friendliness of standard treatment guidelines

Few prescribers expressed concern over ease of use of UCG. This meant that availability alone may not warrant use of UCG. Others felt that the book was either too bulky for opening and consulting especially if patients were many. Only one prescriber revealed that it would be shameful to open the STGs in front of patients as they would think you are not knowledgeable. Given the enlightenment of the public importance of RTIs gained from this study, some health workers proposed the need for the MOH to develop and avail short RTI specific STGs.

“.....The soft copies of UCG are not user friendly.” HC4COID10: female, aged 44, MCO.

“Short STGs for RTIs can be of help “I can be able to follow step by step and come up with a proper diagnosis” HC3ENID1: male, aged 32, Enrolled Nurse.

Enforcement of regulations for prescription and dispensing

Unregulated access to antibiotics from private drug outlets

Prescribers noted that there was a weak system to regulate the opening of new drug shops business and clinics and enforcing good practices. Most of the drug shops and clinics are not licensed and they employ unqualified staff to dispense drugs. They stock un authorized classes of drugs which they are unable to rationally prescribe or guide patients on their use. The community has shunned seeking free medical services from public health facilities because of long waiting time and associated bureaucracies. Unfortunately, they cannot afford to seek medical care from private health facilities with qualified staff because the cost involved. This has fueled irrational AB access from unlicensed drug shops and clinics and self-medication.

“Patients these days know the names of the drugs, when they go to the private drug shops, they can get what they request and, in any quantity” HC3MCOID8: male aged 46, MCO.

Discussion

The study generates knowledge that helps to understand the factors that influence ABP for RTIs in Jinja City. A high rate of ABP in Jinja City had been confirmed [37]. We organized the factors according to the social ecological model in order to understand complex context in which they shape the prescribing decisions and allow for multipronged approach of addressing them. We found out that at the individual level, the prescribers' knowledge on etiology of RTIs, ABR and perceptions about the patient status shaped AB prescribing decisions. Interaction with representatives from pharmaceutical companies and reaction to patient's desire and pressure influenced ABP at interpersonal level. The institutional factors that influenced ABP arose from absence of continuous education of prescribers and public sensitization on AB use and ABR as well as the missed opportunity for monitoring and support supervision of prescribers. At community level, the ease of public access to ABs from mushrooming drug shops increased misuse of ABs while social economic status of the patients or their caregivers also influenced the prescription pattern. Lack of policies or laxity by the MOH and government resulted into unregulated public access to ABs, limited diagnostic facilities and stock out of essential drugs. There was also lack of programs for continuous education and sensitization of health workers and the public aimed at promoting rational AB use. Most of the findings are similar to those from related studies conducted in Uganda and other countries [30, 31, 38]. The key factors for which interventions can be developed to promote rational AB

prescribing, reduce the unnecessarily expenditure and also contribute towards controlling ABR are discussed under.

Most prescribers demonstrated good knowledge of the causative group of organisms for RTIs since they were able to correctly state the viral RTIs. The most stated viral RTIs were those that affected the upper respiratory tract. Despite correctly stating viral RTIs, prescribers expressed reluctance in withholding ABs. They had mixed feelings that upper viral RTIs can be associated with or progress to secondary bacterial infection especially in children, elderly and patients from low social economic settings. Few prescribers relied on clinical examination for evidence of inflammation as a criterion for confirming bacteria co-infection and consequently as a basis for ABP. These findings were similar to those in Malta study where majority of the prescribers expressed difficulty in determining the etiology based on clinical presentation [30]. In our study however, most prescribers regarded all Lower RTIs as bacterial, contrary to UCG [14]. This calls for increased availability of diagnostic facilities and systems to encourage their use by clinicians, since some studies showed prescribers may not adequately use available diagnostic facilities [39].

Diagnostic facilities were unavailable or inadequate in our study setting. Inadequate diagnostic facilities contributed majorly to over prescribing of ABs [31]. The use of POCTs such as C-reactive protein test help prescribers to differentiate viral from bacterial RTIs, estimate the severity of disease and decide on whether to delay or give ABs and this reduces ABP [5, 40, 41]. POCTs also present an opportunity for health workers to prove and educate patients how most RTIs are viral in nature and do not require ABs [42]. In our study we found that there was neither a system for educating patients at health facility level nor a MOH policy for public sensitization on AB use and self-limiting diseases. This may have been the cause of high patient demand for ABP or self-medication with ABs as perceived by prescribers. According to Andrews [43], educating caregivers reduces consulting rates and prescription rate of ABs for acute RTIs. However, it was noted that the nursing staff and health visitors were better placed in educating the groups they interact with, given that prescribers often have a high patient load [39]. The Uganda health system has high numbers of village health teams who talk to patients as they wait in the queue to receive services. The health facility administrators or MOH can enable them to talk on AB use.

In our study we perceived a high level of non-adherence to UCG which the participants didn't acknowledge. In a quantitative study in Eastern Uganda, the prevalence of non-adherence to STGs was 82.6% [31]. In this study we found that the causes of non-adherence to UCG were pressure from patients,

limited diagnostic facilities, stock out of essential drugs, skepticism, inadequate accessibility to hard copies of UCG, difficult to use UCG and their infrequent update in response to present national and international situation. Short RTI specific STGs which describe uncomplicated RTIs as usually self-limiting, lasting for five to seven days but with some like viral bronchitis and sinusitis lasting for more than three weeks reduced ABP [44]. There were no short specific STGs in our study setting. Apart from highlighting causative pathogens, the UCG didn't describe the etiology and prognosis of RTIs [14]. Health workers in a study by Akhtar [45] reported that their behaviour of ABP depended on the prescription guidelines provided by the facility administration. There may be a need to incorporate emerging knowledge in UCG or develop short specific STGs for RTIs given their high prevalence. The perception among prescribers that STGs may be hinged on cost effectiveness of the treatment rather than benefits to the individual patient and the urge for them to maintain relationship with their patient contributes to non-adherence to the STGs [46, 47]. This is similar to our study findings where some prescribers attested that they may not refer to the UCG even if was accessible. The combination of availability of specific STGs for RTIs and programs to improve adherence to them can reduce ABP for RTIs [38, 48]. According to UCG, the first line treatment for RTIs was majorly amoxicillin. In our study, stock out of first line drugs increased the risk of misuse of ABs in terms of increased prescription of the Watch group of ABs and patients buying incomplete doses. Similarly AB stock-out in Malawi was associated with non-adherence to STGs [49, 50]. This implies that strategies need to be put in place to minimize drug stock outs in government health facilities [51].

There were no antibiotic stewardship programs provided or organized by the health facility administration or MOH in our study setting. Therefore, opportunities for continuous medical training on AB use, dissemination of study findings on ABR patterns, monitoring and support supervision of ABP were limited or non-existing. Antibiotic stewardship has been found to be generally weak in Africa [52, 53], yet the burden of infections is high. This has led to persistent irrational AB use and high risk of ABR. Inadequate training on AB use and lack of local AB sensitivity information leads to high ABP [54]. Limited continuous training on AB use may make prescribers more receptive of the knowledge from representatives of drug companies which in addition to the incentives offered may lead to irrational prescription (49). Studies in India by Mishra [38] and Dehn [55] found that training and support supervision of health workers reduced the ABP rate.

NICE guidelines also recommended that training of prescribers can contribute to delaying ABP for RTIs [21]. In our study setting there was no prescribing audit and this led to inappropriate AB prescribing. Studies elsewhere showed that prescribing audit and feedback reduced the ABP rate [38, 55]. Prescribers felt that prescribing audit, feedback and clinical supervision systems made them more accountable [56].

Strengths and limitations

The participants were prescribers of all categories of health professionals that were involved in prescribing during the study period and these included: medical officer, MCOs and nurses. The participants were distributed over ten (10) public health facilities of different service levels. The in-depth interview was conducted by the first author (ZKI) who was a senior pharmacist and was able to rephrase the questions in various forms during the interview to confirm the responses. After transcribing the audio responses, the findings were not shared with the prescribers for further refining. The study didn't probe how patient volume, patients' or caregivers' expectations for ABs and prescribers' ability to reassure patients influenced ABP.

Conclusion

We found that several factors that existed elsewhere also interplayed to determine the current high level of ABP for RTIs in Jinja City. Prescriber's awareness of AMR resistance or availability of STGs alone cannot solve the challenge. There is need for a multipronged approach encompassing but not limited to managing patients' expectations, behavior change for the public and prescribers, continuous medical education, availing specific STGs for RTIs that incorporate delayed prescribing strategy, monitoring and enforcement for appropriate prescribing, AB stewardship and introduction of POCTs. It is worth noting that majority of the prescribers in our study setting were medical clinical officers, followed by nurses with the number of medical officers being insignificant. This could have significantly contributed to inappropriate ABP and can be explored by another study.

Abbreviations

AB	Antibiotic
ABP	Antibiotic prescription
ABs	Antibiotics
ABR	Antibiotic resistance
AMR	Antimicrobial resistance
HC	Health center
MCO	Medical clinical officer
MOH	Ministry of health
NICE	National Institute of Health and Clinical excellence
POCTs	Point of care diagnostic tests
RTIs	Respiratory Tract Infections

UCG Uganda Clinical Guidelines
STGs Standard treatment guidelines

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12890-025-04085-y>.

Supplementary Material 1: Approved in-depth interview guide.

Supplementary Material 2: Transcript.

Supplementary Material 3: COREQ Checklist.

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Authors' contributions

ZKI conceptualized and designed the study, collected the data and drafted the manuscript. ZKI transcribed the interview audio recordings into a written text (transcript). ZKI and EB analyzed the transcript and developed themes and subthemes which were refined by JK. ZKI drafted the manuscript while JK critically reviewed and revised it. All authors approved the final version of the manuscript. ZKI, EB and JK are personally accountable for the integrity of this work.

Data availability

The written transcript originating from the audio interviews has been provided as supplementary: file S2 transcript.

Declarations

Ethics approval and consent to participate

Approval to conduct this study was sought and approved by Mbarara University of Science and Technology Research and Ethics Committee (MUST-REC): reference number MUST-2023-814. The study was also approved by National Council of Science and Technology under registration number. HS3499ES. Permission to conduct the study in public facilities Jinja City was sought from the City health officer of Jinja City and the Director of Jinja Regional Referral Hospital. Interviewees were informed of the aim of study and the importance of their participation. Also, a signed informed written consent was obtained from each of them.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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