

Review Article

Strategies to be Implemented in Sri Lanka to Improve Appropriate Antibiotic Dispensing Practices: A Narrative Review

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ABSTRACT

Background: Antimicrobial resistance (AMR) is a critical global health challenge. Sri Lanka a developing country is more vulnerable to AMR than developed nations due to numerous complex healthcare system issues including inappropriate dispensing practices of antibiotics at community pharmacies leading to inappropriate antimicrobial use. **Objective:** The aim of this review is to describe possible strategies for implementation in Sri Lanka to improve the appropriate antibiotic dispensing practices. **Methods:** Using EMBASE, MEDLINE and International Pharmaceutical Abstracts (IPA), a literature search was conducted for articles published between January 1980 and November 2017 that described studies involved in antibiotic dispensing at community pharmacies. **Results:** Inappropriate antibiotic dispensing is substantial in developing countries and a major contributing reason for overuse and misuse of antimicrobials in the community. Evidenced-based interventional studies showed; enforcement of law, education for pharmacy staff, awareness of consumers, and peer influence can minimize inappropriate dispensing practices at community pharmacies in developing countries. **Conclusion:** A multi-faceted approach is required to improve appropriate antibiotic dispensing practices in a developing country like Sri Lanka. Interventional strategies such as enforcement of existing medicines regulations, provision of targeted education and extensive training of pharmacy personnel, increased awareness of appropriate antibiotic use and AMR by consumers, and implementation of an antimicrobial stewardship program should be implemented and evaluated to help overcome the enablers of inappropriate antibiotics dispensing practices.

Keywords: Antibiotics; Antimicrobial resistance; Community pharmacy; Developing country; Sri Lanka

BACKGROUND

Antimicrobial resistance (AMR) represents a considerable challenge to human health.(1) AMR has the potential to rapidly and easily spread around the world (2); hence, it is a global

public health issue.(3) Inappropriate and excessive antibiotic use can contribute to the emergence of resistant bacteria.(4) This has very serious health, social and economic consequences in developing countries.(4) In



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developed nations, some actions are being taken to address AMR (5); however, to date little has been accomplished in developing countries because of challenges related to poverty, under-developed health systems and inadequate resources.(6)

The situation in developing countries is made worse by certain common practices such as the high prevalence of irrational use of antibiotics facilitated by the relatively easy availability of antibiotics dispensed without prescriptions.(7-9) Self-medication with antibiotics is unfortunately a common practice in many developing countries.(9-12) In addition, antibiotics are often sold in unregulated settings such as roadside stalls in some developing countries.(13) The inappropriate use of antibiotics in food-producing animals and in marine products remains a major challenge in some of these countries.(14,15) These numerous factors contribute to the overuse and misuse of antibiotics in developing countries, (16,3) eventually leading to the formation of resistant bacteria.(1,4)

Sri Lanka, a developing country in South Asia with a population of over 21 million, has well-established national medicines regulations for the supply of medicines including antibiotics.(17) Moreover, antimicrobial drugs should only be dispensed on a medical prescription from a registered medical prescriber.(17) Sri Lanka also has national therapeutic guidelines to support best practice in prescribing.(18) Recent reports from Sri Lanka indicated a high prevalence of community acquired infections, (19) a concerning spread of resistant bacteria in hospitals (20,21) and inappropriate antibiotic use in humans (22) and farm animals.(23) Importantly, Sri Lanka has introduced a national strategic plan for combating AMR.(24) A clear national plan adhering to the World Health Organisation

(WHO) guidelines on AMR, (25) for implementation between 2017 and 2022, was introduced by the Honourable President of Sri Lanka (24) and emphasized the important roles of healthcare professionals, educators, policymakers and other stakeholders to overcome AMR in Sri Lanka.

There is currently a dearth of research conducted in Sri Lanka that identifies effective interventions to improve appropriate antibiotic dispensing practices. Hence, it is important to identify interventions from the literature, that could be implemented in a developing country like Sri Lanka. This review identifies some success stories from developing countries. The aim of this study was to investigate strategies that have the potential to be implemented in Sri Lanka to minimize the inappropriate antibiotic dispensing practices.

METHOD

A literature search was conducted to identify research studies that evaluated interventions to improve appropriate antibiotic dispensing practices in Sri Lanka. Interventional studies that addressed antibiotic dispensing practices at community pharmacies from Sri Lanka or any other developing country were included in this review. The literature search was conducted for articles published between January 1980 and the end of November 2017. Articles published in other than English language were excluded in this review.

The following databases were searched: EMBASE, MEDLINE and International Pharmaceutical Abstracts (IPA) with the following terms, for pharmacist (concept 1), inappropriate drug use (concept 2), simulated client methodology (concept 3), and studies on antimicrobial use (concept 4). Medical Subject Headings (MeSH) terms were used to search articles and concepts followed in this search

strategy. These MeSH terms were identified as the most rigorous concepts to unambiguously address the aims and objectives of this review. This review included Simulated Client Methodology (SCM) study design as one of the concepts as SCM was found to be the most common methodology used by authors to investigate purchase of antibiotics at community pharmacies in developing countries.(9) This search was restricted to studies undertaken in developing countries. The selection of developing countries was based on the report published by the International Monetary Fund (IMF).(26) The following information from relevant studies was then extracted and reviewed: i) Author and year of study published; ii) Country in which the study was performed; iii) Setting of the study; iv) Purpose of the study v) Type of interventions vi) Appropriateness of encounters after intervention. Extracted information for all studies were completed and tabulated (Table 1).

RESULTS

The search strategy identified 1038 articles and further refinement was undertaken using the inclusion and exclusion criteria. Duplicate articles were excluded. Finally, four interventional studies were found and included in this review. These articles were identified and reviewed according to the criteria described in the methods section. Characteristics of eligible studies are shown in Table 1.

In this search, no studies describing strategies to improve appropriate antibiotics dispensing practices at community pharmacies were identified from Sri Lanka. Since, there are no interventional studies of this kind from Sri Lanka, it is important to learn from other developing countries. This review identified four articles with interventional studies from different developing countries; Zimbabwe, (27) Pakistan, (28) Vietnam and Thailand (29) and

Vietnam.(30) Furthermore, this literature review identified four important strategies that can be considered for implementation in Sri Lanka to improve appropriate antibiotic dispensing practices at community pharmacy settings. These strategies include: Enforcement of medicines regulations; Education and training for pharmacists and pharmacy personnel; Improvement of consumer awareness; and, Implementation of antimicrobial stewardship (Figure 1). Community pharmacists are targeted for many of the education and training strategies because it is acknowledged that they are the key healthcare workers providing consumer access to antimicrobials in under-developed health systems.

DISCUSSION

This literature review identified important interventional strategies that can be implemented in a developing country, Sri Lanka to minimize the inappropriate antibiotics dispensing which is an important factor for inappropriate antibiotic consumption in the community and leading to the current global health challenge of AMR. Judicious use of antibiotics by minimizing inappropriate antibiotic dispensing practices will reduce further development and spread of AMR in Sri Lanka.

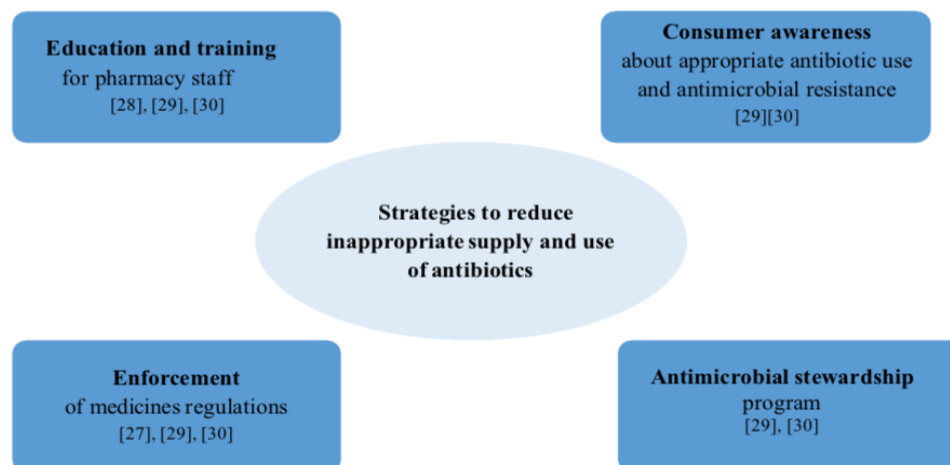
Enforcement of medicine regulations

Evidence for intervention

The absence of enforcement activities for existing medicines policies has been identified as one of the main causes for non-prescription (over the counter) availability of antibiotics in community pharmacies in many developing countries. Enforcement of existing medicines regulations has significantly lowered the inappropriate dispensing of antibiotics in a number of developing countries.

Table 1: Summary of interventional studies on antibiotic dispensing practices at community pharmacies in developing countries (Published between 1980 and 2017)

First author and year	Country	Setting	Purpose of the study	Type of intervention/s	Appropriateness of encounters after intervention
Nyazema <i>et al.</i> , 2007 (27)	Zimbabwe	Community pharmacy	To assess the quality of private pharmacy practice with a focus on the extent of antibiotic sales without prescription in private pharmacies	Enforcement of medicinal law	This study revealed low dispensing of antibiotics without prescription, after medicinal law enforcement.
Qidwai W <i>et al.</i> , 2006 (28)	Pakistan	Community pharmacy	To determine the education of private drug sellers as an intervention tool in promoting rational use of medicines for diarrhoea	Education and awareness	Dispensing practices were improved by providing education to private drug sellers. Significant improvements were noted in the post-interventional study.
Chalker J <i>et al.</i> , 2005 (29)	Vietnam and Thailand	Community pharmacy	To study the effectiveness of a multi-faceted intervention on the dispensing practices of drug sellers in Hanoi and Bangkok	Regulatory enforcement, education and peer influence	Multicomponent intervention helped to change dispensers' behaviour and improved appropriate antibiotic dispensing practices.
Chuc NTK <i>et al.</i> , 2002 (30)	Vietnam	Community pharmacy	To assess the effects of a multicomponent intervention on private pharmacy practice	Regulatory enforcement, education and peer influence	Multicomponent intervention improved appropriate antibiotic dispensing practices

Figure 1: Interventional strategies should be implemented to reduce inappropriate antibiotic dispensing practices

For example, in Zimbabwe, few pharmacies dispensed antibiotics without a prescription after the effective enforcement of a regulation on antibiotic distribution.(27) Enhanced regulatory measures have demonstrated significant impact on reducing non-prescription dispensing of antibiotics in Chile (31) and South Korea (32) with evidence of improved bacterial resistance profiles after the enforcement of medicines regulations in these countries. A study conducted in Vietnam (30) showed that combining interventions such as enforcement of medicines regulation, education and health care personnel involvement through peer networks have contributed to lowering the inappropriate use of antibiotics dispensing practices.

Policy and practice implications

It is recommended that government authorities establish, invest in, and enforce a strict regulatory and legislative framework for antibiotic prescription, distribution and dispensing practices. Pharmacy personnel should dispense antibiotics only if an authentic prescription from a registered prescriber is presented to them and should promote practices whereby consumers seek medical advice for conditions likely to be responsive to antibiotics and where appropriate to use antibiotics. The evidence from the literature highlights the need for strict medicines regulations in developing countries. This is considered as one of the most effective strategies to overcome the non-prescription dispensing of antibiotics ultimately to reduce inappropriate antibiotic use. Therefore, this is a priority strategy that should be implemented in Sri Lanka.

Education and training for pharmacy staff *Evidence for intervention*

Appropriate education and training for

pharmacy staff is identified as an important intervention and will be an essential strategy to minimize inappropriate antibiotic use in developing countries including Sri Lanka.(33) Furthermore, this review identified education and training for pharmacy staff working in community pharmacies as an evidence-based intervention to minimize inappropriate antibiotic use and supply in developing countries. Studies from Vietnam and Thailand (29, 30) found that after introduction of pharmacy treatment guidelines to pharmacists, there was a steady improvement in the quality of services provided by pharmacy staff. Another study from Pakistan (28) found that education to so-called “private drug sellers” resulted in improved rational use of medicines including antibiotics. A study conducted in China reported that the presence of a licensed pharmacist was found to be a protective factor for the inappropriate dispensing of antibiotics.(34) In addition, a study from Thailand (35) reported that more appropriate dispensing practices from pharmacies when those pharmacies were located close to major hospitals because these pharmacies were more likely to have a qualified and trained pharmacist. A study from Tanzania (36) emphasized the need to establish better training for dispensers to increase the quality of pharmaceutical care services. Furthermore, strengthening pharmacists’ role with adequate education and training to overcome the challenge of AMR has been discussed in a recent review.(37) Therefore, the role of the qualified and trained pharmacist is important in encouraging the prudent use of antibiotics.

Policy and practice implications

These evidenced-based studies identify that education and training for pharmacists were

able to improve knowledge of appropriate antibiotic use and influence behaviour among pharmacy personnel in community pharmacies in developing countries. Continuous educational and professional development programs can reduce inappropriate dispensing practices of medicines.(38) Further, it is important that government authorities and pharmacy professional groups, through enforcement of regulation and professional standards, ensure that qualified and trained personnel are working in all community pharmacies.(39) A strict policy ensuring the availability of a qualified pharmacist in every community pharmacy while it is open to the public should be implemented in Sri Lanka.(40) That pharmacist must be responsible for the provision of every prescription medicine and be required to maintain up-to-date knowledge and practice through continuing professional development. A community pharmacy license must require the presence of a qualified pharmacist during opening hours. A license renewal process for community pharmacies should be implemented and monitored. Implementation of these strategies would increase the judicious, appropriate and safe use of all medicines supplied by pharmacies in Sri Lanka and in particular, would help to overcome inappropriate antibiotic use and dispensing practices in Sri Lanka.

Consumer awareness of appropriate antibiotic use

Evidence for intervention

This review recommends increasing consumer awareness about appropriate antibiotic use, as a way to reduce the non-prescription sales of antibiotics.(41) Consumer demand and lack of awareness of AMR among consumers have been shown to play a critical role in the non-prescription sale

of antibiotics.(34) Awareness campaigns about appropriate antibiotic use among general public improved appropriate antibiotic use in the community.(42) Similarly, reduction in antibiotic use was reported after introduction of a community-wide educational intervention.(43)

Policy and practice implications

These studies demonstrate the importance of consumer awareness in the judicious use of antibiotics in the community. Public campaigns about antibiotic use and AMR can probably contribute to more careful use of antibiotics among the general public.(44) Therefore, government authorities should promote such activities to increase awareness among the general public. This is another important strategy which will be helpful to overcome inappropriate antibiotic use and supply in developing countries including in Sri Lanka.

Antimicrobial stewardship program

Evidence for intervention

Antimicrobial stewardship (AMS) is a coordinated program among healthcare professionals that promotes the judicious use of antimicrobials, enhancing patient health outcomes, decreasing microbial resistance, reducing the spread of infections caused by multidrug-resistant organisms, and aiming to reduce unnecessary costs related to antibiotics (45). Antimicrobial stewardship (AMS) programs are important to optimize antimicrobial therapy, ensure best patient outcomes, reduce un-intended use of antimicrobial use, and enhance appropriate prescribing practices.(46) Many countries have implemented and achieved success through AMS strategies (47) including developing countries.(48) Further, AMS is shown to be an effective intervention to reduce non- prescription sales of antibiotics

in developing countries.(49) However, AMS programs are not commonly implemented in developing countries. AMS programs have the potential to minimize unnecessary prescribing of antibiotics through increased awareness among healthcare professionals. (50) Further, AMS can influence prescribers to prescribe antibiotics in accordance with local prescribing guidelines and diagnosis recommendations based on local antibiotic susceptibility patterns.(51)

Policy and practice implications

AMS programs can assist physicians to prescribe and pharmacists to dispense antibiotics according to the local therapeutic guidelines. This will promote appropriate treatment for antibiotic-responsive infections with confirmatory microbiological tests in the community and hospital settings. Furthermore, the success of AMS programs require the collaboration between different healthcare professionals such as physicians, microbiologists, nurses, and pharmacists. This is an effective strategy to facilitate better patient outcomes. Therefore, it is time to

implement AMS programs in Sri Lanka to ensure judicious use of antibiotics.

CONCLUSIONS

In summary, multi-faceted strategies are essential to reduce inappropriate antibiotic use and dispensing in a developing country such as Sri Lanka. These strategies include enforcement of medicines regulations, provision of adequate education and extensive training for pharmacy personnel, increasing awareness about appropriate antibiotic use and knowledge on AMR among consumers, and implementation of antimicrobial stewardship programs.

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