

ANTIBIOTIC STEWARDSHIP IN COMMUNITY
PHARMACY: PERCEPTIONS AND ATTITUDES OF
PHARMACISTS TOWARDS ANTIBIOTIC DISPENSING
IN PAHANG

BY

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A thesis submitted in fulfilment of the requirement for the
degree of Master in Pharmaceutical Sciences
(Pharmacy Practice)

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ABSTRACT

The increase of antibiotic resistance has frequently been linked to the unrestrained antibiotic dispensing. A review was conducted to assess the perception and attitudes of community pharmacists towards antibiotic dispensing. The review showed community pharmacists has a proper perception on antibiotic dispensing but bad attitudes and practices. Thus a cross-sectional survey was conducted using a structured, validated and pilot-tested questionnaire. A systematic approach was used to recruit community pharmacists who completed a 27-item questionnaire in English language. Forty-five participants completed the questionnaire from sixty-five that were approached. Community pharmacists showed good perception (3.558/5) and attitudes (3.255/5) towards antibiotic dispensing. Knowledge on antimicrobial stewardship has a significant effect on pharmacists' perceptions ($p=0.034$) while the number of antibiotic sold per month has significant effect on the attitudes ($p=0.047$). Patients visiting community pharmacies often asked for penicillin group antibiotics (80%) for cough, sore throat, cold or flu. Despite a few community pharmacists sell antibiotics without prescription, they still show a good perception and attitude towards antibiotic dispensing.

خلاصة البحث

زيادة مقاومة البكتيريا للمضادات الحيوية كثيراً ما ترتبط بالصرف غير المقيد لهذه المضادات. الغرض من هذه الدراسة هو تقييم فهم وسلوك الصيدالة تجاه صرف المضادات الحيوية. أظهرت المراجعة أن مجتمع الصيدالة لديهم فهماً سليماً حول صرف المضادات الحيوية ولكن مع بعض الممارسات الخاطئة. ثم أجريت دراسة استقصائية مستعرضة باستخدام استبيان منظم، وتم اختبار والتحقق من موثوقيته. تم استخدام مقارنة منهجية لتجنيد صيدالة مجتمع للإجابة على استبيان باللغة الانجليزية يتكون من ٢٧ بنداً. أكمل خمس وأربعين مشاركاً الاستطلاع من أصل خمس وستين تمت دعوتهم. أظهر صيدالة المجتمع فهماً جيداً (5/3.558) وسلوكاً جيداً (5/3.255) نحو صرف المضادات الحيوية. إن معرفة صيدالة المجتمع حول برامج إدارة المضادات الحيوية أثر بشكل كبير على فهمهم لمشكلة صرف المضادات الحيوية ($p = 0.034$) بينما أثر عدد المضادات الحيوية التي يتم بيعها شهرياً حول سلوكهم ($p = 0.047$). وثيراً ما يطلب المرضى الذين يزورون صيدليات المجتمع المضادات الحيوية لمجموعة البنسلين (80%) للسعال، والتهاب الحلق، والبرد أو الانفلونزا. على الرغم من أن عدداً قليلاً من صيدالة المجتمع يبيع المضادات الحيوية دون وصفة طبية، لكن لا تزال لديهم فهماً جيداً تجاه صرف المضادات الحيوية.

APPROVAL PAGE

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DECLARATION

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LIST OF ABBREVIATION

ADDO	Accredited drug dispensing outlet
AMS	Antimicrobial stewardship
CDC	Centre of Disease Control and Prevention
CPs	Community pharmacists
DAwMP	Dispensing antibiotic without medical prescriptions
IIUM	International Islamic University Malaysia
IREC	IIUM Research Ethic Committee
MRSA	Methicillin-resistant <i>Staphylococcus aureus</i>
OTC	Over the counter
SD	Standard deviation
SPs	Simulated patients
URTI	Upper respiratory tract infection
UTI	Urinary tract infection
WHO	World Health Organization

GLOSSARY

Antibiotic/antimicrobial	Agents that carry the purpose of killing or inhibiting the growth of bacteria, fungi or protozoan.
Antimicrobial stewardship (AMS)	An intervention program dedicated to improve and sustain the appropriate antibiotic use while reducing the emergence of antimicrobial resistance, strengthening the patient safety and reducing the healthcare system's cost.
Healthcare practitioner	Team that take care the public health conditions include general practitioners, hospital doctors, pharmacists, microbiologists and nurses.
Likert scale	A psychometric response scale used in questionnaire to obtain participant's preferences or degree of agreement with a statement or set of statements.
Cronbach's alpha	A measure of internal consistency of a test or scale and it is expressed as number between 0 and 1.
Perception	The way in which something is regarded, understood or interpreted.
Attitude	A settled way of thinking or feeling about something.
Opinion	An observation about particular matter.

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF STUDY

In 1928, the discoveries of penicillin as the world's first antibiotic by Alexander Fleming have revolutionized the field of medicine in the 20th century. The overuse of penicillin post its discovery has triggered bacteria to develop resistance. The World Health Organization (WHO) classified antibiotic resistance as a "serious threat that is no longer a prediction of the future, it is happening right now in every region of the world and has potential to affect anyone, of any age, in any country" ("WHO | WHO's first global report on antibiotic resistance reveals serious, worldwide threat to public health," 2014).

Antibiotics are agents that either inhibit or prevent the growth of bacteria. There are also antibiotics that are used against fungi or protozoan infection. Antibiotics are not effective against viral infections such as common cold which render them useless. All of the antibiotic categories known today were discovered in the mid-1980s (Gualerzi, Brandi, Fabbretti, & Pon, 2014). Even though the clinical indications of using antibiotics clearly highlighted their appropriate role in prescribing and/or dispensing practices, the antibiotic use is still widespread leading to the possibility of antibiotic abuse. The development of new antibiotics is massively trailing behind the pace of infectious agents' ability to adapt against effective treatments. Currently, any new antibiotic that is developed will be complemented with proper guide to limit its usage unless when needed. The problem of antibiotic overuse is persistent and already engulfed both developed (CDC, 2017) and developing

regions (Hadi et al., 2008; Lee et al., 2014). In Malaysia, antibiotics was included within the top 10 therapeutic groups by utilisation in defined daily dose (DDD) in 2010 and the number has increased from 2009 by 16% (Pharmaceutical Services Division and The Clinical Research Centre, Ministry of Health, 2014).

It has triggered the increasing prevalence of antibiotic-resistant microorganisms in both hospitals and community settings (Albrich, Monnet, & Harbarth, 2004; Harbarth & Samore, 2005). The worldwide antibiotic resistant problem was believed to be stemmed from uncontrolled selling of antibiotics by community pharmacies (Costelloe, Metcalfe, Lovering, Mant, & Hay, 2010; Plachouras et al., 2010), thus this research has investigated the perceptions and attitudes of community pharmacists towards antibiotic dispensing.

1.2 STATEMENT OF THE PROBLEM

The increasing prevalence of antibiotic resistance is an alarming matter. As a matter of fact, this problem is seen in all the countries across the globe. The source of this problem is always linked to the excessive antibiotic selling or misuse of antibiotic in the treatment of diseases in a community setting. Despite the knowledge and expertise of community pharmacists on antibiotics and management of diseases, they still dispense antibiotics unnecessarily and often many times simply on patient's demand. Even if the dispensed antibiotics were appropriate, the lack of counselling may also lead to non-compliance and inappropriate usage. Furthermore, physicians also have the capacity to prescribe antibiotics for conditions that do not require antibiotic treatment. It has extended the problem to an unending struggle which seems to be in place for years. This research is an attempt to investigate patient's antibiotic demand and antibiotic dispensing focusing in the community pharmacies in Pahang state.

1.3 RESEARCH OBJECTIVES

This research designed to achieve the following objectives:

1. To assess the perceptions and attitudes of community pharmacists towards antibiotic dispensing in Pahang.
2. To note the frequency of antibiotic agents dispensed by the community pharmacists in Pahang.
3. To investigate the demand for antibiotic agents in community pharmacies in Pahang.
4. To determine the appropriateness of antibiotic dispensing in community pharmacies in Pahang.

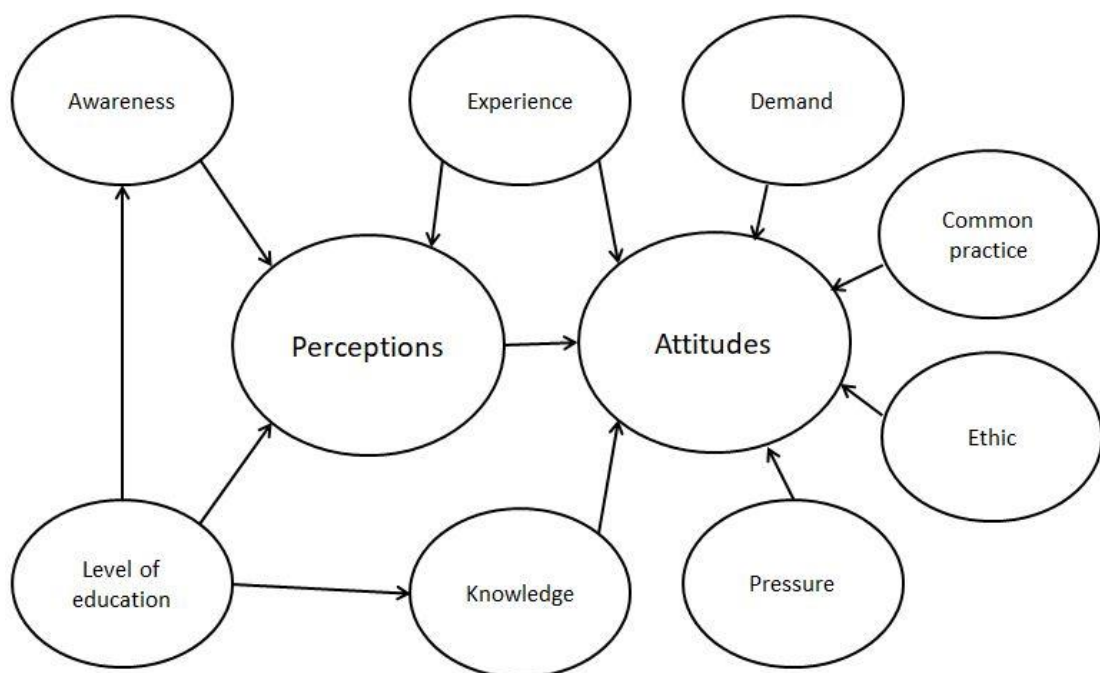
1.4 RESEARCH QUESTIONS

1. What are the perceptions and attitudes of community pharmacists towards antibiotic usage in Pahang state?
2. How frequent do community pharmacists sell antibiotics in community pharmacy in Pahang state?
3. How often do patients/customers demand antibiotics in community pharmacy in Pahang state?
4. Are the antibiotics dispensed at the community pharmacy in Pahang state appropriate?

1.5 THEORETICAL FRAMEWORK

The perceptions and attitudes of community pharmacists can strongly influence the antibiotic selling and there are multiple factors that can affect the pharmacists'

perceptions and attitudes. Some of the factors that can affect perceptions are the pharmacists' level of education, awareness and length of working experience and they have been shown to have significant influence on the perceptions of community pharmacists (Khan et al., 2016). On the other hand, pharmacists' knowledge and perception, patient demands, working experience, common practice, ethical view and pressure from owner can also be a major factor that affecting the attitudes. All of these factors are theorised to have either positive or negative influence on the pharmacists' perceptions and attitudes towards antibiotic selling and the enablers and factors promoting the same. The theoretical premise of the factors that may influence the perceptions and attitudes of the pharmacists is illustrated in Figure 1.1.



*Arrows represent Affect

Figure 1.1 Theoretical frameworks of factors affecting the pharmacists' perceptions and attitudes towards antibiotic dispensing

1.6 RATIONALE OF STUDY

It is assumed that increasing antibiotic resistance was contributed by uncontrolled and inappropriate selling of antibiotics in the community pharmacies. This research attempts to assess the perception and attitudes of community pharmacists towards appropriate antibiotic usage and dispensing in the community pharmacies of Pahang state.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

Morbidity and mortality from bacterial infections has risen dramatically due to increase in prevalence of drug-resistant bacteria (de Kraker, Davey, & Grundmann, 2011). Thrives due to drug-resistant bacteria and claims thousands of lives each year (CDC, 2013). *Escherichia coli* (*E.coli*), *Klebsiella pneumoniae*, *Streptococcus pneumoniae* and methicillin-resistant *Staphylococcus aureus* (MRSA) are among the few strains that have developed resistance towards antibiotic and they are fairly common infection (*Antimicrobial resistance: global report on surveillance*, 2014).

In tuberculosis (TB) treatment, drug resistance has become one of the main issue. The statistics on anti-TB drug resistance highlighted 123,000 patients with MDR-TB or rifampicin-resistant tuberculosis (RR-TB) and around three fourths were located in India, South Africa, China, and European regions (*WHO Global tuberculosis report 2015*, 2015). According to Centre for Disease Dynamics, Economics, and Policy (CDDEP) reports on MRSA, eventhough the incidence of MRSA infection was reduced in United States (44%), Europe (18%) Canada (16%), and South Africa (28%), the incidence had gained momentum in India (40%), Latin America (90%), Australia, and sub-Saharan Africa (European Centre for Disease Prevention and Control, 2015; Gelband et al., 2015; Kariuki & Dougan, 2014; Lino Junior, Ostermayer, Barbosa, & Schmidt, 2014; Public Health Agency of Canada, 2015).

Due to resistance to newer third-generation cephalosporins, *E. coli* has become a difficult-to-treat extended-spectrum betalactamase (ESBL). In 2013, 85-100% *E. coli* was isolated as ESBL-positive in 17 European countries (European Centre for Disease Prevention and Control, 2015). While in the Asian region, 28% of the *E. coli* family has been reported as ESBL-positive (UTIs) in 11 countries followed by resistance to both third- and fourth-generation cephalosporins (Lu et al., 2012). In Europe, five countries reported to have increased incidence of Carbapenem-resistant Enterobacteriaceae (CRE) in 2013 (European Centre for Disease Prevention and Control, 2015), while in the United States, 11% of *K. pneumoniae* and 2% of *E. coli* were resistant to carbapenem (CDC, 2013).

The overuse of antibiotics, inappropriate antibiotic prescribing and dispensing, extensive use in agriculture and veterinary sectors, lack of new antibiotics, and weak regulatory barriers are among the main cause of this problem (Ventola, 2015). It is clear that antibiotic resistance has been burdening both the developed and developing regions while non-prescription use of antibiotics also exacerbate the problem even further (Morgan, Okeke, Laxminarayan, Perencevich, & Weisenberg, 2011; Okeke et al., 2005; Zoorob, Grigoryan, Nash, & Trautner, 2016). Not including US, Canada, and Northern Europe, non-prescription antibiotics usage is observed in many region all over the world (Infectious Diseases Society of America, 2005; Okeke et al., 2005). It is difficult to ascertain the comprehensive effect of antibiotic resistance, but in the middle- and lower-income regions judicious sale of antibiotics is always a question mark (Alabid, Ibrahim, & Hassali, 2014; Almaaytah, Mukattash, & Hajaj, 2015; Abdulhak et al., 2011; Dillip et al., 2015; Diwan, Sabde, Byström, & De Costa, 2015; Gebretekle & Serbessa, 2016; Hadi et al., 2016; Llor & Cots, 2009; Plachouras et al.,

2010; Roque, Soares, Breitenfeld, Figueiras, & Herdeiro, 2015; Roque et al., 2013; Shet, Sundaresan, & Forsberg, 2015; Zapata-Cachafeiro et al., 2014).

A combination of program elements focused on attitude and behaviour changes is important to achieve optimal health outcomes in a population. Antimicrobial stewardship (AMS) is an intervention program directed to improve and sustain appropriate antibiotic use in the absence of antibiotic resistance and strengthen patient safety in a cost-effective manner (Fishman, 2012). The American Society of Health System Pharmacists outlined pharmacists as appropriate antimicrobial stewards who can responsibly acquire projected roles in antimicrobial stewardship programs and can exercise profound influence through participatory action in infection prevention and control measures (“ASHP statement on the pharmacist’s role in antimicrobial stewardship and infection prevention and control,,” 2010). Precisely, the effective execution and maintenance of this program depend on the knowledge and attitudes of the pharmacists working in both hospital and community settings. Globally, community pharmacists’ roles are appropriately recognized to maintain reinforced care and services with customers and/or patients and, thus, are in well-placed positions to carry out interventions related to stewardship and medication management in both minor and major conditions.

The literature review is presented as scoping review. The review mapped articles that discussed on the perception and attitude of community pharmacists towards antibiotic dispensing without prescription and the related aspects and facilitators with most sought-after antibiotics in different diseases. The review also anticipated to highlights research gaps followed by recommendations of interventions and health education.

2.2 MATERIALS AND METHODS

Arksey and O'Malley's step-wise methodological framework was the basis of this scoping review (Arksey & O'Malley, 2005). The step-wise framework aids in research question identification and relevant studies searching. It also helps the selection of studies and allows the data to be put into easy chart forms for collation, summary, and concluding the results. The framework only works as a methodological basis and the methodology was strengthened further by consulting the work of Levac, Colquhoun, and O'Brien (Levac, Colquhoun, & O'Brien, 2010). Their recommendations for each stage of framework were studied and it ultimately improves the precision of the scoping study methodology. The framework steps taken were (1) research questions identification; (2) relevant literature identification; (3) screening and selection of relevant literature; (4) data charting; and (5) analysing, summarizing, and reporting the results.

2.2.1 Step 1: Identification and Development of Research Question

Since the perceptions and attitudes towards antibiotics dispensing among community pharmacists are the main focus of this review, the research question was "What are the perception and attitudes of community pharmacists on antibiotic sales and does it affect the antibiotic resistance?" Five areas of interest based on the antibiotic sales were identified:

- a) What are the perceptions of community pharmacists towards antibiotic dispensing?
- b) What are the attitudes of community pharmacists towards antibiotic dispensing?

- c) How frequently did community pharmacists dispense antibiotics in community pharmacies?
- d) How often did customers demand antibiotics in community pharmacies?
- e) Are antibiotics that were dispensed from community pharmacies suitable?

2.2.2 Step 2: Relevant Literature Identification

From June 2016 until September 2016, a literature search was done to discover and categorize published studies related to knowledge, perception, and attitudes of community pharmacists towards antibiotic dispensing. The search was performed using Boolean operators for the following combination: “perceptions”, “attitudes”, “antibiotic”, “antibiotic resistance”, “antibiotic dispensing”, “community pharmacy”, and “community pharmacists”. The electronic databases used for searching include PubMed, ProQuest, Google Scholar, and Science Direct.

2.2.3 Step 3: Screening and Selection of Relevant Literature

Based on the reviewed titles and the abstracts, qualitative or quantitative studies, or both, were included in the review. Meanwhile, research focusing on general practitioners and customers were excluded from the review. Accessible English language articles were prioritized over non-English to be screened further. The articles screened also need to be recently published to ensure their relevancy. Then, information from each article was abstracted by using a standardized data form in a table format.

In this process, three researchers individually studied and reviewed the abstracts of the articles. Then, face-to-face discussions were done three times on ambiguous aspects of the articles and inclusion or exclusion of the discussed articles.