

**KNOWLEDGE, ATTITUDE, AND PRACTICE OF DOCTORS IN
EMERGENCY DEPARTMENT TOWARDS ANTIMICROBIAL
STEWARDSHIP AND THEIR PREDICTORS IN TERTIARY HOSPITAL IN
KOTA BHARU, KELANTAN**

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LIST OF ABBREVIATIONS

ADR	Antimicrobial drug resistance
AMA	Antimicrobial Agent
AMS	Antimicrobial Stewardship
AST	Antimicrobial sensitivity test
CDC	Centers for Disease Control and Prevention
ED	Emergency Department
HOSPITAL USM	Hospital Universiti Sains Malaysia
HRPZ	Hospital Raja Perempuan Zainab
KAP	Knowledge , attitude , practice
SPSS	Statistical package for social science software
SSTI	Skin and soft tissue infection

ABSTRAK

Pengenalan

Jabatan Kecemasan (ED) adalah persekitaran kritikal bagi Pengawasan antimikrob (AMS) memandangkan kekerapan penemuan penyakit berjangkit. Oleh itu, penyelidikan ini bertujuan untuk mengukur tahap pengetahuan, sikap dan amalan (KAP) para doktor di ED terhadap AMS dan faktor-faktor peramal di hospital berpakar, Kota Bharu, Malaysia.

Kaedah

Kajian keratan rentas ini dilakukan di Jabatan Kecemasan Hospital Universiti Sains Malaysia dan Hospital Raja Perempuan Zainab II di kalangan 150 doktor di Kota Bharu, Malaysia dari Ogos 2019 sehingga Februari 2020 menggunakan soal selidik yang telah disahkan penggunaannya sebelum ini di India. Responden dipilih secara rawak. Soal selidik ini merangkumi empat seksyen termasuk sosiodemografi, pengetahuan, sikap dan amalan terhadap elemen teras AMS. Statistik deskriptif digunakan untuk menganalisis data. Analisis regresi linear berganda dilakukan untuk mengakses faktor-faktor peramal terhadap skor KAP.

Keputusan

Pengetahuan dan amalan keseluruhan responden adalah baik tetapi dengan sikap tidak memuaskan terhadap AMS dengan skor peratusan min masing-masing 85.3%, 70.4% dan 58.1%. Analisis regresi linear berganda menunjukkan bahawa tahap min sikap berhubung kait dengan keseluruhan pengalaman ED doktor ($\beta=0.198$; $p=0.003$) dan kekerapan frekuensi preskripsi antibiotik ($\beta=0.928$; $p=0.005$). Persepsi doktor terhadap AMS mempamerkan hubungan yang signifikan dengan pengetahuan yang baik ($\beta=0.373$; $p=0.044$) dan amalan yang baik ($\beta=0.921$; $p=0.001$).

Kesimpulan

Faktor-faktor peramal yang signifikan terhadap pengetahuan dan amalan yang baik adalah persepsi doktor terhadap AMS. Faktor-faktor peramal sikap yang baik terhadap AMS adalah kekerapan preskripsi antibiotik dan pengalaman bekerja di ED.

Kata kunci

Pengawasan antimikrob, Jabatan kecemasan, pengetahuan, sikap dan amalan

ABSTRACT

Introduction

Antimicrobial stewardship (AMS) is vital in the Emergency Department (ED) because the doctors encounter high frequency of infectious disease. Therefore, we aim to measure the level of knowledge, attitude, and practice (KAP) of doctors towards AMS and their predictors in tertiary hospitals in ED, Kota Bharu, Malaysia.

Method

This cross-sectional study was conducted at the ED of Hospital Universiti Sains Malaysia and Hospital Raja Perempuan Zainab II in Kota Bharu, Malaysia, among 150 doctors from August 2019 to February 2020 using a previously validated self-administered questionnaire. Respondents were randomly selected. The questionnaire comprised of four sections, including sociodemographic, knowledge, attitude and practice on core elements of AMS. Descriptive statistics were used for data analysis. Multiple linear regression analysis was conducted to determine the best model of predictors of the KAP scores.

Results

The respondents' overall knowledge and practice were good but with an unfavourable attitude towards AMS with a mean percentage score of 85.3%, 70.4 %, and 58.1%, respectively. Multiple linear regression analysis revealed that the mean score of attitudes was associated with the doctor's years of overall ED experience ($\beta=0.198$; $p=0.003$) and frequency of antibiotic prescription ($\beta=0.928$; $p=0.005$). Doctors perceptions of AMS exhibited significant association with good knowledge ($\beta=0.373$; $p=0.044$) and good practice ($\beta=0.921$; $p=0.001$) on AMS.

Conclusions

The respondent's overall knowledge and practice level was good but had an unfavourable attitude toward AMS. Significant predictors of good knowledge and practice were

doctor's perceptions of AMS. The predictors of favourable attitudes toward AMS were antibiotic prescription frequency and years of ED experience.

Keywords

Antimicrobial stewardship, Emergency department, knowledge, attitude, and practices

CHAPTER 1: INTRODUCTION

Antimicrobial resistance (AMR) has emerged as one of the significant public health issues of the 21st century.¹ Antimicrobial stewardship (AMS) has been implemented as a direct response to the rise of AMR. AMS consists of systematic measurement and coordinated intervention designed to promote antimicrobial agent (AMA) optimal use, including their choice, dosing, route, and duration of administration.²

The emergency department (ED) is a critical setting for the AMS program, given the frequency of infectious disease encounters and its significant role in hospital admissions and acute care outpatient management. Previous studies reported that AMA is frequently prescribed in EDs, and around half of these prescriptions are either unnecessary or inappropriate.³⁻⁵ Diagnostic uncertainty is one of the fundamental causes of unnecessary prescriptions in ED.³ The introduction of AMS in the ED is difficult due to inherent environment variations and workflows compared to the inpatient setting.⁴ Perception of AMS by ED doctors provides insight into their attitudes, beliefs, and the barriers to implementing AMS strategies.⁵ In Malaysia, the first-year experience and positive results of the post-implementation of the AMS approach in district hospital were reported by Yap and colleagues.⁶ However, there is a lack of study on AMS among ED doctors in Malaysia.

Therefore, this study's objective was to measure the level of knowledge, attitude, and practice of ED doctors towards AMS and their predictors in two tertiary hospitals in Kota Bharu, Malaysia. The study findings will provide useful data to understand better KAP's predictive factors associated with AMS in ED. Data from this study can also be a guide to stratify the urgency for further intervention on the AMS program in ED.

CHAPTER 2.0 STUDY PROTOCOL

2.1 INTRODUCTION

The discovery of antibiotics has been a tremendous driver for unprecedented medical and society advances.⁷ The antimicrobial resistance crisis is the increasing global incidence of infectious diseases affecting the human population, which are untreatable with any known antimicrobial agent. Among all antibiotics, Penicillin's resistance rate ranged from zero to 50%, and around 8% to 65% of *E. coli* associated with urinary tract infections presented resistance to Ciprofloxacin.⁸ According to the National Surveillance of Antibiotic Resistance (NSAR), the emergence of beta-lactamase producers (ESBL) among Enterobacteriaceae had become a significant concern in Malaysia. *Streptococcus pneumoniae*, the commonest cause of community-acquired pneumonia, is now 31% resistant to erythromycin, one of the most typical antibiotics used in primary care in treating respiratory tract infections.⁹ High antibiotic prescribing rate for upper respiratory tract infection and the wrong antibiotic choice is a significant healthcare concern in Malaysia as an antibiotic is a rank among the top 10 most utilized drug.¹⁰

Three significant factors determine this crisis, i.e. (1) the increasing frequency AMR phenotype among microbe is the evolutionary response to the widespread use of antimicrobials; (2) the large and globally connected human population allows pathogen in any environment access to all of humanity; and (3) the extensive and often unnecessary use of antimicrobial by society provide the intense selective pressure that is driving the evolutionary response in the microbial world.¹⁰ The decrease in the production of new antimicrobial agents also contributed to a global crisis with the emergence of bacteria resistance towards most antibiotics.¹¹

2.2 PROBLEM STATEMENT AND STUDY JUSTIFICATION

Antibiotics are frequently prescribed medications in the ED, and around half of these prescriptions are either unnecessary or inappropriate. The impact of EDs regarding antibiotic is significant as prescriptions initially started in ED are often continued in another department or the outpatient setting. AMS is a coordinated, systematic approach to improve antimicrobials' appropriate use of antimicrobials by promoting the optimal drug regimen, the right choice of antimicrobial, right route of administration, correct dose, right time, suitable duration, and minimize harm to the patient and future patients. AMS programs are therefore much needed in EDs, all the more since bacteria resistance is on the rise worldwide. A specific barrier to implementing this program in EDs mainly high staff turnover, time constraints and the vast spectrum of diseases encountered, and difficulties in follow-up for a patient discharged from ED. However, fewer studies on AMS or KAP study in the ED. The Centers for Disease Control and Prevention (CDC) recommend improving antimicrobial use in an outpatient setting. These elements included tracking and reporting antimicrobial prescribing practice and commitment to improving antibiotic prescribing and patient safety.¹²

2.2.1 The benefit of the Study

1. This KAP study can help hospitals and departments understand knowledge, attitude, and practice toward antimicrobial stewardship among doctors in the emergency department. It will allow us to identify measures to reduce inappropriate antibiotic prescription and determine the most effective antibiotic stewardship strategies.
2. By doing this study, it can reveal the factors of usage and prescription of antimicrobials. Access to information on antimicrobial consumption and use can be an essential source for healthcare professionals and policymakers to monitor more prudent antibiotics use.

3. This study can be baseline data for emergency departments, and hospitals on their antimicrobial stewardship performance as ongoing monitoring and feedback are essential to improving antibiotic usage, prescribing the practice, and improving patient clinical outcomes. This data also can be a guide to stratify the urgency for further intervention on antimicrobial stewardship program.
4. This study will help doctors in the emergency department improve their knowledge, attitude, and practice on antimicrobial stewardship as the results will be disclosed to all participants.

2.3 RESEARCH QUESTIONS

1. Do doctors in the Emergency Department of tertiary hospitals in Kota Bharu have good knowledge of antimicrobial stewardship?
2. What is the attitude toward antimicrobials stewardship among doctors in the Emergency Department of tertiary hospitals in Kota Bharu?
3. What is the practice of antimicrobial stewardship among doctors in the Emergency Department of Tertiary Hospitals in Kota Bharu?
4. What factors are associated with the level of knowledge, attitude, and practice toward antimicrobial stewardship among doctors in the Emergency Department?

2.4 OBJECTIVES

General objective:

To study the level of knowledge, attitude, and practice of doctors in the Emergency Department towards antimicrobial stewardship and their predictors in tertiary hospitals in Kota Bharu, Kelantan.

Specific objective:

1. To determine the level of knowledge on antimicrobial stewardship among doctors in the Emergency Department of tertiary hospitals in Kota Bharu.
2. To determine the level of attitude toward antibiotics stewardship among doctors in the Emergency Department of tertiary hospitals in Kota Bharu.
3. To determine the level of practice of antibiotic stewardship among doctors Emergency Department of tertiary hospitals in Kota Bharu.
4. To determine the associated factors for level of knowledge, attitude, and practice on antimicrobial stewardship among doctors in the Emergency Department of tertiary hospitals in Kota Bharu.

2.5 LITERATURE REVIEW

AMR is the ability of bacteria, parasites, and fungi to grow and spread in the presence of antimicrobial medicines that are usually active against them. AMR can occur via several resistance mechanisms, such as modified antimicrobial target, enzymatic hydrolysis/degradation, efflux, and impermeability. This AMR is mediated by diverse resistance genes that evolve due to antimicrobial selection pressure exerted by appropriate or inappropriate antimicrobial medicine and is aggravated by the new AMA in the current therapeutic guideline.¹³

AMS is one of the key strategies to overcome resistance. AMS is an inter-professional effort across the continuum of care that involves timely and optimal selection, dose, and duration of an antimicrobial. It is for the best clinical outcome for treating or preventing infection with minimal toxicity to the patient and minimal impact on resistance and other ecological adverse events such as *C. difficile*.¹⁴ It involves selecting the right antibiotic for the right patient and the correct dose and right route, causing the least harm to the patient and future patients.¹⁵ AMS

is thus a coordinated, systematic approach to improve the appropriate use of antimicrobial. The four main goals of AMS include : (i) improve patient outcome, (ii) improve patient safety, (iii) reduce resistance, (iv) lower health care costs.¹⁶

The ED increasingly functions as the centre of the healthcare system, and antibiotics prescribed here have significant downstream effects in inpatient and outpatient settings. The most common indications for antibiotics in the ED were bronchitis or upper respiratory tract infection (35.1%) followed by skin and soft tissue infection (SSTI) (25%), both of which were the most common unnecessary prescriptions. Of all the antibiotic drugs, 39% reviewed as inappropriate.¹⁷ Reducing antibiotic prescription not only decreases the rates of AMR in the community but also ensures patients safety due to the high speed of an adverse event to antibiotics, including allergic reactions and the development of secondary antibiotic-associated infections such as *C. difficile* infection.¹⁸

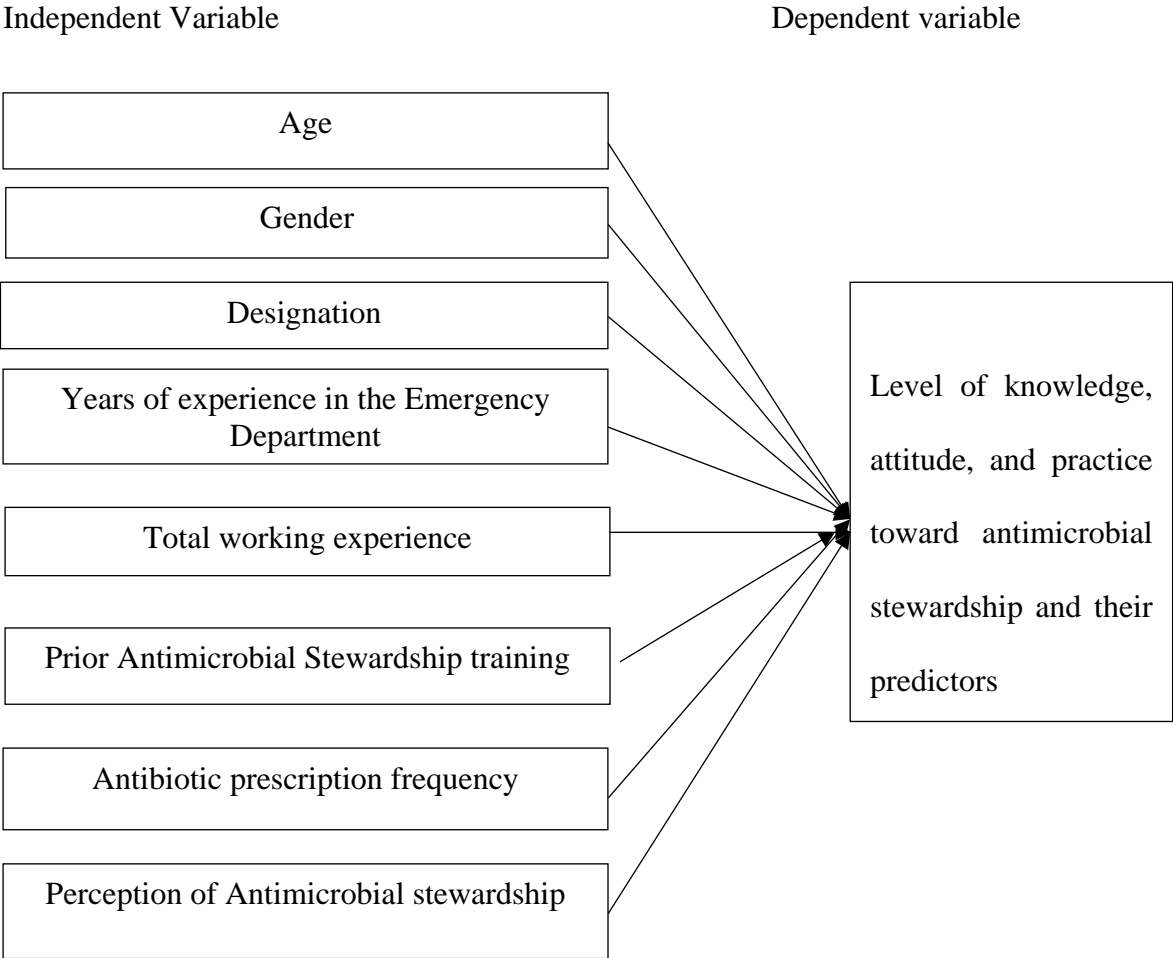
The ED represents a critical setting for initiating intervention that could decrease inappropriate antibiotic prescribing. According to the Surviving Sepsis Campaign, the first initial dose of antibiotic in ED is arguably the most crucial dose the patient received for patients admitted for severe infection and should be based not only on the suspected infection but also on host factors and prior antibiotic exposure. ED practitioners have a significant impact on initial therapy inpatient setting.¹⁹ In the ED setting, clinicians' desire to maintain patient satisfaction has been demonstrated as a factor in antibiotic prescription.²⁰

For rational use of medication, patients need to receive appropriate medication as their clinical needs for adequate duration.²¹ To improve antimicrobial use in an outpatient setting, the CDC released Core Elements of Outpatient Stewardship, which included four elements: commitment to improving antibiotic prescribing and patient safety, implementation of at least one policy or practise, tracking and reporting antimicrobial prescribing practice and providing education and expertise to clinicians and patients on antimicrobial prescribing.²²

In a previous study done at Fitch Hospital, Ethiopia, healthcare professionals showed 62.8% of the respondents have good knowledge of AMS. However, most of them still have a negative attitude towards it.²³ A study among paramedics in India showed that despite adequate knowledge on antibiotic resistance and side effects, their attitude and practice toward antimicrobial usage is still poor.²⁴ This KAP study will fill the research gap regarding knowledge, attitude, and practice on antimicrobial stewardship among doctors in the emergency department of a tertiary hospital in Kota Bharu, Kelantan.

2.6 METHODOLOGY

2.6.1 CONCEPTUAL FRAMEWORK.



The conceptual framework above consists of eight independent variables and one dependent variable. The independent variables are age, gender, designation, total working experience, years of experience in the Emergency Department, prior AMS training, antibiotic prescription frequency, and perception of antibiotic stewardship. The framework's dependent variable is the level of knowledge, attitude, and prescribing practice of antibiotics.

2.6.2 RESEARCH DESIGN

This is a cross-sectional study using a self-administered questionnaire. The study period will be from January 2019 until April 2021(28 months). Data collection will be from December 2019 until May 2020(6months).

2.6.3 STUDY AREA

Emergency Department of Hospital Universiti Sains Malaysia (Hospital USM) and Hospital Raja Perempuan Zainab II, Kelantan

2.6.4 STUDY POPULATION

Reference population: All doctors in the Emergency Department of Hospital Universiti Sains Malaysia (Hospital USM) and Hospital Raja Perempuan Zainab II, Kelantan

Study population: All doctors in the Emergency Department of Hospital Universiti Sains Malaysia (Hospital USM) and Hospital Raja Perempuan Zainab II, Kelantan during that study period.

Study Participant: All doctors in the Emergency Department of Hospital Universiti Sains Malaysia (Hospital USM) and Hospital Raja Perempuan Zainab II, Kelantan, during this study period who fulfilled the inclusion and exclusion criteria.

2.6.5 SAMPLING FRAME

The sampling frame consists of a name list of doctors in the Emergency Department of Hospital Universiti Sains Malaysia (Hospital USM) and Hospital Raja Perempuan Zainab II (HRPZ).

2.6.6 SUBJECT CRITERIA

Inclusion criteria

All consented doctors in the Emergency Departments of Hospital Universiti Sains Malaysia (Hospital USM) and Hospital Raja Perempuan Zainab II.

Exclusion criteria

Doctors in the Emergency Department of Hospital Universiti Sains Malaysia (Hospital USM) and Hospital Raja Perempuan Zainab II, Kelantan, who are not available during the study period.

2.6.7 SAMPLE SIZE ESTIMATION

Objective 1: To determine the level of knowledge on antibiotic stewardship among doctors in the Emergency Department, tertiary hospitals in Kota Bharu

There is no sample size calculated for this objective because it being a descriptive analysis.

Objective 2: To determine the level of attitude toward antibiotic stewardship among doctors in the Emergency Department of tertiary hospitals in Kota Bharu

There is no sample size calculated for this objective because it being a descriptive analysis.

Objective 3: To determine the level of practice of antibiotic stewardship among doctors Emergency Department of tertiary hospitals in Kota Bharu.

There is no sample size calculated for this objective because it being a descriptive analysis.

Objective 4: To determine the associated factors for level of knowledge, attitude, and practice on antimicrobial stewardship among doctors in Emergency Departments of tertiary hospitals Kota Bharu.

The sample size was calculated using PS software, two proportions sample size calculation.

Variable	P _o	P ₁	n	2(n +10%)	Reference
Sex	0.87	0.66	63	138	Sarwar et al., 2018
Age	0.42	0.2	68	150	Sarwar et al., 2018

The Type 1 probability associated with this null hypothesis is 0.05. We will use a continuity corrected chi-squared static or Fisher's exact test to evaluate the null. Probability(power) 0.8. The sample size was calculated according to a previous study conducted among community pharmacists in Pakistan.²⁵

In conclusion, the largest sample size calculated was 150. Therefore, the sample size taken for this study is 150.

2.6.8 Sampling Technique

This study will use simple random sampling. Each name of the target population is assigned a number. A random number is generated, and the unit is having those numbers are included in the sample.

2.6.9 Research tools

Questionnaires are formulated written set of questions to which respondents record their answer, usually within instead closely defined alternatives. The questionnaire used for this study (Appendix I) has been designed from a previous study done in a tertiary care teaching hospital in India.²⁶ The questionnaire has been validated in an earlier study. Hospital USM infection disease physician also reviews this questionnaire to ensure it is relevant. Permission for the use of the questionnaire for this study will be obtained from the original authors. An email was sent to the author of the study requesting permission to use the questionnaire. The structured questionnaire consists of four sections.

Section 1: This section is on sociodemographic data of doctors.

Section 2: This section comprises seven questions on knowledge toward AMS.

Section 3: This section comprises ten questions on attitude toward AMS.

Section 4: This section comprises eight questions on practice toward AMS.

Some questions were yes or no type, while the rest were multiple-choice questions.

2.6.10 OPERATIONAL DEFINITION

Knowledge

According to Park's Textbook of Preventive and Social Medicine, knowledge is an acquired characteristic of an individual. It includes three components ;(a) a cognitive or learning element, (b) an effective or feeling element, and (c)a tendency to action. It is also one's capacity of imagining, one's way of perceiving. Knowledge of health behavior is considered beneficial; however, this does not automatically mean that this behaviour will automatically follow. The degree of knowledge assessed by this survey helps to locate areas where information and

education efforts remain to be exerted. Good knowledge refer to participants answered $\geq 65\%$ of the knowledge score correctly.²⁷

Attitude

Attitude has been defined as a relatively enduring organization of beliefs around a subject or concept which predisposes one to respond in some preferential manner. Attitude is a way of being, a position. These are leanings or "tendencies to." This is an intermediate variable between the situation and the response to this situation. It helps explain that among the possible practices for a subject submitted to a stimulus, the subject adopts one practice and not another.

Favourable attitude if participants answered $\geq 75\%$ of attitude questions correctly.²⁷

Practice

Practice or behavior is the observable action of an individual in response to a stimulus. This is something that deals with concrete actions. Good practice if participants have properly practiced $\geq 70\%$ of practice questions.²⁷

2.7 DATA COLLECTION METHOD

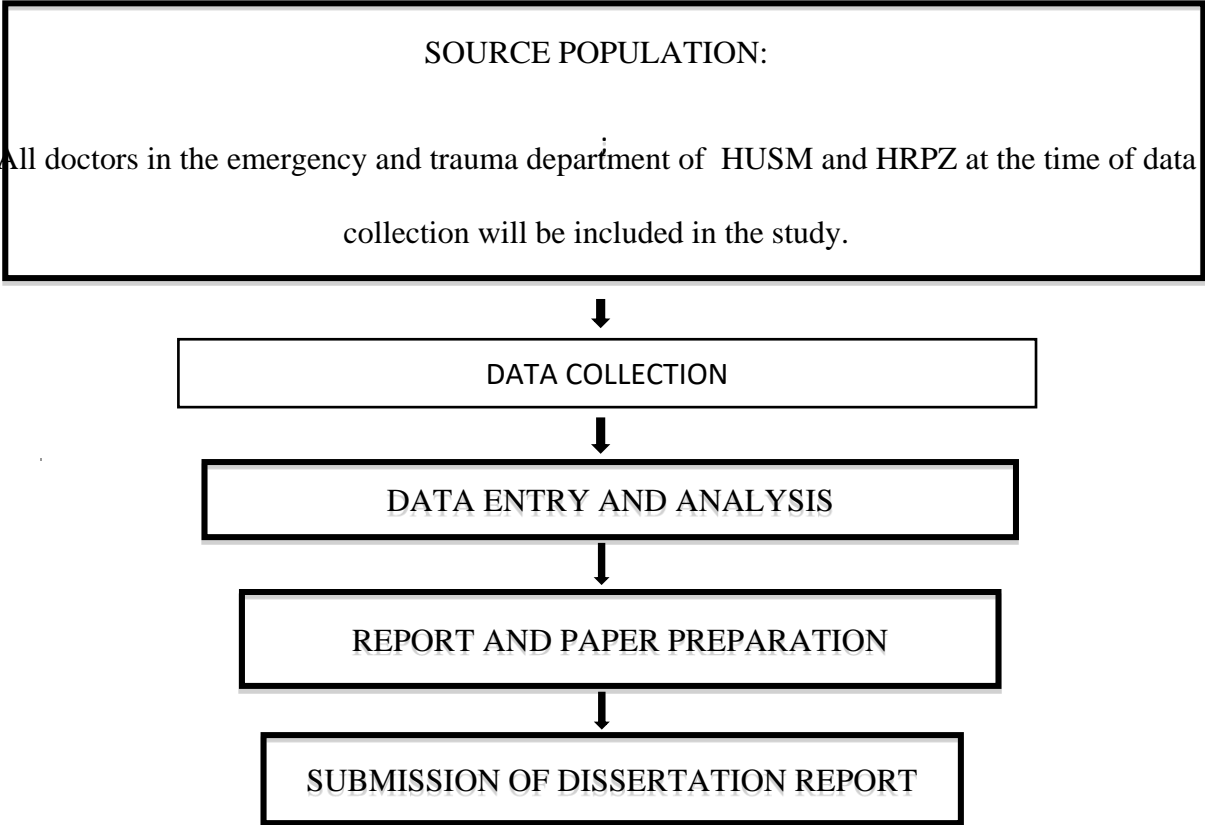
All eligible participants will be given a questionnaire using the direct questionnaires method after consent is given. Patient information sheets and informed consent forms in English will be used as all doctors and expected to understand English. The primary data sources are gathered from the questionnaire and are designed to get the information on knowledge, attitude, and practice toward antimicrobial stewardship among doctors in the emergency department of Hospital USM and HRPZ. Data will be collected from December 2019 to May 2020(6 months). For selected participants, the researcher will approach respondents during their most convenient time. Details of the study will be explained before obtaining written informed consent for the

research study. If the selected respondent refuses to join the study, a replacement will be randomly picked from the unselected list.

For selected respondents who are not in Kelantan, the researcher will arrange an appointment conveniently. The researcher will travel to the respondents' places to explain the study, obtain consent, and distribute and collect the questionnaire.

Respondents are expected to complete the questionnaire individually within 15 minutes in the researcher's presence and hand over the researcher's answered questionnaire. Documents will be kept in a safe place and will be destroyed post-study approximately after one year.

2.8 FLOW CHART



2.9 DATA ANALYSIS

The data collected will be analyzed using IBM SPSS version 24.0. It will be examined using multiple linear regression. Therefore, the data is explained in three forms; demographic information, descriptive analysis, and inferential analysis.

Variable

Independent Variable

- a. Age
- b. Gender
- c. Designation.

Respondents will be categorized into postgraduate trainees, medical officers, and house officers.

- d. Years of Experience in Emergency Department
- e. Years of practice.

Total working experience is the number of years practising medicine, including houseman ship training.

- f. Prior Antimicrobial Stewardship Training

Prior training includes continuous medical education on antibiotic selection, dose optimization, and clinical audit or feedback on antimicrobial prescription's appropriateness.

- g. Antibiotic prescription frequency

The frequency of antibiotic prescriptions will be categorized according to the number of antibiotic prescriptions in a week.

- h. Perception toward Antimicrobial stewardship training.

Dependent Variable

- a. Level of knowledge toward antimicrobial stewardship.
- b. Level of attitude toward antimicrobial stewardship.
- c. Level of practice toward antimicrobial stewardship.

2.10 EXPECTED RESULTS

Table I. Characteristics of respondents

Variables	Frequency(n=)	Percentage (%)
Gender		
Male		
Female		
Age		
21- 30 Years		
31- 40 Years		
41- 50 Years		
Designation		
Post grade trainee		
Service Medical officers		
House officer		
Total working experience		
>4 years		
<4 years		
Years of ED Experience		
<1 year		
1 -5 year		

>5 year

Prior AMS Training

Yes

No

Antibiotic prescription frequency

> once daily

1-2 times per week

3-5 times per week

Perception of Antimicrobial stewardship

Very important

Important

Not important

Notes: ED- Emergency Department, AMS- antimicrobial stewardship

Table 2. Level of KAP of doctors in Emergency Departments towards antimicrobial stewardship

		Category	Frequency (%)
1	Knowledge	Good	
		Poor	
2	Attitude	Favourable	
		Unfavourable	
3	Practise	Good	
		Poor	

Table 3. Associated factors for good knowledge toward antimicrobial stewardship among respondents using simple linear regression

Variables	Crude OR^a	95% CI^b	Wald Stat^c	P-value
Gender				
Male (n=)				
Female (n=)				
Age (n =)				
21- 30 Years (n =)				
31- 40 Years (n=)				
41- 50 Years (n=)				
Designation				
Post grade trainee (n=)				
Service Medical officers (n=)				
House officer (n=)				
Total working experience				
>4 years				
<4 years				
Years of practice				
<1 year				
1 -5 year				
>5 year				
Prior AMS Training				
Yes				
No				
Antibiotic prescription frequency				

> once daily (n =)

1-2 times per week (n=)

3-5 times per week (n =)

Perception of Antimicrobial stewardship

Very important (n =)

Important (n=)

Not important (n=)

Note. :^aCrude odds ratio ^bConfidence interval ^cWald statistic ^dEmergency Department
^eAntimicrobial Stewardship

Table 4. Associated factors for good knowledge toward antimicrobial stewardship among respondents using multiple linear regression.

Variables	Adjusted OR^a	95% CI^b	Wald Stat^c	P-value
Gender				
Male (n=)				
Female (n=)				
Age (n =)				
21- 30 Years (n =)				
31- 40 Years (n=)				
41- 50 Years (n=)				
Designation				
Post grade trainee (n=)				
Service Medical officers (n=)				
House officer (n=)				
Years of practice				
>4 years				

<4 years
Years of ED Experience
<1 year
1 -5 year
>5 year
Prior AMS Training
Yes
No
Antibiotic prescription frequency
> once daily (n =)
1-2 times per week (n=)
3-5 times per week (n =)
Perception of Antimicrobial stewardship
Very important (n =)
Important (n=)
Not important (n=)

Note.: Adjusted odds ratio ^aconfidence interval ^bWald statistic ^cEmergency Department
^eAntimicrobial Stewardship

Table 5. Associated factors for a favourable attitude toward antimicrobial stewardship among respondents using simple linear regression.

Variables	Crude OR ^a	95% CI ^b	Wald Stat ^c	P-value
Gender				
Male (n=)				
Female (n=)				
Age (n =)				

21- 30 Years (n =)
31- 40 Years (n=)
41- 50 Years (n=)
Designation
Post grade trainee (n=)
Service Medical officers (n=)
House officer (n=)
Years of practice
>4 years
<4 years
Years of ED^d Experience
<1 year
1 -5 year
>5 year
Prior AS^e Training
Yes
No
Antibiotic prescription frequency
> once daily (n =)
1-2 times per week (n=)
3-5 times per week (n =)
Perception of Antimicrobial stewardship
Very important (n =)
Important (n=)
Not important (n=)
Note. : ^a Crude odds ratio ^b Confidence interval ^c Wald statistic ^d Emergency Department ^e Antimicrobial Stewardship

Table 6. Associated factors for a favourable attitude toward antimicrobial stewardship among respondents using multiple linear regression

Variables	Adjusted OR^a	95% CI^b	Wald Stat^c	P-value
Gender				
Male (n=)				
Female (n=)				
Age (n =)				
21- 30 Years (n =)				
31- 40 Years (n=)				
41- 50 Years (n=)				
Designation				
Post grade trainee (n=)				
Service Medical officers (n=)				
House officer (n=)				
Years of practice				
>4 years				
<4 years				
Years of ED^d Experience				
<1 year				
1 -5 year				
>5 year				
Prior AS^e Training				
Yes				
No				
Antibiotic prescription frequency				

> once daily (n =)

1-2 times per week (n=)

3-5 times per week (n =)

Perception of Antimicrobial stewardship

Very important (n =)

Important (n=)

Not important (n=)

Note. :^aAdjusted odd ratio ^bconfidence interval ^cWald statistic ^dEmergency Department
^eAntimicrobial Stewardship

Table 7. Associated factors for good practice toward antimicrobial stewardship among respondents using simple linear regression

Variables	Crude OR^a	95% CI^b	Wald Stat^c	P-value
Gender				
Male (n=)				
Female (n=)				
Age (n =)				
21- 30 Years (n =)				
31- 40 Years (n=)				
41- 50 Years (n=)				
Designation				
Post grade trainee (n=)				
Service Medical officers (n=)				
House officer (n=)				

Years of practice

>4 years

<4 years

Years of ED^d Experience

<1 year

1 -5 year

>5 year

Prior AS^e Training

Yes

No

Antibiotic prescription frequency

> once daily (n =)

1-2 times per week (n=)

3-5 times per week (n =)

Perception of Antimicrobial stewardship

Very important (n =)

Important (n=)

Not important (n=)

Note. :^aCrude odds ratio ^bConfidence interval ^cWald statistic ^dEmergency Department

^eAntimicrobial Stewardship

Table 8. Associated factors for good practice toward antimicrobial stewardship among respondents using multiple linear regression.

Variables	Adjusted OR^a	95% CI^b	Wald Stat^c	P-value
Gender				
Male (n=)				
Female (n=)				
Age (n =)				
21- 30 Years (n =)				
31- 40 Years (n=)				
41- 50 Years (n=)				
Designation				
Post grade trainee (n=)				
Service Medical officers (n=)				
House officer (n=)				
Years of practice				
>4 years				
<4 years				
Years of ED^d Experience				
<1 year				
1 -5 year				
>5 year				
Prior AS^e Training				
Yes				
No				
Antibiotic prescription frequency				