

**ENABLERS AND BARRIERS TO RATIONAL ANTIBIOTIC PRESCRIBING IN
PRIMARY HEALTHCARE FACILITIES IN THIRUVANANTHAPURAM DISTRICT.**

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**Dissertation submitted in partial fulfilment of the requirements for the award of the degree
of Master of Public Health**



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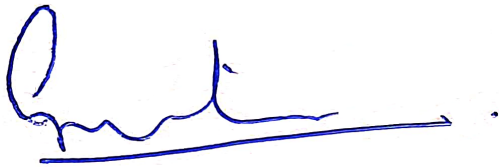
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DECLARATION

I hereby declare that this dissertation entitled “**Enablers and Barriers to Rational Antibiotic Prescribing in Primary Healthcare Facilities in Thiruvananthapuram District.**” is a bonafide record of my original research work. This dissertation has not been submitted, either in part or in full, to any other university or institution for the award of any degree or diploma. All sources of information, including published and unpublished works of other authors, have been appropriately cited and acknowledged within the text.



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CERTIFICATE

This is to certified that the dissertation entitled “**Enablers and Barriers to Rational Antibiotic Prescribing in Primary Healthcare Facilities in Thiruvananthapuram District**” is a Bonafide record of the research work carried out by **Dr. Siddharth Vijayan** under my guidance and supervision.

This dissertation is submitted in partial fulfillment of the requirements for the award of the **Master of Public Health** degree.

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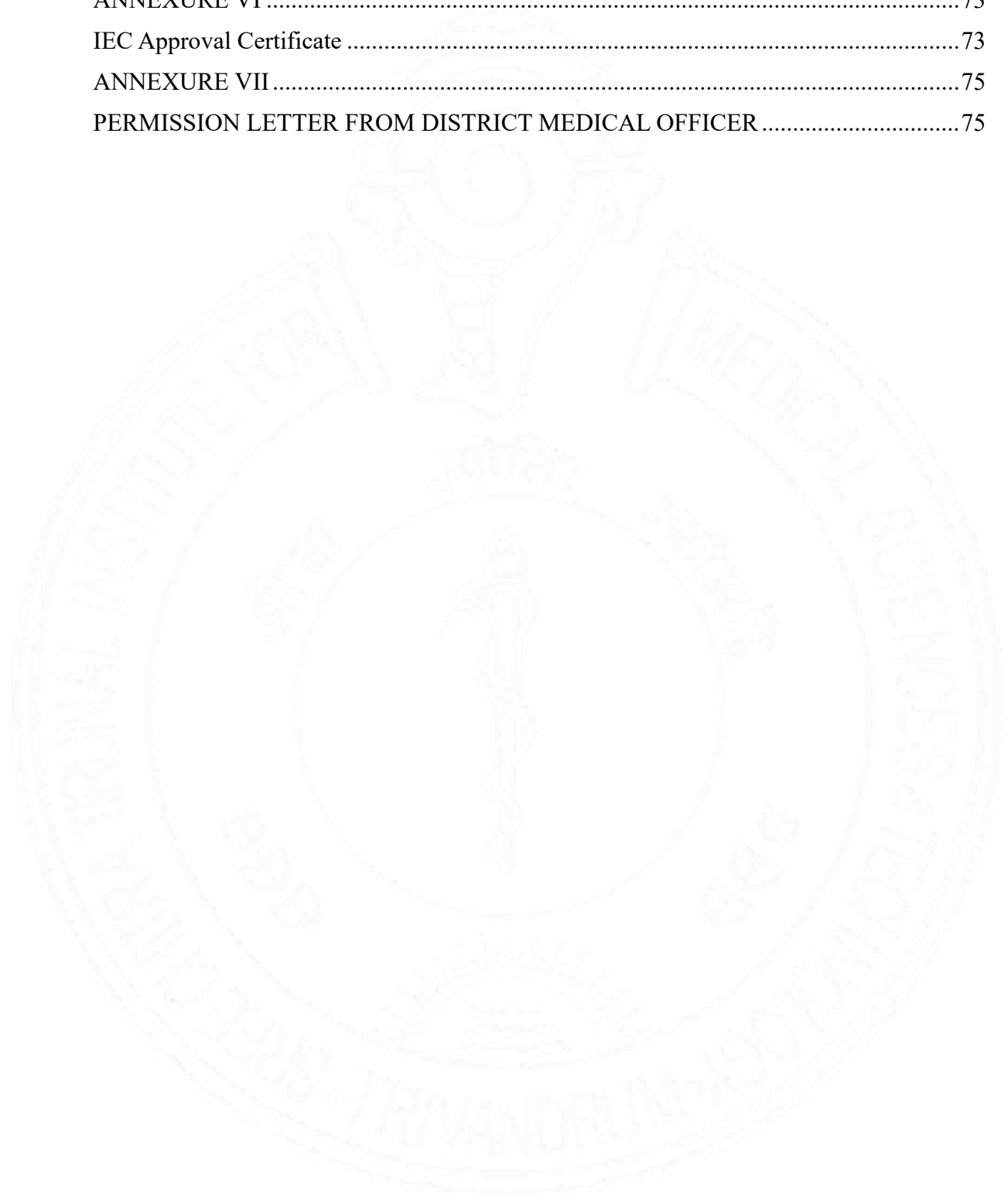
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GLOSSARY OF ABBREVIATION

Abbreviation	Full Form
ADR	Adverse Drug Reaction
AMR	Antimicrobial Resistance
AOR	Adjusted Odds Ratio
AWaRe	Access–Watch–Reserve (WHO antibiotic classification)
CDSCO	Central Drugs Standard Control Organisation
CHC	Community Health Centre
CI	Confidence Interval
CME	Continuing Medical Education
DDD	Defined Daily Dose
EML	Essential Medicines List
HMIS	Health Management Information System
ICMR	Indian Council of Medical Research
IPC	Infection Prevention and Control
LMIC	Low- and Middle-Income Country
NAP-AMR	National Action Plan on Antimicrobial Resistance
NHSRC	National Health Systems Resource Centre
NLEM	National List of Essential Medicines
ODK	Open Data Kit
OPD	Out-Patient Department
OR	Odds Ratio
PHC	Primary Health Centre
STG	Standard Treatment Guideline(s)
UPHC	Urban Primary Health Centre
WHO	World Health Organization

ABSTRACT

Background: Antimicrobial resistance (AMR) is escalating in India, where almost 5 billion defined daily doses of systemic antibiotics were consumed in 2019 and over half belonged to the WHO “Watch” class . Primary-health-care physicians are the gatekeepers of antibiotic exposure, yet evidence on the determinants of their prescribing, particularly in the private sector, remains scarce.

Objectives: This study assessed (i) the enablers and barriers to rational antibiotic prescribing among primary-care physicians in Thiruvananthapuram district, Kerala, and (ii) the extent to which prescriptions conformed to national and international stewardship norms .

Methods: A quantitative, cross-sectional survey was conducted in January–February 2025. Using stratified random sampling, 161 physicians (95 private, 66 public) were approached; 145 participated (response = 90%). Concurrently, 300 exit-prescriptions (150 per sector) were audited using the NHSRC indicators and WHO AWaRe classification. Data were captured on Open Data Kit and analysed in R 4.4.1. Descriptive statistics summarised practices; bivariate tests and multivariable logistic regression identified factors associated with Standard Treatment Guideline (STG) use, non-generic preference and other outcomes .

Results: Although 59 % of physicians reported using an STG, only 36 % always adhered to it. STG use was significantly lower in private facilities (48 %) than in public facilities (76 %; $p < 0.001$), an effect that persisted after adjustment (AOR 3.23 for non-use in private sector) . Initial antibiotic choice was guided by personal clinical experience for 65 % of physicians; patient-symptom–driven follow-up was also more common in the private sector

(OR 0.41 for symptom-based follow-up vs. culture-guided; $p = 0.025$) . Prescription audit showed better documentation, generic naming (64 % vs. 13 %) and legibility (98 % vs. 80 %) in the public sector, but a higher mean drug count (5.0 vs. 4.3). Watch-class antibiotics constituted 45 % of private-sector and 38 % of public-sector prescriptions, exceeding WHO targets . Logistic models identified moderate outpatient load (20–50 patients/day) and private ownership as independent predictors of non-guideline, brand-oriented prescribing .

Conclusions: High AMR awareness has not translated into uniform stewardship. Private facilities, facing diagnostic constraints and commercial pressures, rely more on empirical and branded therapies, whereas public facilities display better guideline compliance but greater polypharmacy. Strengthening primary-care stewardship in Kerala requires mandatory STG enforcement, incentives for generic prescribing, expanded point-of-care diagnostics, targeted continuing education for early-career doctors, and patient-centred communication to temper antibiotic demand. These measures align with India’s draft NAP-AMR 2.0 and are critical to curbing community-level resistance.

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Antimicrobial resistance (AMR) is a major worldwide public health threat and accounts for an estimated 700,000 deaths/year; it could lead to 10 million deaths/year by 2050 if not tackled. It happens when microorganisms such as bacteria, viruses, fungi and parasites change in ways that render the medications used to cure the infections they cause ineffective. This resistance makes treatment of routine infections more difficult, raises the risk of disease spread, and has led to higher medical costs and death rates (Antimicrobial resistance: global report on surveillance, 2014).

AMR is considered one of the most serious global health threats and, therefore, considered one of the top priorities of the World Health Organization (WHO). The World Health Organisation (WHO) also emphasizes the importance of promoting integrated AMR containment programmes for more rational antibiotic use, as well as efforts to tackle AMR development in low and middle income countries (LMICs) where the burden of AMR is disproportionately high (Antimicrobial resistance: global report on surveillance, 2014).

The economic consequences are significant; AMR could lead to annual global economic losses of up to \$3.4 trillion by 2030 as a result of rising healthcare expenditure and productivity loss (Jonas et al., 2017). The emergence of multidrug-resistant bacteria, or so-called "superbugs," presents a significant challenge. These pathogens can be resistant to standard treatments, contributing to longer hospital stays and higher death rates. For example, drug-resistant infections are believed to have killed more than 1.27 million people every year (Murray et al., 2022).

It is essential that antibiotics are used appropriately and that they are not overused in healthcare settings. Inappropriate use in the form of overprescription, incomplete antibiotic courses, OTC sales, self-medication with antibiotics, and poor infection control are some of the common causes of this trend. Rationally used antibiotics are essential to the successful treatment of infections, prevention of adverse events associated with excess or inappropriate antibiotic use, and efforts to reduce the development of antibiotic-resistant organisms (CDC, 2025). Antibiotics are often prescribed unnecessarily for viral infections or without proper diagnostic testing, leading to excess consumption (Gottlieb and Nimmo, 2011). Many patients do not finish their antibiotic treatment, which means living bacteria can adjust and become resistant (*ReAct*, 2016). In many countries, especially in LMICs, antibiotics can be bought without a prescription and are, therefore, overused. Hygiene and sanitation in medical settings can also inhibit the spread of resistant strains among patients (Walsh et al., 2023)(Africa Renewal, 2022c).

A multidisciplinary approach is needed in the battle against AMR, including improved stewardship of antibiotics in health care facilities, provision of a more regulatory framework for antibiotic usage in agriculture, better public awareness, and global surveillance and global response to resistance patterns. The interconnectedness of global health systems highlights the need for holistic prevention strategies that address the health of humans, animals, and the environment, increasingly known as “One Health” (Walsh et al., 2023).

CHAPTER 2

Literature Review

2.1 Importance of Rational Prescribing

The concept of rational drug use was originally formulated by the WHO at the Nairobi Conference in 1985. It explains that patients should receive medications that are appropriate to their condition, in doses that meet their own individual requirements for an adequate time, and at the lowest cost to the patient (Nairobi), 1987). Nearly forty years from then, irrational antibiotic use is still prevalent. In the United States, one in three outpatient antibiotic prescriptions is estimated to be unnecessary (CDC, 2024), while global surveillance reveals up to half of all medicines to be misused. The inappropriate prescribing has three main repercussions. Clinically, it exposes patients to preventable adverse drug reactions (ADRs) and failure of treatment. (Karimi et al., 2023) revealed that ADRs to antibiotics were associated with a median increase in hospital stay of 3.5 days, with the cost of care increasing significantly. Economically, irrational use is a significant reminder of its potential cost on health care budgets and household expenditure. This is a matter of concern in low and middle-income countries where out-of-pocket expenditure predominates (Fazaludeen Koya et al., 2022a). Public-health consequences are embodied in the emerging urgency of antimicrobial resistance (AMR). Widespread use of antibiotics selects for resistant strains, fuelling a vicious cycle of therapeutic escalation and increased mortality (Implementing the global action plan on antimicrobial resistance: first quadripartite biennial report, 2024).

Rational antibiotic therapy is predicated on a set of 5 evidence-based principles: 1) Strong differentiation of bacterial vs. viral illness, 2) Selection informed by local susceptibility patterns and the AWaRe framework, 3) Dose adjustment for age, weight, and renal function, 4) Shortest effective duration, and 5) Review early with de-escalation if possible (The

WHO AWaRe (Access, Watch, Reserve) antibiotic book, 2022). Adherence to these principles yields better clinical outcomes, lower ADRs, and slows the occurrence of resistance.

2.2 Role of primary health care facilities

Primary healthcare facilities are the first point of contact for patients in India, and often their sole source of care, with much of the community's antibiotic exposure coming from them. It is indicated that around 80 percentage of all antibiotic prescriptions are given in primary care (Hay, 2019). In Indian PHCs, prescribers see 60–100 patients/day, have restricted diagnostic availability, and sporadic supervision in conditions that increase diagnostic uncertainty and encourage empirical prescribing (Mukherjee et al., 2024). Data from the United Kingdom indicate that focused stewardship interventions in primary care (audit-and-feedback letters, delayed prescriptions, and point-of-care C-reactive-protein testing) can cut community-based prescribing by 10–15 percentage without harm to patients (Hay, 2019). Adopting models like these for Indian settings is inevitable considering the AMR targets.

2.3 Antibiotic prescribing trends in India

In India, approximately 5,071 million defined daily doses (DDDs) of systemic antibiotics were consumed in 2019, which had the highest absolute volume in the world by far. 54.9 percentage of the volume was classified as “Watch” agents, which suggested that a high proportion of the antibiotics were broad-spectrum drugs with potential resistance (Fazaludeen Koya et al., 2022). There is an increasing disparity between states as revealed by time series analysis. Some states have been efficient in implementing more rational prescribing, and others, in contrast, escalated total consumption and the use of irrational fixed-dose combinations. The private sector holds more influence at 90 % of outpatient antibiotic sales, yet surveillance is largely biased towards the public sector (Fazaludeen

Koya et al., 2022). Prescribing is also influenced by socio-cultural factors like patients' high demand for quick cure, over-the-counter dispensing, as well as aggressive pharmaceutical promotion (Mukherjee et al., 2024).

2.4 Enablers of rational antibiotic prescribing

Availability of Standard Treatment Guidelines (STG) is key to rational prescribing (Gopalakrishnan et al., 2014). Continued Medical Education further reinforces this. (Nabidda et al., 2023) demonstrated improvement in prescriber knowledge and confidence following structured AMR workshops. Supportive supervision via audit-and-feedback loops has achieved relative reductions of up to 15 % in inappropriate prescribing, particularly if baseline usage is high (Ivers et al., 2012). Diagnostic enablers, including point-of-care tests, reduce empirical antibiotic utilization by half for respiratory infections and are cost-effective to scale up in PHCs (Aabenhus et al., 2014). At the policy level, India's National Action Plan on AMR (NAP-AMR 2017-21) facilitated an enabling environment by integrating stewardship requirements in National health programmes and by catalysing State action plans. The draft NAP-AMR 2.0 intends to enlarge these mandates to the Primary Health Care (PHC) tier. (Compiled-report-of-National-Expert-Consultations-for-developing-National-Action-Plan-on-Antimicrobial-Resistance-2.0.pdf, 2024.).

2.5 Barriers to rational antibiotic prescribing

The most significant driver of precautionary prescribing is diagnostic uncertainty (CSIRO PUBLISHING | Australian Health Review, 2021). When laboratory confirmation is not available, clinicians often deploy broad-spectrum agents 'just in case'. Patient demand, which is commonly driven by previous experience, as well as cultural beliefs of rapid cures, adds further pressure, particularly on less experienced doctors. They have less time to consult, negotiate, and manage expectations (Laka et al., 2022). Structural obstacles

comprise high workload at the patient level, shortage of personnel, shortage of Access-group medicines, and the dominance of pharmaceutical marketing, driving prescribers towards the use of expensive Watch and Reserve medications. (Mukherjee et al., 2024).

2.6 Assessment methods for rational antibiotic prescribing

WHO's core drug-use indicators offer a standardized, cross-sectional summary of prescribing, patient care, and facility performance (WHO & INRUD, 1993)(Vaccines, 1993). Prescription audit studies build on this by assessing legibility, completeness, and adherence to STGs. These are especially useful for formative feedback in PHCs without electronic medical records. Quantitative consumption surveillance uses the Daily Drug Dose (DDD)/1,000 population/day and the AWaRe categories to monitor Access-Watch-Reserve ratios. Behavioural determinants of prescribing practice are elucidated in qualitative and mixed-methods studies (Borek et al., 2020a).

2.7 Impact of irrational antibiotic use in primary care

Community-level overuse fuels resistance in commensals with epidemic potential, such as fluoroquinolone-resistant *Escherichia coli*, which in turn amplifies treatment failures and referrals to higher-level facilities (Cao et al., 2023). Adverse drug reactions (ADRs) related to antibiotics comprise up to 7 % of all hospital admissions and further burden the health system already weighted toward out-of-pocket spending.(van Staa et al., 2024) (Pirmohamed et al., 2004). When first-line Access agents are no longer effective; households are compelled to buy costly Reserve drugs, which compound existing disparities in healthcare.

2.8 Anti-microbial use policy and regulation in India

The laws and regulations guided primarily by Schedule H and H1 make it mandatory to sell certain antimicrobials only with a prescription and ensure documenting antimicrobials in the sales registers. National List of Essential Medicines (NLEM 2022) aligns with the

WHO AWaRe framework to encourage Access to drugs and prescribe rational combinations. Susceptibility surveillance is facilitated by the Indian Council of Medical Research (ICMR), and pharmacovigilance and licensing are overseen by the Central Drugs Standard Control Organisation (CDSCO). The updated NAP-AMR 2.0 under development aims to include Access/Watch ratio and AWaRe-adjusted DDDs in India's Health Management Information System (HMIS), thereby bringing accountability down to the PHC level. (MoHFW, 2024).

2.9 Rationale

Facilities offering Primary Healthcare serve as the initial point of contact for the majority of patients, making them crucial in managing infections at an early stage. Doctors in the Primary Healthcare often initiate antibiotic therapy based on clinical judgement. Their understanding of appropriate prescribing practices is vital to reducing unnecessary antibiotic use. Prescribing audit research is part of an audit that monitors, evaluates, and, if necessary, recommends modifications to medical practitioners' prescribing practices (The WHO AWaRe (Access, Watch, Reserve) antibiotic book, 2022). The private healthcare sector accounts for a significant portion of antibiotic consumption in India, with estimates suggesting that up to 90% of total drug consumption occurs in private facilities. However, most research has focused on public hospitals, leading to a gap in understanding prescribing patterns in private settings. (Fazaludeen Koya et al., 2022b)

2.10 Objective

1. To assess the enablers and barriers to rational antibiotic prescribing in primary healthcare facilities.
2. To study rational antibiotic use in primary healthcare facilities, using prescriptions.

CHAPTER 3

Methodology

3.1 STUDY SETTING

Study Area:

Information about rational antibiotic prescribing practice from Physicians in facilities offering primary healthcare services in Thiruvananthapuram District, including rural and urban areas.

3.2 Study Population

Physicians in both Public and Private Primary Healthcare Facilities catering to the primary healthcare needs of the population in Thiruvananthapuram District.

Inclusion Criteria:

One doctor each from a private and public facility who has worked there for a minimum of 3 months prior to the interview. Contractual, Temporary, and Permanent physicians are included. Modern Medicine Doctors.

Exclusion Criteria:

Doctors with less than one year of experience and Interns. Doctors who are administrators of any facility. Dentists, AYUSH Doctors.

3.3 Study Design

A Quantitative Cross-sectional study design was conducted with data collected during months of January and February 2025.

3.4 Sample Size

a) Sample size of Physicians:

The sample size was calculated by Open epi version 3.01 software. The anticipated prevalence is 70%(Sulis et al., 2020), design effect of 1 and 95% CI, this came up to **145**. With a non-response rate of 10 %, the sample size is **161**.

b) Sample size of prescriptions:

The sample size was calculated by Open Epi version 3.01. The anticipated prevalence is 72%, and the 95% CI this came up to **310**. A National Centre for Disease Control survey of 12,000 prescriptions at 20 tertiary care hospitals across India shows that every 3 out of 4 outpatients receive antibiotics, and out of most of them are for prophylaxis rather than cure. The prevalence of 72% is taken from this survey (*The Indian Express*, 2024). The study was conducted between November 2021 and April 2022 under the National Programme of Antimicrobial Containment.

3.5 Sample Selection Procedure

a) Sampling of Physicians:

Physicians from both public and private are selected through **Stratified random sampling** of the facilities. **One physician each from private and public facility** catering to Primary Healthcare in Thiruvananthapuram District was selected through random selection. The schema of selections of physicians is given in **Figure 1: Sampling of physicians**

Number of **private physicians** chosen for study = **95**

Number of **public physicians** chosen for study = **66**

Total physicians chosen for study: **161**

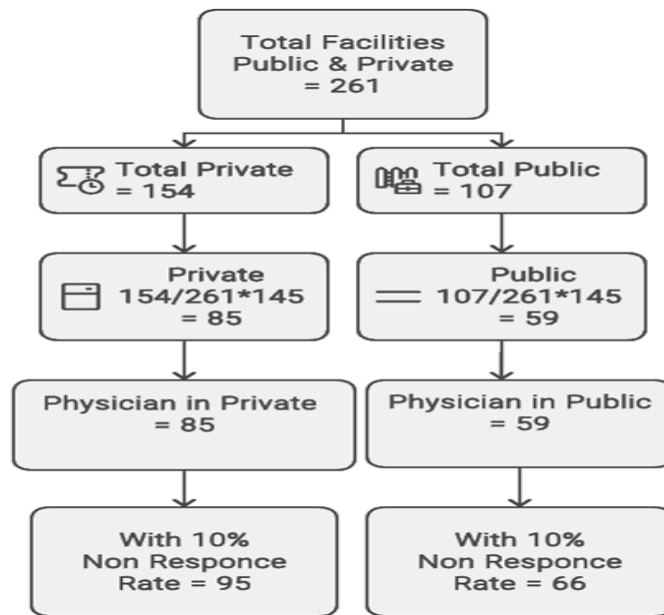


Figure 1: Sampling of physicians

b) Sampling of prescription:

A minimum of 3 prescriptions were collected from each facility through exit interview of the patients coming out of the facility after physician consultation. After reaching the facility, prescriptions were selected from first three patients who have received at least one antibiotic.

3.6 Data Collection Technique

a) Data regarding enablers and barriers to rational antibiotic prescribing practices is collected from the physicians using Structured interview schedule. (tool which is validated by experts and piloted). The venue of data collection was either the clinic or the place of physician's preference. Data was collected using the Open Data Kit (ODK) platform. During the interview, the privacy will be maintained and no probing questions will be asked.

b) Data regarding prescription, was collected from the prescriptions collected from patients exiting the facility. The prescriptions were photographed avoiding the patient identity details, facility details and the physician details. The photographed masked

prescriptions was stored in the phone and later the observations entered into MS Excel. This will be assessed using the NHSRC Prescription Audit guidelines with the Prescription Audit indicators.

3.7 Plan for Data Collection and Analysis

The principal investigator did the data collection and analysis. Informed consent was taken from the study participants. A structured interview schedule was conducted for the participants to gather information on demographic details, facility details, adherence to clinical guidelines, training and capacity building opportunities, professional influence, support of diagnostic tools, continued medical education and patient influence on antibiotic prescribing. Data was collected using the Open Data Kit (ODK) platform.

Data analysis was done by the principal investigator. Data cleaning and quantitative analysis was done using the open-source statistical package R version 4.4.1. After data collection, continuous variables was described using mean and standard deviation and categorical variables was described using frequency and percentages. Inferential statistics such as t-tests, ANOVA, and logistic regression analysis was employed to explore factors associated with rational antibiotic prescribing practices while adjusting for potential confounding factors. The findings were interpreted and presented in tables, graphs, and charts.

3.8 Expected Outcome:

The study aims to find enablers and barriers to rational antibiotic prescription practice in primary healthcare facilities. The findings may help the policies design targeted interventions focused on strengthening antibiotic stewardship in primary healthcare facilities.

Outcome Variables (Main Dependent Variables):

Standard Treatment Guidelines in Use.

Initial and follow-up Choice of Antibiotic.

Patient Request for Antibiotic.

Physician compliance with patient requests.

Preference for Non-Generic Medication.

3.9 Ethical Consideration

The study will be conducted only after obtaining approval from the Institutional Ethics Committee of Sree Chitra Tirunal Institute for Medical Sciences and Technology. Participants will be informed regarding the voluntary nature of the participation, study objectives, and the potential benefits and risks of the participation. Written informed consent will be obtained from all participants before enrolling them into the study. The participation in the study is completely voluntary, and participants are free and have the right to withdraw at any time during the study without any explanation or consequence. Utmost priority will be given to protect the privacy and confidentiality of the participants and the collected information will not be shared with anyone not involved in the study. At no stage identity of the participant will be revealed. All soft copies of the questionnaire will be deemed destroyed when no longer needed or after one year of dissertation report submission whichever is earlier. The participant will also be given a chance to ask any question, query, or doubt related to the study.

CHAPTER 4

RESULT

Table 1: Participant Characteristics

Variable	N = 145 n (%)
Physician Age in Years	
< 30	39 (27%)
30-40	71 (49%)
40-50	9 (6%)
50-60	5 (4%)
>60	21 (14%)
Years in Practice	
<5	65 (45%)
5-15	44 (30%)
15-25	10 (7%)
>25	26 (18%)
Educational Qualification	
MBBS	74 (51%)
Post MBBS Specialisation	71 (49%)
Physician Gender	
Female	69 (48%)
Male	76 (52%)

4.1 Participant Characteristics

A total of 145 physicians participated in the study. The majority of participants were between 30 and 40 years of age, accounting for 49% (n = 71) of the sample. Physicians aged less than 30 years comprised 27% (n = 39), while those aged between 40 and 50 years and 50 and 60 years represented 6% (n = 9) and 4% (n = 5), respectively. Participants over 60 years constituted 14% (n = 21) of the total. **(Table 1: Participant Characteristics)**

In terms of professional experience, 45% (n = 65) of the physicians had less than 5 years of practice, followed by 30% (n = 44) who had between 5 and 15 years of experience. Physicians with 15 to 25 years of experience formed 7% (n = 10) of the sample, while those with more than 25 years of practice accounted for 18% (n = 26). **(Table 1: Participant Characteristics)**

Regarding educational qualifications, the cohort was almost evenly split, with 51% (n = 74) holding an MBBS degree and 49% (n = 71) having completed a post-MBBS specialisation. Gender distribution among participants was also relatively balanced, with 52% (n = 76) being male and 48% (n = 69) female. **(Table 1: Participant Characteristics)**

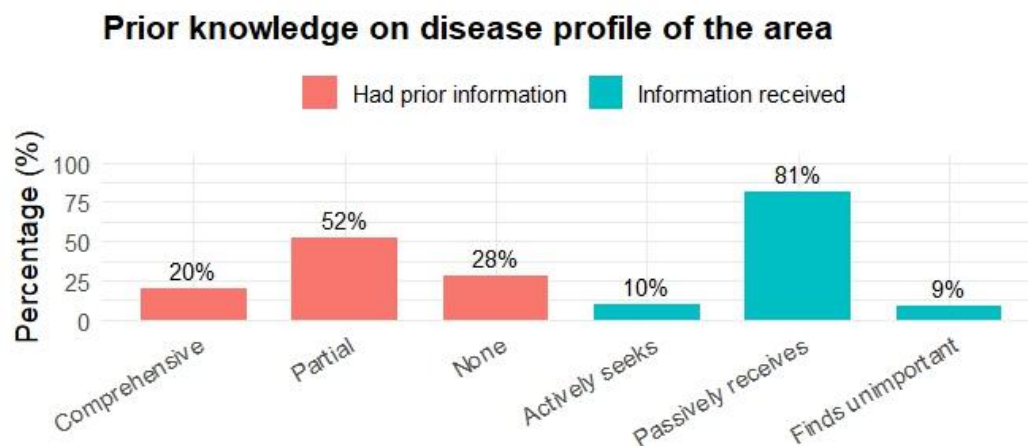
Table 2: Facility Details

Variable	N = 145 n (%)
Facility Type	
Public	59 (41%)
Private	86 (59%)
Daily OPD Patients	
<20	30 (21%)
20-50	57 (39%)
51-100	27 (19%)
>100	31 (21%)

4.2 Facility Details

Among the 145 participating physicians, 59 (41%) were from public primary healthcare facilities, while 86 (59%) practiced in private primary healthcare settings. **(Table 2: Facility Details)**

The daily outpatient department (OPD) patient load varied among physicians. Approximately 21% (n = 30) of the participants reported seeing fewer than 20 patients per day, 39% (n = 57) attended to between 20 and 50 patients daily, and 19% (n = 27) managed between 51 and 100 patients per day. Additionally, 21% (n = 31) of physicians reported attending to more than 100 patients each day. **(Table 2: Facility Details)**

Table 2: Facility Details**Figure 2: Prior knowledge on disease profile of the area**

Regarding the awareness of local disease profiles, 29 physicians (20%) reported having comprehensive information about the disease patterns in their area, whereas 75 physicians (52%) had only partial information. A notable proportion, 41 physicians (28%), indicated that they had no prior information regarding the disease profile of their practice area.

In terms of the source and approach to obtaining this information, only 14 physicians (10%) actively sought updates on the disease profile. A majority, 118 physicians (81%), reported passively receiving information, while 13 physicians (9.0%) considered knowledge of the local disease profile to be unimportant.

Table 3: Adherence to Clinical Guidelines

Variable	N = 145 n (%)
STG in Use	
STG in Use	86 (59%)
STG not in use	45 (31%)
Not Sure	14 (10%)
Type of STG used	
ICMR	28 (33%)
Government	38 (44%)
WHO	15 (17%)
Other	5 (6%)
STG Adherence	
Always	31 (36%)

Mostly	54 (63%)
Rarely	1 (1%)
New Antibiotic generations/brands Affecting STG	
Always	4 (5%)
Sometimes	34 (40%)
Rarely	40 (47%)
Never	8 (9%)

4.4 Adherence to Clinical Guidelines

Among the participants, 86 physicians (59%) reported the use of Standard Treatment Guidelines (STG) in their practice, while 45 physicians (31%) indicated they did not use STGs, and 14 physicians (10%) were unsure about their use.

Among those using STGs, 44% (n = 38) primarily used government-issued guidelines, followed by 33% (n = 28) who used Indian Council of Medical Research (ICMR) guidelines, 17% (n = 15) who used World Health Organization (WHO) guidelines, and 6% (n = 5) who relied on other sources.

In terms of adherence, 36% (n = 31) of the physicians reported always adhering to the STGs, 63% (n = 54) mostly adhered, and 1% (n = 1) rarely adhered.

When assessing the influence of newer antibiotic generations or branded antibiotics on guideline adherence, 5% (n = 4) reported that it always affected their adherence, 40% (n = 34) stated it sometimes affected adherence, 47% (n = 40) indicated it rarely affected adherence, and 9% (n = 8) reported that it never influenced their use of STGs.

Table 4: Patient Influence on Prescribing

Variable	N = 145 n (%)
Patient Request for Antibiotics	
Always	21 (14%)
Sometimes	89 (61%)
Rarely	29 (20%)
Never	6 (4%)
Patient insistence on particular Antibiotics	
Always	10 (7%)

Sometimes	51 (35%)
Rarely	56 (39%)
Never	28 (19%)
Physician compliance with Patient Request	
Always	5 (3%)
Sometimes	36 (25%)
Rarely	58 (40%)
Never	46 (32%)
Patient Influence on STG non Adherence	
Always	1 (1%)
Mostly	8 (9%)
Rarely	43 (50%)
Never	34 (40%)

4.5 Patient Influence on Prescribing

Patient behaviour appeared to exert considerable influence on physicians' prescribing practices. Twenty-one physicians (14%) reported that patients always requested antibiotics, while 61% (n = 89) indicated that patients sometimes made such requests. About 20% (n = 29) experienced such requests rarely, and 4.1% (n = 6) stated they never encountered patient requests for antibiotics.

Regarding insistence on specific antibiotics, 7% (n = 10) of physicians reported that patients always insisted on particular brands or types, 35% (n = 51) observed it sometimes, 39% (n = 56) experienced it rarely, and 19% (n = 28) never encountered it.

When examining physician compliance with patient requests, 3% (n = 5) of physicians reported always complying, 25% (n = 36) complied sometimes, 40% (n = 58) complied rarely, and 32% (n = 46) never complied.

Concerning the impact of patient influence on deviation from Standard Treatment Guidelines (STG), 1% (n = 1) reported that patient demands always led to non-adherence, 9% (n = 8) indicated it mostly led to non-adherence, 50% (n = 43) experienced it rarely, and 40% (n = 34) reported it never contributed to non-adherence.

Table 5: Choice of Antibiotics

Variable	N = 145 n (%)
Basis for Initial Choice	
STG	45 (31%)
Clinical Experience	94 (65%)
Peer Recommendations	2 (1%)
Other	4 (3%)
Basis of Follow-up Antibiotic Choice	
Culture Sensitivity	42 (29%)
Follow up on the previous prescription	22 (15%)
Based on patient symptoms	74 (51%)
Other	7 (5%)
Preference for Non-Generic	
Always	12 (8%)
Sometimes	53 (37%)
Rarely	50 (34%)
Never	30 (21%)
Newer generations/brands Discouraging Generic Use	
Always	9 (6%)
Sometimes	60 (41%)
Rarely	52 (36%)
Never	24 (17%)

4.6 Choice of Antibiotics

The initial choice of antibiotics among physicians was predominantly based on personal clinical experience, as reported by 94 physicians (65%). Only 31% (n = 45) based their initial antibiotic choice on Standard Treatment Guidelines (STG), while 1% (n = 2) relied on peer recommendations and 3% (n = 4) cited other factors.

Regarding the basis for follow-up antibiotic decisions, 29% (n = 42) referred to culture sensitivity reports, 15% (n = 22) followed up based on the previous prescription, and a majority, 51% (n = 74), modified antibiotics based on evolving patient symptoms. A small proportion (5%, n = 7) cited other reasons.

Physicians' preference for non-generic antibiotics varied: 8% (n = 12) always preferred non-generic antibiotics, 37% (n = 53) sometimes preferred them, 34% (n = 50) rarely did so, and 21% (n = 30) never preferred non-generics.

When examining the impact of newer generations and branded antibiotics on discouraging generic antibiotic use, 6% (n = 9) reported that newer brands always discouraged the use of generics, 41% (n = 60) stated it sometimes discouraged them, 36% (n = 52) experienced it rarely, and 17% (n = 24) reported no such discouragement

Table 6: Availability of Antibiotics

Variable	Always n (%)	Mostly n (%)	Rarely n (%)	Never n (%)
Antibiotic Availability in Pharmacy	81 (56%)	60 (41%)	4 (3%)	0 (0%)
Choice Dependent on Pharmacy Stock	27 (19%)	70 (48%)	22 (15%)	26 (18%)
Pharmacy Updates on Stock	84 (58%)	47 (32%)	9 (6%)	5 (4%)
STG Antibiotic Availability	59 (41%)	76 (52%)	9 (6%)	1 (1%)

4.7 Availability of Antibiotics

Regarding antibiotic availability in pharmacies, 56% of physicians (n = 81) reported that antibiotics were always available, while 41% (n = 60) stated they were mostly available, and 3% (n = 4) experienced rare availability.

The choice of antibiotics was influenced by pharmacy stock to varying degrees. About 19% (n = 27) of physicians always chose antibiotics based on available stock, 48% (n = 70) were mostly influenced by stock, 15% (n = 22) were rarely influenced, and 18% (n = 26) reported that their choice was never affected by stock availability.

Pharmacies regularly updated physicians regarding stock status, with 58% (n = 84) reporting that they always received updates, 32% (n = 47) occasionally receiving updates, 6% (n = 9) rarely receiving updates, and 4% (n = 5) never receiving updates.

When specifically considering the availability of antibiotics recommended in the Standard Treatment Guidelines (STG), 41% (n = 59) indicated that STG-listed antibiotics were

always available, 52% (n = 76) stated they were mostly available, 6% (n = 9) reported rare availability, and 1% (n = 1) indicated they were never available.

Table 7: Prescription Practice and AMR Awareness

Variable	N = 145 n (%)
Concerns about AMR as a public health issue	
Always	59 (41%)
Sometimes	72 (50%)
Rarely	13 (9.0%)
Never	1 (0%)
Consideration of AMR while Prescribing in individuals	
Always	78 (54%)
Sometimes	54 (37%)
Rarely	11 (8%)
Never	2 (1%)
COVID-19 Impact on Prescriptions	
Significant	19 (13%)
Moderate	66 (46%)
No change	60 (41%)

4.8 Prescription Practice and AMR Awareness

Awareness regarding antimicrobial resistance (AMR) was notable among the participating physicians. About 41% (n = 59) of physicians reported that they were always concerned about AMR as a public health issue, while 50% (n = 72) expressed concern sometimes. A smaller proportion rarely (9.0%, n = 13) or never (0%, n = 1) considered AMR to be a significant public health concern.

When considering AMR during individual patient prescribing, 54% (n = 78) of physicians stated that they always factored in AMR risks, 37% (n = 54) did so sometimes, 8% (n = 11) rarely considered it, and 1% (n = 2) never considered AMR implications during prescribing.

The COVID-19 pandemic appeared to influence prescribing behaviors to varying extents. Thirteen percent (n = 19) of physicians reported a significant change in their prescribing patterns due to the pandemic, 46% (n = 66) observed a moderate change, while 41% (n = 60) indicated that there was no change in their prescribing practices during the pandemic.

Table 8: Training and Capacity Building

Variable	N = 145 n (%)
Preliminary Training on Antibiotics	
Complete	21 (14%)
Partial	80 (55%)
None	44 (30%)
Refresher Training on Antibiotics	
Regular	12 (9%)
Occasional	44 (30%)
Infrequent	39 (27%)
Never	50 (34%)
IPC Training	
Comprehensive	35 (24%)
Partial	68 (47%)
None	42 (29%)
AMR Training Frequency	
Regular	31 (21%)
Rare	66 (46%)
Never	29 (20%)
Not sure	19 (13%)

4.9 Training and Capacity Building

With regard to preliminary training on antibiotic use, only 14% (n = 21) of physicians reported having received complete training, while 55% (n = 80) had partial training, and 30% (n = 44) had not received any preliminary training on antibiotics.

Refresher training on antibiotic use was limited: 9% (n = 12) of physicians reported receiving regular refresher sessions, 30% (n = 44) received them occasionally, 27% (n = 39) infrequently, and 34% (n = 50) had never received any refresher training.

On infection prevention and control (IPC) training, 24% (n = 35) of physicians had undergone comprehensive training, 47% (n = 68) had partial training, and 29% (n = 42) had no training.

Regarding training specifically focused on antimicrobial resistance (AMR), 21% (n = 31) reported regular training, while 46% (n = 66) received training rarely. About 20% (n = 29)

had never received AMR-related training, and 13% (n = 19) were unsure about their training status.

Table 9: Professional Influence

Variable	N = 145 n (%)
Daily Practice Hours	
4-6	49 (34%)
6-8	38 (26%)
<4	17 (12%)
>8	41 (28%)
Competition Affecting Rational Use	
Always	28 (19%)
Sometimes	64 (44%)
Rarely	32 (22%)
Never	21 (14%)
Peer Influence on Prescriptions	
Always	5 (4%)
Sometimes	54 (37%)
Rarely	45 (31%)
Never	41 (28%)
Patient Volume Impact on Prescriptions	
Always	7 (5%)
Sometimes	41 (28%)
Rarely	47 (32%)
Never	50 (34%)

4.10 Professional Influence

In terms of daily practice hours, 34% (n = 49) of physicians reported working between 4 to 6 hours per day, 26% (n = 38) worked between 6 to 8 hours, 12% (n = 17) worked fewer than 4 hours, and 28% (n = 41) worked more than 8 hours daily.

Competition among healthcare providers was perceived to impact rational antibiotic use by some participants: 19% (n = 28) reported that competition always affected their prescribing practices, 44% (n = 64) indicated it sometimes did, 22% (n = 32) rarely, and 14% (n = 21) stated that competition never influenced their prescribing.

Peer influence on prescribing behaviour was variable, with 4% (n = 5) reporting that they were always influenced by peers, 37% (n = 54) sometimes influenced, 31% (n = 45) rarely influenced, and 28% (n = 41) never influenced by their peers.

Regarding the impact of patient volume on prescribing decisions, 5% (n = 7) of physicians stated that high patient load always influenced their prescribing, 28% (n = 41) said it sometimes did, 32% (n = 47) reported it rarely did, and 34% (n = 50) stated that patient volume never affected their antibiotic prescribing practices.

Table 10: Continued Medical Education and Knowledge Update

Variable	N = 145 n (%)
Importance of Updating Knowledge	
Always	120 (83%)
Sometimes	22 (15%)
Rarely	3 (2%)
Frequency of Updating Knowledge	
Monthly	20 (14%)
Quarterly	55 (38%)
Annually	39 (27%)
Rarely	29 (20%)
Never	2 (1%)

4.11 Continued Medical Education and Knowledge Update

A majority of physicians (83%, n = 120) recognized the importance of continuously updating their medical knowledge, while 15% (n = 22) considered it important only sometimes, and 2% (n = 3) rarely emphasized its importance.

In terms of the frequency of updating their knowledge, 14% (n = 20) reported doing so on a monthly basis, 38% (n = 55) updated quarterly, and 27% (n = 39) updated their knowledge annually. About 20% (n = 29) rarely updated their knowledge, and a very small proportion (2%, n = 2) indicated that they never engaged in knowledge updating activities.

Table 11: Factors associated with STG Use (Enabler)

Characteristic	STG in use N = 86	STG not in use/unsure N = 59	p-value ²
Physician Age in Years			0.8
< 30	20 (51%)	19 (49%)	
30-40	43 (61%)	28 (39%)	
40-50	6 (67%)	3 (33%)	
50-60	3 (60%)	2 (40%)	
>60	14 (67%)	7 (33%)	
Years in Practice			0.8
<5	36 (55%)	29 (45%)	
5-15	27 (61%)	17 (39%)	
15-25	6 (60%)	4 (40%)	
>25	17 (65%)	9 (35%)	
Educational Qualification			0.5
MBBS	42 (57%)	32 (43%)	
Post MBBS Specialisation	44 (62%)	27 (38%)	
Physician Gender			0.086
Female	46 (67%)	23 (33%)	
Male	40 (53%)	36 (47%)	
Facility Type			<0.001
Public	45 (76%)	14 (24%)	
Private	41 (48%)	45 (52%)	
Daily OPD Patients			0.038
<20	14 (47%)	16 (53%)	
20-50	31 (54%)	26 (46%)	
51-100	16 (59%)	11 (41%)	
>100	25 (81%)	6 (19%)	

² Pearson's Chi-square test

4.12 Factors Associated with the Use of Standard Treatment Guidelines

STG use was significantly associated with facility type ($p < 0.001$) and the number of daily OPD patients seen ($p = 0.038$). No significant associations were observed between STG use and physician age ($p = 0.8$), years in practice ($p = 0.8$), educational qualification ($p = 0.5$), or physician gender ($p = 0.086$). All independent variables that demonstrated statistically significant associations with STG use were included in the logistic regression analysis.

Table 12: Results from binary logistic regression analysis for STG not in Use

Characteristic	Crude Odds Ratio 95% CI	p-value	Adjusted Ratio 95% CI	Odds	p-value
Daily OPD Patients					
<20	-Reference-				
20-50	0.73 0.30-1.78	0.5	0.89 0.35-2.20		0.8
51-100	0.60 0.21-1.71	0.3	1.36 0.39-4.98		0.6
>100	0.21 0.06-0.63	0.007	0.51 0.13-1.96		0.3
Facility Type					
Public	-Reference-				
Private	3.53 1.72-7.54	<0.001	3.23 1.26-8.83		0.017

4.13 Binary Logistic Regression Analysis of Factors Associated with Non-Use of Standard Treatment Guidelines

In the unadjusted analysis, physicians attending to more than 100 outpatients per day had significantly lower odds of not using STGs compared to those attending to fewer than 20 patients daily (Crude OR: 0.21; 95% CI: 0.06–0.63; $p = 0.007$). However, following adjustment for potential confounding variables, this association was attenuated and no longer statistically significant (Adjusted OR: 0.51; 95% CI: 0.13–1.96; $p = 0.3$). No significant associations were observed in the categories of 20–50 patients (Adjusted OR: 0.89; 95% CI: 0.35–2.20; $p = 0.8$) or 51–100 patients (Adjusted OR: 1.36; 95% CI: 0.39–4.98; $p = 0.6$), when compared to the reference group (<20 patients).

Facility type demonstrated a significant and independent association with STG non-use. Physicians practicing in private sector facilities had significantly higher odds of not using STGs compared to those in public sector facilities (Crude OR: 3.53; 95% CI: 1.72–7.54; $p < 0.001$). This association remained statistically significant after adjustment, with private sector physicians exhibiting over threefold higher odds of STG non-use (Adjusted OR: 3.23; 95% CI: 1.26–8.83; $p = 0.017$).

These findings suggest that facility-level factors, particularly sector of practice, may play a more critical role in influencing adherence to STGs than individual physician workload measured by patient volume.

Table 13: Factors associated with Initial choice of Antibiotic (Enablers)

Characteristic	Based on STG, N = 45 ^I	Based on clinical experience, peer recommendations and others. N = 100 ^I	p-value
Physician Age in Years			0.065
< 30	16 (41%)	23 (59%)	
30-40	25 (35%)	46 (65%)	
40-50	1 (11%)	8 (89%)	
50-60	0 (0%)	5 (100%)	
>60	3 (14%)	18 (86%)	
Years in Practice			0.068
<5	24 (37%)	41 (63%)	
5-15	16 (36%)	28 (64%)	
15-25	2 (20%)	8 (80%)	
>25	3 (12%)	23 (88%)	
Educational Qualification			0.071
MBBS	28 (38%)	46 (62%)	
Post MBBS	17 (24%)	54 (76%)	
Specialisation			
Physician Gender			0.10
Female	26 (38%)	43 (62%)	
Male	19 (25%)	57 (75%)	
Facility Type			0.001
Public	27 (46%)	32 (54%)	
Private	18 (21%)	68 (79%)	
Daily OPD Patients			0.002
<20	10 (33%)	20 (67%)	
20-50	8 (14%)	49 (86%)	
51-100	12 (44%)	15 (56%)	
>100	15 (48%)	16 (52%)	

4.14 Factors Associated with Initial Choice of Antibiotic

The initial choice of antibiotic was significantly associated with facility type ($p = 0.001$) and the number of daily OPD patients seen ($p = 0.002$). No statistically significant associations were observed between the initial choice of antibiotic and physician age ($p = 0.065$), years in practice ($p = 0.068$), educational qualification ($p = 0.071$), or physician

gender ($p = 0.10$). All independent variables that demonstrated statistically significant associations with the initial choice of antibiotic were included in the logistic regression analysis.

Table 14: Results from binary logistic regression analysis for Initial Choice of Antibiotic using Clinical experience

Characteristic	Crude OR 95% CI	p-value	Adjusted Odds Ratio 95% CI	p-value
Daily OPD Patients				
<20	-Reference-			
20-50	3.06 1.06-9.14	0.039	3.80 1.27-12.0	0.019
51-100	0.63 0.21-1.82	0.4	1.22 0.33-4.72	0.8
>100	0.53 0.19-1.49	0.2	1.13 0.30-4.72	0.9
Facility Type				
Public	-Reference-			
Private	3.19 1.55-6.71	0.002	2.54 0.93-7.20	0.072

4.15 Binary Logistic Regression Analysis of Factors Associated with Initial Antibiotic Choice Based on Clinical Experience

In the unadjusted (crude) analysis, physicians attending to 20–50 outpatients daily had significantly higher odds of relying on clinical experience rather than STGs compared to those attending fewer than 20 patients per day (Crude OR: 3.06; 95% CI: 1.06–9.14; $p = 0.039$). After adjustment for covariates, the association remained statistically significant and strengthened slightly (Adjusted OR: 3.80; 95% CI: 1.27–12.0; $p = 0.019$). No significant associations were observed for physicians managing 51–100 patients daily (Adjusted OR: 1.22; 95% CI: 0.33–4.72; $p = 0.8$) or those attending to more than 100 patients daily (Adjusted OR: 1.13; 95% CI: 0.30–4.72; $p = 0.9$), when compared to the reference group.

Facility type showed a significant crude association, with private sector physicians having higher odds of selecting antibiotics based on clinical experience rather than STGs compared

to those in the public sector (Crude OR: 3.19; 95% CI: 1.55–6.71; $p = 0.002$). However, after adjustment, this association was attenuated and did not reach statistical significance (Adjusted OR: 2.54; 95% CI: 0.93–7.20; $p = 0.072$).

These findings suggest that patient load and sector of practice influence antibiotic prescribing patterns, with moderate daily OPD volumes (20–50 patients) being a significant predictor of non-STG-based prescribing even after adjustment for other factors.

Table 15: Factors Associated with Follow-up Choice of Antibiotic are decided with patient symptoms.

Characteristic	Crude OR 95% CI	p-value
Facility Type		
Public	—	
Private	0.41 0.18-0.87	0.025

4.16 Factors Associated with Follow-up Choice of Antibiotic are decided with patient symptoms:

In the bivariate analysis, facility type was significantly associated with the follow-up choice of antibiotic decided with patient symptoms (not Culture Sensitivity). Physicians working in private facilities were significantly less likely to rely solely on patient symptoms when selecting follow-up antibiotics compared to their counterparts in public facilities. The crude odds ratio (OR) for private facilities was 0.41 (95% Confidence Interval: 0.18–0.87; $p = 0.025$), indicating a 59% reduction in the odds of symptom-based follow-up antibiotic selection in private settings. This association was statistically significant.

Table 16: Factors Associated with Patient Request for Antibiotic (Barrier)

Characteristic	Frequent Requests, N = 110	Infrequent/No requests, N = 35	p-value
Physician Age in Years			0.016
< 30	33 (30%)	6 (17%)	
30-40	55 (50%)	16 (46%)	
40-50	8 (7.3%)	1 (2.9%)	
50-60	1 (0.9%)	4 (11%)	
>60	13 (12%)	8 (23%)	
Years in Practice			0.032
<5	53 (48%)	12 (34%)	
5-15	36 (33%)	8 (23%)	
15-25	7 (6.4%)	3 (8.6%)	
>25	14 (13%)	12 (34%)	

The association between physician characteristics and the frequency of patient requests for antibiotics was examined. Physician age was significantly associated with frequent patient requests for antibiotics ($p = 0.016$). Years in practice was also found to have a significant association with the frequency of patient requests for antibiotics ($p = 0.032$). Both physician age and years in practice, which were found to be significantly associated, were included in the logistic regression analysis.

Table 17: Factors Associated with infrequent/no patient requests on prescribing antibiotics.

Characteristic	Crude OR 95% CI	p-value
Physician Age in Years		
< 30	Reference	—
30-40	1.60 0.59, 4.83	0.4
40-50	0.69 0.03, 4.88	0.7
50-60	22.0 2.70, 474	0.010
>60	3.38 0.99, 12.2	0.054
Years in Practice		
<5	Reference	
5-15	0.98 0.35, 2.62	>0.9
15-25	1.89 0.37, 7.97	0.4
>25	3.79 1.41, 10.4	0.009

4.17 Factors Associated with Patient Request for Antibiotic (Barriers)

In the bivariate analysis, both physician age and years of clinical practice showed significant associations with the likelihood of encountering patient requests for antibiotics.

Compared to physicians younger than 30 years, those aged 50–60 years were significantly more likely to report minimal/no patient requests for antibiotics (Crude OR = 22.0; 95% CI: 2.70–474, $p = 0.010$), indicating a markedly lower exposure to patient-driven demands. Physicians aged over 60 years also had elevated odds (Crude OR = 3.38; 95% CI: 0.99–12.2), although the association was marginally non-significant ($p = 0.054$). In contrast, no significant differences were observed for physicians aged 30–40 years ($p = 0.4$) and 40–50 years ($p = 0.7$).

Similarly, when examining years of practice, physicians with more than 25 years of clinical experience had significantly higher odds of encountering minimal/no patient requests (Crude OR = 3.79; 95% CI: 1.41–10.4, $p = 0.009$) compared to those with less than 5 years’

experience. Physicians with 5–15 years and 15–25 years of experience did not show statistically significant differences.

These findings suggest that more experienced and older physicians may face lesser patient pressure for antibiotic prescriptions, possibly reflecting patient perceptions that experienced doctors may be less accommodating to their treatment expectations. It also highlights the need for targeted communication strategies and patient education interventions to support younger physicians in antibiotic stewardship efforts.

Table 18: Factors associated with Preference for Non-generic

Characteristic	Preferred, N = 65 ¹	Not preferred, N = 80 ¹	p-value ²
Physician Age in Years			<0.001
< 30	19 (49%)	20 (51%)	
30-40	27 (38%)	44 (62%)	
40-50	1 (11%)	8 (89%)	
50-60	1 (20%)	4 (80%)	
>60	17 (81%)	4 (19%)	
Years in Practice			0.007
<5	31 (48%)	34 (52%)	
5-15	14 (32%)	30 (68%)	
15-25	2 (20%)	8 (80%)	
>25	18 (69%)	8 (31%)	
Educational Qualification			0.2
MBBS	29 (39%)	45 (61%)	
Post MBBS	36 (51%)	35 (49%)	
Specialisation			
Physician Gender			<0.001
Female	18 (26%)	51 (74%)	
Male	47 (62%)	29 (38%)	
Facility Type			<0.001
Public	12 (20%)	47 (80%)	
Private	53 (62%)	33 (38%)	
Daily OPD Patients			<0.001
<20	19 (63%)	11 (37%)	
20-50	32 (56%)	25 (44%)	
51-100	6 (22%)	21 (78%)	
>100	8 (26%)	23 (74%)	

Preference for non-generic antibiotics was significantly associated with physician age ($p < 0.001$), years in practice ($p = 0.007$), physician gender ($p < 0.001$), facility type ($p < 0.001$),

and daily outpatient (OPD) patient volume ($p < 0.001$). Educational qualification was not significantly associated with preference for non-generic antibiotics ($p = 0.2$). All independent variables that were found to be significantly associated with preference for non-generic antibiotics were included in the logistic regression analysis.

Table 19: Results from binary logistic regression analysis for Non-Preference for Non-generic

Characteristic	Crude OR 95% CI	p-value	Adjusted Ratio 95% CI	Odds	p-value
Daily OPD Patients					
<20	-Reference-				
20-50	1.35 0.55-3.42	0.5	1.09 0.40-2.97		0.9
51-100	6.05 1.96-20.9	0.003	2.38 0.56-10.7		0.2
>100	4.97 1.72-15.6	0.004	1.63 0.40-6.68		0.5
Facility Type					
Public	-Reference-				
Private	0.16 0.07-0.33	<0.001	0.25 0.08-0.68		0.008
Physician Age in Years					
< 30					
30-40	1.55 0.70-3.43	0.3	1.44 0.60-3.50		0.4
40-50	7.60 1.23-148	0.067	6.40 0.89-132		0.11
50-60	3.80 0.51-78.0	0.3	2.53 0.28-56.4		0.5
>60	0.22 0.06-0.73	0.020	0.23 0.05-0.83		0.033
Years in Practice					
<5					
5-15	1.95 0.89-4.43	0.10	1.33 0.45-3.97		0.6
15-25	3.65 0.84-25.4	0.12	0.43 0.03-8.05		0.5
>25	0.41 0.15-1.04	0.066			

In the crude analysis, compared to physicians seeing fewer than 20 patients per day, those attending to 51–100 patients had significantly higher odds of non-preference for non-

generic antibiotics (Crude OR 6.05; 95% CI: 1.96–20.9; $p = 0.003$), and those seeing over 100 patients also showed increased odds (Crude OR 4.97; 95% CI: 1.72–15.6; $p = 0.004$). However, after adjustment, these associations were attenuated and no longer statistically significant (AOR 2.38; 95% CI: 0.56–10.7; $p = 0.2$ for 51–100 patients; AOR 1.63; 95% CI: 0.40–6.68; $p = 0.5$ for >100 patients).

Facility type demonstrated a strong and significant association with non-preference for non-generic prescribing. Physicians working in private facilities were significantly less likely to not prefer non-generic antibiotics compared to those in public facilities, both in crude (Crude OR 0.16; 95% CI: 0.07–0.33; $p < 0.001$) and adjusted analyses (AOR 0.25; 95% CI: 0.08–0.68; $p = 0.008$).

Physician age was also an important factor. Compared to those under 30 years, physicians aged over 60 years had significantly lower odds of preferring non-generic antibiotics (Crude OR 0.22; 95% CI: 0.06–0.73; $p = 0.020$; Adjusted OR 0.23; 95% CI: 0.05–0.83; $p = 0.033$). No significant associations were observed among physicians aged 30–40, 40–50, or 50–60 years after adjustment.

Years of practice did not show statistically significant associations with non-preference for non-generic antibiotics in crude analysis. Although physicians with more than 25 years of practice had lower odds (Crude OR 0.41; 95% CI: 0.15–1.04; $p = 0.066$), the association was not statistically significant.

Table 20: Factors Associated with Physician No/Minimal Compliance

Characteristic	Crude OR 95% CI	p-value
Facility Type		
Public	—	—
Private	0.30	0.13, 0.68

In the bivariate analysis, facility type was significantly associated with physician no/minimal compliance. Compared to physicians working in public facilities, those in private facilities had lower odds of exhibiting no or minimal compliance (Crude OR 0.30; 95% CI: 0.13–0.68; $p < 0.05$).

Table 21: Prescriptions Assessment using NHSRC prescription audit guidelines

Serial no.	Indicator	Private (N = 150)	Public (N = 150)
1	OP registration number mentioned	27 (18%)	150 (100%)
2	Patient name	150 (100%)	150 (100%)
3	Patient age	150 (100%)	150 (100%)
4	Date of consultation	145 (97%)	150 (100%)
5	Gender of the patient	119 (79%)	150 (100%)
6	Handwriting is legible	120 (80%)	147 (98%)
7	Brief history written	90 (60%)	84 (56%)
8	Allergy status mentioned	-	-
9	Salient features of Clinical Examination recorded	54 (36%)	19 (13%)
10	Presumptive / definitive diagnosis written	115 (77%)	147 (98%)
11	Medicines are prescribed by generic names	19 (13%)	96 (64%)
12	Medicines prescribed are in line with STG	-	-
13	Medicine Schedule/ doses clearly written	150 (100%)	150 (100%)
14	Duration of treatment written	150 (100%)	150 (100%)
15	Date of next visit (review) written	14 (9.3%)	33 (22%)
16	In case of referral, relevant clinical details and reason for referral	-	-
17	Follow-up advice and precautions (do's and don'ts) recorded	8 (5.3%)	47 (31%)
18	Prescription duly signed (legibly)	137 (91%)	150 (100%)
19	Medicines prescribed are as per EML/Formulary	143 (95%)	149 (99%)
20	Medicines advised are available in the dispensary	-	-
21	Vitamins, Tonics or Enzymes prescribed	31 (21%)	28 (19%)
22	Antibiotics prescribed from Access Category	82 (55%)	93 (62%)
23	Antibiotics prescribed from Watch Category	68 (45%)	57 (38%)
24	Antibiotics prescribed from Reserve Category	-	-
25	Investigations advised	29 (19%)	45 (30%)
26	>2 Antibiotics prescribed	3 (2.0%)	1 (0.7%)
27	Injection prescribed	3 (2.0%)	1 (0.7%)
28	Average number of medicines prescribed	4.27 (1.76)	5.01 (1.90)
29	Antacids prescribed	103 (69%)	81 (54%)
30	Patient weight mentioned in paediatric patients	10 (N=24), (41%)	18 (N=40), (45%)

4.18 Prescription Audit: Findings Summary

A total of 300 prescriptions (150 each from private and public primary healthcare facilities) were audited based on key quality indicators aligned with the NHSRC prescription audit framework. The results revealed considerable differences between public and private sector

prescriptions in documentation quality, rational prescribing practices, and antibiotic stewardship.

Documentation Completeness:

Critical patient identifiers such as patient name and age were universally recorded across both sectors (100%). OP registration number was mentioned in all public prescriptions (100%) but poorly captured in the private sector (18%). Gender documentation was complete in public facilities (100%) but less consistent in private facilities (79%). Consultation dates were almost always recorded, with 97% in private and 100% in public facilities.

Handwriting and Clinical Details:

Legibility was relatively high in both sectors but superior in public facilities (98% vs. 80%). Brief clinical history was recorded in 60% of private and 56% of public prescriptions, suggesting moderate adherence to good clinical practices. Allergy status was not mentioned in any prescription, indicating a critical gap in patient safety documentation. Recording of salient clinical examination findings was suboptimal, particularly in public facilities (13% vs. 36% private). Presumptive or definitive diagnoses were noted more frequently in public facilities (98%) compared to private (77%).

Prescription Practices:

Use of generic names was significantly higher in public sector prescriptions (64%) compared to private (13%), reflecting better alignment with rational prescribing principles in public facilities. All prescriptions clearly stated medicine schedules/doses and treatment durations (100% both sectors). However, the date of next visit was infrequently recorded, more so in private (9.3%) than public (22%). Follow-up advice and do's/don'ts were infrequently provided, especially in private facilities (5.3% vs. 31% public).

Signature and Formularies:

Almost all public prescriptions were signed (100%) compared to 91% in private facilities. Adherence to essential medicines lists (EML/Formulary) was high, with 95% in private and 99% in public facilities.

Polypharmacy and Irrational Medicine Use:

The average number of medicines per prescription was higher in public facilities (5.01 ± 1.90) compared to private (4.27 ± 1.76), suggesting a tendency towards polypharmacy. Vitamins, tonics, and enzymes were prescribed similarly across sectors (21% private vs. 19% public).

Antibiotic Stewardship Indicators:

Antibiotic prescribing was common, with a tendency toward the Access category antibiotics (55% private, 62% public), which is generally encouraged under WHO's AWaRe categorization. However, a substantial proportion of Watch category antibiotics were also prescribed (45% private, 38% public), potentially contributing to antimicrobial resistance. Prescriptions involving >2 antibiotics and injections were rare but slightly more frequent in private settings (2%).

Investigation and Pediatric Documentation:

Advising investigations was more common in public facilities (30% vs. 19% private). In paediatric cases, documentation of patient weight was low in both settings but slightly better in public (45% vs. 41% private).

CHAPTER 5

Discussion

This study assessed the enablers and barriers to rational antibiotic prescribing among primary healthcare physicians in Thiruvananthapuram district, Kerala. It also examined the patterns of antibiotic use through a structured audit of prescriptions collected from public and private primary healthcare facilities. A total of 145 physicians were interviewed, and 300 prescriptions were audited. The study findings offer important insights into antibiotic prescribing behaviour, highlighting systemic, professional, and patient-level factors influencing rational antibiotic use in primary care.

The study revealed that although awareness regarding antimicrobial resistance (AMR) was high among physicians, actual adherence to Standard Treatment Guidelines (STGs) and rational prescribing practices varied significantly between public and private sectors. Use of STGs, preference for generic prescribing, and documentation completeness were notably better in public sector facilities, while private sector prescriptions exhibited greater reliance on clinical experience over guideline-based therapy.

5.1 Comparison with existing literature

The findings of this study are largely congruent with national and international literature. The heavy reliance on clinical experience rather than STGs (65% physicians) mirrors patterns reported in other LMICs, where diagnostic uncertainty and workload pressures are key drivers of empirical prescribing (Guma et al., 2022) (*ResearchGate*, 2018).

The higher use of generic names and STG adherence in public facilities aligns with reports from India's NLEM 2022 adoption efforts (Dr Mansukh Mandaviya launches National Lists of Essential Medicines (NLEM) 2022, 2022) (Hannah et al., 2023), indicating

stronger stewardship enforcement in public systems. However, the concerning low percentage of allergy documentation and incomplete clinical examination notes are consistent with findings by (2018)(Saha et al., 2018), pointing towards systemic neglect of prescription quality across healthcare sectors.

Patient demand for antibiotics, a barrier identified in this study (75% physicians reported frequent or occasional requests), matches previous studies showing patient expectations as a major influence on prescribing (Laka et al., 2022) (Lum et al., 2018). The greater resilience to patient pressure among older and more experienced physicians observed here supports similar findings elsewhere that professional seniority improves antibiotic stewardship (Baillie et al., 2024) (Borek et al., 2020b).

The prescription audit revealed an overuse of Watch category antibiotics, notably in private sector prescriptions (45%), echoing (Fazaludeen Koya et al., 2022c) documentation of inappropriate Watch antibiotic consumption trends in India (Fazaludeen Koya et al., 2022c) (Koya et al., 2022).

5.2 Strengths of the Study

One of the key strengths of this study lies in its combination of physician interviews and objective prescription audits, enabling cross-validation of reported behavior with actual practice. The sampling strategy ensured representation from both public and private facilities, addressing a major gap in Indian AMR research which often overlooks the private sector (Alvarez-Uria et al., 2014) (Farooqui et al., 2019).

The structured, validated tool for interviews, use of Open Data Kit for electronic data capture, and blinded prescription assessment minimized interviewer bias and maintained high data quality. The study also adhered to NHSRC guidelines for prescription audits and

AWaRe classification standards, enhancing comparability with global benchmarks. (The WHO AWaRe (Access, Watch, Reserve) antibiotic book, 2022)

5.3 Limitations of the Study

The study was geographically confined to a single district, which may limit external generalizability, particularly to regions with different healthcare dynamics. The cross-sectional design also restricts causal inferences.

Self-reported adherence to STGs and AMR considerations may overestimate actual practices due to social desirability bias, despite objective audits attempting to mitigate this. Limited documentation of allergy status and clinical findings in prescriptions highlights the possibility of underestimation of poor practices.

Furthermore, while the prescription audit provided robust data on written practices, it could not assess the clinical appropriateness of prescribing decisions without patient context or microbiological confirmation, which is a recognized limitation of audit-based methodologies. (WHO & INRUD, 1993)

5.4 Recommendations for Policy Formulation and Reformation

The findings underscore the urgent need to ensure the cooperation of primary physicians in antibiotic stewardship interventions at the primary care level in India. Based on the results, the following policy recommendations are proposed:

Mandatory implementation of Standard Treatment Guidelines (STGs) in all primary healthcare facilities, both public and private, with regular audits to ensure compliance.

Incentivization of generic prescribing through policy mechanisms, including differential reimbursement rates for prescriptions aligned with EML/NLEM recommendations.

Investment in diagnostic infrastructure at the primary care level to reduce empirical prescribing due to diagnostic uncertainty.

Structured continued medical education (CME) programs focused on AMR and rational prescribing, with special emphasis on newly inducted and younger physicians.

Patient-centered communication strategies to manage expectations and reduce inappropriate antibiotic demands.

Expansion of surveillance systems to monitor antibiotic use patterns in the private sector more rigorously, leveraging digital health platforms.

Inclusion of pharmacy-level interventions, ensuring availability of STG-recommended antibiotics and discouraging undue promotion of branded alternatives.

These policy measures are aligned with India's NAP-AMR 2.0 goals and could substantially contribute to slowing the progression of antimicrobial resistance at the community level.

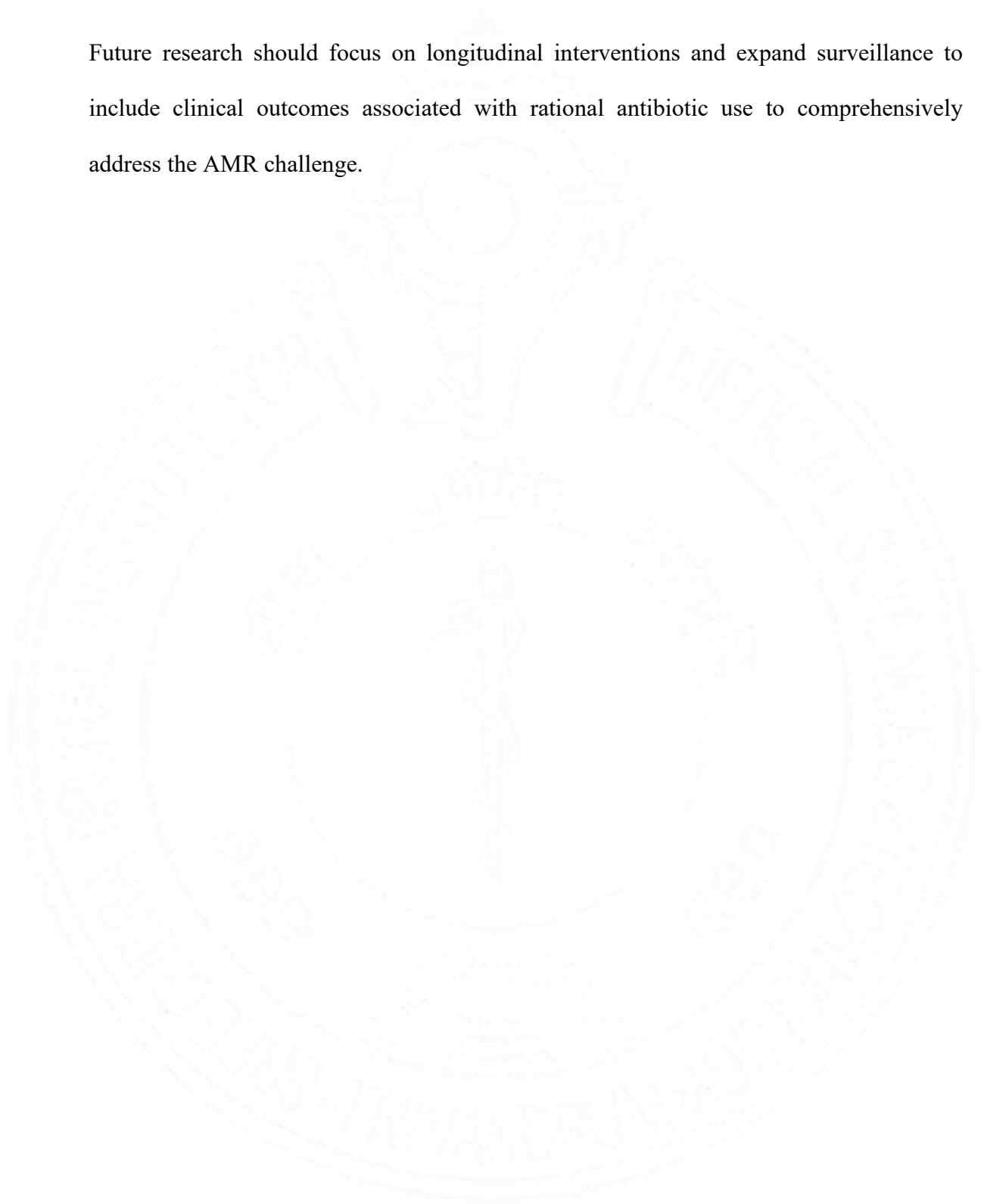
5.5 Conclusion

This study highlights critical gaps in rational antibiotic prescribing in primary healthcare facilities in Thiruvananthapuram district, particularly emphasizing differences between public and private sectors. While awareness of AMR is commendably high, inconsistencies in guideline adherence, preference for branded antibiotics, and patient-driven pressures continue to undermine stewardship efforts.

By identifying both enablers and barriers to rational prescribing, this study offers important evidence to guide targeted interventions at the physician, facility, and policy levels. Strengthening primary healthcare antibiotic stewardship through a multi-pronged strategy

encompassing education, regulation, diagnostics, and patient engagement is imperative to curb the growing threat of AMR.

Future research should focus on longitudinal interventions and expand surveillance to include clinical outcomes associated with rational antibiotic use to comprehensively address the AMR challenge.



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ANNEXURE I

PARTICIPANT INFORMATION

Achutha Menon Centre for Health Science Studies (AMCHSS)

Sree Chitra Tirunal Institute for Medical Sciences & Technology (SCTIMST)

PARTICIPANT INFORMATION SHEET FOR PHYSICIANS

Hello. I am Dr. Siddharth Vijayan, currently enrolled in the Master of Public Health Programme at the Achutha Menon Centre for Health Sciences Studies, Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram. As part of my academic research, I am conducting a survey entitled examining **“Enablers and barriers to rational antibiotic prescribing in primary healthcare facilities in Thiruvananthapuram district.**

As you are aware, Antibiotic misuse and overprescription have contributed significantly to the growing global issue of antimicrobial resistance (AMR). Rational prescribing of antibiotics is essential to combat this issue, ensuring that patients receive the appropriate treatment without contributing to resistance. Primary care physicians (PCPs), being the first point of contact for many patients, play a crucial role in promoting rational antibiotic use.

Understanding the enablers and barriers is crucial in developing strategies that support rational antibiotic prescribing. Tailored interventions, including enhanced training, improved access to diagnostics, and public awareness campaigns, could foster more responsible antibiotic use, thereby curbing the rise of AMR.

I am inviting you to be part of this research survey work. Before you decide to be a part of this survey, you can talk to anyone you feel comfortable with about this research survey.

This consent form may contain terms and questions that you may find difficult to understand. Please ask me to stop as we go through the questions and I will clarify your doubts before proceeding further.

If you have questions regarding the study later, you can ask them either to me or can contact the Member Secretary of the Institution Ethics Committee.

This research survey will require you to complete a questionnaire which will take approximately 15 to 20 minutes. You are invited to participate in this study because I recognize you as a key stakeholder whose experience and knowledge as a Primary Care Physician who prescribes Antibiotics, can contribute significantly to this investigation.

It would be beneficial to pave the way for future implementation of tailored interventions, including enhanced training, improved access to diagnostics, and public awareness campaigns, could foster more responsible antibiotic use, thereby curbing the rise of AMR.

Your participation is purely voluntarily. You are free to choose to take part or not. Your decision will not affect your work or reporting in any way. You are free to withdraw from the study at any point of time. Whether you choose to participate or not, no one will be able to identify you and your participation will be anonymous. There will not be any rewards or incentives for participating in the study.

Risks

There is no risk anticipated in the study.

Benefits

There will be no immediate direct benefit to you, but your participation is likely to help me inform public professionals about the current situation of primary care physicians' enablers

and barriers in rational antibiotic prescription practices, which will pave the way for future research to find a solution to improve the current situation and save lives.

Confidentiality

I will not be sharing information about you to anyone else. The information that I collect from this research survey work will be kept private.

Who to contact

If you have any questions, you may contact anyone of the following.

Dr Siddharth Vijayan, 9633529935, Email : drsiddharthvijayan@gmail.com.

Dr Biju Soman, Professor and HOD, Achutha Menon Centre, SCTIMST. Email: bijusoman@sctimst.ac.in

Dr. Srinivas G, Member Secretary, I E C, SCTIMST, & Scientist - G, Department of Biochemistry, SCTIMST, (email iec.mem.sec@sctimst.ac.in). 04712524689

PARTICIPANT INFORMATION SHEET FOR PATIENT

Hello. I am Dr. Siddharth Vijayan, currently enrolled in the Master of Public Health Programme at the Achutha Menon Centre for Health Sciences Studies, Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram. As part of my academic research, I am conducting a survey entitled examining **“Enablers and barriers to rational antibiotic prescribing in primary healthcare facilities in Thiruvananthapuram district. ”**

As you are aware, Antibiotic misuse and overprescription have contributed significantly to the growing global issue of antimicrobial resistance (AMR). Rational prescribing of antibiotics is essential to combat this issue, ensuring that patients receive the appropriate treatment without contributing to resistance. Primary care physicians (PCPs), being the first point of contact for many patients, play a crucial role in promoting rational antibiotic use.

Understanding primary care physicians’ enablers and barriers in rational antibiotic prescribing is crucial in developing strategies that support rational antibiotic use. Tailored interventions, including enhanced training, improved access to diagnostics, and public awareness campaigns, could foster more responsible antibiotic use, thereby curbing the rise of AMR.

I am inviting you to be part of this research survey work. Before you decide to be a part of this survey, you can talk to anyone you feel comfortable with about this research survey.

This consent form may contain terms and questions that you may find difficult to understand. Please ask me to stop as we go through the questions and I will clarify your doubts before proceeding further.

If you have questions regarding the study later, you can ask them either to me or can contact the Member Secretary of the Institution Ethics Committee.

This research survey will require you to share your Antibiotic prescription details which will take approximately 3 to 5 minutes. You are invited to participate in this study because I recognize you as a key stakeholder whose experience as a patient who is taking Antibiotic treatment, can contribute significantly to this investigation.

It would be beneficial to pave the way for future implementation of tailored interventions, including enhanced training, improved access to diagnostics, and public awareness campaigns, could foster more responsible antibiotic use, thereby curbing the rise of AMR.

Your participation is purely voluntarily. You are free to choose to take part or not. Your decision will not affect your work or reporting in any way. You are free to withdraw from the study at any point of time. Whether you choose to participate or not, no one will be able to identify you and your participation will be anonymous. There will not be any rewards or incentives for participating in the study.

Risks

There is no risk anticipated in the study.

Benefits

There will be no immediate direct benefit to you, but your participation is likely to help me inform public professionals about the current situation of antibiotic prescription practices of Primary Healthcare Physicians which will pave the way for future research to find a solution to improve the current situation and save lives.

Confidentiality

I will not be sharing information about you to anyone else. The information that I collect from this research survey work will be kept private.

Who to contact

If you have any questions, you may contact anyone of the following.

Dr Siddharth Vijayan, 9633529935, Email : drsiddharthvijayan@gmail.com. Co PI

Dr Biju Soman, Professor and HOD, Achutha Menon Centre, SCTIMST. Email: bijusoman@sctimst.ac.in Guide/PI

Dr. Srinivas G, Member Secretary, I E C, SCTIMST, & Scientist - G, Department of Biochemistry, SCTIMST, (email iec.mem.sec@sctimst.ac.in). 04712524689

ANNEXURE II

INFORMED CONSENT FORM

INFORMED CONSENT FORM FOR PHYSICIAN

I have been invited to participate in the thesis titled “**Enablers and barriers to rational antibiotic prescribing in primary healthcare facilities in Thiruvananthapuram district.** ”. I have read the information provided regarding the study, or it has been read to me. I have had the opportunity to ask questions about it and the questions I have been asked have been answered to my satisfaction.

I am aware that there is minimal risk in participating in the study. I understand there is no immediate direct benefit in the study.

I know I will not be incentivized for the participation.

I understand my personal information will remain confidential.

I know that I can withdraw my consent at any point of the study

I consent voluntarily to be a participant in this study.

Participant ID :

Name of the participant :

Mobile Number :

Signature :

Place :

Date :

I confirm that the participant was allowed to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent and the consent has been given freely and voluntarily.

Name of the Researcher :

Date :

Signature of the Researcher:

INFORMED CONSENT FORM FOR PATIENTS

I have been invited to participate in the thesis titled “**Enablers and barriers to rational antibiotic prescribing in primary healthcare facilities in Thiruvananthapuram district.**” I have read the information provided regarding the study, or it has been read to me. I have had the opportunity to ask questions about it and the questions I have been asked have been answered to my satisfaction.

I am aware that there is minimal risk in participating in the study. I understand there is no immediate direct benefit in the study.

I know I will not be incentivized for the participation.

I understand my personal information will remain confidential.

I know that I can withdraw my consent at any point of the study

I consent voluntarily to be a participant in this study.

Participant ID :

Name of the participant :

Mobile Number :

Signature :

Place :

Date :

I confirm that the participant was allowed to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I confirm that the individual has not been coerced into giving consent and the consent has been given freely and voluntarily.

Name of the Researcher :

Date :

Signature of the Researcher:

ANNEXURE III

QUESTIONNAIRE

STRUCTURED INTERVIEW SCHEDULE FOR PRIMARY HEALTHCARE PHYSICIANS

No.	Question	Response Options
	Participant Unique ID	_____
1	Age of the physician in completed years.	_____
2	Number of years of practice in completed years.	_____
3	Maximum level of education attained?	a) MBBS b) MD/MS c) DM/MCh d) Fellowship/Diploma e) Other (Please specify): _____ If not MBBS, please mention specialty: _____
4	Gender?	a) Male b) Female c) Other (Please specify): _____
5	Type of Facility	a) Public/Government owned (PHC/CHC/UPHC) b) Private (Clinic/Primary Care Hospital) c) Non-Profit (Clinic/Primary Care Hospital) d) Cooperative (Clinic/Primary Care

		Hospital) e) Corporate (Clinic/Primary Care Hospital)
6	Type of Appointment?	a) Permanent b) Temporary c) Contractual d) Other (Please specify): _____
7	Average number of OPD patients consulted by the physician in a day?	a) Less than 20 b) 20–50 c) 51–100 d) More than 100
8	When you joined, did you receive any information on the most common infections and previous outbreaks in the area? (Infectious and non-infectious profile, previous outbreaks, endemicity, other disease patterns of patients approaching the clinic, zoonotic profile and infections, entomological profile etc)	a) Comprehensive information b) Partial information c) No information
9	Did you take any effort to get the epidemiological status of the area?	a) Actively (collected info by yourself) b) Passively (received information over time from staff, patients and other sources)

		c) Do not find it important to collect
10	Is there a standard treatment guideline (STG) that you use in the institution?	a) Yes b) No c) Not Sure d) Others (Please specify): _____
11	How often are you able to completely adhere to the STG?	a) Always (more than 80% of patients) b) Mostly (50%–80%) c) Rarely (10%–50%) d) Never (<10%)
12	How often does newer generations of antibiotics being launched affect your prescribing according to STGs?	a) Always (>90% of patients) b) Sometimes (50%–90% patients) c) Rarely (10%–50%) d) Never (<10%)
13	How often do patients approach you for antibiotic prescriptions for their medical condition?	a) Always (>90% of patients) b) Sometimes (50%–90% patients) c) Rarely (10%–50%) d) Never (<10%)
14	How often do patients insist you for prescribing specific antibiotics of their choice?	a) Always (>90% of patients) b) Sometimes (50%–90% patients) c) Rarely (10%–50%) d) Never (<10%)
15	How often do you comply with their prescription needs?	a) Always (>90% of patients) b) Sometimes (50%–90%)

		patients) c) Rarely (10%–50%) d) Never (<10%)
16	How often has patient preference over an antibiotic influenced you from not adhering to STG?	a) Always (more than 80% of patients) b) Mostly (50%–80%) c) Rarely (less than 50%) d) Never
17	How do you decide on your initial choice of Antibiotic?	a) Based on STG b) Based on clinical experience c) Based on peer recommendations d) Based on patient preference e) Others (Please specify): _____
18	How do you decide on the Antibiotic after the patient comes back after completing the first course?	a) Follow-up on previous prescription b) Based on patient symptoms c) Change antibiotic based on resistance d) Others (Please specify): _____
19	How often do you write non-generic medicines?	a) Always (>90% of patients) b) Sometimes (50%–90% patients) c) Rarely (10%–50%) d) Never (<10%) If option a), give reason: _____

20	How often does arrival of new efficacious antibiotics in the market prompt you to choose them over generic medicines?	a) Always (>90% of patients) b) Sometimes (50%–90% patients) c) Rarely (10%–50%) d) Never (<10%)
21	Is your initial choice of antibiotic available in your clinic pharmacy?	a) Always available (for more than 90 percent of infections encountered) b) Mostly available (for 50–90 percent) c) Rarely available (10–50 percent) d) Never available (<10 percent)
22	Is the initial choice of antibiotics dependent on its availability in the pharmacy?	a) Always (for more than 90 percent of infections encountered) b) Mostly (for 50–90 percent) c) Rarely (10–50 percent) d) Never (<10 percent>)
23	Are you updated about the available antibiotics in your pharmacy/nearby pharmacy?	a) Always updated b) Occasionally c) Rarely d) Never
24	Are the antibiotics in the STG available in your clinic pharmacy (or nearby pharmacy if no in-house pharmacy)?	a) Always available (for more than 90 percent of infections encountered) b) Mostly available (for 50–90 percent) c) Rarely available (10–50 percent)

		d) Never available (<10 percent>)
25	How often do concerns about public health issues like AMR affect your antibiotic prescription practices?	a) Always (>90% of patients) b) Sometimes (50%–90% patients) c) Rarely (10%–50%) d) Never (<10%)
26	How often do you consider the chance of AMR, while prescribing Antibiotics?	a) Always (>90% of patients) b) Sometimes (50%–90% patients) c) Rarely (10%–50%) d) Never (<10%)
27	Has COVID-19 affected your antibiotic prescription practices?	a) Significantly b) Moderately c) No change
28	Did you get any preliminary training related to rational Antibiotic use while joining the workplace? (STG, AMR, generic medicines, rational use, tips on reducing the antibiotic use etc)	a) Complete training b) Partial training c) No training
29	Did you get refresher training related to Antibiotic use during your work tenure?	a) Regularly (every 6 months or less) b) Occasionally (once a year minimum) c) Infrequently (once in 3 years or more) d) Never

30	Did you receive any training in Infection prevention and Control?	a) Comprehensively b) Partly c) Never received training
31	How often is AMR training being conducted in the facility?	a) Regularly (Yearly) b) Rarely (Less than once a year) c) Never d) Not sure
32	How is the AMR training delivered?	a) In-person workshops or seminars b) Online training or webinars c) Self-learning modules or manuals d) Combination of in-person and online e) Other (Please specify): _____
33	How many hours do you practice in a day?	a) Less than 4 hours b) 4–6 hours c) 6–8 hours d) More than 8 hours
34	Do you think competition among doctors affects a doctor's decision of prescribing the right antibiotic or following the STG?	a) Always (>90% of patients) b) Sometimes (50%–90% patients) c) Rarely (10%–50%) d) Never (<10%)
35	How often does peer/colleague influence affect your antibiotic prescription practice?	a) Always (>90% of patients) b) Sometimes (50%–90% patients)

		c) Rarely (10%–50%) d) Never (<10%)
36	How often does the number of patients visiting the facility influence your choice of antibiotic?	a) Always b) Sometimes c) Rarely d) Never
37	Do you find it important to update yourself regarding rational antibiotic practices?	a) Always b) Sometimes c) Rarely d) Not necessary
38	How often do you update yourself about good antibiotic practices?	a) Monthly b) Quarterly c) Annually d) Rarely e) Never

PRESCRIPTION ASSESSMENT USING NHSRC PRESCRIPTION AUDIT INDICATORS

Serial no.	Indicator
1	OP registration number mentioned
2	Patient name
3	Patient age
4	Date of consultation
5	Gender of the patient
6	Handwriting is legible
7	Brief history written
8	Allergy status mentioned
9	Salient features of Clinical Examination recorded
10	Presumptive / definitive diagnosis written
11	Medicines are prescribed by generic names
12	Medicines prescribed are in line with STG
13	Medicine Schedule/ doses clearly written
14	Duration of treatment written
15	Date of next visit (review) written
16	In case of referral, relevant clinical details and reason for referral
17	Follow-up advice and precautions (do's and don'ts) recorded
18	Prescription duly signed (legibly)
19	Medicines prescribed are as per EML/Formulary
20	Medicines advised are available in the dispensary
21	Vitamins, Tonics or Enzymes prescribed

22	Antibiotics prescribed from Access Category
23	Antibiotics prescribed from Watch Category
24	Antibiotics prescribed from Reserve Category
25	Investigations advised
26	>2 Antibiotics prescribed
27	Injection prescribed
28	Average number of medicines prescribed
29	Antacids prescribed
30	Patient weight mentioned in paediatric patients

ANNEXURE VI

PARTICIPANT INFORMATION FOR PATIENTS (In Malayalam)

ഹലോ. ഞാൻ ഡോ. സിദ്ധാർത്ഥ് വിജയൻ, തിരുവനന്തപുരം ശ്രീചിത്ര തിരുനാൾ ഇൻസ്റ്റിറ്റ്യൂട്ട് ഫോർ മെഡിക്കൽ സയൻസസ് ആൻഡ് ടെക്നോളജിയിലെ അച്യുതമേനോൻ സെന്റർ ഫോർ ഹെൽത്ത് സയൻസസ് സ്റ്റഡീസിൽ മാസ്റ്റർ ഓഫ് പബ്ലിക് ഹെൽത്ത് പ്രോഗ്രാമിൽ എന്റെ അക്കാദമിക് ഗവേഷണത്തിന്റെ ഭാഗമായി, "തിരുവനന്തപുരം **കോർപ്പറേഷനിലെ യുക്തിസഹമായ ആൻറിബയോട്ടിക് കുറിപ്പടി സമ്പ്രദായങ്ങളിലെ പ്രാക്ടിക്കളെയും തടസ്സങ്ങളെയും കുറിച്ചുള്ള പ്രാഥമിക പരിചരണ ഡോക്ടർമാരുടെ കാഴ്ചപ്പാട്**" എന്ന തലക്കെട്ടിൽ ഞാൻ ഒരു സർവ്വേ നടത്തുന്നു."

നിങ്ങൾക്കറിയാവുന്നതുപോലെ, ആൻറിബയോട്ടിക് ദുരുപയോഗവും അമിതപ്രയോഗവും ആന്റിമൈക്രോബയൽ റെസിസ്റ്റൻസിന്റെ (എഫ്ആർ) വർദ്ധിച്ചുവരുന്ന ആഗോള പ്രശ്നത്തിന് ഗണ്യമായ സംഭാവന നൽകിയിട്ടുണ്ട്. ഈ പ്രശ്നത്തെ നേരിടാൻ ആൻറിബയോട്ടിക്കുകളുടെ യുക്തിസഹമായ നിർദ്ദേശം അത്യന്താപേക്ഷിതമാണ്, പ്രതിരോധത്തിന് കാരണമാകാതെ രോഗികൾക്ക് ഉചിതമായ ചികിത്സ ലഭിക്കുന്നുണ്ടെന്ന് ഉറപ്പാക്കുന്നു. പല രോഗികളുടെയും സമ്പർക്കത്തിന്റെ ആദ്യ പോയിന്റായ പ്രാഥമിക പരിചരണ ഡോക്ടർമാർ (പിസിപികൾ) യുക്തിസഹമായ ആൻറിബയോട്ടിക് ഉപയോഗം പ്രോത്സാഹിപ്പിക്കുന്നതിൽ നിർണായക പങ്ക് വഹിക്കുന്നു.

യുക്തിസഹമായ ആൻറിബയോട്ടിക് നിർദ്ദേശത്തെ പിന്തുണയ്ക്കുന്ന തന്ത്രങ്ങൾ വികസിപ്പിക്കുന്നതിൽ ഈ പ്രാക്ടിക്കളെയും തടസ്സങ്ങളെയും കുറിച്ചുള്ള പ്രാഥമിക പരിചരണ ഡോക്ടർമാരുടെ കാഴ്ചപ്പാടുകൾ മനസ്സിലാക്കുന്നത് നിർണായകമാണ്. മെച്ചപ്പെട്ട പരിശീലനം, ഡയഗ്നോസ്റ്റിക് ലേക്കുള്ള മെച്ചപ്പെട്ട പ്രവേശനം, പൊതുജന അവബോധ കാമ്പെയ് നുകൾ എന്നിവയുൾപ്പെടെ അനുയോജ്യമായ ഇടപെടലുകൾക്ക് കൂടുതൽ ഉത്തരവാദിത്തമുള്ള ആൻറിബയോട്ടിക് ഉപയോഗം പ്രോത്സാഹിപ്പിക്കാനും അതുവഴി എഫ്ആറിന്റെ ഉയർച്ച തടയാനും കഴിയും.

ഈ ഗവേഷണ സർവ്വേയുടെ ഭാഗമാകാൻ ഞാൻ നിങ്ങളെ ക്ഷണിക്കുകയാണ്. ഈ സർവ്വേയുടെ ഭാഗമാകാൻ നിങ്ങൾ തീരുമാനിക്കുന്നതിന് മുമ്പ്, ഈ ഗവേഷണ സർവ്വേയെ കുറിച്ച് നിങ്ങൾക്ക് സൗകര്യപ്രദമെന്ന് തോന്നുന്ന ആരുമായും നിങ്ങൾക്ക് സംസാരിക്കാവുന്നതാണ്.

നിങ്ങൾക്ക് മനസ്സിലാക്കാൻ ബുദ്ധിമുട്ടായേക്കാവുന്ന നിബന്ധനകളും ചോദ്യങ്ങളും ഈ സമ്മത പത്രത്തിൽ അടങ്ങിയിരിക്കാം. ഞങ്ങൾ ചോദ്യങ്ങളിലൂടെ കടന്നുപോകുമ്പോൾ ദയവായി നിർത്താൻ എന്നോട് ആവശ്യപ്പെടുക, കൂടുതൽ മുന്നോട്ട് പോകുന്നതിനുമുമ്പ് ഞാൻ നിങ്ങളുടെ സംശയങ്ങൾ വ്യക്തമാക്കും.

പഠനത്തെ കുറിച്ച് നിങ്ങൾക്ക് പിന്നീട് എന്തെങ്കിലും ചോദ്യങ്ങൾ ഉണ്ടെങ്കിൽ, നിങ്ങൾക്ക് അവ എന്നോട് ചോദിക്കാം അല്ലെങ്കിൽ സ്ഥാപന നൈതിക സമിതിയുടെ മെമ്പർ സെക്രട്ടറിയുമായി ബന്ധപ്പെടാം.

ഏകദേശം 3 മുതൽ 5 മിനിറ്റ് വരെ എടുക്കുന്ന നിങ്ങളുടെ ആൻറിബയോട്ടിക് കുറിപ്പടി വിശദാംശങ്ങൾ പങ്കിടാൻ ഈ ഗവേഷണ സർവ്വേ നിങ്ങളോട് ആവശ്യപ്പെടും. ആൻറിബയോട്ടിക് ചികിത്സ എടുക്കുന്ന ഒരു രോഗി എന്ന നിലയിലുള്ള അനുഭവം ഈ അന്വേഷണത്തിന് ഗണ്യമായി സംഭാവന ചെയ്യാൻ കഴിയുന്ന ഒരു പ്രധാന പങ്കാളിയായി നിങ്ങളെ ഞാൻ തിരിച്ചറിയുന്നു എന്നതിനാലാണ് ഈ പഠനത്തിൽ പങ്കെടുക്കാൻ നിങ്ങളെ ക്ഷണിക്കുന്നത്.

മെച്ചപ്പെട്ട പരിശീലനം, ഡയഗ്നോസ്റ്റിക് ലേക്കുള്ള മെച്ചപ്പെട്ട പ്രവേശനം, പൊതുജന അവബോധ കാമ്പെയ് നുകൾ എന്നിവയുൾപ്പെടെ അനുയോജ്യമായ ഇടപെടലുകൾ ഭാവിയിൽ നടപ്പാക്കുന്നതിന് വഴിയൊരുക്കുന്നത് ഗുണം ചെയ്യും, ഇത് കൂടുതൽ ഉത്തരവാദിത്തമുള്ള ആൻറിബയോട്ടിക് ഉപയോഗം പ്രോത്സാഹിപ്പിക്കുകയും അതുവഴി എഎംആറിന്റെ ഉയർച്ച തടയുകയും ചെയ്യും.

നിങ്ങളുടെ പങ്കാളിത്തം തികച്ചും സ്വമേധയാ ഉള്ളതാണ്. പങ്കെടുക്കണോ വേണ്ടയോ എന്ന് തിരഞ്ഞെടുക്കാൻ നിങ്ങൾക്ക് സ്വാതന്ത്ര്യമുണ്ട്. നിങ്ങളുടെ തീരുമാനം നിങ്ങളുടെ ജോലിയെയോ റിപ്പോർട്ടിംഗിനെയോ ഒരു തരത്തിലും ബാധിക്കില്ല. ഏത് സമയത്തും പഠനത്തിൽ നിന്ന് പിൻവാങ്ങാൻ നിങ്ങൾക്ക് സ്വാതന്ത്ര്യമുണ്ട്. നിങ്ങൾ പങ്കെടുക്കാൻ തീരുമാനിച്ചാലും ഇല്ലെങ്കിലും, ആർക്കും നിങ്ങളെ തിരിച്ചറിയാൻ കഴിയില്ല, നിങ്ങളുടെ പങ്കാളിത്തം അജ്ഞാതമായിരിക്കും. പഠനത്തിൽ പങ്കെടുക്കുന്നതിന് പ്രതിഫലങ്ങളോ പ്രോത്സാഹനങ്ങളോ ഉണ്ടാകില്ല.

അപകടസാധ്യതകൾ

പഠനത്തിൽ അപകടസാധ്യതയൊന്നും പ്രതീക്ഷിക്കുന്നില്ല.

ആനുകൂല്യങ്ങൾ

നിങ്ങൾക്ക് ഉടൻ നേരിട്ടുള്ള പ്രയോജനമൊന്നും ഉണ്ടാകില്ല, എന്നാൽ പ്രാഥമിക ആരോഗ്യ പരിപാലന ഡോക്ടർമാരുടെ ആൻറിബയോട്ടിക് കുറിപ്പടി സമ്പ്രദായങ്ങളുടെ നിലവിലെ അവസ്ഥയെക്കുറിച്ച് പൊതു പ്രൊഫഷണലുകളെ അറിയിക്കാൻ നിങ്ങളുടെ പങ്കാളിത്തം എന്ന സഹായിക്കും, ഇത് നിലവിലെ സാഹചര്യം മെച്ചപ്പെടുത്തുന്നതിനും ജീവൻ രക്ഷിക്കുന്നതിനും ഒരു പരിഹാരം കണ്ടെത്തുന്നതിന് ഭാവി ഗവേഷണത്തിന് വഴിയൊരുക്കും.

രഹസ്യത്വം

നിങ്ങളെക്കുറിച്ചുള്ള വിവരങ്ങൾ ഞാൻ മറ്റാരോടും പങ്കിടില്ല. ഈ ഗവേഷണ സർവ്വേ ജോലിയിൽ നിന്ന് ഞാൻ ശേഖരിക്കുന്ന വിവരങ്ങൾ സ്വകാര്യമായി സൂക്ഷിക്കും.

ആരെ ബന്ധപ്പെടണം

നിങ്ങൾക്ക് എന്തെങ്കിലും ചോദ്യങ്ങൾ ഉണ്ടെങ്കിൽ, ഇനിപ്പറയുന്നവരിൽ ആരെയെങ്കിലും നിങ്ങൾക്ക് ബന്ധപ്പെടാം.

സിദ്ധാർത്ഥ് വിജയൻ, 9633529935, ഇമെയിൽ: drsiddharthvijayan@gmail.com. Co PI

ഡോ.ബിജു സോമൻ, പ്രൊഫസറും എച്ച്.ഒ.ഡിയും, അച്യുതമേനോൻ സെന്റർ, എസ്.സി.ടി.ഐ.എം.എസ്.ടി. ഇ-മെയിൽ : bijusoman@sctimst.ac.in ഗൈഡ്/പിഐ

ശ്രീനിവാസ് ജി, മെമ്പർ സെക്രട്ടറി, ഐ ഇ സി, എസ് സി ടി ഐ എം എസ് ടി, & സയന്റിസ്റ്റ് - ജി, ബയോകെമിസ്ട്രി വകുപ്പ്, എസ് സി ടി ഐ എം എസ് ടി, (ഇമെയിൽ iec.mem.sec@sctimst.ac.in). 04712524689

ANNEXURE V

INFORMED CONSENT FORM FOR PATIENTS (In Malayalam)

"തിരുവനന്തപുരം കോർപ്പറേഷനിലെ യുക്തിസഹമായ ആൻറിബയോട്ടിക് കുറിപ്പടി സമ്പ്രദായങ്ങളിലെ പ്രാപ്തികളെയും തടസ്സങ്ങളെയും കുറിച്ചുള്ള പ്രാഥമിക പരിചരണ ഡോക്ടർമാരുടെ കാഴ്ചപ്പാട്" എന്ന പ്രബന്ധത്തിൽ പങ്കെടുക്കാൻ എന്നെ ക്ഷണിച്ചു. പഠനവുമായി ബന്ധപ്പെട്ട് നൽകിയിട്ടുള്ള വിവരങ്ങൾ ഞാൻ വായിച്ചിട്ടുണ്ട്, അല്ലെങ്കിൽ അത് എനിക്ക് വായിച്ചുകേൾപ്പിച്ചിട്ടുണ്ട്. ഇതിനെ കുറിച്ച് ചോദ്യങ്ങൾ ചോദിക്കാൻ എനിക്ക് അവസരം ലഭിച്ചിട്ടുണ്ട്, എന്നോട് ചോദിച്ച ചോദ്യങ്ങൾക്ക് എനിക്ക് സംതൃപ്തി തരുന്ന തരത്തിൽ ഉത്തരം ലഭിച്ചിട്ടുണ്ട്.

ഈ പഠനത്തിൽ പങ്കെടുക്കുന്നതിൽ കുറഞ്ഞ അപകടസാധ്യതയുണ്ടെന്ന് എനിക്കറിയാം. പഠനത്തിൽ ഉടനടി നേരിട്ടുള്ള പ്രയോജനമൊന്നുമില്ലെന്ന് ഞാൻ മനസ്സിലാക്കുന്നു.

പങ്കാളിത്തത്തിന് എനിക്ക് പ്രോത്സാഹനം ലഭിക്കില്ലെന്ന് എനിക്കറിയാം.

എന്റെ വ്യക്തിഗത വിവരങ്ങൾ രഹസ്യസ്വഭാവത്തോടെ സൂക്ഷിക്കുമെന്ന് ഞാൻ മനസ്സിലാക്കുന്നു.

പഠനത്തിന്റെ ഏത് ഘട്ടത്തിലും എനിക്ക് എന്റെ സമ്മതം പിൻവലിക്കാൻ കഴിയുമെന്ന് എനിക്കറിയാം

ഈ പഠനത്തിൽ ഒരു പങ്കാളിയാകാൻ ഞാൻ സ്വമേധയാ സമ്മതിക്കുന്നു.

പങ്കാളി ഐഡി :

പങ്കാളിയുടെ പേര് :

മൊബൈൽ നമ്പർ :

ഒപ്പ് :

സ്ഥലം:

തീയതി:

പഠനത്തെ കുറിച്ച് ചോദ്യങ്ങൾ ചോദിക്കാൻ പങ്കാളിയെ അനുവദിച്ചിട്ടുണ്ടെന്നും പങ്കാളി ചോദിച്ച എല്ലാ ചോദ്യങ്ങൾക്കും ശരിയായും എന്റെ കഴിവിന്റെ പരമാവധിയും ഉത്തരം ലഭിച്ചിട്ടുണ്ടെന്നും ഞാൻ സ്ഥിരീകരിക്കുന്നു. സമ്മതം നൽകാൻ വ്യക്തിയെ നിർബന്ധിച്ചിട്ടില്ലെന്നും സമ്മതം സ്വതന്ത്രമായും സ്വമേധയാ നൽകിയിട്ടുണ്ടെന്നും ഞാൻ സ്ഥിരീകരിക്കുന്നു.

ഗവേഷകന്റെ പേര് :

തീയതി

:

ഗവേഷകന്റെ ഒപ്പ്:

ANNEXURE VI

IEC Approval Certificate



श्री चित्रा तिरुनाल आयुर्विज्ञान और प्रौद्योगिकी संस्थान, त्रिवेन्द्रम
तिरुवनन्तपुरम - ६९५०११, केरल, इंडिया
SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES AND TECHNOLOGY, TRIVANDRUM
Thiruvananthapuram - 695 011, Kerala, India
(An Institute of National Importance under Govt. of India)

Grams : Chitramet, Phone : +91-471-2443152, Fax : +91-471-2550728 / 2446433, E-mail : sct@sctimst.ac.in, Website : www.sctimst.ac.in

Institutional Ethics Committee

CDSCO Registration No: ECR/189/Inst/KL/2013/RR-24
DHR Registration No: EC/NEW/INST/2022/2775

SCT/IEC/2347/DECEMBER/2024

08.04.2025

Dr. Siddharth Vijayan
MPH Student, AMCHSS
SCTIMST, Thiruvananthapuram

Dear Dr. Siddharth Vijayan,

The Institutional Ethics Committee held on 30th December, 2024, reviewed and discussed your application to conduct the study titled "ENABLERS AND BARRIERS TO RATIONAL ANTIBIOTIC PRESCRIBING IN PRIMARY HEALTHCARE FACILITIES IN THIRUVANANTHAPURAM DISTRICT" (IEC /2347) .

Principal Investigator	Dr. Siddharth Vijayan, MPH Student, AMCHSS, SCTIMST
Co-Principal Investigator(s)	Dr. Biju Soman, Professor, AMCHSS, SCTIMST
Duration of the study	6 months

The following members of the Ethics Committee were present at the meeting held on 30th December, 2024

SL. No.	Member Name	Highest Degree	Gender	Scientific /Non Scientific	Affiliation with Institution(s)
1.	Dr. Manoj Murhekar	MD (Preventive & Social Medicine)	Male	Social Scientist	No
2.	Dr. Annapurna.Y	MD	Female	Basic Medical Scientist	No
3.	Adv. Priya Kaimal	LLM, MBL	Female	Legal Expert	No
4.	Dr. Indu PV	MBBS, DPM, MPhil, PhD	Female	Clinician	No
5.	Dr. Rejnish Kumar	MBBS, MD, DNB	Male	Clinician	No
6.	Smt. Rekha Radhakrishnan	M.A (Eng.); B.Ed	Female	Lay person	No
7.	Dr. Biju Soman	MBBS, MD, DPH, MSc, DLSHTM	Male	Basic Medical Scientist	Yes
8.	Dr. Syam K	MBBS, MD, DM	Male	Clinician	Yes
9.	Dr. Srinivas G	PhD	Male	Basic Medical Scientist (Member Secretary)	Yes

The following documents were reviewed:Original submission

1. IEC Application Form
2. Funding details and Budget
3. Covering letter addressed to the Chairperson, IEC, SCTIMST dated 10.12.2024 forwarded by HOD
4. Tool in English and Malayalam
5. Informed Consent Forms in English and Malayalam Participant Information Sheets in English and Malayalam
6. Checklist Form
7. Proposal
8. Declaration Form
9. CV of PI and Co-PI

Revised submission

1. IEC Recommendation letter dated 09.01.2025
2. Covering letter addressed to the Member Secretary, IEC, SCTIMST dated 12.01.2025
3. Response to IEC comments
4. Proposal
5. Participant Information Sheets in English and Malayalam
6. Consent Forms in English and Malayalam
7. Interview schedule in English and Malayalam

Revised submission on 03.04.2025

1. Covering letter addressed to the Member Secretary, IEC, SCTIMST dated 03.04.2025 regarding the change of the title and objective of the study
1. Proposal
2. Interview schedule
3. Participant Information Sheets in English and Malayalam
4. Informed Consent Forms in English and Malayalam

IEC Decision

The IEC approved the conduct of the study in the present form.

Remarks:

The Institutional Ethics Committee expects to be informed about the progress of the study, any SAE occurring in the course of the study, any changes in the protocol and patient information/informed consent and asks to be provided a copy of the final report.

There was no member of the study team / Guide who participated in voting / decision making process. The ethics committee is organized and operated according to the requirements of Good Clinical Practice and the requirements of the Indian Council of Medical Research (ICMR).

Sincerely,



Dr. G. Srinivas
Member Secretary, IEC

MEMBER SECRETARY
INSTITUTIONAL ETHICS COMMITTEE (IEC)
SCTIMST, THIRUVANANTHAPURAM



ANNEXURE VII

PERMISSION LETTER FROM DISTRICT MEDICAL OFFICER

DMOH-TVM/1083/2024-C4

I/429753/2025

PROCEEDINGS OF THE DISTRICT MEDICAL OFFICER OF HEALTH, THIRUVANANTHAPURAM

- Sub: HSD – DMO(H) – Dr.Sidharh Vijayan MPH student, Achutha Memon Centre for Health Science and Technology ,the public health unit of Sree Chitra Tirunal Institute for Medical Science and Technology, Thiruvananthapuram - data collection from various Government hospitals in connection with NPH Thesis work – Sanctioned –Orders issued
- Read: 1. Request from Dr,Biju Soman, Professor and Head Achutha Memon Centre for Health Science and Technology, Thiruvananthapuram
2. Minutes of The Ethical Committee clearance from Sree Chitra Tirunal Institute for Medical Science and Technology, Thiruvananthapuram, dated 15.01.2025
3. Study Approval Committee for research activities held on 24.02.2025, at DMO (H), TVM, with District Medical Officer (Health) as Chairman

ORDER NO. DMOH-TVM/1083/2024-C4DATED,01-03-2025

The Professor and Head Achutha Memon Centre for Health Science and Technology, Thiruvananthapuram has requested permission for MPH student Dr.Sidharh Vijayan for data collection from various Government hospitals in connection with the thesis study "*Primary care physician's perception of enablers and barriers in rational antibiotic prescribing practices in Thiruvananthapuram district*". The study approval committee examined the matter and decided to give permission for this student.

Hence sanction is hereby accorded to conduct study subject to the condition that

1. The personal identification details of patients or bystanders will not be collected.
2. The proposed Data Collection must be completed before 2025 March.
3. The Health Services department have the right to terminate the sanction granted without notice if the Ethics is not maintained in the study.
4. The data after the study should be shared to the Director of Health Services, Thiruvananthapuram. Any result/data related to the project will not be published without the permission of Director of Health Services.
5. Study should be conducted without causing any interference to the day-to-day activities of the institution and should comply with the instructions of the head of the institution.

O/o DMO DMOHTVM

Signed by
Bindu Mohan
Date: 01-03-2025 13:24:59

District Medical Officer (Health)

DR. BINDHU MOHAN, DMO DMOHTVM

ANNEXURE - VIII

Bivariate and multivariable models

Binary regression: No Prior Information on Disease profile of the area

Characteristic	OR	95% CI	p-value
Facility Type			
Public	—	—	
Private	2.76	1.26, 6.47	0.014

Binary regression: No information received on Disease profile of the area

Characteristic	OR	95% CI	p-value
Physician Age in Years			
< 30	—	—	
30-40	0.07	0.00, 0.39	0.012
40-50	0.57	0.03, 3.93	0.6
50-60	0.00		>0.9
>60	1.08	0.25, 4.10	>0.9

Participant detail and Type of STG used

Characteristic	Govt. STG, N = 38	ICMR,WHO,Other STG, N = 48	p-value
Physician Age in Years			0.044
< 30	6 (16%)	14 (29%)	
30-40	16 (42%)	27 (56%)	
40-50	4 (11%)	2 (4.2%)	
50-60	3 (7.9%)	0 (0%)	
>60	9 (24%)	5 (10%)	
Years in Practice			0.051
<5	11 (29%)	25 (52%)	
5-15	12 (32%)	15 (31%)	

15-25	3 (7.9%)	3 (6.3%)	
>25	12 (32%)	5 (10%)	
Educational Qualification			0.054
MBBS	23 (61%)	19 (40%)	
Post MBBS Specialisation	15 (39%)	29 (60%)	
Physician Gender			0.15
Female	17 (45%)	29 (60%)	
Male	21 (55%)	19 (40%)	
Facility Type			<0.001
Public	31 (82%)	14 (29%)	
Private	7 (18%)	34 (71%)	
Daily OPD Patients			0.047
<20	2 (5.3%)	12 (25%)	
20-50	13 (34%)	18 (38%)	
51-100	10 (26%)	6 (13%)	
>100	13 (34%)	12 (25%)	

Participant detail and Adherence to STG

Characteristic	Strict Adherence, N = 31	Selective Adherence, N = 55	p-value
Physician Age in Years			0.4
< 30	4 (13%)	16 (29%)	
30-40	17 (55%)	26 (47%)	
40-50	2 (6.5%)	4 (7.3%)	
50-60	1 (3.2%)	2 (3.6%)	
>60	7 (23%)	7 (13%)	
Years in Practice			0.3
<5	9 (29%)	27 (49%)	

5-15	11 (35%)	16 (29%)	
15-25	3 (9.7%)	3 (5.5%)	
>25	8 (26%)	9 (16%)	
Educational Qualification			0.063
MBBS	11 (35%)	31 (56%)	
Post MBBS Specialisation	20 (65%)	24 (44%)	
Physician Gender			0.5
Female	15 (48%)	31 (56%)	
Male	16 (52%)	24 (44%)	
Facility Type			>0.9
Public	16 (52%)	29 (53%)	
Private	15 (48%)	26 (47%)	
Daily OPD Patients			0.9
<20	5 (16%)	9 (16%)	
20-50	11 (35%)	20 (36%)	
51-100	7 (23%)	9 (16%)	
>100	8 (26%)	17 (31%)	

Binary regression: Selective Adherence to STG and Educational Qualification

Characteristic	OR	95% CI	p-value
Educational Qualification			
MBBS	—	—	
Post MBBS Specialisation	0.43	0.17, 1.04	0.065

Participant detail and New antibiotic generations/brands affecting STG adherence

Characteristic	High influence, N = 38	Low influence, N = 48	p-value
Physician Age in Years			0.8

< 30	11 (29%)	9 (19%)	
30-40	17 (45%)	26 (54%)	
40-50	2 (5.3%)	4 (8.3%)	
50-60	1 (2.6%)	2 (4.2%)	
>60	7 (18%)	7 (15%)	
Years in Practice			0.4
<5	19 (50%)	17 (35%)	
5-15	9 (24%)	18 (38%)	
15-25	2 (5.3%)	4 (8.3%)	
>25	8 (21%)	9 (19%)	
Educational Qualification			0.048
MBBS	14 (37%)	28 (58%)	
Post MBBS Specialisation	24 (63%)	20 (42%)	
Physician Gender			0.6
Female	19 (50%)	27 (56%)	
Male	19 (50%)	21 (44%)	
Facility Type			0.034
Public	15 (39%)	30 (63%)	
Private	23 (61%)	18 (38%)	
Daily OPD Patients			0.6
<20	7 (18%)	7 (15%)	
20-50	16 (42%)	15 (31%)	
51-100	6 (16%)	10 (21%)	
>100	9 (24%)	16 (33%)	

Binary regression: Educational qualification and New antibiotic generations/brands low influence on STG adherence

Characteristic	OR	95% CI	p-value
Educational Qualification			

MBBS	—	—	
Post MBBS Specialisation	0.42	0.17, 0.99	0.050

Binary regression: Facility type and New antibiotic generations/brands low influence on STG adherence

Characteristic	OR	95% CI	p-value
Facility Type			
Public	—	—	
Private	0.39	0.16, 0.93	0.035

Multivariable regression: Facility type and New antibiotic generations/brands low influence on STG adherence

Characteristic	OR	95% CI	p-value
Facility Type			
Public	—	—	
Private	0.45	0.18, 1.10	0.083
Educational Qualification			
MBBS	—	—	
Post MBBS Specialisation	0.49	0.20, 1.20	0.12

Participant detail and Patient insistence on prescribing

Characteristic	Frequent Insistence, N = 61	Minimal/No Insistence, N = 84	p-value
Physician Age in Years			<0.001
< 30	20 (33%)	19 (23%)	
30-40	36 (59%)	35 (42%)	
40-50	4 (6.6%)	5 (6.0%)	
50-60	0 (0%)	5 (6.0%)	
>60	1 (1.6%)	20 (24%)	

Years in Practice			<0.001
<5	33 (54%)	32 (38%)	
5-15	24 (39%)	20 (24%)	
15-25	3 (4.9%)	7 (8.3%)	
>25	1 (1.6%)	25 (30%)	
Educational Qualification			0.10
MBBS	36 (59%)	38 (45%)	
Post MBBS Specialisation	25 (41%)	46 (55%)	
Physician Gender			0.094
Female	34 (56%)	35 (42%)	
Male	27 (44%)	49 (58%)	
Facility Type			0.2
Public	29 (48%)	30 (36%)	
Private	32 (52%)	54 (64%)	
Daily OPD Patients			0.4
<20	10 (16%)	20 (24%)	
20-50	22 (36%)	35 (42%)	
51-100	13 (21%)	14 (17%)	
>100	16 (26%)	15 (18%)	

Binary regression: Years in practice and patient minimal/no insistence on specific antibiotic

Characteristic	OR	95% CI	p-value
Physician Age in Years			
< 30	—	—	
30-40	1.02	0.47, 2.24	>0.9
40-50	1.32	0.30, 6.03	0.7
50-60	16,475,117	0.00, NA	>0.9

>60	21.1	3.80, 396	0.005

Binary regression: Physician age in years and patient minimal/no insistence on specific antibiotic

Characteristic	OR	95% CI	p-value
Years in Practice			
<5	—	—	
5-15	0.86	0.40, 1.85	0.7
15-25	2.41	0.61, 11.9	0.2
>25	25.8	4.99, 474	0.002

Multivariable regression: Physician age and years in practice with minimal/no Patient insistence for antibiotics

Characteristic	OR	95% CI	p-value
Physician Age in Years			
< 30	—	—	
30-40	1.04	0.40, 2.73	>0.9
40-50	0.39	0.02, 4.04	0.5
50-60	16,418,647	0.00, NA	>0.9
>60	21.0	3.78, 395	0.005
Years in Practice			
<5	—	—	
5-15	0.87	0.34, 2.25	0.8
15-25	4.90	0.56, 111	0.2
>25			

Participant detail and Patient Influence on STG non adherence

Characteristic	High influence, N = 9	Low influence, N = 77	p-value
Physician Age in Years			0.7

< 30	4 (44%)	16 (21%)	
30-40	4 (44%)	39 (51%)	
40-50	0 (0%)	6 (7.8%)	
50-60	0 (0%)	3 (3.9%)	
>60	1 (11%)	13 (17%)	
Years in Practice			0.2
<5	7 (78%)	29 (38%)	
5-15	1 (11%)	26 (34%)	
15-25	0 (0%)	6 (7.8%)	
>25	1 (11%)	16 (21%)	
Educational Qualification			0.7
MBBS	5 (56%)	37 (48%)	
Post MBBS Specialisation	4 (44%)	40 (52%)	
Physician Gender			0.3
Female	3 (33%)	43 (56%)	
Male	6 (67%)	34 (44%)	
Facility Type			0.3
Public	3 (33%)	42 (55%)	
Private	6 (67%)	35 (45%)	
Daily OPD Patients			0.9
<20	2 (22%)	12 (16%)	
20-50	3 (33%)	28 (36%)	
51-100	2 (22%)	14 (18%)	
>100	2 (22%)	23 (30%)	

Participant detail and Antibiotic Availability in Pharmacy

Characteristic	Good availability, N = 141	Poor availability, N = 4	p-value
Physician Age in Years			0.2

< 30	38 (27%)	1 (25%)	
30-40	70 (50%)	1 (25%)	
40-50	9 (6.4%)	0 (0%)	
50-60	4 (2.8%)	1 (25%)	
>60	20 (14%)	1 (25%)	
Years in Practice			0.5
<5	64 (45%)	1 (25%)	
5-15	43 (30%)	1 (25%)	
15-25	10 (7.1%)	0 (0%)	
>25	24 (17%)	2 (50%)	
Educational Qualification			0.4
MBBS	73 (52%)	1 (25%)	
Post MBBS Specialisation	68 (48%)	3 (75%)	
Physician Gender			0.12
Female	69 (49%)	0 (0%)	
Male	72 (51%)	4 (100%)	
Facility Type			>0.9
Public	57 (40%)	2 (50%)	
Private	84 (60%)	2 (50%)	
Daily OPD Patients			0.7
<20	30 (21%)	0 (0%)	
20-50	54 (38%)	3 (75%)	
51-100	27 (19%)	0 (0%)	
>100	30 (21%)	1 (25%)	

Participant detail and Antibiotic choice dependent on Pharmacy Stock

Characteristic	Choice influenced by Stock, N = 97	Choice not influenced by stock, N = 48	p-value
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Physician Age in Years			0.7
< 30	27 (28%)	12 (25%)	
30-40	48 (49%)	23 (48%)	
40-50	4 (4.1%)	5 (10%)	
50-60	4 (4.1%)	1 (2.1%)	
>60	14 (14%)	7 (15%)	
Years in Practice			0.7
<5	46 (47%)	19 (40%)	
5-15	27 (28%)	17 (35%)	
15-25	6 (6.2%)	4 (8.3%)	
>25	18 (19%)	8 (17%)	
Educational Qualification			0.4
MBBS	47 (48%)	27 (56%)	
Post MBBS Specialisation	50 (52%)	21 (44%)	
Physician Gender			0.4
Female	44 (45%)	25 (52%)	
Male	53 (55%)	23 (48%)	
Facility Type			0.10
Public	44 (45%)	15 (31%)	
Private	53 (55%)	33 (69%)	
Daily OPD Patients			0.3
<20	19 (20%)	11 (23%)	
20-50	34 (35%)	23 (48%)	
51-100	21 (22%)	6 (13%)	
>100	23 (24%)	8 (17%)	

Participant detail and Updates from Pharmacy regarding stock

Characteristic	Frequent updates, N = 131	Infrequent updates, N = 14	p-value
Physician Age in Years			0.2
< 30	32 (24%)	7 (50%)	
30-40	64 (49%)	7 (50%)	
40-50	9 (6.9%)	0 (0%)	
50-60	5 (3.8%)	0 (0%)	
>60	21 (16%)	0 (0%)	
Years in Practice			0.2
<5	56 (43%)	9 (64%)	
5-15	39 (30%)	5 (36%)	
15-25	10 (7.6%)	0 (0%)	
>25	26 (20%)	0 (0%)	
Educational Qualification			0.11
MBBS	64 (49%)	10 (71%)	
Post MBBS Specialisation	67 (51%)	4 (29%)	
Physician Gender			0.5
Female	61 (47%)	8 (57%)	
Male	70 (53%)	6 (43%)	
Facility Type			0.12
Public	56 (43%)	3 (21%)	
Private	75 (57%)	11 (79%)	
Daily OPD Patients			0.6
<20	26 (20%)	4 (29%)	
20-50	50 (38%)	7 (50%)	
51-100	26 (20%)	1 (7.1%)	
>100	29 (22%)	2 (14%)	

Participant detail and STG antibiotic Availability in the Pharmacy

Characteristic	Good availability, N = 135	Poor availability, N = 10	p-value
Physician Age in Years			0.030
< 30	33 (24%)	6 (60%)	
30-40	69 (51%)	2 (20%)	
40-50	8 (5.9%)	1 (10%)	
50-60	4 (3.0%)	1 (10%)	
>60	21 (16%)	0 (0%)	
Years in Practice			0.7
<5	59 (44%)	6 (60%)	
5-15	42 (31%)	2 (20%)	
15-25	9 (6.7%)	1 (10%)	
>25	25 (19%)	1 (10%)	
Educational Qualification			0.10
MBBS	66 (49%)	8 (80%)	
Post MBBS Specialisation	69 (51%)	2 (20%)	
Physician Gender			0.3
Female	66 (49%)	3 (30%)	
Male	69 (51%)	7 (70%)	
Facility Type			0.2
Public	57 (42%)	2 (20%)	
Private	78 (58%)	8 (80%)	
Daily OPD Patients			0.3
<20	27 (20%)	3 (30%)	
20-50	52 (39%)	5 (50%)	
51-100	25 (19%)	2 (20%)	
>100	31 (23%)	0 (0%)	

Participant detail and Preliminary Training recieved

Characteristic	Received training, N = 101	No training, N = 44	p-value
Physician Age in Years			0.6
< 30	28 (28%)	11 (25%)	
30-40	48 (48%)	23 (52%)	
40-50	7 (6.9%)	2 (4.5%)	
50-60	5 (5.0%)	0 (0%)	
>60	13 (13%)	8 (18%)	
Years in Practice			>0.9
<5	46 (46%)	19 (43%)	
5-15	30 (30%)	14 (32%)	
15-25	7 (6.9%)	3 (6.8%)	
>25	18 (18%)	8 (18%)	
Educational Qualification			0.9
MBBS	52 (51%)	22 (50%)	
Post MBBS Specialisation	49 (49%)	22 (50%)	
Physician Gender			0.5
Female	50 (50%)	19 (43%)	
Male	51 (50%)	25 (57%)	
Facility Type			0.5
Public	43 (43%)	16 (36%)	
Private	58 (57%)	28 (64%)	
Daily OPD Patients			0.8
<20	19 (19%)	11 (25%)	
20-50	42 (42%)	15 (34%)	
51-100	19 (19%)	8 (18%)	
>100	21 (21%)	10 (23%)	

Participant detail and Refresher Training recieved

Characteristic	Some training, N = 56	No training, N = 89	p-value
Physician Age in Years			0.9
< 30	15 (27%)	24 (27%)	
30-40	26 (46%)	45 (51%)	
40-50	5 (8.9%)	4 (4.5%)	
50-60	2 (3.6%)	3 (3.4%)	
>60	8 (14%)	13 (15%)	
Years in Practice			>0.9
<5	24 (43%)	41 (46%)	
5-15	18 (32%)	26 (29%)	
15-25	4 (7.1%)	6 (6.7%)	
>25	10 (18%)	16 (18%)	
Educational Qualification			0.064
MBBS	34 (61%)	40 (45%)	
Post MBBS Specialisation	22 (39%)	49 (55%)	
Physician Gender			0.6
Female	25 (45%)	44 (49%)	
Male	31 (55%)	45 (51%)	
Facility Type			>0.9
Public	23 (41%)	36 (40%)	
Private	33 (59%)	53 (60%)	
Daily OPD Patients			0.9
<20	13 (23%)	17 (19%)	
20-50	20 (36%)	37 (42%)	
51-100	11 (20%)	16 (18%)	
>100	12 (21%)	19 (21%)	

Binary regression: Educational qualification and no refresher training on antibiotics

Characteristic	OR	95% CI	p-value
Educational Qualification			
MBBS	—	—	
Post MBBS Specialisation	1.89	0.96, 3.77	0.066

Participant detail and IPC Training recieved

Characteristic	Received IPC training, N = 103	No IPC training, N = 42	p-value
Physician Age in Years			0.071
< 30	24 (23%)	15 (36%)	
30-40	48 (47%)	23 (55%)	
40-50	9 (8.7%)	0 (0%)	
50-60	4 (3.9%)	1 (2.4%)	
>60	18 (17%)	3 (7.1%)	
Years in Practice			0.2
<5	42 (41%)	23 (55%)	
5-15	30 (29%)	14 (33%)	
15-25	9 (8.7%)	1 (2.4%)	
>25	22 (21%)	4 (9.5%)	
Educational Qualification			0.095
MBBS	48 (47%)	26 (62%)	
Post MBBS Specialisation	55 (53%)	16 (38%)	
Physician Gender			0.027
Female	43 (42%)	26 (62%)	
Male	60 (58%)	16 (38%)	
Facility Type			0.4

Public	44 (43%)	15 (36%)	
Private	59 (57%)	27 (64%)	
Daily OPD Patients			0.4
<20	21 (20%)	9 (21%)	
20-50	42 (41%)	15 (36%)	
51-100	16 (16%)	11 (26%)	
>100	24 (23%)	7 (17%)	

Participant detail and AMR Training recieved

Characteristic	Received training, N = 97	No training, N = 29	p-value
Physician Age in Years			0.5
< 30	20 (21%)	6 (21%)	
30-40	47 (48%)	19 (66%)	
40-50	8 (8.2%)	1 (3.4%)	
50-60	4 (4.1%)	1 (3.4%)	
>60	18 (19%)	2 (6.9%)	
Years in Practice			0.5
<5	35 (36%)	14 (48%)	
5-15	32 (33%)	10 (34%)	
15-25	8 (8.2%)	2 (6.9%)	
>25	22 (23%)	3 (10%)	
Educational Qualification			0.9
MBBS	45 (46%)	13 (45%)	
Post MBBS Specialisation	52 (54%)	16 (55%)	
Physician Gender			0.5
Female	44 (45%)	11 (38%)	
Male	53 (55%)	18 (62%)	
Facility Type			0.2

Public	43 (44%)	9 (31%)	
Private	54 (56%)	20 (69%)	
Daily OPD Patients			0.7
<20	21 (22%)	5 (17%)	
20-50	35 (36%)	13 (45%)	
51-100	17 (18%)	6 (21%)	
>100	24 (25%)	5 (17%)	

Participant detail and Daily Practice Hours

Characteristic	More than 6 hours, N = 79	less than 6 hours, N = 66	p-value
Physician Age in Years			>0.9
< 30	22 (28%)	17 (26%)	
30-40	38 (48%)	33 (50%)	
40-50	5 (6.3%)	4 (6.1%)	
50-60	2 (2.5%)	3 (4.5%)	
>60	12 (15%)	9 (14%)	
Years in Practice			0.7
<5	38 (48%)	27 (41%)	
5-15	21 (27%)	23 (35%)	
15-25	6 (7.6%)	4 (6.1%)	
>25	14 (18%)	12 (18%)	
Educational Qualification			0.7
MBBS	39 (49%)	35 (53%)	
Post MBBS Specialisation	40 (51%)	31 (47%)	
Physician Gender			0.9
Female	38 (48%)	31 (47%)	
Male	41 (52%)	35 (53%)	
Facility Type			0.015

Public	25 (32%)	34 (52%)	
Private	54 (68%)	32 (48%)	
Daily OPD Patients			0.010
<20	12 (15%)	18 (27%)	
20-50	40 (51%)	17 (26%)	
51-100	15 (19%)	12 (18%)	
>100	12 (15%)	19 (29%)	

Binary regression: Facility type and Physicians with Daily Practice hours less than 6

Characteristic	OR	95% CI	p-value
Facility Type			
Public	—	—	
Private	0.44	0.22, 0.85	0.016

Binary regression: Daily OPD patients seen by physician and Daily Practice hours less than 6

Characteristic	OR	95% CI	p-value
Daily OPD Patients			
<20	—	—	
20-50	0.28	0.11, 0.70	0.008
51-100	0.53	0.18, 1.52	0.2
>100	1.06	0.38, 2.97	>0.9

Participant detail and Professional Competition affecting prescription practice

Characteristic	Influenced by competition, N = 92	Not influenced by competition, N = 53	p-value
Physician Age in Years			0.3
< 30	28 (30%)	11 (21%)	
30-40	46 (50%)	25 (47%)	

40-50	6 (6.5%)	3 (5.7%)	
50-60	3 (3.3%)	2 (3.8%)	
>60	9 (9.8%)	12 (23%)	
Years in Practice			0.2
<5	42 (46%)	23 (43%)	
5-15	30 (33%)	14 (26%)	
15-25	8 (8.7%)	2 (3.8%)	
>25	12 (13%)	14 (26%)	
Educational Qualification			0.3
MBBS	50 (54%)	24 (45%)	
Post MBBS Specialisation	42 (46%)	29 (55%)	
Physician Gender			0.5
Female	42 (46%)	27 (51%)	
Male	50 (54%)	26 (49%)	
Facility Type			0.11
Public	42 (46%)	17 (32%)	
Private	50 (54%)	36 (68%)	
Daily OPD Patients			0.8
<20	19 (21%)	11 (21%)	
20-50	35 (38%)	22 (42%)	
51-100	16 (17%)	11 (21%)	
>100	22 (24%)	9 (17%)	

Participant detail and Peer influence in prescription practice

Characteristic	Influenced by peer, N = 59	Not influenced by peer, N = 86	p-value
Physician Age in Years			0.6
< 30	19 (32%)	20 (23%)	

30-40	29 (49%)	42 (49%)	
40-50	2 (3.4%)	7 (8.1%)	
50-60	2 (3.4%)	3 (3.5%)	
>60	7 (12%)	14 (16%)	
Years in Practice			0.7
<5	30 (51%)	35 (41%)	
5-15	16 (27%)	28 (33%)	
15-25	4 (6.8%)	6 (7.0%)	
>25	9 (15%)	17 (20%)	
Educational Qualification			0.2
MBBS	34 (58%)	40 (47%)	
Post MBBS Specialisation	25 (42%)	46 (53%)	
Physician Gender			0.040
Female	22 (37%)	47 (55%)	
Male	37 (63%)	39 (45%)	
Facility Type			0.085
Public	19 (32%)	40 (47%)	
Private	40 (68%)	46 (53%)	
Daily OPD Patients			0.6
<20	13 (22%)	17 (20%)	
20-50	25 (42%)	32 (37%)	
51-100	8 (14%)	19 (22%)	
>100	13 (22%)	18 (21%)	

Binary regression: Physician gender and no peer influence

Characteristic	OR	95% CI	p-value
Physician Gender			
Female	—	—	
Male	0.49	0.25, 0.97	0.041

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Participant detail and Patient Volume in prescription practice

Characteristic	Influenced by Patient volume, N = 48	Not influenced by Patient volume, N = 97	p-value
Physician Age in Years			0.6
< 30	15 (31%)	24 (25%)	
30-40	24 (50%)	47 (48%)	
40-50	1 (2.1%)	8 (8.2%)	
50-60	1 (2.1%)	4 (4.1%)	
>60	7 (15%)	14 (14%)	
Years in Practice			0.8
<5	24 (50%)	41 (42%)	
5-15	14 (29%)	30 (31%)	
15-25	2 (4.2%)	8 (8.2%)	
>25	8 (17%)	18 (19%)	
Educational Qualification			0.2
MBBS	28 (58%)	46 (47%)	
Post MBBS Specialisation	20 (42%)	51 (53%)	
Physician Gender			0.039
Female	17 (35%)	52 (54%)	
Male	31 (65%)	45 (46%)	
Facility Type			0.4
Public	17 (35%)	42 (43%)	
Private	31 (65%)	55 (57%)	
Daily OPD Patients			0.033
<20	15 (31%)	15 (15%)	
20-50	15 (31%)	42 (43%)	

51-100	5 (10%)	22 (23%)	
>100	13 (27%)	18 (19%)	

Binary regression: Daily OPD patients seen by physician and no influence from patient volume

Characteristic	OR	95% CI	p-value
Daily OPD Patients			
<20	—	—	
20-50	2.80	1.11, 7.19	0.030
51-100	4.40	1.38, 16.0	0.016
>100	1.38	0.50, 3.85	0.5

Participant detail and Importance in knowledge update

Characteristic	Strongly values updating knowledge, N = 120	Less emphasis on knowledge update, N = 25	p-value
Physician Age in Years			0.3
< 30	32 (27%)	7 (28%)	
30-40	58 (48%)	13 (52%)	
40-50	6 (5.0%)	3 (12%)	
50-60	4 (3.3%)	1 (4.0%)	
>60	20 (17%)	1 (4.0%)	
Years in Practice			0.3
<5	54 (45%)	11 (44%)	
5-15	35 (29%)	9 (36%)	
15-25	7 (5.8%)	3 (12%)	
>25	24 (20%)	2 (8.0%)	
Educational Qualification			0.6
MBBS	60 (50%)	14 (56%)	

Post MBBS Specialisation	60 (50%)	11 (44%)	
Physician Gender			0.7
Female	58 (48%)	11 (44%)	
Male	62 (52%)	14 (56%)	
Facility Type			0.6
Public	50 (42%)	9 (36%)	
Private	70 (58%)	16 (64%)	
Daily OPD Patients			0.037
<20	22 (18%)	8 (32%)	
20-50	53 (44%)	4 (16%)	
51-100	20 (17%)	7 (28%)	
>100	25 (21%)	6 (24%)	

Binary regression: Daily OPD patients seen by Physician and less emphasis on knowledge update

Characteristic	OR	95% CI	p-value
Daily OPD Patients			
<20	—	—	
20-50	0.21	0.05, 0.73	0.018
51-100	0.96	0.29, 3.16	>0.9
>100	0.66	0.19, 2.19	0.5

Participant detail and Frequency in knowledge update

Characteristic	Regular knowledge updates, N = 114	Infrequent or no updates, N = 31	p-value
Physician Age in Years			0.6
< 30	31 (27%)	8 (26%)	
30-40	57 (50%)	14 (45%)	
40-50	6 (5.3%)	3 (9.7%)	

50-60	5 (4.4%)	0 (0%)	
>60	15 (13%)	6 (19%)	
Years in Practice			0.4
<5	54 (47%)	11 (35%)	
5-15	34 (30%)	10 (32%)	
15-25	6 (5.3%)	4 (13%)	
>25	20 (18%)	6 (19%)	
Educational Qualification			0.3
MBBS	61 (54%)	13 (42%)	
Post MBBS Specialisation	53 (46%)	18 (58%)	
Physician Gender			0.6
Female	53 (46%)	16 (52%)	
Male	61 (54%)	15 (48%)	
Facility Type			0.6
Public	45 (39%)	14 (45%)	
Private	69 (61%)	17 (55%)	
Daily OPD Patients			0.2
<20	26 (23%)	4 (13%)	
20-50	46 (40%)	11 (35%)	
51-100	22 (19%)	5 (16%)	
>100	20 (18%)	11 (35%)	

Multivariable regression: Age, Years in practice, facility type, Daily OPD patients and non Preference for non generic

Characteristic	OR	95% CI	p-value
Physician Age in Years			
< 30	—	—	
30-40	1.28	0.44, 3.78	0.7
40-50	14.1	0.50, 658	0.14

50-60	2.55	0.28, 56.9	0.5
>60	0.23	0.05, 0.84	0.034
Years in Practice			
<5	—	—	
5-15	1.33	0.45, 3.97	0.6
15-25	0.43	0.03, 8.05	0.5
>25			
Facility Type			
Public	—	—	
Private	0.24	0.08, 0.67	0.008
Daily OPD Patients			
<20	—	—	
20-50	1.12	0.41, 3.09	0.8
51-100	2.38	0.55, 10.8	0.2
>100	1.73	0.41, 7.44	0.5

Participant detail and Newer generations/brands discouraging generic use

Characteristic	Discouraging generic drug use, N = 69	Not discouraging generic drug use, N = 76	p-value
Physician Age in Years			0.008
< 30	21 (30%)	18 (24%)	
30-40	32 (46%)	39 (51%)	
40-50	0 (0%)	9 (12%)	
50-60	2 (2.9%)	3 (3.9%)	
>60	14 (20%)	7 (9.2%)	
Years in Practice			0.004
<5	37 (54%)	28 (37%)	
5-15	15 (22%)	29 (38%)	

15-25	1 (1.4%)	9 (12%)	
>25	16 (23%)	10 (13%)	
Educational Qualification			0.5
MBBS	33 (48%)	41 (54%)	
Post MBBS Specialisation	36 (52%)	35 (46%)	
Physician Gender			0.2
Female	29 (42%)	40 (53%)	
Male	40 (58%)	36 (47%)	
Facility Type			<0.001
Public	16 (23%)	43 (57%)	
Private	53 (77%)	33 (43%)	
Daily OPD Patients			0.007
<20	15 (22%)	15 (20%)	
20-50	36 (52%)	21 (28%)	
51-100	8 (12%)	19 (25%)	
>100	10 (14%)	21 (28%)	

Binary regression: Age of physician and newer generations/brands not discouraging generic medicine

Characteristic	OR	95% CI	p-value
Physician Age in Years			
< 30	—	—	
30-40	1.42	0.65, 3.14	0.4
40-50	49,635,614	0.00, NA	>0.9
50-60	1.75	0.26, 14.4	0.6
>60	0.58	0.19, 1.73	0.3

Binary regression: Years in practice and newer generations/brands not discouraging generic medicine

Characteristic	OR	95% CI	p-value
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Years in Practice			
<5	—	—	
5-15	2.55	1.17, 5.75	0.021
15-25	11.9	2.06, 226	0.022
>25	0.83	0.32, 2.07	0.7

Binary regression: Facility type and newer generations/brands not discouraging generic medicine

Characteristic	OR	95% CI	p-value
Facility Type			
Public	—	—	
Private	0.23	0.11, 0.47	<0.001

Binary regression: Daily OPD Patients and newer generations/brands not discouraging generic medicine

Characteristic	OR	95% CI	p-value
Daily OPD Patients			
<20	—	—	
20-50	0.58	0.24, 1.43	0.2
51-100	2.38	0.81, 7.34	0.12
>100	2.10	0.75, 6.08	0.2

Multivariable regression: Years in practice, facility type, Daily OPD patients and newer generations/brands not discouraging generic medicine

Characteristic	OR	95% CI	p-value
Years in Practice			
<5	—	—	
5-15	2.13	0.91, 5.08	0.082
15-25	10.1	1.60, 200	0.038
>25	0.86	0.31, 2.30	0.8
Facility Type			

Public	—	—	
Private	0.26	0.10, 0.67	0.006
Daily OPD Patients			
<20	—	—	
20-50	0.47	0.18, 1.24	0.13
51-100	0.95	0.25, 3.62	>0.9
>100	0.59	0.15, 2.23	0.4

Participant detail and Concerns about AMR as a Public Health issue

Characteristic	concerned, N = 131	not concerned, N = 14	p-value
Physician Age in Years			0.2
< 30	38 (29%)	1 (7.1%)	
30-40	62 (47%)	9 (64%)	
40-50	7 (5.3%)	2 (14%)	
50-60	5 (3.8%)	0 (0%)	
>60	19 (15%)	2 (14%)	
Years in Practice			0.11
<5	62 (47%)	3 (21%)	
5-15	36 (27%)	8 (57%)	
15-25	9 (6.9%)	1 (7.1%)	
>25	24 (18%)	2 (14%)	
Educational Qualification			0.6
MBBS	66 (50%)	8 (57%)	
Post MBBS Specialisation	65 (50%)	6 (43%)	
Physician Gender			0.060
Female	59 (45%)	10 (71%)	
Male	72 (55%)	4 (29%)	

Facility Type			0.5
Public	52 (40%)	7 (50%)	
Private	79 (60%)	7 (50%)	
Daily OPD Patients			0.4
<20	26 (20%)	4 (29%)	
20-50	54 (41%)	3 (21%)	
51-100	23 (18%)	4 (29%)	
>100	28 (21%)	3 (21%)	

Participant detail and Considering chance of AMR while prescribing

Characteristic	Considered, N = 132	Not considered, N = 13	p-value
Physician Age in Years			0.2
< 30	38 (29%)	1 (7.7%)	
30-40	62 (47%)	9 (69%)	
40-50	7 (5.3%)	2 (15%)	
50-60	5 (3.8%)	0 (0%)	
>60	20 (15%)	1 (7.7%)	
Years in Practice			0.4
<5	60 (45%)	5 (38%)	
5-15	39 (30%)	5 (38%)	
15-25	8 (6.1%)	2 (15%)	
>25	25 (19%)	1 (7.7%)	
Educational Qualification			0.7
MBBS	68 (52%)	6 (46%)	
Post MBBS Specialisation	64 (48%)	7 (54%)	
Physician Gender			0.3

Female	61 (46%)	8 (62%)	
Male	71 (54%)	5 (38%)	
Facility Type			0.7
Public	53 (40%)	6 (46%)	
Private	79 (60%)	7 (54%)	
Daily OPD Patients			0.005
<20	27 (20%)	3 (23%)	
20-50	54 (41%)	3 (23%)	
51-100	20 (15%)	7 (54%)	
>100	31 (23%)	0 (0%)	

Binary regression: Daily OPD patients seen by physician and not considering chance of AMR in prescription practice

Characteristic	OR	95% CI	p-value
Daily OPD Patients			
<20	—	—	
20-50	0.50	0.09, 2.86	0.4
51-100	3.15	0.77, 16.0	0.13
>100	0.00		>0.9

ANNEXURE – IX

ENABLERS AND BARRIERS TO RATIONAL ANTIBIOTIC PRESCRIBING IN PRIMARY HEALTHCARE FACILITIES IN THIRUVANANTHAPURAM DISTRICT.

ORIGINALITY REPORT

2%

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