ANTIMCIROBIALS USE, RESISTANCE and CONTAINMENT BASELINE SURVEY SYNTHESES OF FINDINGS

Drug Administration and Control Authority of Ethiopia in collaboration with Management Sciences for Health, Strengthening Pharmaceutical Systems (MSH/SPS)

August 2009, Addis Ababa

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Abbreviations and acronyms

AB	Antibacterial
ABR	Antibacterial resistance
AIDS	Acquired immunodeficiency syndrome
AM	Antimicrobial
AMR	Antimicrobial resistance
APUA	Alliance for prudent use of antimicrobials
ARTI	Acute respiratory tract infection
BCC	Behavior change communication
BSc	Bachelor of science
CE	Continuing education
CME	Continuing medical education
CNE	Continuing nursing education
C&S	Culture and sensitivity
DACA	Drug administration and control authority
DTC	Drug and therapeutic committee
EDL	Essential drugs list
FMoH	Federal ministry of health
G-	Gram negative
G+	Gram positive
GP	General Practitioner
HC	Health centre
HF	Health facility

Hos	Hospital
HO	Health officer
HPA	Health Professional association
ICC	Infection control committees
IEC	Information, education and communication
IP	Infection prevention
IPC	Infection prevention and control
KABP	Knowledge, attitude, behavior, and practice
NDL	National drugs list
LIDE	List of drugs for Ethiopia
MDR	Multi-drug resistance
MDRO	Multi-drug resistant organism
MIC	Minimum inhibitory concentration
MO	Microorganism
MSH	Management Science for Health
OPD	Outpatient department
RDU	Rational drug use
RF	Rheumatic fever
RHB	Regional health bureau
RHD	Rheumatic heart disease
RPM	Rational Pharmaceutical Management
RPMA	Regional pharmaceutical management associate
SPS	Strengthening Pharmaceutical Systems
SPSS	Statistical package for social scientists
STG	Standard treatment guideline
TB	Tuberculosis
TOR	Term of reference
WHA	World health assembly

EXECUTIVE SUMMARY

Introduction

Emergence of antimicrobial resistance is a result of the use, overuse and misuse of antibiotics both in humans and animals. In Ethiopia, there are indications on the misuse of antibiotics by health care providers', unskilled practitioners, and drug consumers. These coupled with rapid spread of resistant bacteria and inadequate surveillance contributed to the problem.

Bacterial infections are the major causes of death in Ethiopia. Studies on antibacterial resistance and on bacterial infections have shown that emerging antibacterial resistance threatens the management of bacterial infections; however, the prevention and containment has received far too little attention. The consequences of these states of affairs include increased mortality, morbidity, costs of treatment, and loss of production in animals.

Since the causes and problems of resistance are complex, the interventions calls for multifaceted approaches with full involvement of all stakeholders who are involved in the use of antimicrobials, resistance prevention and containment efforts.

The objective of this baseline survey is to have base line information on antimicrobials use and resistance so that will be able to monitor use and resistance over time, evaluate the impacts of interventions and scale up effective ones to promote antibacterials rational use.

Methods

Literature reviews of research and health professionals' course contents were assessed on AMR in Ethiopia. Five years census and accessibility data on culture and sensitivity records were also reviewed. Cross-sectional samples of hospitals and health centers across all the regions of the country were asked on the prevention and containment practices of antimicrobials. Sampled prescribers and dispensers in these health facilities were provided self-administered questionnaires. Structured interviews were also conducted on antibacterials prescribed and dispensed clients exiting the services. Systematic samples of discharged surgical and medical inpatient records were reviewed in each of the sampled health facilities.

Main findings

A total of 52, 682 culture records were reviewed of which 18, 466 have growth and sensitivity tests done and were included in this analysis. The reviews have shown us that antimicrobial resistance ranged from 0% to 100%. Results with 0% or 100% resistant level or too close to 0% or 100% are associated with limited samples and could be attributed to this shortcoming. However, most bacteria that are commonly involved in causing infections to human beings (and animals) show considerable degree of resistance to commonly used first line antibacterials over the five year period.

The following bacteria have particularly shown increment in the level of resistance over the five years period all of them are in Ethiopian calendar. Coagulase negative staphylococcus, Streptococcus pneumoniae, Salmonella species, and Staphylococcus aureus. Coagulase negative staphylococcus showed an increase in resistance to Erythromycin from 21.6% in 1996 to 51.9% in 2000; Streptococcus pneumoniae showed an increase in resistance to Erythromycin from 0% in 1996 to 18.2% in 2000. This organism also showed an increase in resistance to chloramphenicol from 0% in 1996 to 17.4 % in 2000. Salmonella species showed an increase in resistance to Cotrimoxazole from 33.3% in 1997 to 62.5% in 2000. The other microorganism that showed increase in the level of resistance is Staphylococcus aureus. Resistance to Methicillin increased from 87.5% in 1996 to 100% in 2000. Some organisms have also shown high level of multiple drugs resistance. Shigella dysentriae for example showed an over all resistance of 31.8% to Chloramphenicol, 43.8% to cotrimoxazole, 81% to Ampicillin, and 89.5% to Tetracycline over the five years period.

There are only few studies that have been done on important human bacterial infections which were conducted at referral or regional hospitals, and research institutes only. There has never been a comprehensive assessment so far at least in this country. Very little has been done with regard to prevention and control of bacterial infections.

Review of the course contents of health professionals training institutes have shown that some areas of improvement which includes much more emphasis to local context, adherence to treatment and guidelines, and on the prevention and containment of AMR.

Average availability of key antibacterials was 73%. Availability of guidelines and drugs lists in health facilities were, 61% and 62%, respectively. Health education was given in 27% HFs but there were no education on proper antibacterials use to clients in the health facilities. Although there is some awareness on nosocomial infections, little is done by facilities to prevent and contain it and low in the availability and utilization for C & S tests. On top of these availability of key antibacterials and IP materials was less than the ideal standard of 100%.

Although the range of providers is wide; knowledge of antibacterials was serious in certain categories compounded with the often empirical practice in treatment. Moreover, there are reports that certain micro-organisms did not respond to first line drugs and also reports on the existence of nosocomial infections however, there is low utilization of diagnostic facilities, low awareness on the factors contributing to AMR and containment strategies.

It is encouraging to see clients who knew the routes (90%), doses (73%) and frequency of administration (83%) of selected antibacterials. They also knew that antibacterials are not used to certain illnesses like watery diarrhea (40%) and common cold (36%) and also the importance of continuing treatment even if they feel better (93.9%). However, it was revealed that self-medication was common (29%). The sources of information for self-medication were from pharmacy (92.2%), leftover antibacterials at home (15.5%) friends and relatives (13.2%).

Antibacterial prophylaxis was used in majority (75.9%) of surgical procedures including clean surgical procedures (more than half) and in more doses and duration than is scientifically recommended. A number of wide spectrum and combination antibacterials and those with a potential resistance and toxicity problems were also used. These indicate the need for appropriate intervention.

There is wide spread antibacterials prescribing in medical inpatients. More than 70% have had one or more antibacterials prescribed in a range of 1-6 (and with an average of 1.5). Average duration of stay in hospital for medical inpatients with antibacterials prescribed were 7.4 days. Rational prescribing as measured by the extent of adherence to the standard treatment guideline (STG) 2004 is strikingly low. For example, the drug(s) chosen and the duration of therapy comply with the STG for pneumonia in 19.6%, meningitis in 33.3%, typhoid in 24.7%, urinary tract infection in 22.6%, and relapsing fever 14.8% only.

Reviews of outpatient prescription paper records have shown that 23.0% of health facilities did not use a standard prescription paper. The date of prescription, diagnosis, prescriber's name and qualification were absent in 15.8%, 97.4%, 75.0% and 87.0% of patient encounters, respectively. Analysis of these prescriptions showed that one or more antibacterial medicines were prescribed in 61.7% of patient encounters and the average number of antibacterials 1.1 per encounter.

Conclusion and recommendations

In conclusion from record reviews it is evident that there is high level of antibacterials resistance in this country. The factors contributing to this level are many which include knowledge and practices of providers and knowledge and perceptions of clients. These were shown from providers and clients responses and health services records reviews. The specific gaps identified and recommendations are highlighted. Factors that have contributed are many and varied. It is also true that there will not be only one intervention that addresses all. Therefore, in order to prevent further development and spread of, and contain resistance there is a need to form synergy among all the stakeholders.

CONTENTS

INTRODUCTION & BACKGROUND

1. INTRODUCTION AND BACKGROUND

1.1. Introduction

Emergence of antimicrobial resistance is a consequence of the use, overuse and misuse of antibiotics both in humans and animals. In Ethiopia, the misuse of antibiotics by health care providers', unskilled practitioners, and drug consumers, coupled with rapid spread of resistant bacteria and inadequate surveillance contributed to the problem. In recent years, since the rate at which resistance occurs has outpaced the development of new drug replacements, it has become necessary to use the currently available agents, optimally and appropriately. Antimicrobial resistance is one of the crucial challenges that public health is facing today. Some of the major consequences of resistance include increased mortality, morbidity, costs of treatment, and loss of production in animals.

Bacterial infections are the major causes of death especially in developing countries like Ethiopia. There are some indications on the resistance of the common photogenic bacteria to first line antibacterials. Emerging antibacterial resistance threatens to undermine the management of bacterial infections. Consequences of antibacterial resistance may be felt harder in resource-poor settings, since second-line antibacterial drugs for resistant bacteria may be unavailable or unaffordable. Some studies in Ethiopia on antibacterial resistance and on some human bacterial infections have been done, but the issue has received far too little attention.

The interventions to these multifaceted problems of resistance calls for the involvement of all stakeholders who are involved in the use of antimicrobials, resistance prevention and containment efforts. These includes but not limited to clients, health care providers, health care facilities, policy makers and regulatory authority, health professionals training and research institutions, the pharmaceutical industry, and health care professionals and consumers association.

To further the aim of containing AMR and promote the rational use of antimicrobials, Drug Administration and Control Authority of Ethiopia (DACA) with the technical and financial support of Strengthening Pharmaceutical Systems of Management Sciences for Health (SPS/MSH) of Ethiopia in collaboration with the National Advisory Committee for Antimicrobial Resistance Prevention and Containment decided to do a baseline survey to have bench mark to monitor antimicrobials drug use, resistance and promote their rational drug use to preserve the existing drugs in use. These call for the involvement of all stakeholders to prevent and contain antimicrobials resistance.

This baseline assessment tried to show the gaps and specific recommended areas of interventions. These will help to guide the stakeholders the main areas of emphasis during the national plan of action preparation.

1.2. Background

Infectious diseases are the most frequent causes of morbidity and mortality in developing countries. The use of antimicrobials has contributed to the dramatic fall in morbidity from communicable and infectious diseases over the last 50 years globally (1). However, the increase in resistance of microorganisms to commonly used antimicrobials has been a big challenge. Antimicrobial resistance costs lives, money, and threatens to undermine the effectiveness of health delivery system. It has recently been described as a threat to global stability and national security. A few studies have suggested that resistant clones can be replaced by susceptible ones; in general, however, resistance is slow to reverse or is irreversible (2).

In developing countries, relatively unrestricted availability and consumption have led to disproportionately higher incidence of inappropriate use of antimicrobials and greater levels of resistance compared to developed countries (3,4). Experiences from other countries have shown that antimicrobials prescribed in 35 to 60% of clinical encounters although appropriate in less than 20% (5). Analysis of inappropriate prescribing by physicians and other prescribers in 12 developing countries also highlighted an unnecessarily high proportion (25 to 75%) of patients receiving antibiotics during clinical visits (6) and for Ethiopia it was on the higher end of the above figures (7,8). These indicated the continued need to curb the inappropriate use of antimicrobial drugs and to identify effective interventions to improve drug use.

Moreover, participants in drug use decisions include not only health care providers (prescribers and dispensers) and consumers. Consumers discontinue taking prescribed drugs, engage in self-medication of drugs and the use of drugs left over from previous treatments. For antimicrobials, these characteristics of inappropriate drug use cause particular concern for the development of resistance. There is a strong correlation between inappropriate prescribing and inappropriate self-medication (9).

The World Health Assembly (WHA) in its fifty-first Resolution of 1998 on Emerging and other communicable diseases: antimicrobials resistance urged Member States to develop measures to encourage appropriate and cost-effective use of antimicrobials to prohibit the dispensing of antimicrobials without the prescription of a qualified health care professional, to improve practices to prevent the spread of infection and thereby the spread of resistant pathogens, to strengthen legislation to prevent the manufacture, sale and distribution of counterfeit antimicrobials and the sale of antimicrobials on the informal market, and to reduce the use of antimicrobials in food-animal production. Countries were also encouraged to develop sustainable systems to detect resistant pathogens, to monitor volumes and patterns of use of antimicrobials and the impact of control measures. Guidelines and strategy documents were also developed and put into use by WH and MSH (1,2, 10, 11).

Since early 2006, DACA and RPM Plus/MSH have collaborated in several AMR activities to bring the problem of AMR to the forefront. Initial steps in the establishment of the AMR advocacy and containment coalition resulted in a first stakeholders' meeting in Addis Ababa in March 2, 2006. Following this meeting a National Antimicrobials Resistance Prevention and Containment Committee was established comprising different institutions and professionals associations. One of the TORs of the committee was to organize the National AMR Call-to-Action meeting, which was held at Adama in November 2006 for a wider audience of central, regional and facility-level providers and professionals. Training course on scaling up AMR/ DTC/RDU activities for regional health bureau (RHB) pharmacists, DACA representatives and RPM Plus was conducted in Addis Ababa in February 2007.

The latest intervention in this series was an awareness and advocacy activity that DACA and RPM Plus undertook with technical support from Links Media and APUA in Addis Ababa in October 2007. These series of back-to-back training activities included: Training of Trainers on "How to Train Journalists and on How to Communicate the Risk of AMR"; Journalists Training on "How to Communicate the Risk of AMR"; Spokespersons Training on "How to communicate the issues related to AMR"; and Advocacy Training Workshop on "How to Mobilize Resources for Supporting AMR Containment Strategies". This culminated in a Networking Event "Advocacy in Action to contain AMR in Ethiopia"

After these events and activities, the current National Advocacy Committee was re-established in September 2007 and named as "National Advisory Committee for Antimicrobial Resistance Prevention and Containment".

1.3. Scope

The scope of the baselines survey (Fig.1) includes:

- Researches done in the area of common human bacterial infections, bacterial resistance pattern to commonly used antibacterials, prescribing, dispensing and consumption, Pattern on human antibacterial and microbial infections and microorganisms resistance in Livestock through published literature reviews

- Course contents review of health professionals training program in human and animal health.

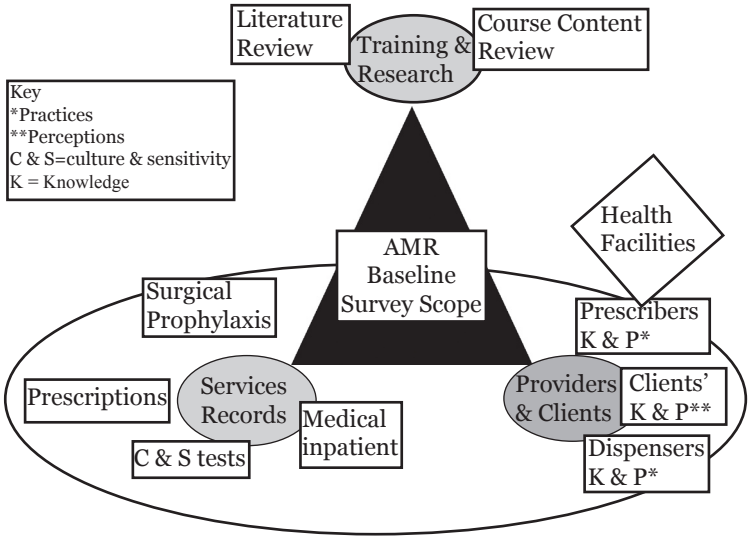
- Providers (prescribers and dispensers) antibacterials knowledge and use practices assessment through self-administered questionnaires

- Knowledge and perceptions of clients on antibacterials through interview questionnaire.

- Records reviews on antibacterials prescribing practices in inpatient (surgical prophylaxis and general medical) and prescriptions; and

- Culture and sensitivity records review from medical diagnostic laboratories

Figure 1: Scope of work of the Antimicrobials Use, Resistance and Containment Baseline Survey



PROBLEM STATEMENT

2. PROBLEM STATEMENT

There is high morbidity and mortality worldwide as a result of infectious and communicable diseases such as acute respiratory diseases, malaria, diarrheal diseases, AIDS, and tuberculosis (TB), which affect the majority of people in the developing world. Added to these major killers is the significant global burden of hospital-acquired (nosocomial) infections usually caused by resistant pathogens. Resistance of pathogens to first-line drugs ranges from 0 to almost 100% while in some instances resistance to second- and third line agents is seriously compromising treatment outcome (1).

A substantial proportion of the total drug budget in many countries is dedicated to antimicrobials and they are often the largest single group of drugs purchased. In Ethiopia, antimicrobials share the highest monetary value (12, 13) of the other category of drugs and representative of the above fact. However, their widespread availability and use have had several both positive and negative implications, one of this is the inappropriate use by health care providers and consumers and the increase of drug resistance.

As the major causes of morbidity and mortality in Ethiopia are infectious and communicable diseases (14), use of antimicrobial drugs is inevitable. Antimicrobial use is the key driver of resistance but their misuse, use for self-limiting and minor infections, overuse by providers and consumers, misuse due to lack of access to appropriate treatment and under use due to lack of money to follow a standard treatment course by the community will further accelerates the development of resistance of microorganism to commonly used antimicrobials. Effective prevention and

containment of infectious and communicable diseases in Ethiopia may be compromised by the increase in resistance to the antimicrobial drugs.

In Ethiopia, the over all consumption of antimicrobials at national level was around 44% in 1993 and 48% in 1996, the highest of all pharmacotheraputic category (12, 13). In addition the prescribing of antimicrobials were 58% in 1995 and 2003 surveys (7, 8) which was higher than the recommended. More over, use of Antimicrobials as first line for pneumonia, 54% and use in ARTIs was 61% compared to the ideal standard of 100% and 0%, respectively (8). On the other hand, self-medication to antimicrobials is still more often for self-limiting illnesses (15) and antimicrobials were the most commonly known by drug consumer as well (16) which pose as an opportunity and a challenge. All these indicative assessments have shown there is not only higher consumption but also irrational use. Over consumption of antimicrobials by providers coupled with self-medication are pre-requites to an increase in the resistance of micro-organisms to commonly used drugs. Little is known about the use of antimicrobials in the private health facilities, and veterinary practice where the situation may be much worse, in which sizable portion of the population is utilizing that source for antimicrobials.

From the above and other preliminary assessments that the prevalence of antimicrobial use, misuse and resistance is high and on the rise. It is high time to identify the gap in knowledge and practice of providers and the community and measure the level of resistance of micro-organisms to commonly used antimicrobials. As the problem is compounded by many factors, it will require or necessitate multifaceted interventions to curb the current states of affairs, to remind us pre-antibiotic era. Attempts to improve antibiotic use should aim to identify the key factors that promote overuse, such as those described above, and develop interventions that address the identified factors. There is relatively little known about effective strategies to improve the use of antimicrobials in the developing country context. The above general drug studies were not comprehensive to cover areas of antimicrobial use and resistance and smaller in scale to represent the nation as a whole.

Therefore, it would be timely and appropriate to have a comprehensive baseline assessment on antimicrobial use and resistance the recommendations of which will contribute in identifying strategies, prioritizing interventions, and formulation of policies and evaluate subsequent impact for further scale up and use.

OBJECTIVES

3. OBJECTIVES

General:

The general objective of this survey is to have base line information on antimicrobials use and resistance so that will be able to monitor the antimicrobials use and resistance over time, evaluate the impacts of interventions and scale up effective ones to promote their rational use. Specifically:

Specific:

- To review literature and course contents of health care providers of human and animal health on rational antimicrobial use in Ethiopia,
- To assess the knowledge and practices of providers, and knowledge and perceptions of patients or clients on antimicrobial use.
- To assess health facilities preparedness and practices on infection prevention, availability and functionality of the different committees on infection control and antimicrobial use.
- To review retrospective records of antimicrobials drugs use at out-patient and In-patient levels.
- To review retrospective records of culture and sensitivity data available in the medical diagnostic laboratories of the country.

METHODS

4. METHODS

4.1. Design and survey area

This Antimicrobials Use, Resistance and Containment Baseline Survey is done in the cross-section sampled health facilities, hospitals and health centers across all regions of Ethiopia, records i.e. surgical prophylaxis, medical antibacterials prescribing and outpatient prescriptions; providers i.e. prescribers and dispensers; clients and culture and sensitivity records from accessible medical diagnostic laboratory health facilities.

In the course content courses review the following training programs were included: Medicine (MD), Pharmacy (BPharm), Pharmacy (Diploma), Health Officers (HO), Nursing (BSc), Nursing (Diploma), Dentistry (BDS), Medical laboratory technology (BSc), Medical laboratory technology (Diploma), Veterinary Medicine (DVM), and Veterinary Medicine (Diploma). Regarding literature review all accessible published electronic and print sources were reviewed.

4.2. Samples, sampling and data sources (Table 1)

Nearly equal proportion of hospitals and health centers were included in the sampled health facilities. Sampling was a combination of probability and non-probability sampling methods as mentioned above. Systematic samples of records i.e. surgical prophylaxis, medical antibacterials prescribing and outpatient prescriptions; census or random samples of providers i.e. prescribers and dispensers; all clients who were prescribed and dispensed antibacterials on the

day of the survey were drawn from these health facilities. Five years census of culture and sensitivity records from accessible medical diagnostic laboratory health facilities.

The courses contents of the above programs which included: Pharmacology, Microbiology, Pharmacotherapeutics, Pharmacy practice and veterinary medicine courses were reviewed with regard to antimicrobial use, resistance, prevention and containment.

Literature reviews on common human and livestock bacterial infections; bacterial resistance pattern to commonly used antibacterial drugs in humans; and reviews on prescribing, dispensing and consumption pattern of antibacterials in humans and animals was done in Ethiopia.

4.3. Instruments, data collection, analysis and report writing (Summary Table 1)

Structured interview questionnaires and semi-structured observations were used for health facilities. Self-administered questioners for prescribers and dispensers and structured interview questionnaire for clients were used. Structured formats were used to collect data from health services records.

Data collection instruments for health facilities, providers, clients and records reviews were drafted by the leader and commented by the experts who were involved in the report writing of this baseline survey. It was also commented by data collectors and pretested. The collected data were entered and analyzed in either EPI Info version 6, MS Excel, or SPSS version 11. The reports were generated by the team as shown in Table 1.

Checklists were prepared before review of the course contents of the training programs. The checklist included among other things content, time allocation, emphasis to local context, common infectious diseases, emphasis to antibacterials included in the list of drug for Ethiopia, nosocomial infections, antibacterials resistance mechanisms and prevention and containment strategies, etc.

Draft reports were written by the team as shown in table 1. These drafts were used to write this Antimicrobials Use, Resistance and Containment Baseline Survey Syntheses of Findings report.

4.4. Baseline Survey Tools

1. Literature Review on Infectious Diseases, Antimicrobial Use, Resistance and Containment: Part I: Humans and Part II: Veterinary Practice

2. Bacteriological Culture and Sensitivity Record Review

3. Course Contents On Antimicrobial Use, Resistance And Containment of Health Training Programs Review In Ethiopia

4. Antibacterials Use, Resistance and Containment Practices In Health Facilities In Ethiopia

5. Antibacterials Prescribing Practices Assessment In Ethiopia

6. Antibacterials Dispensing Practices Assessment In Ethiopia

7. Clients Knowledge and Perception of Antibacterials In Health Facilities In Ethiopia

8. Antibacterials Surgical Prophylaxis Prescribing Practices For Hospitalized Clients In Ethiopia

9. Antibacterials Prescribing Practices For Medical Hospitalized Clients In Ethiopia

10. Prescriptions Records Review In Health Facilities In Ethiopia

4.5. Orientation on the scope and training on the data collection instruments

- The draft and final scopes of work of the AMR baseline survey was shared among DACA and SPS-E, RHB staff more than once using different opportunities.

- The agreed scope of work and draft tools were presented discussed and agreed with the institutionally represented experts.

- Trained data collectors.

4.6. Data collection time and team

Data collection time

Data on Antimcirobials Use, Resistance and Containment using the different tools was collected from 19th August to 19th September 2008.

Data collection Team

The plan for each data collection team was to have one from either DACA or RHB pharmacists or two staff (preferably DTC members) from each health facility for record reviews and one RPMA in each tem. But there were some variations in the composition of the teams in some circumstances.

4.7. Procedures before, during and after the assessment

Before the data collection dates:

- Letter of cooperation from DACA faxed to all RHBs and health facilities
- Additional letter of cooperation was also written to HFs by RHBs) Fax
- Prior communication with DTC members by the respective team leader
- On the eve of the data collection date the team leader met with HF staff (DTC members) and orient about the data collection tools

During the data collection dates

- Early morning appear at the office of the head of the facility, provide copy of the letter of cooperation in case if it was not received, clarify the purpose of the assessment as stated on the first page of each tool and get permission.

- All data collection in the HF was completed within 2 days per HF (HC<Hos)

- Team leader will organize all the data collection process in his catchments area and also effect payment for HF staff on the spot who were involved in the data collection.

- After finishing the data collection, thanked and promise to provide feedback and will be invited to participate at a dissemination workshop when the report is ready

- Each team Member and Team leader was expected to write summary report on each facility and tool and submit along with the tools. The intention was also the summary data to be used as input to the HF for improving services.

After the data collection

- Each team was expected to check the accuracy of the data before leaving the health facility

- The team to make a summary and discuss with staff or DTC members

- The team leader to write a general field summary report.

4.8. Summary of samples, instruments and data sources, entry and report writing

Instruments were drafted by the teal leader of the baseline survey, RDU Team leader at SPS/MSH. Each of these draft tools were shared with DACA and SPS staff; discussed one by one with all experts and data collectors and agreed during the orientation and training sessions. The details on samples, instruments, data sources and report writing are presented below.

Table 1: Samples size, instruments, data source and Report writing

Tool	Samples	Instrument	Data source	Data collectors	Data entry and analysis software	Report writing
1	73 HFs (37 Hos and 36 HCs)	Interview questionnaire and semi-structured observations	Head of HF interview and observation in selected sites of HF	RPM or DACA pharmacist	EPI 6 and SPSS 11	Melaku Wubegzer Tenaw
2	448 prescribers of all categories (Nurses, HOs, GPs, Specialists)	Self-administered questionnaire	Responses in questionnaires	Questionnaire distributed by DTC members (if there is any in HF) or by data collection team	EPI 6 and SPSS 11	Melaku Wubegzer Tenaw
3	227 professionals of all categories who practice dispensing (Pharmacy technicians, Pharmacists) in the above sampled HFs	Self-administered questionnaire	Responses in questionnaires	Questionnaire distributed by DTC members (if there is any in HF) or by data collection team	EPI 6 and SPSS 11	Melaku Wubegzer Tenaw
4	1761 clients who were prescribed and dispensed antibacterial in the above sampled HFs	Structured exit interview	Responses in questionnaires	DACA, RHB or RPMA pharmacists	EPI 6 and SPSS 11	Eyasu Wubegzer Tenaw

Tool	Samples	Instrument	Data source	Data collectors	Data entry and analysis software	Report writing
5	Review of 100 records per HF surgical procedures records in the above sampled HFs	Format to be filled in	Surgical procedures in medical records of inpatients	HF DTC member (if any, GPs or senior nurses and a pharmacist)	MS Excel and SPSS 11	Bircuk Tenaw
6	Review of 100 records per HF general medical inpatient records in the above sampled HFs	Format to be filled in	General medical records of inpatients	HF DTC member (if any, GPs or senior nurses and a pharmacist)	MS Excel and SPSS 11	Tenaw
7	Review of 100 prescriptions per HF at outpatient department in the above sampled HFs	Format to be filled in	Outpatient prescriptions	HF DTC secretary or pharmacist	MS Excel and SPSS 11	Bircuk Tenaw
8	Reviews of all the last 5 years of Culture and Sensitivity records of diagnostic HFs records	Format to copy in	C & S records of diagnostic HFs	The respective providers in the diagnostic HFs or other providers who have this experiences	MS Excel and SPSS 11	Endris Tenaw
9	Course Content on AMR of health care training institutions for human and veterinary practice	Semi-structured checklist	Courses offered in the training institutions	Academics from the respective faculties	Electronic and Print Search	Alemu Eyasu Solomon Yilkal Tenaw
10	Literature review on antibacterials use, resistance and containment	Key words on AMR	Internet and print sources of literature including Theses	Academics from the respective e faculties	Electronic and Print Search	Alemu Eyasu Solomon Yilkal Tenaw

4.9. Limitations of the baseline survey

- Retrospective culture and sensitivity records reviews were analyzed without questioning the methods and quality assurance issues involved in the diagnostic health facilities. As communicated from EHNRI, the commonly employed method is Kirby- Bauer technique.

- This survey focused only on public hospitals and health centers, and also providers and records from these. It did not include private health facilities.

- This survey focused only on antibacterials did not include all antimicrobials such as antiviral, antifungal, anti-protozoal drugs.

4.10. Operational definitions

- Included all public health facilities (HOs and HCs); excluded other level and private health facilities.

- Animal use of antimicrobials is limited to literature review and course content review of health providers.

- For the purpose of this survey, antimicrobials are equated as antibacterials.

- In this survey only antibacterials excluding anti-TB are considered in the analysis.

- Duration of hospital stay was defined as the number of days from admission to discharge or death

- STG, is standard treatment guideline 2004 prepared by DACA by each level of care.

4.11. Client inclusion and Exclusion criteria

Client inclusion:

- Adults who gave verbal consent
- Healthy looking
- Clients with prescribed and dispensed antibacterials in the health facility.

Client exclusion:

- Sick looking
- Children and their care takers
- Clients not prescribed and/or dispensed with antibacterials.
- Clients with other drugs

Records:

- All general medical admitted and discharged adult client records for 2000 E.C. were included except specialized care
- Client records still on treatment are excluded

4.12. Ethical considerations

This is a health services improvement work commissioned by DACA. Support letter from DACA and RHBs were sent to surveyed health facilities. Verbal informed consent was obtained from human participants. Moreover, the response was anonymous; no individual/person or institution reference is made in the specific findings of the survey.

FINDINGS AND IMPLICATIONS

5. FINDINGS and IMPLICATIONS

5.1. Bacteriological Culture and Sensitivity Records Reviews

Tenaw Andualem and Wondewossen Assefa

Microbial resistance to antimicrobial agents seriously undermines efforts to control infectious diseases. Ethiopia, like other developing countries, is affected by high infectious diseases burden. Emergence and spread of antimicrobial resistance further poses hindrance on the fight to alleviate this burden.

Data regarding the level of antimicrobial resistance in this country is not available or is rudimentary because of the absence of proper surveillance system. Antimicrobial resistance data was collected by reviewing all culture and sensitivity test records medical diagnostic laboratory health facilities throughout the country over five years period.

A total of 52,682 culture records were reviewed of which 18,466 have growth and sensitivity tests done and are included in this analysis. Antimicrobial resistance ranges from 0% to 100% for certain bacteria and antibacterials. Some times results with 0% or 100% resistance level or too close to 0% or 100% are associated with limited samples and could be attributed to this shortcoming, the details are shown below. However, most bacteria that are commonly involved in causing infections to human beings (and animals) show considerable degree of resistance to commonly used affordable and available antibacterial drugs. The five year (1996 to 2000 E.C. (2004/5 to 2007/8 G.C.)) retrospective data have shown that there are increases in microorganisms' resistance to first line antibacterials.

There is an overall high level of resistance of microorganisms to antibacterials. The following bacteria have particularly shown increment in the level of resistance over the five years period: Coagulase negative staphylococcus, Streptococcus pneumoniae, Salmonella species, and Staphylococcus aureus. Coagulase negative staphylococcus showed an increase in resistance to Erythromycin from 21.6% in 1996 to 51.9% in 2000 Streptococcus pneumoniae showed an increase in resistance to Erythromycin from 0% in 1996 to 18.2% in 2000. This organism also showed an increase in resistance to chloramphenicol from 0% in 1996 to 17.4 % in 2000. Salmonella species showed an increase in resistance to Cotrimoxazole from 33.3% in 1997 to 62.5% in 2000. The other microorganism that showed an increase in the level of resistance is Staphylococcus aureus. Resistance to Methicillin increased from 87.5% in 1996 to 100% in 2000 (Table 3).

Some organisms show high level of resistance to most of the common antibacterial (multiple drug resistance). Shigella dysentriae for example showed an over all resistance of 31.8% to Chloramphenicol, 43.8% to cotrimoxazole, 81% to Ampicillin, and 89.5% to Tetracycline over the five years period.

The resistance level shown for MRSA and VRSA is very high and alarming. MRSA seems to increase over the five years time from 87.5% to 100.0% from the sample of 102. Since this is a retrospective data we cannot assure the quality of the methods employed for it, however, it was said that they use Kirby- Bauer technique.

Gaps: high level of resistance and multi-drug resistance of the most common pathogenic bacteria against the first line and some times second line drugs. These encounter increased over time.

Conclusion and Recommendations

Even though prospective antimicrobial resistance surveillance is needed the available retrospective data suggests that the level of resistance to first line antibacterial is beyond the expected threshold level calling all stakeholders for immediate coordinated action to contain the emergence and spread of antimicrobial resistance.

Figure 1: Resistance of Staphylococcus aureus to antibacterials over five years time

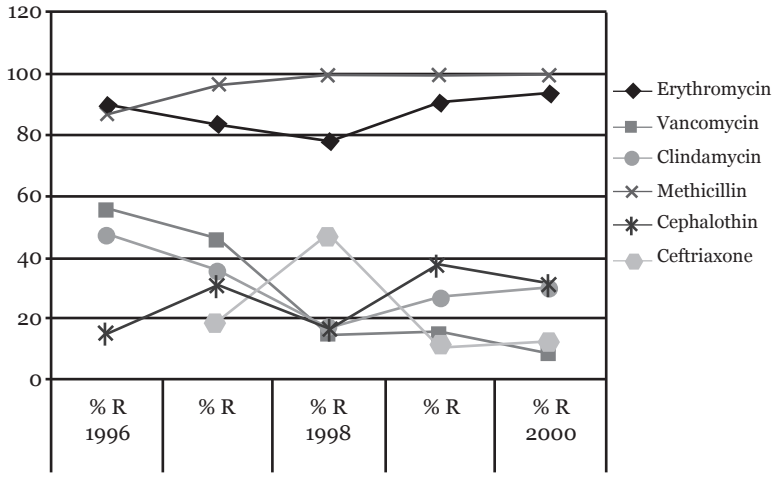


Figure 2: Resistance of Escherichia coli to antibacterials over five years time

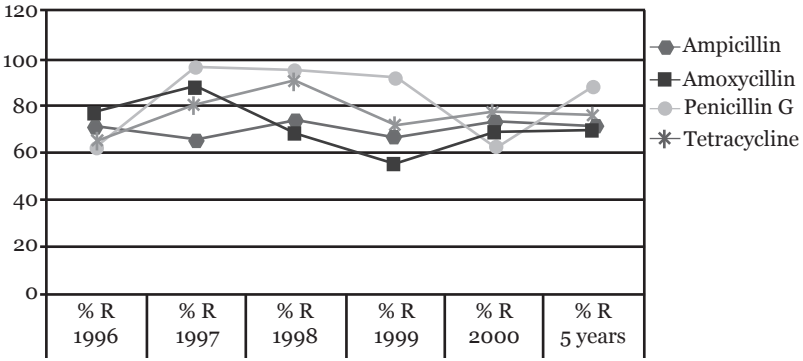


Figure 2: Resistance of Neisseria gohorrhoae to antibacterials over five years time

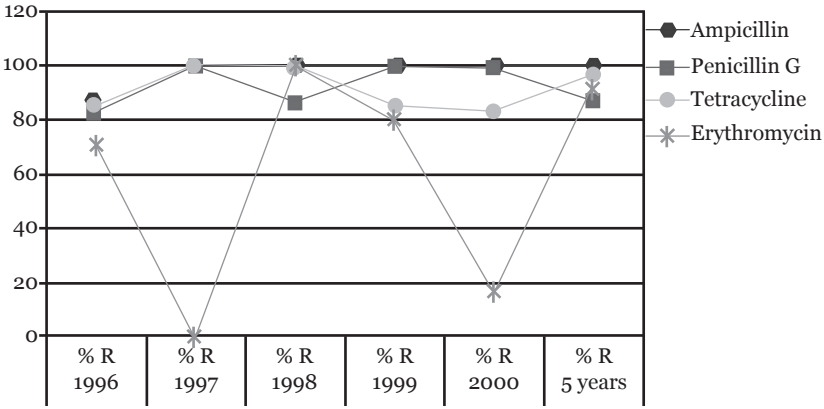


Table 3: Trends in microorganisms' resistance to antibacterials by year
(R= resistance and T= total which includes sensitive, intermediate and resistance test results). Blank cells in each table show there were no data during those times. All are in Ethiopian calendar.

Table: Acinetobacter baumannii

	Antibacterial	1996		1997		1998		1999		2000		5 years	
		% R	T	% R	T	% R	T	% R	T	% R	T	% R	T
1	Ampicillin									100	5	100	5
2	Tetracycline							62.5	8	100	7	80	15

Table: Citrobacter spp.

	Antibacterial	1996		1997		1998		1999		2000		5 years	
		% R	T	% R	T	% R	T	% R	T	% R	T	% R	T
1	Ampicillin	50	2	88.9	9	66.7	6			87.9	105	83.2	173
2	Methicillin							100	3	100	1	100	4
3	Cephalothin	50	2	66.7	9	40	5	100	2	69.7	55	67.1	74
4	Ceftriaxon					50	4	27.8	18	18.5	108	20.8	130

Table: Coagulase negative Staphylococcus.

	Antibacterial	1996		1997		1998		1999		2000		5 years	
		% R	T	% R	T	% R	T	% R	T	% R	T	% R	T
1	Ampicillin	32.1	81	42.1	19	100	3	57.1	7	29.9	134	33.2	244
2	Amoxycillin							22	59	29.2	106	26.7	165
3	Penicillin G	61	77	37.5	16	100	2	60.7	56	60.7	178	59.9	329
4	Gentamicin	15.6	77	23.1	13	25	4	19	58	16.8	191	17.2	343
5	Erythromycin	21.6	74	28.6	21	33.3	3	51.7	60	51.9	183	43.7	341

Table: Escherichia coli

	Antibacterial	1996		1997		1998		1999		2000		5 years	
		% R	T	% R	T	% R	T	% R	T	% R	T	% R	T
1	Ampicillin	72.5	505	65.7	922	73.5	582	68.2	802	74.3	592	70.1	3399
2	Amoxycillin	77.4	115	88.4	509	68.2	471	55.9	642	69.5	394	70.1	2131
3	Penicillin G	62.5	16	97.2	108	95.2	84	92.8	83	62.7		88.3	350
4	Tetracycline	65.3	415	81.2	874	90.3	113	71.2	771	76.7	631	75.4	2799

Table: Enterococcus spp.

	Antibacterial	1996		1997		1998		1999		2000		5 years	
		% R	T	% R	T	% R	T	% R	T	% R	T	% R	T
1	Ampicillin	0	1	100	1	60	5	42.9	7	27.1	23	35.1	37
2	Strreptomycin	100	1			100	5			100	1	100	7
3	Vancomycin					0	5	25	16	0	25	8.7	46

Table 6: Haemophylus influenzae

	Antibacterial	1996		1997		1998		1999		2000		5 years	
		% R	T	% R	T	% R	T	% R	T	% R	T	% R	T
1	Ampicillin									0	3	0	3
2	Amoxycillin									0	2	0	2
3	Cotrimoxasole									66.7	3	66.7	3
4	Amoxycillin + Clavulanic acid									0	1	0	1

Table: Klebsiella spp

	Antibacterial	1996		1997		1998		1999		2000		5 years	
		% R	T	% R	T	% R	T	% R	T	% R	T	% R	T
1	Ampicillin	88	175	97.3	37	83.3	246	70.5	200	79.3	58	81.3	715
2	Tetracycline	54.7	172	87	23	87.5	16	57.9	202	55.5	65	58.8	477
3	Cotrimoxasole	43.1	174	44	25	57.6	491	46.4	207	53.8	65	52	962

Table: Neisseria gohorrhoae

	Antibacterial	1996		1997		1998		1999		2000		5 years	
		% R	T	% R	T	% R	T	% R	T	% R	T	% R	T
1	Ampicillin	87.5	8			100	633	100	7	100	6	99.8	654
2	Penicillin G	83.3	6	100	1	86.4	140	100	5	100	5	87.3	157
3	Tetracycline	85.7	7	100	1	100	116	85.7	7	83.3	6	97.8	137
4	Erythromycin	71.4	7	0	1	100	104	80	5	16.7	6	92.7	123

Table: Pseudomonas aeruginosa

	Antibacterial	1996		1997		1998		1999		2000		5 years	
		% R	T	% R	T	% R	T	% R	T	% R	T	% R	T
1	Ampicillin	94.7	38	100	8	100	4	100	7	100	18	100	25
2	Tetracycline	100	32	87.5	8	100	4	85.7	7	100	19	96.2	26
3	Chloramphenicol	84.6	39	100	8	100	4	100	7	87.5	16	91.3	23

Table: Streptococcus pneumoniae

	Antibacterial	1996		1997		1998		1999		2000		5 years	
		% R	T	% R	T	% R	T	% R	T	% R	T	% R	T
1	Ampicillin							0	1	0	19	0	20
2	Erythromycin	0	5	0	4	6.7	15	8	25	18.2	22	12.8	47
3	Chloramphenicol	0	4	0	2	0	3	4.2	24	17.4	23	10.6	52
4	Tetracycline	0	5	50	4			21.7	23	14.3	21	18.2	44
5	Cotrimoxasole	0	1							0	1	0	1

Table: Salmonella spp.

	Antibacterial	1996		1997		1998		1999		2000		5 years	
		% R	T	% R	T	% R	T	% R	T	% R	T	% R	T
1	Ampicillin			75	12	88.4	43	79.3	29	87.5	16	84	100
2	Gentamicin			20	10	14.3	35	20.8	24	20	15	17.9	84
3	Erythromycin	100	1	50	2	75	12	26.1	69			80	20
4	Chloramphenicol	100	1	33.3	9	22	41	30	30	41.7	12	29	93
5	Cotrimoxasole			33.3	6	66.7	15	57.1	21	62.5	16	58.6	58
6	Cephalothin	100	1	55.6	9	70.6	34	90.9	11	80	10	73.8	65
7	Ceftriaxone					0	1	0	2	28.6	14	23.5	17

Table: Shigella dysentriae

	Antibacterial	1996		1997		1998		1999		2000		5 years	
		% R	T	% R	T	% R	T	% R	T	% R	T	% R	T
1	Ampicillin	100	1	75	4	87.5	8	80	5	66.7	3	81	20
2	Streptomycin	100	1	0	1					100	1	66.7	3
3	Chloramphenicol	0	1	75	4	33.3	9	20	5	0	3	31.8	22
4	Tetracycline	100	1	100	1	88.9	9	100	5	66.7	3	89.5	19
5	Cotrimoxasole			75	4	16.7	6	66.7	3	33.3	3	43.8	16
6	Doxycycline			100	2							100	2

Table: Shigella flexneri

	Antibacterial	1996		1997		1998		1999		2000		5 years	
		% R	T	% R	T	% R	T	% R	T	% R	T	% R	T
1	Streptomycin	100	1									100	1
2	Cotrimoxzole	100	1									100	1
3	Tetracycline	50	2									50	2

Table: Staphylococcus aureus

	Antibacterial	1996		1997		1998		1999		2000		5 years	
		% R	T	% R	T	% R	T	% R	T	% R	T	% R	T
1	Erythromycin	89.5	191	83.8	142	77.9	68	90.9	44	94	50	86.9	495
2	Vancomycin	55.5	47	45.9	37	16	225	16	194	10	219	18.3	722
3	Clindamycin	47.9	73	36.8	125	18.2	335	27.8	198	30.8	65	27.3	796
4	Methicillin	87.5	48	97.1	35	100	7	100	6	100	6	93.1	102
5	Cephalothin	16.0	393	31.4	258	17.1	245	37.8	119	30.9	149	23.8	1164
6	Ceftriaxone			18.9	175	47.1	51	10.6	66	12.1	231	19.9	583

5.2. Literature Review on Infectious Diseases, Antimicrobial Use, Resistance and Containment

Alemu Tekewe, Eyasu Mekonnen, Solomon G. Selassie, Tenaw Andualem, and Yilkal Asfaw

Human

Few studies have been done on important human bacterial infections and were done at referral or regional hospitals, Health centers, research institutes. The studies focused on Staphylococci and the Enterobacteriaceae group bacteria (E. coli, Shigella, Salmonella, Klbesiella, Pseudomonas, Proteus). Many of the studies indicated that there are increasing trends of antibiotic resistance. Multiple antibiotic resistant organisms are commonly identified. Penicillin resistant S. pneumoniae, staphylococci, and gonococci are increasing. There are high rates of resistance to beta-lactam antibiotics. The studies indicated that there are increasing trends of antibiotic resistance. Multiple antibiotic resistant organisms are commonly identified.

Veterinary

There are more than two hundred diseases that are transmitted from animals to man and vice-versa. Humans acquire infection from animals during husbandry, health service delivery, leather industries, food processing plants, vaccine production laboratories, and from zoos during consumption of foods of animal origin (milk and meat from cattle, sheep, goats, poultry, pigs, and fish), and from eggs. The public health importance of infectious animal diseases

is, hence, relevant issue in antimicrobial use and resistance. In zoonoses susceptible and resistant micro organisms are transmitted from animals to man and from man to animals. Knowledge of first types and next resistant microbial infections is required before formulating corrective actions against antimicrobial resistance.

Most of the studies in veterinary medicine were conducted on microbes that cause mastitis (udder infection), trypanosomes, and Salmonella. A high degree of resistance of mastitis to antimicrobials agents has developed in Ethiopia. S. aureus, the most common cause of mastitis in animals, has developed 100% resistance against bacitracin, nitrofurantoin, and sulfamethoxaxole. Many Salmonella serotypes have developed resistance to routinely prescribed antimicrobial drugs in infectious animal diseases. The emergence and prevalence of Salmonella with multiple resistance in food animals can seriously compromise public health. Cattle, sheep, goats, camels, and chicken serve as a potential source of pathogenic and multi drug resistant Salmonella to humans or other animals. Campylobacter jejuni, Staphylococcus aureus, S. epidermidis, S. agalactiae, Bacillus cereus, E. coli, Klebsiella pneumoniae, Enterobacter aerogenes and other bacterial species showed resistance ranging from 17.3 to 100% were isolated from ready to eat meat and milk. This is particularly important for animals that are used by humans as foods and diseases that can be transmitted from animals to humans and vise versa.

The emergence and prevalence of Salmonella with multiple resistances in food animals can seriously compromise public health. Many bacterial species isolated from ready to eat meat and milk showed resistance. Antimicrobials over prescribed for therapeutic, prophylactic uses and as feed additives. As a result, high level of antibiotic residues were detected in meat and milk in studies conducted in Addis Ababa, Debre Zeit, and Nazareth major cities in the country. Some parasitic disease like trypanosomiasis have also shown resistance to antimicrobials.

All antimicrobials have withdrawal times. Withdrawal time of a given drug is the interval between intake and total elimination from the body. Antimicrobials pass into every tissue and fluids of the body before excreted. High levels of antibiotic residues were detected in milk and meat destined for human consumption. In 70.58 % of farms in Debre Zeit and 83.33% of the farms in Nazareth the oxytetracycline level; similarly, in 20.58% of the farms found in Debre Zeit and 16.16% of the farms found in Nazareth, the penicillin G level were above the maximum residue limit established by WTO/FAO/CAC. In another study conducted on poultry meat 27.4% of chicken contained oxytetracycline.

The gaps identified:

- The studies did not address the most common infections and do not represent the whole country. They covered very limited localities and were done mainly in teaching hospitals in bigger cities like Addis Ababa, Gondar and Jimma.
- There are no studies on prescribing, dispensing and consumption practices of antibacterial drugs in animals in Ethiopia.
- Very little has been done with regard to prevention and control of bacterial infections.

Conclusions and recommendations

The studies done on AMR were very few, limited to some areas and no national studies were done. The studies focused on limited diseases and antimicrobials mostly done for academic purposes.

The emergence and prevalence of Salmonella with multiple resistance in food animals can seriously compromise public health. There are no adequate surveys on prescribing, dispensing and consumption practices in humans in Ethiopia. There are adequate assessments on prescribing, dispensing and consumption practices of antimicrobials in animals in Ethiopia.

Concerning Microorganisms resistance pattern to commonly used antimicrobials in animals, there should be strict adherence to proper dosage and frequency of administration, treatment of mastitis should strictly be preceded by antimicrobial sensitivity test, produce a regulation supported by a proclamation to avoid or limit indiscriminate use of antimicrobial use in veterinary medicine and public health. Additional studies on AMR should be conducted on other important microbes affecting animal health like infection of the respiratory tract, gastrointestinal tract, and reproductive tract which includes Mycoplasma, Pasteurella, Eimeria and other Gram negative bacteria. The government should devise appropriate strategies to control and prevent the many prevalent microbial infections in livestock in most regions in Ethiopia, owing to their immense economic and public health importance

The implications of these findings: to the community/ clients include

- Increased in morbidity, mortality and treatment costs.
- There will be excessive loads to health facilities and health providers too.
- Policy makers should design mechanisms to implement effective policies to halt the ever increasing AMR.
- Training institutions should revise their curriculum and should give due attention to the threatening and emerging AMR.
- Pharmaceutical companies should be sensitized by these alarming situations and be prudent in marketing and use of the antimicrobials and also think of newer ones.

Veterinary

- The sensitivity of routine meat inspection was found to be poor; hence, detailed meat inspection in abattoirs need to be practiced and performed strictly to reduce the risk of transmission of tuberculosis from animals to humans
- One source of Salmonella infection is evisceration's knife; hence, sterilization of slaughtering knife at 82oc is essential
- A part of Salmonella and Campylobacter detected in raw meat comes from the intestine via slaughtering personnel's hand; hence, good hygienic practices in the abattoir will reduce human infection and contamination of the environment
- Many types of serotypes of bacteria causing infection of the respiratory tract are identified; the dominant serotypes need to be included in vaccine production.

- In view of the many types and amount of antimicrobials being used to combat the prevalent microbial infections in animals, proper use of the drugs is necessary to prevent antimicrobial resistance
- M. bovis is isolated from samples taken from humans. This suggests transmission of the agent from animals to humans; hence, it is required to apply detailed meat inspection, boiling of milk, cooking meat, and public education to create awareness

5.3. Courses Contents on Antimicrobial Use, Resistance and Containment of Health Training Programs Review

Alemu Tekewe, Eyasu Mekonnen, Solomon G. Selassie, Tenaw Andualem, and Yilkal Asfaw

Course contents of Pharmacology in different health training programs

Strengths:

- Topics like mechanisms of antibacterial actions, indications and adverse reactions of the antibacterial drugs are reasonably addressed in the course contents of most programs

- Case studies are included in the course contents of pharmacology for medicine and pharmacy

Deficiencies:

- Most training programs do not have adequate coverage for the topics on antibacterial use and resistance
- Mechanisms of resistance emergence to antibacterial drugs are not given due attention in some programs like nursing and veterinary medicine
- Almost all programs don't give emphasis on the local context on AMR
- Chemoprophylaxis and adherence to antibacterial therapy are not addressed in almost all programs
- Nothing is mentioned about rational prescribing/ dispensing, standard treatment guidelines, principles of the choice of drugs and essential drug concept except in

Medicine and Pharmacy.

- No cases are discussed in other programs except in medicine and pharmacy
- Strategies in the prevention and containment of AMR not addressed Course contents of microbiology in different health training programs

Strength:

- Topics on clinically relevant bacteria, culture, sensitivity tests, sterilization and disinfection are included in the course contents

Deficiencies:

- They don't give emphasis to the local context
- Less time allotted both for theory and practice
- Topics on Bacterial genetics, key bacterial resistance, nosocomial infections and antibiotics resistance mechanisms are not addressed
- There are no detailed course contents for veterinary medicine
- No strategies on how to combat the AMR are addressed in the course contents
- Topics on Antibacterials resistance mechanisms and key bacterial resistance are not included Course contents of pharmacotherapeutics for pharmacy program

Strengths:

- The course content has adequate coverage for the pharmacotherapy of common infectious diseases and surgical antibiotic prophylaxis
- Topics like rational dispensing/prescribing, STGs and case studies on antibacterial use and resistance are addressed

Deficiency:

- Drug of antibacterial choice concept is not addressed

Course contents of pharmacy practice for pharmacy program

Strength:

- General patient counseling on the use of medicines in is covered

Deficiency:

- No time is allotted to discuss issues related to antibacterial use and resistance
- Emphasis is not given to discuss patient counseling and adherence to treatment on use of antibacterial drugs and antibacterial resistance

5. Contents of veterinary courses

Strengths:

- Epidemiology is dealt in all medicine, preventive medicine and infectious diseases courses except General Medicine
- Prescription of antimicrobials, control and chemoprophylaxis are practiced in all courses dealing with medicine, preventive medicine and infectious diseases.
- Zoonotic infections are addressed in most courses in the area of veterinary public health
- Contamination of livestock food products (milk, meat, eggs, poultry, and fish) with antimicrobials is included

Deficiencies:

- Reasonable time is not given for antimicrobial use and resistance and the subject is not detailed enough
- No time is allotted for theory as well as practicum for all the courses except for Veterinary Public Health I which includes introduction and meat hygiene
- Common resistant microbial infections and nosocomial infections are not dealt in all medicine, preventive medicine and infectious diseases courses
- Epidemiology is incorporated only in Veterinary Public health II (zoonoses and milk hygiene) not incorporated in the other courses of Veterinary Public Health I, Meat Hygiene and Food Quality & Safety
- n the course Meat Hygiene offered at Alagae antimicrobial residue is not addressed

Implications for interventions to health training institutes

- Every course outline should have detailed topics together with time allotment
- Reasonable time should be allotted for topics on antibacterial use and resistance
- Emphasis should be given to antibacterials included in the list of drugs for Ethiopia (LIDE)
- Topics like chemoprophylxis and adherence should be introduced in all programs
- Mechanisms of resistance emergence should be given attention by all programs
- Strategies to prevent and contain antibacterials against resistance should be included in all course contents

- All programs which train prescribers should incorporate principles of rational prescribing in the pharmacology courses, and those which train pharmacy professionals should do the same for rational dispensing
- Formulation of STGs, principles of drug of choice and essential drug concept should be included in the pharmacology course contents of all programs
- The course on clinical pharmacology for medical students and pharmacotherapy for pharmacy students should be strengthened
- Cases on infectious diseases should be well addressed in medical and pharmacy programs
- Antimicrobial clearance should be included in the pharmacology course contents for veterinary medicine
- Principles of the choice of antibacterials should be given emphasis in all programs
- Teaching should be evidence-based and should give focus to disease of public health importance and emphasis to the local context.
- The consequences of antibacterial resistance (morbidity, mortality, cost, loss of production in animals, etc.) should be included in all programs
- Topics like patient counseling on antibacterial use and resistance should be included with reasonable time allotment
- Reasonable time, relative to other topics, should be given to nosocomial infections and common resistant microbial infections in all veterinary medical and preventive medicine courses
- Reasonable time should be given to antimicrobial residue and contamination of milk, meat (cattle, sheep, goats, camel, poultry, fish), and eggs in all veterinary public health courses.

5.4. Antibacterials Use, Resistance and Containment Practices In Health Facilities

Melaku Samuel, Tenaw Andualem and Wubegzer Mekonnen

Antibacterial use, resistance and containment practices in HFs

There was no prescription restriction for prescribers to prescribe certain type of antibacterials which might lead to irrational prescription of drugs, particularly on prescribing some potent and reserved antibacterials.

Fifty six percent and fifty seven percent of the HFs have DTCs and IPCs, respectively. However, only less than a quarter (22.6%) of the DTCs discussed about AMR. More over, facilities did not consider AMR as a priority problem for them.

Availabilities of list of drugs and treatment guidelines of all sorts were much below the expected 100%. About 62% of the survey facilities have national drug list (NDL) and facilities with list of drugs by service level and essential drug list (EDL) were below fifty percent. On the other hand, about 61% of health facilities have claimed that they had one or more STGs. When assessed by types of treatment guidelines, ARV guideline (86%) was the most frequently available guideline whereas ARTI guideline (43%) was the least available one. Likewise, IP guideline was available in 60% of health facilities. All the seventy three survey health facilities (100%) responded that no staff in their health facilities received in-service training on antibacterial resistance (AMR) over the past one year, excluding DTC

training. Only 27% of health facilities have conducted health education on drug use and resistance for clients at OPD level over the past one year and only one health facility reported to conduct health education on drug resistance (AMR). Though only 8% of health facilities (all hospitals) reported to have currently functional culture and sensitivity laboratory facilities, nearly 25% of facilities have claimed that they were aware of occurrence of nosocomial infections in their respective hospitals. However, no health facility has reviewed antibacterials sensitivity pattern and took an action based on the review findings during the past one year.

Average availability of key antibacterials was 73% (79% for hospitals and 67% for health centers with significant mean variation ($P<0.05$). The average stock out duration of key antibacterials for hospitals was 41.4 and for health centers 57.1 days over a year time more serious in lower HFs which might have contribute to irrational use of ABs particularly when coupled with lower level of training.

Health facility environment is mostly considered as the main breeding site for drug resistant microorganisms, including MDRs. For successful IP program implementation in any health facility, sustainable administrative supports and regular IP equipments and materials supply is mandatory. Percentage of facilities with functional steam sterilizer and autoclave were 64% and 88%, respectively. The availability of other key IP materials or supplies was also lower than the ideal value (100%) for example 87.7% functional autoclave, 64.1% functional autoclave, 96.9% chlorine solution. Assessment on average stock out duration of IP supplies has revealed that the routine supplies such as aprons (41 days), alcohol (40 days) and savlon (35 days) had high stock out duration as compared to other supplies. It was

observed that nearly 50% of facilities had no documented instructions for dilution of antiseptics and disinfectants, with wrong dilution techniques (41%) and use of wrong concentration of antiseptics or disinfectants (31%) were highly prevalent in survey facilities. All survey health facilities were without any type of education materials on rational use of antimicrobials/antibacterials (posters/ leaflets/ pamphlets/video or tape cassettes).

Conclusion

- The survey revealed that there was no prescription and dispensing restrictions.
- The availability of STGs and drug lists was less than the expected 100%.
- There were no continuing education programs focused on antibacterial use and resistance.
- Only small numbers of health facilities have conducted to educate the public (clients) on rational use of drugs but not on antibacterials use and resistance.
- Only very few health facilities (6 hospitals) had lab facilities capable to provide culture and sensitivity tests and no health facilities have conducted AMR surveillance in the past one year.
- Nearly one fourth of health facilities claimed the existence of nosocomial infection in their health facilities over the past one year of time.
- Shortage and stock out of first line key antibacterials was evident which might have contributed in the use of non-first line antibacterial which contributes to the emergency of resistance of bacterial strains. Average availability was 73% and average stock out duration was 49 days for key antibacterials below the expected 100%.

Recommendations

National and/or regional policy makers and regulatory bodies:

- Develop policies or regulations on the use of antibacterials by level of prescribers and dispensing staff within a health facility and enforcement
- Strengthen/introduce surveillance on MOs resistance surveillance system such as C & S records review and information dissemination mechanisms. Establish standard methods and quality assurance techniques and systems.
- Improve availability of key antibacterials and IP supplies

Woreda health offices and health facilities:

- Monitor the availability and functionality of DTCs and IPCs
- Ensure the availability and monitor utilizations of treatment guidelines, drugs lists, IP guidelines and other related materials
- Organize and conduct need-based in-service/on-job trainings for prescribers and dispensing staffs
- Improve availability and reliability of laboratory facilities, particularly C & S tests
- Encourage surveillance particularly on targeted MOs and Antibacterials
- Implement and evaluate strategies to improve the availability of safe, cost-effective antibacterials and IP supplies
- DTCs and IPC to coordinate health facilities public (clients) education on hygiene, infection prevention, antibacterial use and drug resistance. Improve availability of updated IEC/BCC materials on the same.

Health sector partners, international organizations and HPAs:

- Identify health facilities lacking or inadequately functioning DTCs and IPCs and provide technical supports to enhance the outputs in the prevention and on drug resistance containment practices
- Provide/coordinate evidence-based continuing education programs for health care providers
- Support targeted applied research on antibacterial use and resistance
- Facilitate dissemination of data and information on antibacterial use and resistance patterns
- Provide technical and material support for health facility IP program

Pharmaceutical industries/companies/importers/ distributors:

- Pharmaceutical companies and/or importers/ distributors have responsibilities to capitalize on the government efforts of AMR containment practices through ethical practices that is control over promotional messages that that would promote rational use, and control over the activities of medical representatives

5.5. Antibacterials Prescribing Practices Assessment

Melaku Samuel, Tenaw Andualem and Wubegzer Mekonnen

Prescribers antibacterial knowledge and prescribing practices

The three most commonly prescribed antibacterial groups were pencillins (commonly prescribed by 87% of participants), sulfonamides/co-trimoxazole (63%) and quinolones (59%), whereas; glycopeptides (never prescribed by 72% of respondents), macrolides (21%) and pencillins + beta lactamase inhibitors (13%) were the three less commonly prescribed groups.

Most prescribers were familiar with (have good knowledge on) pencillin (99%) and aminoglycoside (99%) groups of antibacterials while glycopeptides (53%) by prescribers. Knowledge of prescribers was better on the indications of pencillins (92%), quinolones (89%) and cephalosporins (84%) while only few (20%) of them knowledgeable with the appropriate indications of glycopeptides. Prescribers working at health center level (70.7%), particularly clinical nurse prescribers (31.9%) and prescribers with longer than five years years of service (76.3%) had inadequate knowledge on appropriate indications of some key antibacterial drugs.

Assessment on knowledge of empirical treatment of infections caused by Gram-positive bacteria has shown that most of the respondents (82%) would use appropriately penicillin as a first line and alternative drugs of choices (cephalosporins, macrolides, sulfonamides) by 63% of prescribers. For infections caused by Gram-negative

bacteria appropriate first line (aminoglycosides) was chosen by 71% of prescribers and alternative antibacterials (cephalosporins, quinolones) by 63% of prescribers.

Nearly half of the respondents (49%) are used to prescribe one or more antibacterial drugs for prophylaxis. Similarly, larger number of specialists and GPs use antibacterials for prophylactic treatments than other prescribers. Injectable penicillins (36%) were the most frequently prescribed drugs for prophylaxis followed by ampicillin (14%) and amoxicillin (13%). Rheumatic heart disease/Rheumatic fever (RHD/RF), traumatic wound, major surgical procedures (before, during or after procedures) and tooth extractions were the clinical conditions for which antibacterials most commonly prescribed for prophylaxes.

Prescribers antibacterial resistance containment practices
Almost all prescribers (>99%) used clinical symptoms and signs as one of diagnostic methods to justify the prescription of antibacterials. Despite poor functioning laboratory facilities in most health care units, about 80% of respondents have reported to use bacteriological tests for diagnostic purposes. Only 19% of respondents reported to use antibiogram/MIC.

About 61% of prescribers have never or rarely refer their clients (or send specimens) for culture and sensitivity test even if it is seriously needed. Only very few (2%) of prescribers have requested the test on routine-basis. Unavailability or shortage of resources was the most frequently mentioned reason by the prescribers for never or rarely requesting C & S test.

Large proportion (83%) of prescribers didn't know bacterial resistance patterns to commonly prescribed antibacterials in their health facilities.

Prescribers reported their experiences that Salmonella typi was the most common bacteria to be resistant to the first (such as Chloramphenicol) and second line drugs followed by Gonococcus and S.aureus bacteria.

Twenty one percent of prescribers have agreed that for some clients or clinical conditions they used to prescribe antibacterials which are not the first drug of choice. The main reasons for not prescribing antibacterial of choices were unavailability or shortage of the drugs and/or in some cases unaffordable to their clients.

According to the respondents of the survey, the common factors contributing for the emergence of antibacterial drugs resistance were lack or poor antibacterial treatment adherence by clients (89%), lack of continuing education and updated information for prescribers (89%) and lack of diagnostic laboratory facilities (88%).

Prescribers sources of information and training on antibacterial and drug resistance

About 83% of drug prescribers have reported to use one or more of the STGs as a reference material. However, the utilization rate varies with the various types of STGs, sexual transmitted infections treatment guideline used by most prescribers (91%) followed by diarrheal diseases management guideline (69%). When considered by level of health facilities, nearly 91% of the hospital prescribers and 71% of the health center prescribers have used at least one STGs showing significant percentage variation ($P<0.05$).

On the other hand, textbooks were the main sources of information on antibacterial drugs and drug resistance (87%), continuing education (27%) followed by scientific journals (37%) for prescribers involved in this survey.

Prescribers patient load, self-medication and client counseling

About 86% of prescribers used to elicit antibacterial drugs use history of their clients (both prescribed and self-medication) before prescribing antibacterial drugs. Eighty-nine percent of respondents have witnessed that they were commonly or sometimes encounter clients who used one or more antibacterials without prescription. Amoxicillin, ampicillin, metronidazole and co-trimoxazole were the antibacterial drugs most commonly used for self-medication. Respiratory tract infections (symptoms) and diarrheal diseases (abdominal symptoms) were the most common causes of illness for self-medications.

About 89% of prescribers used to counsel their clients on prescribed antibacterials and importance of drug adherence. Shortages of time or patient overload were mentioned by most respondents as the main reason for not adequately counseling their clients during the clinical visits. About 3/4th of prescribers said that the clients visiting the heath facilities demand to prescribe certain types of antibacterial drugs.

Recommendation

- Provide need-based in-service training /CME for prescribers on diagnosis and management of common infections, antimicrobial use, and containment of ABR/ AMR. In general, capacity building trainings should give priority for primary health care facilities and frontline prescribers.
- Ensure the availability and monitor appropriate utilizations of treatment guidelines, national and essential drug lists, IP guidelines and other related materials at all health facility levels.
- Improve availability and access to journals on health/ pharmaceuticals, news papers/magazines and internet websites which disseminate current information on antibacterials and best practices/successes in resistance containments
- Improve availability, reliability and cost-effectiveness of laboratory facilities, particularly culture and sensitivity tests
- Information dissemination on antibacterial resistance surveillance
- Increase access to essential key antibacterials
- Design and implement client education programs focused on antibacterial/ antimicrobial use and drug resistance containment
- Conduct further assessment on prescribers-client interaction (counseling), self-medication and client pressure for antibacterial prescription.

5.6. Antibacterials Dispensing Practices Assessment

Melaku Samuel,Tenaw Andualem and Wubegzer Mekonnen

Dispensers antibacterial knowledge and dispensing practices

Drug dispensers were more familiar and have better knowledge of penicillin (98%), tetracycline (98%) and sulfonamides (co-trimoxazole) (96%). Knowledge of appropriate indications of five key antibacterials were quinolones (92%), pencillin (83%) and microlides (80%).

Benzanthin penicillins (18%) and doxcycline (18%) were the most frequently dispensed antibacterials for prophylaxis followed by ampicillin (15%) and ciprofloxacin (13%). Some of the prophylactic treatments were found to be irrational, such as using antibacterials for self-limiting clinical conditions (acute diarrheal diseases, clean minor traumatic wounds). Major surgical procedures (before, during or after procedures), meningitis, rheumatic heart disease/rheumatic fever (RHD/RF) and relapsing fever were the clinical conditions for which antibacterials most commonly dispensed for prophylaxes.

Client counseling practices of drug dispensers

About 12% of staff practicing drug dispensing reported that they used to spend less than one minute per client and about 88% have claimed that they used to spend one or more minutes per client. On the other hand, larger proportion (94%) of respondents has agreed that the actual time needed per client is 1-3 minutes or more than 3 minutes.

The three main reasons mentioned by the respondents for spending less than one minute were patient overload (75%), poor working environment (41%) and lack of incentives for staff (35%).

More than 3/4th of drug dispensing staffs have claimed that they always or sometimes elicit clients' history of previous use of antibacterials before dispensing any antibacterials. Nearly three-fourth of respondents has reported that they commonly or occasionally encounter clients who used one or more antibacterials without prescription. Amoxicillin, ampcillin, co-trimoxazole and tetracycline were the most commonly self-medicated antibacterials. Respiratory tract and gastrointestinal (GI) symptoms (complaints) and fresh (infected) wounds of the skin were the commonest reasons for self-medications.

Only 40% of drug dispensing personnel have used written materials or other adherence aids to enhance appropriate use of antibacterial drugs by the clients and encourage treatment adherence. Writing information on envelope is the common adherence aid implemented by most of the respondents. Only one-third of the drug dispensers have practiced feedback mechanisms to ensure patients' adherence and better outcome to dispensed antibacterial treatment, and cross-check questions and asking the client to repeat what was said were the commonest feedback mechanisms used by the respondents.

Dispensers antibacterial Resistance Containment Practices

About 20% of the respondents said no need to do the test whereas about 48% said sometimes (occasionally) and 32% said always necessary (routinely) to conduct the test before using antibacterial drugs. The main reasons reported by the respondents for not recommending to use C & S test on routine/regular-basis include unavailability of laboratory facilities in or near by health facilities, unreliable/delayed results, not cost-effective test and not affordable by most clients.

Sixty four percent of drug dispensers have said that in some cases they used to dispense antibacterials which were not they believe are not first drug of choice. The main reasons were unavailability or shortage of drugs, side effects and unaffordable to their clients. Another interesting finding was that they dispensed the drug just because it was prescribed by clinicians though they thought not the first line of choice. Only 17% of respondents had awareness on pattern of bacterial resistance to commonly prescribed antibacterials in their respective health facilities.

According to the respondents report, Salmonella typhi was the most common bacteria claimed to be resistant to the first (such as Chloramphenicol) and second line drugs followed by Gonococcus and S.aureus. The three commonest factors believed to be contributing for the emergency of antibacterial drugs resistance are lack or poor antibacterial treatment adherence by clients (91%), lack of continuing education and updated information for drug dispensers and prescribers (91%), and empirical treatment of infectious diseases (84%).

Dispensers Sources of Information on Antibacterial Use and Resistance

Only 22% of drug dispensers have received up-to-date information related to antibacterials and resistance during the past one year. Standard treatment guidelines, drug lists and formularies (84.5%) and textbooks (74.2%) were the main sources of information whereas, scientific conferences, journals and continuing education were not significant information sources for most respondents on antibacterial drugs and drug resistance for most respondents.

Recommendations

- Provide need-based in-service training to drug dispensers on antimicrobial use, and containment of ABR/AMR.
- Develop and disseminate antibacterial use for prophylaxis guidelines
- Ensure the availability and monitor appropriate utilizations of national and essential drug lists, formularies and other related materials.
- Improve availability and access to health/pharmaceutical journals, news papers/magazines and internet websites which disseminate current information on antibacterials and best practices/successes in resistance containments
- Improve infrastructure of drug dispensaries at public health facilities
- Design and implement locally feasible and effective adherence aids
- Identify and implement strategies to encourage and sustain health care team work that is communication (information exchange practices) between drug dispensers and prescribers for the benefit of the patient.

- Design and implement client education programs focused on antibacterial/ antimicrobial use and drug resistance containment
- Improve availability, reliability and cost-effectiveness of laboratory facilities, particularly culture and sensitivity tests
- Establish antibacterial resistance surveillance information dissemination mechanisms and systems.
- Improve access to essential key antibacterials

5.7. Clients (Patients) Knowledge and Perception of Antibacterials

Eyasu Mekonnen, Tenaw Andualem, and Wubegzer Mekonnen

A total of 1733 clients who were prescribed and dispensed antibacterials were interviewed before exit from the health facility, 52.9% male, and 69.1% literate and in the age group of 18-29 years (46.7%) and 30-64 years (45.7%).

The most common reasons for clients to discontinue the prescribed and dispensed antibacterials were improvement of conditions, 79.2%; severe side effects of the antibacaterial(s), 40.6%; doubt on drug's efficacy, 30.0%; and forgetfulness (16.0%). These tell us on areas to emphasize during adherence counseling. Most clients knew that discontinuing medication would result in recurrence of the illness (89.9%) and lead to resistance emergence (53.1%). Clients also associate resistance emergence with incomplete treatment with antibacterials (85.0%); use of inadequate amount of antibacterials (56.8%); and use of the wrong antibacterials (53.4%). The baseline survey highlighted the following strengths and weaknesses.

Strengths:

- Most clients know the routes (90%) and frequencies of administration (83%) and the doses (73%) of the dispensed antibacterial drugs
- Significant number of clients were satisfied with the counseling services given by both prescribers (79.4%) and dispensers (89.9%)
- Most clients knew the names (52.5% to 77.5%) of at least three most commonly used antibacterial drugs
- Some clients believe that antibiotics are not used for watery diarrhea (40.2%) and common cold (36.3%)
- Most clients would like to continue taking all the prescribed medicines (93.9%) though some would like to discontinue taking when conditions improved
- Most clients knew that discontinuing medication would result in recurrence of the illness (89.9%) and in emergence of resistance (53.1%)
- Some clients know that resistance has already emerged to some commonly used antibacterial drugs, such as tetracycline (21.0%), ampicillin (20.0%), amoxicillin (12.1%), cotrimoxazole (9.0%) and chloramphenicol (5.2%).
- Some clients can differentiate between analgesics and antibacterial drugs (37.0%)

Deficiencies:

- Most dispensed antibacterials were not properly labeled only 30.2% doses, 37.7% frequency, 16.4% duration.
- Most clients don't know the names (65.1%), indications (46.8%) and duration of administration (48.3%) of the dispensed antibacterials
- Some clients use antibacterial drugs for self-medication (29.0%)

- The main sources of information for self-medicating antibacterials were from pharmacy (92.2%), leftover antibacterials at home (15.5%) friends and relatives (13.2%)
- Some clients keep drugs at home mostly antibacterial at home (28.1%)

Implications for interventions to clients and/or the community

- Improve the labeling practices of dispensed antibacterials
- Improve the counseling services given both by prescribers and dispensers
- Improve the perception of clients on the use of antibacterials for watery diarrhea and cold
- Education of clients about the difference between antibacterials and analgesics. Discourage self-medication
- Clearly explain or counsel the indications and duration of administration of the dispensed antibacterials
- More work on antibacterials adherence counseling or to complete the dispensed doses even if conditions improved
- Improve the clients understanding on emergence of resistance to antibacterials
- Encourage clients to get information about antibacterial drugs from health professionals
- Discourage self medication of antibacterial drugs
- Pharmacies/ Drug Retail Outlets should not be the source for self medication for antibacterials i.e., they should not dispense antibacterial drugs without prescriptions
- Advise clients not to keep leftover antibacterial drugs at home and use as a source of self-medication.
- Advise clients not to share antibacterial drugs with friends, relatives, etc.

5.8. Antibacterials Prescribing Practices for Surgical Prophylaxis

Biruck Messele and Tenaw Andualem

Antibacterials prophylaxis were used in 75.9% of the 2796 surgical procedures, among which, laparatomy, appendectomy and thyroidectomy were the most common ones. For the clean surgical procedures, such as herniorraphy, mastectomy and thyroidectomy, antibacterials were used in 52.1%, 84.2% and 56.0% of cases, respectively. A number of surgical procedures used up to 10 different antibacterial medicines for prophylaxis in different hospitals. A total of 4619 antibacterials, most of which were intravenous parenteral preparations were used as prophylaxis, among which, ampicillin, gentamycin and chloramphenicol comprise 72.0% while ceftriaxone (10.8%) was observed to be the next most common antibacterial used. More than 42 different antibacterials and antibacterial combinations were used for surgical prophylaxis. The top 10 comprised more than 99% of those antibacterials used. The combinations of ampicillin, chloramphenicol and gentamycin were found to be the most widely used. Ampicillin used alone or in different combinations with chloramphenicol and gentamycin made up more than 43% of antibacterial combinations used.

Antibacterials dose information was included for 98.6% of antibacterial medicines used in surgical prophylaxis. The average number of doses of antibacterial medicines used for prophylaxis was 30 (average of 4.4 days) while the average duration of antibacterial prophylaxis considering those used for one day and more was 4.4 days. Single dose antibacterials (i.e. stat) in 4.1% of cases and used on the day of the surgery (2 to 4 doses) in 36.88% of cases.

Conclusion

It can be concluded from the present study that antibacterial prophylaxis was used in majority of surgical procedures including clean surgical procedures and in more doses and duration than is scientifically recommended. A number of wide spectrum antibacterials and those with a potential resistance and toxicity problems were used. The findings of the study have implications and warrant actions from prescribers/surgeons, nurses, health facilities, policy makers and regulatory authorities, health professionals training institutions, the pharmaceutical industry and health professional associations.

It can be concluded from the present study that:

- Antibacterial prophylaxis was used in more than 75% of surgical procedures including those clean surgical procedures such as thyroidectomy where antibacterial prophylaxis is not recommended.
- Antibacterial agents were used in more doses and duration than is scientifically recommended.
- A number of antibacterials were used for surgical prophylaxis including ceftriaxone, a 3rd generation cephalosporin, which has a wide spectrum of activity and is not recommended for routine use while narrower spectrum would have served the same purpose.
- Antibacterial agents were used empirically including those with potential resistance and toxicity problems.
- Oral route of administration was used alone and in combination with the intravenous route in 16.2% of cases.

Implications for interventions to various actors are to:

Prescribers/surgeons:

- Strive to implement infection prevention/control procedures
- Update knowledge on use of antibacterials and implement accordingly
- Follow standard treatment guidelines including those on prophylaxis use of antibacterials.
- Prescribe antibacterials based on epidemiological and laboratory evidence

Health facilities:

- Infection control systems and mechanisms to create a clean hospital and surgery environment should be instituted, so that at least antibacterials would not be required for clean surgical procedures.
- Standard treatment guidelines especially those dealing with use of antibacterials in surgical prophylaxis should be prepared, disseminated and promoted to relevant health care providers and should be regularly updated.
- Adopt measures that enforce use of standard treatment guidelines and restrict use of specific antibiotics.
- A system to conduct microbiological testing to isolate and identify pathogenic organisms should be established so that an appropriate antibacterial is selected.
- Perform periodic analyses to assess intervention methods are adopted and adhered to in wards.

Policy makers and regulatory authority:

- Ensure health facilities assign appropriate healthcare professionals to enable rational use of antibacterials.
- Ensure that health facilities get access to relevant reference materials.
- Continuing education programs should be mandatory and be made a requirement for re-licensing for healthcare providers.
- Facilitate the establishment of microbiology laboratories to regularly monitor antibiotics resistance pattern of the common pathogenic organisms and disseminate timely data to healthcare providers.

Health professionals training institutions:

- Give due emphasis to relevant aspects of infectious diseases and their treatment in the curriculum to ensure that the graduates have the required knowledge, skills and attitudes to use antibacterials rationally.

Pharmaceutical industry:

- Should abide by guides and regulations of specific health institutions on use of drugs including antibacterials.
- Provide evidence based information to all healthcare professionals.

Health professional associations

- Conduct regular and accredited continuing education programs on relevant topics including on antibacterial use for surgery.

5.9. Antibacterials Prescribing Practices for General Medical Hospitalized Clients

Tenaw Andualem

There is wide spread use particularly more than one and haphazard use of antibacterials which may end up in resistance to first and second line drugs simultaneously. Clients who were taking more than one and who stayed longer than ten days in the hospital were more than 14%, these may be indications for the possibility of improper diagnosis and/or treatment and also nosocomial infections.

The total numbers of records reviewed in this survey were 3517. The overall average duration of hospitalization was 7.4 days. From the total, 695 (29.1%) stayed in hospital more than 10 days and on antibacterials (15% due to pneumonia and 24% due to UTI).

Analyses of the number of antibacterials per case are shown as follows. Out of the 3517, 2482 (70.6%) were prescribed with one or more antibacterials in a range of 1-6 and an average of 1.5 antibacterials per case. One or more antibacterials were prescribed in 91.6% of the cases (47.3% for pneumonia and 35.8% for UTI, and 63% for diarrhea) and 8.4% more than two antibacterials. Further observations on the duration of antibacterials prescription have shown that 35% were 1-4 days duration and 5.8% more than 10 days (average of 5.8 days); although the general recommended is 7-10 days. Moreover, only 48/2236 (2.2%) of the treatments were prescribed or send culture and sensitivity tests.

The most frequently prescribed antibacterials included cephalosporins, 30.0% followed by penicillin benzyl 13.8%; gentamycin 10.8%; chloramphenicol, 9.3%; and ampicillin 8.9% showing a shift to second line drugs. One of the encouraging findings of this survey is that more than 98% of antibacterials were prescribed in generics.

Rational prescribing, as measured by the extent of adherence to the standard treatment guideline (STG), is strikingly low. Out of the total of the 453 pneumonia only 19.6%; 117 meningitis 33.3%; 93 typhoid 24.7%; 53 urinary tract infection 22.6%; and 27 relapses fever cases 14.8%, the antibacterial chosen and the duration of therapy comply with the STG. In addition to selecting the incorrect antibacterial for an infection, irrational prescribing is also observed in prescribing antibacterials for conditions that do not require antibacterial at all. These conditions include diarrhea and cold. For example, from 16 cases of watery diarrhea investigated, antibacterial were prescribed for 9 (56.3%) of them.

Although the extent of appropriate knowledge positively influences prescribers; antibacterials prescribing decisions is largely unknown. It is paramount importance to provide up to date sources of information on antibacterial and bacteria; local patterns of resistance; risk perceptions; differences between various antibacterials and antibiotic categories, and the consequences of inappropriate use.

Implications

Health facilities or systems:

- Health facilities need to think in re-initiating or re-instituting culture and sensitivity diagnostic laboratories even with the meager resources they have because it has a return on investment. Moreover, there is also a need to discuss prescribing practices at health facilities even among colleagues to serve as audit and feedback intervention. There is also a need to prevent infection and re-infection particularly, health facility acquired infections which might have lead to longer hospitalization and prescription of more than one antibacterial.
- Health service should routinely assess appropriateness of antibiotic use, like use culture and sensitivity tests and ongoing quality improvement programs that encourage more appropriate use.

Prescribers:

- Prescribers to optimally use bacteriological diagnostic facilities to correctly identify the etiologic agent and then prescribe the right antibacterial

Clients and Consumer organizations:

- Consumer organizations should be encouraged to take up antibacterials use and resistance as consumer issues, and should be subsidized to provide simple, targeted information to consumers.

Policy makers or regulatory authority:

- Regulatory authority or ministry of health should be able to provide appropriate information particularly relevant to the local situation and also regulatory and managerial interventions to address antibacterial use and resistance, and prevention and containment practices.
- Develop antibiotic prescribing policies
- Not only developing treatment guidelines but also use and adherence to it should be supported

Health training institutions:

- Health training institutions should incorporate an explicit component in their curriculum on appropriate use of antimicrobials and the problem of resistance.
- It should also teach antibacterial resistance prevention and containment strategies.

Professional societies:

- Should offer evidence-based continuing education on antibacterials address the behavioral aspects of prescribing.

Pharmaceutical companies:

- Although there is no evidence on the influence of pharmaceutical companies on prescribing in this survey; they should voluntarily control messages on antibacterial to providers and work together with other stakeholders for prudent and correct use of antibacterials.

5.10. Out patients Prescriptions Review

Biruck Messele and Tenaw Andualem

A total of 6353 prescriptions were collected from 65 health facilities in different parts of the country. Analysis of these prescription papers revealed that 23.0% of health facilities did not use a standard prescription paper. Patient information (such as name, age or sex), the date of prescription, diagnosis information, prescriber's name and qualification were absent in 15.8%, 97.4%, 75.0% and 87.0% of patient encounters, respectively.

The findings of the study indicated that one or more antibacterial medicines were prescribed in 61.7% of patient encounters. Among cases where antibacterial medicines were prescribed, dosage form was specified in only 62.2% of antibacterial medicines prescribed and 95.3% of them were prescribed by generic names. A total of 4224 antibacterial medicines were prescribed in the study period of which, amoxicillin, cotrimoxazole and ciprofloxacine comprise 51.0% of total prescribed. The average antibacterials prescribed per encounter was however 1.08 and 1.09 for health centers and hospitals respectively. It can be concluded from the present study that important patient, disease and drug regimen related information was not properly filled in the prescriptions surveyed.

Conclusion and Recommendations

It can be concluded from the present study that:

- Patient and disease related information was not appropriately filled out in the prescription papers

- None of the prescriptions contained complete information as regards to depicting the dosage regimen (dose, frequency and duration of medicine taking).
- High proportion of patient encounters resulted in antibacterials being prescribed, with the health centers prescribing more antibacterials than the hospitals.

Implications for interventions:

Prescribers:

- Strive to implement proper prescription writing guidelines and complete all relevant information on prescriptions.
- Follow standard treatment guidelines including those on use of antibacterials.
- Prescribe antibacterials based on epidemiological and laboratory evidence
- Update knowledge on use of antibacterials and implement accordingly

Health facilities:

- Adopt a standard prescription and enforce its proper use.
- Standard treatment guidelines especially those dealing with use of antibacterials should be prepared, disseminated and promoted to relevant health care providers and regularly updated. Enforce restricted use of specific antibiotics.

- A system to conduct microbiological testing to isolate and identify pathogenic organisms should be established so that an appropriate antibacterial is selected.

Policy makers and regulatory authorities:

- Ensure health facilities assign appropriate healthcare professionals to enable rational use of antibacterials.
- Ensure that health facilities get access to relevant reference materials.
- Continuing education programs should be mandatory and be made a requirement for re-licensing for healthcare providers.
- Facilitate the establishment of microbiology laboratories to regularly monitor antibiotics resistance pattern of the common pathogenic organisms and disseminate timely data to healthcare providers.

Health professionals training institutions:

- Give due emphasis to relevant aspects of infectious diseases and their treatment in the curriculum to ensure that the graduates have the required knowledge, skills and attitudes to use antibacterials rationally.

Pharmaceutical industry:

- Should abide by guides and regulations of specific health institutions on use of drugs including antibacterials.
- Provide evidence based information to all healthcare professionals.

Health professional associations:

- Conduct regular and accredited continuing education programs on relevant topics including on antibacterial use for surgery.

SNTHESES OF MAIN FINDINGS

6. SNTHESES OF MAIN FINDINGS

Tenaw Andualem

Under the syntheses of findings, the major problems or gaps identified and recommended actions in each of the tools used for the survey were triangulated into their implications to stakeholders are presented.

6.1. Clients and/or the community at large

The Problems/constraints/gaps

- Most clients don't know the names (65.1%), indications (46.8%) and duration of administration (48.3%) of the dispensed antibacterials
- Some clients (29.0%)use antibacterial drugs for self-medication
- Their main source of antibacterials for self-medication were drug retail outlets (92.2%), though some could get from leftover at home (15.5%) and family/friends/ neighbors (13.2%)
- Hoarding of antibacterial at home is not uncommon (28%) mostly antibacterials
- Not small numbers do think use of antibacterials to common cold (36%) and watery diarrhea (40%)
- Many discontinue taking before finishing their antibacterials when conditions improved 79.2%, dues to side effects 40.6%, and believe antibacterials did not work 30.3%
- Only some know about antibacterial resistance less than 20%
- Not all are able to differentiate between analgesics and antibacterials 37%.

- Clients acquire antibacterial other than the recommended sources.

Recommendations

Immediate implementation

- Design and implement client education program focused on antibacterial/ antimicrobial use and drug resistance containment in general and for watery diarrhea and cold in particular.
- Improve the labeling of dispensed antibacterials
- Improve antibacterials adherence counseling services given both by prescribers and dispensers on the indications, dose, frequency and duration of administration
- Educate clients to differentiate antibacterials and analgesics
- Encourage clients to complete the prescribed doses of antibacterial drugs even if conditions improved
- Raise the clients understanding on emergence of resistance to antibacterials
- Encourage clients to get information about antibacterial drugs from health professionals
- Discourage the use of self medication specially with antibacterials
- Educate clients not to keep leftover antibacterials at home
- Advise clients not to share antibacterials with friends, relatives, etc.
- Educate clients to only get their antibacterial from legal sources only.

Mid-term implementation

- Consumer organizations should be encouraged to take up antibiotic use and resistance as consumer issues, and should be supported to provide simple, targeted information to consumers.

6.2. Health care providers

The Problems/constraints/gaps, Prescribers

- Knowledge and choice of antibacterials for G+ and G- was not adequate
- Empirical treatment was the commonest method of treatment
- Antibacterials use for prophylaxis is common (49%)
- Low availability of C & S diagnostic facilities and low use even when available
- Many prescribers have encounters that certain MOs did not respond to first line drugs
- Most (83%) do not know the local prevalence of microorganisms resistance to antibacterials and the main contributing factors to it
- Many (21%) prescribers use antibacterials which are not their first choices
- Low access to standard treatment guidelines (39%) and drugs lists (38%)
- Low emphasis on treatment adherence and counseling
- Inadequate source of information on antibacterials and MOs
- Use of first and second line antibacterials for clean surgical prophylaxis is common (75.9%) often extended use than recommended.

- Antibacterial agents were used empirically including those with potential resistance and toxicity problems.

The Problems/constraints/gaps, Pharmacy professionals (Dispensers)

- Most dispensed antibacterials in health facilities are not adequately labeled
- Many dispensers have encounters that certain MOs did not respond to first line drugs
- Most do not know the local prevalence of microorganisms resistance to antibacterials and the main contributing factors to it
- Low access to standard treatment guidelines and drugs lists
- Knowledge and choice of antibacterials was not adequate
- Short counseling and dispensing time due to patient load, working environment/facility,
- Often do not ask antibacterial use history. When asked self-medication by clients is common often for unjustified illnesses or reasons.
- Inadequate source of info on antibacterials and MOs

Recommendations to Prescribers

Immediate implementation

- Adherences to proper prescription writing practices and complete all relevant information on prescriptions.
- Ensure the availability and monitor appropriate utilizations of treatment guidelines, national and essential drug lists, IP guidelines and other related materials at all health facility levels. Improve availability and use of standard treatment guidelines including those on use of antibacterials.

- Improve availability, reliability and cost-effectiveness of laboratory facilities, particularly culture and sensitivity tests
- Improve accessibility and affordability of essential key antibacterials

Mid-term implementation:

- Provide need-based in-service training and/or CE for prescribers on diagnosis, management of common infections, antimicrobial use, and containment of AMR.
- Improve availability and access to health and pharmaceutical journals, news papers, magazines and internet websites which disseminate current information on antibacterials and best practices and successes on resistance containments.
- Establish a national and regional antibacterial resistance surveillance system and information dissemination mechanisms.
- Conduct further assessment on prescribers-client interaction (counseling), self-medication and client pressure for antibacterial prescription
- Develop and disseminate antibacterial use for prophylaxis guidelines
- Prescribe antibacterials based on epidemiological and laboratory evidence

Recommendations to Pharmacy professionals (Dispensers)

Immediate implementation

- Ensure the availability and monitor appropriate utilizations of national and essential drug lists and other related materials.
- Design and implement client education programs focused on antibacterial/ antimicrobial use and drug resistance containment
- Improve accessibility and affordability of essential key antibacterials

Mid-term implementation

- Provideneed-basedin-servicetrainingand/orcontinuing education to drug dispensers on antimicrobial use, and containment of AMR.
- Improve availability and access to health and pharmaceutical journals, news papers, magazines and websites which disseminate current information on antibacterials and best practices and successes in resistance containments
- Improve infrastructure of drug dispensaries at public health facilities
- Design and implement locally feasible and effective adherence aids
- Encourage team work and sustain communication between pharmacy professionals and prescribers for the benefit of the patient.
- Establish a national and regional antibacterial resistance surveillance system and information dissemination mechanisms.

6.3. Health facilities

The Problems/constraints/gaps

- Not all health facilities (only 77%) have standard prescription papers. And when exist and used, often are incomplete.
- No prescription and dispensing restriction
- No functioning DTC and IP discussing AMR
- Availability of guidelines and drug lists are limited
- Stock out of essential antibacterials and IP supplies
- No training on AM use and resistance to providers
- No education on AM use and resistance to clients
- No culture and sensitivity labs and even the existing not used
- Do not know or did not take action on nosocomial infections

Recommendations

Immediate implementation

- Standardize or promote the proper use of antiseptics and disinfectants
- Develop standard prescription papers
- Improve availability of key antibacterials and IP supplies
- Improve availability and reliability of laboratory facilities, C & S tests

Mid-term implementation

- Strive to implement infection prevention procedures and control of nosocomial infections
- Adopt measures that enforce use of standard treatment guidelines and restrict use of specific antibiotics.
- Develop or adopt standard treatment guidelines especially on prophylactic use of antibacterials
- Perform periodic analyses to assess intervention methods are adopted and adhered to in wards.
    - Health facilities need to think in re-initiating or re-instituting culture and sensitivity diagnostic laboratories even with the meager resources they have because it has a return on the investment.
    - Supervise prescribing practices of providers for improved services and outcomes. Like audit and feedback intervention.
    - Health service should routinely assess appropriateness of antibiotic use, like use culture and sensitivity tests and ongoing quality improvement programs that encourage more appropriate use.
- Adopt measures that enforce use of standard treatment guidelines and restrict use of specific antibiotics by providers.
- Assess IP intervention methods are adopted and adhered to in wards.
- Implement and evaluate strategies to improve the availability of safe, cost-effective antibacterials and IP supplies
- Ensure that health facilities get access to relevant reference materials.
- Enforce to establish and strengthen DTCs and IPCs in health facilities for accreditation.

6.4. Policy makers and regulatory authority

The Problem/constraints/gaps

- Absence of restriction in the prescribing and dispensing of antibacterials other than categorizing list of drugs by level of health facilities and Drug Retail Outlets.
- Absence of active or passive surveillance system to monitor MOs resistance to antibacterials. And disseminate findings to health care providers

Recommendations

Immediate implementation

- Strengthen/introduce surveillance on MOs resistance such as C & S. Establish standard methods and quality assurance techniques
- Monitor the availability and functionality of DTCs and IPCs
- Ensure the availability and monitor utilizations of treatment guidelines, national and essential drug lists, IP guidelines and other related materials
- Encourage drug resistance/ AMR surveillance particularly on targeted MOs and ABs

Mid-term implementation

- Develop policies on the use of antibacterials by level of prescribers and dispensing staff
- Organize and conduct need-based pre-service and in-service/on-job trainings to prescribers and dispensing staffs
- Improve availability of updated IEC/BCC materials on antibacterials and resistance and Facilitate appropriate information on the local situation

- Continuing education programs should be mandatory and be made a requirement for re-licensing for healthcare providers.
- Develop antibiotic prescribing policies
- Not only developing treatment guidelines but also use and adherence to it should be supported

6.5. Training and research institutions

The Problems/constraints/gaps

- Most training programs do not have adequate coverage for the topics on antibacterial use and resistance, and containment
- Courses don't give emphasis on the local MOs resistance profile in most programs
- Chemoprophylaxis and adherence to antibacterial therapy are not addressed in almost all programs
- Nothing is mentioned about rational prescribing/ dispensing, standard treatment guidelines, principles of the choice of drugs and essential drug concept except in Medicine and Pharmacy.
- Less time allotted both for theory and practice in microbiology courses
- key bacterial resistance, nosocomial infections and antibiotics resistance mechanisms are not addressed
- Course contents on patient counseling and adherence to treatment on use of antibacterials and antibacterial resistance is not adequate
- There are limited research on priority diseases, micro-organisms and antimicrobials of public health importance

Recommendations

Immediate implementation

- Teaching and research should be evidence-based, well address infectious diseases and give focus to diseases of public health importance, to list of drugs for Ethiopia (LIDE) and emphasis to the local context.
- Every course should have detailed topics on antibacterials and MOs together with time allotment
- Health training institutions should incorporate an explicit component in their curriculum on appropriate use of antimicrobials and the problem of resistance.
- Reasonable time should be allotted for topics on antibacterial use and resistance, and containment which included:
    - Nosocomial infections, common resistant microbial infections, strategies for prevention and containment in all programs and including veterinary medicine
    - Antimicrobial residue and contamination of milk, meat (cattle, sheep, goats, camel, poultry, fish), and eggs in all veterinary public health courses.
- The following topics should be included or strengthened in all health professionals training:
    - Indications for chemoprophylaxis
    - Patient counseling and adherence on antibacterial use and resistance should be included with reasonable time allotment
    - Mechanisms of resistance emergence, and prevention and containment
    - Strategies to prevent and contain antibacterials against resistance
    - Principles of rational antibacterials use
    - Use of STGs, principles of drug of choice and essential drug concept

- Antimicrobial clearance should be included in the pharmacology course contents for veterinary medicine
- Consequences of antibacterial resistance (morbidity, mortality, cost, loss of production in animals, etc.)

- The course on clinical pharmacology for medical students and pharmacotherapy for pharmacy students should be strengthened

Mid-term implementation

- Need based research on priority public health problems, microorganisms and antibacterials
- Support micro-organisms and antibacterials surveillance by health facilities and research institutes.

6.6. Pharmaceutical industry

Recommendations

- Pharmaceutical companies to work in line with AMR containment efforts of the country.
- Provide evidence based information to all healthcare professionals.
- Assist ethical client antibacterials use education programs
- Although there is no evidence on the influence of Pharmaceutical companies on prescribing in this survey; they should voluntarily control messages on antibacterial to providers and work together with other stakeholders for prudent and correct use of antibiotics.

6.7. Health professionals and consumer associations

Recommendations

- Conduct regular and accredited continuing education programs on proper use of antibacterials use, resistance prevention and containment
- Assist consumer associations to educate their members on antibacterials proper use.

6.8. Non-human use of antibacterials

- Non-human uses of antibacterials need to be supported with guidelines on proper use by professionals. It should also be strictly controlled.

CONCLUSION

7. CONCLUSION

- AMR is real and high in magnitude in this country

- Providers and health facilities have been facing difficulties of AMR. Little is done in the containment of AMR. AMR is not advocated as a real challenge although the magnitude is alarmingly high.

- AMR is widespread and requires multifaceted approach to prevent and contain it. Every stakeholder has a role to contribute in the prevention and containment of resistance

AREAS FOR FURTHER WORK

8. AREAS FOR FURTHER WORK

- Non-human use of antibacterials is one of the priority areas to be looked into
- Study percent each major factor contribute to antibacterials resistance
- Further in-depth understanding of clients-provider interactions and study determinants on adherence and treatment outcomes
- Focused research on diseases of public health importance: microorganisms and antibacterials
- Generate evidence on interventions that are helpful in every category of stakeholders.

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REFERNCES

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Annex: Tool 8: Bacteriological Culture and Sensitivity Records Review Form

Name of Diagnostic Facility:_____ Data Collector: _____

Date	Code	Spec	MO Isolated	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

Key to data collector: you can make codes for drugs but need to decode in the table below .and agree with the supervisor

No	Antimicrobial	No	Antimicrobial	No	Antimicrobial	No	Antimicrobial	No	Antimicrobial
	Amoxicillin		Chloraphenicol		Flucloxacillin		Nalidic Acid		*Streptomycin*
	Amoxicillinclav		Clindamycin		Gentamycin		Nitrofurantoin		Tetracycline
	Ampicillin		Cloxacillin		Kanamycin		*Norfloxacillin*		*Vancomycin*
	Carbencillin		Cotrimoxazole		Methicillin		PencillinG		
	Cephalotin		Erythromycin		Mupirocin		*PolimixinB*		

Annex: Tool 1: Antibacterial Use and Resistance Health Facility Assessment

(i) General Guidelines/instructions for administering health facility survey tool

- Before starting any interview or activities, the data collector should present support letter from the DACA/ MoH and/or from the RHB to the head of the health facility, and ask his/her consent (please see below how to introduce yourself & about the survey and ask the consent)
- The data collector (supervisor) should explain the objective or importance of the survey very carefully to the head (Director) of the health facility. If the respondent (the head/director) agrees to be interviewed circle # 1 & start the interview. If s/he disagree circle # 2 & go to the next health facility.
- This health facility assessment tool has two parts. Part one deals with the general information of the health facility, rational use of antibacterials & drug resistance containment practices. Part one again divided into two sections. Questions on part 1, section one suppose to be answered by health facility head (Director) and section two suppose to be handled by both facility head & pharmacy unit head.
- Part two is Observation of antimicrobial drugs & IP supplies and practices. The data collectors shall conduct these observations in different units of the health facility (mainly in drug store, surgical department, outpatient department…)
- The data collection must be started with part one (section one) & the observation part must be conducted after completion of part one. However, if two different data collectors will conduct the survey, both data collection can be accomplished simultaneously.

- This particular survey on rational drug use & resistance focuses only on antibacterial antibiotics (excluding antituberculosis, antileprosy drugs). Drug resistance with antiviral, antifungal, antiprotozoal (including antimalarial) & other antimicrobial drugs is not part of this assessment.
- Method of answering or instruction of one specific question may vary from the other. Please read each question very carefully before asking the respondent (interviewee).
- More than one answer might be possible for some questions.
- If the data collector or supervisor of this survey has any questions, quires or misunderstandings, s/he should ask the survey team or responsible person before starting the actual data collection.

(ii) Introduction & Consent:

[Greetings]Mynameis_____,
and I work with [Institution].

DACA/MoH*/MSH is conducting a national baseline assessment on Antibacterial drug Resistance (ABR/AMR) and your health care facility has been chosen at random to take part in this survey.

This survey instrument has two parts. Part one again divide into two sections, section one requires me to ask you a series of questions to obtain general information about your health facility and section two deals with rational use of antibacterials & drug resistance containment practices. For part two, I will carry out observations around the health facility focusing on antimicrobial drugs & IP supplies and practices.

There is no risk to you or your health facility for taking part in this survey. Taking part is your choice; you can choose not to answer any of the questions or tell us to stop at any time. Your name will not be kept on the forms. Please feel free to ask questions at any time.

At this time, do you want to ask me anything about the survey?

May I begin the interview now?

=RESPONDENT AGREES TO BE INTERVIEWED . . . 1 START THE INTERVIEW

RESPONDENT DOES NOT AGREE TO BE INTERVIEWED . . . 2 END

* The Support letter from the DACA/MoH and/or from the RHB should be presented.

Tool 1: Antibacterial Use and Resistance Health Facility Assessment

Part 1: Structured interview questionnaire for health facility

I: General Information

1101. Name of the health facility:

_____

1102. Facility Type:

1. Central Referral Hospital
2. Regional Referral Hospital
3. Zonal Hospital
4. District Hospital
5. Health Centre

1103. Ownerships of the health facility:

1. Public 2.Private 3.NGO

4.Others (specify) _____

1104-12. Type of Services provided by the health facility

Type of Service	In-Patient/Outpatient	
	In	Out
1104. Gynaecology/Obstetrics		
1105. Internal medicine		
1106. Surgery		
1107. Paediatrics		
1108. Psychiatry		
1109. Ophthalmology		
1110. Dermatology		
1111. ENT		
1112. Pharmacy		
1113. Laboratory service		
1114. Others (specify)		

1115. Health human resources

Type	Total number
1116. Specialists	
1117. General Medical Parishioner (GP)	
1118. Health Officers	
1119. BSc Nurse	
1120. Senior Nurse	
1121. Junior Nurse	
1122. Pharmacist	
1123. Druggist/pharmacy diploma	
1124. Junior Pharmacy technicians	
1125. Pathologist	
1126. Microbiologist	
1127. Medical Laboratory Technologist	
1128. Laboratory Technician, diploma	
1129. Junior Lab technicians	
1130. Others:	

1131-2. Patient Load

1131 Average number of outpatients per day (year) =

____ (_____)

1132. Average number of inpatients per day (year) =

____ (_____)

1133-37. Top FIVE infectious diseases that cause Morbidity & Mortality (according to last fiscal year health data, exclude TBL, HIV, Protozoal and helminthes):

Top 5 causes of morbidity	Top 5 causes of mortality
1133	11331
1134	11341
1135	11351
1136	11361
1137	11371

II: Antibacterials Use, Resistance and Containment Practices

1201-7. Who prescribes antibacterials in your health facility? If there is restriction on prescribing of certain antibacterials, please indicate these in the third column below.

Type of Health Profession	Prescribed antibacterial? (Yes/No)	Name of antibacterial restricted to be prescribed by the specific professionals
1201. Specialist		12011.
1202 Physicians (GP)		12021.
1203. Health Officers		12031.
1204. BSc Nurses		12041.
1205. Senior Nurses		12051
1206. Junior Nurses/ Health assistant		12061.
1207. Others (specify):_____		12071.

1208. Do you have any documented regulation in your health facility that restricts prescription of antibacterial by specific health professionals? 1. Yes 2. No

1209-13. Who dispenses antibacterials in your health facility? If there is restriction on dispensing of certain antibacterials, please indicate these in the third column below.

Type of Health Profession	Dispense antibacterials? (Yes/No)	Name of restricted antibacterial/s dispensed by the specific professionals
1209. Pharmacist		12091.
1210. Druggist/pharmacy diploma		12101.
1211. Junior Pharmacy Technician		12111.
1212. Others (specify): _____		12121.
1213. Others (Specify):_____		12131.

1214. Do you have any documented regulation in your health facility that restricts dispensing of antibacterial by specific health professionals? 1.Yes 2. No

1215. Do you have DTC in this health facility?
1. Yes 2.No (skip to Q 1218)

1216. If yes to Q1215, has the committee met over the last 3 months? 1.Yes 2.No

1217. If yes to Q1216, has AMR been an agenda of discussion? 1. Yes 2.No

1218. Do you have an infection prevention (IP) committee in this health facility?
1.Yes 2.No (skip to Q 1220)

1219. If yes to Q1218, has the committee met over the last 3 months?

1.Yes 2. No

1220-37. Are the following Guidelines and Formularies available in this facility?

Type of Guidelines		Availability (Y/N)
Drug List	1220. National Drug List (NDL)	
	1221. List of drugs by HF level	
	1222. Essential Drug List	
	1223. Own drug list	
	1223. Others:	
Treatment Guidelines	1224. Standard treatment Guideline by level	
	1225. Malaria treatment guideline	
	1226. Sexually transmitted infections	
	1227. Antiretroviral treatment guideline	
	1228. Diarrheal Diseases treatment guideline	
	1229. Acute respiratory tract infections treatment guideline	
	1230. Health facility's own guidelines	
	1231. TB treatment guideline	
	1232. Others:	
Drug Formularies	1233. Formulary by level	
	1234. Own formulary	
	1235. Others:	
1236. Infection Prevention (IP) Guidelines and/or manual		
Other guidelines (specify):	1237.	

1238. Have any of your staff received in-service training on AMR or related topics over the past one year? (Note: Exclude DTC trainings since this training includes AMR)

1.Yes 2.No

1239-41. If yes to Q1238, would please provide the following information regarding the training(s):

Topic of AMR/related training	Duration of the training	Number of staff trained	Organization which conducted the training
1239	12391	12392	12393
1240	12401	12402	12403
1241	12411	12412	12413

1242. Have you provided education on antimicrobials use and resistance to your clients in this facility over the last year (consider yes if drug use education is provided)?

1.Yes 2.No

1243-5. If yes to question # 1242, please provide the following information about the education program.

Topic of the education conducted	**Duration of education program**
1243.	12431
1244.	12442
1245.	12451

1246. Have you encountered health facility acquired or nosocomial infections in this health facility?

1.Yes 2.No 3. Don't know/remember

1247. Do you have functional laboratory facility to conduct culture & sensitivity test over the past one year?

1.Yes 2.No

1248. If yes to question # 1247, have you ever reviewed sensitivity patterns of antibacterials in the health facility over the past one year?

1.Yes 2.No

1249. If yes to question #1248, have there been any changes on antibacterial use following the findings?

1.Yes 2. No 3. I don't remember

The End for the Interview

Thank you!

Part 2: Structured observation of antibacterial & Infection Prevention supplies availability and related practices in selected health facilities

201-10. Observations of selected (Key) antibacterial drugs availability at the facility (at the store)

Type of Antimicrobials	Availability on the day of visit (Yes, No)	Stock out over the past ONE year (in days, if different strengths take the shortest stock out)
201. Ampicillin capsule		2011
202. Ampicillin suspension		*2021*
203. Amoxicillin (Amoxicillin + Clavulanic acid) capsule/tablet		2031
204. Amoxicillin (Amoxicillin + Clavulanic acid) suspension		*2041*
205. Chloramphenicol capsule		2051
206. Chloramphenicol suspension		2061
207. Ciprofloxacin tablet		2071
208. Co-trimoxazol tablet		2081
209. Co-trimoxazol suspension		2091
210. Erythromycin tablet		2101
211. Gentamycin injection		*2111*
212. Metronidazole capsule/tablet		2121
213. Metronidazole suspension		*2131*
214. Procaine penicillin injection		2141
215. Tetracycline capsule		*2151*

216. Do you have the following Antibacterials?

Antibacterials	Yes/No	Remark
216. Cephalexin		
217. Ceftriaxone		

218-25. Observation of Key Infection Prevention (IP) supplies & functional equipment availability at the health facility. (Note: observation to be done in surgical department)

Type of IP supplies/ functional equipment	**Availability on the day of the visit (Yes, No)**	**Stock out over the last ONE year (in days)**
218.Functional Autoclave		Not applicable
219.Functional Steam sterilizer		Not applicable
220.Alcohol (ethanol)		2201
221.Apron		2211
222.Chlorine bleach (different brands of *berkina)*		2221
223.Chlorohexidine 1.5 % + cetrimide 15 % (Savlon)		2231
224.Surgical gloves		2241
225.Utility or heavy duty glove		2251

226-35. Observation on Proper Use of Antiseptics and Disinfectants

Materials/Procedures/process observed	(Yes, No)	Remarks (if any)
227. Is there a documented procedure(s) for dilution of antiseptics & disinfectants in this health facility?		
228 Are antiseptics and disinfectants being used properly in this health facility?		
229.Wrong choice of antiseptic/ disinfectants		
230.Use of wrong concentration (check for chlorine, *berkina*)		
231.Errors in dilution/wrong dilution procedures		
232.Wrong application/administration technique		
233.Use of wrong container		
234.Inappropriate handling/storage		
235.Other (specify)		

236-41. Observation on availability of antimicrobials use and resistance education materials:

Availability of education materials	Yes/No
236.Are there any patient education materials on rational use of antimicrobials/ABR/AMR in this health facility?	
237-32.If yes to the above question, what type of educational materials available?	
238.Posters	
239.Leaflets/pamphlets	
240.Video/tape cassettes	
241.others (specify)	

The End

Thank you for your collaboration and assisting my data collection

Date: _____

Data Collector: _____

Annex: Tool 2: Antibacterial Prescribing Practices Assessment

You Do Not Have to Write Your Name. It is Anonymous.
Dear Participant:

You are purposively selected to be part of this assessment. It is a self-administered questionnaire, which may take between 20-30 minutes to complete.

The purposes of this survey are to assess the existing ANTIBACETRIAL MEDICINES USE PRACTICES AND RESISTANACE PATTERNS in Ethiopia and concur on certain standards and interventions subsequently. Your responses to the following questions have paramount importance to you as a professional and to our country at large in the design of evidence-based intervention strategies to promote rational use; prevent and contain antimicrobials resistance. Feel free to provide the actual practice.

This assessment is the collaborative effort of many institutions.

THANK YOU IN ADVANCE FOR AGREEING TO PARTCIPATE IN THIS ASSESSMENT

Section I: Respondent and Health Facility Information

101. Name of health facility:
_____

102. Type (level) of facility (select appropriate one below):
1. Central Referral Hospital 2. Regional Referral Hospital
3. Zonal Hospital 4. District Hospital
5. Health Centre

103. Age of the respondent: _____ years 104. Gender:
1.Male 2.Female

105. Qualification:
1. MD + Specialist _____ 2.Physician (GP)
3.Health Officer 4. BSc Nurse
5.Senior Nurse
6.Other (specify): _____

106. At which university/college did you graduate last in health science? _____

107. Year (s) of service in drugs prescribing practice after graduation? _____ Years

108. Currently, where do you practice drugs prescribing (including this facility)?

Type of Facilities	Practice (Y/N)	
Public health facility	Yes	No
Private health facility	Yes	No
NGO health facility	Yes	No

II. Antibacterials Prescribing Practices

201-10. Antibacterial drug categories are listed below, which one you commonly prescribe to your clients visiting this health facility? If you say commonly and sometimes, please give specific examples of antibacterial drugs.

Antibacterial category	Common	Sometimes	Never	Examples
201.Penicillins				2011.
202.Penicillins + ß lactamase inhibitors				2021.
203.Cephalosporins				2031.
204.Aminoglycosides				2041.
205.Macrolides				2051.
206.Quinolones				2061.
207.Tetracylines				2071.
208.Sulfonamides				2081.
209.Glycopeptides				2091.
210.Antianaerobic antibacterials				2101.

211-7. What infectious diseases are justified prescribing the following categories of antibacterials? Please give examples for each.

Category of Antibacterial Drugs	Infectious Diseases
211.Pencillins	2111.
212.Penicillin's + ß lactamase inhibitors	2121.
213.Cephalosporins	2131.
214.Aminoglycosides	2141.
215.Macrolides	2151
216.Quinolones	2161
217.Glycopeptides	2171.

218-9. Which antibacterials would you prescribe for the following clinical cases?

Clinical cases caused by:	First line antibacterial (only one)	Alternative antibacterial
218.Gram-positive bacteria	2181.	2182.
219.Gram-negative bacteria	2191.	2192.

220. Do you prescribe any antibacterial drug for prophylaxis use? (Excluding prophylaxis for TB, HV/AIDS and malaria) 1. Yes 2. No

221-4. If yes to question # 220, please give example of antibacterial you commonly prescribe for prophylaxis and the clinical conditions you are using.

Antibacterial used for prophylaxis	Clinical condition
221.	2211.
222.	2221.
223.	2231.

III. Antibacterial Resistance Containment Practices

301-304. Which diagnostic methods or criteria you use to justify the prescription of antibacterials for your patient?

Diagnostic Method	Yes/No	
301.Clinical symptoms and signs	Yes	No
302.Bacteriological tests	Yes	No
303.Antibiogram/MIC	Yes	No
304.Other (specify	Yes	No

305. How frequent you refer your clients or send specimens for culture and sensitivity testing?

1. Always 2.Sometimes 3.Rarely/never

306. Please write down your main reason(s)?

Reasons: _____
_____
_____

307. Do you know the bacterial resistance patterns to commonly used antibacterials in your health facility?

1. Yes 2. No

308-10. If your answer is yes to question # 307, please list down three infectious bacteria or clinical condition and antibacterial drugs no longer working, and alternative antibacterial you are using.

Resistant bacteria or clinical condition	Antibacterials you think not working	Alternative antibacterials you use
308.	3081.	3082.
309.	3091	3092.
310.	3101	3102.

311. Have ever prescribed antibacterials that were not your choice? 1. Yes 2. No

312-14. If yes to # 311, please list 3 clinical conditions where you have prescribed antibacterials that were not your choice? What was your drug of choice, alternative drug you prescribed and the reason for not prescribing your drug of choice?

Clinical conditions	Antibacterial used (not drug of choice)	Drug of choice	Reasons for not prescribing your drug of choice
312	3121	3122	3123
313	3131	3132	3133
314	3141	3142	3143

315-29. What do you think are some of the factors that might have contributed to antibacterial drugs resistance in your health facility?

Factors	Yes/No	
315.Prescribing the wrong antibacterial drugs	Yes	No
316.Prescribing antibacterials when not needed	Yes	No
317. Empirical (without lab investigation) prescribing	Yes	No
318. Lack of diagnostic laboratory facilities	Yes	No
325.Lack of treatment guidelines	Yes	No
326.Lack of continuing education and updated information for prescribers	Yes	No
328.Lack/inadequate infection control in the health facility	Yes	No
319.Lack of patient counseling on drug adherence	Yes	No
320. Lack/poor antibacterials treatment adherence by clients	Yes	No
321. Patients demand prescribing for antibacterials	Yes	No
322.Lack/shortage of antibacterials	Yes	No
323. Poor quality antibacterials		
329. Others (specify	Yes	No

IV. Sources of Information and Training on Antibacterials and Drug Resistance

401-8. Which of the following guidelines, drug lists and manuals listed below you use as a reference when you are prescribing antibacterials to your clients?

Guidelines/Manuals	Used as a reference (Yes/No)	
401.Standard Treatment Guideline		
402.Sexually transmitted infections treatment guideline		
403.Diarrheal Diseases management guideline		
404.Acute respiratory infections treatment guideline		
405.Drugs Lists		
406. MIMS Africa or others		
407.Not using references		
408.Others (Specify):		

409-17. Which of the following are your main sources of information on antibacterials and drug resistance during the past one year?

Source of information	Yes/No	
409.Scientific journals		
410. Continuing education in scientific conferences		
411.News letters/magazines		
412.Promotion materials		
413.Internet		
414.Textbooks		
415. Standard treatment guidelines/drug lists/formularies		
416. Received no information		
417.Other sources (specify)		

418. How do you describe the frequency of your communication with pharmacy professional in the pharmacy at your health facility on antibacterial use?

1. Always/regularly 2. Sometimes 3. Rarely/none

419. How frequent are you visited by pharmaceutical representatives (promoters) of antibacterial drugs?

1. Always/regularly 2.Sometimes 3.Rarely/none

420. Have you attended any in-service training related to antibacterials use and resistance during the past one year (Excluding DTC training)?

1.Yes 2.No

421-23. If yes to question number 419, please list the last 3 trainings on the table below (Excluding DTC training):

Title of the training	Duration days, hours, or minutes, etc	Organization/institution organized the training
421	4201	4202
422	4211	4212
423	4221	4222

V. Client counseling and antibacterials use history

501. On average, how many clients do you see (serve) per day in this health facility? ____per day

502. Do you ask your clients on their antibacterial drug use history (prescribed or self-medication) before prescribing? 1.Yes 2.No

503. If yes to question number 502, how common is self medication among your clients?

1. Common 2.Sometimes 3.Rare/none

504-6. If your answer to question number 503 is common, please list three types of antibacterials commonly used for self-medication and the possible health problem

Name of antibacterial self-medicated	Health problems for self-medications
504	5041
505	5051
506	5061

507. Do you counsel your clients why you prescribed antibacterial drug and the importance of treatment adherence 1.Yes 2.No

508. If your answer is no for question number 507, what are your main reasons?

_____
_____
_____
_____
_____

509. Do clients demand to prescribe certain antibacterial drugs? 1. Yes 2. No

510. Any other comments related to antibacterials use, resistance and containment. _____
_____
_____

This is the End
Thank you!

Annex: Tool 3: Antibacterial Dispensing Practices Assessment

You Do Not Have to Write Your Name. It is Anonymous.

Dear Participant:

You are purposively selected to be part of this assessment. It is a self-administered questionnaire, which may take between 20-30 minutes to complete.

The purposes of this survey are to assess the existing ANTIBACETRIAL MEDICINES USE PRACTICES AND RESISTANACE PATTERNS in Ethiopia and concur on certain standards and issues subsequently. Your responses to the following questions have paramount importance to you as a professional and to our country at large in the design of evidence-based intervention strategies to promote rational use; prevent and contain antimicrobials resistance. Feel free to provide the actual practice.

This assessment is the collaborative effort of many institutions.

THANK YOU IN ADVANCE FOR AGREEING TO PARTCIPATE IN THIS ASSESSMENT

I: General Information

101. Name of health facility:

_____

106. Level of the facility:

1. Central Referral Hospital
2. Regional Referral Hospital
3. Zonal Hospital
4. District Hospital
5. Health Centre

107. Age of the respondent: _____ years

108. Gender: 1 Male 2 Female:

109. Qualification:

1. B. Pharm. + M. Sc. (specialization)_____
2. B. Pharm.
3. Pharmacy technician (diploma)
4. Pharmacy Certificate
5. Other (specify): _____

110. Which university or college did you graduate last in health science?_____

111. Year (s) of service in drugs dispensing practice after graduation? _____ Years

112. Currently, where do you practice drugs dispensing practices (including this facility)?

Type of Facilities	Practice (Y/N)	
Public health facility	Yes	No
Private health facility	Yes	No
NGO health facility	Yes	No

113. On average how many patients do you serve per day?

_____

114. Have you taken any in-service courses or trainings on antibacterial? 1.Yes 2. No

115. If your answer is yes to question 114, please describe last 3 courses or trainings.

Name of Training/Course	Date	Place	Duration
115	1151	1152	1153
116	1161	1162	1163
117	1171	1172	1173

II. Antibacterial Dispensing Practices

201-13. Are you familiar with antibacterial categories listed below? For those your answer is yes, please give at least one example of antibacterial drug:

Antimicrobial Category	Yes/No	Examples
201. Penicillins (all types)		2011.
202. Penicillin's +ß lactamase inhibitors		2021.
203. Cephalosporins		2031.
204. Aminoglycosides		2041.
205. Macrolides		2051.
206. Quinolones		2061.
207. Tetracylines		2071.
208. Sulfonamides		2081.
209. Glycopeptides		2091.
210. Others:		2131.

210-14. For what type of infectious diseases are the following classes of antibacterials used for? For each group please give example of infectious diseases only:

Classes of Antimicrobial	Example of infectious diseases
210. Pencillins:	2141.
211. Cephalosporins:	2151.
212. Aminoglycosides:	2161.
213. Macrolides:	2171.
214. Quinolones:	2181.

215. Which antibacterial would be appropriate for the clinical infections caused by the following organisms?

Infectious clinical cases caused by:	First line (only one drug)	Alternative antibacterials
215. Gram-positive bacterium	2151.	2152.
216. Gram-negative bacterium	2161.	2162.

217. Is there any practice of using an antibacterial drug for prophylaxis use at your facility (Note: Exclude prophylaxis use for Malaria, HIV and TB)

1. Yes 2. No 3. I don't know

218-20. If your answer is yes to Q217, please list THREE specific situations

Antibacterials used for prophylaxis	Clinical conditions or reasons
218.	2181.
219.	2191.
220	2201.

III. Patient Counseling Practices During Dispensing

301. On average, how much time do you spend per patient when you are dispensing and counselling your clients on antibacterials?

1. Less than one minute
2. 1-2 minutes
3. Greater than 2 minutes

302. On average how much time do you think will be needed in dispensing and counselling of antimicrobials?

1. Less than one minute
2. 1-3 minutes
3. Greater than 3 minutes

303. If less than one minute, indicate the reason why your counselling time is less than one minute (Please select all that applies to you)

1. I thought it is sufficient time
2. Patient load
3. Poor infrastructure (physical barrier, no counselling room)
4. Lack/shortage of drug information resources
5. Lack of staff motivation
6. Clients do not listen to me
7. Others explain)_____

304. Do you ask your clients about antibacterial drugs use history (prescribed or self-medicated)?

1. Always 2. Sometimes 3. Never

305. If yes to question number 304, how common is self medication among your clients?

1. Common 2.Sometimes 3.Rare/none

306. List THREE antibacterials that are most frequently self-medicated and the health problems or reasons for self-medication:

Name of antibacterial	Health problems (reason) for self-medication
3061.	30611.
3062.	30621.
3063.	30631.

307. Do you have/use written materials or adherence aids for your clients that describe or show dosage and adherence with the antibacterial regimen?

1. Yes 2. No

308. If your answer is yes to Q307, please list the type of materials or aids:

_____
_____

309. Do you have any feedback mechanism in place to ensure patients' adherence to the dispensed antibacterial treatment?

1. Yes 2. No

310. If your answer is yes to Q309, please mention some of the mechanisms you are using: _____
_____
_____

IV. Antibacterial Resistance Containment Practices

401. Do you consider culture and sensitivity test is necessary prior to antibacterial use?

1. Always 2. Sometimes 3. Never

402. What are your reasons? _____

_____

_____

403. Have you dispensed antibacterials that were not the first drugs of choice?

1. Always 2. Sometimes 3. Never

404-6. If your response is Always or Sometimes to Q403, please list THREE clinical conditions where you have dispensed antibacterials that were not first choice?

Clinical diagnosis	Antibacterial used (not drug of choice)	Drug of choice	Reason
404	4042	4041	4043
405	4052	4051	4053
406	4062	4061	4063

407. Do you know any antibacterial(s) that are no longer used in your facility because of resistance?

1. Yes 2. No

408-10. If your answer is yes to Q407, please list down THREE antibacterials that are no longer effective, the indication(s), and alternative antibacterial(s) being used.

Resistant Infectious bacteria	Antibacterials not working to treat diseases caused by these bacteria	Alternative antibacterial
408	4081	4082
409	4091	4092
410	4101	4102

411-25. What do you think are the factors that might have contributed to antibacterial drugs resistance in YOUR facility?

Factors for antibacterial drugs resistance	**Yes/No**
411.Prescribing the wrong antibacterial drugs	
412.Prescribing antibacterial when not needed	
413. Empirical prescribing (without lab investigation)	
414. Lack of diagnostic laboratory facilities	
415.Lack of treatment and/or dispensing guidelines	
416.Lack of continuing education and updated information for prescribers and dispensers	
417.Lack/inadequate infection control in the health facility	
418.Lack of patient counseling on drug adherence	
419. Lack/poor antibacterial treatment adherence by clients	
420. Patients demand prescribing for antibacterials	
321.Lack/shortage of antibacterials	
322. Poor quality antibacterials	
323. Others (specify	

V. Sources of Information and Trainings on Antibacterials Use and Resistance

501. How do you describe the frequency of your communication with prescribers' at your health facility on antibacterials use?

1. Always/regularly 2. Sometimes 3. Rarely/none

502. How frequent are you visited by pharmaceutical company representatives (promoters) of antibacterials?

1. Always/regularly 2.Sometimes 3.Rarely/none

503. Have you received updated information on antibacterials and bacterial drug resistance over the past one year?

1. Yes 2. No

504-12. If yes to Q503 (received information), what were your sources of information?

Source of information	Yes/No
504. Scientific journals	
505. Scientific events/conferences	
506. News letters/magazines	
507. Promotion materials	
508. Internet	
509. Textbooks	
510. Continuing education	
511. Standard treatment guidelines/drug lists/formularies	
512. Other sources (Specify):	

513. Any other comments _____

_____

_____

This is the End
Thank you!

Annex: Tool 4: Antibacterials Knowledge and Perception: Patient Exit Interview

Data collector guide

Clients who are going to be interviewed are those who fulfill the following criteria:

- Adults and healthy looking
- Clients who give consent to be interviewed
- Clients prescribed and dispensed with antibacterial in the health facility

Politely greet and introduce yourself. But do not ask the name of the interviewee, it is anonymous.

Tell the purposes of this survey are to assess the existing ANTIBACETRIAL MEDICINES USE AND RESISTANACE PRACTICES IN Ethiopia and concur on certain standards and interventions subsequently. Your responses to the following questions have paramount importance to you as an individual and to our people at large in the design of evidence-based intervention strategies to promote rational use; prevent and contain antimicrobials resistance.

This assessment is the collaborative effort of many institutions.

Ask for consent; if s/he is willing (tell also he/she may not respond to any of the questions in the process even during the interview.

THANK IN ADVANCE FOR AGREEING TO PARTCIPATE IN THIS ASSESSMENT

- Ask the questions exactly as they are written in the questionnaire.
- If you find out that the patient do not know how to take the antibacterials, please link with the appropriate provider for clarification before s/he leaves the health facility.
- The location of the interview should be in close proximity to the pharmacy to have easier access to the patient, and interview should be done after the prescribed antibacterial are dispensed.

I. Respondent characteristic:

101. Gender: 1. M 2. F

102. Age (years): _____

103. Education:
1. Literate (able to read and write) 2. Not literate

II. Proper labeling: Politely request the client to observe the dispensed antibacterial label. Then mark Yes or No (201-204. Mark Y/N after observing the label)

Name of the drug **(Y/N)**	Dosage form **(Y/N)** (Oral/injection)	Strength **(Y/N)**	Dose **(Y/N)**	Frequency **(Y/N)**	Duration **(Y/N)**	Others (specify)
201	2011	2012	2013	2014	2015	2016
202	2021	2022	2023	2024	2025	2026
203	2031	2031	2033	2034	2035	2036
204	2041	2042	2043	2044	2045	2046

Note it may be simple to ask the following questions at the same time while observing the label.

III. Knowledge about the prescribed and dispensed Antibacterials (305-8. Ask the client and fill as replied appropriately. Exclude topical dosage forms)

Name of the drug	Route	Dose	Frequency	Duration	Indication	Others (specify)
305	3051	3052	3053	3054	3055	3056
306	3061	3062	3063	3064	3065	3066
307	3071	3072	3073	3074	3075	3076
308	3081	3082	3083	3084	3085	3086

IV. Opinion on the counseling services the patient received from prescriber and dispenser

401. Are you satisfied with the counseling services of the prescriber?

1. Y 2. N

402. If not, why not? _____
_____

403. Are you satisfied with the counseling services of the dispenser?

1. Y 2. N

404. If not, why Not? _____
_____

405. Do you have any other comments about the counseling services you get today? _____
_____

V. Perception about antibacterials use and resistance

501-3. I am going to mention some of the antibacterials; would you please share me the following information about the antibacterials? (The following list should be other than prescribed and dispensed; mark Y/N for each response)

Drug	Know Name of the drug	Dose	Frequency	Duration	Indication
501. Ampicillin		5011	5012	5013	5014
502. Amoxicillin		5021	5022	5023	5024
503. Tetracycline		5031	5032	5033	5034

504. Are the above antibacterials used for pneumonia?
1.Y 2.N 3. Don't know

505. Are the above antibacterials used for watery diarrhea?
1Y 2. N 3. Don't know

506. Are the above antibacterials used for Cold?
1. Y 2. N 3. Don't know

507. In the past, have you asked your provider for any antibacterials?
1. Y 2. N

508. Did you ever stop taking before finishing any prescribed antibacterial?
1. Y 2. N

509. If (yes to Q508) you stop taking before finishing, what were your reasons? (Mark the response)
1. Condition improved
2. Condition did not improve/did not think it was working
3. Side effect of antibacterials made me sick
4. Was told to stop by a health provider
5. Did not have enough money to buy for the entire course
6. Was not given enough
7. Do not like to take antibacterials
8. Forget to take
9. Other (specify) _____

510. If you get better before finishing the prescribed antibacterials, what will you do? (Mark the response)
1. Will continue to take or use until finished
2. Stop taking or using the antibacterial
3. Keep the antibacterials to use for another time
4. Consult health service providers
5. Other, specify _____

511-4. Can you tell me some of the problems that might occur when you don't complete the full course antibacterials therapy? (Please mark all that apply)

Problems	Experience (Y/N)
511. Illness will not be improved or illness recurrence	
512. Antibacterials resistance	
513. Wastage of the antibacterial or money	
514. Others (specify_____	

515. Have you ever known or heard that some of the antibacterials are no longer working for some illnesses?

1. Y 2.N

512. If yes to Q. 515 (known or heard about resistance), what do you think are the reason(s)?

1. Using the wrong antibacterial
2. Stop to take antibacterial before completing the full dose
3. Insufficient amount of antibacterials
4. Sharing of antibacterials with someone
5. Poor quality antibacterials
6. Other (specify) _____

517-22. If yes to Q. 515 ((known or heard about resistance), where did you hear?

Source of Information	Yes/No
517. Health care provider	
518. Radio	
519. TV	
520. News paper or magazine	
521. Friend/Relative	
522. Others (specify):	

523-8. If yes to Q.515 ((known or heard about resistance), can you mention some of these antibacterials that used to work in the past for fighting infections but no longer working? (Medicines for which antibacterials resistance or drug resistance has occurred?)

Antibacterials with resistance	Mentioned (Yes/No)
523. Ampcillin	
524. Amoxicillin	
525. Tetracyline	
526. Chloramphenicol	
527. Cotrimoxazole	
528. Others (specify	

529. Do you know the difference between antibacterials and analgesics?

1. Y 2. N

530. What is it? _____
_____

V. Practices related to self-medication with antibacterial use (general and other than prescribed.

601. Have you ever self-medicated antibacterial (without prescription)? 1.Y 2.N (If no, please proceed to question number 608).

602. If yes to Q601, Why? _____
_____

603-6. If yes to Q601 (self-medicated), where did you obtain these antibacterial?

Drug source	Yes/No
603. Purchased from pharmacy	
604. Obtained from family/friend/neighbor	
605. leftover antimicrobials at home	
606. Others, please specify	

607. Do you keep medicines at home?

1. Y 2. N

608. If yes to Q607, to the above question, are antibacterial drugs present among them?

1. Y 2. N 3. Don't know

609- 11. If yes to Q608, please list them and respond to associated questions in the table below

Name of antibacterial drug	Indication	Dose regimen	Storage condition	Expiry date
609	6091	6092	6093	6094
610	6101	6102	6103	6104
611	6111	6112	6113	6114

613. Any other comments? _____
_____

The End . Thank You

Annex: Tool 5: Document Review: Surgical Antibacterials Prophylaxis Use
Key: Y/N = write yes if antibacterial were prescribed before, during or after the surgical

Name of Health facility:_____ Data Collector: _____

	Surgical procedure	Antibacterial Prophylaxis (Y/N)	Antibacterial used (name, dosage form)	Dose	Total # of doses per day	Total # of doses	Remark
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							

Annex: Tool 6: Document Review: General In-patient in Medical Department (AB= antibacterial; C&S= Culture and Sensitivity

Name of Health Facility:						**Data collector:**					
	# of days admitted in HF	Final Diagnosis	AB Rxed Y/N)	# of ABs	C & S sent (Y/N)	Antibacterial					
						Name	Generic Y/N	Dosage form, strength	Dose	# per day	# of days Rxed
1											
2											
3											
4											
5											

Key: # = Number of sampled patients records reviewed the last one year; Y/N = write Y if the information required is present in the record and N if absent. Please, copy as is written on the record.; If the numbers of antibacterial are more than one please fill the information in each sub-row given in the format.

Annex: Tool 7: Document Review: General Prescription Review

Key: Y/N = Yes if required information is present and No if required information is absent.

- #: Represent client ; Date Rx = data prescribed
- Standard Rx Paper: if the prescription (Rx) paper is a standard one containing relevant health facility and other information, record as 'Y'. Or otherwise 'N'.

#	Prescription order related		Patient related information			Disease related	Antibacterial related information								Prescriber related information		
	Std. Rx Paper used **Y/N**	Date Rxed **Y/N**	Name **Y/N**	Sex **Y/N**	Age **Y/N**	Dx	AB Rxed **Y/N**	Name	Generic **Y/N**	DF **Y/N**	Strength **Y/N**	Dose **Y/N**	Freqn **Y/N**	Duration **Y/N**	Name **Y/N**	Qualf **Y/N**	Sign **Y/N**
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	

#	Prescription order related		Patient related information			Disease related	Antibacterial related information								Prescriber related information		
	Std. Rx Paper used **Y/N**	Date Rxed **Y/N**	Name **Y/N**	Sex **Y/N**	Age **Y/N**	Dx	AB Rxed **Y/N**	Name	Generic **Y/N**	DF **Y/N**	Strength **Y/N**	Dose **Y/N**	Freqn **Y/N**	Duration **Y/N**	Name **Y/N**	Qualf **Y/N**	Sign **Y/N**
9																	
10																	
11																	
12																	
13																	
14																	
15																	

- If there are more than one antibacterial per prescription, please fill out drug related information in another row for each additional. antibacterial
- Dx = diagnosis (including that written as ICD number); AB = Antibacterial; DF = dosage form; Freqn = Frequency
- Drug name should be recorded as written.