Preservice and Post-Basic Nursing Training Curricula for Registered Nurses in Zambia: Curriculum Review and Expert Interviews to Assess Antimicrobial Use and Antimicrobial Resistance Content, March 2006

Muriel Syacumpi

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Rational Pharmaceutical Management Plus
Center for Pharmaceutical Management
Management Sciences for Health
4301 N. Fairfax Drive, Suite 400
Arlington, VA 22203 USA
Phone: 703-524-6575
Fax: 703-524-7898
E-mail: rpmplus@msh.org

Strategic Objective 5

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Rational Pharmaceutical Management Plus
Center for Pharmaceutical Management
Management Sciences for Health
4301 North Fairfax Drive, Suite 400
Arlington, VA 22203 USA
Telephone: 703-524-6575
Fax: 703-524-7898
E-mail: rpmplus@msh.org
Web: www.msh.org/rpmplus

CONTENTS

ACRONYMS

AIDS	acquired immunodeficiency syndrome
AMU	antimicrobial use
AMR	antimicrobial resistance
ARV	antiretroviral
BSc	bachelor of science
CBOH	Central Board of Health
GNC	General Nursing Council [Zambia]
HIV	human immunodeficiency virus
MoH	Ministry of Health
PBL	problem-based learning
PRA	Pharmaceutical Regulatory Authority
RN	Registered Nurse
RUM	rational use of medicines
STGs	standard treatment guidelines
TB	tuberculosis
UNZA	University of Zambia
UTH	University teaching hospital
WHO	World Health Organization

EXECUTIVE SUMMARY

Despite the significant strides in fighting disease and infection brought about by the discovery of antibiotics, some bacteria have developed ways in which to outwit the effects of antibiotics. Widespread use of antibiotics is thought to have spurred evolutionary changes in bacteria that allow them to survive these powerful drugs. Antibiotic resistance presents two big problems: it makes it more difficult for the body to purge itself of infections, and it heightens the risk of acquiring infections in a hospital. It is in this vein that antimicrobial resistance (AMR) becomes of utmost importance in the medical field.

Zambia is one of the countries concerned with the high levels of AMR, rational use of antimicrobials, and the issue of containment of AMR. With the emergence of newer medicines on the market and easy unregulated access to some of these medicines by various individuals in the communities, the need for the education of health providers to help with the containment of the problem cannot be overemphasized. The commissioning of this study to assess the status of AMR/antimicrobial use (AMU) training in schools is therefore important as a starting point. A review of the curricula for the graduate nursing program at the University of Zambia, Department of Post-Basic Nursing, and the curricula for Registered Nurse (RN) training programs in Zambia was undertaken to assess how topics on AMU and AMR were addressed in those curricula. The review process was also aimed at identifying gaps in the curricula based on the coverage and programming of the AMR/AMU topics in the training plans.

The first phase of the study consisted of a desk review of the curricula, identifying courses within which antimicrobial topics are integrated, the periods when the topics are taught, the amount of time allocated, and whether students are examined on the topics. The second phase involved conducting in-depth interviews with key officials with links to the teaching programs in the nursing schools. That group included those persons involved in training, those responsible for the regulation of training institutions, and those responsible for policy formulation. The persons interviewed were officials from the General Nursing Council (GNC), which regulates training, certification, and registration of all nurses to practice and had recently guided the review and revision of curricula for all nurse training programs in Zambia; the Chief Nurse in the Ministry of Health (MoH) in order to obtain the government's stand on the issue of AMR/AMU; tutors in governmental nurse training institutions; tutors from the newly opened private nurse training schools; guest lecturers in microbiology and pharmacology; three recent nursing graduates; and three senior student nurses. These in-depth interviews were a vital source of information relevant to this study.

The interviews further solicited information on how the subjects wanted related training to be done better or improved. Annexes 1 and 2 show the curriculum course content for the three-year training for the preservice and post-basic graduate programs. Some key literature was also reviewed to help put the issues of AMR and AMU into the context of this study (References).

The Post-Basic curriculum was reviewed to provide insight on how well prepared the graduates from the program were to be able to teach in the nursing schools, especially teaching AMR/AMU, infection prevention, and other related topics. The findings show that very little

time was devoted to AMR and AMU, with the Post-Basic training program allocating only 13 hours in a semester to teach microbiology, within which topics of AMR/AMU and other related topics are taught. Although the curriculum indicates 6 hours of lecture contact per week as an ideal situation, that is not the case.

The two broad areas that were reviewed at both post-basic and preservice levels in this study were AMU and AMR and related topics, such as infection prevention, patient education, and rational use of medicines (RUM).

Antimicrobial Use and Antimicrobial Resistance

The two curricula reviewed and the ensuing interviews show that antimicrobials have been adequately covered in different courses and application of such knowledge is guaranteed because students are normally examined—as is the case in the preservice programs where examinations are concerned with application of all knowledge acquired during the three-year period. The student is therefore expected to have knowledge on antimicrobials and an understanding of when, how, and why these apply in patient care. However, their indiscriminate prescription has had an adverse effect on use because of the many resistant strains being seen today. The curricula talk about drugs of choice but do not adequately teach the process of prescribing effectively. Students are taught prescribing principles, drug interactions, and adverse drug reactions and effects. Antimicrobial resistance is mentioned, but the teaching programs have not been clear in ensuring the subject adequately addresses how to find further ways of containing the problem.

Rational Use of Medicines

Respondents also expressed concerns on the variations in the levels of detail being taught to students in schools. The University Teaching Hospital (UTH) has specialists that participate in teaching in the nurse training, and their understanding is at a different level. In other hospitals, however, those experts are not available, thus resulting in the nurse tutors having to cover the topics. RUM is being compromised because nurse tutors may only discuss issues pertaining to AMU superficially, especially those coming from hospitals where interaction with specialists is minimal. Most respondents observed that the situation has resulted in nurses not challenging some of the doctors' prescriptions. The GNC initiative in developing a guide to prescribing for the nurse is an effort that will need to be supported. Having said this, the curricula for both programs talked about RUM, but the topic does not stand out separately and is not adequately covered. The discussions on different disease conditions do talk about the drugs of choice (although nonavailability or poor supply of medicines does affect what the drug of choice may be), the mechanism of action, side effects, and length of use.

Infection Prevention

The preservice nursing curriculum is strong in the area of infections and infection prevention. The topics are discussed in such courses as medicine, surgery, pediatrics, obstetrics and gynecology, public health, and the related nursing interventions. The topic is discussed at different levels of training, and the daily practices in patient care always emphasize hand washing before and after every procedure. This also emphasizes in many procedures the importance of aseptic techniques, and promotes them as ways to prevent the spread of infections. Students are comprehensively exposed to related clinical practice; however, the practice of infection prevention is crippled by lack of essential supplies. Topics on immunization are also a strong component of the curriculum. For both programs, students are provided with opportunities to work in the communities where they reinforce what has been taught in class.

The post-basic program is very weak in the teaching of infection prevention. The level of effort in teaching the topic varies and is mostly dependent on the lecturer's interest and prior orientation.

Antimicrobial Resistance

This area had been identified during the assessment as an area of greater concern. The curriculum review and in-depth discussions revealed that the schools do appreciate the dangers of such resistance and expressed the need for schools to urgently address the resistance problems, but no clear strategy existed on how the issue could be addressed. The topic is covered when teaching related subjects but not in greater detail. It is mentioned as one of the negative effects of antimicrobial treatment. The two programs are very weak in the area of AMR.

Patient Education

Respondents were also in agreement on the importance of teaching patients about the need for adherence to prescribed medicines. The curriculum emphasizes the importance of patient education as a community approach to reducing AMR. Patients need to know the importance of completing treatment, of taking medicines as instructed by the health providers, of not sharing medicines, of storing medicines safely, and of discouraging self-medication.

From the foregoing, the review has been able to establish the emphatic need to refocus effort in addressing AMR issues in both the preservice and post-basic nursing programs. The study has further established the need to address other factors dictating the current situation, such as lack of laboratory facilities and inadequately trained tutors. All stakeholders should agree on ways and means of dealing with AMU and AMR.

Recommendations

- The curriculum for nurses in both programs should be reviewed, including topics on AMR.
- Related components of the two curricula should be revised to clearly state what needs to be taught so that anyone teaching the subject provides the same information.
- Funding should be made available for the GNC to initiate training of nurses in prescribing skills and to take the opportunity to teach topics on AMU, AMR, and AMR containment.
- The lecturers who teach and supervise student nurses in the clinical areas need to be oriented to AMU and AMR, injection safety, and infection prevention so that they can prepare the learners better.
- Practical classes should be provided during training.
- Standard treatment guidelines (STGs) and the Essential Drug List should be made available to all student nurses, qualified nurses, and other concerned health providers.
- Essential medicine security should be improved and safeguarded against stock-out of medicines.
- More laboratory assistants should be trained and made available to conduct investigative tests, and the required laboratory resources should be made available.

BACKGROUND INFORMATION

Context

The World Health Organization (WHO) fact sheet *Use of Antimicrobials Outside Human Medicine and Resultant Antimicrobial Resistance in Humans* (WHO 2002) describes antimicrobials as natural or synthetic medicines that inhibit or kill bacteria. This capability makes antimicrobials unique for the control of deadly infectious diseases caused by a large variety of pathogenic bacteria. The discovery of antibiotics or antimicrobials for human medicine in the 1940s provided a positive development and change to management and treatment of different conditions and infectious diseases—"[antibiotics] transformed medical care and dramatically reduced illness and death from infectious diseases."[1] Today, however, this picture has changed because most bacterial infections are becoming resistant to antimicrobials, a factor that is now posing a danger to the lives of those having a need for the antimicrobials. Most of the rising AMR problem in human medicine is caused by the overuse and misuse of antimicrobials by doctors, other health personnel, and patients. It is a fact that the continued use of antibiotics without appropriate monitoring will result in the development of antibiotic-resistant strains of bacteria. Appropriate monitoring includes accurate diagnosis and correct use of appropriate antimicrobials. Those are some of the positive factors that will contribute to the reduction of AMR. However, to reduce AMR, the environment within which clients/patients are being managed needs to be carefully reviewed.

The emergence of resistance strains of microorganisms like the human immunodeficiency virus (HIV), *Mycobacterium tuberculosis* (TB), and *Streptococcus pneumonia* has created challenges to antimicrobial use in hospitals and communities. Bacterial resistance means that the antimicrobials have no effect on the bacterium or it is resistant to the antibiotic. When AMR occurs in the community it becomes a public health concern, because the illness and resulting suffering are prolonged. According to the National Institute of Allergy and Infectious Diseases fact sheet, *The Problem of Antibiotic Resistance* (NIAID 2004), "Tuberculosis, malaria, gonorrhea and childhood ear infections are more difficult to treat today than they were a decade ago. Drug resistance is an especially difficult problem for hospitals because they harbor critically ill patients who are vulnerable to nosocomial infections. Heavy use of antibiotics in these patients hastens the mutations in the bacteria that bring about drug resistance."

The issues in AMR that urgently need to be addressed today include training of health providers, patient education, availability of resources for laboratory analyses, constant and sustained availability of medicines, and prescribing patterns. To strengthen interventions aimed at patients and the general community and those that are to be carried out by the prescribers, the WHO *Global Strategy for Containment of Antimicrobial Resistance* (2001, 6) recommends the following interventions—

[1] Centers for Disease Control and Prevention (CDC). 2006. "About Antibiotic Resistance." <http://www.cdc.gov/drugresistance/community/anitbiotic-resistance.htm> (accessed Aug. 25, 2006).

- **Patients and the General Community Education**
  - Educate patients and the general community on appropriate use of antimicrobials.
  - Educate patients on the importance of measures to prevent infections, such as immunization, vector control, use of bednets, etc.
  - Educate patients on simple measures that may reduce transmission of infection in the household and community, such as handwashing and food hygiene, etc.
  - Encourage appropriate and informed health care seeking behavior.
  - Educate patients on suitable alternatives to antimicrobials for relief of symptoms and discourage patient self-initiation of treatment, except in specific circumstances.
- **Prescribers and Dispensers Education**
  - Educate all groups of prescribers and dispensers (including drug sellers) on the importance of appropriate antimicrobial use and containment of antimicrobial resistance.
  - Educate all groups of prescribers on disease prevention (including immunization) and infection control issues.
  - Promote targeted undergraduate and postgraduate educational programs on the accurate diagnosis and management of common infections for all health care workers, veterinarians, prescribers and dispensers.
  - Encourage prescribers and dispensers to educate patients on antimicrobial use and the importance of adherence to prescribed treatments.
  - Educate all groups of prescribers and dispensers on factors that may strongly influence their prescribing habits, such as economic incentives, promotional activities, and inducements by the pharmaceutical industry.

Zambia today faces a critical shortage of prescribers of medicines. Health facilities are being manned by various categories of staff with no or inadequate knowledge and skills to prescribe and dispense medicines simply because they are found in that health facility. To compound the situation, most of these health facilities do not have adequate equipment, reagents, and other resources to carry out laboratory tests to determine the appropriate antimicrobials to use.

The National Drug Policy (MoH 1999) states its objective as being “to eradicate unnecessary and inappropriate drug use at all levels of society,” and as such, prescribing and dispensing were to be aggressively controlled. It further adds that drugs on the National Essential Drug List were to be allocated to certain levels of use, such as primary health care, first-level referral, and so on. This policy would further encourage practitioners to handle only a small number of medicines in whose use they could gain a lot of knowledge and expertise. Furthermore, “The resolution by the World Health Assembly for member countries to encourage appropriate and effective use of antimicrobials, to prohibit the dispensing of antimicrobials without the prescription of a qualified

health 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"(WHO 2002, 24) is a very important development in guiding medical practice to address issues relating to AMR/AMU and AMR containment. The findings and recommendations of this curriculum review will provide the avenue by which the government of Zambia through the MoH can address the problems of AMR.

Scope of Work for the Consultancy

Antimicrobial resistance has been and continues to be a major area of concern in the medical field. Governments and their cooperating partners have been working on ways to contain this problem. Various approaches are being taken to contain AMR. In Zambia, the U.S. Agency for International Development is supporting the development and implementation of a country-level approach toward building local advocacy, a coalition, and a package of activities to combat the growing problem of AMR.

Although advocacy is the main thrust of the Zambian program, education, regulation, surveillance, and research are the four major intervention areas identified to support containment of AMR. As part of the overall AMR containment initiative in Zambia, this consultancy reviewed the undergraduate curriculum for nurses at the preservice and post-basic levels. The inclusion of the post-basic program in the review process was aimed at providing information on the preparation of nurses who are involved in the nurse training programs at the preservice levels.

The review of training curricula for undergraduate/preservice health professionals will generate information on what and how much of AMR-related topics are being addressed in the preservice training. Such an assessment will identify any gaps that need to be filled and assist in the subsequent process of developing recommendations on suitable modifications and additions required in the Zambian context to ensure adequate coverage of these topics during the training.

Assessment Methodology

The assessment was conducted in two phases, first a review of the curricula for both the post-basic nursing program of the University of Zambia (UNZA) and the preservice curricula for registered nurses. Other relevant documents that have bearing on the training of nurses in the preservice program were also reviewed. The documents included the RN curriculum and school of medicine reference book, the Nurses and Midwives Act, the scope of practice for nurses, and the training learning guides. Second, in-depth interviews were conducted with heads of institutions, lecturers, tutors in public and private schools, guest lecturers, regulatory bodies, and senior government officials. Focus group discussions with recent graduates (interns) and senior students in the preservice program were also held in two separate sessions. The entry levels of the preservice and post-basic programs differ, and the AMR-related content of the curricula must reflect the differences.

FINDINGS

Registered Nursing Curriculum (Preservice Nursing Program)

Students entering the preservice nursing program have a minimum of five O-level qualifications, and the program runs for three years. The training program allows students to be exposed to both theory and practical experiences in a phased manner. It is arranged in a block system that ensures that at every stage of training, the student is given an opportunity to practice in the clinical areas and in the community, where knowledge gained from the theory classes and practical sessions is put into practice. The student from this program qualifies as an RN with key skills to provide health care and also manage health facilities.

In accordance with the RN curriculum, the aim of the program is to train a nurse who will be self-directed, analytical, knowledgeable, skillful, and able to respond to changing and emerging diseases and contribute toward improving the quality of care.

The program objectives state that the graduate nurse shall be able to—

- Assess health needs of individuals, families, groups, and communities, using various nursing models
- Apply knowledge from basic sciences (behavioral and biological) in the management of patients and clients
- Initiate and conduct operational research
- Develop a multidisciplinary and team approach in his or her work
- Work in partnership with groups and communities in the assessment, planning, and implementation of and evaluation of health care
- Recognize and accept the needs for self-direction, professional awareness, and continued professional growth
- Apply various innovative methods of learning and education in order to be self-directed in addressing different health care issues
- Apply knowledge on information technology in day-to-day work
- Serve as a role model in the nursing profession

The three-year program of study is arranged in a block system where the student systematically builds on the knowledge previously gained. There are two lecture periods in each of the first two years, and one in the third year. Students attend theory classes and are then exposed to clinical practice in the appropriate hospital departments or health facilities or in the community for application of theory to practice (Table 1).

During the foundation period, students learn about infection prevention and related topics. These topics are taught in different courses like Fundamentals of Nursing and Public Health Nursing I and II. In microbiology, topics on types of microorganisms, microscopic examination, cultivation and identification of microorganisms, antimicrobial susceptibility, nosocomial infections and opportunistic infections, sterilization, and disinfection are taught.

In Pharmacology I and II, Surgery and Surgical Nursing, and Pediatrics and Pediatric Nursing, AMR/AMU-related topics are clearly stated; however, in other courses such as Medicine and Medical Nursing and Integrated Reproductive Health, the topics relating to AMR and AMU are not categorically mentioned or stated in the curriculum, but it is assumed the tutor or lecturer will make reference to or discuss those issues. Infection prevention-related topics appear to be mentioned frequently in the different courses.

Determining the actual number of hours spent on these topics was difficult. The curriculum states the total number of hours for each subject and the contact hours per course per week (Table 2); however, the actual or minimum amount of time allocated to each component is not stated because topics are part of the total number of hours allocated to the course. In addition, the topics are grouped and taught as a whole.

As the student progresses through the training, the time allocated to clinical practice increases while that allocated to theory classes decreases.

Determination of the actual time spent on AMR/AMU-related topics in each lecture block was not possible. Discussions during the lectures always make reference to AMR/AMU because information on AMU is applied when discussing management of different conditions.

Table 1. Three-Year RN Programming

Period	Program	Length of Time
Year 1	First lecture block	13 weeks
	Clinical practice*	13 weeks
	Second lecture block	10 weeks
	Clinical practice	12 weeks
Year 2	First lecture block	8 weeks
	Clinical practice	21 weeks
	Second lecture block	8 weeks
	Clinical practice	12 weeks
Year 3	First lecture block	8 weeks
	Clinical practice	38 weeks
	Revision block	2 weeks

Source: GNC 2005.
Note: Examination and vacation periods are not included.
* The clinical practice is done on rotation basis to all medical, surgical, and specialized departments, including fieldwork in urban and rural communities.

Table 2. Actual Hours on AMR/AMU-Related Topics

Year	Period	Weeks	Number of Days/Week	Hours/Day	Total Hours
1	First lecture period	13	5	8	520
	Second lecture period	10	5	8	400
	Clinical practice	32	5	8	1,280
	Total				**2,200**
	Total courses taught 12 Courses with AMR/AMU-related topics				
	Medicine/medical nursing	Related topics			
	Fundamentals of nursing				4
	Public health nursing				4
	Microbiology				4
	Surgery/surgical nursing	Related topics			
	Pharmacology				6
	Actual time spent on AMR/AMU-related topics				**18**
2	First lecture period	8	5	8	320
	Second lecture period	8	5	8	320
	Clinical practice	39	5	8	1,560
	Total				**2,200**
	Total courses taught 8 Courses with AMR/AMU-related topics				
	Medicine/medical nursing	Related topics			
	Public health nursing	Related topics			4
	Surgery/surgical nursing	Related topics			
	Pharmacology				4
	Pediatrics/pediatric nursing	Related topics			
	Integrated reproductive health	Related topics			
	Actual time spent on AMR/AMU-related topics				**8**
3	First lecture period	10	5	8	400
	Clinical practice	38	5	8	1,520
	Total				**1,920**
	Total courses taught	**3**			
	Clinical practice				

Post-Basic Nursing Curriculum (Graduate Nursing Program)

Students who enter into this program are qualified RNs who possess O-level qualifications. Because they are already qualified nurses, they are exempted from the first year and enter the university in the second year, going on to study for three years. Upon completion, the nurse graduates with a Bachelor of Science in nursing degree and is ready to work in any health care setting. The majority of such graduates, however, have gone to teach in the nursing schools.

A review of the UNZA School of Medicine *Reference Book* (2000) shows that 32 courses are offered to students in the second (12 courses), third (13 courses), and fourth (8 courses) years. The training periods do not indicate the number of hours spent on each of the topics; however, it does state the following contact hours per week of each semester (6 lectures, 1 tutorial, and 2 practicals), and a semester is about 13 weeks. For each course listed in the *Reference Book*, the aim, objectives, course content, teaching methods, contact hours, course assessments and examinations, lists of prescribed textbooks, and recommended textbooks are indicated.

The review of the curriculum shows that in the third year, students are taught topics in Bacteriology, which is a component of Systemic Pathology for nurses. Topics covered in Bacteriology include Introduction to Medical Microbiology, Classifications of Microorganisms, Growth and Nutrition of Microorganisms, Antimicrobial Agents, Resistance, Sterilization and Disinfection, Common Infections, Nosocomial Infections and their control.

Students are exposed to lectures in this course once per week in a semester. However, as expressed by the lecturers and graduates from the program, the content and length of exposure to practical teaching in the laboratory is not adequate for nurses who are expected upon graduation to teach in the nursing schools.

The curriculum also revealed that during Community Health Nursing, students are taught prevention and control of communicable diseases, including universal child immunization, importance of health education in prevention and control of diseases, and the role of essential medicines program in prevention and control of diseases. The lecturer teaching Community Health Nursing has to use his or her own initiative to include topics related to infection prevention practices because this subject is not categorically expressed in the curriculum. Therefore, the strength of this teaching will depend on the orientation of the lecturer.

Teaching and Learning Methods

The nursing department of the university uses lecture presentations, tutorials, clinical practices, and case studies. Students are given opportunities to work in the clinical areas of the different branches of medicine for practical experiences. During the time in the clinical areas, the student is exposed to different conditions and also given the opportunity to work on case studies in the areas of practical allocation.

The preservice program also uses teaching/learning situations, including demonstrations and tutorials by the lecturer, followed by return demonstrations by students. The teaching schools

have a coach, or a clinical instructor who has the responsibility of reinforcing whatever theory is taught in class and further introduces students to practical applications of procedures on patients. Some schools (preservice) are using a problem-based learning (PBL) approach, allowing students to conduct their own search for information, write case studies based on the assigned topics, and make presentations to the class with guidance from the tutors (GNC 2004a, 39).

When discussing microbiology and pharmacology, students in the preservice nursing programs were found to have little contact with the laboratory—the laboratory visit was intended to introduce students to some of the equipment, occasionally allow them to view microscopic presentations of red blood cells or some parasites, and the like. Those in the undergraduate program, however, were expected to have some practical experience in the laboratory, a process that has not been happening adequately. The hours spent in teaching the related topics or courses that deal with AMR or containment of AMR are not clearly stated and the time spent on the topics depends on the interest of the person teaching and the level of understanding.

Respondents' Views on AMU, AMR, and Containment of AMR

The majority of key respondents in this review were generally of the view that AMR, containment of AMR, and AMU were critical issues that needed to be addressed by the Government of Zambia. Most respondents indicated that AMU was not being adequately addressed. In Zambia, different categories of unrecognized and unlicensed prescribers and dispensers exist. For example, a qualified RN or even an Enrolled Nurse sometimes has to screen a patient and prescribe medications because no doctor or clinical officer is available. In most cases, the community expects that whoever is working at the health facility is adequately trained to prescribe. Furthermore, the lack of adequate equipment, poor laboratory infrastructure, lack of reagents, and staff shortages have contributed to inadequacy of AMR containment programs in the country. Where doctors are available to prescribe, a nurse will in most cases carry out the doctor's orders without question because she or he is not adequately prepared to understand medicine use, especially antimicrobials. Members of the community believe that treatment is adequate when they are given antimicrobials and thus do not accept other medicines and sometimes will even ask for antimicrobials.

The observed practice of prescribing relates to past experiences where certain antimicrobials were used and provided positive results in patient health. Respondents cited examples of health providers prescribing specific antimicrobials for patients who showed similar symptoms to another who may have responded to treatment without carrying out any laboratory tests to determine the causative organism(s) and the antimicrobial of choice. The practice of sharing medicines is quite common in communities, as is self-prescribing of antimicrobials without seeking medical attention.

Respondents expressed lack of clear understanding of the subject of AMR and containment of AMR; hence, the subject has not received pronounced attention in the preservice programs and the post-basic curricula. The MoH has made efforts to develop treatment guidelines and protocols, but the reality is that those documents rarely reach those they are intended for and end up on the shelves in higher offices.

The GNC recently revised the scope of practice for nurses. The Nurses and Midwives Act, No. 31 (1997) has, among other provisions, a new prescribing role for the nurse. The act states—

> Part VI: Nursing and midwifery scope of practice
> Professional Practice of Nurses and Midwives
> …
> 2) A nurse, midwife or specialist referred to in subsection (1) shall in administering nursing care—
> Prescribe relevant drugs and other pharmaceutical preparations from a list defined by the national drug Formulary Committee constituted under the Pharmacy and Poisons Act

The GNC developed the Drugs and Prescriptions for Nurses and Midwives Guideline in July 2004. This national document was well intended. Among other goals, it was to contribute to making prescribers available as close to the family as possible and to reducing indiscriminate prescribing by nurses and midwives. The guidelines clearly state that nurses will prescribe medicines based on clinical symptoms, laboratory findings, or protocols. However, since the document was developed, the GNC has had no resources to conduct training for nurses, and nurses in practice continue to prescribe. During training, nurses are taught pharmacology during years one and two. Pharmacology, which is a full course, is allocated only 45 hours for each year, compared to a course like Medicine and Medical Nursing, which is also a full course and is allocated 310 and 315 hours in years one and two, respectively. Most respondents were of the view that tutors should teach the details on medicine use during discussions on management of related conditions. This time was felt to be when issues pertaining to AMR could be explained and strategies to contain AMR could be discussed.

The academic staff believe that if AMR and AMU are to be addressed adequately, pharmacology and microbiology courses need to be reviewed and a system of retraining tutors and lecturers in the two areas of specialty has to be instituted. Because those teaching pharmacology are guest lecturers, the depth of the content to be taught should be discussed fully with the school management and agreed on for critical areas like AMR and AMU. The current situation is open to some kind of neglect because different people teach at different times, and the identity of the person teaching always will depend on availability. The curriculum does contain topics in prescribing antibiotics under classification of medicines and issues of antimicrobial use, antimicrobial resistance, and containment of AMR could be adequately addressed under those topics.

Table 3. Summary of Identified Gaps: Preservice Nursing Program*

Discipline	Topics Covered	Identified Gaps
Microbiology	• Science of microbes • Infections, sterilization, disinfection • Antimicrobial resistance	• Rational medicine use • AMR surveillance • Infection prevention • Patient education
Pharmacology	• Antimicrobials and use • Antimicrobial resistance taught at random for individual antimicrobials	• Systematic coverage of antimicrobial resistance, for example, the scope of problem, mechanism of resistance Rational medicine use
Medicine and Medical Nursing	• Infections • Treatment of infections • Drug resistance • Patient education • Coverage of rational medicine use and antimicrobial resistance at random	• Infection prevention • Role of inducement from pharmaceutical firms and counterfeit drugs on AMR • AMR surveillance
Pediatrics	• Infections, vaccinations, treatment of infections • Drug resistance (random) • Rational medicine use, infection prevention • Patient/parent education	• Role of inducement from pharmaceutical firms and counterfeit drugs on AMR AMR surveillance
Obstetrics and Gynecology	• Infections, vaccinations, treatment of infections • Drug resistance (random) • Rational medicine use • Infection prevention	• Systematic coverage of rational medicine use and antimicrobial resistance • Patient education • Role of inducement from pharmaceutical firms and counterfeit drugs on AMR • AMR surveillance
Surgery and Surgical Nursing	• Infections, infection prevention (random) • Treatment of infections • Drug resistance (random) • Rational medicine use	• Systematic coverage of rational medicine use and antimicrobial resistance • Patient education • Role of inducement from pharmaceutical firms and counterfeit drugs on AMR • AMR surveillance

* The program does not require the student to be examined in AMU/AMR, but students are expected to apply AMU/AMR knowledge to management of different disease conditions. A student who may not have an accurate understanding may get away with limited information because the grading of marks is based on the total picture of patient care. This is a major gap in the program.

Table 4. Summary of Identified Gaps: Post-Basic Nursing Program*

Discipline	Topics Covered	Identified Gaps
Medical Microbiology	• Science of microbes • Infections • Antimicrobial agents • Antimicrobial resistance • Sterilization and disinfection • Nosocomial infections	• Rational use of antibiotics • Monitoring efficacy • AMR surveillance • Dangers of indiscriminate AMU • Practical demonstrations • Antibiotic policy • Infection prevention
Community Health Nursing I, II, III	• Prevention and control of communicable diseases • TB/Leprosy • AIDS and sexually transmitted diseases • Malaria • Role of essential drugs program in prevention and control of diseases • Importance of health education in prevention and control of diseases • Infections and nutrition	• AMR surveillance • AMR and the scope of the problem • Patient education in AMU • Rational medicine use • Infection prevention • Role of inducement from pharmaceutical firms and counterfeit drugs on AMR
Maternal and Child Health	• Maternal and child health services • Malaria • Infections, treatment of some infections	• Infection prevention Immunizations • Systematic coverage of rational medicine use and antimicrobial resistance patient education • AMR surveillance
Medical and Surgical Nursing	• Role of the nurse in patient care, • Nursing a patient with urinary tract infections and other medical and surgical conditions and communicable diseases, • Antimicrobial resistance, Patient education	• Pharmacology • Infection prevention • Systematic coverage of prescribing and rational medicine use • Role of inducement from pharmaceutical firms and counterfeit drugs on AMR • AMU and AMR surveillance

* The program does not require the student to be examined in AMU/AMR, but students are expected to apply AMU/AMR knowledge to management of different disease conditions. A student who may not have an accurate understanding may get away with limited information because the grading of marks is based on the total picture of patient care. This is a major gap in the program.

The findings from the interviews and review of the curriculum reveal that in most cases the lecturer decides on the content of the topic; accordingly, content depended on the level of knowledge and skill that the lecturer has.

DISCUSSION AND RECOMMENDATIONS

It became clear from the in-depth interviews that all respondents were concerned with the issue of AMR and AMU. This concern has generally been compounded by the mushrooming of drug stores in the communities, by the different new medicines on the market, and by the lack of medicines in health facilities where patients are expected to buy those medicines. The critical shortages of staff in the health facilities and the general disappearance of persons charged with the responsibilities of prescribing medicines have contributed to irrational medicine use and possibly to AMR. As a general observation, prescribers do not conduct proper investigations before deciding what medicine to use for treatment. Medicines are sometimes prescribed for patients for diseases without knowing the causative organisms, and sometimes patients are not asked whether they have used the medicine before or are on any similar medicines. The apparent recognition by the nursing fraternity that nurses were not adequately prepared to talk about AMR means that their ability to take measures to contain the situation is weakened.

Preservice Nursing Program

Although the preservice curriculum does cover a wide area of topics related to AMU and mentions AMR, gaps have been identified and will need to be addressed.

Because topics in microbiology are presented by guest lecturer, the depth of coverage of the materials will always vary depending on the consistency of those who teach. Schools situated in hospitals that have specialists to teach such subjects are at an advantage because the topics should be adequately covered. Those in schools attached to hospitals that are not teaching hospitals may have difficulties in having lecturers teach in the schools. When that happens, nurse tutors are expected to teach those topics. Without special orientation for the tutors, the topics may not be adequately covered. Thus, the tutors who in the graduate program did not receive adequate information give superficial information on microbiology, pharmacology, and other related courses.

However, the nursing program has been very strong in preparing nurses to prevent the occurrence of infections in different situations. The program of training has provided courses to prepare the nurse and has included at different stages of training information that will equip nurses with abilities to intervene in situations where infections may have opportunities to thrive.

The issue of AMU has been of greater concern even to the GNC, resulting in the development of guidelines that will govern the prescribing of medicines for patients. The curriculum specifically requires that students be given the opportunity to practice in the laboratory, but that does not happen—even at university level. If the university cannot adequately expose students to practical experience in the laboratory, then those same students cannot teach similar content in the preservice program for nurses, thereby creating a learning gap that has been perpetuated over the years.

Fortunately, the preservice program is strong on infection prevention, because the same is not provided in the university program for nurses. In the latter, the lecturer will discuss the topic only when making reference to issues pertaining to infection prevention and related to the topic of discussion. The component of immunizations is very strong in both curricula, and especially in the preservice program students have adequate theory and practical exposure. These topics are covered in pediatrics and also in public health nursing

Post-Basic Program

The exposure of students to AMU and AMR appears to be weak. Because these are the same graduates who teach in the preservice programs, it is critical that the AMR curriculum content is enough to give this group sound AMR/AMU knowledge. This review has established the need to revise the exposure time for the related topics and courses to allow for more exposure in the practical areas. Nurses need to be adequately prepared to be able to challenge irrational prescribing by doctors, thereby reducing AMR. The gaps identified in the post-basic curriculum need to be addressed so that the post-basic program graduates who go on to teach can improve the competencies of the graduates from the preservice program.

Patient Education

Respondents were in agreement about the importance of teaching patients about the role of adherence in taking prescribed medicines. The curriculum has emphasized the importance of patient education as a community approach to reducing AMR. Patients need to know the importance of completing treatment, of taking medicines as instructed by the health providers, of not sharing medicines with others in the community, of safely storing medicines, and of discouraging self-medication.

Antimicrobial Use

Although the curriculum does not talk about AMU and AMR, the course content does discuss the different aspects of causative organisms, how to manage conditions resulting from such diseases/infections, how antimicrobials work, and how to arrive at a medicine of choice. In practice, however, most hospital staff members prescribe without carrying out any laboratory investigations. The excuse of having laboratories that are not adequately equipped has encouraged this lapse in the expected professional process of making prescriptions. The practice in the hospitals and health facilities of prescribing without proper investigations and subsequent prescribing of antimicrobials has contributed to the increase in AMR in the country today.

Rational Use of Medicines

Respondents also expressed concerns on the variations in the depth of subject matter detail being taught to students in schools. The University Teaching Hospital has specialists who participate in

teaching RUM in the nurse training, and their teaching is at a higher level than that in other locations. For example, in some hospitals, these experts are not available, thus resulting in the nurse tutors having to cover the topics. The issue of RUM is in this event being compromised because nurse tutors may discuss issues pertaining to AMU only superficially, especially those coming from hospitals where interaction with specialists is minimal. The situation as observed by most respondents has resulted in nurses not challenging some of the prescriptions. The GNC initiative in developing a guide to prescribing for the nurse is a good effort. Having said this, the curricula for both programs mention RUM. Although it does not stand out as separate topic, it is adequately covered. The discussions on different disease conditions talk about the medicines of choice (nonavailability or poor supply of medicines does affect what the medicine of choice may be), the mechanism of action, side effects, and duration of treatment.

Infection Prevention

The nursing curriculum is strong in the area of infections and infection prevention. The topic is discussed in courses such as medicine, surgery, pediatrics, obstetrics and gynecology, public health, and the related nursing interventions. The topic is discussed at different levels of training, and the daily practices in patient care always emphasize hand washing before and after every procedure. The importance of aseptic techniques during the many procedures and promotion of ways of preventing the spread of infections are also emphasized when students are comprehensively exposed to related clinical practice. However, the practice of infection prevention is crippled by lack of essential supplies for practice. In addition, immunization is a strong component of the curriculum. For both programs, students are provided with opportunities to work in the communities where they reinforce what has been taught in class.

The curriculum review process and the interviews of key informants in this study were able to establish the need to refocus effort in addressing AMR issues in both the preservice and post-basic nursing programs. Furthermore, the process has established that the teaching environment will require calculated adjustments to ensure that other factors, such as lack of laboratory facilities and inadequately trained tutors, which dictate the current situation, will need to be addressed. The recognition of a major problem by the different segments of the health profession should lead to a concerted effort by all concerned to devise ways and means of coming to consensus on dealing with the issues of AMU and subsequent AMR.

Recommendations

- The curriculum for nurses in both programs should be reviewed, including topics on AMR. The topics should be taught early during the first year of training, as students are learning pharmacology and microbiology. Furthermore, this component should be strengthened when discussing related disease conditions by discussing the roles of patients, communities, and health providers in AMR and AMU. The GNC recently revised the curriculum in preservice nursing programs. Specialists from the nursing schools, including post-basic program, microbiology, and pharmacy should now agree on the content of the revised curriculum in

terms of the depth of teaching and contact time. The team should have regular meetings to review the processes.

- The related components of the two curricula should be revised to clearly state what needs to be taught so that anyone teaching the subject provides the same information.
- Funding should be made available for the GNC to initiate training of nurses in prescribing skills and to take the opportunity to teach topics on AMU, AMR, and AMR containment.
- The lecturers who teach and supervise learners in the clinical areas need to be oriented to AMR and AMU, injection safety, and infection prevention so that they can prepare the learners better.
- Practical classes, which are a requirement during the two training programs, should be provided during training, and a mechanism should exist of ensuring that all students have participated and have attained some level of competence.
- STGs and the Essential Drug List should be made available to all nurses in schools and work sites. The guidelines should clearly state the levels of staff who can prescribe and what punitive measures should be taken when a health worker does not follow procedures when prescribing and managing clients on antimicrobials.
- Essential medicine security should be improved and safeguarded against stock-outs of medicines.
- The training of lab assistants should be reintroduced so that more staff members are available to carry out laboratory investigative tests and to take advantage of the current funding in the health sector to equip and make available resources required to carry out laboratory investigations.

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ANNEX 1. INTERVIEW TRANSCRIPTS

Heads of Institutions, Lecturers, Tutors in Public and Private Schools, Guest Lecturers

Mr. Donald Kalolo, Stores Pharmacist

Curriculum content in relation to AMU, AMR, containment of AMR

The curriculum for nurses just outlines the topics to be taught in pharmacology and does not provide the in-depth information on how much details need to be taught. It is not that clear as to what the nurse is expected to walk away with after training. It is not well defined by school on what kind of comprehension of pharmacology the nurse will be expected to have. It is my strong belief that the nurse must be an active team player in health care, and as such she should not accept without question the prescription provided by the doctor. Anyway, if she does not understand issues related to AMR, then she will just dispense the medications without understanding the whys and the how of drug interactions. I have seen nurses just taking orders from doctors without questioning, even when they see the patient is not responding accordingly to treatment.

Programming of topics related to AMR and related containment, AMU, and teaching/learning methodology

Nurses are not exposed to the linkage between pharmacy and other departments—

- Need to be exposed to what is happening in pharmacy.
- Need to have more interaction with the nursing fraternity—the interaction should be beyond the hospital confines.
- Need to teach beyond what is in the curriculum to-day.

The Nurses and Midwives Act now allows nurses to prescribe, the question is—

- What is the legality of the prescription?
- Does the nurse understand the relationship between diagnosis and prescription?
- Hence clinical experience in pharmacy is a must for the student nurse.

I also feel that even at degree level, there is [a] need to look at what nurses are actually doing. Nurses are dispensing: Do they know the interactions of the drugs, diagnosis using laboratory investigation—up to when you are able to prescribe?

The why in the use of the particular treatment in the condition should be a must for all nurses. For example, in the use of antimicrobials, one needs to ask—

> Why are penicillins used? When are they used? How do you substitute? When can you never use the penicillin?

Using lab results, what microorganisms are being destroyed by the chosen antimicrobials? Need for nurses to have comprehensive approach to care of patients.

Multidisciplinary involvement is very important where the nurses, doctors, pharmacy, [and] biomedical sciences work together, for example, in addressing issues of infection prevention on the wards. These topics should be taught in classroom situations and not in workshop but as part of the curriculum. There should be clear guidance on the depth of the subject matter to be taught, not just a listing of topics. Contact time with students should not just be confined to the ward but be extended to the department of pharmacy.

Need for treatment guides for nurses—especially now that we are moving into ARVs [antiretrovirals], where resistance and issues of adherence are being discussed.

Standard books for practice for nurses should be made available, e.g., the Essential Drug List, which is discussed in the classroom, [but] the document is rarely found in the clinical areas and thus not available to the nurse. The nurse has no necessary tool for quick reference.

Do they know what rational drug use is?

Do the nurses have guidelines—for malaria, TB, ARV—adult and children, pregnant women? Curriculum is superficial in the following topics: Biochemistry, Pharmacokinetics.

Preparation of protocols and guidelines, standard treatment guidelines should involve nurses, thereby providing an in-depth preparation for the nurses to make contributions to the development of guidelines.

Infection prevention and immunization

Nurses can be taught how to make a simple solution of alcohol and glycerin in their effort to prevent the spread of infection. There are a number of preventive actions that can be taken. When using disinfectants, nurses should be able to know how they are calculated and understand the concentration, and the pharmacy can help in [making] the training of nurses be practical and in learning how to make solutions for infection prevention in an emergency.

For example, do nurses scrape the floor and take a swab to the labs—so that one knows what microorganisms are around in the environment? For example, chlorine is used from January to December—and does one check whether the chlorine is still effective or not? Nurses should be able to determine contaminants, e.g., in a vaccine, and ask questions about the efficacy of that vaccine.

Recommendations for additions, modifications to the curriculum

Computer skills are a must for nurses so that they are able to browse the Internet and get to know other information on AMR that may not be available in the curriculum.

Multidisciplinary team to address issues on resistance, different departments can work as a team in the efforts to contain the AMR and have input into how the process of resistance happens so that there is accurate understanding of issues of resistance and strategize on how to deal with AMR.

The GNC recently revised the curriculum. Schools should now put a team of specialists from the school, microbiology, pharmacy to agree on the content of the revised curriculum in terms of the depth of teaching and learning.

Mr. John Mwabam, Biomedical Scientist

Curriculum content in relation to AMU, AMR, containment of AMR

What is in the curriculum now? Mechanism of action, Mechanism of resistance, General principles of the use of antibiotics. These topics are under Antimicrobial Chemotherapy and are not enough.

Some nurses will be holding higher positions that require decision making and may sit on committees, e.g., infection prevention committee, [and] their accurate understanding of infection prevention is very important.

Topics in microbiology at university level are taught once per week, which is very inadequate. Antimicrobial chemotherapy, Mode of action of antimicrobial drugs, General principles of the use of antimicrobial drugs, Resistance to antimicrobials are taught.

The emergency of antibiotic resistance is a major concern. The choice of antimicrobials to use is of special importance, as [the] nurse must understand and interpret the sensitivity testing, e.g., the use of penicillin on *Staphylococcus aureus*, [rather] than using other drugs like cloaxacillin, using drugs that are expensive instead of nalidixic acid,for example, which is cheaper, all these factors need to be included in the curriculum. The teaching involves mostly lecture method. Students are not exposed to any practical sessions.

Recommendations for additions, modifications to the curriculum

Nurses should also participate in clinical meetings for these meetings are informative as issues relating to management of patients and AMR are also discussed.

Some drugs should not be prescribed without authority from the consultant.

Mrs. Fridah Zulu, Nurse Education Manager

Curriculum content in relation to AMU, AMR, containment of AMR

Preservice program arrangement:

When nurses come into the program in the first year, basic courses are taught that are aimed at building the nurses' understanding of basic knowledge on kinds of diseases, medicine and surgery, pharmacology introduced to know how medicines are used—period of application of knowledge on disease, fundamentals of nursing, and other related basic courses.

The topics related to AMU are covered in microbiology—when they are taught about infections, immunity, defense mechanism, types of microorganism—does not specially say antimicrobial resistance, but is included in the teaching: the lecturer goes into detail of the specific topic. The content detail also depends on the level of training of the student.

Programming of topics related to AMR and related containment, AMU, and teaching/learning methodology

Students are not prepared in culture and sensitivity to help them determine the type of microorganism. Students visit the laboratory to have an opportunity to look through a microscope and view microorganisms, e.g., malaria parasite, or view the shape of red blood cells.

In pharmacology will learn how to prescribe as they learn the different diseases. Prescribing for nurses is new in the nursing profession in UTH—it is rare for nurses to prescribe.

Microbiology only taught in the first year with 90 hours of theory; [students] visit the laboratory within the 90 hours. Pharmacology is taught during the same period as they are learning medicine, surgery in the first and second year.

Rational prescribing and rational use of drugs are taught by the pharmacist or tutor. In terms of the depth, it is based on already acquired information in the first year. Students are not examined in AMR per se, but the questions asked in the examinations are phrased in such a way that student will discuss the management of patients with different conditions.

[In t]heir tests (2/3) in the examination it is integrated in the other subjects—in a condition. Main expectations are that nurses must be aware of antimicrobials, resistance issues, how to prescribe, and how to have an input into the containment programs.

In UTH students are given opportunity to have rural experience, in urban and rural clinics, and during this period are able to learn about prescribing because these are some health facilities where there is no doctor or clinical officer.

Infection prevention and immunization

Immunization is taught in public health nursing in the first year, and students have practical experiences in the clinics/health centers.

Topics in first year include microbiology in public health; during this period they are exposed to situation of meeting those that are not sick and promote health living habits, including infection prevention.

Recommendations for additions, modifications to the curriculum

There is need for special program—a package specially designed for nurses. Although the curriculum is already full, maybe make time between second and third years or some time created for nurses to be introduced to AMR, AMU, and containment of AMR.

Pharmacology course comes too late—second year—could come earlier. Need for linkages with different departments in the hospital in planning what is to be taught to nurses.

Training of tutors for the various related topics/subjects as not all hospitals have pharmacist or microbiologist to assist in the teaching of nurses. We can have Nurse Tutors specialized in different topics.

Mrs. Salome Zulu, Principal Tutor, RN Training School, UTH
Mrs. Mukoma, Nurse Tutor

The Registered Nurse curriculum prepares the 21st-century nurse with the knowledge, skills, and attitude that will enable the nurse to respond to the changing disease burden, health care needs and demands. HIV/AIDS and the increasing chronic diseases are among these trends.

Stage of training at which the topics are taught and participants in the teaching/learning process

The curriculum includes the following topics on antimicrobials.

Antimicrobials are introduced at first-year level and run through the three years training. At the end of each lecture, the learner is able to calculate and administer drugs. Experience is gained through practice under strict supervision of the Clinical Teacher and the Ward Sister. The antimicrobials are covered according to classification and the system they act on.

The pharmacist participates in teaching; while the lecturer gives tutorials on how to calculate and administer the drug, the clinical teachers and the sisters in charge supervise the practice in the clinical area.

The methods used for teaching are lectures, demonstrations, return demonstrations, problem solving where students are given calculations to do individually, and practice in groups.

The topics covered

Prescribing principles, rational use of drugs; drug interactions and adverse drug reactions; legal, ethical, and cultural aspects of pharmacology; drugs acting on the cardiovascular, respiratory, and gastrointestinal systems; and drugs used in obstetrics**.**

Learner assessment in AMR and AMU

The learner's assessment is through continuous practical assessments using the evaluation manuals and written examinations.

Preparation for immunization

Immunization is introduced at second-year level. This topic is covered in Pediatric Nursing under Expanded Programme in Immunization; the learners get their experience during Primary Health Care experience at the urban health center and rural area (Rural District) for practice. During the third year Integrated Management of Childhood Illness is taught. Immunizations are also covered at this stage.

Preparations learners receive in related patient education regarding—

Patient adherence

The learners are well prepared for this role. They are prepared to give health information, education, and communication to patients. The role of the nurse in the community is emphasized. Counseling of clients and networking with other stakeholders in the community are also covered, which prepares the learner to deal with issues of patient adherence.

Infection prevention, hygiene, including hand washing

Hand washing, disinfection, and waste management are covered in almost all courses. It is practice to wash hands before and after every procedure. However, proper hand washing is taught [and] learners [are] observed and assessed on these procedures to emphasize the importance of hand washing.

Recommendations

Although covered in the curriculum, AMR and AMU do not come out clearly. In pharmacology, there is a topic on drug resistance that covers the dangers of drug abuse and overprescribing of antibiotics. There is a need to make adjustments to the curriculum in order to develop skills and knowledge required for the graduates to be competent practitioners.

The lecturers who teach [and those who] supervise learners on the clinical areas need to be oriented to AMR and AMU, injection safety, and infection prevention so that they can prepare the learners better.

Elenia Tembo, Nurse Tutor

Curriculum content in relation to AMU, AMR, containment of AMR

It is not particularly spelled out as antimicrobial, but the course is expected to cover this topic. In fundamentals of nursing, the topic is taught under infection prevention. Antimicrobial use is taught under pharmacology; in term of resistance, this is not taught.

The question is when a patient is not responding to treatment the nurse would not make decision as to whether to take a swab and assess why the patient was not responding.

At hospital level, in invasive surgery a patient is always started on antimicrobial due to research finding where resistance to antimicrobial is always common so instead of ampicillin, to which most clients are resistant, gentamycin, crystalline penicillin, Flagyl are prescribed.

Graduate nurses are expected to prescribe; however, they do not do so because they are not taught how to determine the drug of choice and how to calculate doses.

The tutors are not prepared on how to teach prescribing.

Programming of topics related to AMR and related containment, AMU, and teaching/learning methodology

Students are exposed to theory but not practical; however, the students will visit the laboratory to observe what was happening and be allowed to look through the microscope to observe, e.g., the normal cell, microbes, and bacteria. Also visit the Central Sterile Supply to see the process of sterilizing hospital equipment and materials.

The doctors will always order end of treatment test to ensure that the medications had worked.

Recommendations for additions, modifications to the curriculum

When dealing with microbiology and pharmacology, there should be deliberate inclusion of the antimicrobial content and strengthen[ing of] the two courses.

The tutors should be adequately trained to teach the subject.

Antimicrobial use should be related to laboratory test results so that you know the appropriate antimicrobials to use.

Ms. Elizabeth Kalunga, Education Manager, Ndola School of Nursing (Telephone Interview)

Curriculum content in relation to AMU, AMR, containment of AMR

The school does teach students in antimicrobial use, and these [topics] are taught when discussing different diseases, while antimicrobial resistance is just mentioned when one is teaching medicine and medical nursing and does not feature prominently in the curriculum. When teaching topics relating to TB, HIV and AIDS, and other infectious diseases, then antimicrobial resistance is mentioned. Students also learn about patient adherence and the importance in medical care.

Programming of topics related to AMR and related containment, AMU, and teaching/learning methodology

Mostly tutors use lecture methods, demonstrations, visits to the laboratory when topics in microbiology are being taught. The number of hours of exposure to AMR, AMU, RDU [rational drug use] is not specific. Students are not specifically examined in these topics, but those that appear in the examination are part of the main question on patient management.

Infection prevention and immunization

During the first year, students start learning about infection prevention, but mostly in Public health nursing, when they are also taught about Immunizations and go out to work in the health centers where they will practice immunizations as part of the health center MCH [maternal and child health] practical experience. Very few staff (two tutors) in the school have been trained in IP [infection prevention].

Recommendations for additions, modifications to the curriculum

Train more tutors in AMR, AMU, and infection prevention.

Ms. Harriet Mulonda, Nurse Education Manager, Livingstone School of Nursing (Telephone Interview)

Curriculum content in relation to AMU, AMR, containment of AMR

Antimicrobial resistance was not in the curriculum. But we do teach antimicrobial use in Microbiology classes. We use lecture, discussion method of teaching. Students visit the laboratory for one day just to view microorganisms in the microscope.

Programming of topics related to AMR and related containment, AMU, and teaching/learning methodology

Teaching of microbiology is facilitated by those from the laboratory who are not trained tutors, so the way they handle classes is not that adequate. UNZA training does expose the nurse tutors to theory and practical, but the time spent on those subjects is not adequate.

Infection prevention and immunization

These are adequately covered.

Recommendations for additions, modifications to the curriculum

There is an urgent need to equip tutors with knowledge on AMR, AMU, and RDU [rational drug use], and the issue of adherence must be strengthened in the school teaching learning program.

Mr. Chela Brighton, Director, Lusaka Nursing Institute, Biomedical Scientist

Curriculum content in relation to AMU, AMR, containment of AMR

According to the GNC July version of the RN curriculum, topics on page 55, including antimicrobial susceptibility, will be redone. Nosocomial Infection: This including opportunistic infection are wide subjects and are taught in details to equip nurses with skills in how to deal with such situations. The expert or consultant teaches and the nurse tutors will tackle issues that relate to infection prevention at ward level.

The curriculum contains topic on antimicrobial susceptibility—the topic has to be understood in depth so that the nurse will understand the prescription by the doctor.
The part that deals with medicine will train the nurses how to prescribe: They are taught to base their prescription on history, diagnosis by examining the patient, and decide what drugs to give. Will teach on laboratory investigation, e.g., how to do a malaria parasite, take blood. Natures of the disease and infection and after the necessary tests, then antimicrobials are given accordingly.

As a common practice, prescription is mostly based on clinical diagnosis and not on lab diagnosis/findings. There are very few health centers with working laboratories and this has highly contributed to AMR. Inadequate chemicals for laboratory use have also contributed to prescribing without proper investigations, a common feature in a number of district hospitals.

Programming of topics related to AMR and related containment, AMU, and teaching/learning methodology

According to GNC curriculum, the topics are taught in the first lecture block, but when they learn medicine reference is made to what was taught in the first lecture block.

Also PBL, lecture method, demonstrations, the school has an arrangement with Chainama college's laboratory where students go to observe laboratory tests being done and also look through a microscope to identify some microorganisms.

The school also follows PBL approach to teaching, allowing students to research a topic in the library, then [make] case presentations with guidance from the nurse tutor.

School has assigned the afternoon for practical and the other teaching/learning discussion. A minimum of 40 hours is allocated to teach microbiology. Yes, they are examined in AMR and antimicrobial use in related subjects. Microbiology is advanced, thus the key step is to provide information so they understand results. The way the curriculum is presented is okay and makes sense.

Infection prevention and immunization

During the second lecture block is when students are taught the immunization and also [during] practical in the health centers. The practical experience is through rotation process and is effected after theory period.

The student is taught the importance of patients' completing taking medications.

Infection prevention under this course, topics like gloving, hand washing, and more especially, avoiding nosocomial infection, are taught. Those that have adverse effect on the community, e.g., malaria, HIV/AIDS, TB, pneumonia. Observation of patient on AMU is very important and needs to receive greater attention. AMR and antimicrobial use are very important, there is need to understand what antimicrobials are for nurses to be able to prescribe. The drug kit system does not allow, e.g., the C/O [clinical officer] to prescribe the antimicrobials in the kit, but nurses will be prescribing in the near future.

Recommendations for additions, modifications to the curriculum

There is need to introduce more laboratories with qualified personnel. The situation right now is critical. The training of lab assistants should not have been phased out; these should be reintroduced so that there is more staff to carry out sensitivity tests.

The three-year program for nurses is already packed; nevertheless, we need to train nurses to have accurate understanding, maybe need to add more years, and all courses need to be reviewed and this needs to be brought to the attention of GNC.

When they learn medicine, the topic dealing with antimicrobials should be emphasized to show the importance of antimicrobials in health care.

Ms. Mercy Mbewe, Director of Nursing, UTH

Curriculum content in relation to AMU, AMR, containment of AMR

Microbiology is a component of the first year. Medicines, Pharmacology, Public health are also taught in the first year. During pharmacology classes, topic on classification of drugs is taught. However, AMR is a big issue because nurses are not exploring the drug histories of patients. Histories should include questions like: what drugs the patient has been taking then or before; the nurse must probe more about drug history. The curriculum does not have a topic on antimicrobial resistance but does have topics on antimicrobial use. The Nurses Drug Formulary contains antimicrobials to be prescribed by the nurse; however, nurses should be wary of what the patients' response should be like. The graduate nurse should elicit from the clients the effect of the drug, be aware how to store the drug—which may affect the potency if poorly stored. The topic on adherence is stronger when discussing ARVs, though adherence should be discussed when teaching about all drugs and should be taught from the provider perspective and the client perspective.

Programming of topics related to AMR and related containment, AMU, and teaching/learning methodology

Lecture method is used, although would love to have a more interactive sessions and students need to be given opportunity to visit the pharmacy. Each course taught by a specialist from the hospital has a tutor assigned to teach the nursing aspect of the condition. Student nurses have quite good exposure in antimicrobials but inadequate in AMR.

Infection prevention and immunization

Places where patients are cared for should be the safest place. In the first year, student nurses are taught about safe environment, including infection prevention, mode of infections, hand washing, calculation of disinfectants.

Topic on nosocomial infections is found in the curriculum but does not specifically state the role of the nurse in prevention of nosocomial infections; how does the nurse prepare to reduce cross infections. Patients are in closed units where infections are common; how often do they take swabs to examine the environment? Some nurses with long nails, what is the hand-washing practice? Immunizations are taught in the first year in public health, pediatrics, and pharmacology and receive practical learning experiences during public health field work.

Discussion on infection prevention is very good; topics on hygiene are also taught but there are no resources to help promote hygiene.

Recommendations for additions, modifications to the curriculum

To include AMR as a topic in the first year of training in microbiology. AMR and antimicrobial use should be adopted in the curriculum and strengthen the role of the nurse.

Essential drug list be made available to all nurses in schools and work sites and make it user-friendly. All related guidelines must be made available. Nurses should be well informed about all antimicrobials and articulate issues relating to AMR, AMU and argue issues relating to prescriptions. Although nurses are prescribing, they have not been trained as the GNC has yet to find funding to train nurses.

Mrs. Catherine Ngoma, Head of Department, Post-Basic Nursing Department BSc, University of Zambia School of Medicine

This is a post-basic nursing program that offers an undergraduate course leading to a bachelor of science (BSc) in nursing. Candidates to this program are required to have completed a three-year basic nursing program and are exempt from the first-year courses at the UNZA.

Under the course: Community Health Nursing 11: CHN 322, the course builds on what was taught in Community Health Nursing 1: CHN 321 the following related to AMR and antimicrobial use courses are covered; although according to one of the lecturers is not in detail as the component is expected to be covered during specific courses in medical surgical nursing. The topics in infection prevention are covered, but it is up to the lecturer to decide the content and depth of the materials to be covered.
During Community health nursing some aspects of AMU/AMR are taught, the topics presented are discussed.

UNIT IV, Prevention and control of communicable diseases
Universal Child Immunization
AIDS and STD

UNIT V, Prevention and control of noncommunicable diseases
Malaria control
Importance of health education in prevention and control of diseases
Role of essential drug program in prevention and control of diseases

Under Medical Microbiology, the following topics are also covered—

- Antimicrobial chemotherapy
  - Mode of action of antimicrobial drugs
  - General principles of use of antimicrobial drugs
  - Resistance to antimicrobial drugs
- Nosocomial infections
  - Sources and spread of nosocomial infections
  - Control of nosocomial infections

Graduate Interns, UTH

Collins Sakala, Seboyi Kalumiana, Chibale Zulu

Curriculum content in relation to AMU, AMR, containment of AMR

Yes, we were taught about antimicrobial use and the topics included groups of antimicrobials, mechanism of action, dosages, routes, side effects, and contraindications.

Nursing implication of giving antimicrobials like crystalline penicillin where a patient has to be asked whether the patient has received the drug before; otherwise a test dose should be given. It is very important to isolate the microorganism causing the disease before treatment is initiated. There is no adequate system to monitor patients on antimicrobials, especially those that get discharged. Therefore education before discharge is important. AMR is not a topic taught during training. But students who happen to attend Thursday clinical meeting have heard of AMR, and these meetings are not a must for nurses. Student nurses have used own initiative to attend clinical meetings and normally use own time as the system does not expressly permit them.

Programming of topics related to AMR and related containment, AMU, and teaching/learning methodology

Not applicable.

Infection prevention and immunization

Yes, we are exposed to lectures in infection prevention, and also go for practical experience in health centers for Public Health experience where we practice giving out immunizations, conduct health education activities, and also go into communities and discuss hygiene and health in general.

Recommendations for additions, modifications to the curriculum

Intensify topics in microbiology, especially the investigative component so that nurses can prescribe, if possible, based on laboratory findings. Supplies to the hospitals and health facilities can be improved upon by also being consistent so that pharmacies do not run out of drugs as the clients in most instances have no money to purchase the prescribed drugs.

Third-Year Student Nurses, UTH School of Nursing

Nellie Zulu, Saopa Nyirenda, Robby Chungu

Curriculum content in relation to AMU, AMR, containment of AMR

Antimicrobial use is only mentioned in pharmacology and medicine courses. They are taught that antimicrobials are to be used for a specific period of time, but you find in practice doctors extend

the period of use. At times patients do not complete the full course because the have felt better. Patient education is very important. Nurses need to have information to educate patients on medications when to stop the drug or/and when to continue and explain the benefit of following such instructions.

Programming of topics related to AMR and related containment, AMU, and teaching/learning methodology

Microbiology is taught in the first year, while Pharmacology is taught in first and second years of training. In microbiology we learn about disease-causing microorganisms, their characteristics. These courses are mostly theory classes with no practical experiences.

Infection prevention and immunization

Hand washing to prevent the spread of infections, use of antiseptics, also hand washing is taught to students for them to teach patients. Nosocomial infections are taught in microbiology, and in fundamentals of nursing students are taught how to prevent these during bed-making.

Recommendations for additions, modifications to the curriculum

Teaching of drugs in Pharmacology should be in detail so that there is in-depth understanding by the nurses. Practical experiences in microbiology should be introduced.

Regulatory Bodies and Senior Government Officials

Mrs. Dorica S. Mwewa, MoH Policy Analyst for the Nursing Profession

What national policies or guidelines exist in the country on rational use of (a) antimicrobial agents, (b) antimicrobial quality, (c) essential drugs, (d) standard treatment guidelines?

Different hospitals have developed treatment guidelines following the set guidelines from Central Board of Health (CBOH). The MoH develops policies, CBOH develops guidelines, and the hospitals will develop protocols for service delivery. The Nurses and Midwives Act, No. 31 of 1997, has allowed nurses to prescribe medicines and drugs. The list of drugs to be prescribed by nurses and midwives is contained in the GNC *Nurses Drug Formulary*. The GNC will conduct in-service training for nurses before they start to prescribe, and only those certified will be registered to prescribe. Policy analyst for nursing, the GNC, and the Pharmaceutical Regulatory Board worked together in coming up with the guidelines for nurses.

Does the nursing profession also have standard treatment guidelines or protocols for all nurses? Who is responsible for producing the guidelines/protocols?

As mentioned above; however, the nursing practice guidelines are developed by the GNC, and nurses, midwives, nurse tutors, and other key professionals participate in the process.

Could you recommend any additions to the current curriculum in relation to antimicrobial use?

The current course dealing with pharmacology will need to be revised.

What modifications would you recommend should be made to the current curriculum to the following: (a) AMR, (b) antimicrobial use?

In the act it specified that nurses will diagnose. There is need, therefore, to strengthen the curriculum in microbiology, so that nurses will be able to carry out some laboratory tests. AMR is as a result of over- or underprescribing. Issues of adherence, rational use of drugs must all be strengthened in the curriculum. Persons dispensing drugs should take time to explain to patients the correct ways of taking drugs and to follow instructions correctly. However, with the current shortage of staff, different cadres of staff are getting involved in dispensing and it is such people without knowledge who will also not be able to explain to patients about adherence and compliance issues.

Need to train more pharmacists and technologists.

General Nursing Council of Zambia—
Ms. Bertha Chipepo, Education and Training Manager
Ms. Dorcas Phiri, Standards and Compliance Manager
Ms. Tabitha Ndele, Reproductive Health Specialist and Acting Examination Specialist

Curriculum content in relation to AMU, AMR, containment of AMR

Antimicrobials and [their] use have been a concern to the GNC. Nurses must continue to emphasize issues of adherence and AMR as has been the case in the treatment of malaria. Counseling for continuity of treatment as is [given] with antiretroviral therapy. Some tutors have been trained in adherence issues and the program has covered all schools with at least one tutor trained. All provinces have trained tutors, and the training program continues.

The nurse is now allowed to prescribe but, although the guidelines are available, the training has not yet happened, and the guidelines are not yet distributed. The system for introducing the guidelines has not yet been developed, training manual not in place. Before the guidelines are even operational, there has been observed new drugs like ARVs that need to be included in the guidelines.

Nurses were already prescribing antimicrobials, especially where there are no doctors. Nurses' situation, especially in rural areas, is very difficult and cannot base treatment on laboratory investigations because of inadequate laboratory resources in the health facilities, so clinical picture is followed. In some instances client will go away without being tested (investigated) if the test requires payment.

There are situations when patients are reviewed by the doctor who will write, "Continue same treatment, or CST." A nurse should be able to caution the doctor, especially when the time specified to use the drug has elapsed. This contributes to misuse of drugs.

Recommendations for additions, modifications to the curriculum

Strengthening teaching skills to include skills to read laboratory results.

The training of nurses should allow for a nurse to question a doctor when treatment is not appropriate; there the training program must prepare a nurse who is able to do so. The relationships between doctor and nurse will need to be improved so that they complement each other.

Different training programs when combined, e.g., in training in AMR, AMU, and containment of AMR will learn to appreciate each other's roles. Nurses also need to be trained in culture and sensitivity to enable them to translate the finding accurately to diagnose and prescribe appropriately.

Laboratory facilities should be made available at different levels of health care delivery. Treatment protocols will have to be disseminated widely in schools, hospitals for all nurses to have access.

The GNC does not yet have a monitoring and evaluation system to monitor usage of antimicrobials and this has to be developed.

Ms. Mwape, Acting Director, Pharmaceutical Regulatory Authority (PRA)

The new Pharmacy and Poisons Act will review the categories of those who can prescribe and what they will prescribe, e.g., antimicrobials are under the Prescription Only Medicines schedule and these will only be prescribed by medical practitioners. PRA will also review the competencies of those prescribing; unfortunately, those in the public sector will not be affected, only those in the private sector. The introduction of nurses to prescribing will complicate the picture. Rational use of antimicrobials will have to be addressed aggressively. Standard Treatment Guidelines are available; unfortunately, only a few access them. Essential drug list for ordering drugs for health facilities is there, but only a few know the list.

There is no clear system to monitor the quality of antimicrobials coming into the country; however, the new act will demand that. Although all drugs that come into the country go through a registration process, post-market survey is not done, and fears are that this may or has contributed to antimicrobial resistance. PRA has viewed AMR as a critical problem but has no data on AMR.

It is recommended that PRA collect data on AMR and this will help monitor drugs coming into the country. The situation needs immediate attention and the regulatory role of the authority will need to be invigorated.

Need for public education in communities about purchasing of antimicrobials and use from drug stores or individuals. Reinforce the regulation governing unlicensed drug stores that have mushroomed in the communities. Strengthen the inspectorate unit of PRA to carry out its activities. PRA needs to work together with the nursing profession in controlling antimicrobial use. (The current collaboration just initiated needs to be strengthened.)

ANNEX 2. CURRICULA FOR THE TWO NURSING PROGRAMS

Preservice Nursing (Three-Year Program)

Year	Course	Number of Hours		
		Theory	**Practical**	**Total**
Year 1	Fundamentals of Nursing (Full)	100	270	370
	Anatomy and Physiology (Full)	80	45	125
	Public Health I (Full)	150	315	365
	Sociology (Half)	20	0	20
	Psychology (Half)	30	0	30
	Professional Practice (Half)	45	0	45
	Nutrition (Half)	25	0	25
	Microbiology (Half)	50	0	50
	Medicine and Medical Nursing I (Full)	85	225	310
	Surgery and Surgical Nursing I (Full)	90	225	315
	Pharmacology I (Full)	45	0	45
	Basic Computer Skills	0	0	0
Total				**1,700**
Year 2	Medicine and Medical Nursing II (Full)	90	135	225
	Surgery and Surgical Nursing II (Full), including Orthopedic and Operating Theater/Anesthesia	90	135	225
	Integrated Reproductive Health	70	135	205
	Nursing Research	45	45	90
	Public Health II (Full)	40	135	175
	Pharmacology II (Full)	45	0	45
	Pediatrics and Pediatric Nursing (Full)	90	270	360
	Mental Health Nursing and Psychiatry (Full)	90	135	225
Total		**560**	**990**	**1,550**
Year 3	Leadership and Management (Full)	90	45	135***
	Nursing Research (project) (Half)†	0	0	0
	HIV/AIDS—ARVs, OIs, PMTCT	144	0	144
Total				**279**

* Indicates the weakness or strength of the AMR/antimicrobial-related content of the curriculum (* from weakness number of asterisks increases with strength).
† The schools have included research in the curriculum but have not yet allocated hours to the course; however, the topic is currently being taught in some other courses.

Three-Year Post-Basic BSc Nursing Program

Year	Courses	Contact Hours per Week†			
Year 2	**Semester I: 13-week period**	**Lectures**	**Tutorials**	**Clinical**	**AMR/Antimicrobial-Related**
	Sociology of Education	4	0	2	
	Nursing in Society				
	Nursing Physiological Sciences and Anatomy I	6	1	2	*****
	General Pathology for Nurses	6	1	2	*****
	Introduction to Sociology I	3	1	NA	
	Research Methods in Social Sciences				
	Semester II				
	Educational Psychology for BSc Nursing	3	NA	NA	
	Nursing in Society	4	NA	2	
	Nursing Physiological Sciences and Anatomy II	6	1	2	
	Systemic Pathology for Nursing	6	1	2	*****
	Introduction to Sociology II	3	1	NA	
	Statistical Method in Social Sciences	NA	NA	NA	
Year 3	**Semester I**				
	Community Health Nursing I	2	NA	4	****
	Maternal and Child Health II	2	NA	4	
	Medical-Surgical Nursing I	2	NA	4	**
	Nursing Education I	3	1		
	Mental Health and Psychiatric Nursing I	2	1	4	
	Human Resources Management	3	1	NA	
	Semester II				
	Community Health Nursing II	2	NA	4	**
	Maternal and Child Health II	2	NA	4	**
	Medical-Surgical Nursing	2	NA	4	**
	Nursing Education	3	1	NA	
	Mental Health and Psychiatric Nursing II	2	1	4	
	Nursing in Society	4	NA	2	
	Community Field work: Done during vacation				****

Year 4	**Semester I**				
	Nursing Management I	4-6	2	NA	
	Introduction to Research in Nursing?				
	Community Health Nursing III	2	NA	4	**
	Medical-Surgical Nursing III	2	1	4	***
	Semester II				
	Nursing Management II				
	Introduction to Research in Nursing?				
	Community Health Nursing IV	2	NA	4	**
	Medical-Surgical Nursing IV	2	1	4	**

* Indicates the weakness or strength of the AMR/AM-related content of the curriculum (* from weakness number of asterisks increases with strength).
† NA indicates that the *Reference Book 2000* does not indicate the number of hours allocated to the course, although the subject is taught.

ANNEX 3. GAPS IDENTIFIED IN THE BSC NURSING PROGRAM

Antimicrobial Chemotherapy

1. Rational Use of Antibiotics

- Emergence of antibiotic resistance
  - Hospital settings
  - Community settings
- Adverse side effects
  - Use of more toxic antimicrobials
- Increased health costs
  - Prolonged hospitalizations
  - Use of newer generation antibiotics
  - Use of combination of antibiotics
  - Parenteral route of administration

2. Monitoring Efficacy

- Early review of clinical responses
  - See whether signs and symptoms have subsided
  - Decide to continue present regimen, increase level of treatment, decrease or stop antibiotic
- Nonresponses and causes
  - Wrong diagnosis
  - Incorrect choice, dosage, route, and duration of antibiotic
  - Antibiotic cannot reach site of infection
  - Local complications, such as pus, foreign body
  - Noncompliance of host

3. Dangers of Indiscriminate Use

- Widespread sensitization resulting in hypersensitivity reaction, e.g., rash, fever, anaphylaxis
- Changes in normal flora of the body leads to
  - Super infection
  - Selection of drug-resistant strains
- Masking serious infections without eradication
  - Suppress symptoms but not disease process
- Direct drug toxicity
  - E.g., chloramphenicol causes aplastic anemia, renal damage
- Development of drug resistance in microbial population

4. Antibiotic Policy

- Education
  - Continuously informing doctors regarding the use of antibiotics and any new agents
  - Resistance patterns
  - Clinical meetings, lectures
- Prescribing strategies
  - Designed to limit inappropriate use
  - Restrict drug list
  - The need of authorization by consultants
  - Restriction of reporting of antibiotic susceptibility results
- Antibiotic audit
  - Regularly done
  - Poor compliance, find out why?
  - Review of policy if necessary

5. Practical Demonstrations

- Methods of susceptibility testing
- Interpretation of results

Under Medical Microbiology, the following topics are also covered—

- Antimicrobial chemotherapy
- Mode of action of antimicrobial drugs
- General principles of use of antimicrobial drugs
- Resistance to antimicrobial drugs
- Nosocomial infections
- Sources and spread of nosocomial infections
- Control of nosocomial infections

ANNEX 4. KEY INFORMANTS

Name	Institution	Department	Designation
Mr. Donald Kolala	University Teaching Hospital (UTH)	Pharmacy, Stores Department	Stores Pharmacist
Ms. Fridah Zulu	UTH	Schools of Nursing	Nursing Education Manager
Ms. Salome Zulu	UTH	Schools of Nursing	Principal Tutor
Ms. Justina Mukoma	UTH	School of Nursing	Nurse Tutor
Ms. Mercy Mbewe	UTH	Hospital Services Area	Director of Nursing
Mr. John Mwaba	UTH	Microbiology/UNZA	Biomedical Scientist
Ms. Dorica Mwewa	MoH	Policy Development	Chief Nursing Policy Analyst
Ms. Esnart Mwape	Pharmacy Regulatory Authority	Secretariat	Acting Registrar
Mr. Collins Sakala	UTH	Nursing Intern	Graduate Nurse
Ms. Saboyi Kalumyana	UTH	Nursing Intern	Graduate Nurse
Ms. Chibale Zulu	UTH	Nursing Intern	Graduate Nurse
Ms. Catherine Ngoma	UNZA School of Medicine	Post-Basic Nursing	Head of Department
Ms. Dorothy Chanda	UNZA School of Medicine	Post-Basic Nursing	Lecturer
Ms. Elizabeth Kalunga	Ndola Central Hospital	Ndola School of Nursing	Nurse Education Manager
Ms. Harriet Mulonda	Livingstone General Hospital	Livingstone School of Nursing	Nurse Tutor
Ms. Bertha Chipepo	GNC of Zambia	Education	Education and Training Manager
Ms. Dorcas Phiri	GNC of Zambia	M&E	Standards and Compliance Manager
Ms. Tabitha Ndele	GNC of Zambia	Reproductive health	Reproductive health Specialist and Acting Examination Specialist
Ms. Nellie Zulu	UTH	School of Nursing	Preservice graduate student
Ms. Saopa Nyirenda	UTH	School of Nursing	Preservice graduate student
Mr. Robby Chungu	UTH	School of Nursing	Preservice graduate student
Mr. Brighton Chela	Lusaka Nursing Institute	Administration	Director
Ms. Elenia Tembo		Programs	Nurse Tutor

ANNEX 5. STRATEGIES FOR CURRICULUM REVIEW AND INTERVIEWS

Strategies for the Implementation of Registered Nurses and Enrolled Nurses Curriculum Reviews

The curricula review strategy will involve—

- Review of nurse training guidance documents from the General Nursing Council of Zambia and schools of nursing to provide information on how much the training schools are preparing students to understand AMU and AMR. Also provide the regulatory issues pertaining to the use of antimicrobials and AMR, for example, the Nurses and Midwives Act 1997, consider and form opinion of what the act stipulates regarding nurses, prescribing, and antimicrobials. For this review process, we shall look at the following curricula and training guides—

    - Registered Nurse training curriculum

    - Registered Nurse training learning manuals to include: Learning guide for RN, Evaluation manual, Procedure manual

    - Tutor's Training Guide

    The Nurse training programs include: Training for Registered Nurses (RN) and Enrolled nurses (EN) (preservice), Registered Midwives (RM) and Enrolled Midwives (EM) (in-service), Training for Registered Mental Nurses (preservice), at the university level: Bachelors in Nursing and Masters in Nursing (in-service). Please note that different schools offer different programs. It is in the mandate of the GNC of Zambia to set guidelines for training, examining, licensing of nurses in Zambia and further monitor nursing practice in all health institutions.

    However, my review will involve visiting Lusaka School of Nursing at the University Teaching Hospital for the RN and Midwifery. I will also visit one mission-aided training school in Mazabuka and review the EN and EM practical allocations of students.

- Review of training modules from the nursing schools to determine the actual time spent on teaching and learning the related AMU and AMR topics.

- Theory and Practical rotations will provide us with kind of preparation of nurses in readiness for actual professional work after training; also will show the kind of practical work that students go through. The GNC in the recent past allowed nurses to open private clinics/health facilities and training schools. We shall find out how they will be handling issues related to and procedures for prescriptions and handling of antimicrobials and AMR. The review will seek to establish what practical experiences they are exposed to as these relate to infection prevention practices, prescribing trends, monitoring of uptake of antimicrobials, and interventions carried out in the event of resistance.

- Review of prescribed textbooks will also provide us with the in-depth information on the exposure of nurses to antimicrobials. The review will bring out information from the prescribed books and how they relate to the curricular needs and job requirements.

- Visits to one or two selected training schools (to include the one new training institution in Lusaka) offering different programs and those in areas where there are specialists to determine how the topics are taught, who teaches them, what are the learning experiences offered.

- In-depth interviews with GNC staff, lecturers in the nursing schools, Laboratory department, Pharmacy department, General Medicine, some departments in the hospitals. These discussions will further provide the review process with critical information on how the different departments would like to see how the Antimicrobials and AMR would be strengthened in the nurses' curricula. Also interview selected faculty members in the first two privately owned and also recently opened nursing schools. Conduct interviews with student representatives of both RN and EN schools, and recently graduated nurses from both programs.

- Conducting a one-day consensus meeting with key staff from the schools and key informants: Those to be invited will include staff from the GNC who are responsible for setting standards for nursing practice, Nurse tutors from both RN and EN schools. The lecturers who participate in the training of nurses, especially those that teach microbiology, Pharmacology, and Medicine. Head of nursing practice in the UTH, some members of the faculty from the University of Zambia who were responsible for preparing staff to teach in the Nursing schools, staff from the Pharmaceutical Regulatory Authority. During this meeting, there will be a presentation of the major findings, and have input into the input into the curricula.

    - How the key issues in antimicrobials will to be incorporated into the curricula.

    - What preparation the lecturers will require to teach the new related materials.

    - Plan for development of new materials for the nurses' curricula and plan for the training and orientation of teaching staff on how to use the materials. (***This did not happen due to other factors but can happen as a next stage of addressing AMU/AMR.***)

- Data analysis will include—

    - Analysis and consolidation of data from the teaching staff from the nursing schools, including those that provide services as guest lecturers

    - Consolidation and analysis of information from the key documents reviewed

    - Description of the training requirement as stipulated by the GNC

- Description of what was current in the different nurse training programs and analysis will also be based on whether there is conformance with the GNC guidelines
- Recommendations for action

- **Interview guide for key informants**

Does the curriculum include topics on antimicrobial resistance?

- Are topics on nosocomial infection included in the curriculum, and are nurses taught how to prevent or contain the spread of resistant microbes in a health facility, to what details is the topic taught?
- Does the curriculum include topics on and antimicrobial use? What is/are the expectation(s) of the graduate nurse in the use of antimicrobials use?
- At what stage of training are the topics taught, and who participates in the teaching/learning process?
- What methodologies are used for the teaching/ learning process?
- What topics are covered and how many hours for each topic?
- Are students assessed and examined in AMR and antimicrobial use?
- What in your opinion is the adequacy of the current exposure of students on AMR, AMU?
- At what stage of training are students prepared in immunization and how does the student receive the practical experience?
- What preparations do students receive in related patient education regarding
  - Patient adherence?
  - Infection prevention?
  - Hygiene including hand washing?
- Could you recommend any additions to the current curriculum in relation to AMR?
- Could you recommend any additions to the current curriculum in relation to AMU?
- What modifications would you recommend should be made to the current curriculum to the following—
  - AMR
  - Antimicrobial use
  - Hygiene, including hand washing

- What national policies or guidelines exist in the country on rational use of
  - Antimicrobial agents
  - Antimicrobial quality
  - Essential drugs
  - Standard treatment guidelines

- Does the nursing profession also have Standard Treatment Guidelines or protocols for all nurses? Who is responsible for producing the guidelines/protocols?

ANNEX 6. SCOPE OF WORK

Scope of Work for Consultant to Conduct Curriculum Review and Interview of Experts to Identify Topics Included on Antimicrobial Use and AMR in Undergraduate Nursing Training Programs in Zambia

Background

U.S. Agency for International Development is supporting the development and implementation of a country-level approach towards building local advocacy, coalition, and packages of activities to combat the growing problem of antimicrobial resistance (AMR). This approach is undergoing pilot test in Zambia.

Although advocacy is the main thrust of the Zambia program, opportunities are also being explored to identify and carry out relevant and suitable interventions. Education, regulation, surveillance, and research are the four major intervention areas identified to support containment of antimicrobial resistance (AMR). Education involves both preservice and in-service components. Adequate, up-to-date, and locally relevant preservice training is critical to develop the knowledge and skills required to be develop appropriate professional competence.

As part of the overall AMR containment initiative in Zambia, undergraduate curriculum review and development of appropriate preservice training package on rational antimicrobial use and AMR was identified as an important intervention to pursue during the AMR Advocacy Working Group (AWG) meeting held in Lusaka on the 16th of November 2004. In a more recent AWG meeting held on the 30th of June 2005, the AWG considered hiring local consultants to review undergraduate health professionals training curricula to generate information on what and how much of AMR- and rational antimicrobial use-related topics are being addressed in preservice training. Such an assessment will identify any gaps that need to be filled and assist in the subsequent process of developing recommendations on suitable modifications/additions required in the Zambian context to ensure adequate coverage of these topics during the training.

To assist in this process, RPM Plus plans to hire local consultants to review different health professionals curricula currently in use in the training institutions of Zambia.

Scope of Work for the Consultant

The scope of work (SOW) for the consultant will include two components – review of the undergraduate nursing curriculum and interview of relevant experts. As decided in the June 30th 2005 AWG meeting, review of the curriculum of each health discipline will be carried out by a consultant related to that discipline.

Specific activities will include:

- Develop a curriculum review strategy for detailed analysis of the curriculum(s) to identify what is included on AMR and antimicrobial use. (If more than one curriculum exists that are being followed by different universities or institutes to teach the course, then all of them will be reviewed.) Illustrative information to be included is – detailed inventory of all the topics covered related in these areas; hours of exposure for each area or topic; methodology of teaching-learning. The review should include analysis of not only purely pharmacological and biomedical contents related to AMR and antibiotics, but also other real life application issues such as the current global and local problem of AMR; ways to deal with AMR; irrational and rational use of antimicrobial agents; antimicrobial quality; essential drugs; standard treatment guidelines, etc. These are illustrative topics; it is expected that the consultant will expand on these.

- Develop a strategy for interview of relevant experts to identify what is actually being taught currently on AMR and antimicrobial use (compared to what is advised in the curriculum regarding the topics, hours of exposure, and teaching-learning methodologies). Information will also be obtained during the interview about which of the topics is included in student assessment and examinations. This task will be done after the curriculum review is over in order to facilitate focused and informed interview of the experts.

  Develop an inventory of the experts to be interviewed and also develop a detailed interview guideline to obtain relevant information from the experts. Recommended experts to be interviewed include, but not necessarily limited to, the teaching faculty members (from pharmacology, microbiology, medicine, therapeutics, surgery, pediatrics, obstetrics/gynecology, etc depending on which subjects these topics are taught in) and other relevant officials such as those in the Ministry of Health and the Professional Association and Council.

  During interview, the consultant should also ask the expert respondent to provide his/her opinion about the adequacy of the current exposure of students on AMR and antimicrobial use topics and to recommend any modifications/additions.

- Send the detailed strategies (for task # 1 and 2 above) to RPM Plus for feedback and incorporate them to finalize the tools for curriculum review and interview of experts.

- Conduct the curriculum review and interview of experts ensuring adequate documentation, analyze and interpret the results, and write a detailed draft report with background, assessment methodology, findings, and recommendations. Finalize the report based on RPM Plus feedback on the draft.

Deliverables

- Electronic copy of detailed draft strategies for curriculum review and expert interview (including interview guideline) as outlined in task # 1 and 2 above for review and feedback by RPM Plus

- Electronic copy of the detailed draft report of the assessment for review and feedback by RPM Plus.

- Electronic and hard copies of the final report incorporating any comments/suggestions RPM Plus may have.

- Hard copies of the raw data captured in the interview guidelines during interview with each of the experts

Timeline

Total 20 days service by the consultant:

- 3 days for development for assessment strategy, inventory of key informants, and interview guidelines.

- 3 days for curriculum review and 6 days for interview of experts.

- 3 days for data analysis and synthesis of different pieces of findings.

- 4 days for report writing.

- 1 day for report finalization based on the feedback RPM Plus may have on the draft.

Work to start from November 30, 2005 and to finish not later than January 16, 2006. The consultant will provide services for a period not exceeding 20 days during this overall contract period.

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