

Republic of Yemen

Ministry of Higher Education & Scientific Research



Council for Accreditation & Quality Assurance

National Academic Reference Standards (NARS)

Undergraduate Pharmacy Education Program
(Pharmaceutical Sciences)

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PREFACE

The Council for Accreditation and Quality Assurance in Higher Education (CAQAY) is pleased to introduce this document that contains the National Academic Reference Standards for pharmacy undergraduate program. In light of its mission and general policy for developing National Academic Reference Standards (NARS) for higher education, the Council intends to present this document with a view to provide higher education institutions with reference points in the design, delivery and review of their academic programs. It also aims at providing these institutions with a general guidance for articulating the key attributes of tomorrow's pharmacy education graduates, and learning outcomes associated with the programs. By these National Academic Reference Standards stated in this document, the Council hopes to solve the problems that higher education institutions face during the process of programs' review or development by bridging the gap that usually arises as a result of the general absence of national academic reference standards. Hence, there is a genuine need for National Academic Reference Standards for pharmacy education programs.

In this changing world of globalization and digitalization, faculties of pharmacy have to produce graduates who are relevant in the 21st Century that is marked by rapid developments in technology, knowledge explosion, borderless economic and business operations and many other complex problems of the new millennium. Therefore, the graduate attributes presented in this document and the learning outcomes derived from them as well as teaching and assessment methods provide faculties of pharmacy's deans, department chairs and faculty members with a frame of reference for reviewing their curriculum. If the design, content, and implementation of pharmacy curricula are guided by the set of graduate attributes and learning outcomes presented in this document, these programs will certainly produce well-prepared, self-motivated and responsible graduates who can assume their expected professional duties in solving the community problems and facing healthcare challenges of the 21st century.

The Council recognizes that faculties and programs of pharmacy have to respond to the unprecedented changes in the methods of pharmacy education. We hope that faculties and programs of pharmacy will respond to the intent of this document with some sense of urgency. They should consider establishing formal processes for using those attributes and learning outcomes to guide reviews of their curricula and program specifications. This should also be accompanied by gradual but significant changes in the way faculties and programs of pharmacy teach and assess their students. This aspect of pharmacy education entails a special focus from the deans and department chairs in order to make sound improvements in pharmacy education in our country.

Prof. Abdullateef Haidar,

CAQAY Chairperson

Sana'a, 23 May 2018

National Academic Reference Standards (NARS)

National Academic Reference Standards (NARS) are the expected minimum requirements of knowledge and skills necessary to fulfill the requirements of an academic degree.

NARS aim at providing a minimum level of reference that guides the academic community to prepare academic program specification documents in a particular field or specialization. It also represents the overall expectation of academic qualifications, abilities and qualities that graduates should acquire when completing a program of study.

NARS represent a threshold of standards that encourage higher levels of achievement and therefore require educational institutions to distinguish themselves in their educational performance by developing their own Academic Reference Standards (ARS). On the other hand, ARS for educational institutions are higher level of requirements that educational institutions must achieve through their academic programs to ensure that their graduates are able to carry out professional or career practices successfully.

It must be pointed out here that NARS do not intended to provide a unified national curriculum for academic programs, nor do they seek to provide a list of contents for academic programs. Hence, the authors of NARS documents avoided that, because it is the core task of higher education institutions. In turn, higher education institutions should refer to NARS documents to prepare their program specification documents that typically include programs goals, graduate attributes, learning outcomes, study plans, contents, strategies for teaching and learning, assessment methods, etc.

HISTORY OF PHARMACY EDUCATION IN YEMEN

Yemen is undergoing rapid demographic and epidemiologic transitions. The health of the population in the country is threatened by the double burden of lifestyle-associated diseases and new and existing infectious diseases. To respond to these challenges faculties and programs of pharmacy were established to educate and train a workforce and healthcare professionals to deal with these health challenges and the changing needs to carry out proper healthcare services. Therefore, the fundamental objectives of these faculties are to produce pharmacists who are competent in their profession, aware of and able to respond to their societies' health needs and able to pursue graduate education both locally and internationally.

At present, several public and private universities are offering pharmacy education programs. There are 6 public and 17 private programs and faculties of pharmacy in Yemen. The first public pharmacy program was established in 1989 in Sana'a University. It was first a department within the Faculty of Medicine and Health Sciences. Then, it became an independent faculty in 2002. In 1995, the second public pharmacy program was established in Aden University. Similar to pharmacy program at Sana'a, it was first a department within the Faculty of Medicine and Health Sciences, and then it became an independent faculty in June 2009. The third and fourth pharmacy programs were established at Tamar University in 2005 and at Hodeidah University in 2011. However, the Faculty of Pharmacy in Tamar University was closed lately due to the lack of faculty members where expatriate faculty members left the Country after 2011 military back to their home countries.

Many private higher education institutions offer pharmacy programs. For example, the University of Science and Technology established its pharmacy program as a department within the Faculty of Medical Sciences in 1994. Al Watania University initiated its pharmacy program in 1997 within the Faculty of Health Sciences. Queen Arwa University established its pharmacy program within the Faculty of Health Sciences in 2003/04. Similarly, Alrazy University established its pharmacy education program within the Faculty of Health Sciences in 2013. Since then, many private universities established their pharmacy faculties and programs to reach 17 programs and faculties today.

Currently, most pharmacy programs and faculties in Yemen face multiple challenges represented by many factors including, but not limited to, out-dated curriculum, old fashioned teaching methods, and lack of the enough specialized faculty members, as well as bad allocation and utilization of available resources

NATIONAL ACADEMIC REFERENCE STANDARDS FOR PHARMACY PROGRAMS

I. GRADUATE ATTRIBUTES:

Upon successful completion of an undergraduate pharmacy education program, the graduates will be able to:

1. Demonstrate knowledge of basic and biomedical sciences and their application in pharmacy.
2. Demonstrate a sound understanding of a substantial body of knowledge in pharmaceutical sciences.
3. Apply current Good Manufacturing Practices (cGMP) criteria in formulating and preparing pharmaceutical /cosmetic products from different sources (including raw materials) and contribute to the distribution and storage system.
4. Utilize analysis methods (qualitative and quantitative) in testing raw materials and pharmaceutical products.
5. Deal safely and effectively with chemicals, natural materials and pharmaceutical products and participate in optimizing medicine use.
6. Practice and perform responsibilities and authorities ethically, legally, professionally and respect patients' rights.
7. Educate patients and members of health care team in the rationale use of medicines based on updated drug information.
8. Apply evidence-based decision-making skills and research in solving problems related to the profession of pharmacy.
9. Demonstrate effective communication, leadership, marketing and business management skills.
10. Plan, design, conduct, and participate in research to improve healthcare system performance.
11. Apply self-dependence, life-long and collaborative learning skills in updating their knowledge.

II. LEARNING OUTCOMES

A-KNOWLEDGE AND UNDERSTANDING

Upon successful completion of an undergraduate pharmacy education program, the graduates will be able to:

- A1. Show understanding of the fundamentals of the basic and biomedical sciences including physics, mathematics, chemistry, structure of human body, normal and abnormal body functions, basis of genomes and different biochemical pathways and their relations to different diseases.
- A2. Explain the fundamentals of social and behavioral sciences relevant to pharmacy, ethics of health care and its impact on their relationship with patients and other healthcare professionals.
- A3. Explain the physicochemical properties of pharmaceutical products and their relationship to molecular structure and the design of medicinal agents.
- A4. Describe the analytical methods, principles, design, development, and validation of pharmaceutical products.
- A5. Identify the actions of the medicines within living systems, therapeutic uses of medicines in human, adverse reactions, interactions of medicines, toxicity, and misuse or abuse.
- A6. Explain the basis of complementary and alternative medicine.
- A7. Identify the types of poisonous substances, sources, mechanisms of toxicity, analysis, clinical pictures, and management.
- A8. Describe the bio-pharmaceutics and pharmacokinetics of medicines and their applications.
- A9. Define the basis of health policy, pharmacoconomics, pharmacoepidemiology, marketing, and administration with reference to pharmacy.
- A10. Describe the pharmacist's role in health care; dispensing, designing, implementing, monitoring, evaluation, and adjustment of medication therapy plans that are patient-specific and evidence-based to achieve maximum clinical effectiveness.

- A11. Identify the properties of different pharmaceutical dosage forms including novel drug delivery systems and biotechnology.
- A12. Describe the methods of bio-statistical analysis and pharmaceutical calculations.

B-COGNITIVE/INTELLECTUAL SKILLS:

Upon successful completion of an undergraduate pharmacy education program, the graduates will be able to:

- B1. Collect, interpret and assess relevant pharmaceutical and biomedical sciences to construct the pharmacophores of the structure and their effect on the stability, pharmacokinetic and pharmacodynamics profile of the drug.
- B2. Classify the synthetic and natural drugs according to their mechanism of action, systemic effect, therapeutic uses, contraindication and toxicity.
- B3. Design and evaluate different types of safe and effective pharmaceutical dosage forms.
- B4. Select appropriate Standard Operating Procedures (SOP) to conduct qualitative and quantitative analysis of pharmaceutical preparations.
- B5. Plan a modern system for administration of medical foundations and merge the ethics to business in the drug marketing
- B6. Develop and design suitable methods for extraction, isolation, purification, identification, and standardization of active substances from various sources.
- B7. Formulate and evaluate patient care plan about the rational use of medications to improve patient safety and efficacy.
- B8. Use appropriate research methods to solve practice problems.
- B9. Apply pharmaceutical calculation in different pharmaceutical practice.

C- PRACTICAL AND PROFESSIONAL SKILLS:

Upon successful completion of an undergraduate pharmacy education program, the graduates will be able to:

- C1. Handle the chemical, biological, and pharmaceutical materials safely, taking into account their physical and chemical properties, including any specific hazards associated with their use, distribution, and storage.
- C2. Operate different pharmaceutical equipment and instruments and use emerging technologies in pre-formulation, formulation, packaging, storage and analysis of pharmaceutical products according to Good Laboratory Practice (GLP), Good Storage Practice (GSP) and cGMP guidelines.
- C3. Screen drug from different sources, bioassay, and carry out pharmacological and biopharmaceutical experiments.
- C4. Extract, isolate, purify, identify, standardize, formulate natural products and assure their rational use.
- C5. Advise the patients and health care professionals to optimize medicines use.
- C6. Employ the relevant ways of preparation and presentation of medicines including extemporaneous, Total Parenteral Nutrition (TPN), and Intravenous (I.V.) admixtures.
- C7. Apply administrative and pharmacoeconomic rules in pharmacy and ethically use marketing skills for promoting the pharmaceutical and cosmetic products.
- C8. Conduct research studies and utilize the results in different pharmaceutical fields.

D – GENERAL / TRANSFERABLE SKILLS:

Upon successful completion of an undergraduate pharmacy education program, the graduates will be able to:

- D1. Interact and communicate effectively and ethically with patients, public, and health care professionals.
- D2. Apply financial, management, decision-making, time management, organization, sales and marketing skills.
- D3. Appraise the importance of team work and the need to work within personal limitations.
- D4. Take responsibility for adaptation to change in pharmacy practice.
- D5. Retrieve the essential references of evidence-based practice to achieve maximum clinical effectiveness.

TEACHING AND LEARNING STRATEGIES AND ASSESSMENT TOOLS

NARS approach emphasizes the importance of aligning teaching, learning and assessment with NARS to help students acquire graduate attributes and the intended learning outcomes.

Although teaching and learning strategies and assessment methods vary from one discipline to another and from an academic program to another, whatever teaching and learning strategies and assessment tools are used, they should provide students with opportunities to acquire graduate attributes and the intended learning outcomes. This requires that curricula design and delivery methods should be updated periodically to respond to developments in the subject matter, the results of research about teaching and learning in higher education, changes in national policy, professional practices and the needs of employers.

A. Teaching and Learning Strategies

The introduction of NARS in higher education curriculum development is a new approach that requires higher education institutions to adopt appropriate teaching and learning strategies to help students achieve academic standards and to demonstrate that all their graduates are able to achieve those standards.

Regardless of the teaching approach adopted by a faculty, institutions of higher education should provide a great deal of active learning in which the students are actively involved in the learning process, and allocate enough time for directed self-learning and reflections as to encourage students to develop life-long learning habits.

Curricula should also be designed to provide students with sufficient opportunities to acquire adequate knowledge and to develop practical and professional skills to a level that qualifies them to obtain professional licensing. This requires sufficient practical applications and field training during long periods of their academic study.

In general, teaching and learning in undergraduate pharmacy education programs should use a variety of teaching methods, such as:

- Active Lectures (supported with dissections),
- Group learning and Problem-based learning,
- Seminars, journal clubs and workshops,
- Practical classes,
- Field training,
- Simulated software programs,
- Field visits to industries,
- Computer and web-based learning,
- Use of communication and information technology,
- Project work,
- Directed self-study.

B. Assessment Tools

Assessment is the means by which students' ability to meet academic standards is measured and should be a key part of the learning process. To ensure this, faculties should design consistent and credible assessment tools at course level and at program level as well.

On the other hand, NARS require an emphasis on rigorous assessment of practical and professional skills to identify those who are not yet qualified for the profession or occupation. The ways to achieve this may vary, but should always include direct and frequent observations of students during practical applications and field training.

It should also be noted that while it may be difficult to assess professional attitudes directly, the impact of attitudes on students' behavior should be assessed by observing this behavior over a period of time.

Finally, assessments must be accurate but should not be exhausting or repetitive, as this may affect the learning process.

In general, assessment in undergraduate pharmacy education programs should use a variety of assessing methods, such as:

- Short essays,
- Written assessments, such as multiple choice questions (MCQs),
- Faculty assessment by structured observation through checklists and rating scales,
- Seminar assessment,
- Multi-source assessments, such as student self-assessment,
- Simulations, such as computer-based clinical scenarios,
- summative practical assessments,
- Graduate projects,
- laboratory and other written reports,
- Work samples, such as, logbooks and portfolios.

TERMINOLOGY

1. Higher education institutions:

These are universities, faculties, higher institutes and academies which offer academic programs that extend for a period of more than three years of study under the supervision of the Ministry of Higher Education and Scientific Research.

2. NARS:

The national academic reference standards prepared by the Council for Accreditation and Quality Assurance with the assistance of specialized experts and representatives of various beneficiary sectors to represent the minimum standards required for accreditation of academic programs.

3. ARS:

Academic standards prepared by higher education institutions, provided that they include NARS as well as a number of standards (attributes and learning outcomes) that distinguish an institution from other institutions (allowing for creativity and diversity).

4. Academic program:

A distinct and well-structured group of courses that, after successfully completed, enable students to get an academic degree associated with an academic program (BA / BSc, MSc, PhD).

5. Graduate attributes:

A set of attributes (competencies) that result from the acquisition of knowledge and skills during the study of a particular academic program, and which identify what the graduate is expected to exhibit at the end of an academic program.

6. ILOs:

Intended Learning Outcomes (ILOs) refer to the knowledge, understanding and skills that specify what a student should know, be able to do and the values to be acquired after the completion of a study unit, a course or an academic program.

7. Knowledge and understanding:

Key facts, concepts, laws, theories and techniques that the students are reasonably expected to acquire in a particular field of specialization. It also includes mental skills such as memorizing and comprehension.

8. Intellectual skills:

These are skills that the academic program seeks to help students develop, such as analysis, the ability to choose from different alternatives, discussion and reasoning skills, innovation, creative thinking and problem solving.

9. Practical and professional skills:

These are skills that enable a student to convert acquired academic knowledge into practical applications such as: ability to diagnose diseases, write medical prescription, manage water resources, or accomplish an engineering design.

10. Transferable skills:

These are general skills that involve several disciplines, such as communication skills, computer skills, IT skills, management skills, discussion and negotiation skills, self-marketing skills, time management skills, teamwork skills, presentation and delivery skills, and research skills.

11. Health care professionals

These are individuals who provide preventive, curative, promotional or rehabilitative health care services in a systematic way to people, families or communities.

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