

Pharmacy Infection Control: Education and Training

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ABSTRACT

Objectives: In this study, we aimed to explore the Education and Training policy of pharmacy infection control as a new initiative project in Saudi Arabia. **Methods:** It is a narrative review of pharmacy infection control. The literature search was done using databases, including PubMed, Medline, and Google Scholar, about specific pharmacy practice infection control policies and procedures. The search time was from the 1960s to October 2021. The topic was in English and included narrative review, meta-analysis, systemic review, and guidelines across all hospitals and community pharmacy services. Moreover, the national and international guidelines of general research in hospital practice. The pharmacy research committee formulated and consisted of various experts, including clinical pharmacists, drug information pharmacists, and infection control specialists. Some authors drafted the policy and procedures, and others reviewed and corrected them. The additional author, an infection control specialist, revised the final document. The study emphasizes the Pharmacy infection control policy of Research Education and Training. **Results:** The Pharmacy Infection control Education and Training policy consisted of various items, including program objectives, admission requirements, teaching and education methodology, and Pharmacy infection control Education and Training steps in pharmacy practice. The education and training contained five models. Namely hand hygiene and personal protective equipment, environment and workplace, employment immunization and occupational safety, pharmacy wastage and spill cleaning, pharmacoepidemiology with a pharmacy infection control surveillance, and pharmacy infection control quality management. Each model described Module description, Learning Objectives, Module Outlines, and Competency items. **Conclusion:** The pharmacy infection control policy of Research Education and Training is a new initiative for pharmacy career professionals. The Pharmacy infection control Education and Training pharmacy policy aims to improve infection control skills and encourage pharmacists' compliance with infection control regulations in different places in the public and healthcare organizations. Therefore, education and training in pharmacy infection control policy are necessary for the pharmaceutical care services in Saudi Arabia.

Keywords: Infection control, Policy, Pharmacy, Education, Training, Saudi Arabia.

INTRODUCTION

Over the last few years, pharmaceutical leaders have implemented an updated pharmacy strategic plan and a new pharmacy strategy in line with Saudi Arabia's new vision 2030.^{1,2} Both pharmacy strategic plans establish broad goals, strategies, and objectives for education and training in pharmacy practice, with a near-term goal of 2030.^{1,2} All new candidates should be educated and trained as part of any new pharmacy practice program. The pharmacy infection control service is part of a new initiative to provide local services. Several studies examined the demand for infection control education and training programs across various healthcare professional specializations due to insufficient knowledge and compliance with infection control standards.³⁻⁷ Other research looked at the needs and context of infection control education and training programs for nursing staff and healthcare workers.⁸⁻²⁰ The authors were unaware of national or international publications on pharmacy infection control education and training.²¹ However, only infection control competencies existed.²²⁻²⁶ The current assessment seeks establishing a pharmacy infection control education and training policy and procedures in Saudi Arabia.

MATERIALS AND METHODS

It is a narrative review of pharmacy infection control. A literature search was performed from various databases, including PubMed, Medline, and Google Scholar, about specific topics related to infection control in pharmacy practice. The search period was from the 1960s until October 2021. The subject was English and included narrative review, meta-analysis, systemic review, and guidelines. Policies of the last ten years were searched across all hospitals or community pharmacies. The pharmacy services in the search included inpatient, outpatient, and ambulatory care pharmacy, satellite pharmacy, extemporaneous preparation unit, repackaging unit, pharmacy store, drug information center, and clinical pharmacy services. Furthermore, the national and international guidelines of infection control in hospital practice^{27,28} include the Centers for Disease Control and Prevention (CDC) of the United States of America, the Saudi Center for Diseases Control (SCDC), American Society of Health-System Pharmacist (ASHP), World Health Organization (WHO), and the United States Pharmacopeia (USP).²⁹⁻⁴⁰ The committee of pharmacy infection control contains various members, including clinical pharmacists, community pharmacists, and infection control specialists. The first author drafted the policy guidelines, and the second author reviewed

and corrected them. The third author, who is an infection control specialist, revised it. The policy included topics such as environmental and workplace, staff immunization and occupational safety, pharmacy basic hygiene, quality of pharmacy infection control, pharmacy infection control competency, and pharmacy infection control education and training. The AGREE (Clinical practice guidelines) guided the reporting of the results of this study.⁴¹

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Translations

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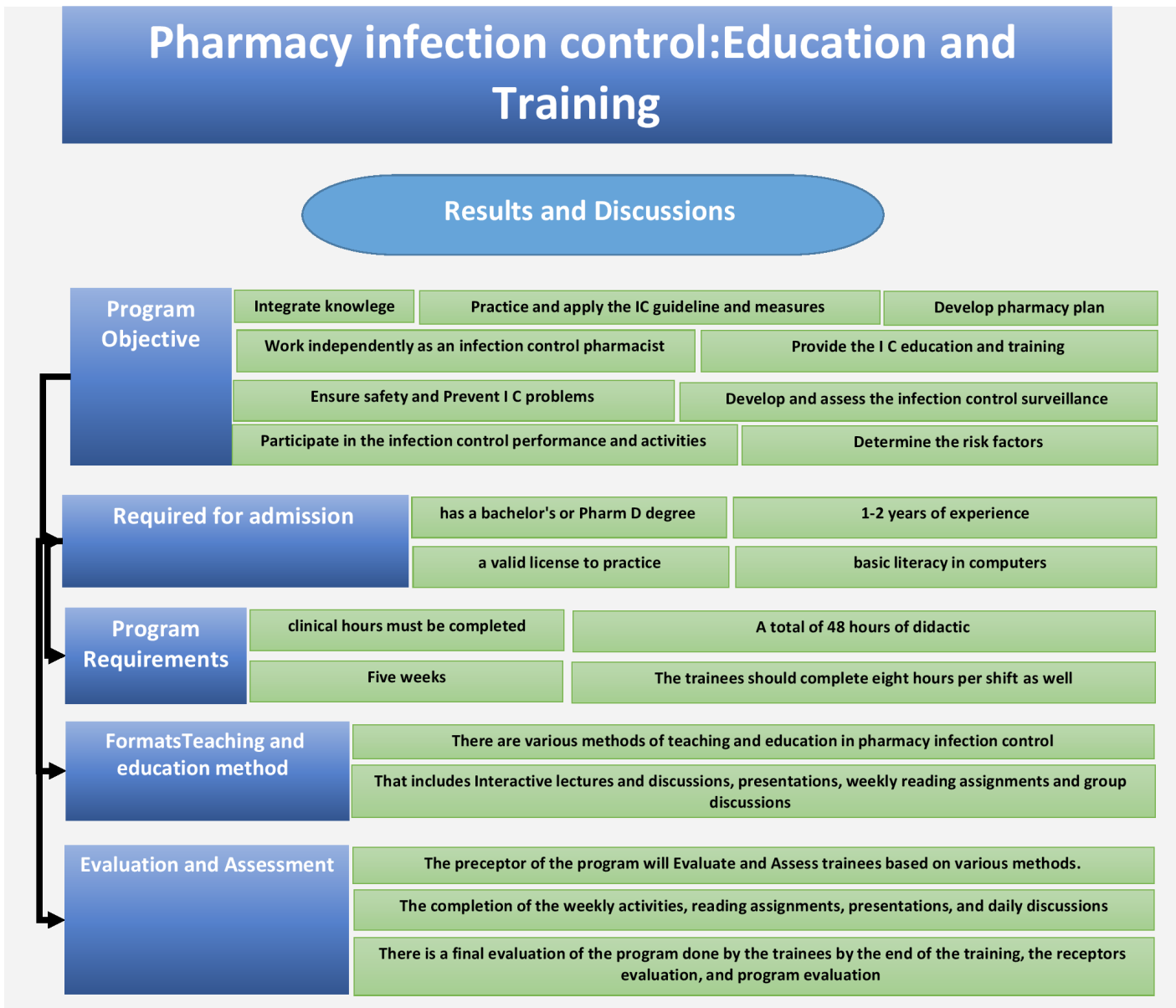


Figure 1: Aspect of pharmacy infection control education and training policy.

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Results and Discussions

Program objective

Upon completing the pharmacy infection control course, the learner will be able to:

Integrate knowledge of pharmacy practice and infection control in healthcare institutions.

S.No	Module description	It is basic hygiene principles and personal protective equipment needed in the pharmacy practice. Besides, hygiene at different locations in the pharmaceutical care department and units.
1.	Learning Objectives:	After finishing the Handwashing and PPE course, the trainees should be able to <ul style="list-style-type: none"> Know the basic principle of infection. Understand hand washing skills. Aware of all types of hand sanitizer and the pros and cons of them. Know the personal protective equipment skills. Familiar with all types of PPE and the disadvantages and advantages of each of them. Understand the location and situation usage of handwashing and PPE.
2.	Module Outlines:	Principle foundation of infection control at healthcare organizations <ul style="list-style-type: none"> Hand washing skills. Hand sanitizer. Usage of hand hygiene. PPE. Usage of PPE.
3.	Competency	By the end of the course, each trainee will be able to: <ul style="list-style-type: none"> Explains the basic principles of infection control. Demonstrate the hand hygiene skills. Exhibit the PPE skills. Apply the hand hygiene and PPE at different locations in the pharmacy department.

Table 2: Employee immunization and occupational safety.

S.No	Module description	It is the principle of immunization of all pharmacy workers, immunization of particular pharmacy workers' conditions, and immunization through occupational safety. Besides pharmacy restrictions, personnel is exposed to infection in the pharmacy setting.
1.	Learning Objectives:	Learning Objectives: After finishing the employment immunization and occupational safety research model, the trainees should be able to <ul style="list-style-type: none"> Know the foundation of pharmacy worker immunization. Understand of test of immunization of pharmacy workers before employment and during the students' stage. Understand the pharmacy worker immunization in a particular condition. Aware of various types of vaccination for an occupational accident during employment duties. Familiar with pharmacy personnel restrictions during exposure to infected in the pharmacy setting.
2.	Module Outlines:	General Pharmacy workers' immunization before employment <ul style="list-style-type: none"> Pharmacy worker immunization during employment. Pharmacy worker immunization in unique condition. Pharmacy workers' immunization during an occupational incidence. Pharmacy workers' restriction for infected personal.
3.	Competency	By the end of the course, each trainee will be able to: <ul style="list-style-type: none"> Exploring the different immunization tests before employment for pharmacy workers. Demonstrate pharmacy worker immunization activities before and during employment. Apply various immunization in particular conditions for pharmacy workers. Exhibit the implementation immunization of occupational incidents for pharmacy workers. Demonstrate the pharmacy worker's restriction during infection personal in the pharmacy setting.

Table 3: Pharmacy environmental and workplaces.

1.	Module description	Its practice of the pharmacy environmental and workplaces Infection control. That includes carpets and furniture, Clothes, Water and solution, Air handling system, Sink and related places, Toilet, Kitchen, Sterile compounding area, Non-sterile compounding area, Point of dispensing, and Point of drug distribution in the pharmacy department and units. Besides, The disinfectant Indications and Safety related issues
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continued...

Table 3: Cont'd.

2.	Learning Objectives:	After finishing the Pharmacy environment and workplace, the trainees should be able to <ul style="list-style-type: none"> • Know the pharmacy environment and workplaces need for infection control. • Understand the method of infection control in the pharmacy environment and workplace. • Know the infection control during sterile and non-sterile compounding pharmaceutical products. • Aware of various types of disinfectants, indications, safety, and advantages and disadvantages. • Familiar with disinfectants throughout healthcare organizations.
3.	Module Outlines:	Pharmacy environmental and workplaces Infection control of pharmacy environment and workplaces <ul style="list-style-type: none"> • Carpet and furniture • Clothes • Waters and solution • Air handling system • Sinks and related places • Toilet • Kitchen • Sterile of the compounding area • Non-sterile compounding area • Point of dispensing • Point of drug distribution The disinfectant <ul style="list-style-type: none"> • Types • Indications • Safety
4.	Competency	By the end of the course, each trainee will be able to: <ul style="list-style-type: none"> • Exploring the different disinfectant materials in each environment and workplace in the pharmacy department. • Demonstrate infection control of environment and workplace in pharmaceutical care services. • Apply infection control skills during sterile compounding medications. Demonstrate the infection control skills during non-sterile compounding medications Exhibit the implementation of disinfectant distribution through the healthcare organizations

Table 4: Pharmacy wastages and spill cleaning.

1.	Module description	It is the foundation of pharmacy wastage control, including biohazard and non-biohazard wastage control. Besides, spill cleaning for any shaft or infected material accidents at pharmacy departments and units.
2.	Learning Objectives:	After finishing the pharmacy wastages and spill cleaning model, the trainees should be able to <ul style="list-style-type: none"> • Know the types of pharmacy wastages • Understand pharmacy biohazard material wastage management • Aware of the pharmacy's non-biohazard wastages material and management • Know the content of the spill kit material for biohazard and non-biohazard wastages • Familiar with spill cleaning of biohazard and non-biohazard material management

3.	Module Outlines:	Module Outlines: Types of pharmacy wastages <ul style="list-style-type: none"> • Biohazard wastages • Non-biohazard wastages • Sharp material Management of pharmacy wastages Biohazard wastages <ul style="list-style-type: none"> • Non-biohazard wastages • Sharp material Spill kit content <ul style="list-style-type: none"> • Biohazard wastages • Non-biohazard wastages Cleaning of spill material <ul style="list-style-type: none"> • Biohazard wastages • Non-biohazard wastages
4.	Competency	By the end of the course, each trainee will be able to: <ul style="list-style-type: none"> • Exploring the difference among the types of pharmacy wastages • Demonstrate the management of biohazard pharmacy wastages • Illustrate the management of non-biohazard pharmacy wastage Exhibit the cleaning of spills for biohazard and non-biohazard pharmacy

Table 5: Pharmacoepidemiology and infection control surveillance.

1.	Module description	The principle of pharmacoepidemiology and active infection control surveillance in pharmaceutical care services. Besides, the measurements of morbidity and mortality of infection in the pharmaceutical product and prevention measures of disease transmission among pharmacy workers and patients
2.	Learning Objectives:	At the end of this course, the student should be able to: <ul style="list-style-type: none"> • Understanding of the dynamics of bug transmission among pharmaceutical preparation. • Know the transmissions of the disease among pharmacy workers. Besides, patients and pharmacy staff or pharmacy staff and pharmaceutical products. • Familiar with infection control tests of pharmaceutical preparation at each pharmacy department. • Know the incidence and prevalence of infection in pharmacy departments and units. • Understand the morbidity and mortality of infection transmission in pharmaceutical care services. • Understand the efficacy of preventive and therapeutic measures of infection control in pharmacy practice. • Familiar with formulating the Pharmacoepidemiology research design such as case report or case-control and cohort model in pharmacy infection control.
3.	Module Outlines:	The pharmacoepidemiology and infection control surveillance in Pharmacy Practice <ul style="list-style-type: none"> • The Dynamics of disease transmission-infectious disease among healthcare workers and patients • The infection control screening test used in pharmaceutical preparation • The morbidity and mortality of pharmacy infection control • The pharmacy incident and prevalence of infection control • The preventive and therapeutic measures of infection control in pharmacy practice The pharmacoepidemiology research design in pharmacy practice

Table 5: Cont'd.

4.	Competency	By the end of the course, each trainee will be able to: <ul style="list-style-type: none"> demonstrate the Calculate the measures of morbidity and mortality of pharmacy infection control Exhibit the incidence and prevalence of infection control in pharmacy practice Perform the infection control screening test and active surveillance at each pharmacy department and units Assess the efficacy of preventive measures of infection control in pharmaceutical care units
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Maintain safety and prevent infection control issues in pharmacy departments and related items.
Provide infection control education and training opportunities for pharmacy employees and healthcare professionals.
Participate in infection control performance and activities via healthcare organizations and pharmaceutical services.

Admission requirements

Any pharmacist with a bachelor's or Pharm D degree and at least 1-2 years of experience was preferred. Furthermore, he held a legal license to practice and possessed basic computer literacy.

Program requirements

During the entire period, the program lasted five weeks. Therefore, a total of 48 hours of didactic and clinical time is required. Furthermore, the trainees must work for eight hours per shift as well.

Teaching and education method

In pharmacy infection control, there are several techniques of teaching and educating. The interactive lectures and discussions, presentations, weekly reading assignments, and group discussions were all part of it.

Evaluation and Assessment

The program's preceptor will evaluate and assess learners using a variety of approaches and, for example, completing weekly activities such as reading assignments, presentations, and daily discussions. There is a final evaluation of the program done by the trainees at the end of the training, besides assessing the receptors and an assessment of the program as explored in figure 1. The pharmacist implements the policy of pharmacy infection control training and coaching as follows

1. The infection control pharmacist coach examines the trainee's learning and practice using a digital survey with particular questions.
2. Discusses the evaluation survey results with the trainee. Aside from the desired goal for the trainee as explored in tables 1-6
3. Establish schedules for educational modules as explored in tables 1-6 with trainees during the overall training term.
4. Create the lookup tasks based solely on the lookup lecture agenda.
5. Examine the pharmacy infection control materials to complete with trainees and correct them.
6. The trainee corrects the lookup errors associated with the infection control pharmacist education preceptor.
7. The final evaluation of knowledge and infection control pharmacist education at each education and examination with a preliminary assessment.
8. Conduct a final survey on trainee pride in the application of infection control in pharmacy coaching and discuss the results with the learner to make future improvements.
9. The infection control pharmacist coaching preceptor goes through all previous evaluation outcomes before and after the education program and the last pride of lookup training. It modifies the aim, objective, and actions to reflect this.

CONCLUSION

The scope of pharmacy infection control training and education manipulates the essential precept for undergraduate and postgraduate pharmacists. The training program lasted five weeks and included six modules covering hand hygiene and personal protective measures, pharmacy surroundings and workplace, job immunization, and job security. Furthermore, pharmacy waste and spill cleaning, pharmacoepidemiology, contamination management surveillance, and pharmacy infection control quality management. Each module is stated in learning the objective, module outcomes, and competency. Training

Table 6: Quality management of Pharmacy infection control.

1.	Module description	It is quality management of the pharmacy infection control performances. That includes Hand hygiene and PPE, Environmental and workplaces, pharmacy Employee immunization, and occupational safety. Besides, the pharmacy Wastage and spill cleaning, and Pharmacoepidemiology and infection control surveillance
2.	Learning Objectives:	After finishing the quality management of the pharmacy infection control model, the trainees should be able to <ul style="list-style-type: none"> Know the quality management indicators of Hand hygiene and PPE activities. Understand the Environmental and workplaces indicators. Familiar with quality management of Employee immunization and occupational safety. Know the Wastage and spill cleaning quality management indicators. Aware of Pharmacoepidemiology and infection control surveillance quality indicators.
3.	Module Outlines:	Module Outlines: <ul style="list-style-type: none"> Hand hygiene and PPE quality management and indicators. Environmental and workplaces quality management and indicators. Quality management of the Employee immunization and occupational safety. Quality management of the pharmacy Wastage and spill cleaning. Quality management of the pharmacoepidemiology and infection control surveillance.
4.	Competency	By the end of the course, each trainee will be able to: <ul style="list-style-type: none"> Demonstrate the Hand hygiene and PPE indicators. Apply Environmentally and workplaces quality management indicators. Exhibit the quality management of the Employee immunization and occupational safety. Illustrate the Wastage and spill cleaning quality management indicators. Demonstrate the quality management of the pharmacoepidemiology and infection control surveillance.

Follow infection control recommendations and implement infection control measures in all pharmaceutical care departments and units.
Determine the infection risk variables in pharmaceutical preparations and goods.

Create an infection control pharmacy plan for all pharmacy settings.
Function independently as an infection control pharmacist while collaborating with infection control teams and committees.
Create and evaluate infection control surveillance in pharmacy practice.

and coaching in pharmacy contamination management coverage and techniques are simple in pharmacy practice. However, the extent and methods of schooling and teaching in pharmacy contamination manipulation are shockingly cautioned to implement in Saudi pharmaceutical offerings.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

CONSENT FOR PUBLICATIONS

Informed consent was obtained from all the participants

ETHICAL APPROVAL

This research is exempted from research and ethical committee or an institutional review board (IRB) approval. <https://www.hhs.gov/ohrp/regulations-and-policy/decisioncharts-2018/index.html>

ABBREVIATIONS

CDC: Centers for Disease Control and Prevention; **SCDC:** Saudi Center for Diseases Control; **WHO:** World Health Organization; **ASHP:** American Society of Health-System Pharmacist; **USP:** United States Pharmacopeia (USP); **AGREE:** Appraisal of Guidelines for Disease Control and Prevention; **OMT:** Outbreak Management Team; **IPC:** Infection Prevention and Control; **PPE:** personal protective equipment; **KSA:** Kingdom of Saudi Arabia; **MOH:** Ministry of Health

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