Education and Training Research Policy in Pharmacy Practice

Yousef Ahmed Alomi*, BSc. Pharm, MSc. Clin Pharm, BCPS, BCNSP, DiBA, CDE
Critical Care Clinical Pharmacists, TPN Clinical Pharmacist, Freelancer Business Planner, Content Editor, and Data Analyst, Riyadh, SAUDI ARABIA.
Amal Hassan Al-Najjar, BSc, MSc, Drug and Poison Information Center, Security Forces Hospitals, Riyadh, SAUDI ARABIA.
Maha Hussein Almadany, Bsc. Pharm.
Health Care Quality Management Professional Diploma (HCQM), Pharmacy Quality Department, King Salman bin Abdulaziz Medical City, Al Madina Al Monwarah, SAUDI ARABIA.
Abeer Hussin Almasoudi, Bsc. Pharm
Director, Administration of Research and Studies, Ministry of Health, Tabuk, SAUDI ARABIA.

Correspondence:
Dr. Yousef Ahmed Alomi, Bsc. Pharm, msc. Clin pharm, bcps, bCNSP, DiBA, CDE
Critical Care Clinical Pharmacists, TPN Clinical Pharmacist, Freelancer Business Planner, Content Editor and Data Analyst, P.O.BOX 100, Riyadh 11392, Riyadh, SAUDI ARABIA.

Phone no: +966 504417712
E-mail: yalomi@gmail.com

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ABSTRACT

Objectives: This study explores the Research policy of Research Education and Training in pharmacy practice as a new initiative in Saudi Arabia. **Methods:** The current topic is a narrative review of education and training procedures in pharmacy research. Litterateur was searched in various databases. That includes PubMed, Medline, Google Scholar, and academic Microsoft. The period covered for the search is from the 1960s to October 2021. The terms used are in the English language and encompass narrative reviews, systemic reviews, meta-analyses, and guidelines. The search keyword includes all hospital and community pharmacy-related services. Moreover, there are national and international guidelines for conducting general research in research in pharmacy practice. The committee of pharmacy research was formed and comprised numerous expert members, including clinical pharmacists, drug information pharmacists, and clinical research specialists. A member drafted the policy's guidelines, which were then reviewed and corrected by another member. The research specialist made the third revision. The topic emphasizes the Pharmacy Research policy of Research Education and Training. **Results:** Pharmacy Research's policy on Research Education and Training covered various topics, including the program objectives, admission requirements, teaching, educational methodology, and steps in pharmacy practice involving research, education, and training. Five models were used in research education and training. For instance, skills in searching for and reviewing the literature, research design and methodology, survey design, biostatistics, and research proposal writing. In addition, each model included a description of the module and Learning Objectives, Module Outlines, and Competency Items. **Conclusion:** The pharmacy research policy is a new initiative and a component of the pharmacy strategic plan. The Research Education and Training pharmacy policy aims to enhance pharmacists' research abilities and encourage pharmacists to conduct various types of research in multiple settings within the public and healthcare sectors. Therefore, the Research Education and Training policy are critical for the pharmacy career in Saudi Arabia.
Keywords: Research, Policy, Pharmacy, Education, Training, Saudi Arabia.

INTRODUCTION

Each pharmacy student submits a research project upon graduation from pharmacy school.[1] The faculty of pharmacy oversee the research project, and at times, external supervisors from outside the pharmacy school were involved. The pharmacy school offered an undergraduate didactics course on fundamental research and occasionally rotated students through research practice.[1] Additionally, all residents must complete one research project and are exposed to educational and training components during their local and international pharmacy practice residency programs.[2-3] Education and training in Good Clinical Practice (GCP) are well established for all healthcare professionals. GCP is primarily concerned with drug investigational clinical trials.[4-5]

Despite these educational and training programs, basic knowledge remains insufficient and falls short of the optimal level.[6-8] For instance, numerous local studies revealed an inadequate understanding of fundamental research and biostatistics.[9-10] Moreover, additional analyses revealed basic errors in the manuscript's submission for publication.[11-12] The majority of studies strongly advocated for improving pharmacists' undergraduate and postgraduate education and training.[6-8] Thus, established education and training programs for healthcare professionals, including pharmacists, in basic research skills. Education and training structures must be implemented through pharmacy services within healthcare organizations. However, numerous studies have examined the education and training of healthcare professionals in research skills, but not pharmacists.[13-16] Additionally, the authors were unaware of any investigation into the policies and practices governing research education and training in Saudi Arabia, the Middle East, and the rest of the world. This study reviews a fundamental aspect of pharmacy practice's scientific research education and training skills.

MATERIALS AND METHODS

It's a narrative review of education and training policy and procedures in pharmacy research. The litterateur searched for a specific term in various databases. The database includes PubMed,

Medline, and Google Scholar. The period frame for the search is from the 1960s until October 2021. The terms used were in English with various methodology designs. It included narrative review, systemic review, Meta-analysis, and guidelines and regulations. The research policy had all hospital or community pharmacy services. That includes Inpatient pharmacies and outpatient or ambulatory care pharmacies. Besides, extemporaneous preparation, repackaging units, the satellite pharmacy, pharmacy store, drug information center, and clinical pharmacy services. Furthermore, the National and international guidelines for general research in hospital practice are used as guiding of the current review.[17-30] That includes the Saudi Food and Drug Authority (SFDA) regulations,[18-19] the European Medicine Agency,[29] the American Society of Health-System Pharmacist (ASHP),[30] and the World Health Organization (WHO),[27] and other literature.[31-32] The committee of pharmacy research was formed and comprised of numerous expert members. That consisted of clinical pharmacists, drug information pharmacists, and clinical research specialists. One member drafted the policy guidelines, another member reviewed and corrected them, and a research specialist revised them for the third time. The topic covered various areas, including pharmacy research practice, the Research and Ethical Committee, data collection and organization, the quality of pharmacy research services, pharmacy research competency, and pharmacy research education and training. The current reviews of the pharmacy research education and training. Five models were used in research education and training. For instance, skills in searching for and reviewing the literature, research design and methodology, survey design, biostatistics, and research proposal writing. Each model included a description of the module and Learning Objectives, Module Outlines, and Competency Items adopted from the Saudi Commission for Health Specialities (SCHS) training module publication.[33] The narrative review was reported in accordance with the internationally adopted Appraisal of Guidelines, Research, and Evaluation (AGREE) standard.[34]

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Table 1: Litterateur search and review skills.

1.	Module description	It is basic skills of litterateur search in the public and evidence medicine database for pharmacy practice scientific research. That includes free such PubMed, Google Scholar, and Academic Microsoft. And paid dates such as the web of science and the Scopus database. Moreover, the courses discussed litterateur review and summary of the finding required for scientific research. The skills demand participants to revise the Research and get complete information and summarize it
2.	Learning Objectives:	After finishing the litterateur search and review course, the trainees should be able to 1- Know the general and accessible databases such as PubMed, Google Scholar, and academic Microsoft 2- Understand using specific paid search databases such as the web of sciences and Scopus. Besides Cochran library, 3- understand the filtering of search databases, including date period, language, humanities, research design and methodology, and other fillers. Besides, basic search and advanced search in each database 3- Aware of formulating the search topic questions by including and excluding criteria used for search. It had text world or title and meshed word searching skills 4- Familiar with the organizations of selected litterateur based on Prisma algorithms 4- understand reading, critically reviewing, and summarizing through prism table 5- Familiar with the risk of bias in the literature
3.	Module Outlines:	General and free searching databases such PubMed, Google Scholar, and academic Microsoft Specific and paid search databases such as the web of science and Scopus Filters used in search database in general and advanced litterateur search included period of searching, language, humanities, type of research design, and other filters Formulation of the search question and Setup of inclusion and expulsion criteria for litterateur search Prisma algorithm organizations Reading, critically revising skills, and summarizing the finding by using Prisma tables Risk of bias in the experimental and observational study
4.	Competency	By the end of the course, each trainee will be able to: Demonstrate search skills in free general and particular paid databases and get full-text articles Illustrate searching filters skills in the general and specific database for choosing the designated articles Formulate search questions and Apply inclusion and expulsion searching criteria for a particular topic of research Demonstrate the organization of the selected literature through the Prisma algorithm Exhibit the summary of the literature chosen by Prisma tables, including the risk of bias

Table 2: Research design and methodology.		
1.	Module description	It is the foundation of research design and methodology required for research methodology in pharmaceutical care. Besides, the awareness of various types of research design, including experimental such as clinical trials and non-experimental such as case reports, case series, case-control, cohort studies, and cross-sectional observational studies that have been used in pharmacy practice research
2.	Learning Objectives:	After finishing, the research design and methodology course, the trainees should be able to 1- Know the basic principle of evaluative, including experimental and non-experimental (observational) research methodology 2- Understand using basic various basic descriptive reports 3- understand the types of the descriptive report such as case reports, case series, pharmaceutical practice, and program 3- Aware of various types of non-experimental (observational) research designs such as case-control, cohort, follow up, and cross-sectional study 4- Know the Advantages and disadvantages of non-experimental (observational) research design 4- understand experimental research methodology 5- Familier with phases of clinical trials 6- Know the advantages and disadvantages of phases of clinical 7- Calculate the reliability test for the survey 8- Know the correlation and regression analysis 9- Aware of chi-square and contingency tables 10- Using some software biostatistics analysis such as SPSS Module Outlines:
3.	Module Outlines:	General Principle of experimental and non-experimental research design Types of evaluative and non-evaluative research design Type of evaluative experimental research design Clinical trial The phase of clinical trails Phase 1 Phase 2 Phase 3 Types of evaluative non-experimental research designs Case-control Cohort study Follow up Cross-sectional Type of descriptive report Case report Case series Pharmaceutical practice Program
4.	Competency	By the end of the course, each trainee will be able to: 1. Exploring the difference between the evaluative (experimental and non-experimental) research methodology and descriptive reports 2. Demonstrate choosing the appropriate research design among experimental and non-experimental research methodology 3. Apply various research designs such as case report, case series, case-control, cohort, and cross-sectional stud Exhibit the implementation of the clinical trial of research design and their phases

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RESULTS

Program objective

Upon completion of education and training in pharmacy research, the learner will be able to:

1. Apply knowledge from various types of research to healthcare organizations and pharmacy practice.
2. Adhere to clinical research guidelines and methodology within pharmaceutical studies and reviews.
3. Establish policies and procedures for pharmacy research in all pharmacy settings.
4. Develop a pharmacy research strategic plan for all pharmacy settings.

Table 3: Survey design skills.

1.	Module description	History of pharmacy research international and locally included various benefits and impacts of research in pharmacy practice. Besides, the basic foundation's survey design skills in pharmaceutical care research. The survey was designed for qualitative scientific research. That includes the pre-survey stage, during survey design, and the post-survey step. Moreover, the survey validation and application of Reliability analysis.
2.	Learning Objectives:	After finishing the Survey design skills course, the trainees should be able to 1- Know the History of pharmacy research international and locally 2- Understand the benefits and impact of research in pharmacy practice 3- Know the pre-survey skills, including goal and objective, type of survey, either interview survey or self-survey, and draft questions 3- Aware of formulating survey stage, including the writing of the research questionnaire, closed or open questions, software of electronic survey 4- Familiar with the post-survey stage, including validation of the survey, pilot testing of the survey 4- understand survey distribution methods to the population target of the research 5- Familiar with reliability tests of the questionnaire risk
3.	Module Outlines:	History of pharmacy research internationally and locally Benefits and impact of research in pharmaceutical care Pre survey stage Interview survey Self-survey During survey stage Regular vs. electronic survey Software of electronic survey Google doc Free electronic survey Post survey stage Validation of the survey Pilot testing of the survey Method of survey distribution and data collection Reliability test of the survey or questionnaire
4.	Competency	By the end of the course, each trainee will be able to: 1. Explain the History of pharmacy research and its benefits with outcomes in the practice 2. Demonstrate the setup goal and objective of the survey, and draft a questionnaire from previous studies 3. Illustrated the skills of making regular or electronic surveys through software survey Demonstrate the skills of survey validation and pilot testing of the survey Explore the distribution method skills of the survey and data collection Exhibit the ability of reliability test calculation of the current study or questionnaire

5. Work independently as a researcher or investigational drug pharmacist or research pharmacist and collaborate with teams and committees of institutional review boards.
6. Establish and evaluate steps for the pharmacy research.
7. Ensure the safety of patients while conducting investigational drug research and resolving research-related issues within the healthcare organization.
8. Provide pharmacy staff and healthcare professionals with pharmacy research education and trading opportunities.
9. Assist healthcare organizations and pharmacy services with clinical trials and pharmacy research performance and activities.

Required for admission

Any pharmacist must possess a bachelor's or Pharm D degree and a minimum of 1-2 years of experience. Additionally, he holds a current license to practice and has basic computer literacy.

Program requirements

Throughout the period the program lasted five weeks. There must be a total of 48 hr of didactic and clinical instruction. Additionally, trainees must work a minimum of eight hours per shift.

Teaching and education method

There are numerous teaching and educational methods available in pharmacy infection control. There have been interactive lectures and discussions, presentations, weekly reading assignments, and group discussions.

Evaluation and Assessment

The program preceptor will Evaluate and assess trainees using a variety of techniques. Weekly activities, reading assignments, presentations, and daily discussions must be completed. The trainees conduct the program's final evaluation after the training, an assessment of the receptors, and an assessment of the program.

1. The research trainer assesses the trainee's knowledge and practices via an electronic survey assessment of participants based on five modules as addressed in tables 1-5
2. Discussed the assessment survey results with the trainee and the trainee's required objective, as detailed in Tables 1-5.
3. Schedule training lectures and discussions with trainees during the post-training period.

Table 4: Biostatistics.		
1.	Module description	It is basic principles of biostatistics that are needed in pharmacy practice research. Besides, practice aspect of some free or paid biostatistics software and utilization in the Research in pharmaceutical care.
2.	Learning Objectives:	After finishing the biostatistics course, the trainees should be able to 1- Know the basic principle of various types of data that are included quantitative and qualitative 2- Understand using fundamental parametric analysis in biostatistics such as mean, mode, median, and range 3 Calculate the standard deviation, stander error of the mean, and confidence interval 4- aware of probability value p(-value) and the significance 5- Familiar with parametric analysis such as paired and unpaired t-test 6- Understand the calculation of Analysis of variance (one way ANOVA - Two way ANOVA) 7- Calculate the reliability test for the survey 8- Know the correlation and regression analysis 9- Aware of chi-square and contingency tables 10- Using some software biostatistics analysis such as SPSS
3.	Module Outlines:	Principle of cleaning data and summaries in tables, graphics, and frequency Descriptive analysis included measures of central tendency and variability Confidence interval and level of significant Parametric analysis for quantitative data Paired T-test Unpaired T-Test Analysis of variance (One way ANOVA) Two way ANOVA Non- parametric analysis of qualitative data Chi-square Krosalwalix Fried Man Correlation analysis Regression analysis Single regression analysis Multiple regression analysis Reliability test Bayesian biostatistics Software ware analysis
4.	Competency	By the end of the course, each trainee will be able to: 1. Illustrate how to clean, organize, and summarize the data 2. Demonstrate choosing the appropriate biostatistics test for each type of data 3. Compute measures of reliability tests and central tendency and variability. 4. Apply the parametric and non-parametric statistical data analysis 5. Demonstrate the use of software for biostatistics

4. Plan research activities in accordance with the research lecture schedule.
5. Conduct a review of the trainee's research activities and make necessary corrections.
6. The trainee works with the research training preceptor to correct errors in research activities.
7. Conduct a final assessment of the knowledge and skills acquired during each training session and compare it to the initial evaluation.
8. Conduct a final survey of trainee satisfaction with the research training program and discuss the results with the trainee to improve the program in the future.
9. The preceptor for research training reviews all previous assessment results before and following the training program and the final satisfaction with the research training and updates the goal, objective, and activities as necessary.

CONCLUSION

A research-based education and training policy is critical for undergraduate and postgraduate pharmacists. The education program lasted five weeks and included five modules covering literature search and review, research design and methodology, survey design skills, biostatistics, and writing a research proposal. Each module consists of a learning objective, module outcomes, and competency description. In addition, the program's policies and procedures are comprehensive in program administration and simple to implement in pharmacy practice. Therefore, education and training in pharmacy research policies and procedures are highly recommended for pharmacy career professionals in Saudi Arabia.

Table 5: Research Proposal.		
1.	Module description	It is the basic principle of the research proposal. That includes the objective of the research proposal, the type of research proposal, and the content of the research proposal. Besides the Institutional review board, the activities of IRB, the kind of research exempted from IRB, research expedited from IRB, and complete research review of IRB. In addition to ethics behavior for the study of pharmacy practice.
2.	Learning Objectives:	After finishing the research proposal course, the trainees should be able to 1- Know the basic foundation of the research proposal that's including the objective of the research proposal and type of research proposal, and content of the research proposal 2- Understand IRB performance related to pharmacy research 3- Aware of research exempted from IRB 3- Know the research that's being expedited from IRB 4- familiar of research needed to be reviewed by IRB 4- Understand of electronic research proposal 5- Know the pharmacy research ethics
3.	Module Outlines:	The goal of the research proposal Type of research proposal Content of research proposal Summary Introduction Methodology Financial budget Time table of research Research exempted from IRB Research expedited from IRB Research complete reviewed by IRB Ethics in research in pharmacy practice
4.	Competency	By the end of the course, each trainee will be able to: 1. Demonstrate to write a full research proposal that's can be submitted to IRB illustrate segregation among research exempted from IRB, research expedited from IRB, and research should fill reviewed by IRB 3. Apply ethics in pharmacy research in the proposal

ACKNOWLEDGEMENT

None.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

ABBREVIATIONS

KSA: Kingdom of Saudi; **GCP:** Good Clinical Practice; **SFDA:** Saudi Food and Drug Authority; **WHO:** World Health; **WHO:** World Health Organization; **ASHP:** American Society of Health-System Pharmacists; **SCHS:** Saudi Commission for Health Specialties; **AGREE:** Appraisal of Guidelines, Research, and Evaluation.

ORCID ID

Yousef Ahmed Alomi https://orcid.org/0000-0003-1381-628X

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