

Introduction to Pharmacy Research Methods

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Designed for students, new researchers, and practicing pharmacists

1. Why Research Matters in Pharmacy

Benefit	Description
Improved Patient Care	Generates evidence for safer, more effective drug therapy.
Professional Advancement	Publishes findings, contributes to guidelines, supports career growth.
Regulatory Compliance	Provides data required for drug approval, labeling, and post-marketing surveillance.
Innovation	Identifies gaps, inspires new formulations, delivery systems, or therapeutic strategies.

2. Types of Pharmacy Research

Category	Focus	Typical Study Designs
Basic/Pre-clinical	Molecular mechanisms, drug discovery, formulation science.	In-vitro assays, animal models, computational modelling.
Clinical	Human drug therapy, safety, efficacy, pharmacokinetics/dynamics.	Randomized controlled trials (RCTs), cohort studies, case-control studies, crossover trials.
Pharmaco-epidemiology	Drug use patterns, outcomes in real-world populations.	Database analyses, registry studies, cross-sectional surveys.
Pharmacoeconomics	Cost-effectiveness, budget impact, health-technology assessment.	Cost-utility analysis, cost-benefit analysis, decision-analytic modelling.
Pharmacy Practice	Service delivery, medication counseling, adherence interventions.	Quasi-experimental designs, quality-improvement projects, mixed-methods studies.

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3. The Research Process – Step by Step

1. Identify a Knowledge Gap

- Literature review (systematic or scoping).
- Clinical observations, adverse event reports, policy changes.

2. Formulate a Research Question

- Use the **PICO** framework (Population, Intervention, Comparison, Outcome) for clinical questions.
- Example: *In adult diabetic patients (P), does a pharmacist-led education program (I) compared with standard care (C) improve HbA1c levels (O)?*

3. Select an Appropriate Study Design

- Match the question to design (e.g., efficacy ? RCT; prevalence ? cross-sectional).

4. Develop a Protocol

- Objectives, hypotheses, methodology, sample size calculation, data collection tools, statistical plan, ethical considerations.
- Register clinical trials (e.g., ClinicalTrials.gov) or systematic reviews (PROSPERO).

5. Obtain Ethical Approval

- Submit to an Institutional Review Board (IRB) or Ethics Committee.
- Include informed consent forms, risk-benefit analysis, data privacy safeguards.

6. Data Collection

- **Quantitative:** questionnaires, lab assays, electronic health records.
- **Qualitative:** interviews, focus groups, observation notes.
- Ensure standardization (SOPs, training, calibration).

7. Data Management & Quality Control

- Use secure databases (REDCap, OpenClinica).
- Perform double-entry, range checks, and audit trails.

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8. Statistical Analysis

- **Descriptive:** means, medians, frequencies.
- **Inferential:** t-tests, chi-square, regression, survival analysis, multilevel modelling.
- Software options: SPSS, SAS, R, Stata, JMP.

9. Interpretation of Results

- Relate findings to the original hypothesis.
- Discuss clinical relevance, limitations, and potential biases.