CHAPTER 14

CLINICAL DECISION MAKING

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Abstract

Clinical decision making applies systematic cognitive processes to pharmaceutical care, integrating evidence evaluation with patient-specific factors to optimize therapeutic outcomes. Evidence-based practice combines research evaluation, clinical expertise, and patient preferences through structured approaches identifying answerable clinical questions, efficiently searching information sources, critically appraising literature quality, applying findings to specific patients, and evaluating outcomes, with hierarchies rating evidence from meta-analyses and randomized controlled trials to case reports and expert opinion. Clinical guidelines implementation translates consensus recommendations into practical application through identification of relevant guidelines, assessment of evidence quality and applicability, adaptation to local resources and patient populations, implementation strategies addressing barriers, and outcome monitoring evaluating adherence and clinical impact. Patient case analysis employs structured frameworks systematically evaluating subjective and objective information, including comprehensive medication reviews identifying actual and potential drug-related problems, with particular attention to indication appropriateness, effectiveness assessment, safety evaluation, and adherence factors across acute and chronic conditions. Therapeutic problem solving applies clinical reasoning models to complex medication challenges through clear problem definition, generation of multiple intervention options, systematic evaluation of alternatives against therapeutic goals, implementation of selected interventions, and ongoing monitoring with adjustment based on response, incorporating both analytical and intuitive processes while considering patient-specific contexts, preferences, and clinical variables. Decision-making principles enable pharmacists to translate theoretical knowledge into practical interventions that address individual patient needs while incorporating best available evidence and professional judgment.

Keywords: Clinical Reasoning; Literature Evaluation; Problem Identification; Intervention Selection; Evidence-Based Practice

Learning Objectives

After completion of the chapter, the learners should be able to:

- Formulate clinically relevant questions using PICO (Population, Intervention, Comparison, Outcome) format to guide evidence-based inquiries.
- Evaluate primary literature using critical appraisal tools to assess validity, importance, and applicability to specific patient scenarios.
- Implement clinical practice guidelines while appropriately adjusting recommendations based on patient-specific factors and comorbidities.
- Develop systematic approaches to patient case analysis using standardized frameworks that identify actual and potential drug-related problems.
- Apply clinical reasoning models to complex therapeutic problems through clear definition, option generation, intervention selection, and outcome evaluation.
- Integrate patient preferences, clinical evidence, and professional judgment when making recommendations for challenging clinical scenarios.
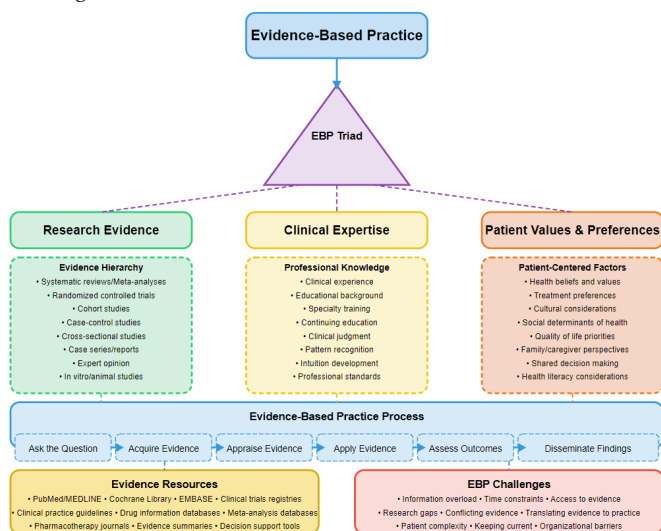
EVIDENCE-BASED PRACTICE

Evidence-based practice (EBP) represents the conscientious, explicit, and judicious integration of best available research evidence with clinical expertise and patient values to optimize therapeutic decision-making. This approach moves beyond tradition, intuition, or unsystematic clinical experiences to incorporate rigorous evaluation of scientific literature while recognizing the essential contributions of practitioner judgment and patient preferences. Effective implementation of evidence-based practice requires both methodological understanding for critical literature evaluation and practical strategies for integrating evidence into daily clinical workflows.

Principles of Evidence-Based Practice

Evidence-based practice rests on fundamental principles guiding both conceptual understanding and practical application. The evidence hierarchy organizes information sources according to methodological rigor and potential for bias, with systematic reviews and meta-analyses of randomized controlled trials generally occupying the highest position; individual randomized controlled trials providing strong evidence for causal relationships; observational studies including cohort

and case-control designs offering insights into associations and real-world effectiveness; and case reports, expert opinion, and physiological rationale providing lowest-level evidence when stronger sources are unavailable. While this hierarchical approach provides general guidance, appropriate evidence selection must consider the specific clinical question being addressed, with different study designs offering complementary strengths for different inquiry types. The five-step EBP process offers a structured approach to clinical problem-solving: formulating clear clinical questions; searching efficiently for best evidence; critically appraising evidence quality; applying relevant findings to specific patient circumstances; and evaluating outcomes. Clinical question formulation typically employs the PICO framework identifying Patient/Problem, Intervention, Comparison, and Outcome elements, creating focused queries supporting efficient literature searching.

Figure 14.1: Evidence-Based Practice

Evidence searching strategies balance comprehensiveness against efficiency through selection of appropriate information resources ranging from pre-appraised sources (clinical decision support systems, evidence-based guidelines) to primary literature databases (PubMed/MEDLINE, Embase) based on question complexity, time constraints, and resource availability. Critical appraisal examines both internal validity (methodological quality) and external validity (applicability to specific patients or settings) through structured

assessment of study design, execution, analysis, and reporting. Application integrates research findings with individual patient factors including comorbidities, preferences, social circumstances, and economic considerations, recognizing that even high-quality evidence requires contextual interpretation. Evaluation completes the cycle by assessing both patient outcomes and process effectiveness, creating continuous improvement opportunities in evidence application.

Table 14.1: Evidence-Based Practice Framework

Component	Description	Application Methods
Research Evidence	Systematic reviews Randomized controlled trials Cohort studies Case-control studies Case series/reports	Literature search strategies Critical appraisal tools Evidence synthesis methods Hierarchy of evidence application
Clinical Expertise	Professional knowledge Practice experience Specialized training Pattern recognition Clinical judgment	Reflective practice Experience documentation Peer consultation Skill development planning
Patient Values/Preferences	Expressed preferences Health beliefs Treatment goals Risk tolerance Quality of life priorities	Patient interviews Shared decision-making tools Preference elicitation methods Patient-reported outcomes
Clinical Circumstances	Patient-specific factors Comorbidities Medication history Social determinants Healthcare access	Comprehensive assessment Patient-specific data collection Risk stratification Contextual analysis
Critical Appraisal	Validity assessment	Structured appraisal tools

Component	Description	Application Methods
	Results interpretation Relevance evaluation Applicability determination	Quality assessment checklists Bias identification methods Statistical significance evaluation
Information Mastery	Knowledge management Efficient information access Trusted resource identification Pre-appraised evidence use	Point-of-care tools Evidence-based resources Information triage strategies Foraging vs. hunting approaches
Question Formulation	PICO framework application Focused clinical questions Searchable questions Prioritization of inquiries	PICO templates Question refinement processes Question categorization systems Priority-setting frameworks
Evidence Application	Patient-specific adaptation Contextual consideration Benefit-risk assessment Shared decision-making	Clinical pathways Decision aids Guidelines with exceptions Collaborative decision processes
Outcome Evaluation	Patient outcomes monitoring Intervention effectiveness Unintended consequences Process assessment	Outcome measurement systems Process metrics Patient feedback collection Comparative effectiveness methods
Continuous Improvement	Reflection on outcomes	Performance feedback loops

Component	Description	Application Methods
	Practice adaptation Knowledge updating System enhancement	Learning systems Continuous education Practice-based research
Evidence Implementation	Knowledge translation Practice integration System-level adoption Sustainable change	Implementation frameworks Change management strategies Educational outreach System integration approaches

Critical Appraisal of Medical Literature

Critical appraisal skills enable discrimination between robust evidence supporting practice change and flawed research potentially leading to inappropriate interventions. Randomized controlled trial (RCT) evaluation examines multiple quality dimensions including randomization adequacy protecting against selection bias; allocation concealment preventing enrollment manipulation; appropriate blinding minimizing performance and detection bias; complete outcome reporting avoiding attrition bias; predetermined analysis plans preventing selective reporting; and sufficient statistical power ensuring capability to detect clinically meaningful differences. Systematic review assessment considers comprehensive literature searching minimizing publication bias; explicit inclusion criteria ensuring appropriate study selection; rigorous quality evaluation of included studies; appropriate synthesis methods accounting for study heterogeneity; and transparent reporting of all methodological decisions. Observational study evaluation addresses design-specific considerations including representativeness of cohort studies; appropriate control selection in case-control research; adequate follow-up duration capturing relevant outcomes; comprehensive confounder identification and adjustment; and recognition of inherent limitations in establishing causality. Statistical interpretation requires understanding of both significance and clinical importance, recognizing that statistically significant findings may lack practical relevance if effect sizes remain small. Concepts including absolute risk reduction, relative risk reduction, number needed to treat, and confidence intervals provide context for

determining clinical significance beyond p-value interpretation. Common methodological limitations requiring identification include inappropriate surrogate endpoints inadequately predicting clinical outcomes; insufficient study duration missing delayed benefits or adverse effects; selective population enrollment limiting generalizability; inappropriate comparators providing misleading conclusions about relative efficacy; industry funding potentially introducing bias through multiple mechanisms; and publication bias systematically overrepresenting positive findings in available literature. Practical appraisal approaches balance comprehensive evaluation against time constraints through structured assessment tools including the Cochrane Risk of Bias Tool for randomized trials; AMSTAR-2 for systematic reviews; Newcastle-Ottawa Scale for observational studies; and various critical appraisal checklists developed by evidence-based practice organizations providing guided evaluation frameworks.

Applying Evidence to Individual Patients

Translating population-based evidence to individual patient care requires thoughtful consideration of various factors influencing both appropriateness and effectiveness of interventions. Benefit-risk assessment evaluates potential therapeutic advantages against possible harms within the context of specific patient circumstances. This assessment considers absolute risk reduction rather than relative measures alone; evaluates time-to-benefit relative to patient life expectancy and treatment goals; examines number needed to treat alongside number needed to harm; and incorporates patient-specific risk factors potentially altering the intervention's benefit-risk profile. Individual patient factors significantly influencing evidence application include age-related physiological changes affecting pharmacokinetics and pharmacodynamics; organ dysfunction altering medication elimination or sensitivity; genetic variations influencing drug metabolism or receptor response; pregnancy or lactation considerations; comorbid conditions potentially introducing drug-disease interactions; and concurrent medications creating potential drug-drug interactions. Patient preferences and values constitute essential components of evidence-based decision-making, reflecting personal goals, risk tolerance, treatment burden acceptance, and quality-of-life priorities. Preference elicitation employs various approaches including direct discussion of options with associated benefits and risks; decision aids presenting information in accessible formats; and shared decision-making processes explicitly incorporating patient values alongside clinical evidence. Practical limitations affecting evidence application include financial constraints related to medication costs, monitoring requirements, or access to care; literacy and comprehension barriers

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1. Mortar and pestle

It consists of a glass or porcelain mortar and a pestle.

Advantages:

(i) Small quantity emulsions can be prepared in the laboratory.

(ii) Low cost

(iii) Simplest method for preparing emulsions.

Disadvantages:

(i) Generally, the final particle size is considerable larger than in other methods.

(ii) It is necessary to use intermittent trituration; certain viscosity must be maintained in the mixture for a sufficient shear.

2. Agitator : Mechanical drivers

Impellers (propeller or turbine) are used. Electric turbines produce radial and tangential velocities mounted on shafts, which are placed directly into the system to be emulsified.

For low viscosity emulsions propeller type can be used but for higher viscosity turbine type is used.

The degree of agitation is controlled by the rotational speed of impeller, by the pattern of the liquid flow and the resultant efficiency of mixing are controlled by the type of impeller, its position in the container, the presence of baffles, and the general shape of the container.