11

Basics of Evidence-Based Practice

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LEARNING OBJECTIVES

After the completion of the chapter, the readers will be able to:

- Define evidence-based practice and explain its importance in physiotherapy.
- Describe the core components and basic steps of the evidence-based practice process.
- Identify and interpret different levels of research evidence and study designs.
- Apply research evidence to clinical decision-making to improve patient care.

CHAPTER OUTLINE

- Introduction
- Historical Development
- Definition and Core Concepts
- Evidence-Based Practice Process: Sackett's Five-Step Model
- Types and Hierarchy of Evidence
- Research Designs Commonly Used in Evidence-Based Practice
- Barriers and Facilitators of Evidence-Based Practice in Physiotherapy
- Evidence-Based Practice in Clinical Decision-Making for Physiotherapists
- Teaching and Learning Evidence-Based Practice in Physiotherapy Education

KEY TERMS

Critical appraisal: Systematic evaluation of research for validity, reliability, and applicability.

Evidence-based practice (EBP): Integration of best research evidence, clinical expertise, and patient preferences for decision-making.

Hierarchy of evidence: Ranking of research designs based on strength and reliability of evidence.

PICO framework: Structured method to formulate clinical questions (Population, Intervention, Comparison, and Outcome).

Randomized controlled trial (RCT): Experimental study with random allocation to evaluate intervention effectiveness.

INTRODUCTION

Evidence-based practice (EBP) has emerged as a cornerstone of modern healthcare, serving as a systematic approach to clinical decision-making that integrates the best available research evidence with clinical expertise and patient preferences (Sackett et al., 1996). For physiotherapists, EBP ensures that interventions are grounded in scientific reasoning, enhancing treatment effectiveness, patient safety, and professional accountability. The integration of EBP into physiotherapy education empowers students to become critical thinkers and lifelong learners capable of delivering high-quality, individualized care.

The EBP is an essential component of physical therapy, enabling therapists to make well-informed clinical decisions by integrating the most up-to-date and relevant research evidence. By relying on current research and data, physiotherapists can deliver treatments that are both effective and efficient. EBP reduces reliance on guesswork, personal bias, and outdated traditional methods that may not yield optimal results, thereby improving patient outcomes and satisfaction.

Furthermore, EBP supports therapists in keeping pace with ongoing advancements in the field, helping them continuously enhance their knowledge and clinical skills. This ongoing learning ultimately contributes to improved quality of care. In summary, EBP plays a vital role in the growth of the physiotherapy profession and ensures that patients receive the highest standard of care possible.

This chapter explores the fundamental concepts, processes, and applications of EBP in physiotherapy. It also discusses its historical roots, methodological framework, hierarchy of evidence, barriers to implementation, and relevance to physiotherapy education.

HISTORICAL DEVELOPMENT

The concept of using scientific evidence to guide medical practice dates back to the 19th century, when Pierre Louis introduced quantitative and numerical methods into clinical medicine (Rosenberg & Donald, 1995). This marked an early shift toward more objective and systematic approaches in healthcare.

The modern movement of EBP emerged in the early 1990s at McMaster University, led by David Sackett and his team. They emphasized that clinical decision-making should rely not only on expert opinion but also on evidence, systematically collected, critically appraised, and scientifically validated (Sackett et al., 1996).

Physiotherapy began adopting EBP in the late 1990s, recognizing the importance of standardized interventions supported by strong scientific evidence. The growing number of randomized controlled trials (RCTs) and systematic reviews in rehabilitation science further strengthened the foundation for implementing EBP principles in physiotherapy (Herbert et al., 2005). Over time, EBP has been integrated into physiotherapy education and professional guidelines worldwide, reflecting a global movement toward accountability, improved quality of care, and enhanced clinical outcomes.

DEFINITION AND CORE CONCEPTS

Definition

Evidence-based practice (EBP) is defined as 'the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients' (Sackett et al., 1996, p. 71). It emphasizes a thoughtful and systematic approach to clinical decision-making.

Core Concepts

In physiotherapy, EBP is based on the integration of three core components:

1. **Best available evidence**—derived from high-quality research such as systematic reviews, randomized controlled trials, and scientific literature.
2. **Clinical expertise**—the practitioner's professional skills, experience, and clinical judgment.
3. **Patient values and preferences**—the individual's needs, expectations, and cultural context (Straus et al., 2018).

These three pillars ensure that clinical decisions are both scientifically sound and patient-centered. By combining research evidence with professional expertise and patient perspectives, EBP reduces reliance on tradition or intuition alone and promotes more effective, individualized care.

EVIDENCE-BASED PRACTICE PROCESS: SACKETT'S FIVE-STEP MODEL

The process of implementing EBP in physiotherapy typically follows a five-step model (Fig. 11.1) proposed by Sackett and colleagues (1996):

Step 1: Ask—Formulating a Clinical Question

The first step involves identifying the patient's problem and converting it into an answerable clinical question.

The PICO framework

The PICO framework is a structured approach used to formulate clear and focused clinical or research questions, particularly in evidence-based practice.

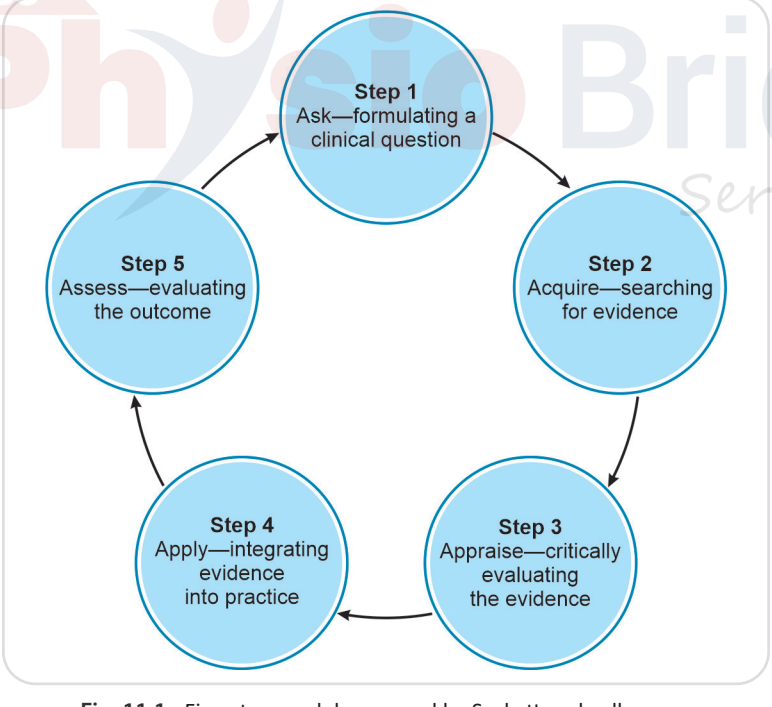

Fig. 11.1: Five-step model proposed by Sackett and colleagues

PICO stands for:

- **P – Population/problem:** Refers to the group of individuals, patients or the specific condition or situation being studied. These are the recipients or potential beneficiaries of an intervention.
- **I – Intervention/exposure:** Represents the treatment, procedure or action being considered for the population.
- **C – Comparison:** Refers to an alternative intervention, treatment or control condition used for comparison, which may or may not produce similar outcomes.
- **O – Outcome:** Indicates the measurable effects or results used to determine the effectiveness of the intervention.

The PICO framework helps in developing well-structured clinical questions, guiding literature searches, and supporting evidence-based decision-making in clinical practice.

Example: In elderly patients with osteoarthritis (Population), does exercise therapy (Intervention) compared to usual care (Comparison) improve pain and mobility (Outcome)?

The PICO components with keywords and clinical scenario for this question are given in Table 11.1.

Step 2: Acquire—Searching for Evidence

Once the clinical question is defined, relevant evidence must be gathered from reliable sources. Physiotherapy students should be familiar with databases such as PubMed, PEDro (physiotherapy evidence database), CINAHL, and Cochrane Library. Search strategies include using Boolean operators, truncation, and filters for study type or date (Higgins et al., 2021).

TABLE 11.1: The PICO components with clinical scenario

Components	Clinical scenario
Patient population	Patients with osteoarthritis
Intervention	Physical therapy exercises
Comparison (if any)	Usual care
Outcome	Improvement in pain and mobility

Step 3: Appraise—Critically Evaluating the Evidence

Not all evidence is equally trustworthy. Critical appraisal involves evaluating the validity, reliability, and applicability of studies. Physiotherapists assess study design, sample size, bias, outcome measures, and statistical significance. Tools such as the PEDro scale, CASP checklists, and the Cochrane Risk of Bias Tool help determine study quality (Maher et al., 2003).

Step 4: Apply—Integrating Evidence into Practice

The next step is applying the evidence to patient care, taking into account clinical expertise and patient preferences. For instance, evidence supporting exercise interventions must be adapted to each patient's physical condition, motivation, and environmental factors (Jette et al., 2003).

Step 5: Assess—Evaluating the Outcome

Finally, the effectiveness of the chosen intervention should be evaluated through outcome measures such as pain scales, range of motion tests or functional assessments. Continuous evaluation helps refine practice and identify areas for improvement (Guyatt et al., 2015).

TYPES AND HIERARCHY OF EVIDENCE

The strength of evidence varies depending on study design. The hierarchy of evidence provides a framework for ranking research according to methodological rigor (Melnyk & Fineout-Overholt, 2019) (Fig. 11.2). To evaluate evidence systematically, study designs are arranged in a hierarchy based on the reliability of their findings:

1. Systematic reviews and meta-analyses of randomized controlled trials (RCTs)
2. Randomized controlled trials
3. Cohort studies
4. Case-control studies
5. Cross-sectional studies and surveys
6. Case reports and case studies
7. Mechanistic studies
8. Editorials and expert opinions

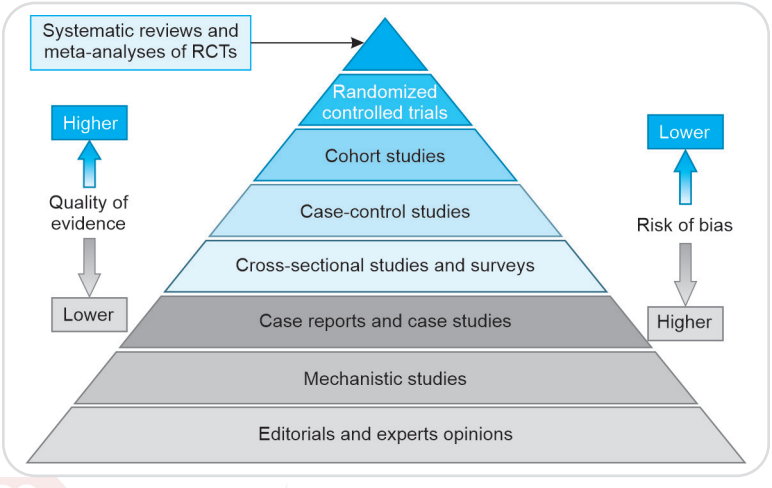

Fig. 11.2: Hierarchy of evidence-based medicine

In physiotherapy, RCTs are particularly valuable for testing interventions such as exercise programs, manual therapy or electrotherapy. However, qualitative research also contributes by exploring patient experiences, which are critical for person-centered care (Greenhalgh et. al., 2014).

RESEARCH DESIGNS COMMONLY USED IN EVIDENCE-BASED PRACTICE

Different research designs provide various types of evidence. Key designs include:

Randomized Controlled Trial

A randomized controlled trial (RCT) is a study design in which participants are randomly assigned to either an experimental group or a control group. This random allocation ensures that both groups are comparable at the start of the study. As the study progresses, the only expected difference between the groups is the outcome variable being measured, allowing researchers to attribute any observed effects directly to the intervention. RCTs are considered the gold standard for evaluating the efficacy of treatments and interventions due to their ability to minimize bias and establish cause-and-effect relationships.

Cohort Studies

Cohort studies are observational designs in which one or more groups (cohorts) are followed over time to assess the development of a particular outcome. Participants are initially classified based on their exposure to a risk factor, and their outcomes are measured prospectively. This design helps in establishing potential cause-and-effect relationships by examining how different exposures influence outcomes over time.

Case-Control Studies

Case-control studies are retrospective in nature. They compare individuals with a specific disease or outcome (cases) to those without it (controls). Researchers look back in time to identify prior exposure to risk factors and determine their association with the outcome. This design is particularly useful for studying rare conditions.

Cross-Sectional Studies

Cross-sectional studies analyze data from a population at a single point in time. Both exposure and outcome are measured simultaneously, providing a 'snapshot' of the population. These studies are commonly used to estimate the prevalence of a condition or characteristic.

Qualitative Research

Qualitative research focuses on understanding participants' experiences, perceptions, and behaviors. It addresses 'how' and 'why' questions rather than numerical measurements. This approach can be used independently or as a part of mixed-methods research, offering deeper insights into subjective aspects such as experiences of patients, motivations, and barriers in physiotherapy.

BARRIERS AND FACILITATORS OF EVIDENCE-BASED PRACTICE IN PHYSIOTHERAPY

Barriers

Despite its recognized benefits, the adoption of EBP in physiotherapy faces several challenges:

- **Lack of time:** Clinical workloads leave little room for literature review.

- **Limited access to resources:** Some institutions lack journal subscriptions or online databases.
- **Insufficient training:** Many clinicians lack skills in research appraisal and statistics.
- **Resistance to change:** Practitioners may rely on traditional methods or personal experiences (Jette et al., 2003).

Facilitators

- **Continuing education:** Workshops and EBP modules enhance knowledge and confidence.
- **Institutional support:** Providing access to research databases and protected learning time.
- **Peer collaboration:** Team discussions encourage knowledge sharing and reflection.
- **Mentorship:** Senior clinicians guiding juniors through research appraisal (Salbach et al., 2007).

EVIDENCE-BASED PRACTICE IN CLINICAL DECISION-MAKING FOR PHYSIOTHERAPISTS

Clinical decision-making in physiotherapy integrates scientific evidence with patient-centered values. For instance, when determining treatment for low back pain, physiotherapists may refer to evidence supporting exercise therapy and patient preferences for noninvasive methods. EBP thus bridges the gap between theory and practice, leading to individualized, effective care (Herbert et al., 2005).

Moreover, EBP fosters ethical practice by minimizing ineffective or potentially harmful interventions. It aligns with professional standards set by organizations such as the World Confederation for Physical Therapy (WCPT, 2020), which emphasizes evidence-informed care as a fundamental competency.

TEACHING AND LEARNING EVIDENCE-BASED PRACTICE IN PHYSIOTHERAPY EDUCATION

Integrating EBP into physiotherapy curricula is essential for preparing students to become competent practitioners. Educational strategies include:

- **Problem-based learning (PBL):** Encourages inquiry and critical thinking.
- **Journal clubs:** Facilitate discussion and critique of research papers.
- **Simulation-based learning:** Applies evidence to clinical scenarios.
- **Assessment tools:** Using assignments, presentations, and reflective writing to measure understanding (Young et al., 2015).

Students trained in EBP develop analytical skills, curiosity, and confidence to engage with research. This foundation promotes lifelong learning and adaptability in evolving healthcare systems.

SUMMARY

Evidence-based practice represents a paradigm shift in physiotherapy from experience-driven to data-driven decision-making. By integrating best research evidence with clinical expertise and patient values, physiotherapists can deliver care that is effective, ethical, and personalized. For students, mastering EBP principles not only enhances academic competence but also prepares them for evidence-informed clinical reasoning and lifelong professional growth. Embedding EBP in physiotherapy education and practice is therefore essential for advancing the quality and credibility of the profession.

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STUDENT ASSIGNMENT

LONG ANSWER QUESTIONS

1. Define EBP and explain its importance in physiotherapy practice with suitable examples.
2. Describe the five steps of the EBP process. Explain the role of the PICO framework in formulating clinical questions.
3. Discuss the hierarchy of evidence in physiotherapy and explain different research designs commonly used in EBP.

SHORT ANSWER QUESTIONS

1. What are the three core components of evidence-based practice?
2. Define the PICO framework with one clinical example.
3. What is critical appraisal and why is it important in physiotherapy research?

MULTIPLE CHOICE QUESTIONS

1. **EBP includes:**
   a. Only clinical expertise
   b. Only patient preference
   c. Research evidence, clinical expertise, and patient values
   d. Trial and error

2. **The 'P' in PICO stands for:**
   a. Procedure
   b. Patient/Population
   c. Practice
   d. Problem-solving
3. **The highest level in the hierarchy of evidence is:**
   a. Case reports
   b. Cohort studies
   c. Systematic reviews and meta-analyses
   d. Cross-sectional studies
4. **Which study design is considered the gold standard for intervention studies?**
   a. Case-control study
   b. Cross-sectional study
   c. Randomized controlled trial
   d. Cohort study
5. **Critical appraisal is used to:**
   a. Collect data
   b. Analyze patient history
   c. Evaluate quality of research
   d. Perform treatment

ANSWER KEY

1. c **2.** b **3.** c **4.** c **5.** c