Using Evidence-Based Practice and Scientific Statements in the Clinical Setting: Examples From Cardiac Rehabilitation

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Many clinical exercise physiologists recognize the term *evidence-based practice* (EBP) but may not understand its specifics or the rationale for using this framework in clinical care. The EBP process combines evidence from the literature, including findings from randomized controlled trials when available, with clinician expertise and patient preferences in order to guide clinical decision making (12,15,16). The intended outcomes of EBP are reducing the variability in healthcare delivery while increasing its quality and ultimately reducing healthcare costs (13,15). A solid understanding of the EBP process can assist exercise physiologists in improving their treatment decisions and patient outcomes. The purpose of this article is to describe EBP, its use in developing scientific statements, and the use of two types of scientific statements—*Clinical Guidelines* and *Expert Opinion Statements*—in clinical practice. Specific examples related to cardiac rehabilitation are provided.

STEPS IN THE EVIDENCE-BASED PRACTICE PROCESS

The EBP process includes six steps (15,20,22,23; Table 1). The first step is to ASK a clinical question specific to the population and condition of interest in a format that will yield the most useful and relevant research information. These questions are usually asked in a *PICOT* format: **P**atient population, **I**ntervention or **I**ssue of interest, **C**omparison, **O**utcome, and **T**ime frame.

The following is an example of a PICOT question: Among patients in outpatient cardiac rehabilitation programs (**P**), does the addition of cognitive behavioral exercise counseling (**I**), as compared to no cognitive behavioral exercise counseling (**C**), improve rates of adherence to the cardiac rehabilitation program (**O**) during the first six months (**T**)?

TABLE 1. Steps in the evidence-based practice process.

Step 1	Ask a clinical question specific to the population.
Step 2	Search a variety of databases.
Step 3	Critically appraise the research evidence.
Step 4	Integrate the evidence with clinical expertise and patient preferences.
Step 5	Evaluate the outcomes of the treatment decision or practice change.
Step 6	Disseminate findings and share outcomes.

The second step of the EBP process is to systematically SEARCH a variety of online library databases (such as Medline®, CINAHL®, and Embase®) for the most relevant evidence to answer the PICOT question. In this step, the goal is to conduct a thorough and systematic search, gathering all available evidence, including international studies written in English. Systematic reviews, meta-analyses, and well-designed randomized controlled trials are considered the strongest evidence (4,9,19). If one is fortunate and finds either of these two types of comprehensive reviews (systematic or meta-analysis) about the PICOT question, the searching process is easier because they often provide the reader a ready-made reference list of randomized controlled trials. This search step of EBP relies greatly on randomized controlled trials that contain the strongest and most valid research results. However, at times, less controlled studies are gathered. For example, if randomized controlled trials are not available, which is sometimes the case, additional credible types of information may be collected (controlled

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trials without randomization or case control and cohort studies). Sometimes, no research studies are found about a given PICOT question. In these cases, the person conducting the search collects whatever evidence is available.

The third step is to critically APPRAISE the research evidence that has been found through a literature search. In this step, each identified *study* is evaluated to determine if the findings are valid, reliable, important, and applicable (13). In the cases where there are no well-controlled studies, other types of evidence that have been collected are appraised. Then, the *overall body* of evidence is synthesized to determine if findings from the various studies are in agreement or disagreement and the *overall strength* of the body of evidence regarding the PICOT question is determined (15).

Step four is to INTEGRATE the evidence with clinical expertise and patient preferences to make a decision or a practice change. The fifth step is to EVALUATE the outcomes of the treatment decision or practice change. The final step is to DISSEMINATE findings and share outcomes with other clinicians and researchers. While the EBP process is time and labor intensive, it can dramatically improve patient care.

THE USE OF EVIDENCE-BASED PRACTICE TO DEVELOP SCIENTIFIC STATEMENTS

Scientific statements are formal, highly organized summaries of evidence in an area of practice, published by experts, to provide recommendations for practice (7). When developing scientific statements, *experts use the first three steps of the EBP process (ask, search, appraise)* to compile and organize the evidence.

THE USE OF SCIENTIFIC STATEMENTS IN CLINICAL PRACTICE

Why use scientific statements?

The clinician generally uses institution policies in combination with his or her own knowledge base, information from the physical exam and history, laboratory reports, and the patient's own concerns about various treatment or exercise options to determine the best course of action. In order to stay current, clinicians typically keep up with the literature and healthcare trends through their professional societies, conferences, and publications. However, most clinicians do not have easy access to the vast amounts of existing data or the time to undertake extensive literature searches. Fortunately, experts have done much work on synthesizing research findings for clinicians and they have organized the results into scientific statements. Therefore, scientific statements developed via an evidence-based process can be tremendously helpful and save the clinician valuable time by summarizing the existing literature and organizing findings into practical recommendations and tools for use with patients (7). Alternatives to using an EBP might be using outdated knowledge or basing practice on experience alone—both of which might be detrimental to patients (15).

Who writes scientific statements?

The topics for scientific statements are often ones of current interest (a *hot* topic) that are selected by a special task force or suggested by members of a professional organization. The writing team consists of content experts and clinicians—from academic and nonacademic settings—representing different perspectives (research, clinical practice, education, administration, and policy) (7,14). Team members must be free from conflicts of interest or outside influences and must follow written policies should such a conflict arise.

Where can scientific statements be found?

Many scientific organizations, such as the American College of Sports Medicine (ACSM), the American Heart Association (AHA), and the Academy of Nutrition and Dietetics (AND), publish scientific statements each year. In addition, a National Guideline Clearinghouse is maintained (8). It contains current, English-language, evidence-based practice guidelines to assist the clinician (www.guideline.gov).

How can scientific statements that are evidence based be identified?

Variability exists in the degree to which scientific statements are evidence based. Those that are most complete are written by a group of well-known experts in the field, are usually from professional organizations, and include references from high-quality journals. In addition, they incorporate evidence from other experts in the field, including expert or consensus panels or clinically based and evidence-based practice committees. Moreover, well-written scientific statements follow the six steps of the EBP process (15,20,22). Scientific statements are less helpful if they use a broad PICOT question and therefore conduct a nonspecific review of the literature, do not summarize this broad literature well, present only statements of conventional wisdom, and/or have a short reference list (15).

Why do different types of scientific statements exist?

Scientific statements are of two different types: (1) Clinical Guidelines and (2) Expert Opinion Statements. A good understanding of both types of scientific statements, including their strengths and weaknesses, might encourage clinical exercise physiologists to apply these published recommendations more often in practice. Applications to practice as well as specific examples of scientific statements in the cardiac rehabilitation setting are provided.

Clinical Guidelines (also known as Position Stands, Guideline Statements, or Practice Guidelines): These guidelines are systematically developed, evidence-based recommendations that result from a synthesis of the best available information (7). Clinical Guidelines identify which specific clinical questions they address and in which specific clinical populations. They address relevant PICOT questions

TABLE 2. A category rating system to evaluate overall strength of evidence used by the American College of Sports Medicine and defined by the National Institutes of Health (18).

Evidence Category	Sources of Evidence	Definition
A	Randomized controlled trials (rich body of data)	Evidence is from end points of well-designed randomized controlled trials (or trials that depart only minimally from randomization) that provide a consistent pattern of findings in the population for which the recommendation is made. Therefore, Category A requires substantial numbers of studies involving substantial numbers of participants.
B	Randomized controlled trials (limited body of data)	Evidence is from end points of intervention studies that include only a limited number of randomized controlled trials, post hoc or subgroup analysis of randomized controlled trials, or meta-analysis of randomized controlled trials. In general, Category B pertains when few randomized trials exist, they are small in size, and the trial results are somewhat inconsistent or the trials are undertaken in a population that differs from the target population of the recommendation.
C	Nonrandomized trials and observational studies	Evidence is from outcomes of uncontrolled or nonrandomized trials or from observational studies.
D	Panel-consensus judgment	Expert judgment is based on the panel's synthesis of evidence from experimental research described in the literature and/or derived from the consensus of panel members based on clinical experience or knowledge that does not meet the aforementioned criteria. This category is used only in cases where the provision of some guidance is deemed valuable but an adequately compelling clinical literature addressing the subject of the recommendation is deemed insufficient to justify placement in one of the other categories (A through C).

and serve as a tool in clinical decision making (21). A Clinical Guidelines approach is used most typically when there is an intervention or a program with multiple interventions (such as cardiac rehabilitation) that needs to be systematically examined and evaluated. This approach can be used to determine the effectiveness of an intervention or a program in specific populations. This type of scientific statement also serves to identify specific gaps in the literature.

Although various organizations develop Clinical Guidelines somewhat differently, there is generally much overlap in their approach. The writing group develops a list of target users of the guidelines, such as the clinical exercise physiologist. The team conducts a systematic review and critical appraisal of the literature, *restricting* their inclusion of lower-level evidence, such as scientific abstracts and conference presentations (6). The writing group then determines summary statements and overall conclusions/recommendations from the *overall body* of evidence.

The writing team uses a rating system to assign a *grade* and sometimes also a *class* to summary statements and overall conclusions/recommendations. The rating system provides the reader with a sense of the strength of the overall body of evidence presented in the guideline. The clinical exercise physiologist is likely to see rating systems used by the ACSM (18) (see Table 2) and the AHA (6,7,24) (see Tables 3 and 4). As an example, an AHA recommendation with a grade of A and a class of I indicates that the recommendation is supported by the strongest evidence that a treatment is useful and effective.

The development of Clinical Guidelines is a thorough process. Before releasing the guidelines, the writers must state that the committee has considered the benefits, the side effects, and the risks or harms involved in the recommendations. As a final

TABLE 3. A category rating system to evaluate overall strength of evidence used by the American Heart Association (6,7,24).

Level of Evidence Rating	Definition of Rating
A	Recommendation is based on evidence from multiple randomized controlled trials or meta-analyses
B	Recommendation is based on evidence from a single randomized trial or nonrandomized studies
C	Recommendation is based on expert opinion, case studies, or standards of care

TABLE 4. A class rating system to evaluate overall strength of evidence used by the American Heart Association (6,7,24).

Class Rating	Definition of Rating
I	Conditions for which there is evidence and/or general agreement that a given procedure or treatment is useful and effective
II	Conditions for which there is conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of a procedure or treatment
IIa	The weight of evidence/opinion is in favor of usefulness/efficacy
IIb	Usefulness/efficacy is less well established by evidence/opinion
III	Conditions for which there is evidence and/or general agreement that a given procedure or treatment is not useful and effective and in some cases may be harmful

step, Clinical Guidelines generally undergo multiple external reviews from other scientists and clinicians and concerns are addressed prior to publication. In addition, some organizations also seek comment from the public and the scientific community at large prior to publishing Clinical Guidelines.

The strengths associated with Clinical Guidelines are that the methods used are rigorous, transparent, reproducible, and generally available for public view on an organization's website. They rely on best available evidence and particularly on results from randomized controlled trials. Clinicians can find the best evidence summarized in one document. *Executive summaries* accompanying the guidelines allow an exercise physiologist to focus on key points. Guidelines are a succinct way of discerning what is known and what it not yet known about a specific topic area. This helps to clarify future directions for research. Clinical Guidelines can enhance clinicians' understanding of the research within a specific topic area and inform the clinician as to best treatment approaches for optimal patient care. Clinical Guidelines undergo a much stricter process for development and external review than a general review article and thus carry more weight. They provide recommendations that can serve as standards of care and can have policy implications.

Regarding weaknesses, the development of Clinical Guidelines is a time- and labor-intensive process, generally taking 12 to 18 months to develop. The process is a financially costly undertaking. Finally, Clinical Guidelines need to be regularly updated to reflect new research findings and developments in clinical knowledge. Overall, the strengths far outweigh the weaknesses.

The application of Clinical Guidelines to practice: Through the use of Clinical Guidelines, clinical exercise physiologists can promote a spirit of inquiry in the clinical setting—a climate where clinicians are encouraged to identify big or pressing clinical questions specific to their settings and to use evidence-based documents to answer compelling PICOT questions (11). They can also be used to engage staff and stakeholders in assessing and eliminating barriers in practice and to share information with patients. As a result, the guidelines can increase clinical knowledge, spark in-depth discussions, promote critical thinking about important clinical questions, and may enable exercise physiologists to facilitate steps toward change.

Guideline documents also generally provide instruction on how recommendations can be applied in a clinician's practice setting. By choosing guidelines with a stated objective in the exact topic area, a clinician can use the guidelines to find the evidence base and recommendations related to specific clinical questions about specific clinical populations. The guidelines can dispel misperceptions and eliminate the use of rote clinical policies that rarely undergo review. The widespread use of guideline statements can facilitate current, easily accessible, written policies for clinic staff and assist clinicians in determining whether their standard practices are current and their clinical decisions are evidence based. Guideline documents also generally contain a section on tools for application, which provides guidance on working with patients and implementing guideline recommendations in the clinical setting. The guidelines might also suggest the types of structural modifications and resources needed to implement a change in practice (8,11). Furthermore, the guidelines will identify specific variables or outcomes that should be measured before, after, and at a distal follow-up time point in order to ascertain the effectiveness and the sustainability of the implemented change or intervention. Finally, the guidelines can show whether there is sufficient evidence for the continuation of current practices, whether there is sufficient evidence to propose any new practices, and whether there is sufficient evidence to discontinue certain practices.

Clinical Guidelines can also be practical tools for sharing information with patients. Often, patients will seek their own information on the Internet and will begin self-guided programs based on false or popularized information. Clinical Guidelines provide clinicians with straightforward, evidence-based information to share with patients. Clinical Guidelines are purposely presented in clear and specific language and the recommendations themselves are set apart and easily identifiable.

Sometimes, patient preferences will be taken into consideration in the development of the Clinical Guidelines and can be shared with patients. These guidelines are also available to patients on the Internet, and when patients ask about the standards of care used in the setting, exercise physiologists can discuss the Clinical Guidelines used. An added benefit is that the professional organization that writes the Clinical Guidelines often develops or provides a link to trusted patient education materials that the clinician can also share with the patient.

A specific example in Cardiac Rehabilitation: An example of Clinical Guidelines in cardiac rehabilitation is the AHA's 2007 Scientific Statement "Core Components of Cardiac Rehabilitation/Secondary Prevention Programs: 2007 Update" (3). This publication updates the statement published in 2000 and identifies the core components that all cardiac rehabilitation/secondary prevention programs should contain to reduce cardiovascular disease (CVD) risk, teach and promote healthy behaviors, and reduce disability in patients with CVD. For each core component identified, the publication provides information on evaluation, interventions, and expected outcomes. These evidence-based recommendations are intended to assist cardiac rehabilitation staff as they develop and implement programs and to make a larger audience (such as healthcare providers, insurers, policymakers, and consumers) aware of the comprehensive nature of cardiac rehabilitation programs.

Expert Opinion Statements (also known as Opinion Statements, Expert Consensus Statements, or Scientific Advisories): These statements generally result from experts reviewing a growing research base or clinical observations and may or may not include a comprehensive review of the literature. Specifically, an Expert Opinion Statement is developed when (a) an initial search of the literature shows

there are not sufficient systematic reviews, meta-analyses, and high-quality randomized controlled trials to develop Clinical Guidelines, (b) it is already known that the topic has an insufficient research base, or (c) a professional organization simply wishes to comment on a topic in a very timely manner. Expert Opinion Statements provide a tool for a timely communication of recommendations and/or considerations for healthcare professionals and policymakers (1).

Expert Opinion Statements—developed by unbiased reviewers from several disciplines working together—rely heavily on recent high-level publications (when available) and primarily represent the consensus of the leading experts in the field of interest following much discussion and debate (1,17). Thus, while Expert Opinion Statements are often informed by *some* available evidence, they are often considered *evidence informed* rather than *evidence based* and are far less scientifically rigorous than Clinical Guidelines.

Strengths associated with Expert Opinion Statements are that they provide rapid, clear, consistent information on an emerging topic of importance/concern to the public and healthcare professionals (1). Given that not all areas of cardiac rehabilitation have studies at the level of randomized controlled trials as evidence, Expert Opinion Statements allow an opinion or advice to be delivered prior to the accumulation of a large body of research evidence.

Weaknesses are that they rely heavily on expert opinions, observations, and smaller, less well-controlled studies. Furthermore, as research is conducted, information may develop rapidly and recommendations/advice may change, necessitating another rapid publication.

The application of Expert Opinion Statements to practice: Expert Opinion Statements are an important resource for clinical exercise physiologists. Through the use of Expert Opinion Statements, clinical exercise physiologists can become experts in current healthcare and exercise trends. Clinicians can use the statements to provide their institutions with new ideas that might translate into innovative clinical changes. Expert Opinion Statements can clarify an issue and explain the need for action on an issue. Expert Opinion Statements can inform decision making and policy and, therefore, should be included when gathering evidence (15).

When there is little to no research, Expert Opinion Statements serve as a consensus by experts to guide the profession and to present evidence that supports an intervention or a change or to motivate others around a politically charged topic. Thus, *evidence* in Expert Opinion Statements may be built and presented based on observations and experience (such as from related fields) or from established theory (such as from epidemiological theory or science underlying CVD or CVD risk factor reduction). As such, these statements give clinical exercise physiologists "a leg to stand on" when there is little or no research in an area of interest.

Expert Opinion Statements are also a valuable resource for patients. Patients can gain information about what the experts in the field support, even without hard evidence. Expert Opinion Statements represent information from *actual experts* rather than popular celebrities or health websites created without expert input. Because Expert Opinion Statements are available to patients on the Internet, it is important for clinical exercise physiologists to be familiar with their content so they can direct their clients to the best options for care.

A specific example in cardiac rehabilitation: An example of an Expert Opinion Statement relevant to cardiac rehabilitation is the AHA's 2012 Scientific Advisory "Increasing Referral and Participation Rates to Outpatient Cardiac Rehabilitation: The Valuable Role of Healthcare Professionals in the Inpatient and Home Health Settings" (2). This publication highlights the fact that although there are numerous benefits to outpatient cardiac rehabilitation, referral rates remain very low. This publication is a call to healthcare professionals in inpatient and home health settings to facilitate the referral process to cardiac rehabilitation. The authors call for increased efforts by clinical exercise physiologists working in inpatient settings to communicate the clinical benefits of participating in outpatient cardiac rehabilitation programs. There are numerous randomized controlled trials, systematic reviews, and meta-analyses indicating its benefits on health outcomes (5,10). There are also a variety of studies that examine predictors of cardiac rehabilitation use and of referral to these programs. However, few or no randomized controlled trials have specifically examined the effect of inpatient and home healthcare *referrals* on overall cardiac rehabilitation participation rates. As shown in this example, Expert Opinion Statements rely less heavily on scientifically objective sources and more heavily on expert opinion.

SUMMARY

EBP is an approach to clinical care that relies on the best available evidence, clinician expertise, and patient preferences. EBP methodology requires a systematic and critical appraisal of the literature and is used to guide clinical decision making, resulting in reduced variability in how patients are treated and improved patient care and outcomes. Ongoing review of scientific statements within the clinical setting can (a) promote a spirit of inquiry, increase the clinical exercise physiologist's knowledge about specific topics, and help develop EBP expertise among staff; (b) clarify how recommendations can be applied in the clinical setting; (c) promote dialogue and policy change; and (d) provide a very practical resource for sharing information with patients. Clinical exercise physiologists are strongly encouraged to use scientific statements in their practice settings.

Finally, we recommend the use of scientific statements to promote the development of EBP expertise in the clinical setting. A unit practice committee or administrator may take responsibility for keeping staff abreast of new evidence-based recommendations or clinicians may develop an EBP team that updates the staff on new scientific statements. A clinical exercise physiologist may be asked to take the lead in creating an EBP team. This team would review scientific statements for relevance to their specific clinical setting and

population. The team may wish to seek assistance from an EBP expert with proficiency in article critiquing and evidence-based scientific statements. The EBP team can provide much needed mentorship to further develop the EBP knowledge base and a cadre of EBP mentors in their own clinical setting (11,15). A clinic environment that is supportive of the use of the EBP process in practice is optimal, and within that setting, a clinical exercise physiologist can use scientific statements to enhance decision making to improve patient care outcomes.

Keywords: clinical exercise physiologist, clinical decision making, healthcare, policy

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