The Evidence Cycle

The five A's of the Evidence Cycle

Incorporating best evidence into clinical care requires a systematic approach in order to be manageable. A clear series of steps known as the Evidence Cycle can provide an excellent paradigm to guide you through this process. The foundation of evidence-based care remains an excellent clinical evaluation. The clinician must ***ASSESS*** the patient and the problem to determine the pertinent issues, which may include a differential diagnosis, treatment decisions, or prognosis. The clinician must draw from this evaluation and ***ASK*** a clear, answerable question to be pursued. The next step is to efficiently ***ACQUIRE*** the evidence from an appropriate source. Potential sources include original research studies, systematic reviews, evidence-based journal abstracts, textbooks and computerized decision support systems. With a potential source in hand, the clinician must ***APPRAISE*** the evidence to further examine its worth and reliability. Finally, the process must conclude by returning to the individual patient, as the clinician has to decide whether it is appropriate to ***APPLY*** the evidence to the particular patient and their unique values and circumstances. Evidence alone is never sufficient to direct decision making. Rather, it must be put into context with a patient's values.

ASSESS: Clinical Evaluation

The method of evidence-based clinical practice (EBCP) begins with a thoughtful assessment by a clinician who incorporates all the pertinent data. A common fallacy is that EBCP somehow devalues the fundamental tenets of the practice of medicine, specifically clinical expertise. A comprehensive understanding of pathophysiology and the thorough history and physical remain a critical starting point for the process.

ASK: Clinical Question Development

The first critical step is to clarify one or two key issues that come up in the course of caring for your patient and to develop a focused clinical question. Despite its critical place at the start of the evidence cycle, question development is often not a focus of training. In a recent survey of 417 internal medicine program directors, only 44% of programs with evidence-based medicine curricula included posing a focused question as an objective.[1] However, without this critical first step, the rest of the steps are immaterial.

The Anatomy of the Clinical Question (PICO)

One useful approach to framing a clinical question involves distilling the question into several key elements. In this framework, there are 4 components to every clinical question, the **P**atient population, **I**ntervention, **C**omparison and **O**utcome (**PICO**).[2] We can use this framework to clarify the steps that we must take to find the evidence we seek.

ACQUIRE: Searching for the Evidence

Armed with our well-built clinical questions, our attention next turns to finding the evidence in the medical literature. Many resources are currently available; therefore we must learn to appreciate the pros and cons of each type to determine when each one can best be applied. We also have to learn how to access resources that can maximize our efficiency, such as a systematic review, clinical practice guideline or an evidence-based journal abstract.

APPRAISE: Critical Appraisal of the Evidence

Much of the initial attention in the realm of evidence-based medicine focused on the critical appraisal portion of the evidence cycle. A growing body of resources exists in various print and electronic formats to aid readers of the medical literature in the critical appraisal process. The following tables were abstracted from the Users' Guides to the Medical Literature from the evidence-based medicine working group. (See Table)

APPLY: Applying Evidence to the Patient

Every management decision requires value-laden deliberation and judgment. Each piece of evidence that we review adds something to our understanding of our patient's situation. However, we need to consider how to generalize the results from clinical trials to our individual patient. We must consider whether the patient populations and treatments or interventions are comparable to our setting. The final challenge is to combine the evidence and clinical expertise with compassion and patient values. Clinicians trying to engage the medical literature for best care must take the information from these studies to try to help individuals within the context of their own values and preferences.

Are The Results of the Study Valid?
Table extracted from User's Guide to the Medical Literature, Evidence-Based Medicine Working Group

(Note: **Bold Text** indicates the questions that can serve as your first screen for validity)

Type of Question	Questions that will help you determine Validity of the Results
Therapy or Prevention	• **Was the Assignment of patients to treatments randomized?** • **Were all of the patients who entered the trial properly accounted for and attributed at its conclusion?** • Were patients, clinicians and study personnel kept "blind" to treatment received? • Were the groups similar at the start of the trial? • Aside from the experimental intervention were the groups treated equally?
Diagnosis	• **Was there an independent, blind comparison with a reference standard?** • **Did the patient sample include an appropriate spectrum of the sort of patients to whom the diagnostic test will be applied in clinical practice?** • Did the results of the test being evaluated influence the decision to perform the reference standard? • Were the tests methods described clearly enough to permit replication?
Harm	• **Were there clearly identified comparison groups that were similar with respect to important determinant of outcome, other than the one of interest?** • **Were outcomes and exposures measured in the same way in the groups being compared?** • Was follow up of patients sufficiently long and complete? • Is the temporal relationship correct? • Is there a dose-response gradient?
Prognosis	• **Was there a representative and well defined sample of patients at a similar point in the course of disease?** • **Was follow up sufficiently long and complete?** • Were objective and unbiased outcomes criteria used? • Was there adjustment for important prognostic factors?
Systematic Review	• **Did this review address a focused clinical question?** • **Were the criteria for article inclusion appropriate? (taking into account the type of question being asked)** • Is it unlikely that relevant studies were missed? • Was the validity of the included studies appraised? • Was the assessments of studies reproducible? • Were the results similar from study to study?
Practice Guidelines	• **Were all important options and outcomes clearly specified?** • **Was an explicit and sensible process used to identify, select and combine evidence?** • Was an explicit and sensible process used to consider the relative value of different outcomes? • Were the important recent developments included? • Has the guideline had peer review and testing?

What is the magnitude of the results?
Can you apply the results to your individual clinical question?
Table extracted from User's Guide to the Medical Literature, Evidence-Based Medicine Working Group
User's Guides are accessible from the World Wide Web via the McMaster Web site

For All Types of Questions	• What are the overall results and the precision of the estimates? • Are the results are applicable to your own individual population or patient? (Were the study patients similar to my own? Was the setting of the study applicable to my practice?)
Type of Question	• **Considerations Specific to Particular Types of Questions**
Therapy or Prevention *results*	• To estimate the size of the Treatment effect, you want to look at Relative Risk, Odds Ratios or Numbers Needed to Treat to prevent adverse outcomes (See Survival Statistics Cheat Sheet)
applicability	• Were all clinically relevant outcomes considered? • Are the benefits worth the harms and costs?
Diagnosis *results*	• To estimate the ability of a test to change your pretest probability of disease, you want to look at Likelihood ratios (See Survival Statistics Cheat Sheet)
applicability	• Will the test be reproducible and well interpreted in my practice setting? • Will the test results change my management? • Will my patients be better off because of the test?
Harm *results*	• To estimate the strength of the association between the exposure and the outcome, you want to look at Relative Risk, Odds Ratios or Numbers Needed to Cause adverse outcomes (See Survival Statistics Cheat Sheet)
applicability	• What is the magnitude of the risk? • Should I attempt to stop the exposure?
Prognosis *results*	• To estimate the prognostic risk, you want to look at absolute risk (e.g. 5 yr. survival rate), relative risk (e.g. risk from a prognostic factor) or cumulative events over time (e.g. survival curves). • What are the possible outcomes and how likely are they to occur over time?
applicability	• Will the results lead directly to selecting therapy? • Are the results useful for counseling patients?
Systematic Review *results*	• What are the overall results when considering all of the studies reviewed and what is the precision of these results?
applicability	• Specific Questions to determine whether you can apply these results to your population or patient should be determined by the type of question you are asking (e.g. Therapy vs. Diagnostic Testing, vs. Prognosis)
Practice Guidelines *results*	• Are practical, important recommendations made? • How strong are the recommendations? • Could the uncertainty in the evidence or values change the guideline's recommendations
applicability	• Is the objective of the guideline consistent with mine? • Are the recommendations applicable to my patients?

[1] Green ML. Evidence-based medicine training in internal medicine residency training programs. J Gen Intern Med 2000; 15: 129-133.
[2] Richardson WS, Wilson MC, Nishikawa J, Hayward RSA. The well-built clinical question: a key to evidence-based decisions. ACP Journal Club. Nov-Dec 1995; 123: A-12.