How to Use the Rational Clinical Examination Education Guides

*It would be better if you began to teach others only after you yourself have learned something.*

—Albert Einstein to Arthur Cohen, age 12, who submitted a paper to Einstein

Teachers as learners; learners as teachers

Take a moment to recall teachers who truly influenced your understanding. What about those individuals made them great teachers? Did they simplify key concepts? Did they help you understand why you needed to know or connect ideas to show a common thread? Did they make it fun and interactive? Likely, it was a combination of these factors.

Successful teaching is not a purely spontaneous event, although great teachers will make it seem that way. Rather, effective teaching is deliberate: it follows from practice, patience and planning. Thus, we created the Education Guides for the Rational Clinical Examination with a systematic approach that provides teachers with tools, tips and ideas for making the contents of the book real, meaningful, and exciting to their learners.

We intentionally sought learners as collaborators for producing the Education Guides; approximately 90% of the chapters involved Duke University Department of Medicine residents or fellows, often as the lead author of the teaching materials. Learners’ active involvement kept the Education Guides relevant to clinical trainees and generalist physicians. It also served to blur the lines between teachers and learners. To teach the material, the Education Guides authors first needed to learn the material! After the authors created the Education Guides, the Editors reviewed the slides for education content, flow and relevance. Finally, authors of the original Rational Clinical Examination article or its Update reviewed the Guide to assure that the content and emphasis were consistent with their prior work.

Both teachers and learners who are in a hurry may access the chapter content through the Education Guides. However, the Guides only complement, not replace the chapters of the Rational Clinical Examination. Readers or educators who choose to use the slides independently from the book will not be well-prepared, as they will miss some of the salient features.

**Teaching Tip #1**

*Be familiar with core content. Preparing to teach is first a learning exercise. The teaching materials provide a summary of the key content to complement each chapter of the book.*

Educators and learners are encouraged to spend time understanding the chapters that are particularly relevant to their every day practice and teaching. Most educators can easily identify clinical conditions or findings that they repeatedly encounter. For example, an attending covering the inpatient hospital service may first become familiar with the chapter on deep vein thrombosis, while a resident or medical student preparing for a clinical rotation in their emergency room might study in advance the chapter on acute dyspnea.
Teaching Tip #2

Prioritize your reading and learning to focus on clinical syndromes and settings you most frequently encounter. Identify topics that are predictably present in your clinical-education environment and become familiar with the prior probabilities and likelihood ratios that apply.

What's in the education guides?

All the information summarized in the Education Guides comes directly from the the original Rational Clinical Examination article or its Update. Each set of teaching materials begins with one or more clinical case scenarios and a series of questions to pose to learners. We always ask that learners explicitly state their impression of likelihoods or probabilities of the target conditions. This immediately forces teachers into an environment of active engagement. Our interactive approach at the beginning of each Education Guide produces a skill building exercise whereby 1) learners think in terms of probability, 2) we promote retention and understanding by getting learners to name their educated guess and check this estimate against the evidence, and 3) we ultimately either reinforce or redirect their prior assumptions. Each set of teaching materials ends with the resolution of the clinical scenarios followed by “take home messages” and a “bottom line” for the chapter.

In addition to the clinical content and data in the Education Guides, we added teachers' notes and tips. Microsoft® Office PowerPoint® has a feature that allows each slide to be viewed with a Notes page. We used the Notes pages to identify basic principles, potential obstacles, and strategies for interactive teaching such as the use of slide animation. The Notes pages also provide teachers with an additional layer of information to enhance or further explain the bullet points or tables on the slides to assist in preparation for a teaching session.

Field testing of the Education Guides

The teaching strategies and stumbling blocks described as part of the Education Guides have been field tested for clarity and relevance among Duke Internal Medicine residents at the Durham Veterans Affairs Medical Center. The general interactive teaching strategies were developed and tested over the past 5-10 years by experts participating in McMaster University and Duke University workshops on teaching evidence-based practice. Although some of the teaching strategies have been published as a part of the evidence-based teaching tips project the strategies have not undergone formal testing and thus reflect expert opinion.

Planning for delivery: Maximizing interactivity in classroom settings

The Education Guides use the primary format of PowerPoint® slides. However, educators are encouraged to avoid a purely didactic lecture style for this content (or any content, for that matter!) In fact, if the guides are only used for didactic presentations, we will have failed in our attempt to encourage strategies to address learner engagement. The teaching tips focus on two key elements of engagement: relevance and interactivity.
We systematically designed the case scenarios by including clinical elements that highlight key points in each chapter. When more than one case is used, the cases compare and contrast different aspects of clinical decision making. For example, a chapter may include cases that reflect examples of low, intermediate and high prior probability of disease. This allows the educator to illustrate the impact of differing prior probability on posttest probability. Similarly, the cases might reflect differing patient characteristics that require consideration of action thresholds for pursuing additional tests or implementing a treatment strategy.

**Teaching Tip #3**

**Focus on relevance using a case based format. Clinical examination is a skill that should be taught in context. In classroom settings, anchor your teaching with the clinical cases provided in the materials, or cases of relevance to you and your learners.**

Educators are encouraged to view the PowerPoint® slides as part of a preparatory tool kit, rather than 'ready made' slides set for presentation. In fact, educators may most effectively use the materials for teaching without actually projecting a single slide. For example, a very effective classroom teaching session might involve describing the 3 cases that are used for the chapter on community acquired pneumonia in adults. The learners could be broken up into 3 small groups, each assigned to discuss one of the patient cases. As a first step, the learners could be asked to discuss the cases without any further information and to estimate the probability that each patient has community acquired pneumonia. These estimates can be written on a flip chart and discussion can take place about what elements went into the decision making for each group.

**Teaching Tip #4**

**Ask learners to commit to probabilities. Creating a safe learning environment in which learners can discuss their initial assessments is important to help them build on their base knowledge in each session.**

The educator can then discusses the concept of likelihood ratio, prior probability of disease and the individual likelihood ratios for the clinical examination items. The educator should ask whether this information would alter the learners' assessment of likelihood of disease.

**Teaching Tip #5**

**Focus on learner interaction, minimizing or eliminating didactic teaching. The teaching tools should serve as substrate interactive teaching. Educators can combine some didactic teaching for emphasis, orientation and reinforcement of principles, but primary strategies should be interactive.**

In the example of community acquired pneumonia, the likelihood ratios for the individual findings are not very useful so this creates an opportunity for discussing multivariate analyses and clinical prediction rules. The learners could be given
summaries of the Diehr multivariate model and the Heckerling clinical prediction model and break into their 3 groups to repeat their discussion on the assessment of probability of pneumonia.

**Teaching Tip #6**

*Focus the clinical examination on useful items while pointing out findings that may not be helpful. As learners familiarize themselves with likelihood ratios, educators should identify clinical examination that impacts those assessments and also dispel myths about examination items that don't.*

Using the Diehr multivariate model as an example, the educator could have each group come up with the likelihood ratio to apply to their patient. The educator can then hand out a blank nomogram such as the one that is included in the PRIMER (A Primer on the Precision and Accuracy of the Clinical Examination: Introduction) and have the trainees plot the results for each case. The nomogram serves as a visual tool to illustrate the concept that a likelihood ratio, applied to a prior probability, generates the posttest probability of disease.

**Teaching Tip #7**

*Use the nomograms to illustrate movement from pretest to posttest probabilities. The nomogram can be a valuable visual and conceptual tool when working through individual patient cases.*

Planning for delivery: Finding ways to practice the skill of taking history and physical examination

For optimal professional development, trainees require orientation to key concepts of clinical examination, skills practice and feedback from their faculty mentors and role models. Some of the topics are particularly suited for classroom practice of clinical exam, such as examination of the shoulder or knee. To facilitate these learning exercises, the Rational Clinical Examination and Education Guides have pictures and illustrations that highlight the technical points of clinical maneuvers.

Some of the clinical examination items will require teaching directly in the context of patient care, for example learning to assess central venous pressure or ascites. Patient-centered teaching can be complemented by bringing the evidence from the Education Guides to a teaching session or rounds either proceeding or following a trip to the bedside. Educational assignments written on a prescription pad, called education prescriptions, encourage the learner to follow up on a finding identified during ward rounds or clinic sessions. The prescription should note the clinical question and suggest the relevant Rational Clinical Examination articles. Just as in clinical medicine where the physician follows-up on the treatment response, the education prescriber should follow-up with the learner at their next clinical session.
**Teaching Tip #8**

*Find ways to practice hands on maneuvers with your learners in both the classroom and clinical settings. Learners need to practice and receive feedback on clinical examination. When patients are respectfully included, skills can be refined in the clinical environment as well as in the classroom setting.*

A barrier when trying to incorporate evidence into clinical teaching is discomfort with statistical principles and the frequent misperception that evidence based practice is equivalent to statistics. Throughout the Education Guides, we included descriptions of common statistical concepts that the teachers and learners will encounter. The PRIMER includes an entire set of descriptions and teaching strategies that can serve to assist educators in confronting these principles. However, we emphasize that while understanding the statistical concepts is helpful, it should not take away from the clinical application and focus of a teaching session. The Education Guides should help educators and learners become better users of the medical literature on the clinical examination, rather than to become statisticians or researchers.

**Teaching Tip #9**

*Avoid statistical jargon. The goal is to assist learners to become effective at incorporation of evidence into clinical practice.*

More than any other goal in the creation of the Education Guides for the Rational Clinical Examination, we hope that educators and learners will have fun with the book and the tools it supplies. The Rational Clinical Examination series provides a plethora of teaching opportunities that uniquely combine evidence and the medical literature with direct patient care. Enjoy yourself and good things will follow.

**Teaching Tip #10**

*Have fun. Strive to employ new and creative ways to engage your learners, involve them in excitement of clinical decision making and the fun of life long learning.*
