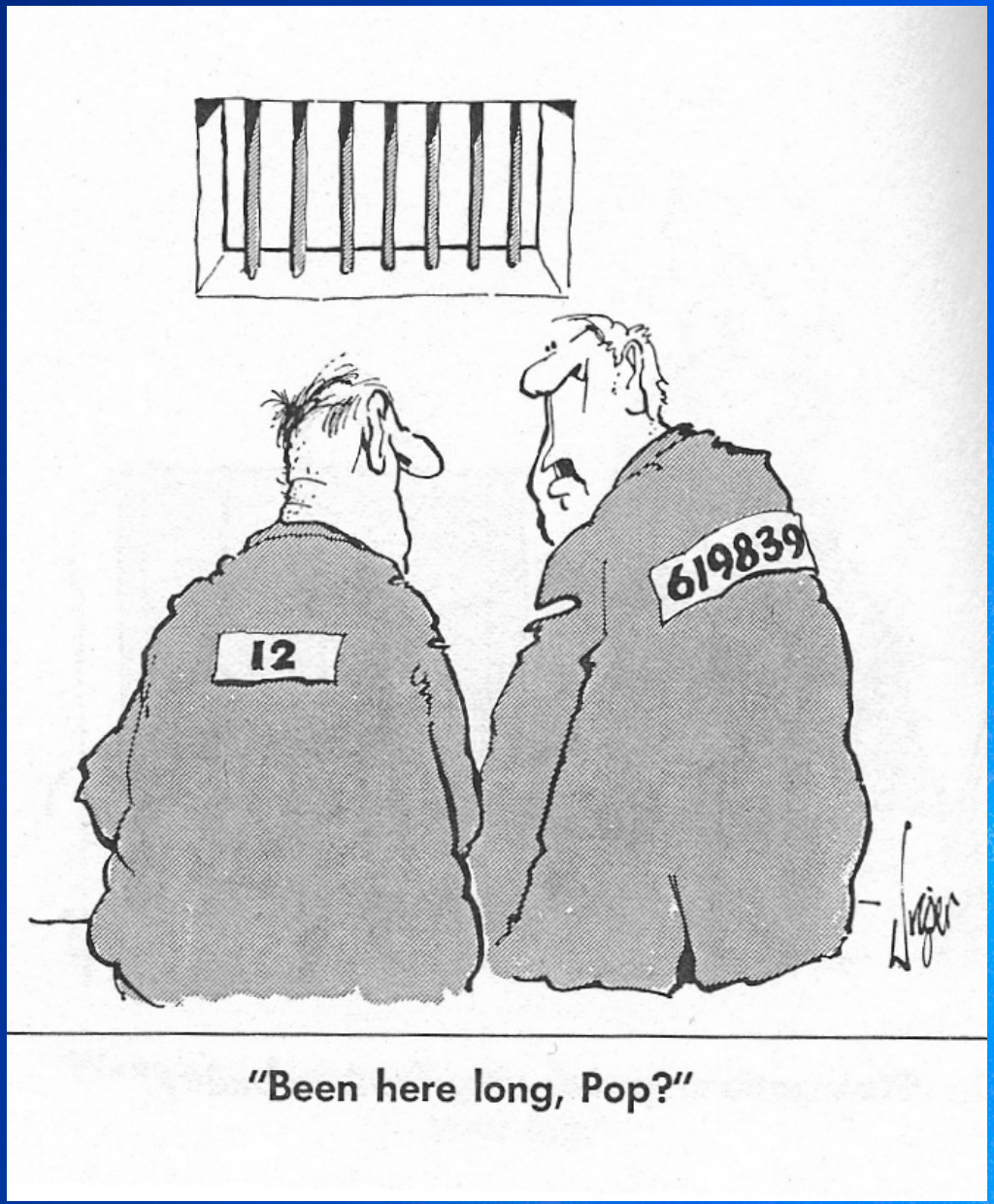
Evidenced Based Therapy Practice within the BOP

Presented by:
CDR Eric Payne, DPT, OCS



"Been here long, Pop?"

JASPA*(Journal associated score of personal angst)

J: *Are you ambivalent about renewing your* ***JOURNAL*** *subscriptions?*

A: *Do you feel* ***ANGER*** *towards prolific authors?*

S: *Do you ever use journals to help you* ***SLEEP****?*

P: *Are you surrounded by* ***PILES of PERIODICALS****?*

A: *Do you feel ANXIOUS when journals arrive?*

* Modified from: BMJ 1995;311:1666-1668

Paul Glasziou
University of Queensland & Oxford

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0 (?liar)
1-3 (normal range)
>3 (sick; at risk for polythenia gravis and related conditions)

* Modified from: BMJ 1995;311:1666-1668

Paul Glasziou
University of Queensland & Oxford

Training Objectives

- Be able to provide examples for various levels of evidence for clinical research.
- Be able to formulate a good searchable clinical question using the PICO format.
- Understand the basic components of a critical appraisal topic (CAT) and be able to utilize CATMaker to help produce a CAT.
- Be able to interpret the findings of a treatment PICO question using the Number Needed to Treat and Absolute Risk Reduction statistics.
- Be able to utilize a nomagram to calculate post test probability given positive and negative likelihood ratios.

Massive Information Overload

Leads to Professional Guilt Syndrome (PGS)

- Hundreds of journals related to rehabilitaton
- Estimated that a therapist would have to read more than 15 professional articles per day to keep up with the basic research
- Very easy becoming overwhelmed and abandoning journal reviews

What is EBP?

"Evidence-based medicine is the integration of ***best research evidence*** *with* ***clinical expertise*** *and* ***patient values*** *"* - Sackett, et al 2001

What EBP is not:

EBM is not cook-book medicine

evidence needs extrapolation to my patient's unique biology and values

EBM is not cost-cutting medicine

when efficacy for my patient is paramount, costs may rise, not fall

-Sackett 1997

The ABCs of EBP

How do we do this?

- Asking an answerable clinical foreground question.
- Searching for the best evidence.
- Critically-appraising the evidence.
- Integrating the evidence with our expertise and our patient's unique biology and values
- Evaluating our performance

Asking an Answerable Question

PICO format most commonly used.

P - Patient Population
I - Interventions or Exposures
C - Comparison Intervention
O - Outcome

PICO Examples for Treatment

http://www.cc.nih.gov/rm/pt/advPTprac.htm#PTcat

"For a 60 year old male with bilateral osteoarthritis of the knees, is a physical therapy program of manual therapy plus guided exercises more effective than placebo in reducing pain, improving function, and reducing the likelihood of surgery?"

LCDR Jessica Feda, DPT, OCS

October 2006

PICO Example for Prognosis

"For a 46 year old male with a venous stasis ulcer of 16.5 cm^2 in size which has remained open for 2.5 years, what is the likelihood of the wound closing with compression therapy by the time that the patient is released from prison in 4 months?"

CDR Eric Payne, DPT

January 2007

PICO Example for Diagnosis

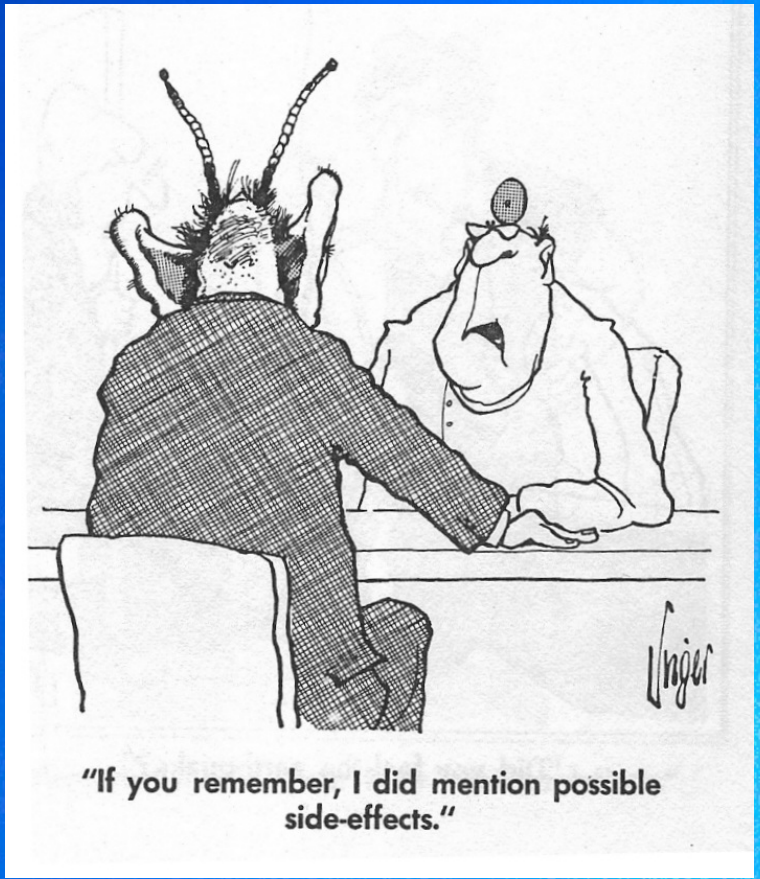
"For a 22 year old male runner is there a clinical test that is valid for determining patellofemoral pain syndrome?"

Heather Khan, DPT

January 2007

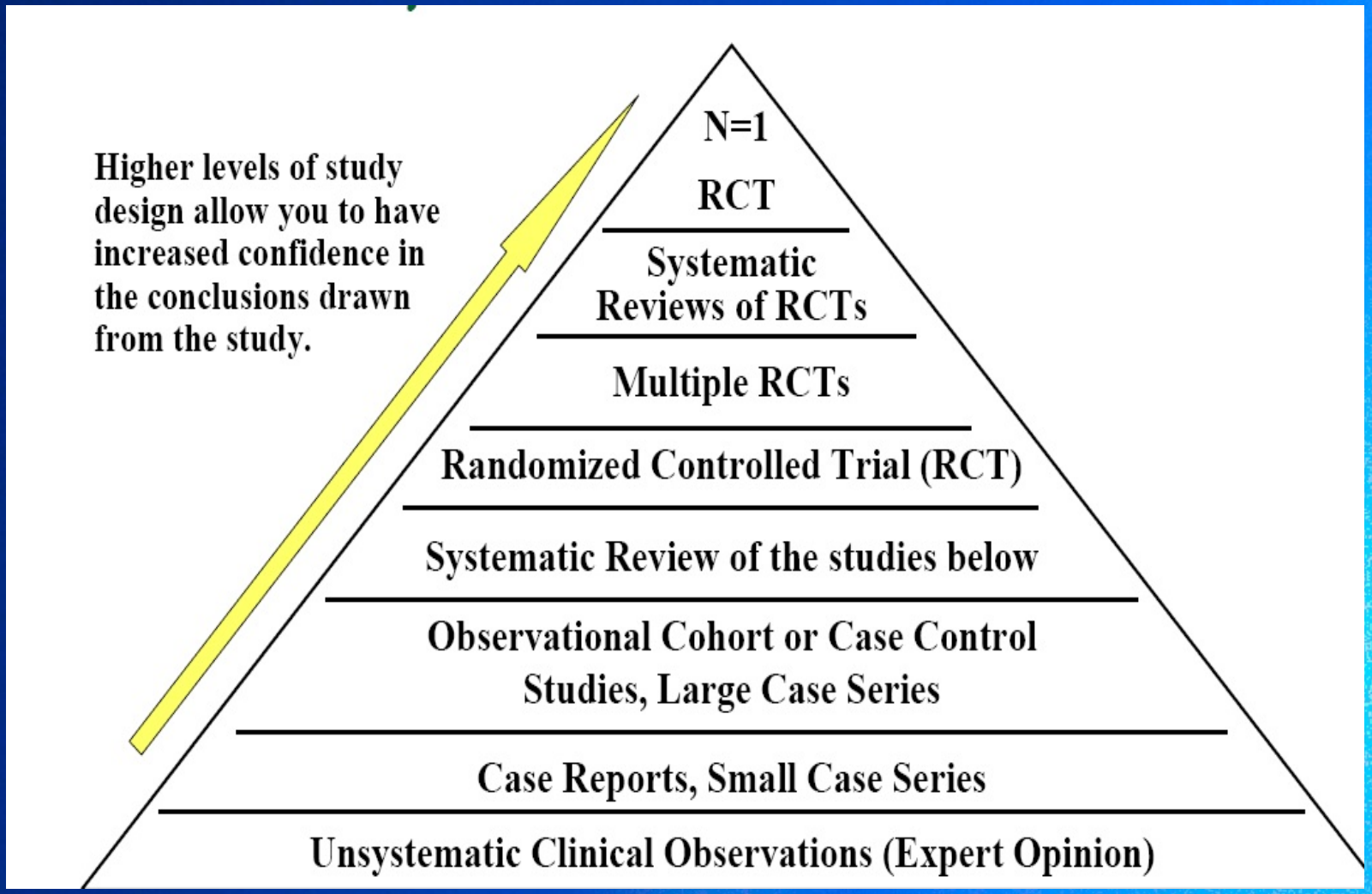
PICO Example for Harm

For a 54 year old man taking a non-FDA approved drug for male pattern balding what is the prevalence for permanent disfigurement as related to drug side effects?



"If you remember, I did mention possible side-effects."

Searching for the Best Evidence



Adopted from Dr. Steve Allison, PhD, MPT

Improving Search Techniques

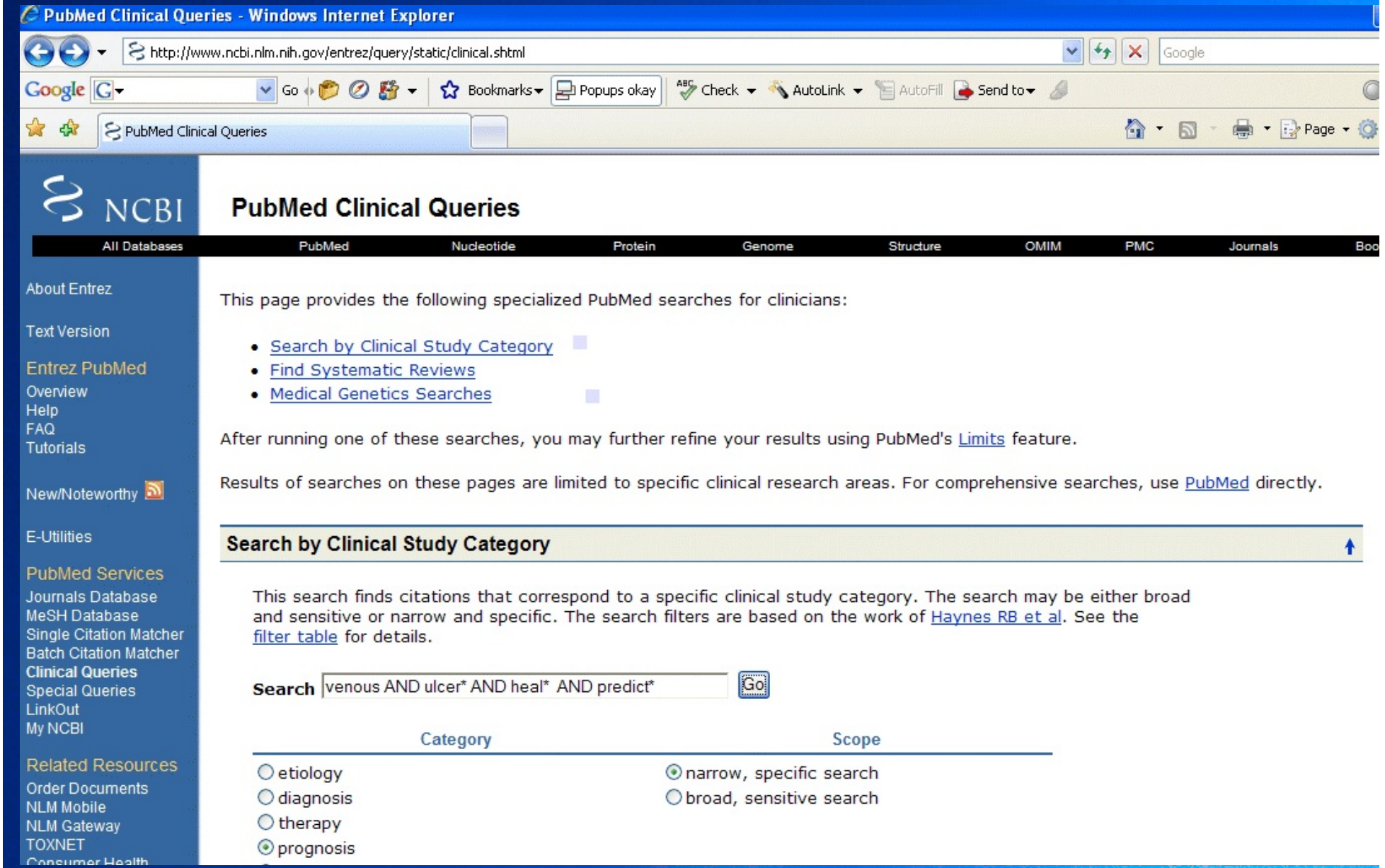
- Practice improves efficiency
- Particularly useful are the tutorials from NIH: http://www.nlm.nih.gov/bsd/disted/pubmedtutorial/
- Proper search will result in less than 20 related articles.
- Choose the research with highest level of evidence.

Example Search Criteria

Pubmed Clinical Queries: narrow, specific search for prognosis with the following search string:

(venous AND ulcer* AND heal* AND predict*) AND (prognos*[Title/Abstract] OR (first[Title/Abstract] AND episode[Title/Abstract]) OR cohort[Title/Abstract]) AND (Humans[Mesh]).

The search yielded 17 hits, one of which was the Margolis et al article.


PubMed Clinical Queries - Windows Internet Explorer
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Tutorials
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MeSH Database
Single Citation Matcher
Batch Citation Matcher
Clinical Queries
Special Queries
LinkOut
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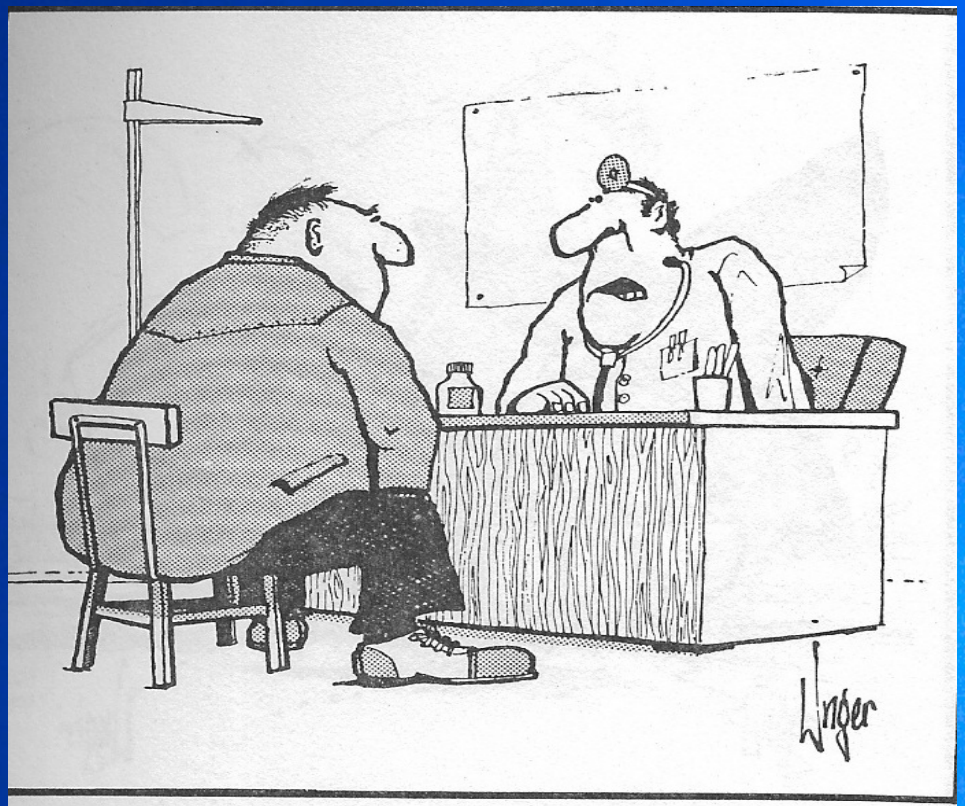
Search by Clinical Study Category
This search finds citations that correspond to a specific clinical study category. The search may be either broad and sensitive or narrow and specific. The search filters are based on the work of Haynes RB et al. See the filter table for details.
Search
venous AND ulcer* AND heal* AND predict*
Go
Category
etiology
diagnosis
therapy
prognosis
Scope
narrow, specific search
broad, sensitive search

Critically Appraising the Evidence

Are we looking at the data the way we should be?



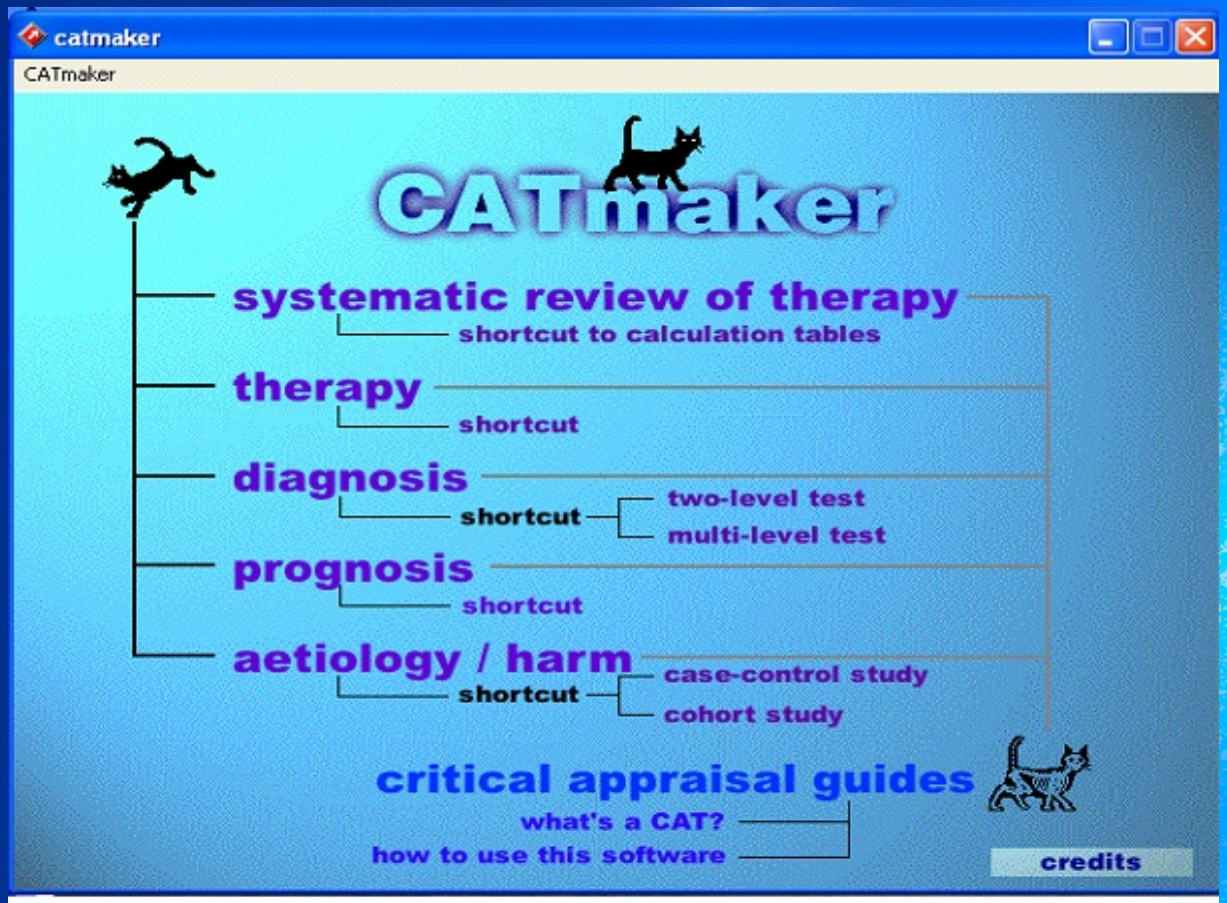
"Let me put it this way . . . for your weight you should be thirty-seven feet tall."

Critically Appraising the Evidence

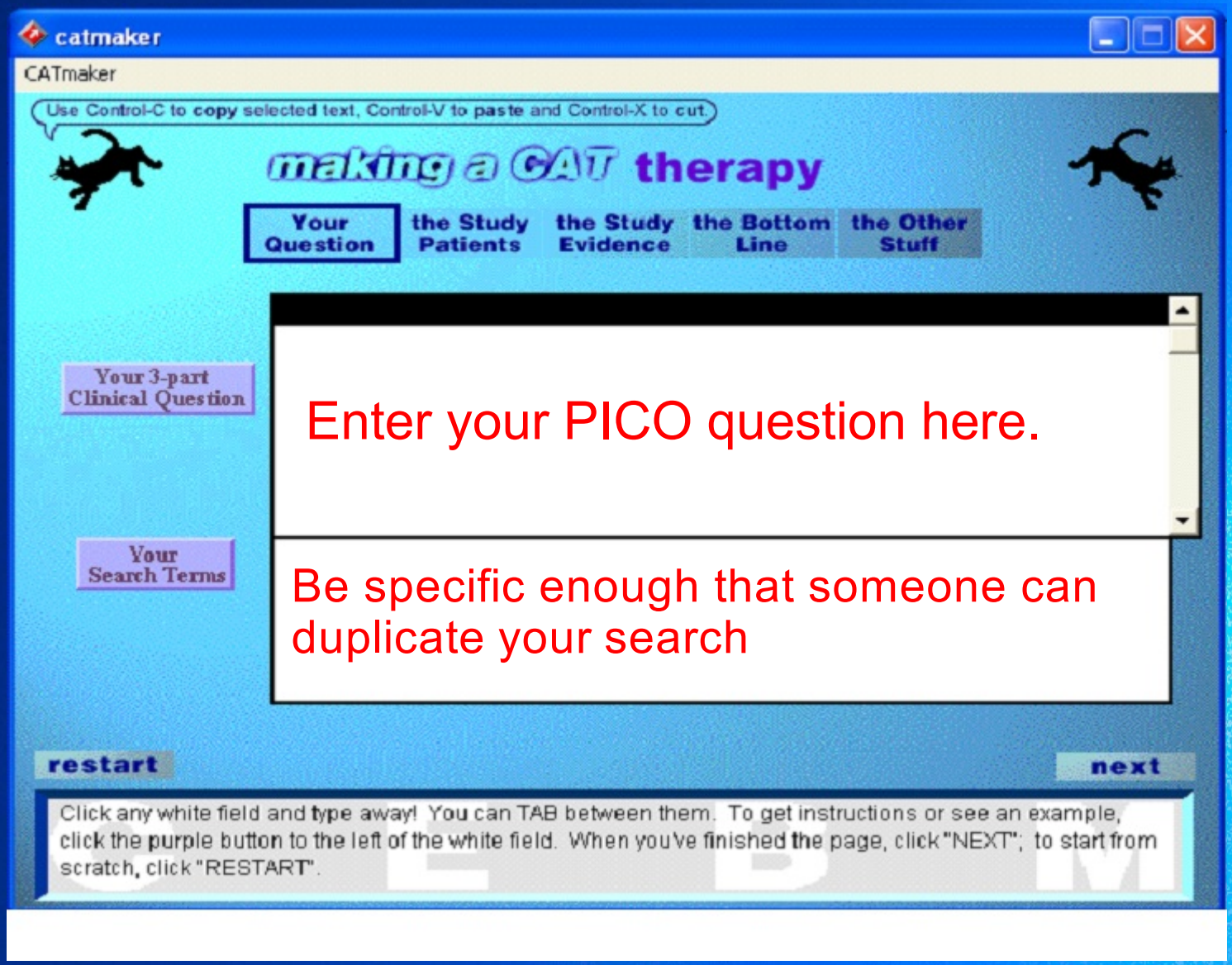
- EBP allows for comparing apples to apples by using specific statistics which have been shown to be more clinically useful.
- Critical Appraisal Topic (CAT) is a formal way of analyzing research to answer the clinical question.
- CATmaker software available free at: http://www.cebm.net/mod_product/uploads/catmaker.zip

Anatomy of a CAT

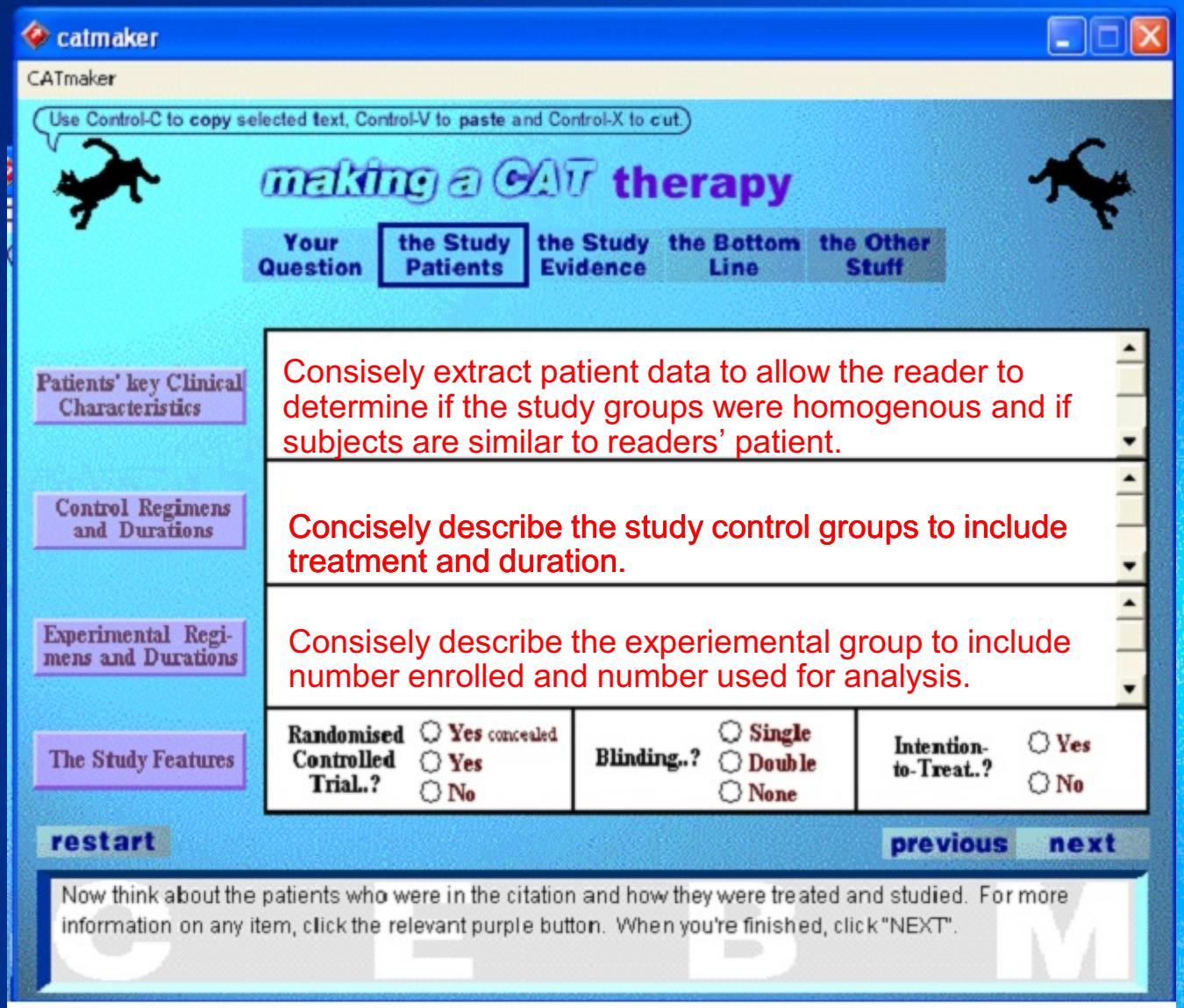
CATmaker


catmaker
CATmaker
CATmaker
systematic review of therapy
shortcut to calculation tables
therapy
shortcut
diagnosis
shortcut
two-level test
multi-level test
prognosis
shortcut
aetiology / harm
shortcut
case-control study
cohort study
critical appraisal guides
what's a CAT?
how to use this software
credits

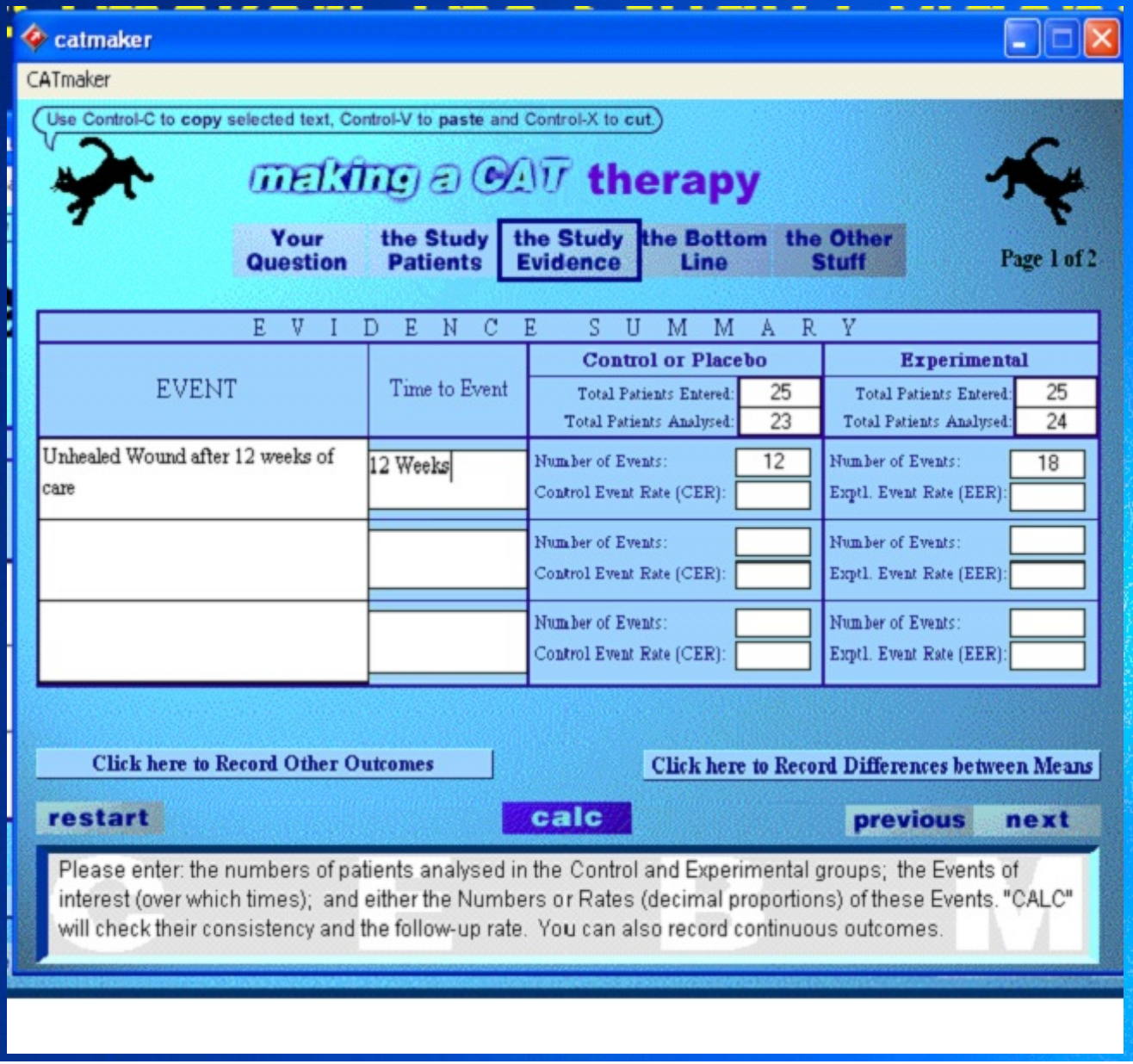
CATmaker: The Question



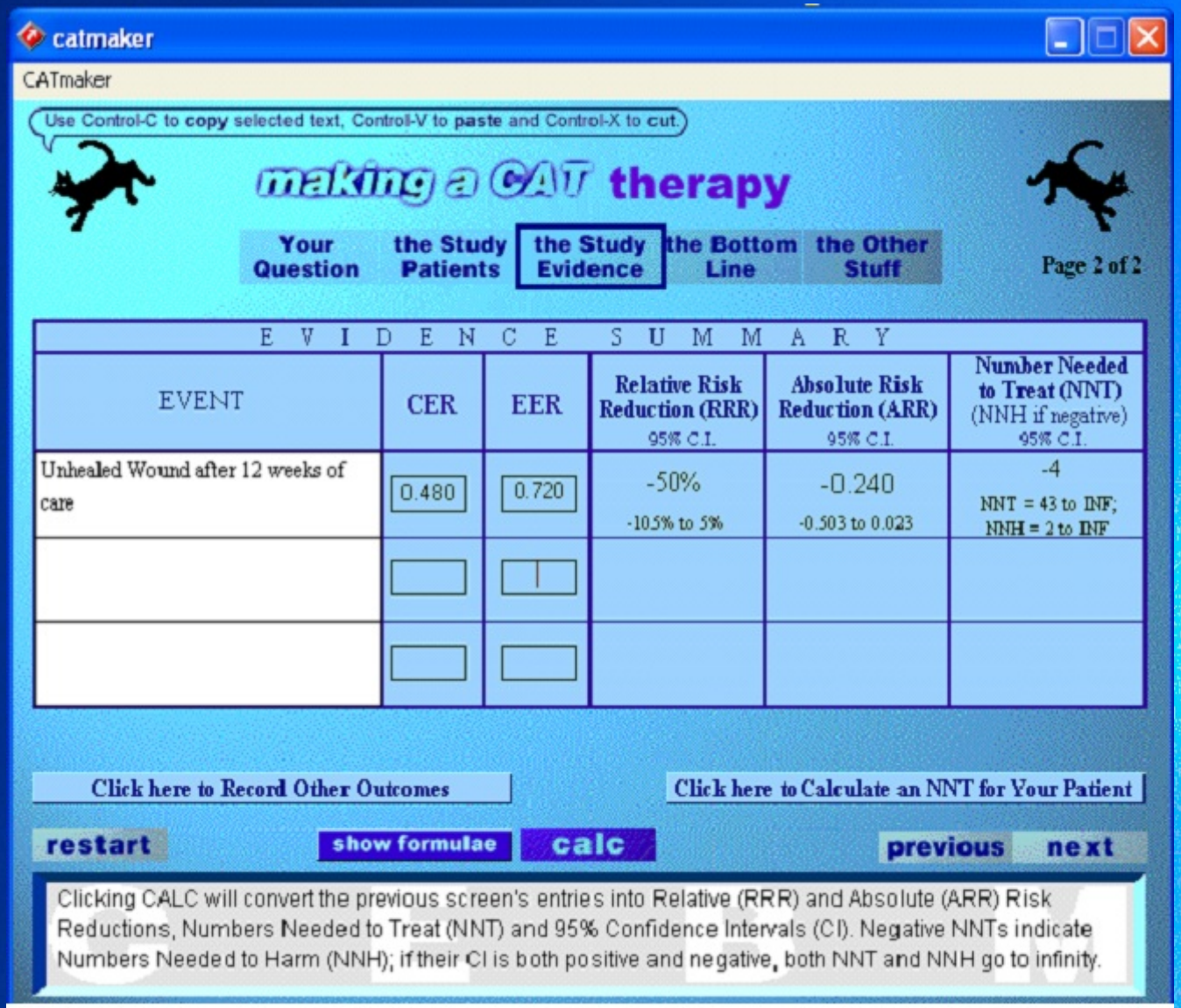
CATmaker: The Study Patients



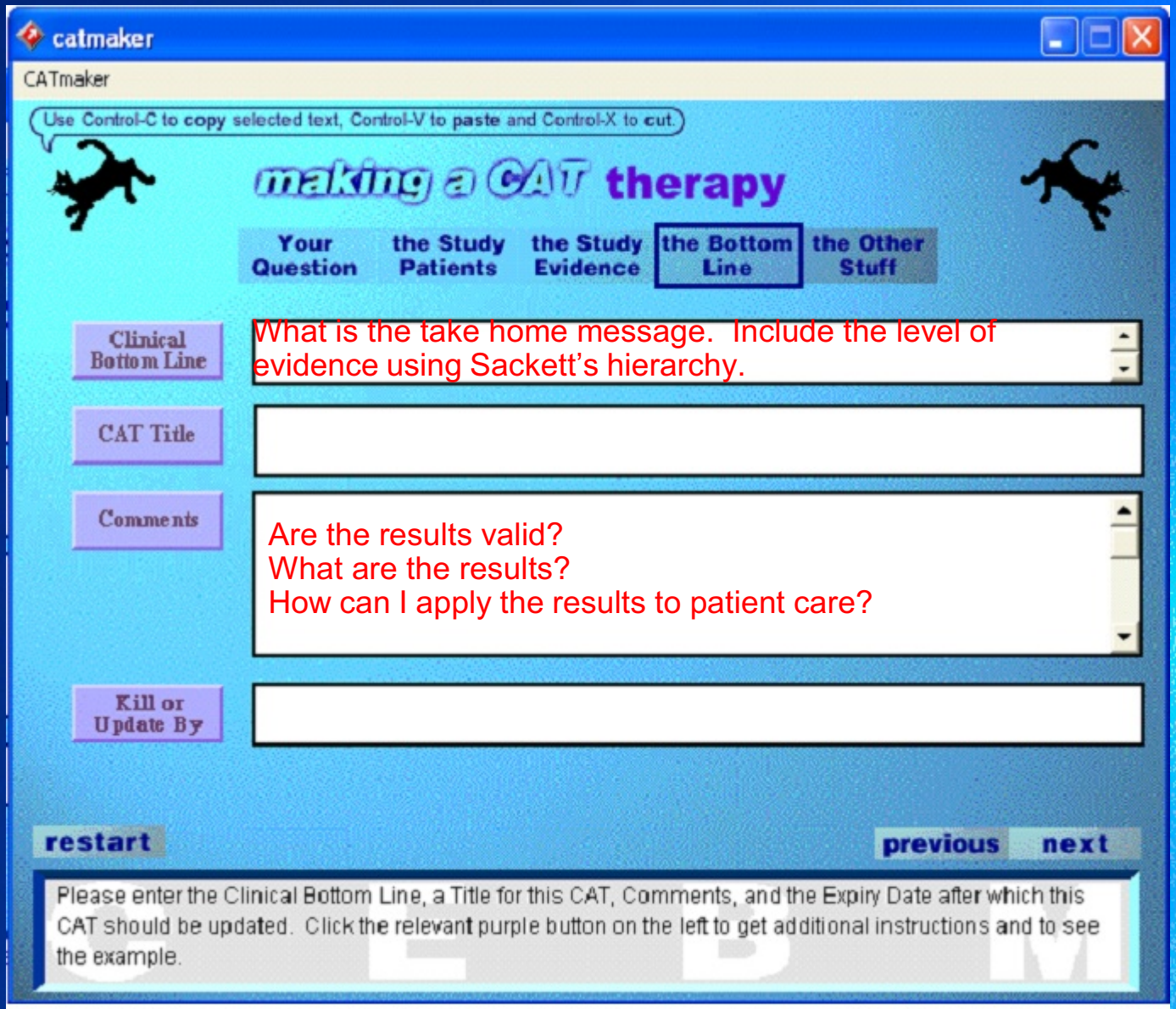
CATmaker: The Study Evidence



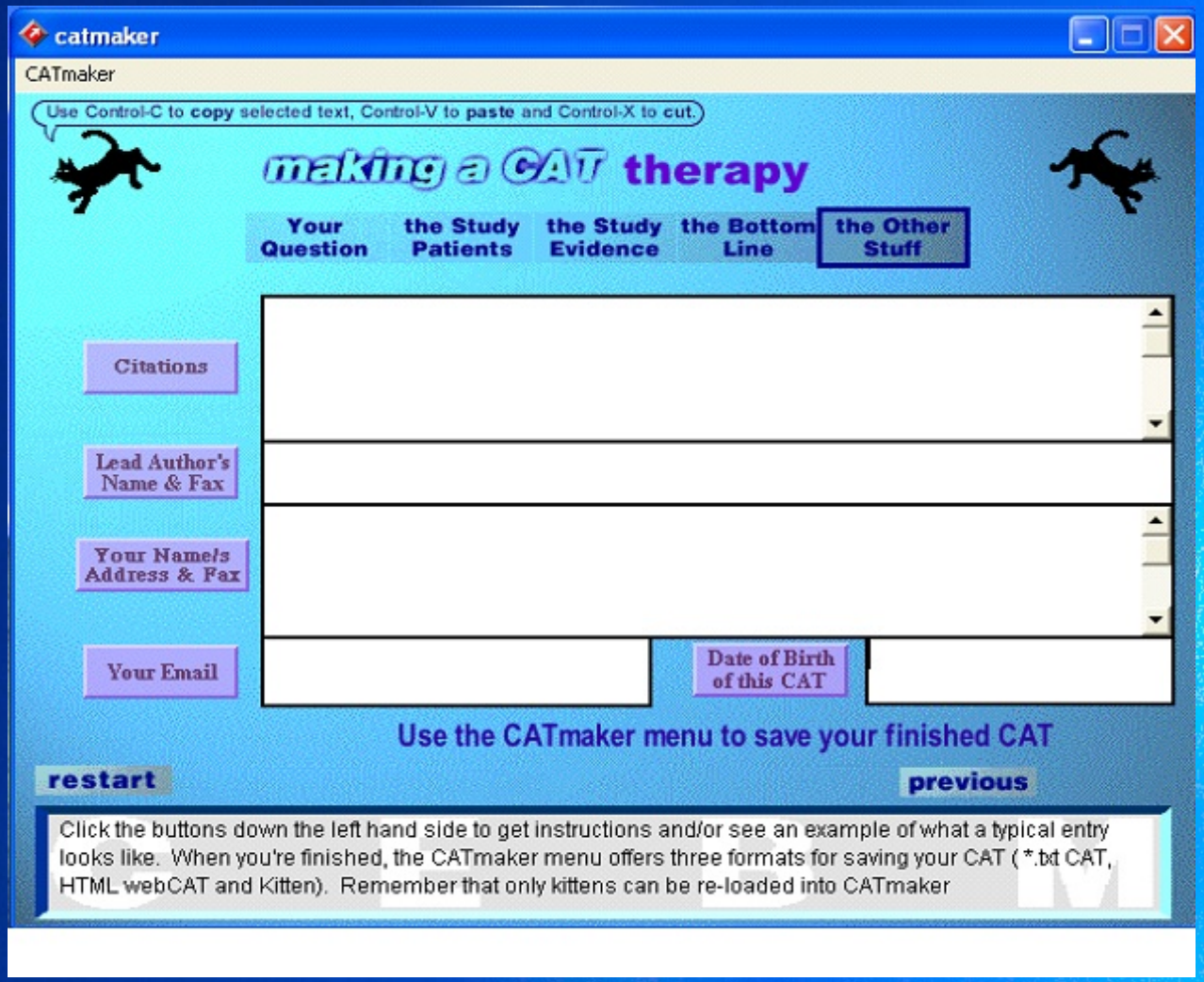
CATMaker: The Study Evidence



CATmaker: The Bottom Line



CATmaker: The Other Stuff



CAT Comments

Are the Results Valid

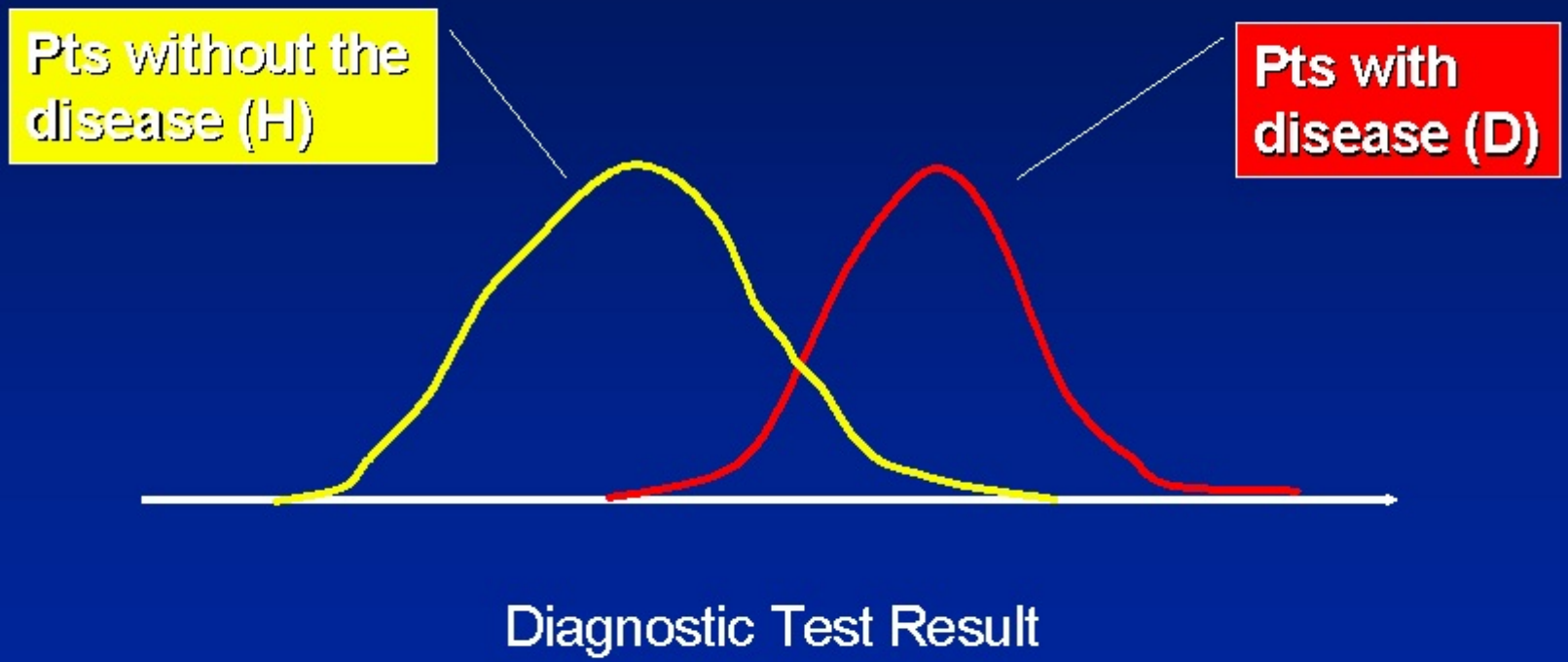
- Describe the patient selection process.
- Was this a blinded study - who was blinded?
- Was the treatment and control group homogenous?
- Did the study design lend itself to bias?
- Who paid for the study?
- Was there an intention to treat analysis?

What are the results?

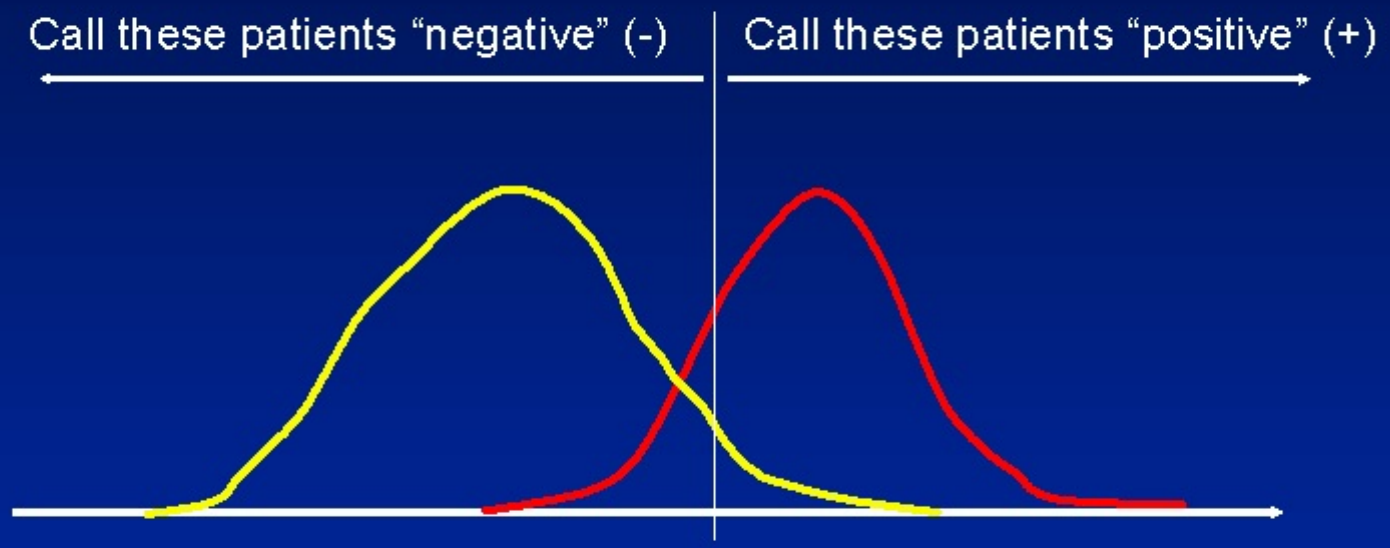
- Need to discuss point estimates and confidence intervals.
  - NNT of 6 with 95% CI -27 to 46
  - NNT of 24 with 95% CI 5 to 42
- Effect size and discussion of minimal clinically important difference (MCID)
  - 6MWT - 39 meters in patient's with pulmonary hypertension
- Need to understand some key EBP stats

Ready for the CAT stats?

Diagnostic Test Results Often on a Continuous Scale

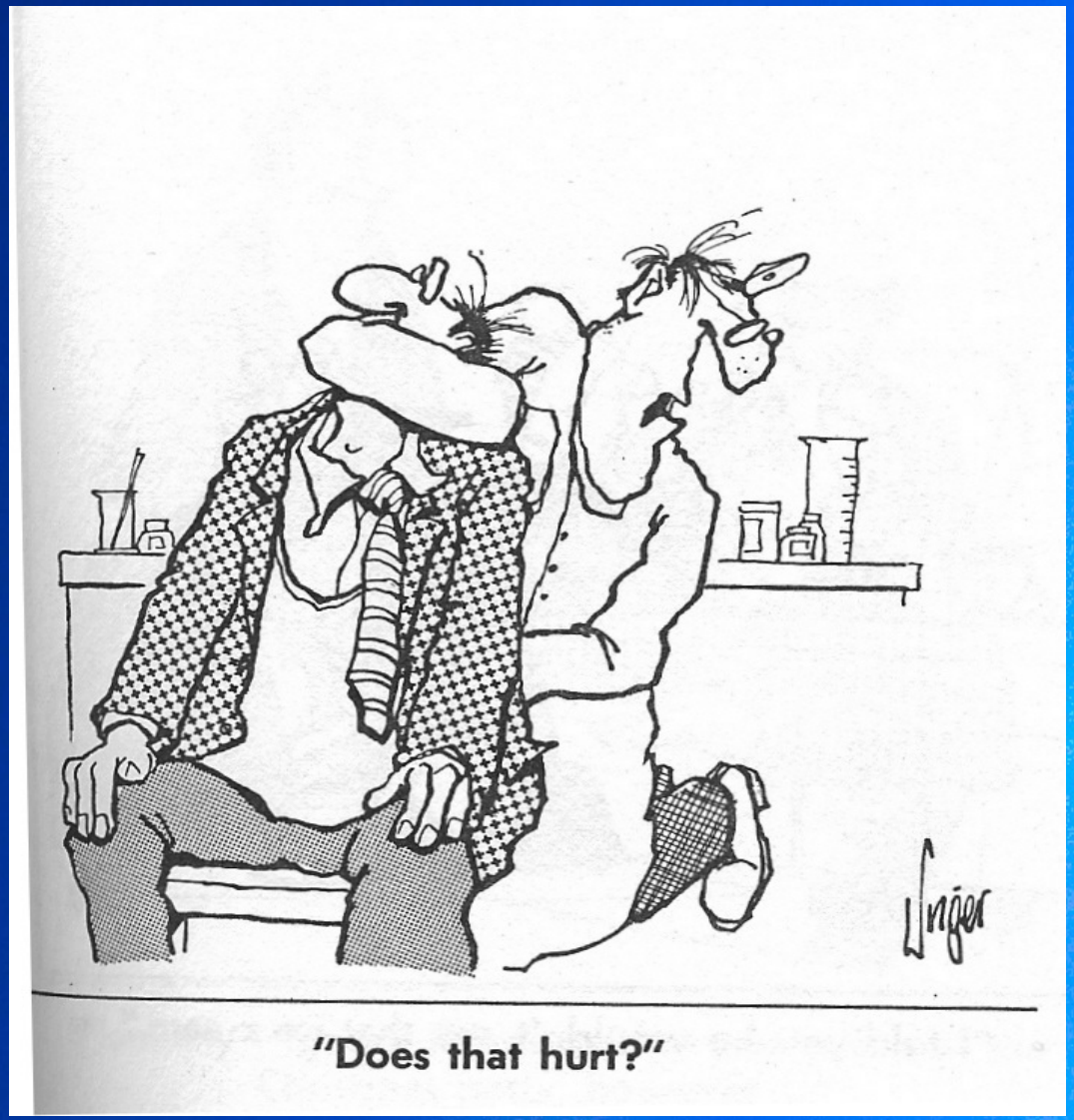


Consider a Cut-point



without the disease (H)
with the disease (D)

The Test in Question



Diagnostic Test Results

Test Result	Condition Present	Condition Absent
Postive	True Positve A	False Positive B
Negative	False Negative C	True Negative D
	SENSITIVITY A/(A+C)	SPECIFICITY D/(B+D)

Cut-point Gives Rise to a 2 x 2 table

Consider 1000 patients: 500 with a disease, 500 without

	with disease	no disease	total
test +	400	50	450
test -	100	450	550
total	500	500	1000

Positive Likelihood Ratio

Positive Likelihood Ratio:

$$LR^{+} = \frac{\text{sensitivity}}{1 - \text{specificity}}$$

In our example:

$$= \frac{0.8}{1 - 0.9} = 8.0$$

Indicates:

- How much odds of disease is increased if test is positive
- A ratio of something that is desirable (true positives) divided by something undesirable (false positives)

General Guidelines:

1	=>	Test is Useless
1 - 2	=>	Rarely important change in pre- to post test odds
2 - 5	=>	Small Change
5 - 10	=>	Moderate Change
>10	=>	Large Change

Negative Likelihood Ratio

Negative Likelihood Ratio:

$$LR^- = \frac{1 - \text{sensitivity}}{\text{specificity}}$$

In our example:

$$= \frac{1 - 0.8}{0.9} = 0.22$$

Indicates:

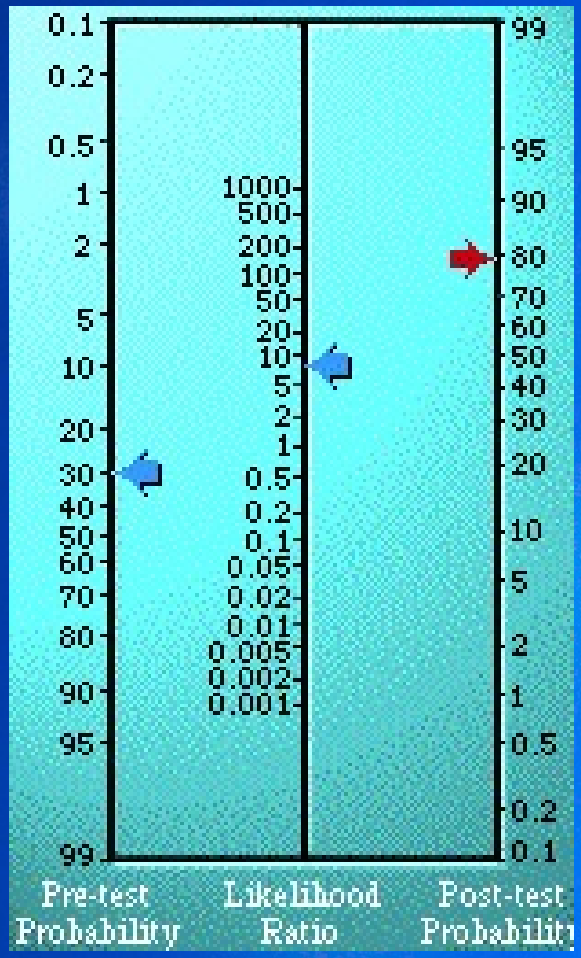
- How much odds of disease is decreased if test is negative
- A ratio of something that is undesirable (false negatives) divided by something desirable (true negatives)

General Guidelines:

0.5 - 1	=>	Rarely important change in pre- to post test odds
0.2 - 0.5	=>	Small Change
0.1 - 0.2	=>	Moderate Change
0 - 0.1	=>	Large change in pre- to post test odds

Use of Nomogram

Allows the clinician to use results from multiple tests



http://www.cebm.net/index.aspx?o=1161

Control Event Rate (CER)

Proportion of Patients Responding to Control Treatment

Example:

25 patients in control group

Event studied observed in 15/25

CER = 15/25 = 0.60

Experimental Event Rate (EER)

Proportion of patients responding to experimental treatment

Example:

26 patients in experimental group

Event being studies observed in 22/26

EER = 22/26 = 0.85

Relative Risk Reduction (RRR)

Percent reduction in measured outcome between experimental and control groups

Example:

Outcome = Cure Rate

Experimental Group Cure Rate = 85%

Control Group Cure Rate = 60%

RRR = (85-60)/60 = 42%

Caution: RRR can make small effect rates seem more important.

Absolute Risk Reduction (ARR)

Difference in outcome event rate between experimental group and control group

Example:

Outcome = Cure Rate

Experimental Group Cure Rate = 85%

Control Group Cure Rate = 60%

ARR = 85 - 60 = 25%

Number Needed to Treat (NNT)

Number of patients who must be treated to prevent one adverse outcome or for one patient to benefit

NNT = 1/ARR

Experimental Group Cure Rate = 85%

Control Group Cure Rate = 60%

NNT = 1/(0.85-0.60) = 4

NNT is most clinically useful statistic.

Typically a NNT of <= 10 is useful for treatments.

Example CAT Statistics Table

Efficacy of MIST Ultrasound in the Treatment of Chronic Diabetic Foot Ulcers

The Evidence:

Outcome	Time to Outcome	CER	EER	
Failure of wound to close	**Up to 12 weeks**	**0.778**	**0.743**	
	95% Confidence Intervals:			-
Clinically significant adverse reactions such as wound enlargement, wound infection, blister formation or additional wound formation	**Up to 12 weeks**	**0.016**	**0.100**	-
	95% Confidence Intervals:			-1

EVERLAST
SUGAR

Call to all BOP Therapists

Begin to practice EBP by completing one CAT per quarter with submission to Advanced Therapy Practice web page.

Therapist Professional Advisory Committee

Advanced Physical Therapy Practice

To Shed Light on Advanced Medical Practices as a U.S. Public Health Service Therapist

Purpose:

"Evidence Based Medicine (EBM) has been defined as "the conscientious", explicit, and judicious use of current best evidence in making decisions about the care of individual patients. The practice of evidence based medicine means integrating individual clinical expertise with the best available external clinical evidence from systematic research" David Sackett et. al "Evidence Based Medicine: What it is and What it isn't" BMJ 312 No. 7023 (1996).

Discipline Board Certifications	PT	OT	SLP/Aud
Other Specialty Certifications	PT	OT	SLP/Aud
Clinical Research Contributions	PT	OT	SLP/Aud
Evidence Based CME's	PT	OT	SLP/Aud
CAT Express	PT	OT	SLP/Aud
Evidence Based Medicine Links	PT	OT	SLP/Aud
Clinical Consultation Forums	PT	OT	SLP/Aud
Therapy Presentation Postings	PT	OT	SLP/Aud

Any Questions?