

Test Taking Strategies for BPS Exams

Conquering the Biostatistics Question

Anthony J. Busti, MD, PharmD, MSc, FNLA, FAHA



Introduction



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Participation Required
You Must Fill in Some Blanks



Disclaimer

- High-Yield Med Reviews has no working relationship with BPS (Board of Pharmacy Specialities)
- This live webinar event is not endorsed or sponsored by BPS or anyone other than High-Yield Med Reviews
- This is not meant to be a commercial or sales pitch



Agenda

- A General Overview
- Part 1 – Conquering the Biostatistics Question
- Part 2 – Interpreting Statistical Results Correctly
- A Special Coupon Code
- Live Q&A



Conquering the Biostatistics Question

- Essential steps and decision points
 1. Consider drawing out study design in question
 2. How many groups are being studied?
 - a. Are those groups related or independent of each other?
 3. What type of data is represented in the outcome of interest (i.e., nominal, ordinal, continuous)?
 4. Connect the row and column on summary table
 5. The Killer Foil Moment → If “applicable” results/data are available, consider the following:
 - a. How many patients are in each group?
 - b. Does it appear to be parametric or nonparametric?

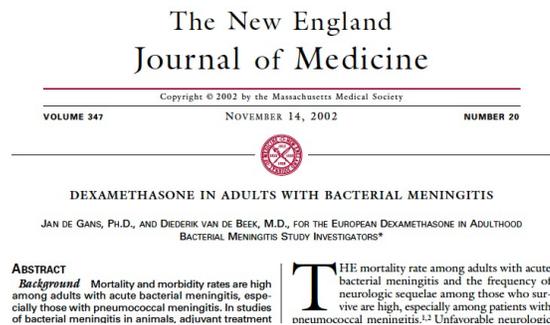
Test-Taking Strategies Memorize the Chart



Type of Data	Two Independent Samples	Related or Paired Samples	3 or more Independent Samples	3 or more Related Samples	Measures of Correlation
Nominal	1. Chi-square 2. Fisher's Exact	McNemar Test	Chi-square for k independent samples	Cochran Q	Contingency coefficient
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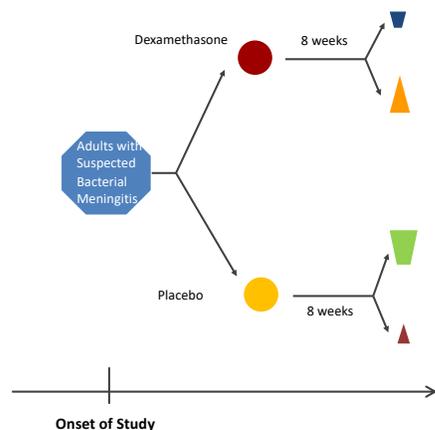
N Engl J Med 2002;347:1549-56.

Treatment

Patients were randomly assigned to receive dexamethasone sodium phosphate (Oradexon), at a dose of 10 mg given every six hours intravenously for four days, or placebo that was identical in appearance to the active drug. The study medication was given 15 to 20 minutes before the parenteral administration of antibiotics. After the interim analysis, the protocol was amended to allow administration of the study medication with the antibiotics.

Balanced treatment assignments within each hospital were achieved with the use of a computer-generated list of random numbers in blocks of six. The code was not broken until the last patient to be enrolled had completed eight weeks of follow-up. Treatment

Dexamethasone – Adult Meningitis Study

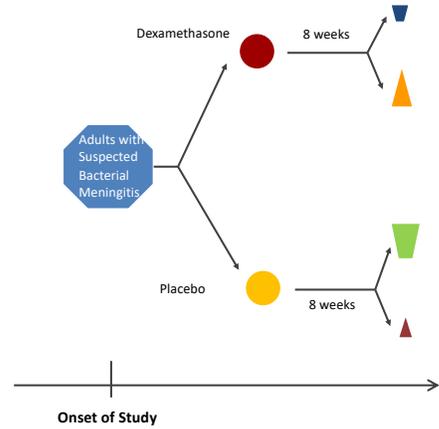


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Conquering the Biostatistics Question

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Dexamethasone – Adult Meningitis Study



The Lancet · Saturday 13 August 1988

RANDOMISED TRIAL OF INTRAVENOUS STREPTOKINASE, ORAL ASPIRIN, BOTH, OR NEITHER AMONG 17 187 CASES OF SUSPECTED ACUTE MYOCARDIAL INFARCTION: ISIS-2

ISIS-2 (SECOND INTERNATIONAL STUDY OF INFARCT SURVIVAL) COLLABORATIVE GROUP*

Summary 17 187 patients entering 417 hospitals up to 24 hours (median 5 hours) after the onset of suspected acute myocardial infarction were randomised, with allocation concealment, to one of four treatment groups:

0.2%) and of confirmed cerebral haemorrhage (0.1% vs 0.4%), but with fewer other strokes (0.6% vs 0.8%). These “other” strokes may have included a few undiagnosed cerebral haemorrhages, but still there was no increase in total strokes (0.7% streptokinase vs 0.8% placebo infusion). Aspirin significantly reduced non-fatal reinfarction (1.0% vs 2.0%) and non-fatal stroke (0.3% vs 0.6%), and was not associated with any significant increase in cerebral haemorrhage or in bleeds requiring transfusion. An excess of non-fatal reinfarction was reported when streptokinase was used alone, but this appeared to be entirely avoided by the addition of aspirin. Those allocated the combination of streptokinase and aspirin had significantly fewer

Treatment

A 2 × 2 factorial study design was used.¹⁴ Half of all patients were allocated randomly to receive streptokinase (1.5 MU of ‘Streptase’) and half to receive matching placebo (hepatitis-B-antigen-free albumin), infused intravenously over about 1 hour in 50–250 ml physiological saline, starting immediately. Half of all patients were also allocated randomly to receive oral aspirin (exact dose: 162.5 mg in enteric-coated tablets) and half to receive matching placebo (enteric-coated starch tablets), given daily for one month from a calendar pack, starting immediately with the first tablet crushed, sucked, or chewed for a rapid antiplatelet effect. Hence, there were 4 treatment groups: streptokinase alone, aspirin alone, both, or neither. The trial treatments were to be interrupted only if this was

ISIS-2 Trial. Lancet 1988

ISIS-2 Trial. Lancet 1988

2 x 2 Factorial Study

	Aspirin	Placebo
Streptokinase	S + A	S + P
Placebo	P + A	P + P

THE LANCET, AUGUST 13, 1988

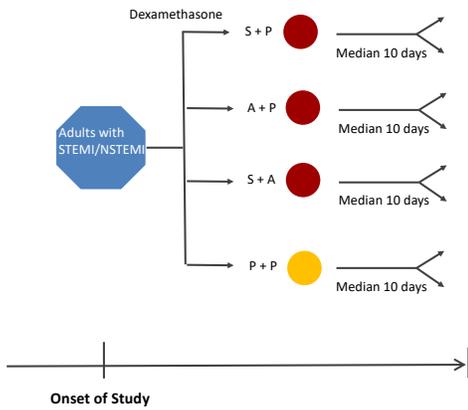
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TABLE 1—EFFECTS OF ALLOCATED TREATMENT ON CLINICAL EVENTS IN HOSPITAL AND ON NON-VASCULAR MORTALITY

Clinical event	Streptokinase allocation			Aspirin allocation			Combination therapy		
	Streptokinase	Placebo infusion	Absolute reduction (% Placebo vs SK)	Aspirin	Placebo tablets	Absolute reduction (% Placebo vs Asp)	Streptokinase & Aspirin	Both placebos	Absolute reduction (% Neither vs SK & Asp)
No randomised	8992	8995		8587	8600		4292	4300	
No with discharge form	8490	8491		8492	8489		4239	4238	
Reinfarction									
Any	238	202	-0.4%	156	284	1.5%	77	123	1.1%

ISIS-2 Trial. Lancet 1988

ISIS-2 Trial



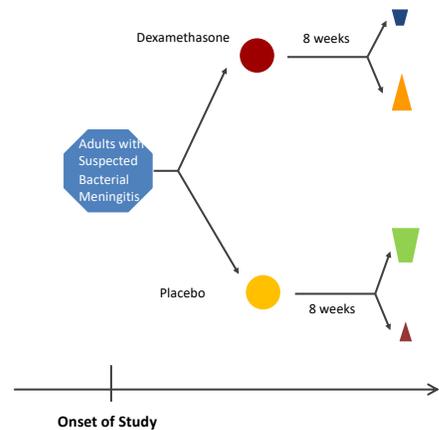
Type of Groups

SAME patient in ALL arms	DIFFERENT patients in each arm
<ul style="list-style-type: none"> • Cross-Over Studies • Retrospective Study of All Patients Start & End of Study • Left eye vs right eye on the same patient • Warning: <ul style="list-style-type: none"> • Patients Randomized to look almost the same • Identical Twins 	<ul style="list-style-type: none"> • RCT • Cohort Study • Case-Controlled Study

Test-Taking Strategies Circling Back - Application



Dexamethasone – Adult Meningitis Study



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ISIS-2: 2 x 2 Factorial Study

	Aspirin	Placebo
Streptokinase	S + A	S + P
Placebo	P + A	P + P

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Conquering the Biostatistics Question

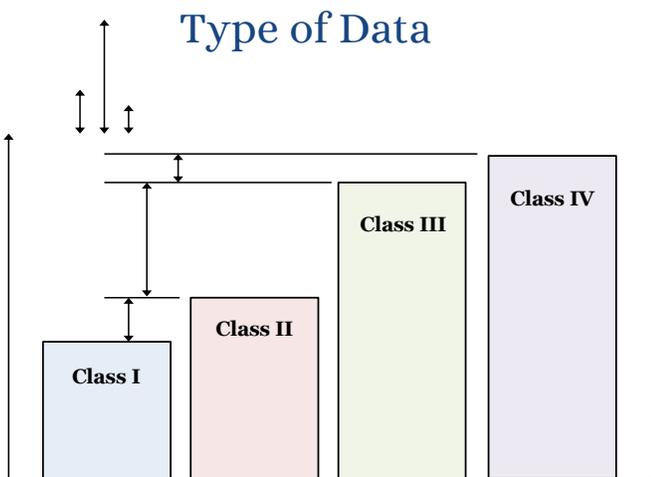
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Nominal Data

- Key descriptors:
 - Categorical
 - Dichotomous
 - Binomial distribution
 - No sense of “ranking” or “order”
 - Thus the magnitude of difference between the two does not apply
- Assessment of data:
 - The endpoint is treated at the end as:
 - “yes or no”
 - “either did or didn’t”
 - There CANNOT be an average or a mean value

Ordinal Data

- Key descriptors:
 - Data endpoints have a sense of “order” that also has a sense of “ranking” or “scale”
 - Nonparametric (not normally distributed data)
 - Could by continuous data with outliers
- Assessment of data:
 - The “magnitude of differences” between endpoints is NOT the same



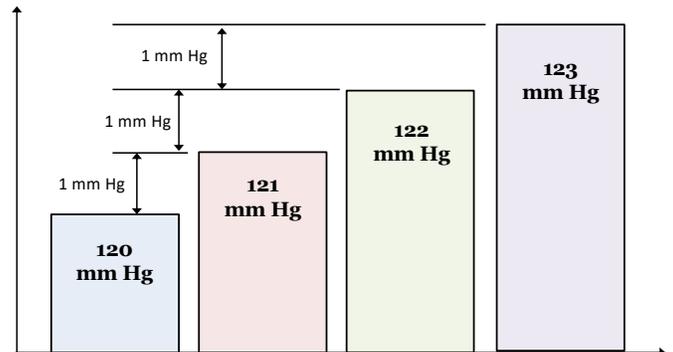
Type of Data

- Examples of Ordinal Data:
 - Classification of HF (class I – IV)
 - Severity of pain:
 - Mild, Moderate, or Severe
 - Well’s Score for PE (0 – 12.5)
 - Low or PE unlikely (< 4 points)
 - Moderate (4-6 points)
 - High probability (> 6 points)
 - What about:
 - NIH Stroke “Scale”
 - Pain Scale: 0 - 10

Continuous Data

- Key descriptors:
 - Data endpoints have a sense of “order” that also has a sense of “ranking”
 - Parametrically distributed
 - Assumes no “outliers”
- Assessment of data:
 - The “magnitude of difference” between endpoints is ARE the same

Type of Data



Continuous Data

- Examples of Continuous Data:
 - Temperature
 - Pulse (heart rate)
 - Blood pressure (without a cutoff or designated goal)
 - Labs (Sodium level)

Test-Taking Strategies Circling Back - Application



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 VOLUME 347 NOVEMBER 14, 2002 NUMBER 20



DEXAMETHASONE IN ADULTS WITH BACTERIAL MENINGITIS

JAN DE GANS, PH.D., AND DIEDERIK VAN DE BEEK, M.D., FOR THE EUROPEAN DEXAMETHASONE IN ADULTHOOD BACTERIAL MENINGITIS STUDY INVESTIGATORS*

ABSTRACT

Background Mortality and morbidity rates are high among adults with acute bacterial meningitis, especially those with pneumococcal meningitis. In studies of bacterial meningitis in animals, adjuvant treatment

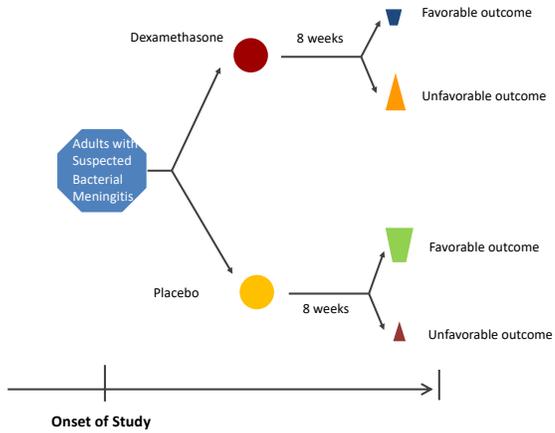
THE mortality rate among adults with acute bacterial meningitis and the frequency of neurologic sequelae among those who survive are high, especially among patients with pneumococcal meningitis.^{1,2} Unfavorable neurologic

Assessment of Outcome

The primary outcome measure was the score on the Glasgow Outcome Scale eight weeks after randomization, as assessed by the patient's physician. A score of 1 indicates death; 2, a vegetative state (the patient is unable to interact with the environment); 3, severe disability (the patient is unable to live independently but can follow commands); 4, moderate disability (the patient is capable of living independently but unable to return to work or school); and 5, mild

or no disability (the patient is able to return to work or school).¹² A favorable outcome was defined as a score of 5, and an unfavorable outcome as a score of 1 to 4. The Glasgow Outcome Scale has frequently been used in trials involving stroke and other brain injuries. It is a well-validated scale with good interobserver agreement.^{13,14}

Dexamethasone – Adult Meningitis Study



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Summary 17 187 patients entering 417 hospitals up to 24 hours (median 5 hours) after the onset of suspected acute myocardial infarction were randomised, with allocation concealment. Mortality (0% vs 1 hour later) was significantly lower

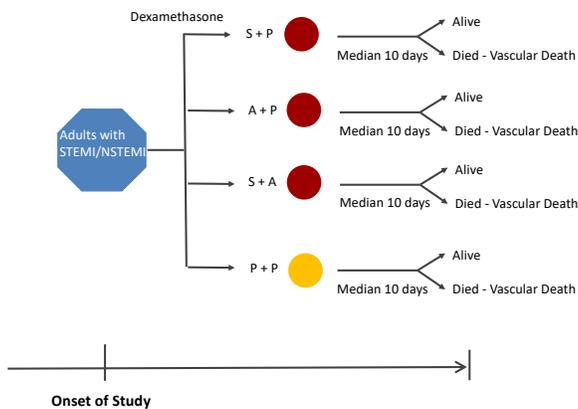
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The present report is of outcome by allocated treatment among all randomised patients, except those 206 (102 active SK vs 104 placebo infusion; 95 active aspirin vs 111 placebo tablets) for whom discharge forms had not yet been obtained by July, 1988. Discharge was at a median of 10 days, and mortality follow-up was for a maximum of 34 and a median of 15 months. The completeness of follow-up is 99% to discharge, 97% to week 5, and 96% to Jan 1, 1988. (About nine-tenths of all deaths in the first 5 weeks occur in hospital, so it is probable that more than 98% of the 5-week deaths among the 17 187 randomised patients are included in the present analysis.)

ISIS-2 Trial. Lancet 1988

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ISIS-2 Trial



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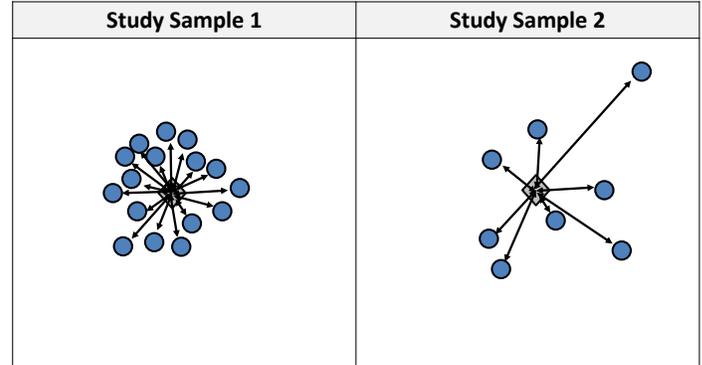
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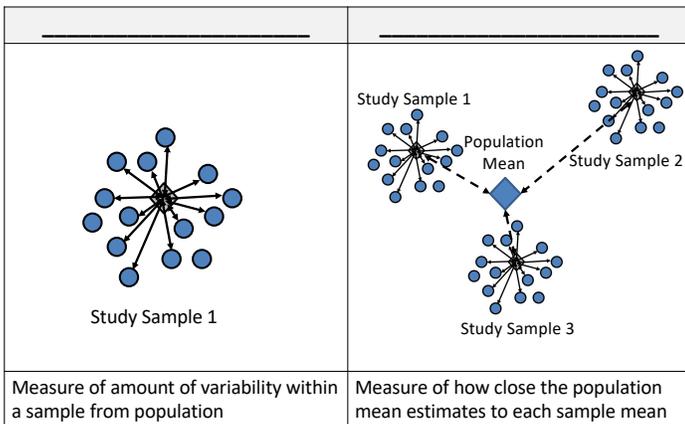
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Measure of Variability



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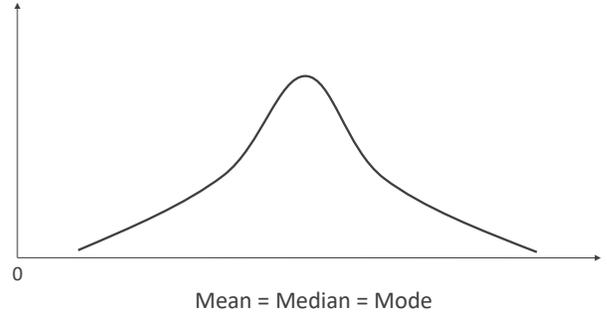
Chi-squared vs. Fisher's exact

Variable	_____ test	_____ test
Sample Size	Large	Small
Desired Accuracy	Approximate	"Exact"
Considerations	<ul style="list-style-type: none"> Becomes more accurate with larger sample sizes 	<ul style="list-style-type: none"> More exact regardless of number but harder to calculate by hand using computer. Note: is it really "exact"? Typically used when > 20% of the cells have a frequency of < 5 because an approximation at this level is inadequate.

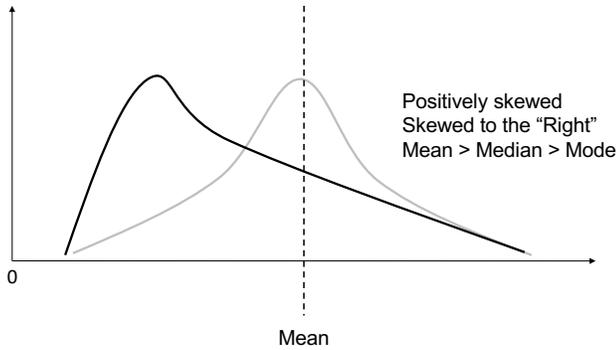
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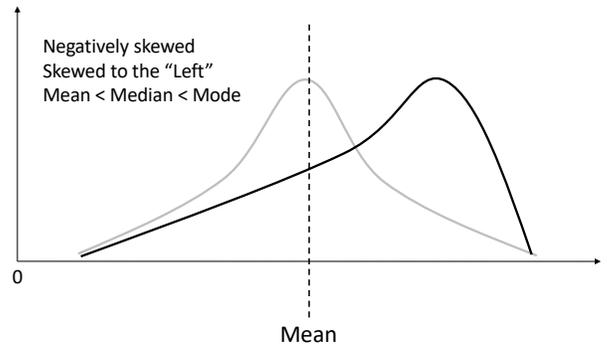
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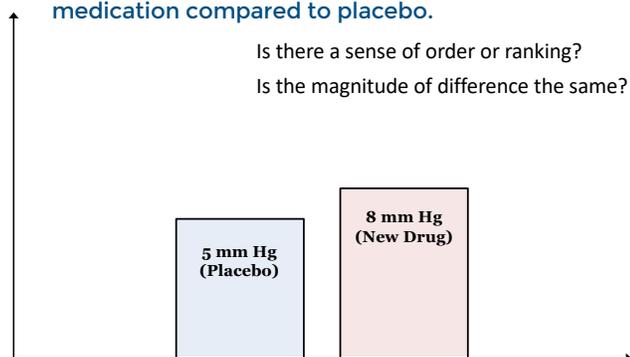


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Test-Taking Strategies Circling Back - Application

Type of Data

An RCT was done to assess the “average reduction in BP” of a new antihypertensive medication compared to placebo.



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Coupon

- Limited time coupon
 - Coupon = _____
 - 10% OFF ENTIRE ORDER
 - Expires = **Sept 30, 2022**



Live Q&A



HIGH-YIELD
MED REVIEWS



Why Should I Consider High-Yield Med Reviews? ...

What makes you different?



High Yield Study Tools

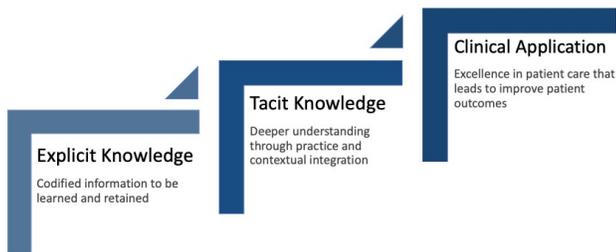
<p>Lectures & Books</p> <ul style="list-style-type: none"> • 225+ Core topics available • Organized by topic areas • HD lectures for quality • Works on all devices • Monitors your progress 	<p>Q-Bank</p> <ul style="list-style-type: none"> • 2,000+ practice questions • Select topic categories • Teaching points provided • Performance statistics • Ability to flag questions • Peer comparison metrics 	<p>Case Reviews CE</p> <ul style="list-style-type: none"> • Available on-demand • Integrates content • Builds on knowledge • Facilitates application • Taught by expert faculty
<p>Biostatistics CE</p> <ul style="list-style-type: none"> • EBM • Biostatistics • Literature Evaluation and Application 	<p>Rapid Review</p> <ul style="list-style-type: none"> • Review core concepts quickly. • Final step in comprehensive review 	<p>Other Study Tools</p> <ul style="list-style-type: none"> • Landmark Clinical Trials Reviews • Live Study Groups with Open Q&A

How does all of that fit together?

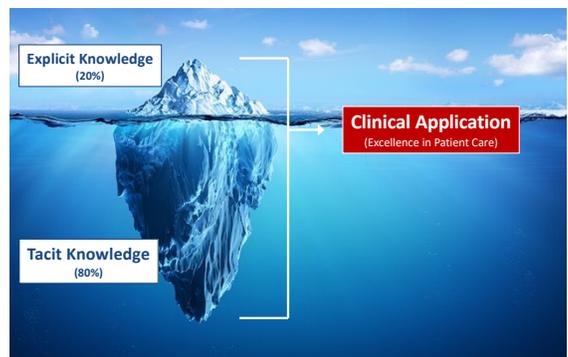


Knowledge Transfer

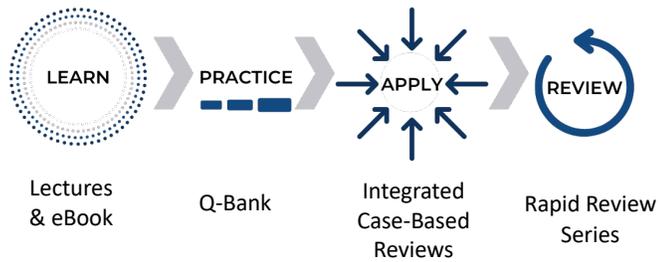
The High-Yield Approach



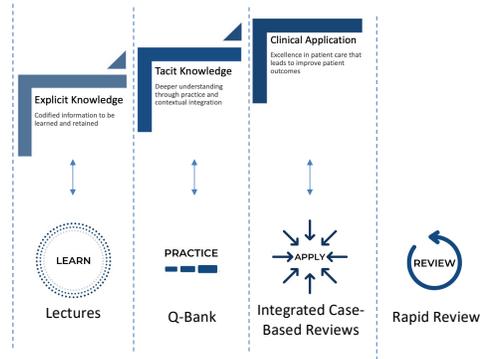
Knowledge Transfer



The High-Yield Approach



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The High-Yield Approach

