

Critical Appraisal Skills:

A Comparison between a Canadian and a US School

The Dal-Cal Study

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Dal-Cal Investigators

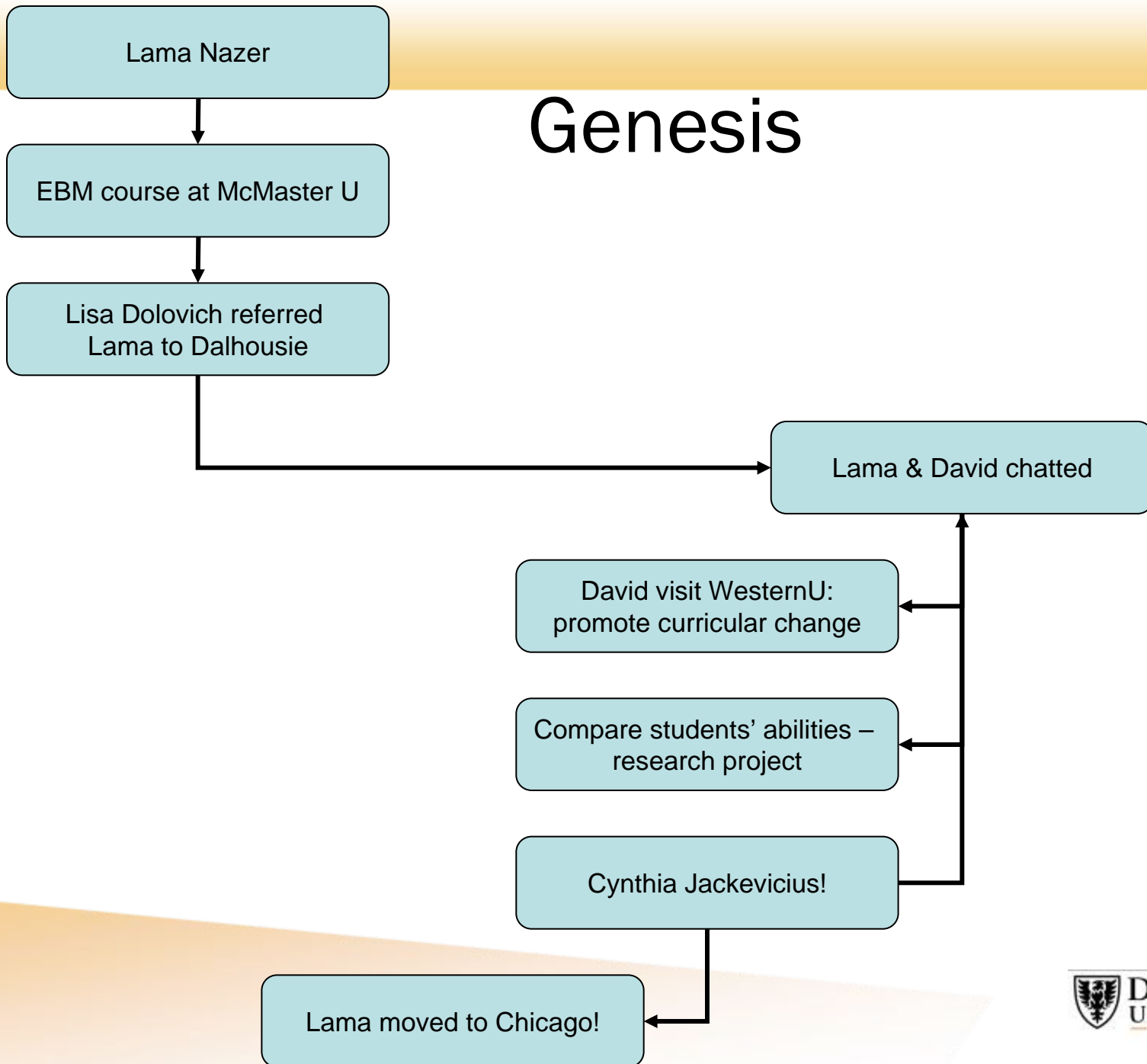
Dalhousie:

David Gardner & Peter Zed

WesternU:

Cynthia Jackevicius & Lama Nazer

Genesis



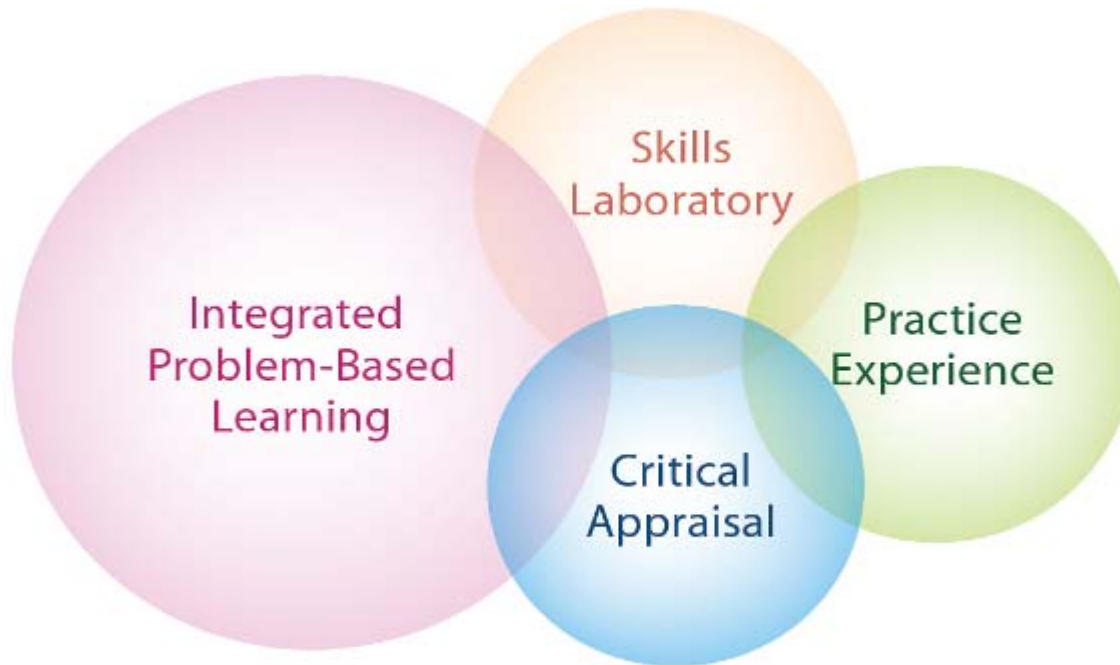
Background

The Critical Appraisal Series @ Dalhousie

Dalhousie's College of Pharmacy

PROGRAM OVERVIEW

Major Curricular Components



1. establish relationship

The Dalhousie College of Pharmacy Pharmacist's Patient Care Process

Pharmaceutical care and evidence-based theories provide the basis for Dalhousie's pharmacist's patient care process.

Skills learned in Dalhousie's program emphasize evidence-based patient-centered care.

2. assessment:
collect, synthesize,
interpret patient
information to
identify DRPs

3. consolidate
patient DRPs

4. prioritize
DRPs

5. identify & assess options
to resolve DRP

7. make
recommendation
& develop
monitoring plan

8. monitor,
follow-up

6d. reassess decision-
making factors

6c. critical
appraisal

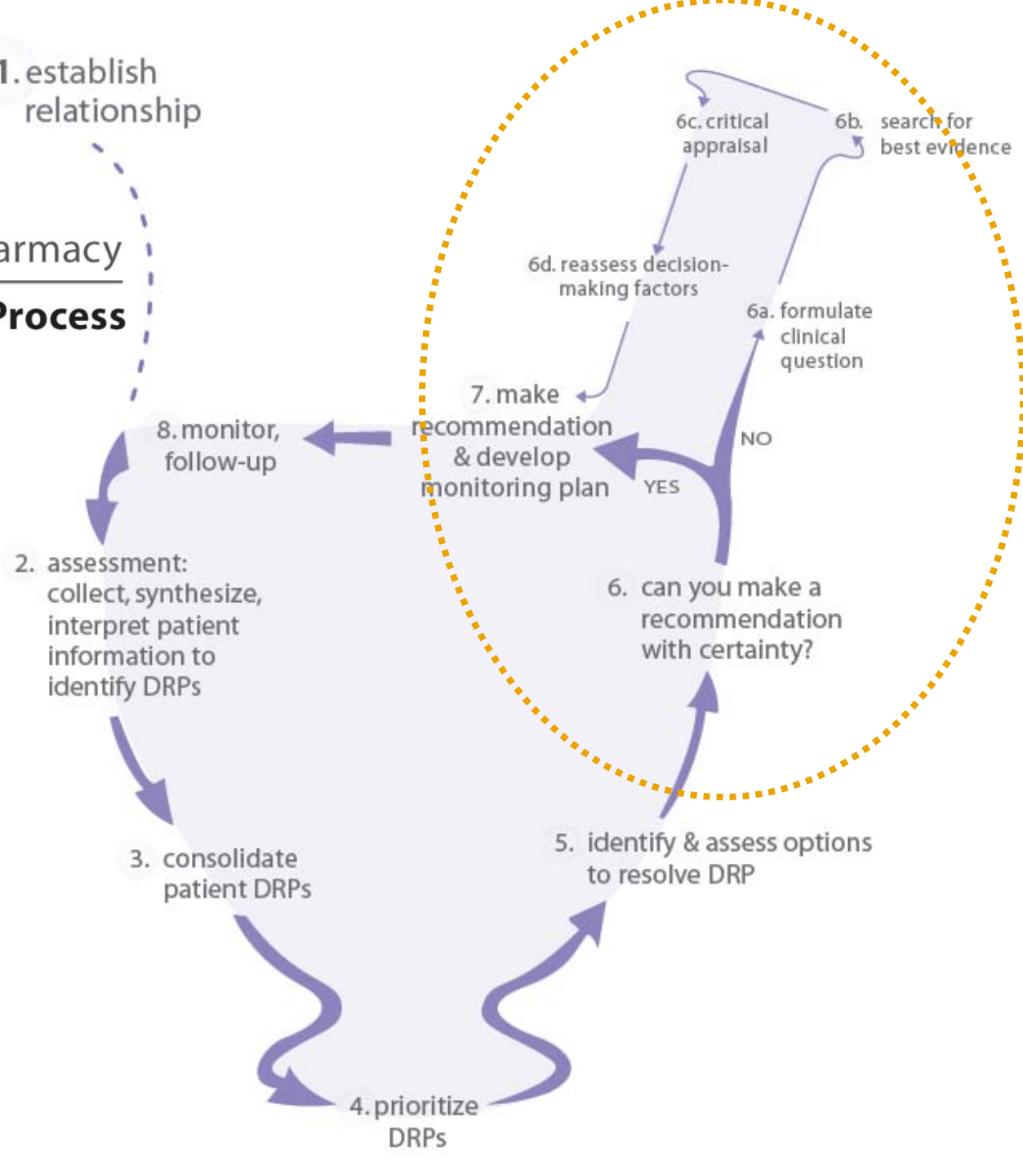
6b. search for
best evidence

6a. formulate
clinical
question

6. can you make a
recommendation
with certainty?

NO

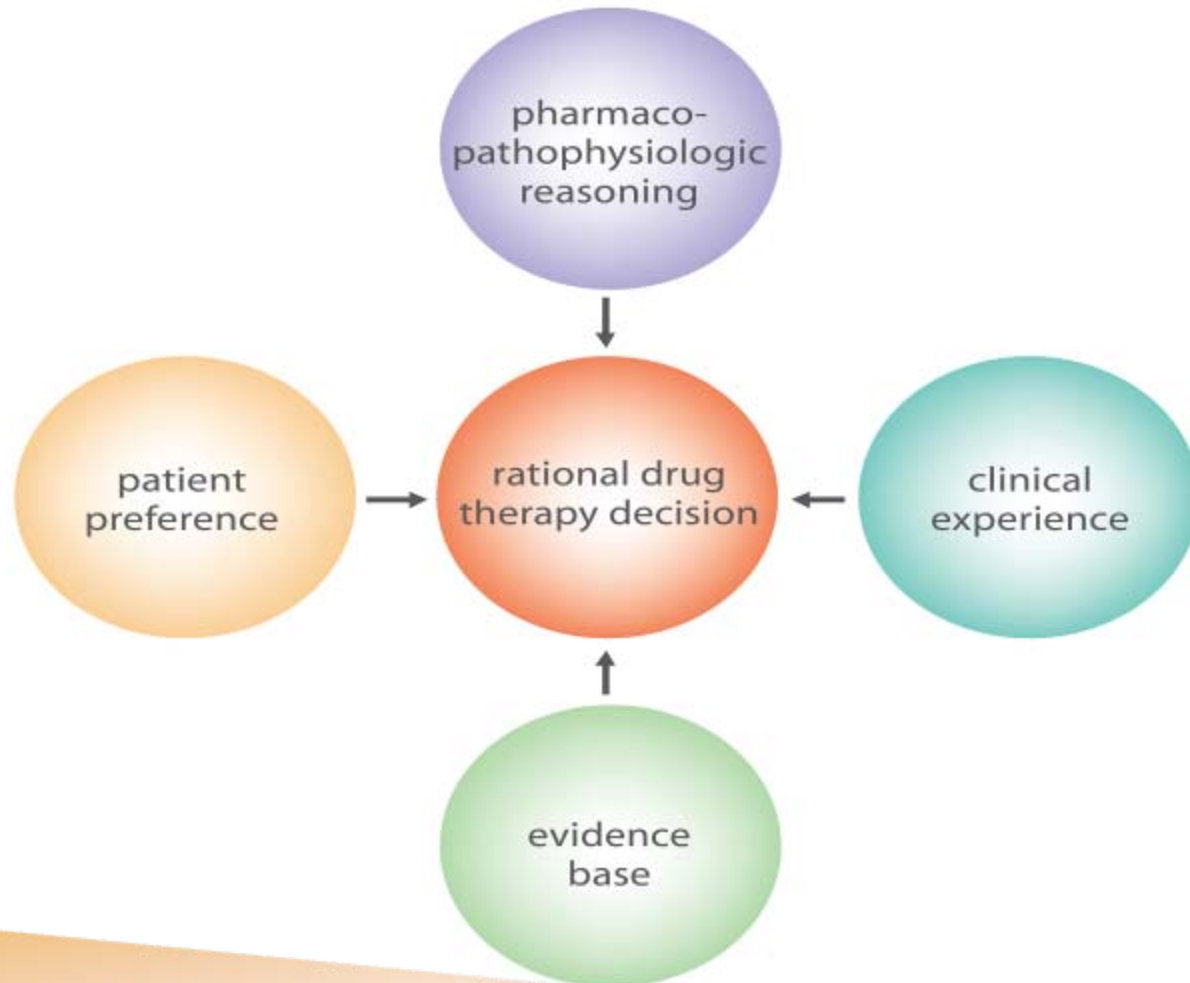
YES



Pharmacist's Patient Care Process



Factors Influencing Drug Therapy Decisions



The Critical Appraisal Series

KEY CHARACTERISTICS

Longitudinal
Clinically oriented
Prioritized
Integrated
Lauded

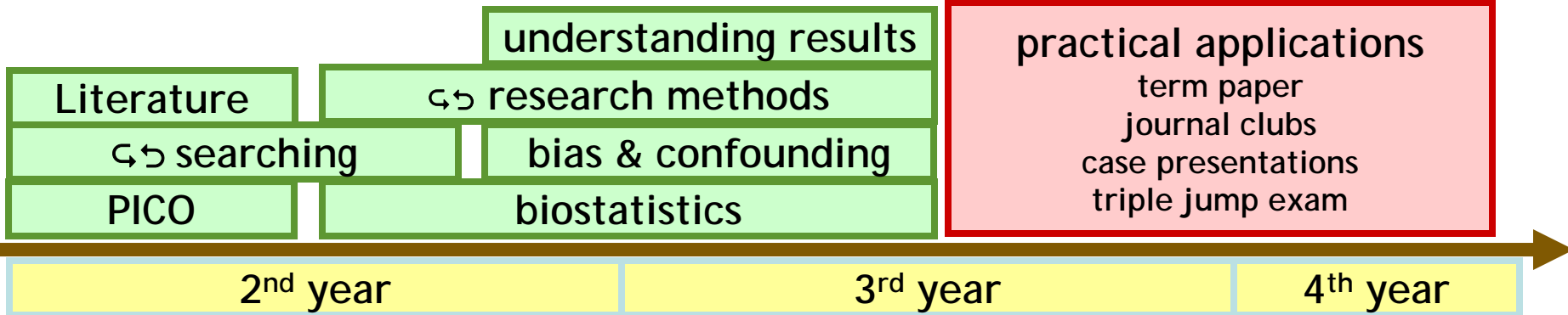
[... Evidence-based]

CAS is not ...
a stand alone
research
methods or
biostats course

CAS: Learning Timeline

RCTs
Observational studies

diagnostic tests
systematic reviews
practice guidelines
pharmacoeconomics

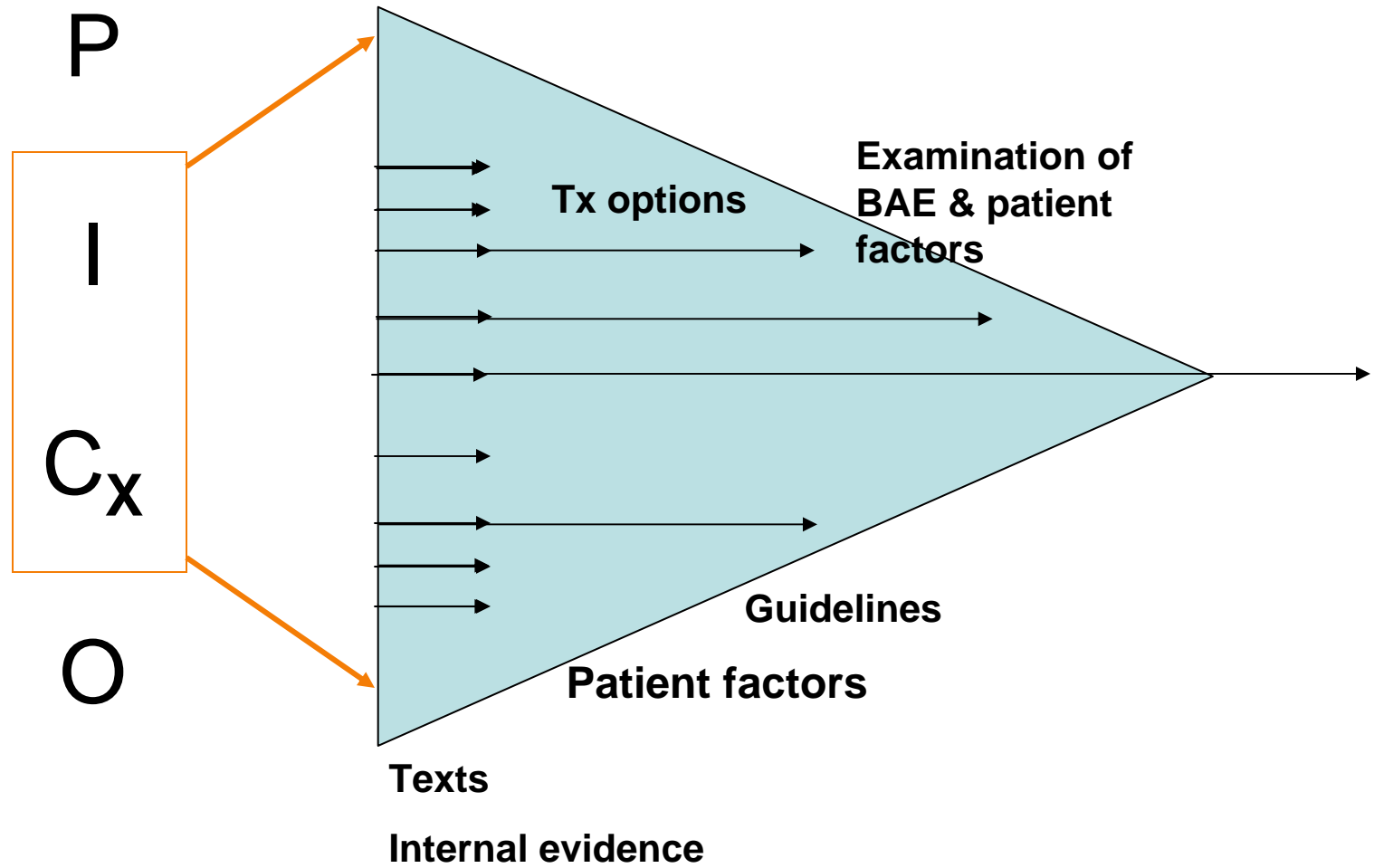


Mary
MacCara
PharmD

Peter
Zed
PharmD

David
Gardner
PharmD, MSc

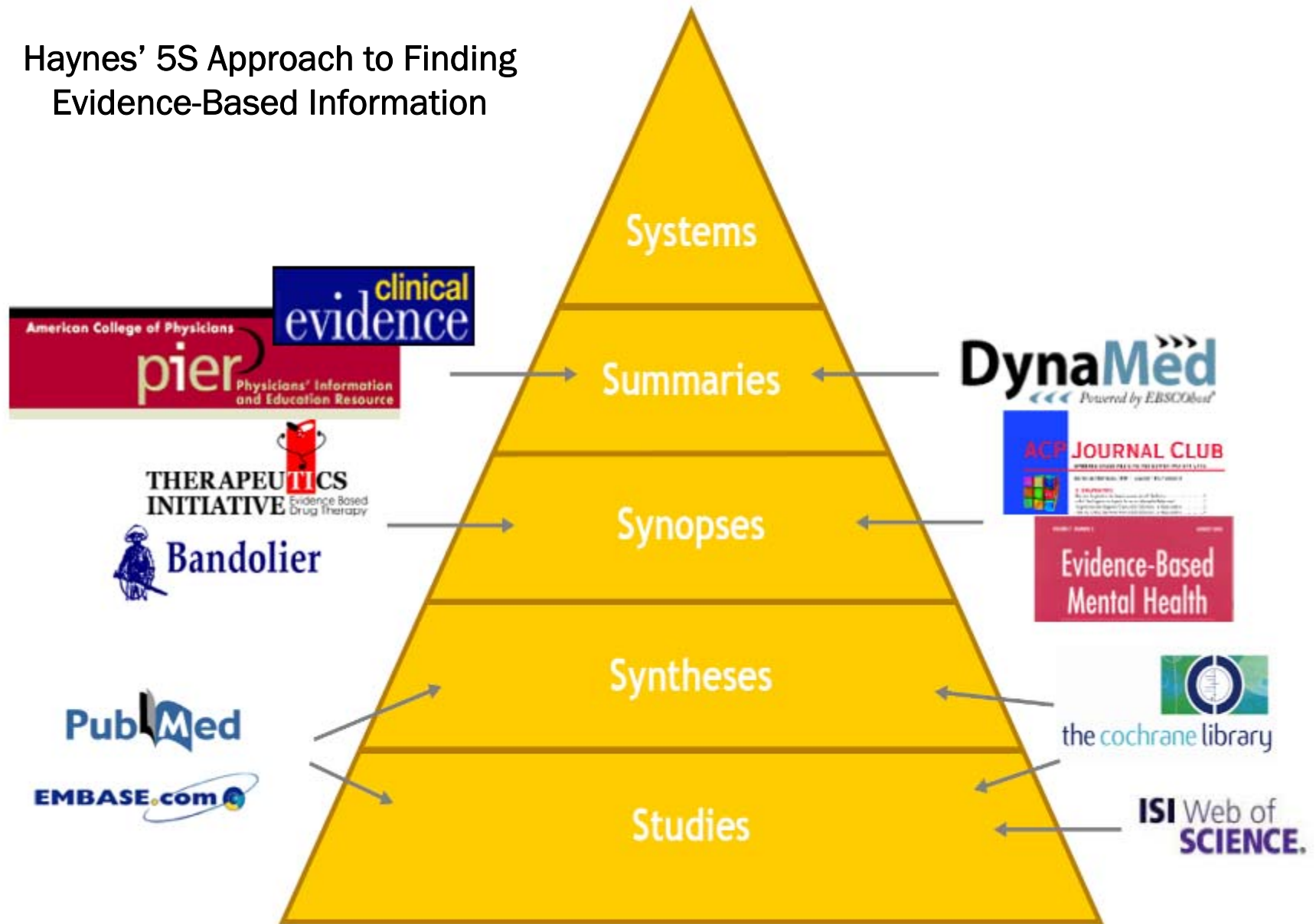
The Evolution of a Clinical Question

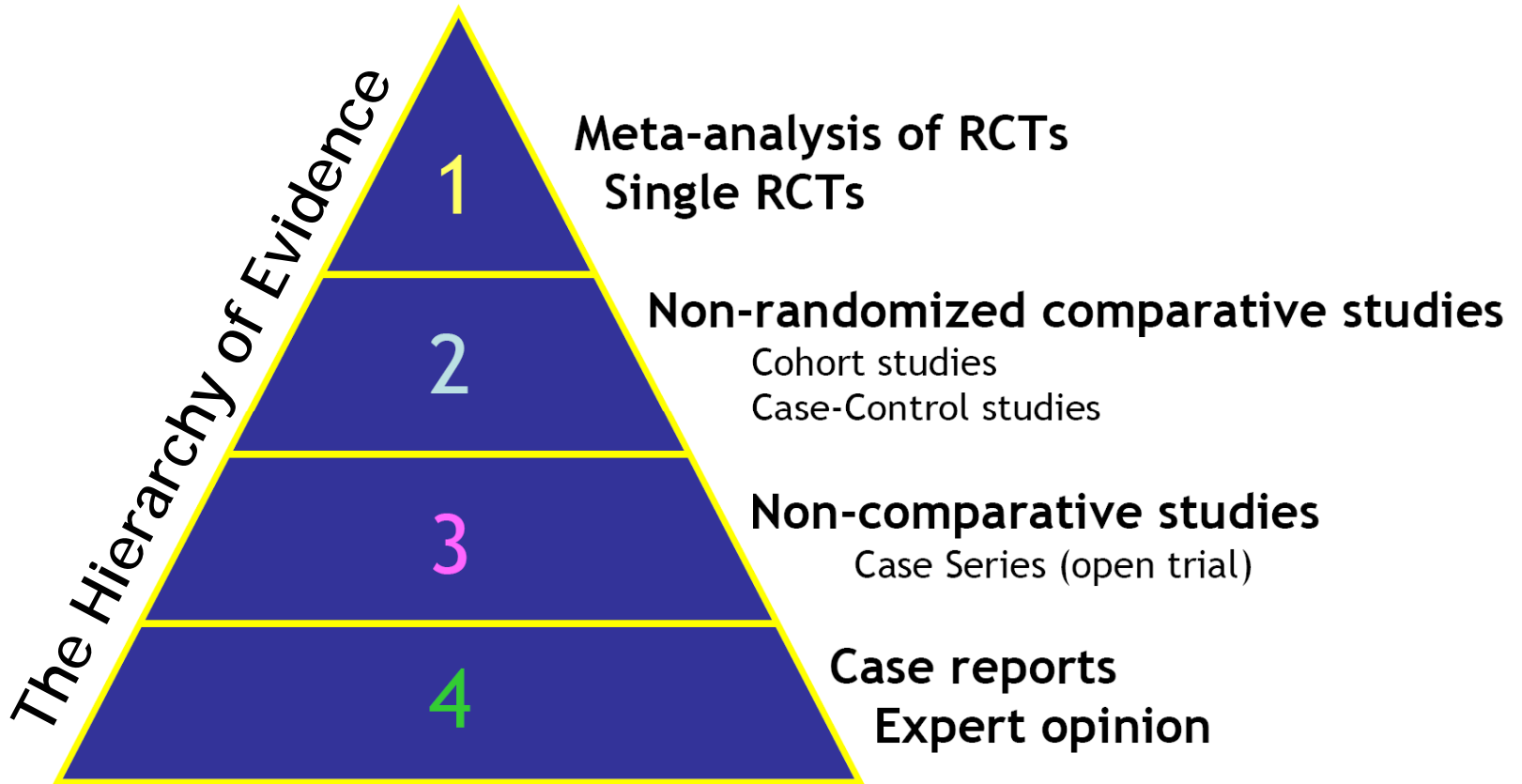


Very little →

Usable knowledge

Haynes' 5S Approach to Finding Evidence-Based Information





Randomization
Blinding
Intention to treat analysis
Relative risk
Relative risk reduction
Absolute risk reduction
Odds ratio
Hazards ratio
Systematic reviews
Cohort studies
Case control studies
Cross sectional studies
Non-inferiority trials
Regression analysis
Survey methodology
Generalizability
Surrogate endpoints
Clinical outcomes

etc.

Bias & confounding
Confidence intervals
P-values
Number needed to treat
Number needed to harm
Effect size
Contamination
Cointervention
Generalizability
Heterogeneity
P I C_x O
5S Search Strategy
Levels of evidence
Funnel plot
Forest plot
Causality assessment
Diagnostic tests
Pharmacoeconomics

CAS is attempting to overcome ...

- Google as the “go to” pharmacotherapy resource
- Citing “class notes” during student presentations
- Statements such as:
 - ▶ “treatment was effective in this study, $p < 0.05$ ”
 - ▶ “no RCT = no evidence”
 - ▶ “the author’s concluded ...”



WESTERN UNIVERSITY

- COLLEGE OF HEALTH SCIENCES
- COLLEGE OF OSTEOPATHIC MEDICINE OF THE PACIFIC
- COLLEGE OF ALLIED HEALTH PROFESSIONS
- COLLEGE OF PHARMACY
- COLLEGE OF GRADUATE NURSING
- COLLEGE OF VETERINARY MEDICINE

Dal v. Cal Study

Evaluation of Evidence-
Based Medicine Knowledge
and Abilities
of 3rd Year Pharmacy
Students



Participants

Dalhousie:

- 3rd year pharmacy students
- Undergraduate BSc program
- PBL curriculum
- n=92
- Course requirement (30% of final mark; 60% minimum)

WesternU:

- 3rd year pharmacy students
- PharmD program
- Traditional curriculum
- n=130
- EBM unit requirement (5% of unit mark)
- Prior to clinical rotations

Instrument#1: Exam

- 2h/3h written examination
- Primarily short-answer questions
- Article (meta-analysis) provided 5 days in advance
 - ▶ ~50% of marks
- Developed by Dalhousie faculty
 - ▶ 3rd year 1st term examination
- Minimally adapted for WesternU

Instrument#2: Self Assessment

- Age, education, experience
- 12 question self-assessment:
 - ▶ 6 x EBM/CAS abilities
 - ▶ 2 x interest
 - ▶ 2 x value of abilities
 - ▶ 1 x community pharmacy orientation
- Ordinal: 1 - 10

EBM Abilities

- Primary outcome:
 - ▶ Exam total score
- Secondary outcomes:
 - ▶ Abilities subgroups
 - ▶ Association between objective and subjective evaluations

| Ability | |
|--------------------|----|
| Find | F |
| General knowledge | GK |
| Critical appraisal | CA |
| Application | A |

Question examples

12. In the Canadian guidelines for the management of *Helicobacter pylori*, approved recommendations require that a regimen achieve an 80% eradication rate using intention-to-treat (ITT) analysis and an 90% eradication rate using per-protocol (PP) analysis. These two different approaches to handling study data answer different questions related to this guideline.
- A. Describe and contrast ITT and PP analyses in this context?
 - B. A 35 year old woman with peptic ulcer disease and a positive urea breath test has been prescribed an approved first line eradication regimen for *H. pylori*. Describe how you would respond when she asks how effective this regimen will be if the ITT eradication rate is 60% and the PP eradication rate is 90%.

**General
knowledge**

**Applicatio
n**

The following questions refer specifically to ... **Lancet 2007;370:657-66.**

26. For the primary outcome, calcium alone was associated with a RR of 0.90 (95%CI 0.80-1.00), while calcium plus vitamin D was found to have a RR of 0.88 (95%CI 0.77-0.97). In reviewing these results, some might conclude that fractures are only reduced when calcium is combined with vitamin D. Do you agree? Justify your position. (2 points)
27. Using the findings on compliance in this study, formulate a statement a pharmacist could make to a patient that addresses the effect of treatment with high, moderate and low compliance. Remember use numbers! (4 points)

**Critical
appraisal**

**Applicatio
n**

Dal v. Cal

RESULTS

Participant Characteristics

| | Dalhousie | WesternU |
|---------------------|------------|------------|
| Age | 24.0 ± 3.3 | 28.2 ± 2.8 |
| Education: | | |
| Masters | 0% | 11% |
| BSc | 43% | 81% |
| None | 57% | 8% |
| Pharmacy experience | | |
| Community | 76% | 62% |
| Hospital | 24% | 38% |

*Based on a sub-sample who completed the self-assessment

Results

| | Round 1 3 raters, 10 Dal exams | Round 2 3 raters, 10 WesternU exams |
|----------------------------------|--------------------------------------|---|
| Intra-class correlation (ICC) | 0.86 | 0.91 |
| P-value | <0.0001 | <0.0001 |
| 95% CI | 0.19 – 0.97 | 0.48 – 0.98 |

Primary Outcome

Total Exam Scores (%)

| | <u>D</u> alhousie n=91 | <u>W</u> esternU n=132 | Ratio D/W | P-value |
|-------------------------|---------------------------|---------------------------|--------------|---------|
| Total exam score (%) | 67.9 ± 12.4 | 32.2 ± 7.6 | 2.11 | <0.0001 |

Cohen's d Effect Size

| | <u>D</u> alhousie n=91 | <u>W</u> esternU n=132 | Ratio D/W | P-value |
|----------------------|---------------------------|---------------------------|--------------|---------|
| Total exam score (%) | 67.9 ± 12.4 | 32.2 ± 7.6 | 2.11 | <0.0001 |

$$\begin{aligned}\text{Effect size} &= (\text{mean 1} - \text{mean 2})/SD_p \\ &= 3.6\end{aligned}$$

99% of WesternU students scored below the average Dalhousie student.

Secondary Analyses

| | <u>D</u> alhousie n=91 | <u>W</u> esternU n=132 | Ratio D/W | P-value |
|-----------------------------|---------------------------|---------------------------|--------------|---------|
| Abilities | | | | |
| Find (3%) | 31% | 9% | 3.4 | <.0001 |
| General knowledge (23%) | 76% | 38% | 2.0 | <.0001 |
| Critical appraisal (25%) | 62% | 42% | 1.5 | <.0001 |
| Application (49%) | 66% | 26% | 2.5 | <.0001 |

Self-Assessment Results

| | Dalhousie | WesternU | p-value |
|--|-----------|-----------|---------|
| I have no difficulty in making decisions that are based on clinical evidence | 7.5 ± 1.2 | 7.5 ± 1.9 | 0.96 |

Subjective assessment of abilities

| | CQ to help search | Search tertiary refs | Search Pub-med | Search EBM resources e.g., ... | Critical analysis of clinical studies | Interpret biostats (p, CI, power) |
|------------------|-------------------|----------------------|----------------|--------------------------------|---------------------------------------|-----------------------------------|
| Dalhousie (10) | 8.2 | 8.5 | 8.3 | 7.7 | 7.3 | 7.3 |
| WesternU (10) | 7.9 | 8.2 | 8.3 | 6.9 | 7.1 | 6.9 |
| Difference (D-W) | 0.30 | 0.27 | -0.05 | 0.80 | 0.12 | 0.42 |
| p-value | 0.27 | 0.32 | 0.85 | 0.007 | 0.67 | 0.23 |

Other results

| | Pharmacists should be efficient searchers | Pharmacists should be able to evaluate clinical studies | Interest in community pharmacy |
|------------------|---|---|--------------------------------|
| Dalhousie (10) | 9.5 | 9.5 | 8.0 |
| WesternU (10) | 9.0 | 9.0 | 5.3 |
| Difference (D-W) | 0.41 | 0.55 | 2.7 |
| p-value | 0.10 | 0.02 | <0.0001 |



Study Limitations

- Performance bias:
 - ▶ Higher motivation: Dalhousie
- Testing bias:
 - ▶ Exam developed by Dalhousie faculty
- Responder bias:
 - ▶ Self-assessment was voluntary at WesternU

Dal vs. Cal Summary

- Dalhousie students demonstrated markedly greater knowledge and EBM abilities across all domains measured
- WesternU students subjectively rated their abilities similarly to Dalhousie students
- The integrated, longitudinal Critical Appraisal curriculum at Dalhousie likely account for these differences in student abilities
- Result support Dalhousie and energize WesternU

Future Directions

- Standardize EBM/CA abilities assessment
 - ▶ Other comparisons
 - Intra-Canadian
 - International
- PEBC

If interested in developing a national evaluation, please contact david.gardner@dal.ca

