



Searching & Evaluating Medical Literature

HCA Healthcare/USF Morsani College of Medicine
Graduate Medical Education Programs
Clinical Educator Learning Series

Objectives

At the end of this course, participants will be able to:



- Describe the utility of creating a good clinical question
- Identify types of reviews, studies, and research designs
- List key tools in the search process
- Differentiate between medical literature evaluation methods

Evidence-Based Practice Framework & the 5 A's



What is Evidence-Based Practice (EBP)?



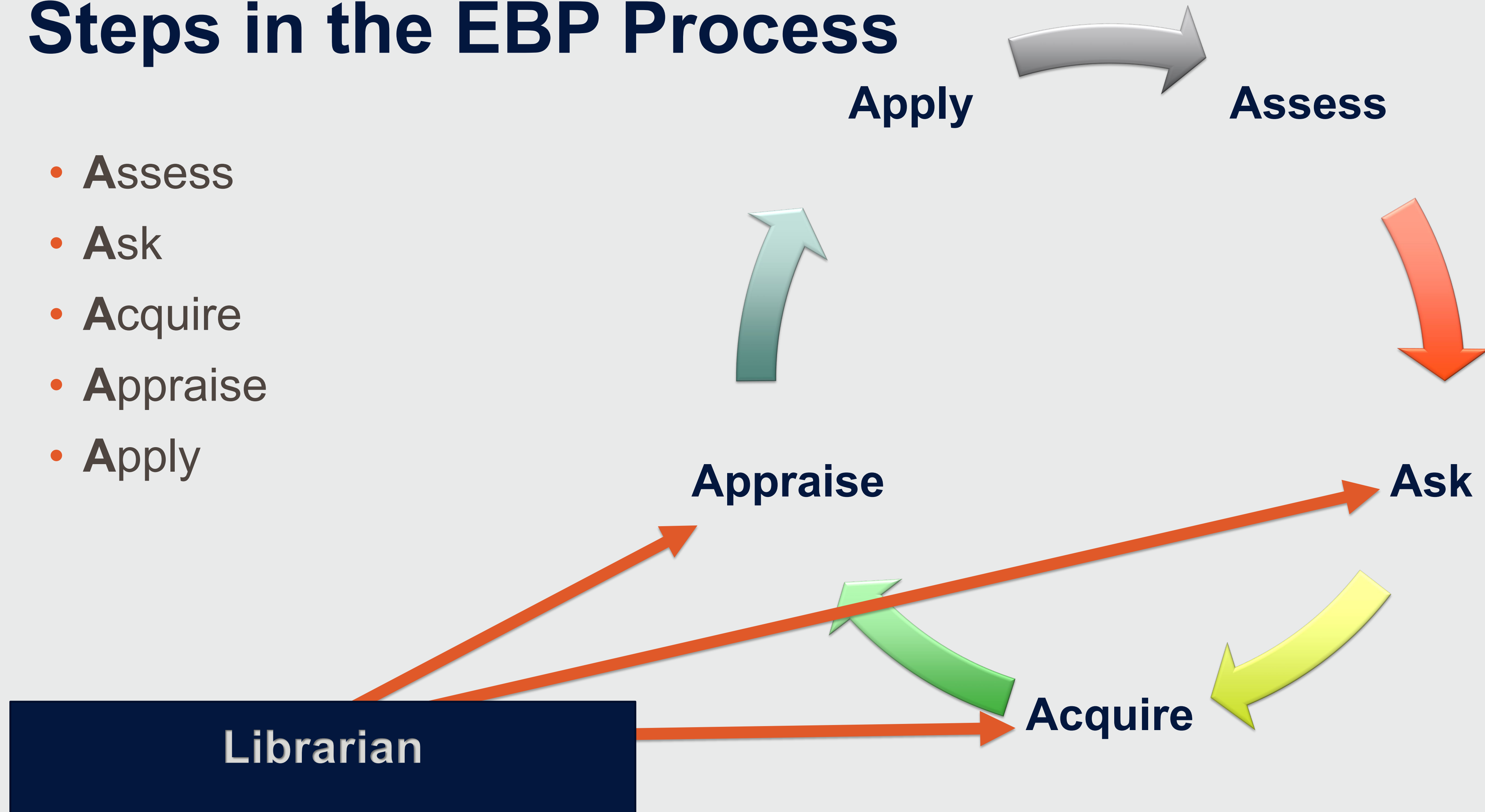
Why is EBP important?

- Rapid changes in knowledge and practice
- Exponential growth of research articles
- Easier to find and apply evidence during busy situations
- It allows you to blend patients' preferences with the research, resulting in patient-centered care

Steps in the EBP Process

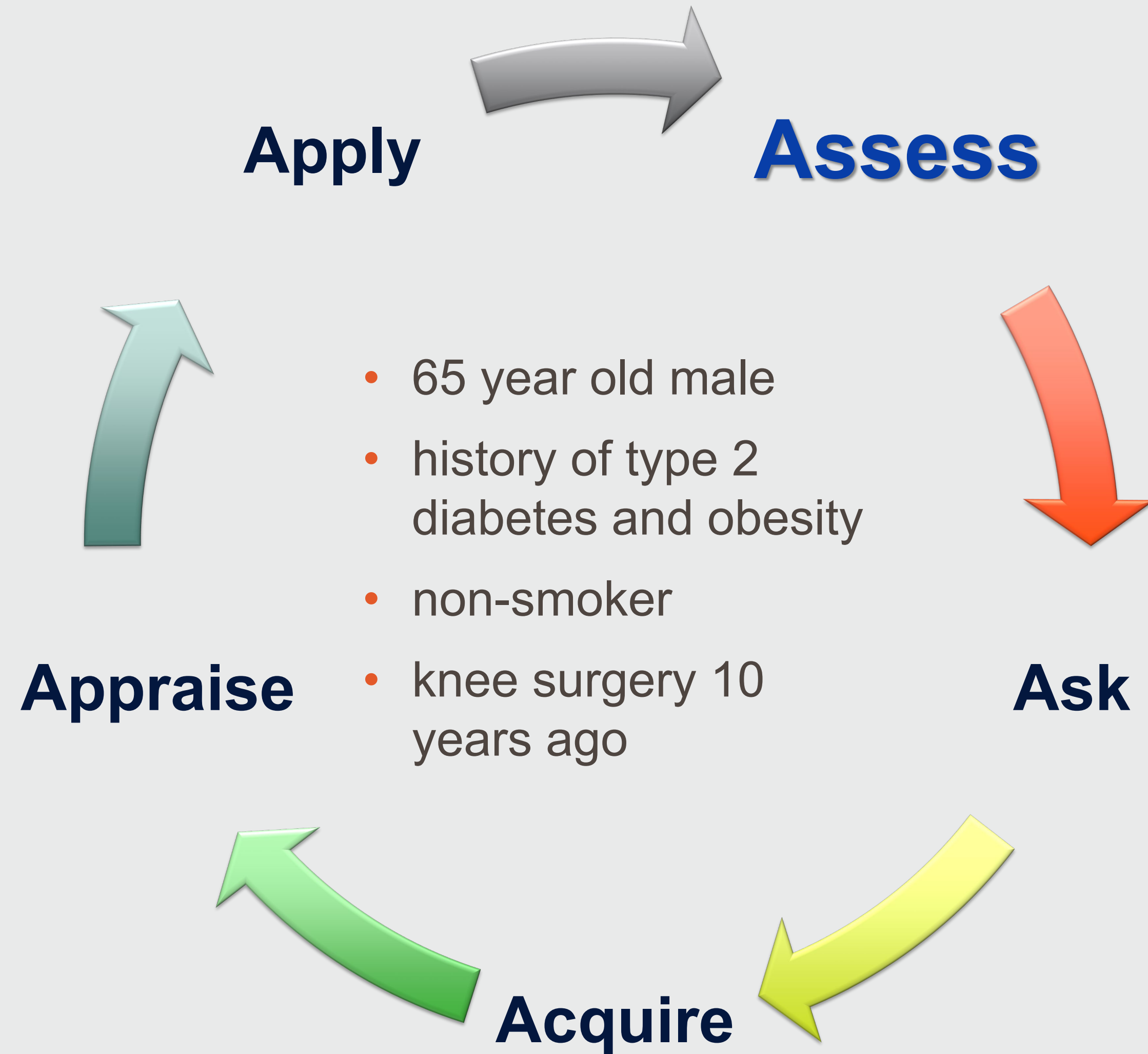
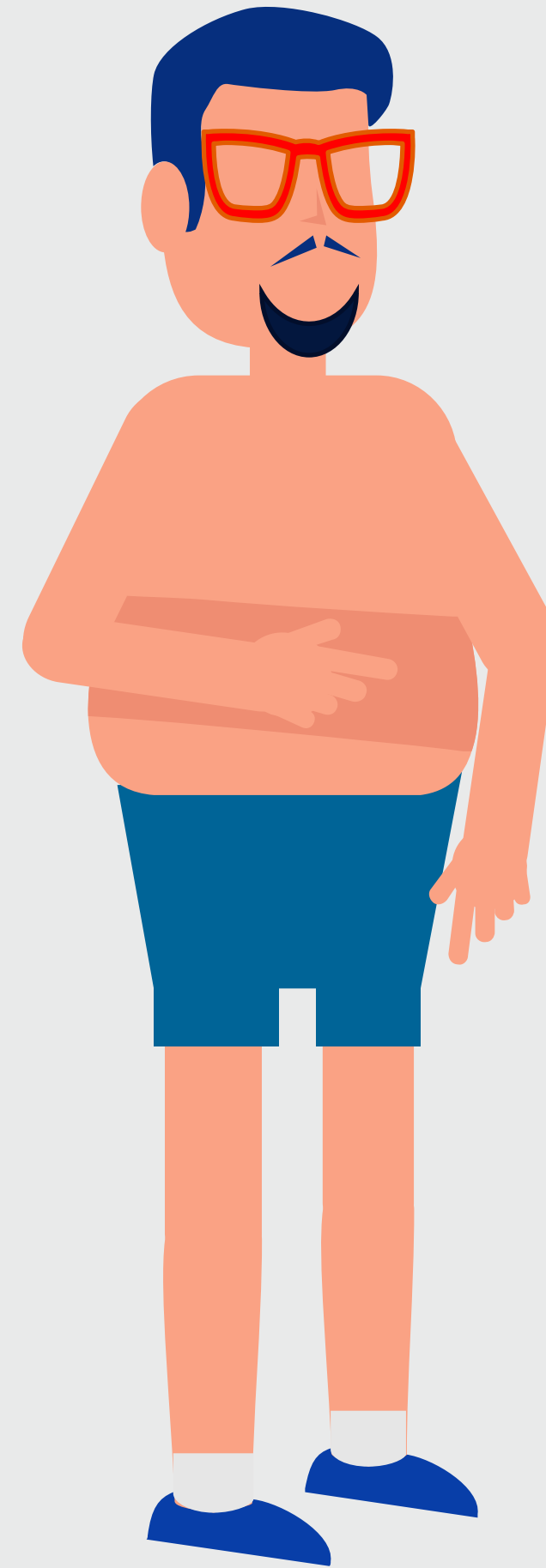


- Assess
- Ask
- Acquire
- Appraise
- Apply

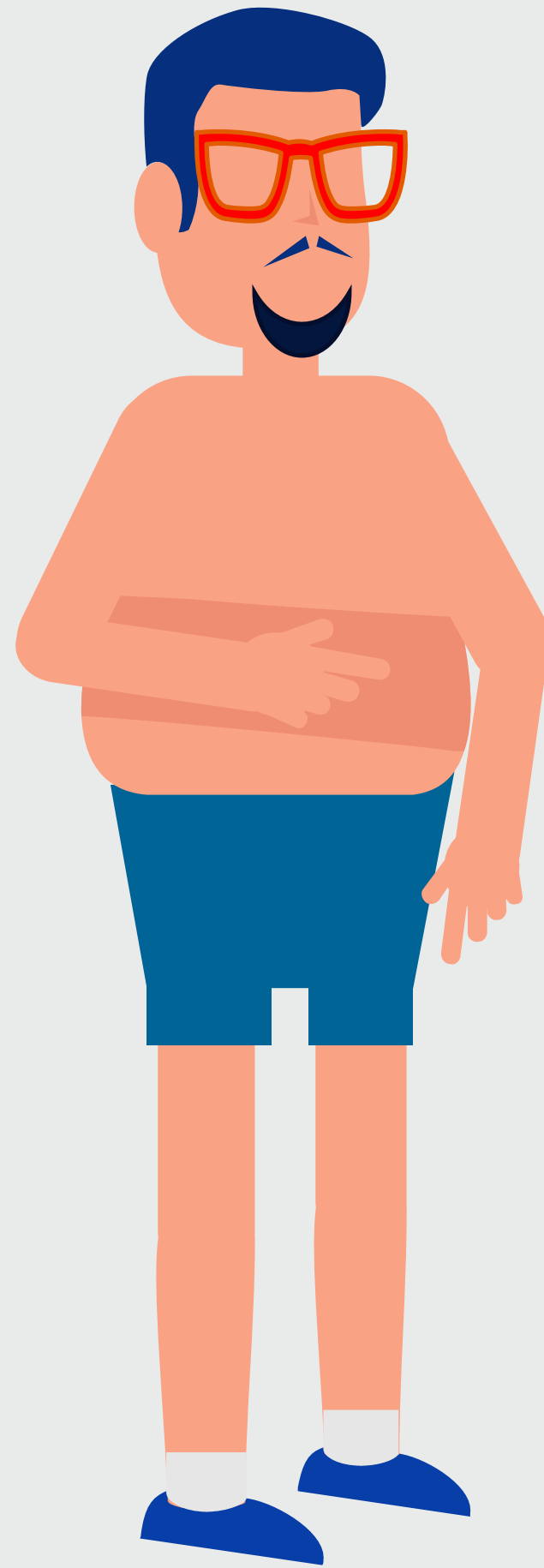


Assess

- **Assess**
- Ask
- Acquire
- Appraise
- Apply

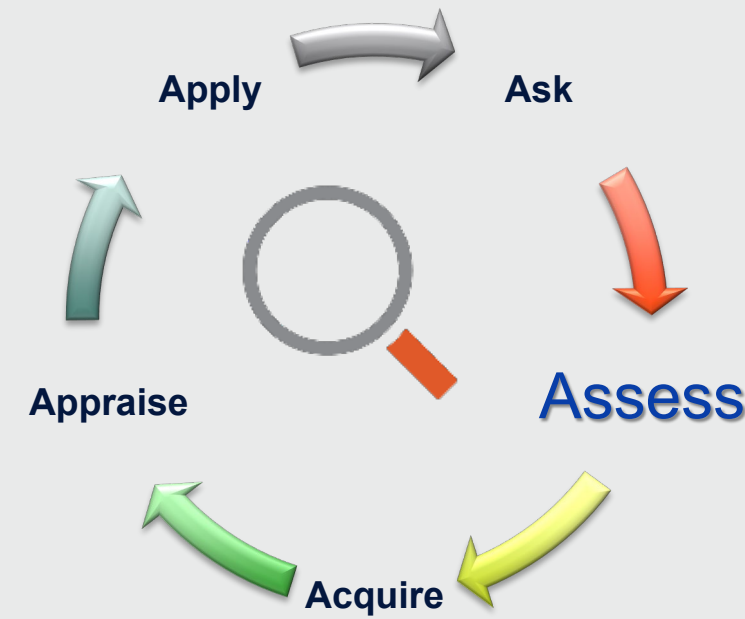


Assess



- **Assess**
- Ask
- Acquire
- Appraise
- Apply

- Diets and exercise are not working
- Understands longevity
- Understands risk
- Stomach stapling



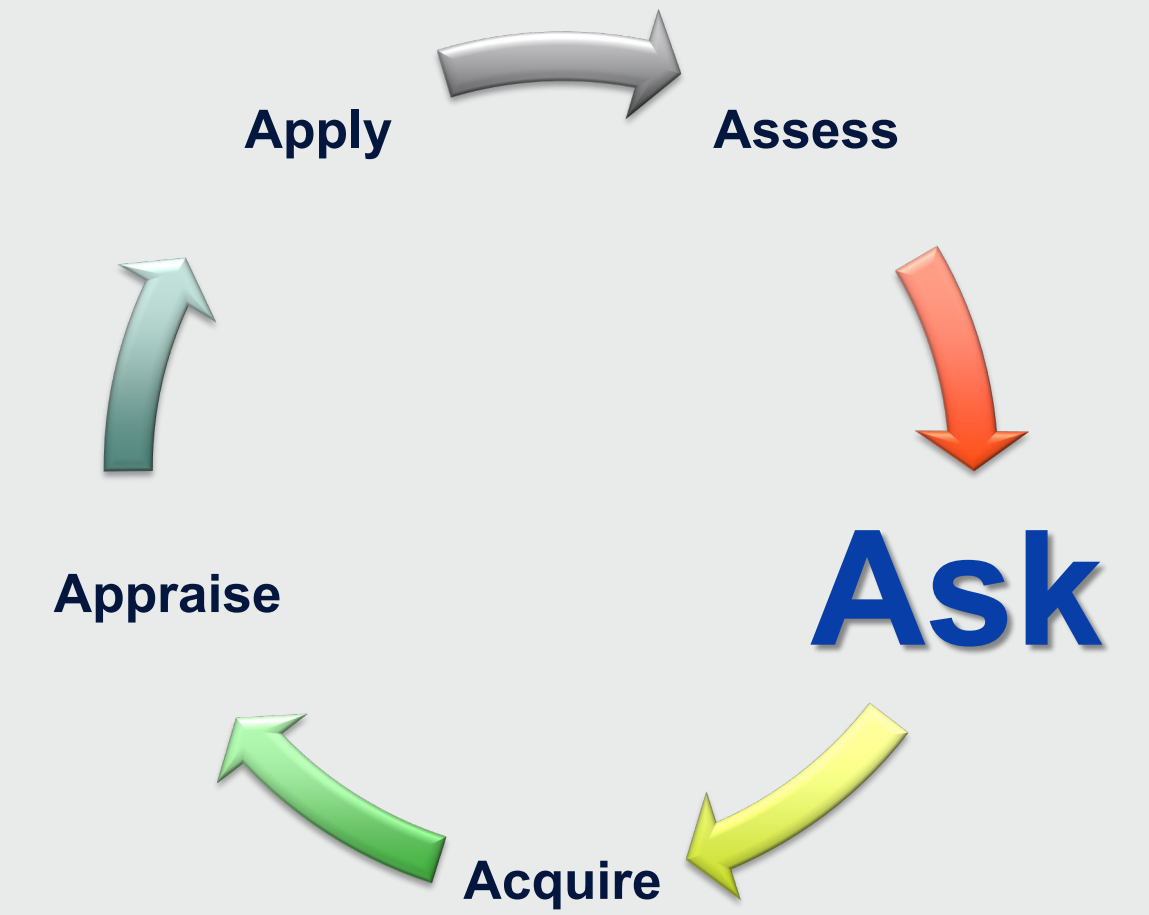
Ask

- Background questions

Novice

- Foreground questions

Expert

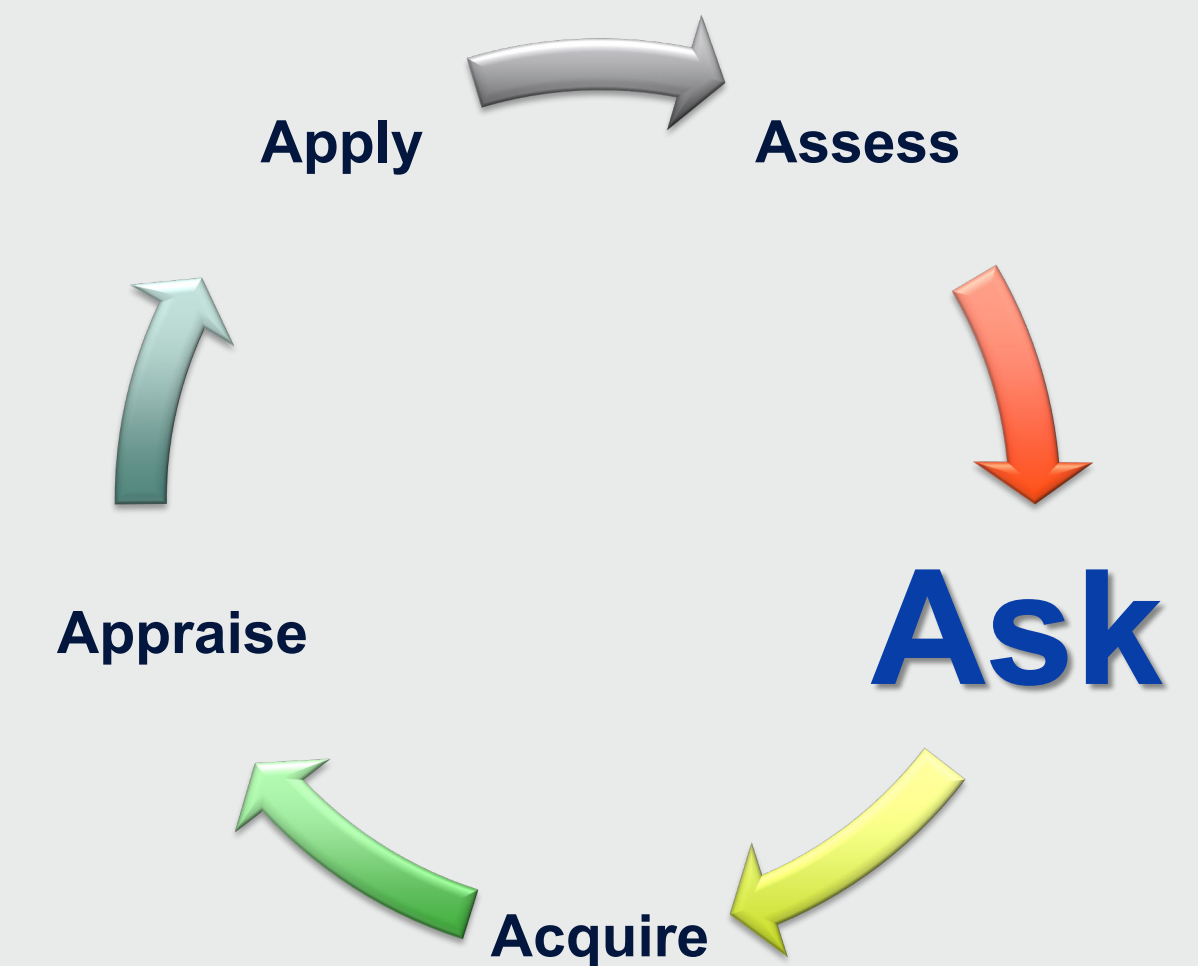
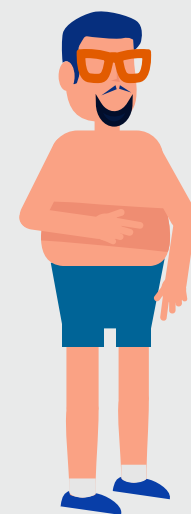


Ask PICO



- **P**atient Problem
- **I**ntervention
- **C**omparison
- **O**utcome

PICO is a way to remember the key components of well focused question.



Ask PICO



Patient Problem

Diabetes
Type 2
Obesity

Intervention

Bariatric
Surgery,
Gastric
Bypass

Comparison

Standard
Medical
Care

Outcome

Mortality
Remission of
Diabetes
Weight Loss

The Question is: In patients with type 2 diabetes and obesity, is bariatric surgery more effective than standard medical therapy at increasing the probability of remission of diabetes?

Ask Type of Question & Study



Diagnosis

How to select and evaluate diagnostic tests?

Therapy

Is a treatment effective?

Prognosis

Patients likely clinical course over time

Harm/Etiology

What caused this disease?

Study Designs

Cross-sectional study or a prospective, blind comparison to a gold standard

Systematic review, randomized controlled trial or cohort study

Cohort study, case control, or case series

Cohort, case control or case series can answer questions of harm

Ask: Type of Study

- Assess
- **Ask**
- Acquire
- Appraise
- Apply

Hierarchy of Evidence

Quality of evidence

Risk of bias: Lower
Fewer studies

Meta-Analysis

Systematic Reviews

RCTs

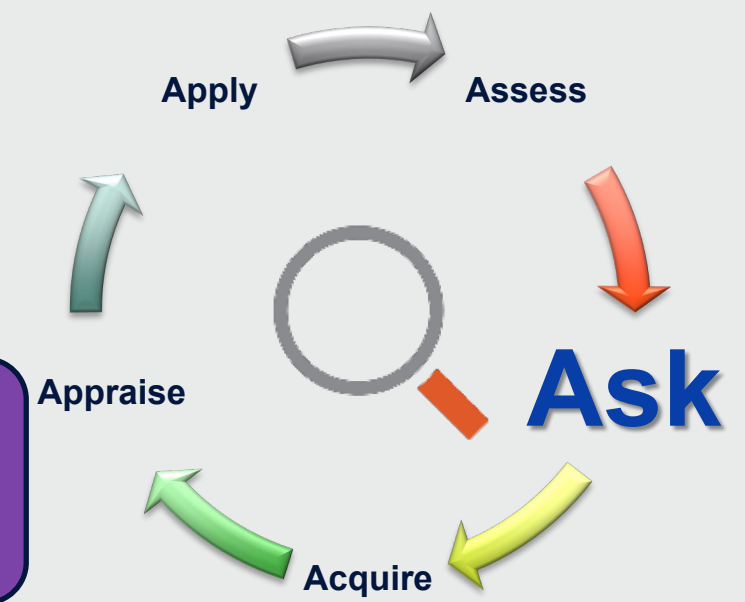
Cohort Studies

Case Control Studies

Case Series/ Case Reports

Animal Studies/ Laboratory Studies

Risk of bias: Higher
More studies





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find reporting guidelines | improve your writing | join our courses | run your own training course | enhance your research



Library for health research reporting

The Library contains a comprehensive searchable database of reporting guidelines and also links to other resources relevant to research reporting.

- Search for reporting guidelines
- Not sure which reporting guideline to use?
- Reporting guidelines under development



Reporting guidelines for main study types

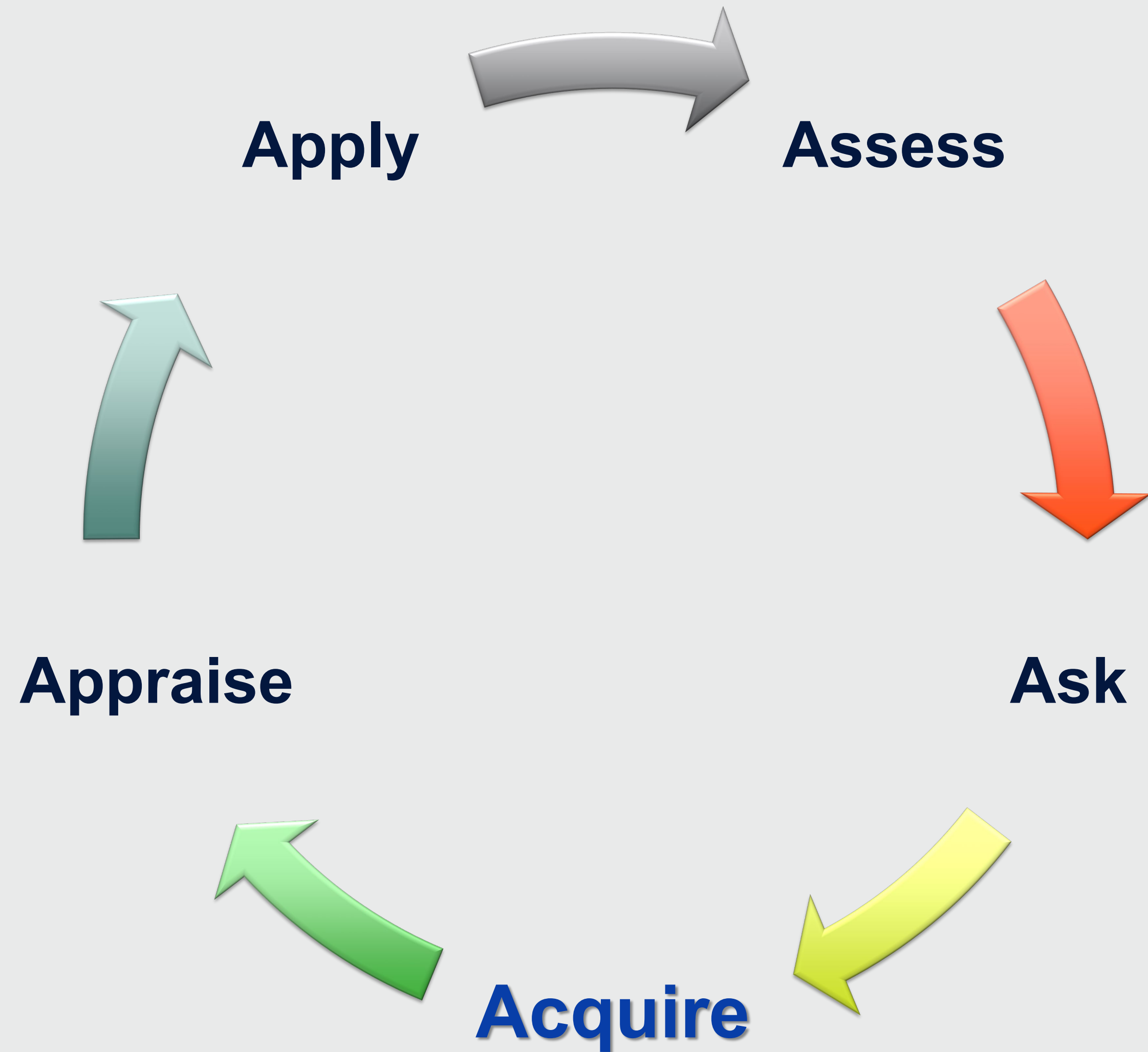
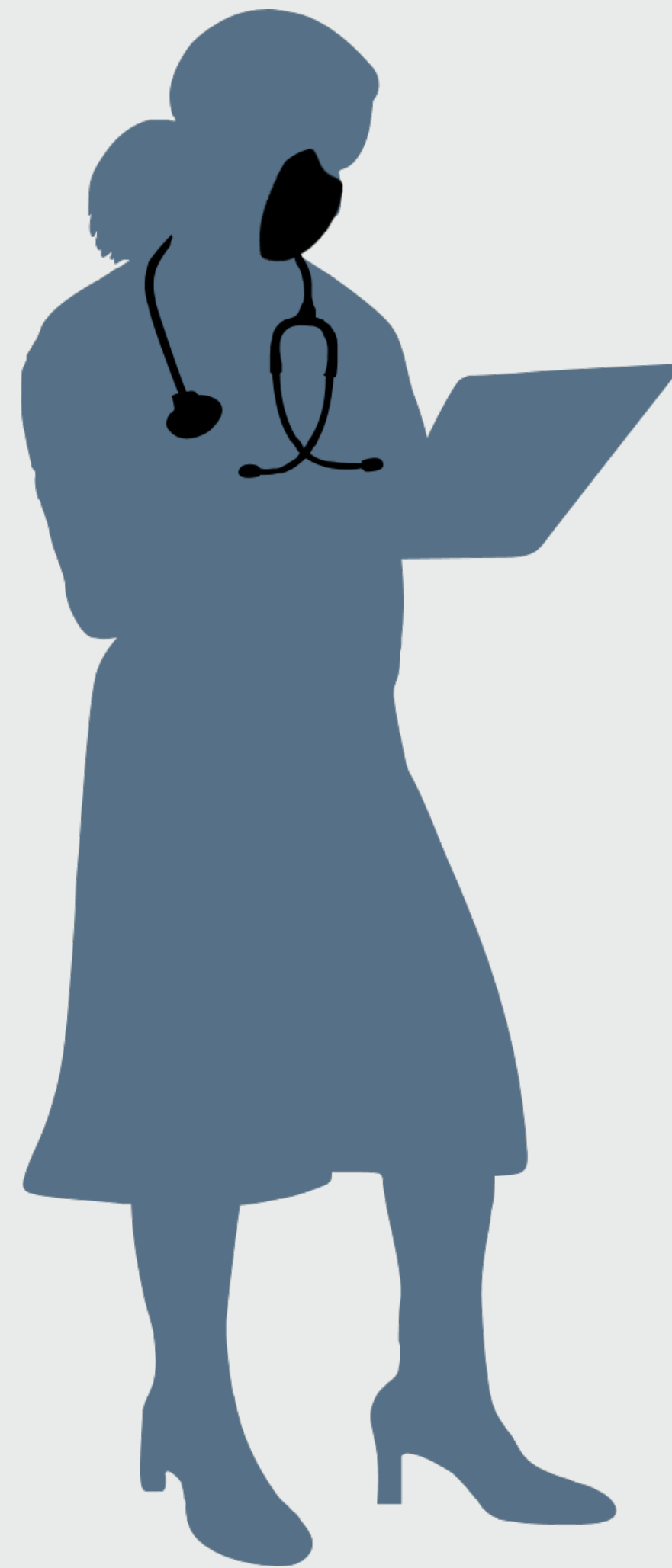
Randomised trials	CONSORT	Extensions
Observational studies	STROBE	Extensions
Systematic reviews	PRISMA	Extensions
Study protocols	SPIRIT	PRISMA-P
Diagnostic/prognostic studies	STARD	TRIPOD
Case reports	CARE	Extensions
Clinical practice guidelines	AGREE	RIGHT
Qualitative research	SRQR	COREQ
Animal pre-clinical studies	ARRIVE	

EBM assessment forms & checklists

- Centre for Evidence-Based Medicine (CEBM) Oxford University
- CONsolidated Standards of Reporting Trials
- PEDro Scale
- PRISMA Checklist and Flow Diagram
- Scottish Intercollegiate Guidelines Network (SIGN)

Acquire

- Assess
- Ask
- **Acquire**
- Appraise
- Apply



Acquire: Resources

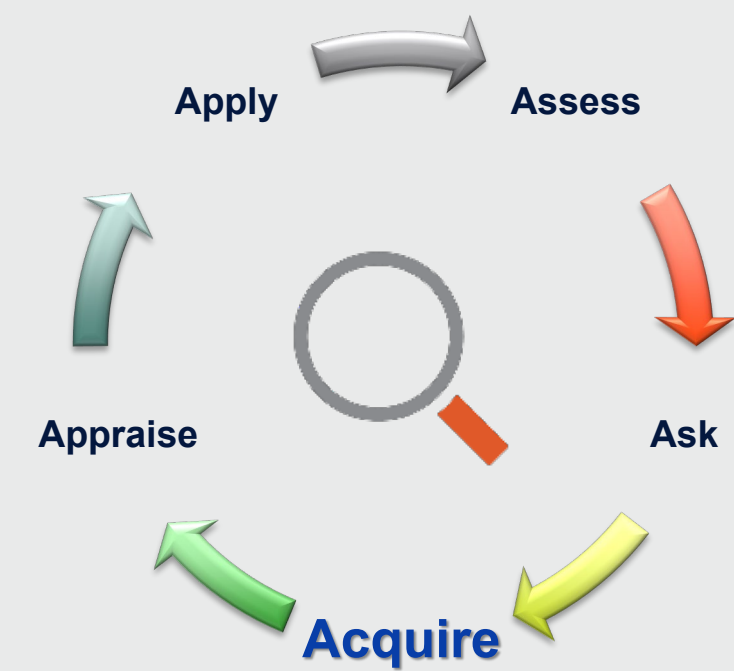
- Assess
- Ask
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- Appraise
- Apply

Background questions

Online textbooks. These are searchable and offer guidance and best practices for various specialties and disciplines.

These can be found in AccessMedicine, Clinical Key, and Scientific American Surgery.

UpToDate. The provides syntheses on clinical topics, including background information , disease management, and prognosis.

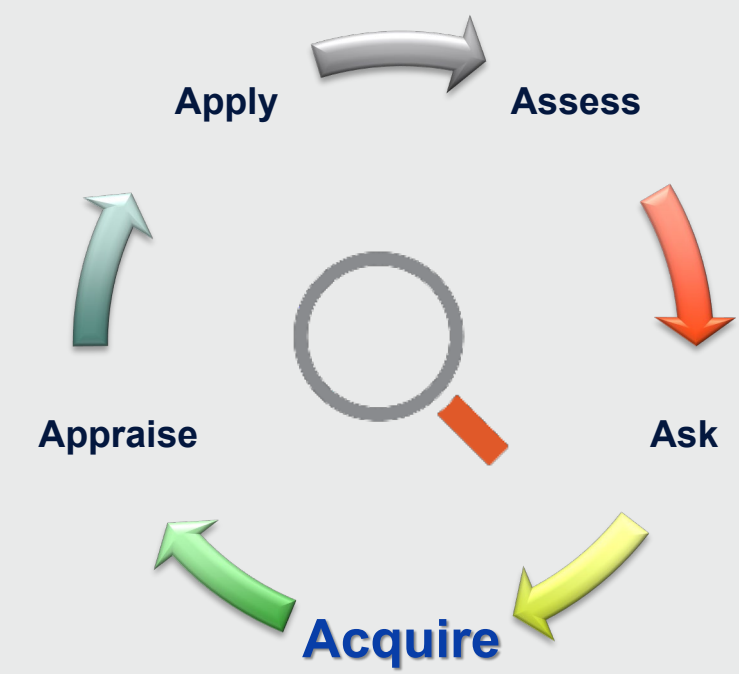


Acquire: Resources

- Assess
- Ask
- **Acquire**
- Appraise
- Apply

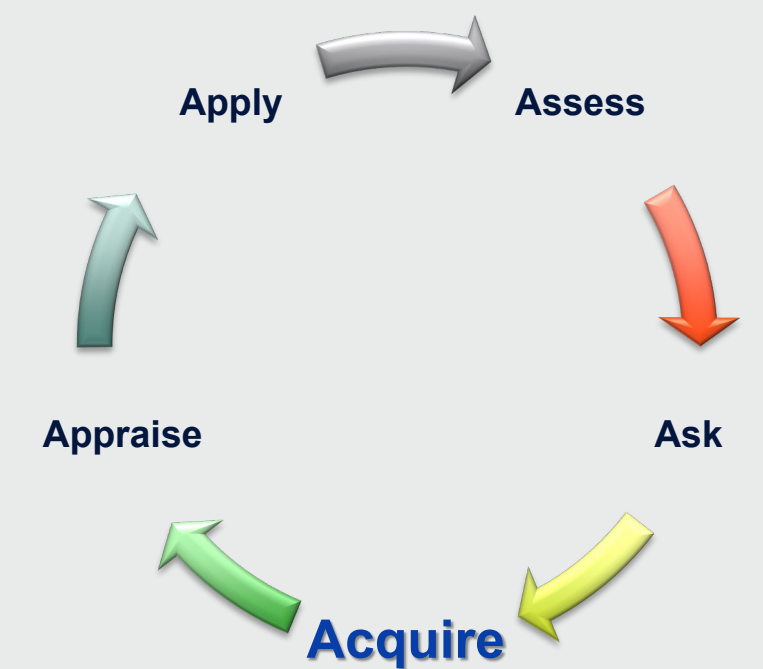
Foreground questions: Journal articles

These are found in databases such as PubMed/MEDLINE, Scopus, Web of Science, Google Scholar.



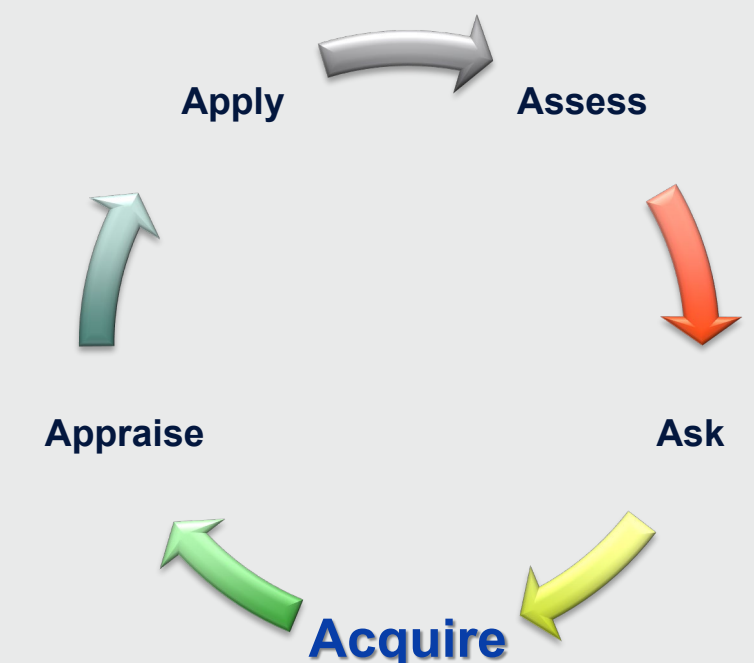
Acquire Primary Sources for EBM

- Assess
 - Ask
 - **Acquire**
 - Appraise
 - Apply
- Essential Evidence Plus
 - International Pharmaceutical Abstracts (IPA)
 - Web of Science
 - PubMed

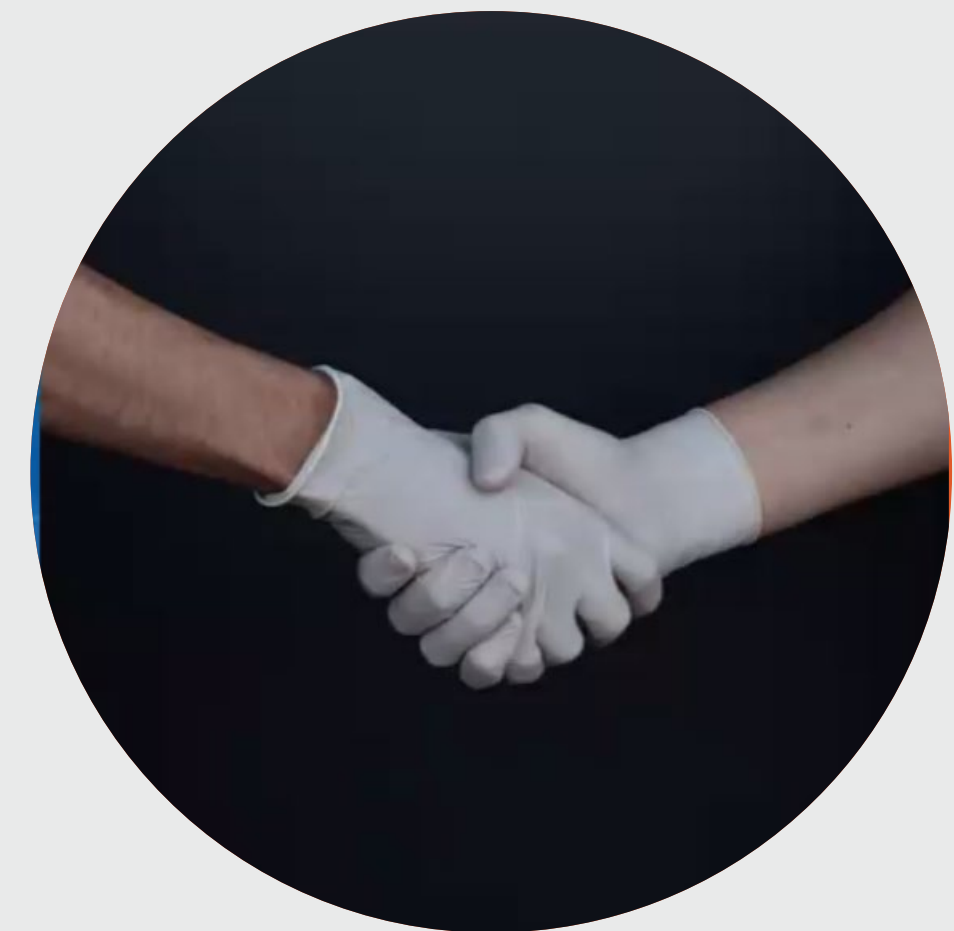
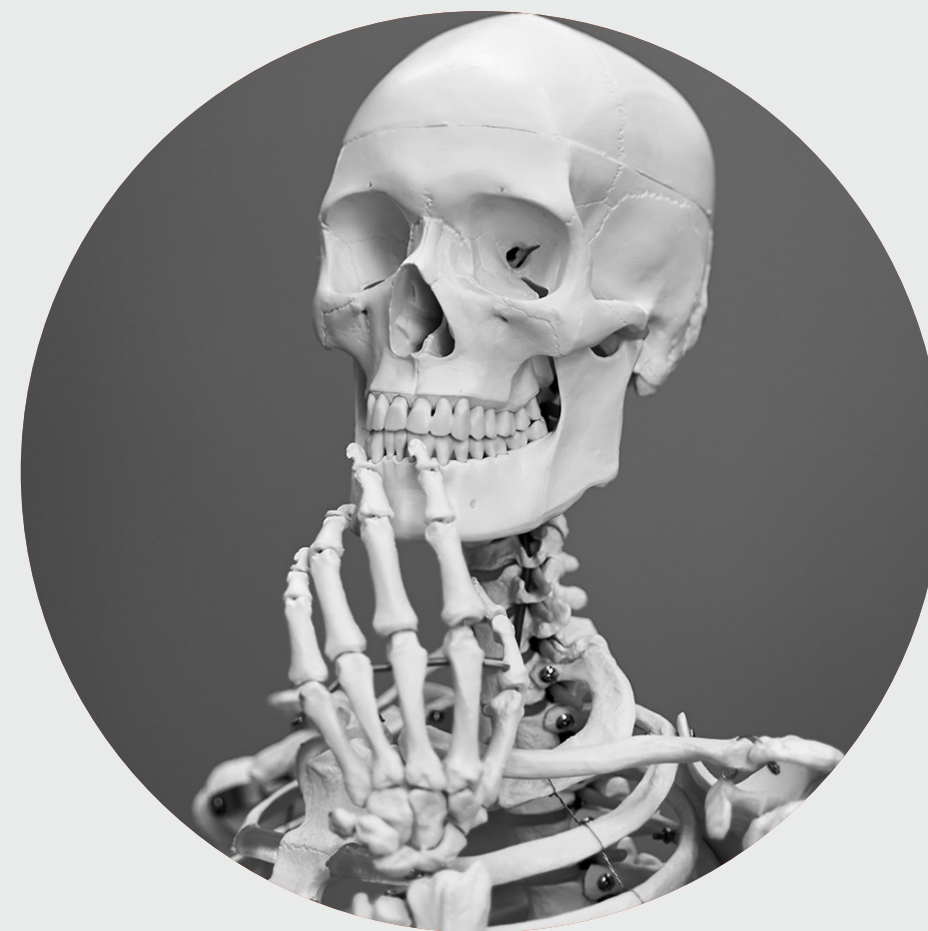


Acquire Grey Literature

- Assess
 - Ask
 - **Acquire**
 - Appraise
 - Apply
- multiple document types
 - government, academia, business, and organization
 - not controlled by commercial publishing
- Conference proceedings
 - Research registers

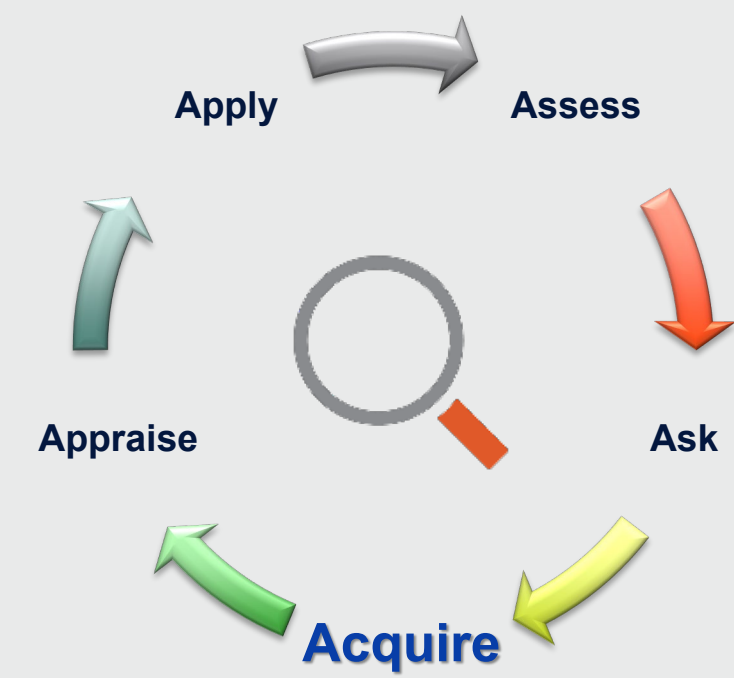


Break



Acquire: PubMed

- Assess
- Ask
- **Acquire**
- Appraise
- Apply



Millions of references

1940s- present

5600 journals

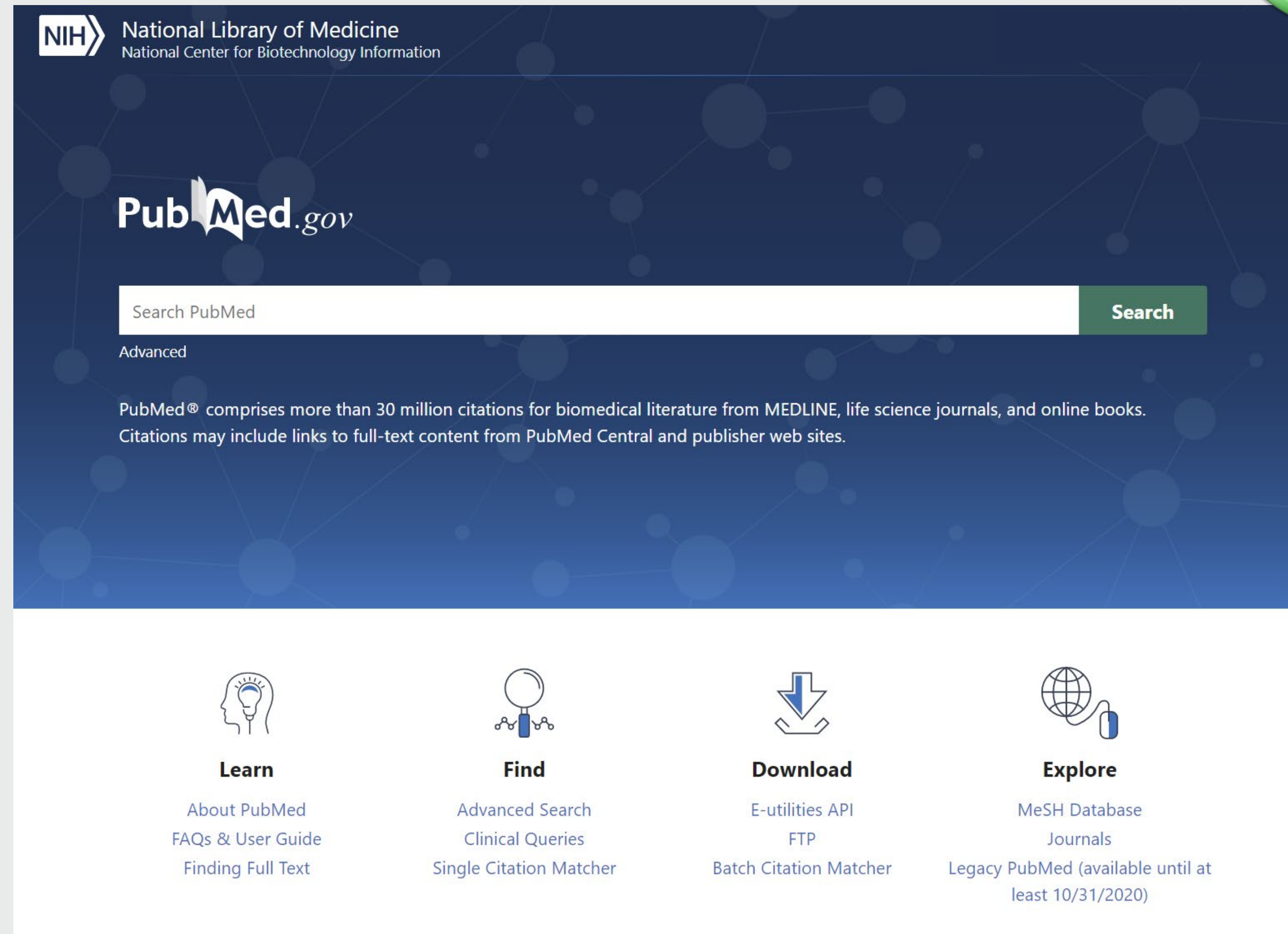
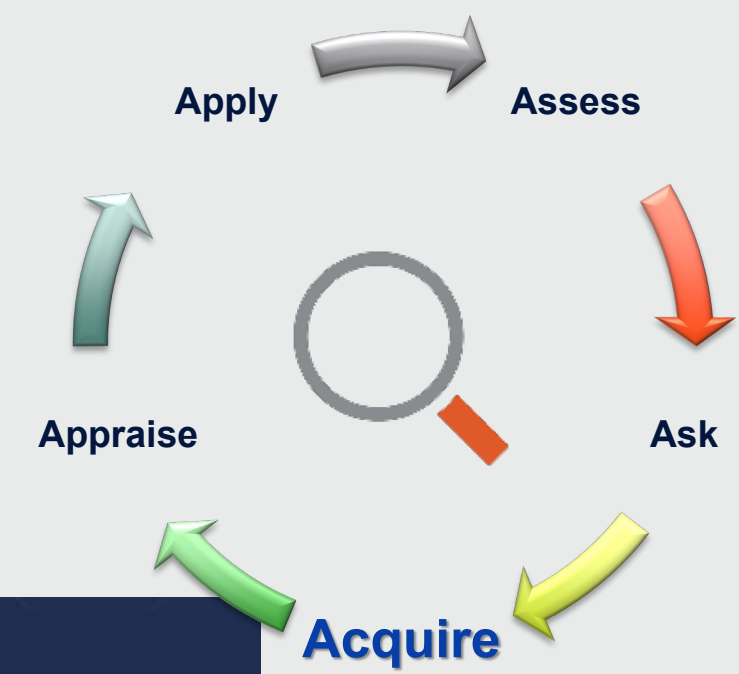
Indexed with MeSH



pubmed.ncbi.nlm.nih.gov

Acquire: PubMed

- Assess
- Ask
- **Acquire**
- Appraise
- Apply

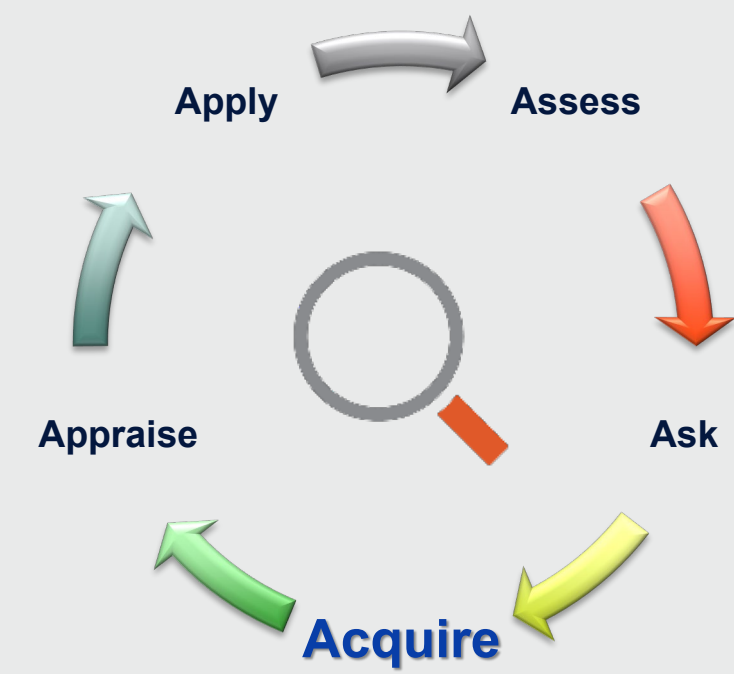


Acquire: PubMed

- Assess
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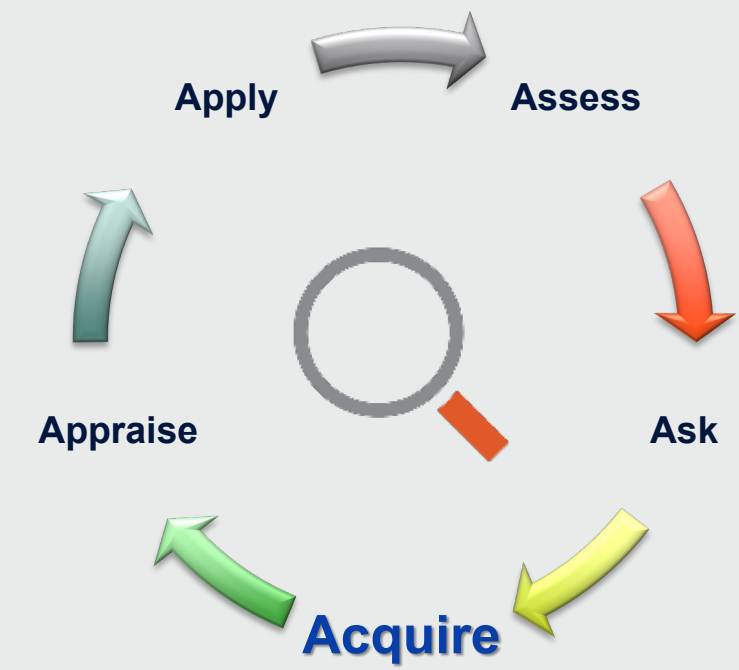


1. Identify key concepts
2. Use medical subject headings
3. Combine sets
4. Apply relevant limits

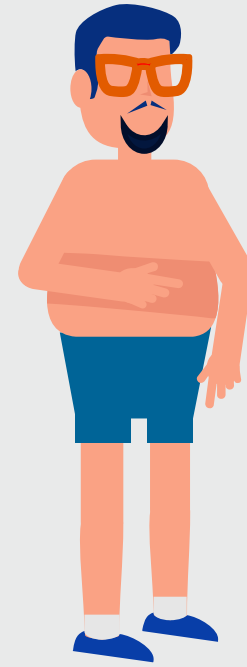


Acquire: PubMed

1. Key Concepts



- Assess
- Ask
- **Acquire**
- Appraise
- Apply



In patients with type 2 diabetes and obesity, is bariatric surgery more effective than standard medical therapy at increasing the probability of remission of diabetes?

Patient Problem

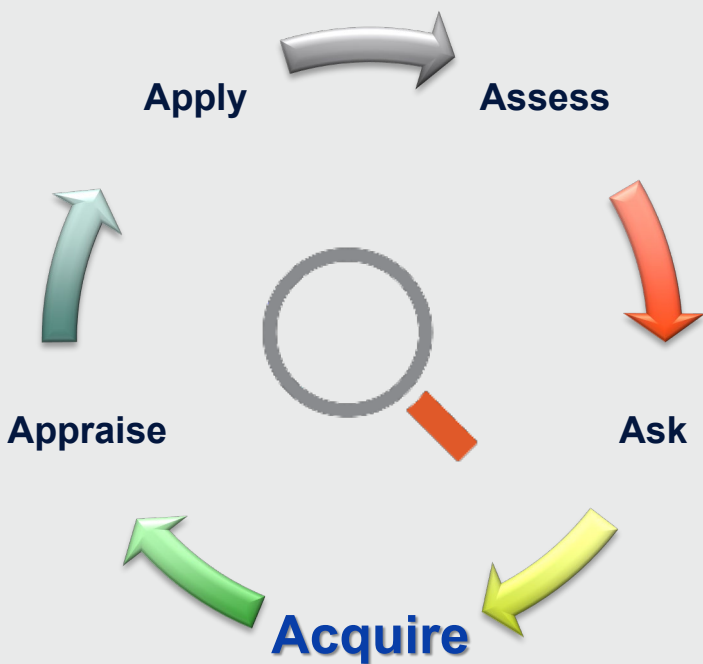
Intervention

Comparison

Outcome

Acquire: PubMed

2. Use MeSH



- Assess
- Ask
- **Acquire**
- Appraise
- Apply

Medical Subject Headings (MeSH)

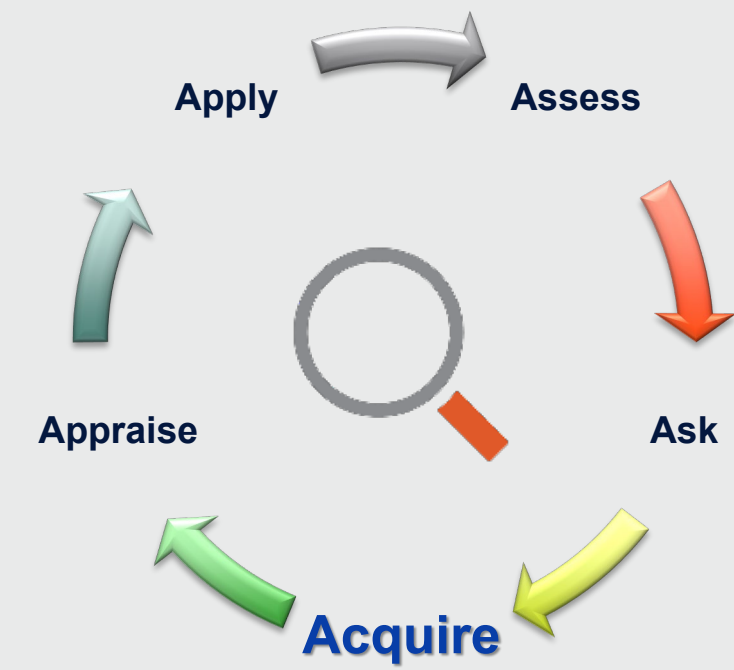
For example: What is the name of the condition that is when a blood clot blocks the flow of blood through the coronary artery?


Heart attack? Myocardial Infarction? MI? Heart Infarction?

History and Search Details						Download Delete	
Search	Actions	Details	Query	Results	Time		
#10	...	▼	Search: heart attack "myocardial infarction"[MeSH Terms] OR ("myocardial"[All Fields] AND "infarction"[All Fields]) OR "myocardial infarction"[All Fields] OR ("heart"[All Fields] AND "attack"[All Fields]) OR "heart attack"[All Fields] Translations heart attack: "myocardial infarction"[MeSH Terms] OR ("myocardial"[All Fields] AND "infarction"[All Fields]) OR "myocardial infarction"[All Fields] OR ("heart"[All Fields] AND "attack"[All Fields]) OR "heart attack"[All Fields]	261,265	16:14:42		


Acquire: PubMed

- Assess
- Ask
- **Acquire**
- Appraise
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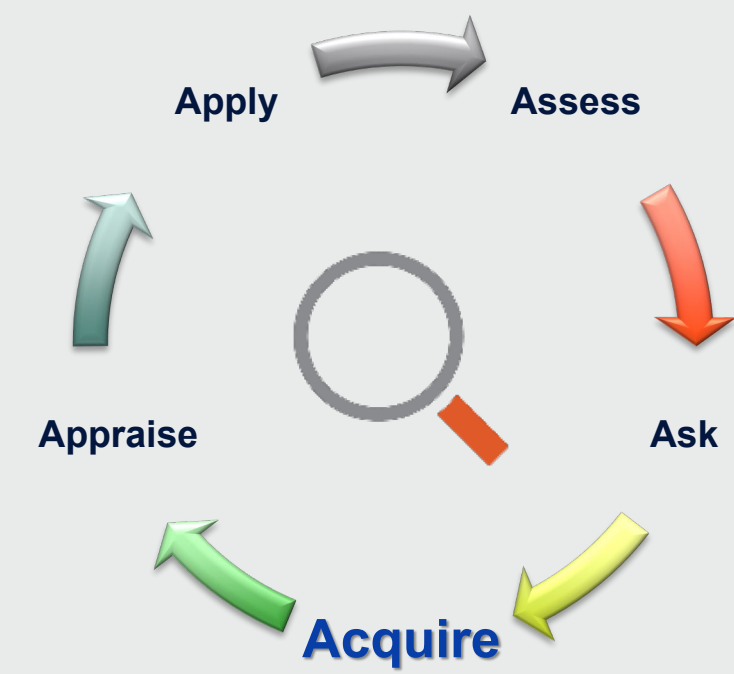
Query box

Enter / edit your search query here

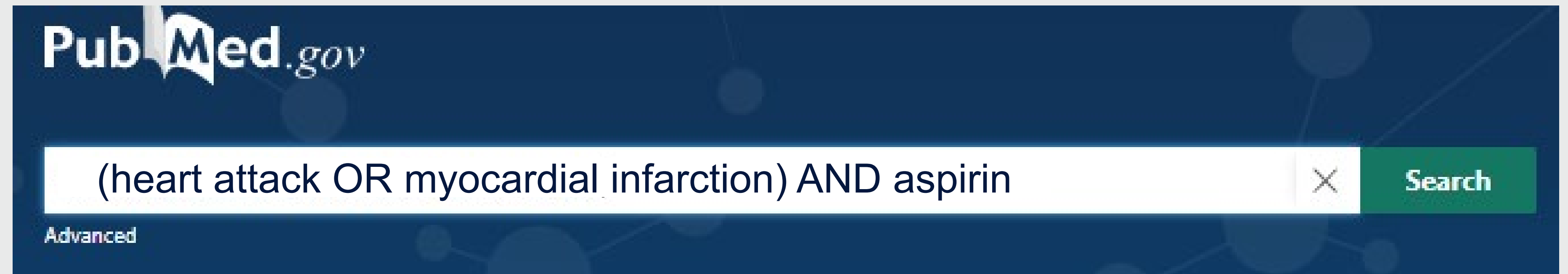
Search

Acquire: PubMed

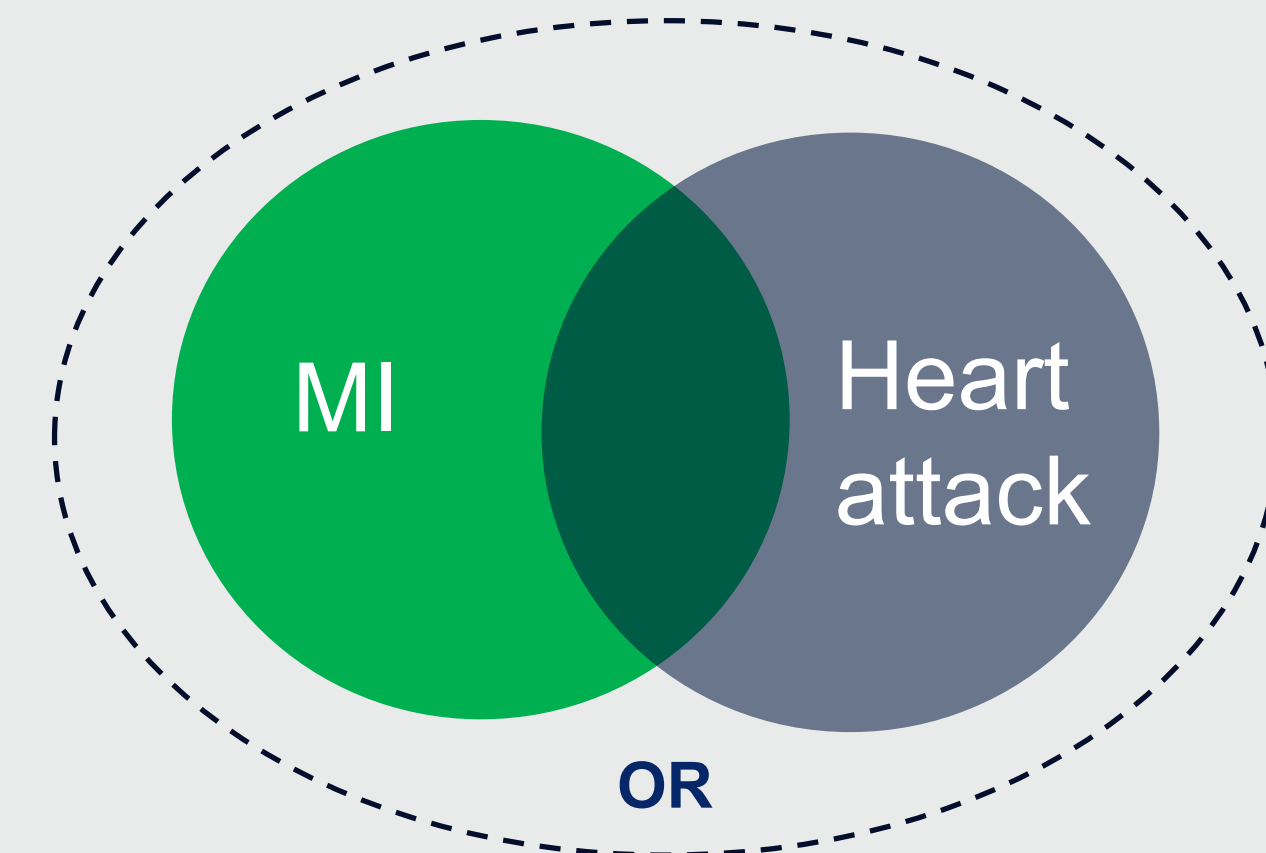
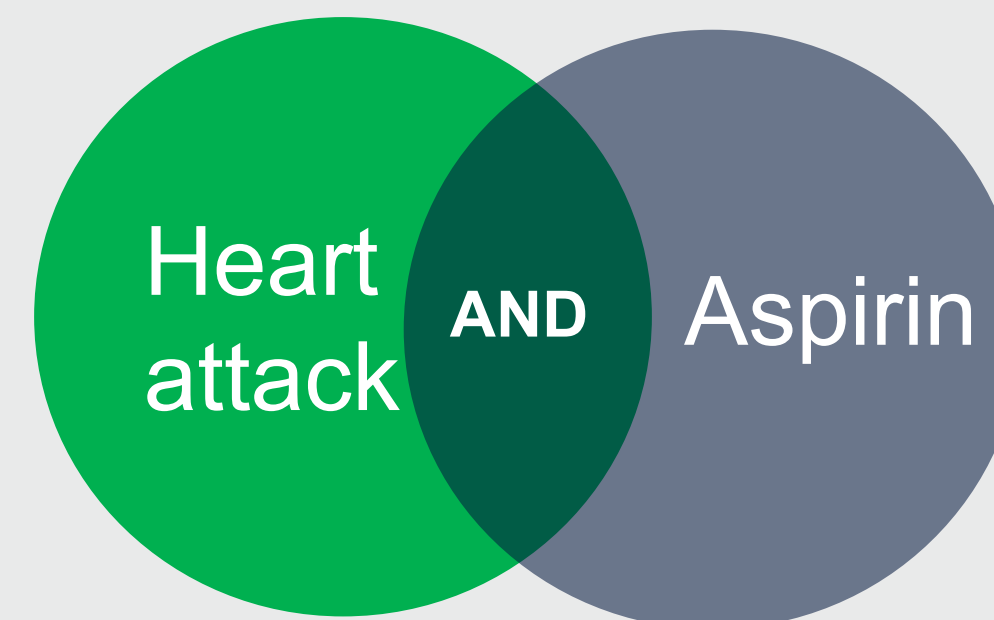
3. Combine Sets



- Assess
- Ask
- **Acquire**
- Appraise
- Apply



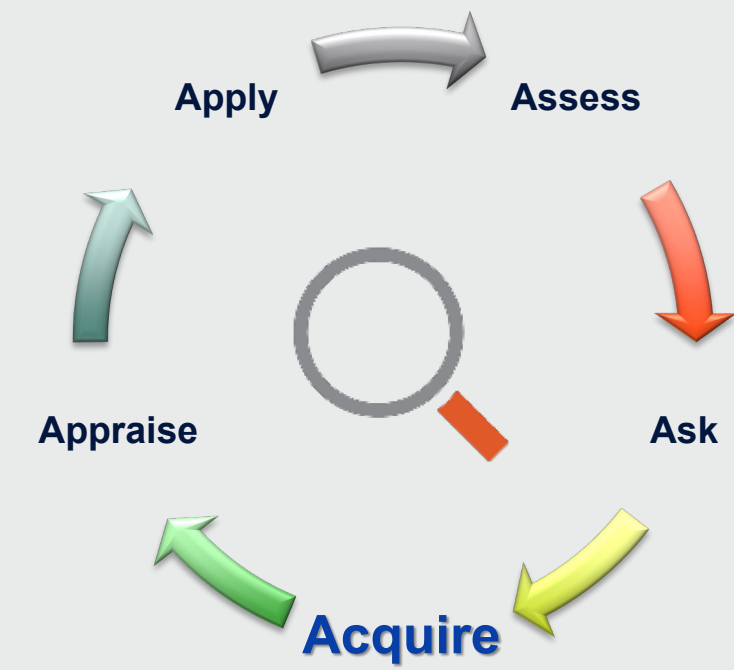
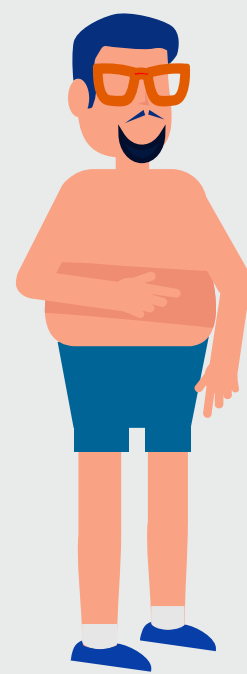
Boolean terms



Acquire: PubMed

3. Combine Sets

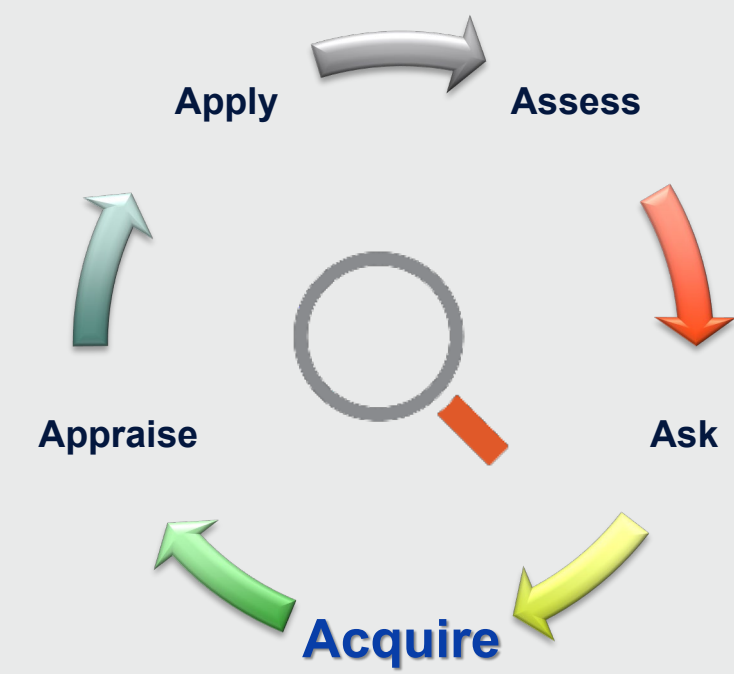
- Assess
- Ask
- **Acquire**
- Appraise
- Apply



Acquire: PubMed

4. Apply Filters

- Assess
- Ask
- **Acquire**
- Appraise
- Apply



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Sorted by: Best match

MY NCBI FILTERS

3,282 results

RESULTS BY YEAR

1984 2020

TEXT AVAILABILITY

☐ Abstract

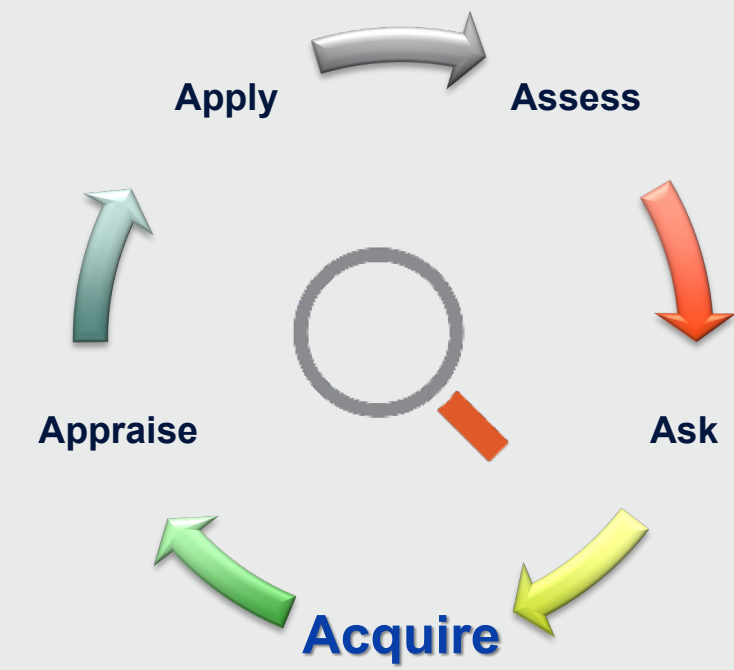
☐ **Bariatric surgery: to whom and when?**
1 Benaiges D, Goday A, Pedro-Botet J, Más A, Chillarón JJ, Flores-Le Roux JA.
Cite Minerva Endocrinol. 2015 Jun;40(2):119-28. Epub 2015 Feb 10.
PMID: 25665592 Review.
Share **Bariatric surgery** is the most effective treatment for **obesity**. Its effects go beyond weight loss, in a high percentage of cases achieving remission of comorbidities associated with **obesity** and reducing mortality. ...The aim of this review was to ascertain ...

☐ **A Landscape of Bariatric Surgery in Canada: For the Treatment of Obesity, Type 2 Diabetes and Other Comorbidities in Adults.**
2 Anvari M, Lemus R, Breau R.
Cite

Acquire: PubMed

4. Apply Filters

- Assess
- Ask
- **Acquire**
- Appraise
- Apply



ARTICLE TYPE

- ☐ Address
- ☐ Books and Documents
- ☐ Case Reports
- ☐ Clinical Trial
- ☐ Guideline
- ☐ Journal Article
- ☐ Meta-Analysis
- ☐ Randomized Controlled Trial
- ☐ Review
- ☐ Systematic Review

PUBLICATION DATE

- ☐ 1 year
- ☐ 5 years
- ☐ 10 years

LANGUAGE

- ☐ English
- ☐ Spanish

SPECIES

- ☐ Humans

Additional filters

☐ 3 **Impact of bariatric surgery on type 2 diabetes.** Contribution of inflammation and gut microbiome?
Debédat J, Amouyal C, Aron-Wisnewsky J, Clément K.
Semin Immunopathol. 2019 Jul;41(4):461-475. doi: 10.1007/s00281-019-00738-3. Epub 2019 Apr 25.
PMID: 31025085 **Free article.** Review.
It is associated with an abundance of comorbidities, including **type 2 diabetes** (T2D). **Bariatric surgery**, which induces modifications of the intestinal tract, is to date the most successful treatment for **obesity**. ...These characteristics a ...

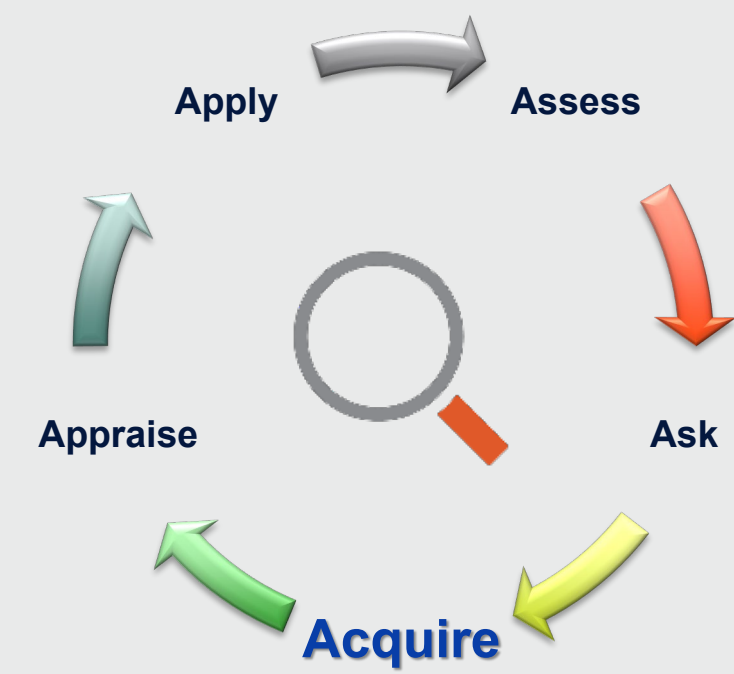
☐ 4 **Role of gut microbiota, bile acids and their cross-talk in the effects of bariatric surgery on obesity and type 2 diabetes.**
Liu H, Hu C, Zhang X, Jia W.
J Diabetes Investig. 2018 Jan;9(1):13-20. doi: 10.1111/jdi.12687. Epub 2017 Jun 12.
PMID: 28434196 **Free PMC article.** Review.
Bariatric surgery was initially designed to achieve weight loss, and subsequently was noted to induce improvements or remission of **type 2 diabetes**. Currently, these **bariatric** operations, such as Roux-en-Y gastric bypass and sleeve gastrec ...

☐ 5 **Surgery in the treatment of type 2 diabetes mellitus.**
Maleckas A, Vendauskas L, Wallenius V, Lönnroth H, Fändriks L.
Scand J Surg. 2015 Mar;104(1):40-7. doi: 10.1177/1457496914561140. Epub 2015 Jan 26.
PMID: 25623915 Review.
The relationship between **type 2 diabetes mellitus** and **obesity** is well established, and surgical treatment is widely used for **obese** patients with **type 2 diabetes mellitus**. ...CONCLUSION: **Surgery** is an eff ...

☐ 6 **The Long-Term Effects of Bariatric Surgery on Type 2 Diabetes Remission, Microvascular and Macrovascular Complications, and Mortality: a Systematic Review and Meta-Analysis.**
Sheng B, Truong K, Spitler H, Zhang L, Tong X, Chen L.
Obes Surg. 2017 Oct;27(10):2724-2732. doi: 10.1007/s11695-017-2866-4.
PMID: 28801703 **Free article.** Review.
This systematic review aimed to evaluate the long-term (≥ 5 years) outcomes of **bariatric surgery** on

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4. Apply Filters



- Assess
- Ask
- **Acquire**
- Appraise
- Apply

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This column displays citations for systematic reviews. See [filter information](#) or additional [related sources](#).

Medical Genetics

This column displays citations pertaining to topics in medical genetics. See more [filter information](#).

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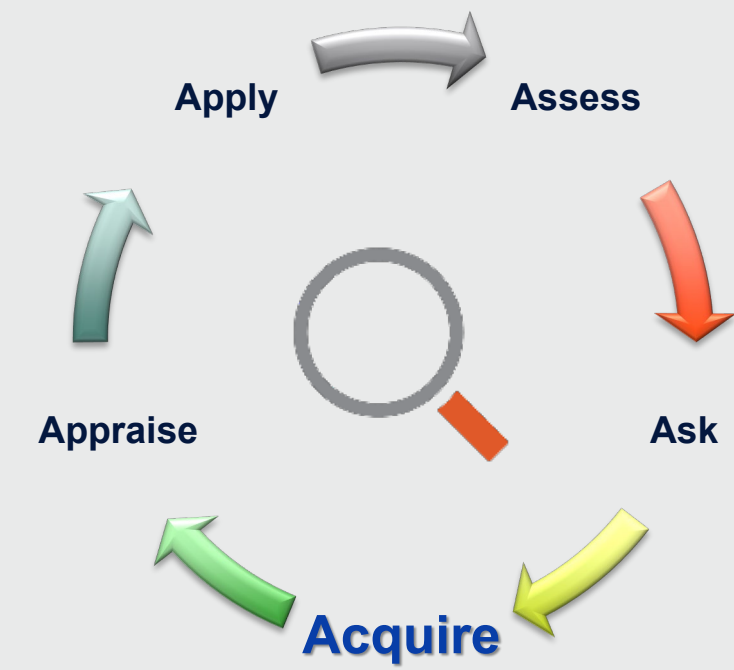
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Explore
MeSH Database
Journals
Legacy PubMed (available until at least 10/31/2020)

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- Assess
- Ask
- **Acquire**
- Appraise
- Apply



PubMed Clinical Queries

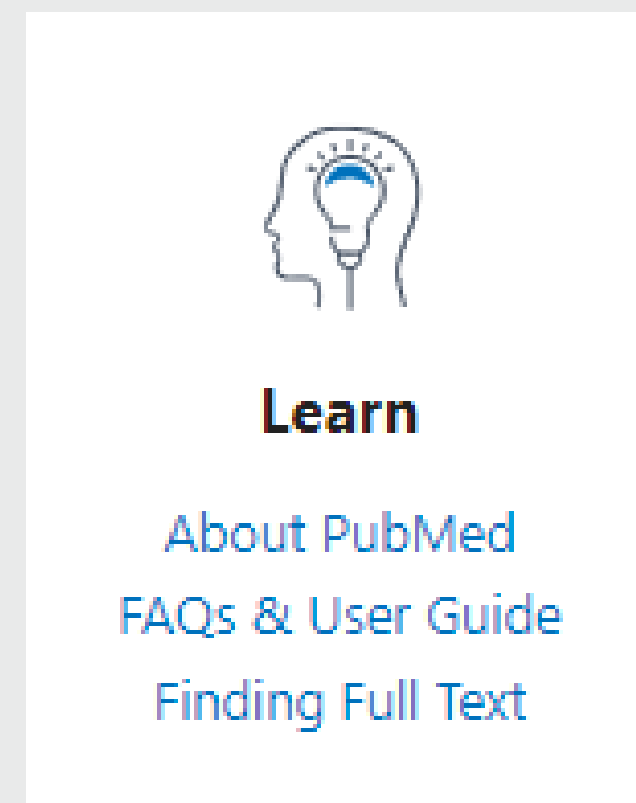
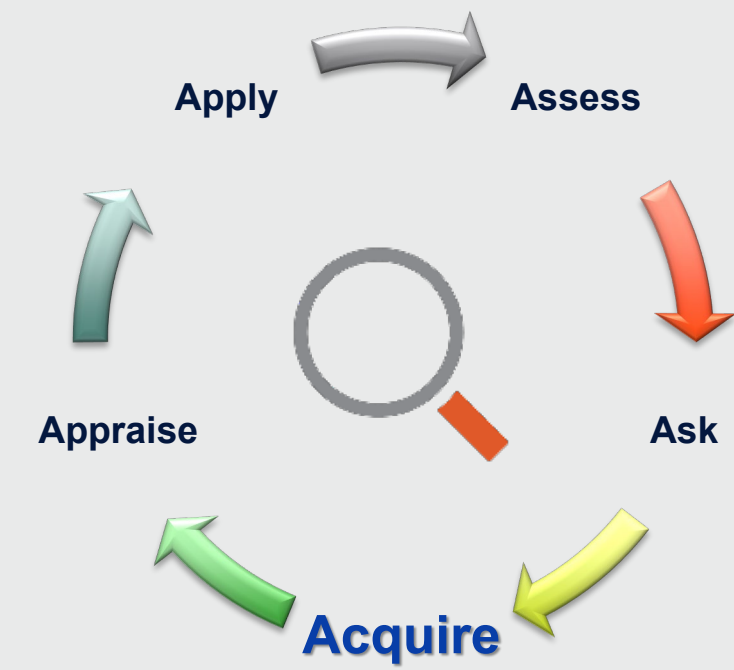
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obesity AND type 2 diabetes AND bariatric surgery

Clinical Study Categories	Systematic Reviews	Medical Genetics
Category: <input type="text" value="Therapy"/> Scope: <input type="text" value="Narrow"/>		Topic: <input type="text" value="All"/>
Results: 5 of 148 Banded Versus Nonbanded Sleeve Gastrectomy: A Randomized Controlled Trial With 3 Years of Follow-up. Fink JM, Hetzenecker A, Seifert G, Runkel M, Laessle C, Fichtner-Feigl S, Marjanovic G. Ann Surg. 2020 Aug 21; . Epub 2020 Aug 21. A randomized controlled trial comparing intensive non-surgical treatment with bariatric surgery in adolescents aged 13-16 years (AMOS2): Rationale, study design, and patient recruitment. Janson A, Järholm K, Gronowitz E, Sjögren L, Klaesson S, Engström M, Peltonen M, Ekblom K, Dahlgren J, Olbers T. Contemp Clin Trials Commun. 2020 Sep; 19:100592. Epub 2020 Jun 27.	Results: 5 of 84 Association of bariatric surgery with all-cause mortality and incidence of obesity-related disease at a population level: A systematic review and meta-analysis. Wiggins T, Guidozzi N, Welbourn R, Ahmed AR, Markar SR. PLoS Med. 2020 Jul; 17(7):e1003206. Epub 2020 Jul 28. Comparative Safety and Effectiveness of Roux-en-Y Gastric Bypass and Sleeve Gastrectomy in Obese Elder Patients: a Systematic Review and Meta-analysis. Xu C, Yan T, Liu H, Mao R, Peng Y, Liu Y. Obes Surg. 2020 Sep; 30(9):3408-3416. Comparison of the effect of Roux-en-Y gastric	Results: 5 of 167 Can genetics help predict efficacy of bariatric surgery? An analysis of microRNA profiles. Doyon L, Das S, Sullivan T, Rieger-Christ K, Sherman J, Roque S, Nepomnayshy D. Surg Obes Relat Dis. 2020 Jun 20; . Epub 2020 Jun 20. Higher Mast Cell Accumulation in Human Adipose Tissues Defines Clinically Favorable Obesity Sub-Phenotypes. Goldstein N, Kezerle Y, Gepner Y, Haim Y, Pecht T, Gazit R, Polischuk V, Liberty IF, Kirshtein B, Shaco-Levy R, et al. Cells. 2020 Jun 20; 9(6). Epub 2020 Jun 20. Differential Impact of Weight Loss and Glycemic Control on Inflammasome Signaling.

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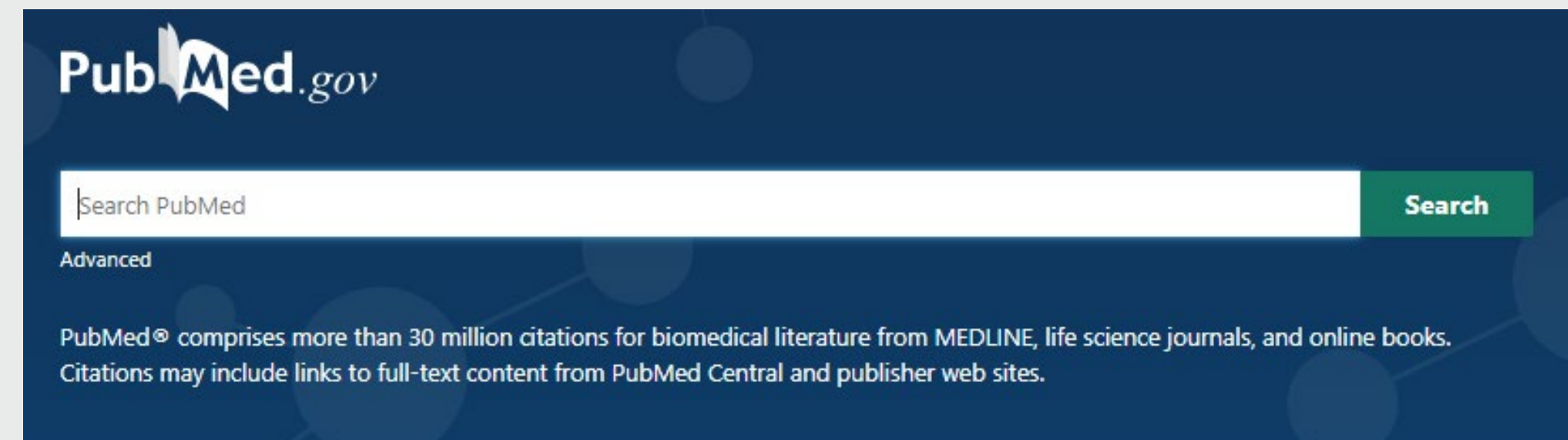
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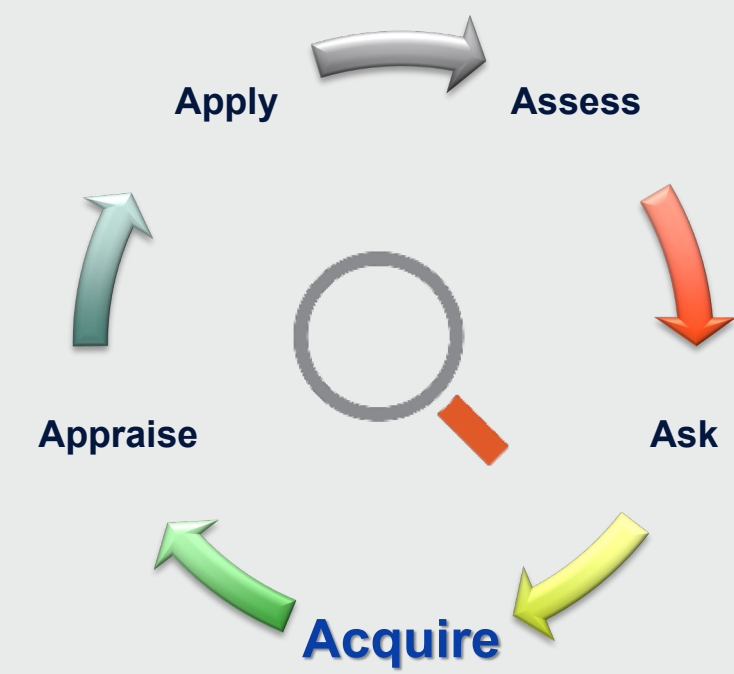
National Library of Medicine's PubMed help resources

Acquire: PubMed

- Assess
- Ask
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- Appraise
- Apply



1. Identify key concepts
2. Use subject headings
3. Combine sets
4. Apply relevant limits



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Search

Hint: clicking the "Search" button without any terms listed in the search box will transport you to that database's homepage.

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Most recent citations:

Walker OLS, Holloway AC, Raha S. [The role of the endocannabinoid system in female reproductive tissues](#). J Ovarian Res. 2019 Jan 15;12(1):3. doi: 10.1186/s13048-018-0478-9. Review. PubMed PMID: 30646937.

Gartung A, Yang J, Sukhatme VP, Bielenberg DR, Fernandes D, Chang J, Schmidt BA, Hwang SH, Zurakowski D, Huang S, et al. [Suppression of chemotherapy-induced cytokine/lipid mediator surge and ovarian cancer by a dual COX-2/sEH inhibitor](#). Proc Natl Acad Sci U S A. 2019 Jan 15. pii: 201803999. doi:

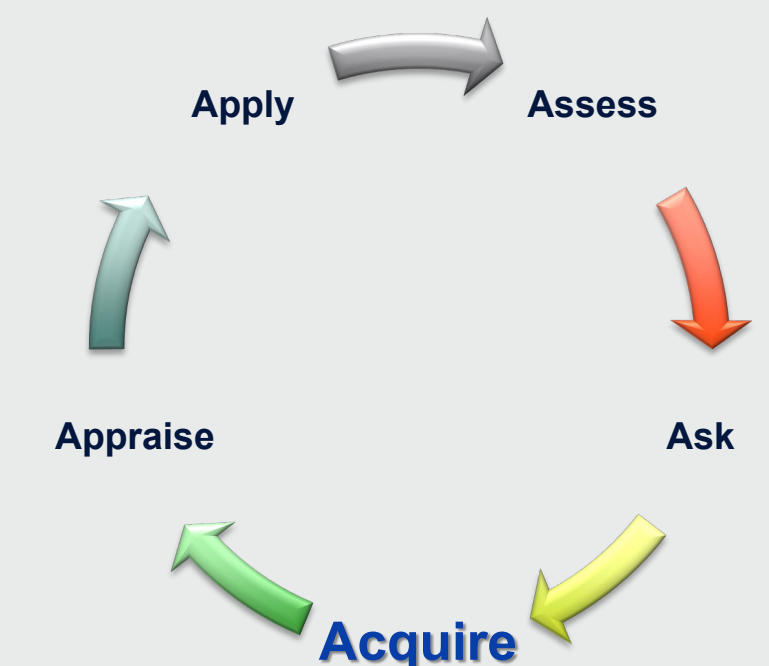
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ovarian cancer	0	today
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gershenson ovarian	0	yesterday
(("Ovarian Neoplasms/analysis"[Mesh]) AND ("Ova...	0	yesterday

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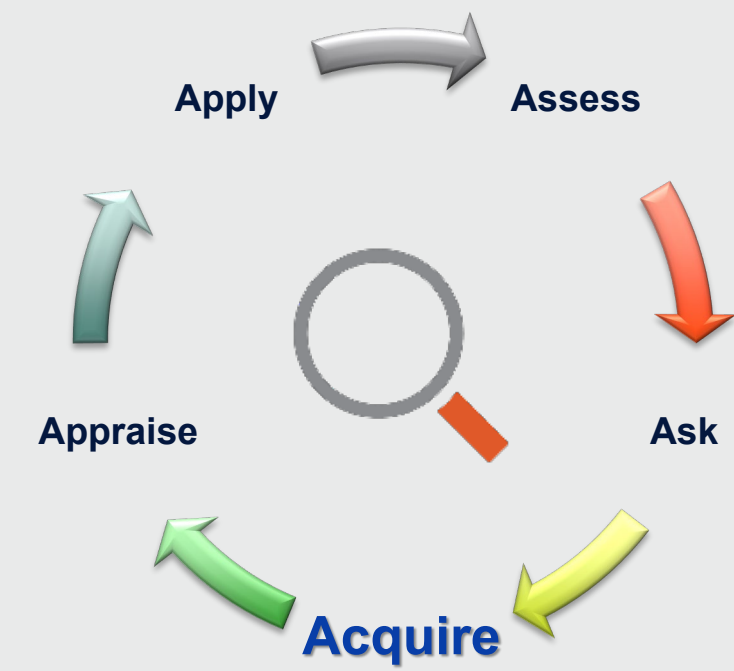
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Other Citations	edit 15	Private	Standard
ca125	edit 21	Private	PubMed



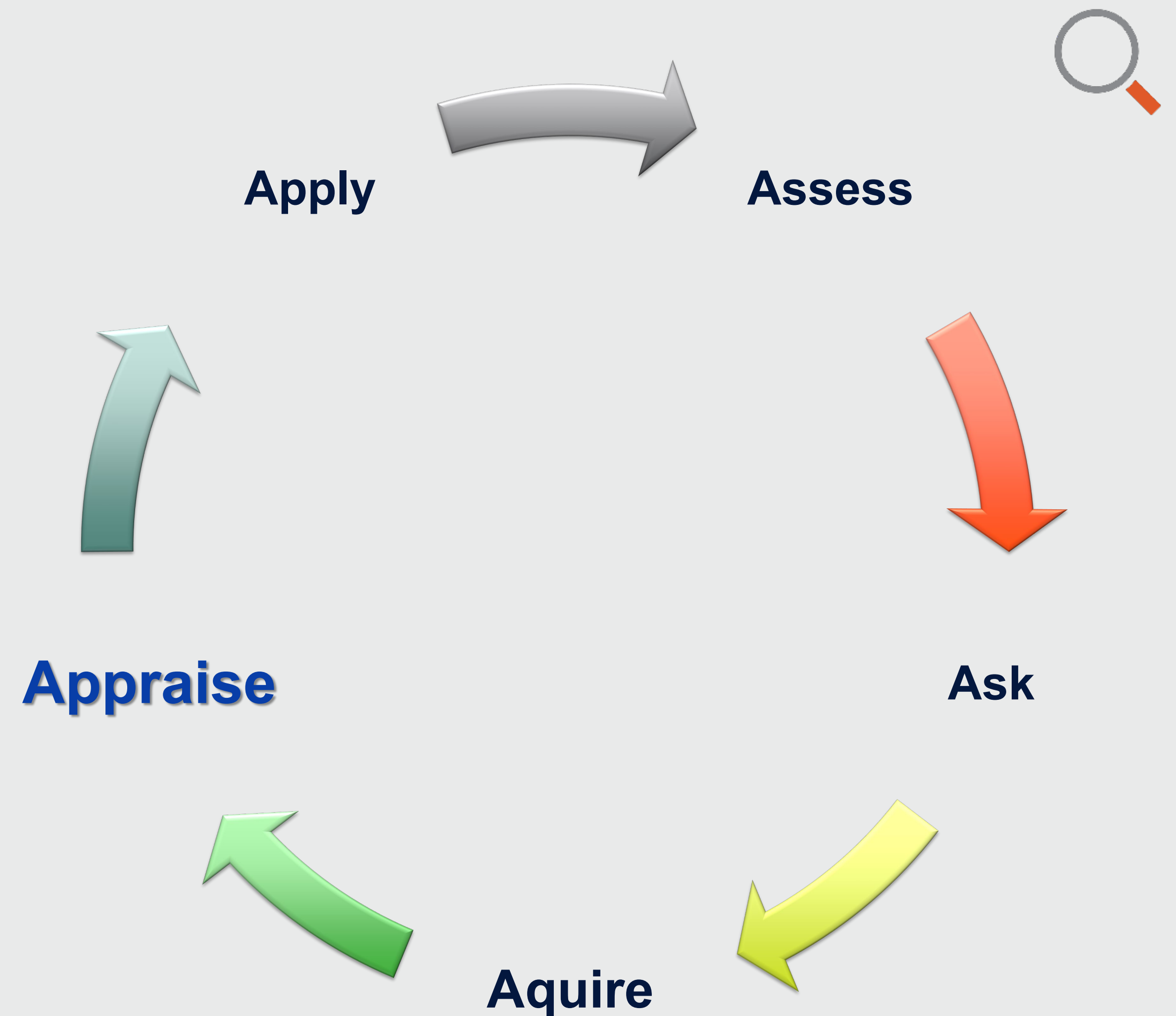
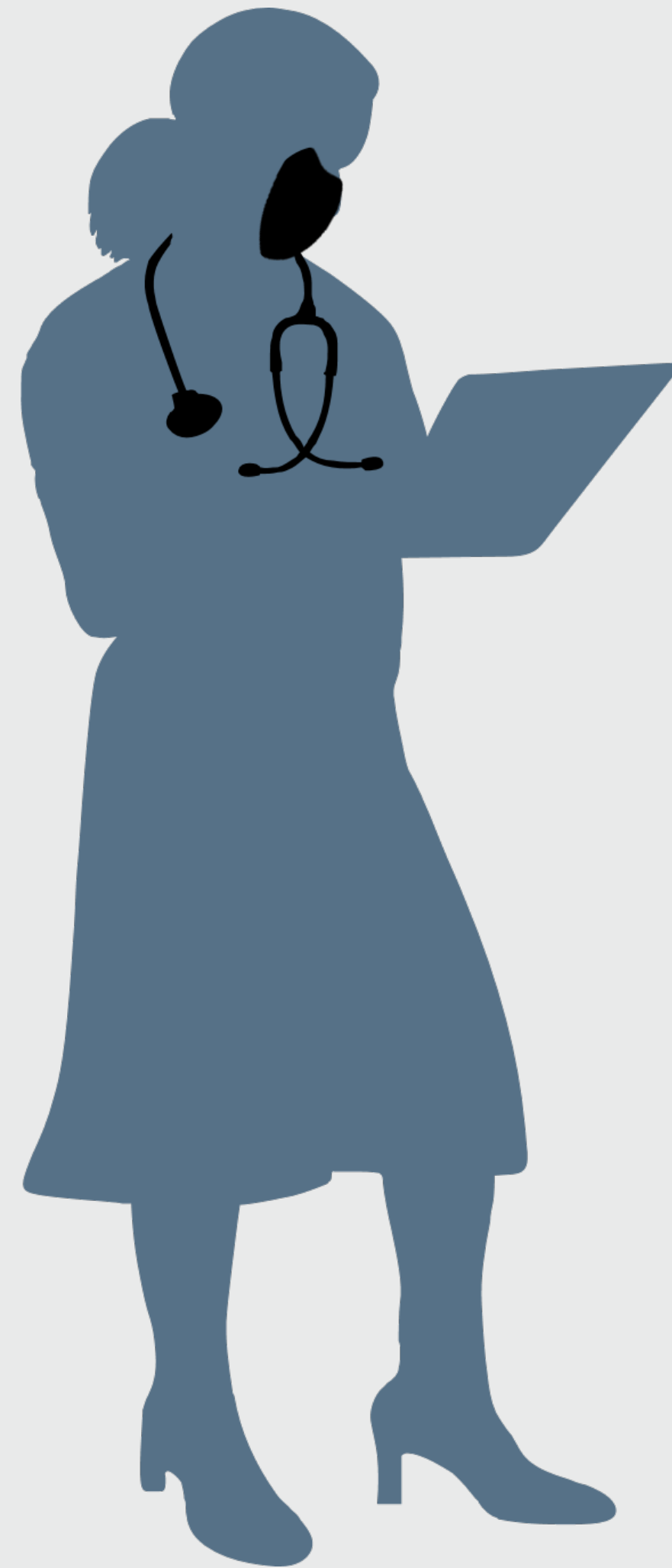
Acquire: Endnote/Mendeley

- Assess
 - Ask
 - **Acquire**
 - Appraise
 - Apply
1. Collect resources
 2. Arrange
 3. Apply
 4. Appraise systematically
 5. Store



Appraise

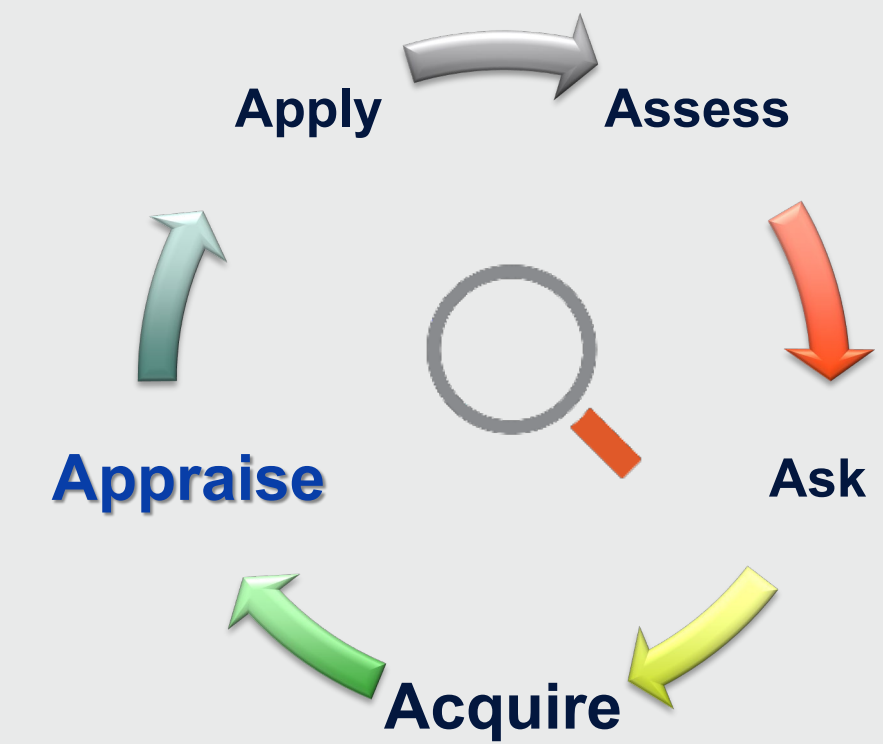
- Assess
- Ask
- Acquire
- **Appraise**
- Apply



Appraise



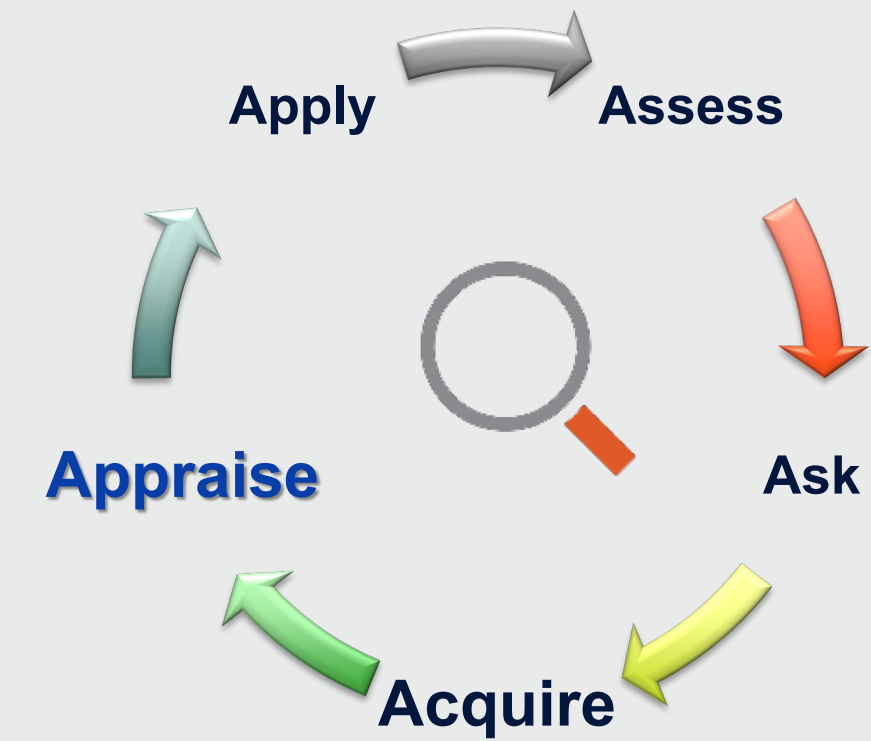
Center for Evidence-Based Medicine



- Assess
 - Ask
 - Acquire
 - **Appraise**
 - Apply
- Clear and focused question?
 - Valid methods?
 - Study important?
 - Applicable to my patient or population?

No? Don't bother reading and move on.

Appraise



Center for Evidence-Based Medicine

- Assess
- Ask
- Acquire
- **Appraise**
- Apply

Critical Appraisal Worksheets

English

- Systematic Reviews Critical Appraisal Sheet
- Diagnostics Critical Appraisal Sheet
- Prognosis Critical Appraisal Sheet
- Randomised Controlled Trials (RCT) Critical Appraisal Sheet
- Critical Appraisal of Qualitative Studies Sheet
- IPD Review Sheet

CRITICAL APPRAISAL OF PROGNOSTIC STUDIES



Are the results of the study valid? (Internal Validity)

1. Was the defined representative sample of patients assembled at a common (usually early) point in the course of their disease?

What is best?

It is preferable if study patients are enrolled at a uniformly early time in the disease usually when disease first becomes manifest. Such groups of patients are called an 'inception cohort'. Patients should also be representative of the underlying population. Patients from tertiary referral centres may have more advanced disease and poorer prognosis than patients from primary care.

Where do I find the information?

The Methods section should describe the stage at which patients entered the study (eg at the time of first myocardial infarction; Stage 3 breast cancer). The Methods section should also provide information about patient recruitment, whether patients were recruited from primary care or tertiary referral centres.

In this paper

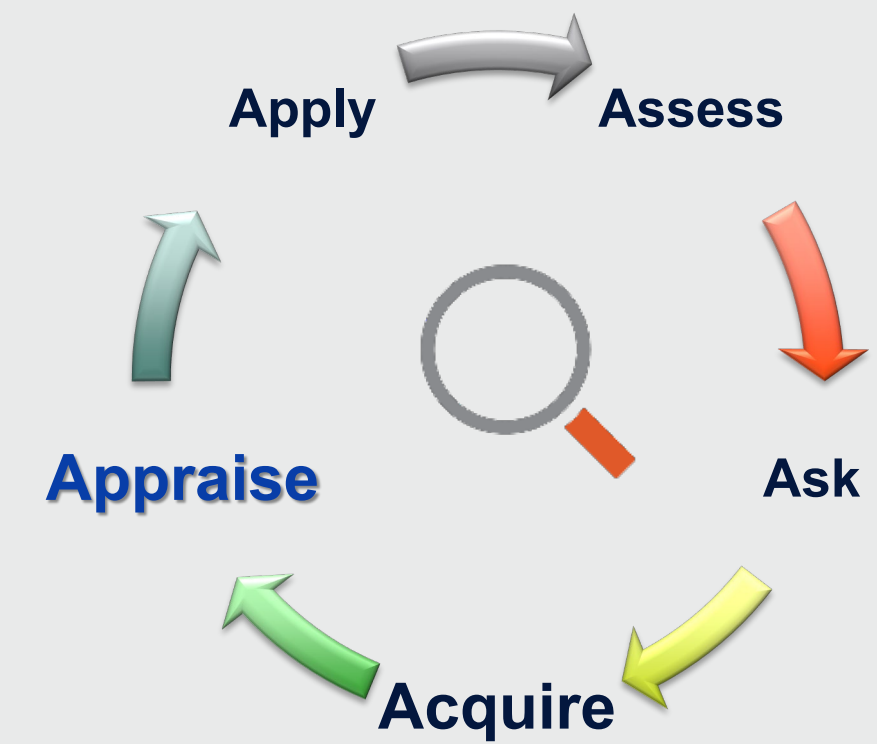
cebm.net

Appraise

- Assess
- Ask
- Acquire
- **Appraise**
- Apply

EBM Grading

- GRADE
- GRADE Handbook
- U.S. Preventive Services Task

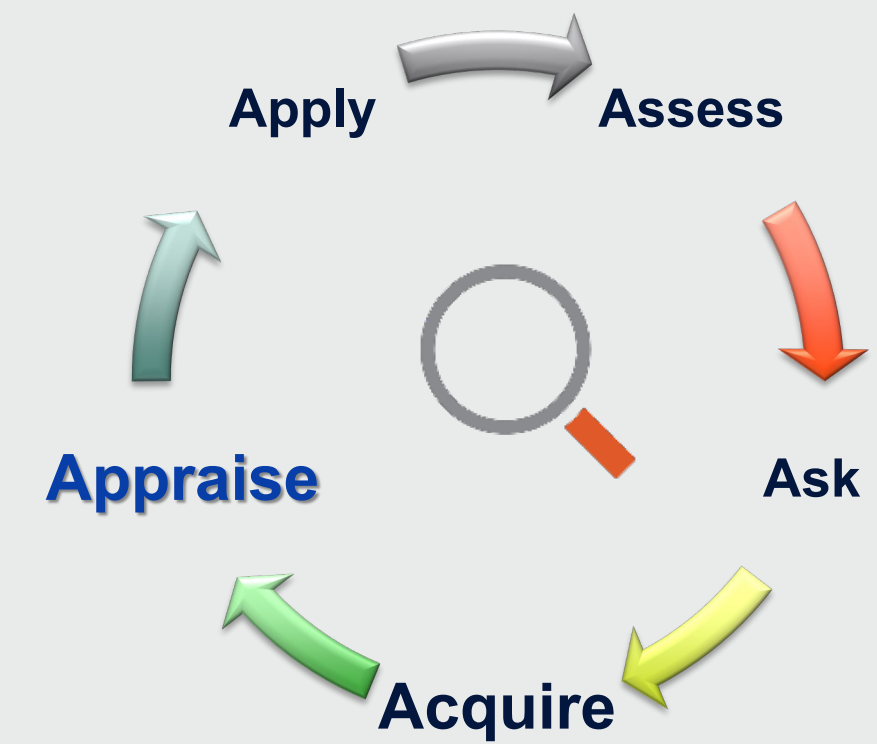


Appraise

- Assess
- Ask
- Acquire
- **Appraise**
- Apply

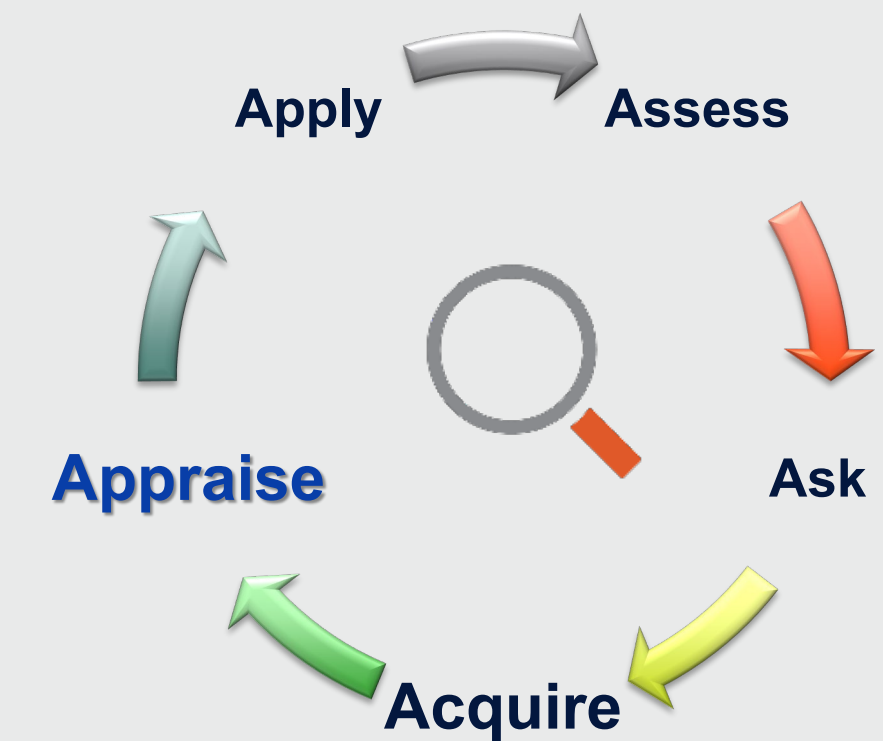
Critical Appraisal Three Overarching Questions

- 1. How serious is the risk of bias?**
2. Will the result help in caring for my patient?
3. What are the results?



Appraise

- Assess
- Ask
- Acquire
- **Appraise**
- Apply



Were patients **randomized**?

The assignment of patients to either group (treatment or control) must be done by a random allocation.

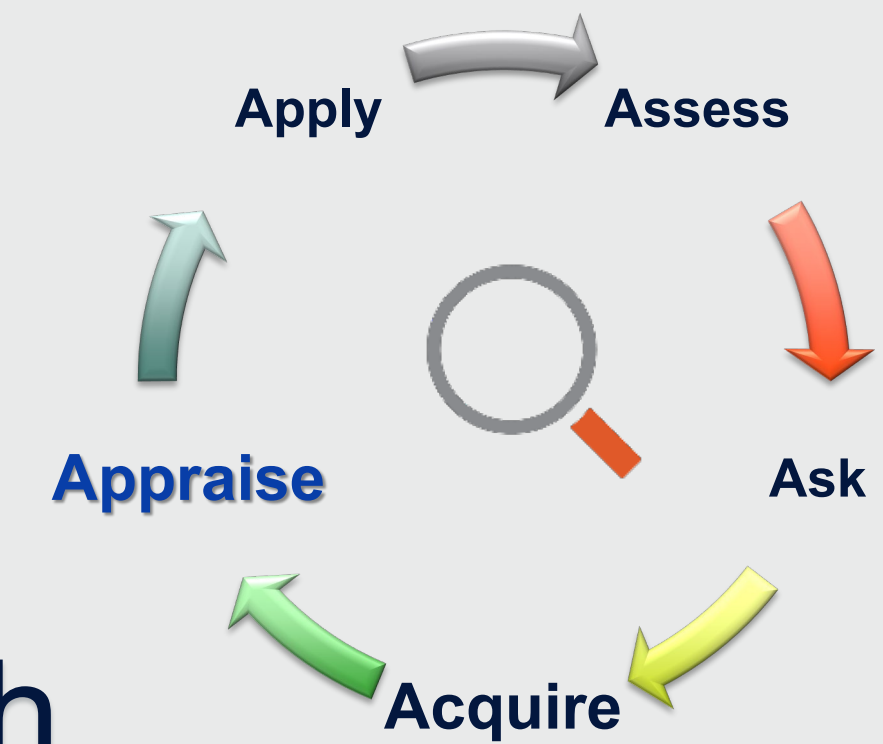
This balances the group for known factors (age, weight, gender (ask, don't assume), and unknowns, like socioeconomic).

Appraise

- Assess
- Ask
- Acquire
- **Appraise**
- Apply

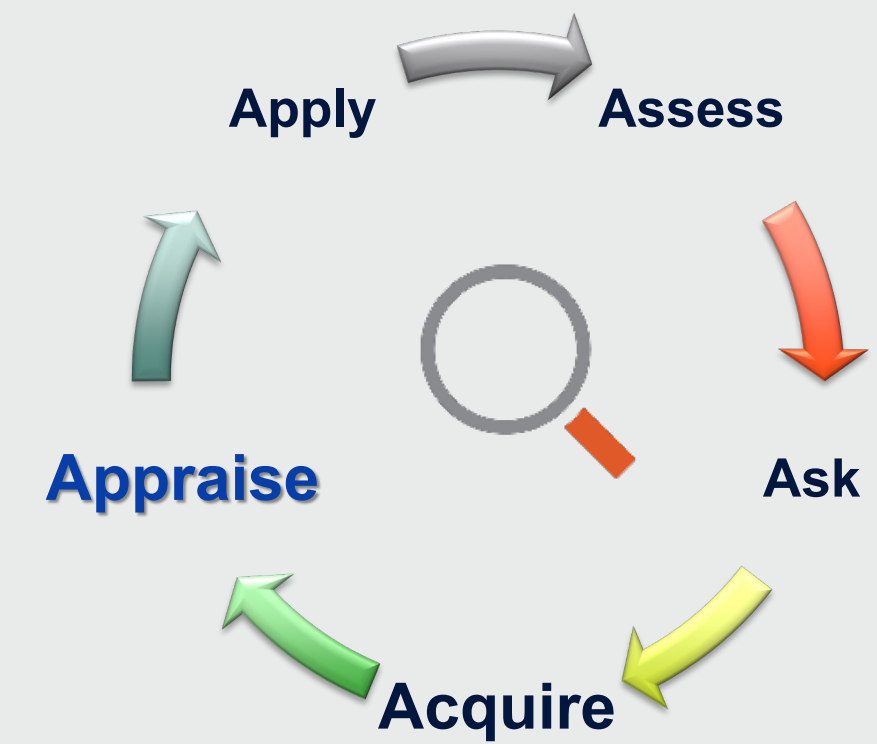
Group **allocation concealed** (from both clinicians and researchers)?

This happens after randomization and can help reduce conscious or unconscious bias.



Appraise

- Assess
- Ask
- Acquire
- **Appraise**
- Apply



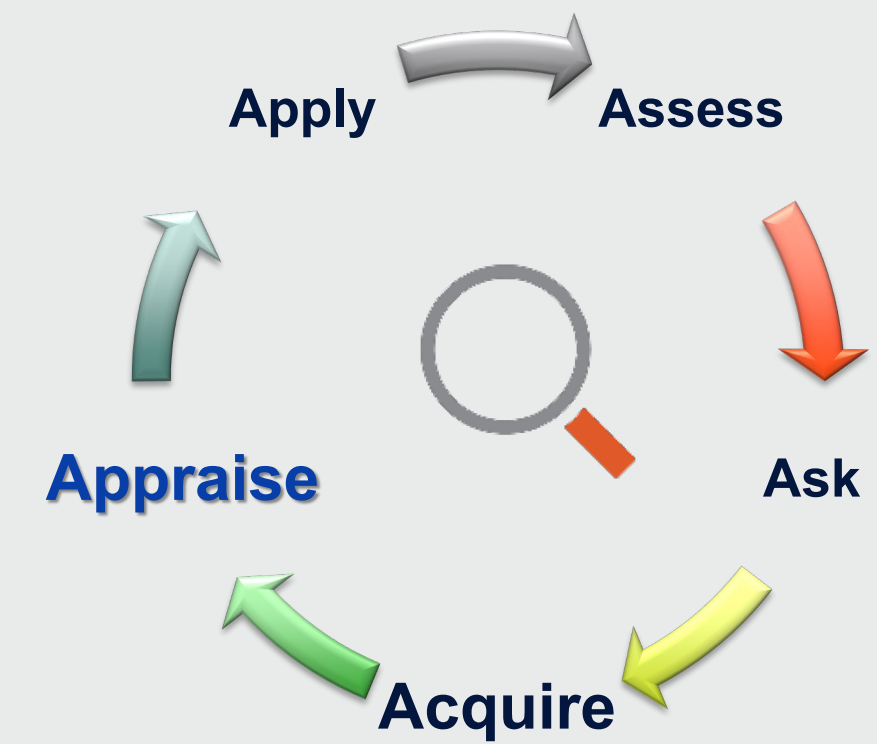
Were patients in the study groups **similar?**



Appraise

- Assess
- Ask
- Acquire
- **Appraise**
- Apply

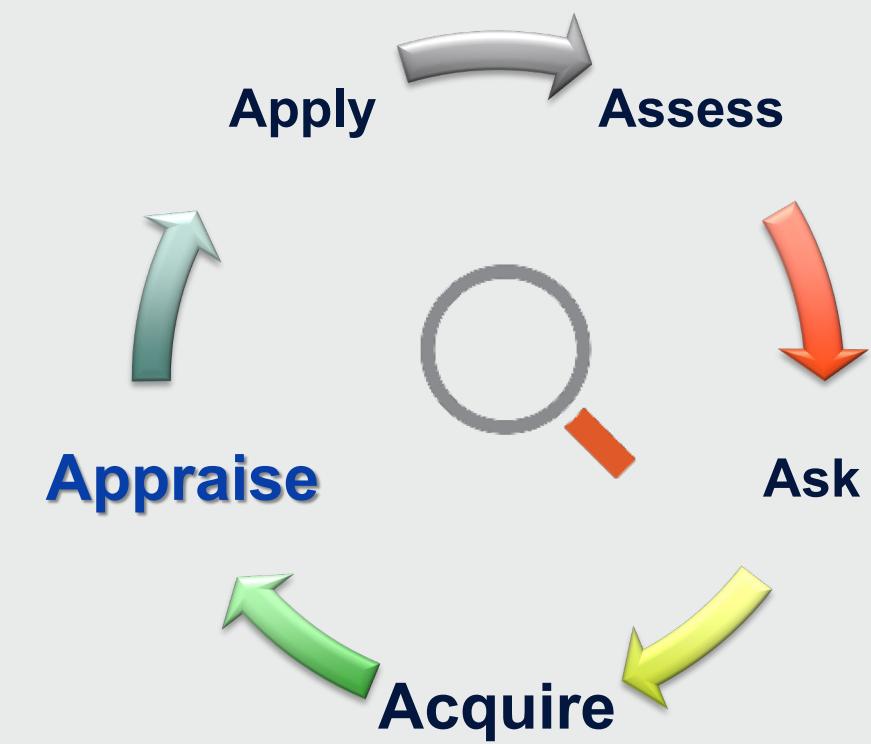
To what extent was
the study **blinded**?



Appraise

- Assess
- Ask
- Acquire
- **Appraise**
- Apply

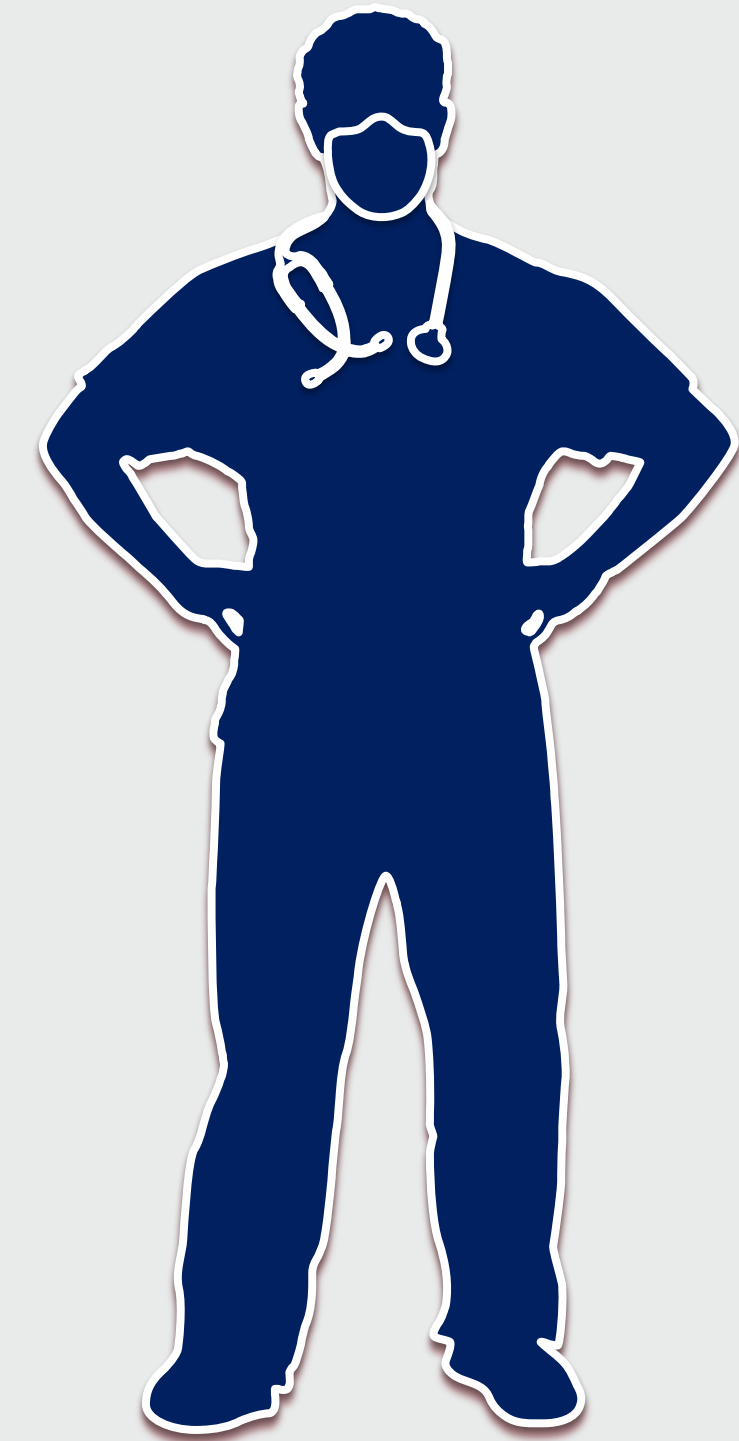
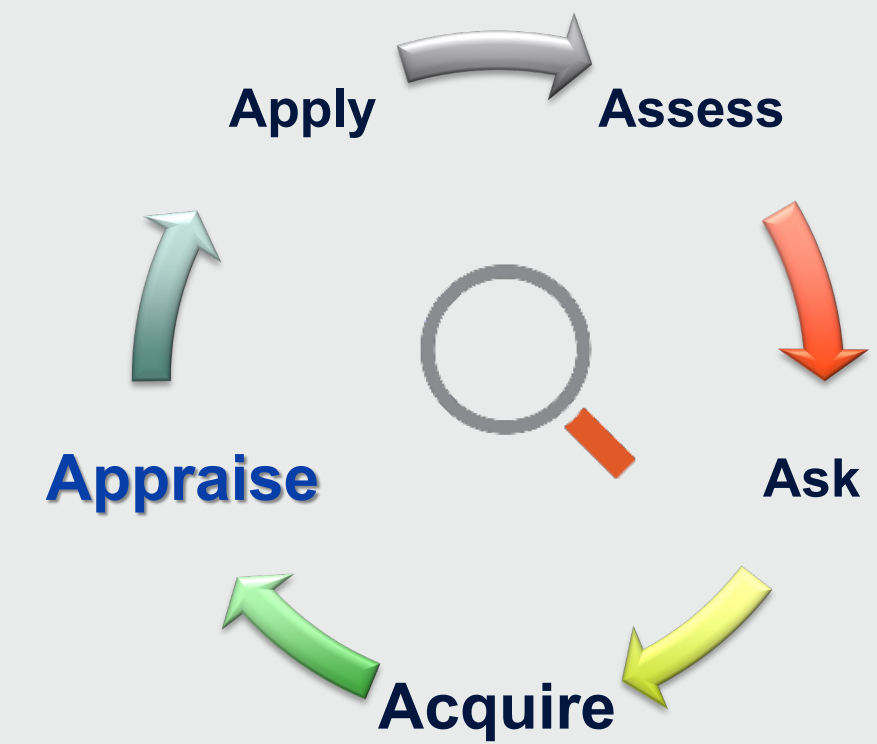
Was follow up
complete?



Appraise

- Assess
- Ask
- Acquire
- **Appraise**
- Apply

Was the trial
stopped early?



Appraise

- Assess
- Ask
- Acquire
- **Appraise**
- Apply

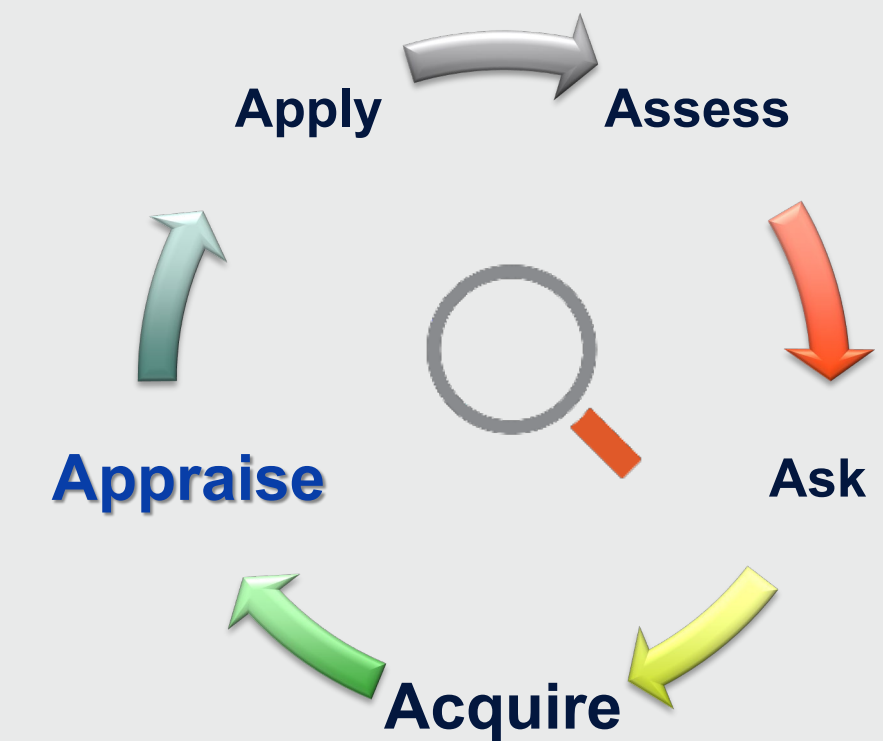
How serious is the risk of bias?

- Randomization
- Allocation concealment
- Blinding,
- Baseline balance,
- Follow up
- Trials stopped early

Will the result help in caring for my patient?

What are the results?

see later lectures in this series for more!



Appraise

- Assess
- Ask
- Acquire
- **Appraise**
- Apply

Systematic Reviews

Type of research methodology

Synthesize primary research studies.

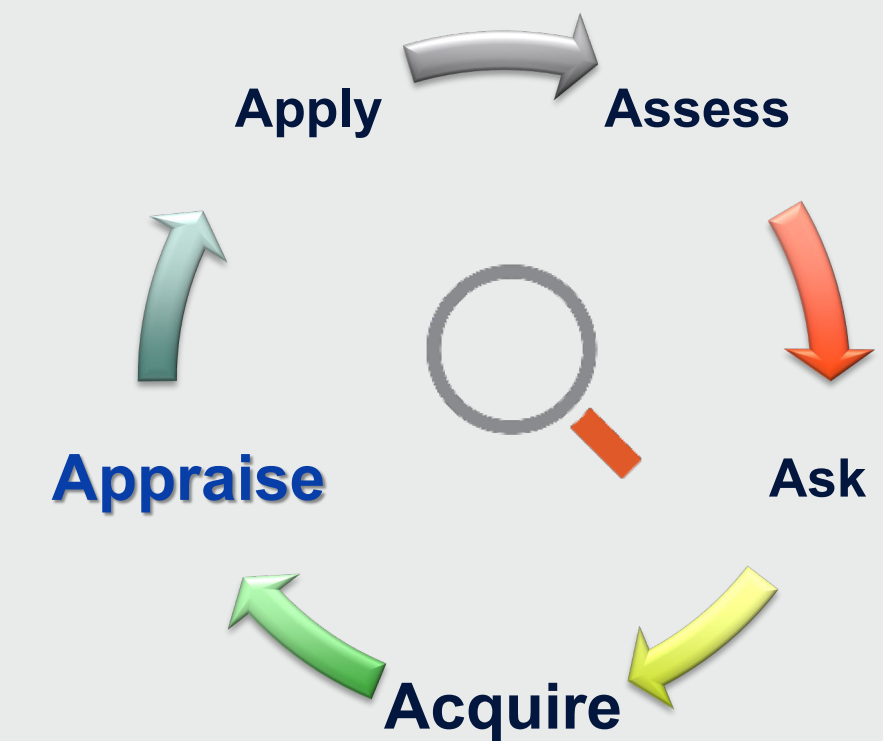


Appraise

- Assess
- Ask
- Acquire
- **Appraise**
- Apply

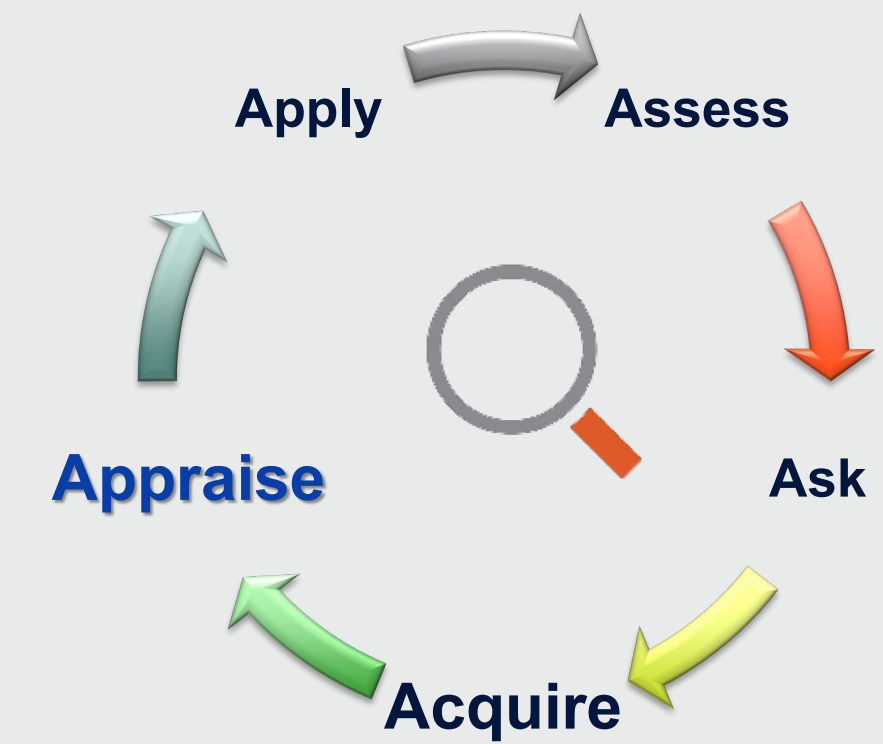
Characteristics of Systematic Reviews

1. Clearly articulated clinical question
2. EXPLICIT inclusion and exclusion criteria
3. COMPREHENSIVE searches of literature
4. Appraisal of the **quality** of the included studies
5. Analysis of the data extracted from included studies
6. Qualitative synthesis of study findings
7. Transparent reporting of the methodology



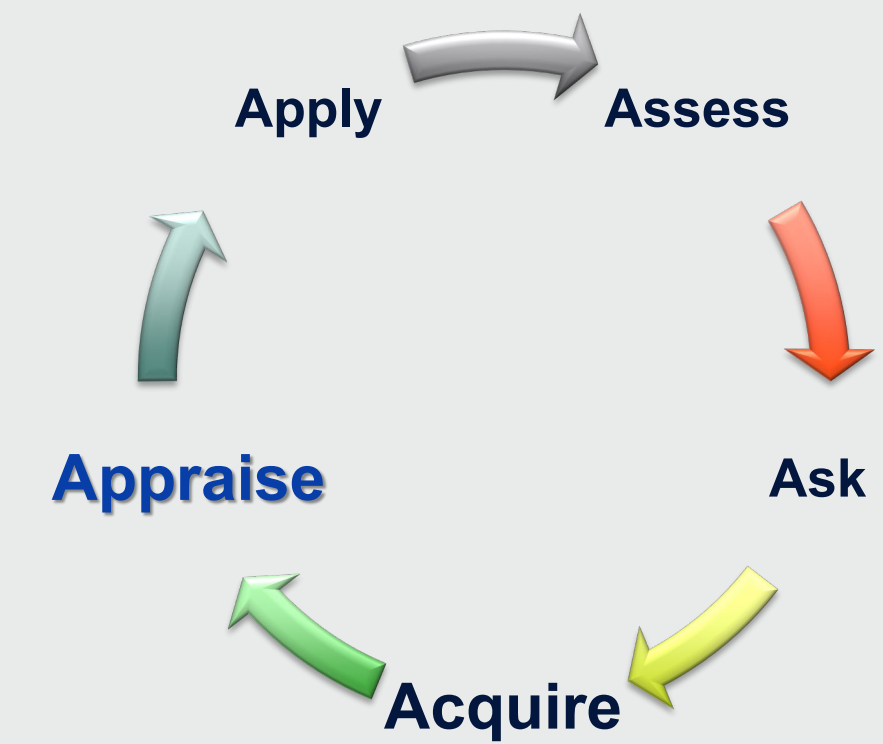
Appraise

Systematic Review Validity Criteria



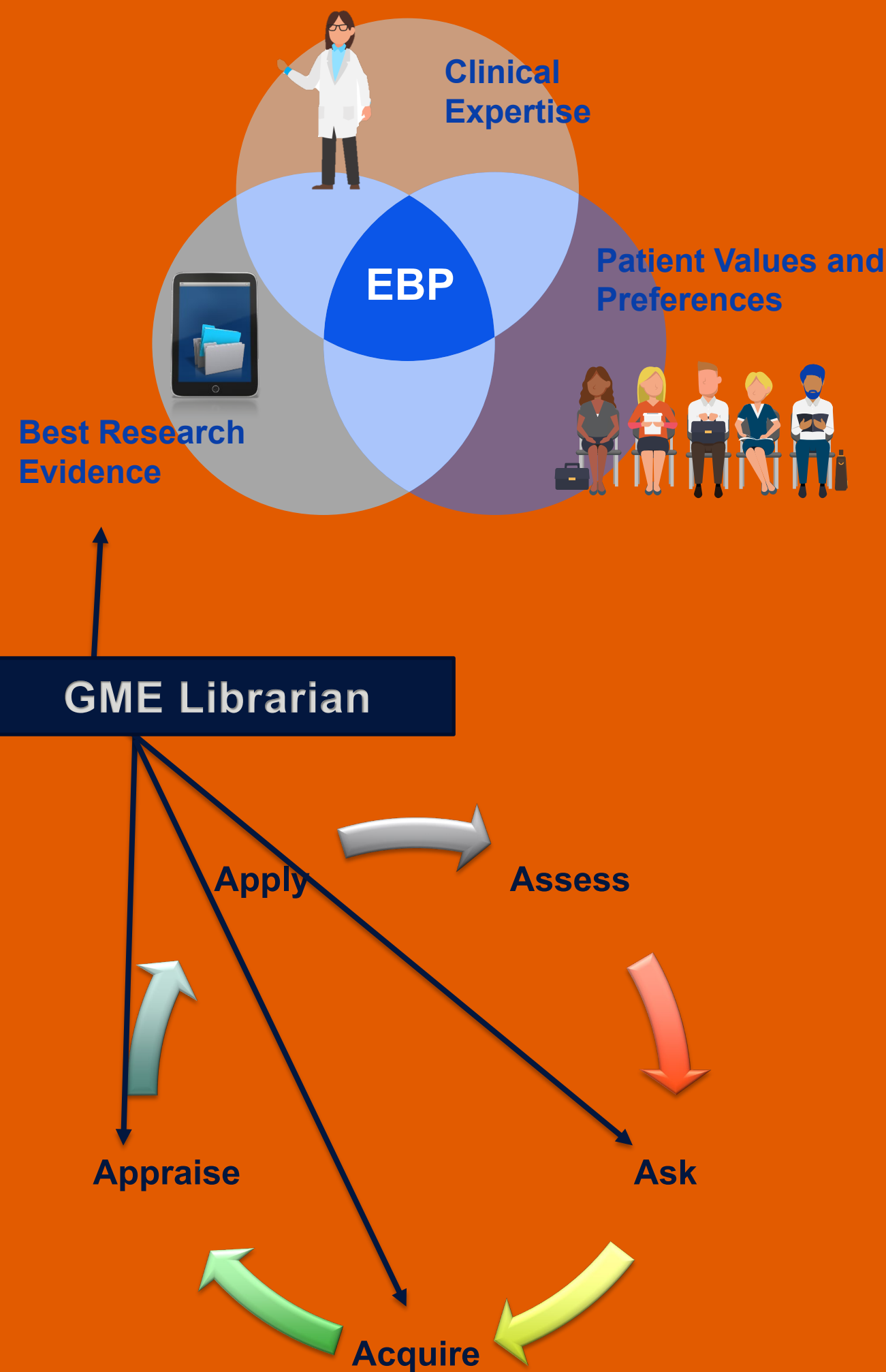
- Assess
 - Ask
 - Acquire
 - **Appraise**
 - Apply
- Did the review address a focused clinical question?
 - Was the search for relevant studies detailed and exhaustive?
 - Was the selection of studies reproducible?
 - Was the risk of bias of the primary studies assessed?

Appraise Primary Sources for Systematic Reviews & Meta-analysis



- Campbell Collaboration
- Cochrane Library
- Equator Network for Health Research Reporting
- HMD (formerly Institute of Medicine (IOM))
- National Institute for Health Research (NIHR)

In review



Today we:



- Learned the utility of creating a good clinical question using PICO
- Identified types of reviews, studies, and research designs using the 5A's
- Discovered key tools in the search process including research databases like PubMed and EBP evaluation tools like CEBM and EQUATOR
- Explored medical literature evaluation methods in order to critically appraise the literature

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