McMaster University

Family Medicine

David Braley Primary Care Research Collaborative

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# Critical Appraisal of Primary Care Literature

Watch a recording of the session here

**Jennifer Lawson**

March 27th, 2017

Michael G. DeGroote SCHOOL OF MEDICINE

McMaster University
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# Critical Appraisal of Primary Care Literature: Guided by Jennifer Lawson

Michael G. DeGroote
SCHOOL OF MEDICINE

EBM is defined as the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients. ... [It] means integrating individual clinical expertise with the best available external clinical evidence from systematic research.

Sackett DL, Rosenberg WM, Gray JA, Haynes RB, Richardson WS (1996). "Evidence based medicine: what it is and what it isn't". *BMJ*. **312** (7023): 71–2. doi:10.1136/bmj.312.7023.71. PMC 2349778 . PMID 8555924.

# Presentation Overview

- Why search the literature
- Where to search: literature database
- What to search: search strategy
- How to critically appraise: filtering, selecting results
- EBM Literature Search Services

# Why search the literature?

- Has your question has already been answered?
- Inform your study methods
- Background section of a publication
- Comprehensive searches support a systematic review or meta-analysis
- Remain current and informed

# Where to Search

- Health Literature Databases
  - Medline: PubMed, OVID Medline
  - CINAHL
  - EMBASE
- Grey Literature
  - Commissioned reports, government reports, dissertations, theses
- Google Scholar

http://hsl.mcmaster.ca/

Faculty of Health Sciences

HSL Health Sciences Library

**Today's Hours**

8am – 10:45pm

More hours

**Off-campus Access**

**Popular Tools**

Google Scholar

RACER

RACER registration

RefWorks

library.mcmaster.ca

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## Search Resources

Catalogue | E-Journals

Find books, journals, video, and more:

in Anywhere Go

Classic Catalogue / My Account Login
Advanced Search / Course Reserves

## Resource Guides

Find your program

Choose your topic

View all guides and tutorials

## Key Resources

**Article Databases**

- CINAHL
- OVID
- Pubmed
- Web of Science

More health databases

**Evidence-Based**

- Best Practice
- Cochrane
- Dynamed Plus
- UpToDate

More evidence-based resources

**E-Book Collections**

- Access Medicine
- Books @ OVID
- Clinical Key
- R2 Library

More e-book collections

**News**

- Liam the Library dog – HSL visits
- Natural Medicines is now available!
- Holiday hours

More news

ONLINE STUDYROOM BOOKING

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Make a Suggestion
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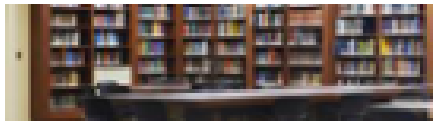
## Key Resources



### Article Databases

- CINAHL
- OVID
- Pubmed
- Web of Science

More health databases

### Evidence-Based

- Best Practice
- Cochrane
- Dynamed Plus
- UpToDate

More evidence-based resources

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- Access Medicine
- Books @ OVID
- Clinical Key
- R2 Library

More e-book collections

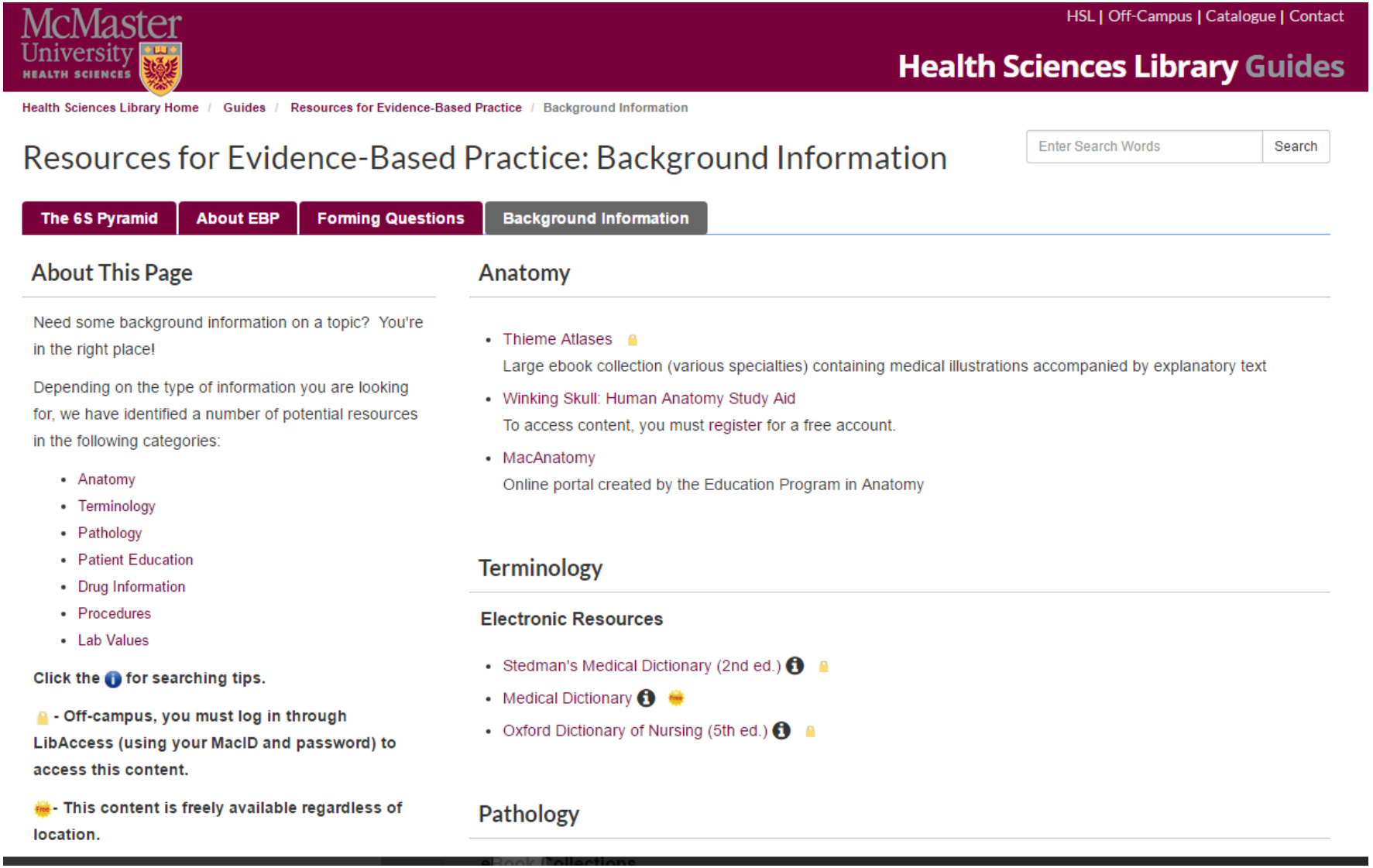
http://hsl.mcmaster.ca/

# What to Search

- Question formulation
- Background vs Foreground question
- PICO (T) framework
- Search terms: controlled vocabulary and free text
- PubMed search filters

# Question Type

- Background questions
  - Definitions
  - Pathology
  - Drug name
  - Clinical procedures




http://hsl.mcmaster.libguides.com/c.php?g=306765&p=2044720

## Pathology

### eBook Collections

Full-text search of a wide variety of health-related textbooks

- Access Medicine
- Clinical Key
- R2 Library

### Evidence-Based Texts

- DynaMed Plus
- UpToDate

### Electronic Resources

- The Merck Manual

## Drug Information

### Electronic Resources

- RxTx (contains CPS)
- Merck Index

### eBook Collections

Full-text search of a wide variety of health-related textbooks

- Access Medicine
- Clinical Key

### Evidence-Based Texts

- DynaMed Plus
- UpToDate

# Foreground Questions

**Qualitative Questions:**

- aim to discover meaning or gain an understanding of a phenomena. They ask about an individual's or population's experience of certain situations or circumstances

**Quantitative Questions:**

- aim to discover cause and effect relationships by comparing two or more individuals or groups based on differing outcomes associated with exposures or interventions.

# PICO Framework

**P**atient, **I**ntervention, **C**omparison, **O**utcome

- **A good question...**
- Focuses your information needs
- Identifies key search concepts
- Points you in the direction of potential resources

http://hsl.mcmaster.libguides.com/c.php?g=306765&p=2044787

## Quantitative Questions: The PICO(T) Model

A quantitative approach can answer many different types of questions, but all can be formatted by following the **PICO(T) Model** outlined below:

| | Therapy | Etiology | Diagnosis | Prevention | Prognosis |
|---|---|---|---|---|---|
| **P** – Population/ Disease | Characteristics of a population (age, gender, ethnicity, etc.) with a specific condition or set of circumstances. Ex. African-American males with type 2 diabetes. | | | | |
| **I/E** – Intervention OR Exposure | Specific drug or procedural intervention | Exposure to certain conditions or risk behaviour | Specific diagnostic tool or procedure | Specific drug or procedural intervention | Specific drug or procedural intervention |
| **C** – Comparator | Alternative drug or procedural intervention | Absence of certain conditions or risk behaviour | Alternative diagnostic tool or procedure | Alternative drug or procedural intervention | Alternative drug or procedural intervention |
| **O** - Outcome | Management of disease/ condition | Development of disease/ condition | Effective diagnosis of condition | Prevention of disease/ condition | Occurrence or absence of new condition |
| **T** – Time Frame | The time it takes to demonstrate an outcome OR the period in which patients are observed. Ex. The six-months following childbirth. | | | | |

# PICO(T) Templates

**Therapy**

In ___[***P***]___, do/does ___[***I***]___ result in ___[***O***]____ when compared with ___[***C***]___ over ___[***T***]____?

E.g.) In *nursing home residents with osteoporosis*, do *hip protectors* result in *fewer injuries from slips, trips, and falls*when compared with *standard osteoporosis drug therapy* over *the course of their stay*?

**Diagnosis**

Is/are ___[***I***]___ performed on ___[***P***]___ more effective than ___[***C***]___ over ___[***T***]____in ___[***O***]____?

E.g.) Are *self-reporting interviews and parent reports* performed on *children aged 5-10* more effective than *parent reports alone* over a *four-week consultation process* in *diagnosing depression*?

More found at
http://hsl.mcmaster.libguides.com/c.php?g=306765&p=2044787

Secure | https://www.ncbi.nlm.nih.gov/pubmed

NCBI Resources How To clouds My NCBI Sign O

PubMed.gov
US National Library of Medicine
National Institutes of Health

PubMed Search

Advanced He

# PubMed

PubMed comprises more than 26 million citations for biomedical literature from MEDLINE, life science journals, and online books. Citations may include links to full-text content from PubMed Central and publisher web sites.

## Using PubMed

- PubMed Quick Start Guide
- Full Text Articles
- PubMed FAQs
- PubMed Tutorials
- New and Noteworthy

## PubMed Tools

- PubMed Mobile
- Single Citation Matcher
- Batch Citation Matcher
- Clinical Queries
- Topic-Specific Queries

## More Resources

- MeSH Database
- Journals in NCBI Databases
- Clinical Trials
- E-Utilities (API)
- LinkOut

# PubMed Single Citation Matcher

Use this tool to find PubMed citations. You may omit any field.

Journal Help

Date yyyy/mm/dd (month and day are optional)

Details Volume Issue First page

Author name Help Holland Jl

Limit authors Only as first author Only as last author

Title words stools

Search Clear form

NCBI Resources How To

PubMed.gov
US National Library of Medicine
National Institutes of Health

PubMed Holland JI[author] AND stools

Create RSS Create alert Advanced

Format: Abstract Send to

J Clin Microbiol. 2000 Nov;38(11):4108-13.

# PCR detection of Escherichia coli O157:H7 directly from stools: evaluation of commercial extraction methods for purifying fecal DNA.

Holland JL[1], Louie L, Simor AE, Louie M.

Author information

## Abstract

Rapid identification of Escherichia coli O157:H7 is important for patient management and for prompt epidemiological investigations. We evaluated one in-house method and three commercially available kits for their ability to extract E. coli O157:H7 DNA directly from stool specimens for PCR. Of the 153 stool specimens tested, 107 were culture positive and 46 were culture negative. The sensitivities and specificities of the in-house enrichment method, IsoQuick kit, NucliSens kit, and QIAamp kit were comparable, as follows: 83 and 98%, 85 and 100%, 74 and 98%, and 86 and 100%, respectively. False-negative PCR results may be due to the presence of either inherent inhibitors or small numbers of organisms. The presence of large amounts of bacteria relative to the amount of the E. coli O157:H7 target may result in the lower sensitivities of the assays. All commercial kits were rapid and easy to use, although DNA extracted with the QIAamp kit did not require further dilution of the DNA template prior to PCR.

PMID: 11060076 PMCID: PMC87549

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# Automated term mapping

Search: Migraine headache

- "migraine disorders"[MeSH Terms] OR ("migraine"[All Fields] AND "disorders"[All Fields]) OR "migraine disorders"[All Fields] OR ("migraine"[All Fields] AND "headache"[All Fields]) OR "migraine headache"[All Fields]

29366 hits

# Finding Related Articles

- Good Citation → Similar Articles
- Takes indexed profile and textwords of the presenting article and applies a matching strategy to find other similar articles
- Useful browsing feature to employ at the start of your search to reveal written term expression and MeSH

Fam Pract. 2014 Oct;31(5):502-16. doi: 10.1093/fampra/cmu053. Epub 2014 Sep 12.

# Organizational aspects of primary care related to avoidable hospitalization: a systematic review.

van Loenen T[1], van den Berg MJ[2], Westert GP[3], Faber MJ[3].

Author information

## Abstract

**BACKGROUND:** Often used indicators for the quality of primary care are hospital admissions rates for conditions which are potentially avoidable by well-functioning primary care. Such hospitalizations are frequently termed as ambulatory care sensitive conditions (ACSCs).

**OBJECTIVE:** We aim to investigate which characteristics of primary care organization influence avoidable hospitalization for chronic ACSCs.

**METHODS:** MEDLINE, Embase and SciSearch were searched for publications on avoidable hospitalization and primary care. Studies were included if peer reviewed, written in English, published between January 1997 and November 2013, conducted in high income countries, identified hospitalization for ACSC as outcome measures and researched organization characteristics of primary care. A risk of bias assessment was performed to assess the quality of the articles.

**FINDINGS:** A total of 1778 publications were reviewed, of which 49 met inclusion criteria. Twenty-two primary care factors

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Similar articles

Strategies for reducing potentially avoidable hospitalizations for an [Ann Fam Med. 2013]

Preventable hospitalization and access to primary healtr [BMC Health Serv Res. 2007]

The impact of primary care organization on avoidable [Scand J Prim Health Care. 2016]

Review The relationship between avoidable hospit [Eur J Public Health. 2013]

**CONCLUSIONS:** Available evidence suggests that strong primary care in terms of adequate primary care physician supply and long-term relationships between primary care physicians and patients reduces hospitalizations for chronic ACSCs. There is a lack of evidence for the positive effects of many other organizational primary care aspects, such as specific disease management programs.

© The Author 2014. Published by Oxford University Press. All rights reserved. For permissions, please e-mail: journals.permissions@oup.com.

**KEYWORDS:** Access to health; chronic disease; continuity of care; hospitalization; primary care; quality of care.

PMID: 25216664 DOI: 10.1093/fampra/cmu053

[PubMed - indexed for MEDLINE]

## Publication Types, MeSH Terms

**Publication Types**

Research Support, Non-U.S. Gov't
Review

**MeSH Terms**

Ambulatory Care/organization & administration*
Continuity of Patient Care
Health Services Accessibility
Health Services Misuse*
Hospitalization*
Humans
Physician-Patient Relations
Physicians, Primary Care/supply & distribution*
Primary Health Care/organization & administration*
Quality of Health Care

# Controlled Vocabulary

- Structured search terms
- Medline → MeSH (**Me**dical **S**ubject **H**eadings)
  - Consider scope notes
  - Major, minor or exploded MeSH
  - MeSH Database
- Terms tags

  [MAJR] MeSH Major Topic

  [MH] MeSH

Secure | https://www.ncbi.nlm.nih.gov/mesh

NCBI Resources How To clouds My NCBI

MeSH

MeSH

Limits Advanced

# MeSH

MeSH (Medical Subject Headings) is the NLM controlled vocabulary thesaurus used for indexing articles for PubMed.

## Using MeSH

Help

Tutorials

## More Resources

E-Utilities

NLM MeSH Homepage

NCBI Resources How To

MeSH

MeSH migraine headache

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Full Send to:

## Migraine Disorders

A class of disabling primary headache disorders, characterized by recurrent unilateral pulsatile headaches. The two major subtypes are common migraine (without aura) and classic migraine (with aura or neurological symptoms). (International Classification of Headache Disorders, 2nd ed. Cephalalgia 2004: suppl 1)

Year introduced: 2006 (1963)

PubMed search builder options

Subheadings:

- analysis
- anatomy and histology
- blood
- cerebrospinal fluid
- chemically induced
- classification
- complications
- congenital
- diagnosis
- diagnostic imaging
- epidemiology
- ethnology
- etiology
- genetics
- history
- immunology
- metabolism
- microbiology
- mortality
- nursing
- physiology
- physiopathology
- prevention and control
- psychology
- radiotherapy
- rehabilitation
- secretion
- statistics and numerical data
- surgery
- therapy

- [ ] diagnosis
- [ ] diagnostic imaging
- [ ] diet therapy
- [ ] drug therapy
- [ ] economics
- [ ] enzymology
- [ ] mortality
- [ ] nursing
- [ ] organization and administration
- [ ] parasitology
- [ ] pathology
- [ ] surgery
- [ ] therapy
- [ ] urine
- [ ] veterinary
- [ ] virology

- [ ] Restrict to MeSH Major Topic.
- [ ] Do not include MeSH terms found below this term in the MeSH hierarchy.

Tree Number(s): C10.228.140.546.399.750
MeSH Unique ID: D008881
Entry Terms:

- Disorder, Migraine
- Disorders, Migraine
- Migraine Disorder
- Migraine
- Migraines
- Migraine Headache
- Headache, Migraine
- Headaches, Migraine
- Migraine Headaches
- Acute Confusional Migraine
- Acute Confusional Migraines
- Migraine, Acute Confusional
- Migraines, Acute Confusional
- Status Migrainosus
- Hemicrania Migraine

- Headache, Sick
- Headaches, Sick
- Sick Headaches
- Abdominal Migraine
- Abdominal Migraines
- Migraine, Abdominal
- Migraines, Abdominal
- Cervical Migraine Syndrome
- Cervical Migraine Syndromes
- Migraine Syndrome, Cervical
- Migraine Syndromes, Cervical

All MeSH Categories
Diseases Category
Nervous System Diseases
Central Nervous System Diseases
Brain Diseases
Headache Disorders
Headache Disorders, Primary
**Migraine Disorders**
Alice in Wonderland Syndrome
Migraine with Aura
Migraine without Aura
Ophthalmoplegic Migraine

## PubMed Search Builder

"Migraine Disorders"[Mesh]

Add to search builder | AND ▾

Search PubMed

PubMed ▾ "Migraine Disorders"[Mesh]

Create RSS Create alert Advanced

**Format**: Summary **Sort by**: Most Recent **Send to**

### Search results

**Items: 1 to 20 of 23744**

<< First < Prev Page 1 of 1188 Next > Last >>

1. Risk of medication overuse headache across classes of treatments for acute migraine.
Thorlund K, Sun-Edelstein C, Druyts E, Kanters S, Ebrahim S, Bhambri R, Ramos E, Mills EJ, Lanteri-Minet M, Tepper S.
J Headache Pain. 2016 Dec;17(1):107. Review.
PMID: 27882516 **Free PMC Article**
Similar articles

2. Intravenous ketamine for subacute treatment of refractory chronic migraine: a case series.
Lauritsen C, Mazuera S, Lipton RB, Ashina S.
J Headache Pain. 2016 Dec;17(1):106.
PMID: 27878523 **Free PMC Article**

PubMed ▼ "Migraine Disorders"[Mesh]

Create RSS Create alert Advanced

**Format**: Summary **Sort by**: Most Recent **Send to**

## Search results

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Similar articles

2. Intravenous ketamine for subacute treatment of refractory chronic migraine: a case series.

Lauritsen C, Mazuera S, Lipton RB, Ashina S.

J Headache Pain. 2016 Dec;17(1):106.

PMID: 27878523 **Free PMC Article**

Similar articles

# Textword terms

- Required where no MeSH exist, delayed
- Applied to get at author used terminology

  e.g. Ambulatory Care Sensitive Conditions or ACSC
- Specified with Term Tag: [TW]  textword
- Use quotes to search a specific phrase
- Use of * for truncation e.g.hospital*
- To narrow where the term is found apply the [TIAB] Title, abstract

| Concept | MeSH Strategy | Text Strategy |
|---|---|---|
| Ambulatory care sensitive condition | | (Ambulatory-care sensitive conditions[TIAB] OR Ambulatory-care sensitive condition[TIAB] OR Ambulatory care sensitive conditions[TIAB] OR Ambulatory care sensitive condition[TIAB] OR ACSC[TIAB] OR ACSCs[TIAB]) |
| Patient Admission, Patient Readmission | Patient Admission[MeSH] OR Patient Readmission[MeSH] | Patient Admission[TIAB] OR Patient Readmission[TIAB] |
| Hospitalization | Hospitalization[MeSH] | hospital admission [TIAB] or Readmission[TIAB] or hospitalization*[TIAB] OR hospitalisation*[TIAB] |
| Acute Care Admission | | "acute care admission" |
| Unplanned Hospitalization/Hospital Admisson | | unplanned [tiab] OR unexpected[TIAB] OR unscheduled[TIAB] OR preventable[TIAB] OR avoidable[TIAB] |
| potentially preventable hospitalisations (PPH) | | potentially preventable hospitalisations [TIAB] |
| Avoidable hospitalization (AH) | | "avoidable hospitalization OR "avoidable hospitalisation" |
| Low acuity ED use | | Low acuity[TIAB] |
| ED visit reduction | | "ED visit reduction" |
| Emergency Admission | Emergency Medical Services[MeSH Terms] OR Emergency Treatment[MeSH Terms] OR Emergency Care[MeSH Terms] OR Emergency Services, Hospital[MeSH] | (emergency department*[TIAB] OR emergency unit*[TIAB] OR emergency centre*[TIAB] OR emergency center*[TIAB] OR emergency room*[TIAB] OR afterhours[TIAB] OR after hours[TIAB] OR Emergency visit[TIAB]) |

PubMed ▾ Migraine [TIAB]

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**Format**: Summary ▾ **Sort by**: Most Recent ▾ **Send to** ▾

## Search results

**Items: 1 to 20 of 28211**

<< First < Prev Page 1 of 1411 Next > Last >>

1. Endovascular thrombectomy and post-procedural headache.
   Khan S, Amin FM, Holtmannspötter M, Hansen K, Florescu AM, Fakhril-Din Z, Petersen JF, Ghanizada H, Ayata C, Gaist D, Ashina M.
   J Headache Pain. 2017 Dec;18(1):10. doi: 10.1186/s10194-017-0719-0.
   PMID: 28130625
   Similar articles

2. EEG findings during "paroxysmal hemiplegia" in a patient with GLUT1-deficiency.
   Pellegrin S, Cantalupo G, Opri R, Dalla Bernardina B, Darra F.
   Eur J Paediatr Neurol. 2017 Jan 17. pii: S1090-3798(17)30021-1. doi: 10.1016/j.ejpn.2017.01.002. [Epub ahead of print]
   PMID: 28129950
   Similar articles

3. 50 Years Ago in The Journal of Pediatrics: **Migraine**.
   Jeng S.
   J Pediatr. 2017 Feb;181:85. doi: 10.1016/j.jpeds.2016.08.090. No abstract available.

# Search Filters

## Basic Filter

hasabstract[text] AND English[Lang] NOT ("animals"[MeSH Terms] NOT "humans"[MeSH Terms]) AND "last 5 years"[PDat]

3795438 hits

PubMed ▾ (Migraine [TIAB]) AND ((hasabstract[text] AND English[Lang] NOT ("animals"[MeSH Search

Create RSS Create alert Advanced

**Format**: Summary **Sort by**: Most Recent **Send to**

## Search results

**Items: 1 to 20 of 5574**

<< First < Prev Page 1 of 279 Next > Last >>

1. Endovascular thrombectomy and post-procedural headache.
Khan S, Amin FM, Holtmannspötter M, Hansen K, Florescu AM, Fakhril-Din Z, Petersen JF, Ghanizada H, Ayata C, Gaist D, Ashina M.
J Headache Pain. 2017 Dec;18(1):10. doi: 10.1186/s10194-017-0719-0.
PMID: 28130625
Similar articles

2. EEG findings during "paroxysmal hemiplegia" in a patient with GLUT1-deficiency.
Pellegrin S, Cantalupo G, Opri R, Dalla Bernardina B, Darra F.
Eur J Paediatr Neurol. 2017 Jan 17. pii: S1090-3798(17)30021-1. doi: 10.1016/j.ejpn.2017.01.002. [Epub ahead of print]
PMID: 28129950
Similar articles

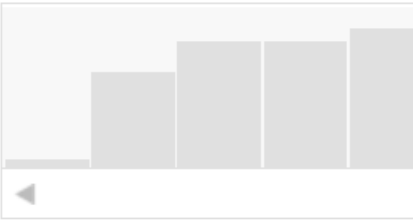
3. Improvement of **migraine** with change from combined hormonal contraceptives to progestin-only contraception with desogestrel: How strong is the effect of taking women

**Filter your results:**

All (5574)

Published in the last 30 da (119)

**Results by year**



**Find related data**

Database: Select

Find items

Secure | https://www.ncbi.nlm.nih.gov/pubmed

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US National Library of Medicine
National Institutes of Health

PubMed Search

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# PubMed

PubMed comprises more than 26 million citations for biomedical literature from MEDLINE, life science journals, and online books. Citations may include links to full-text content from PubMed Central and publisher web sites.

## Using PubMed

- PubMed Quick Start Guide
- Full Text Articles
- PubMed FAQs
- PubMed Tutorials
- New and Noteworthy

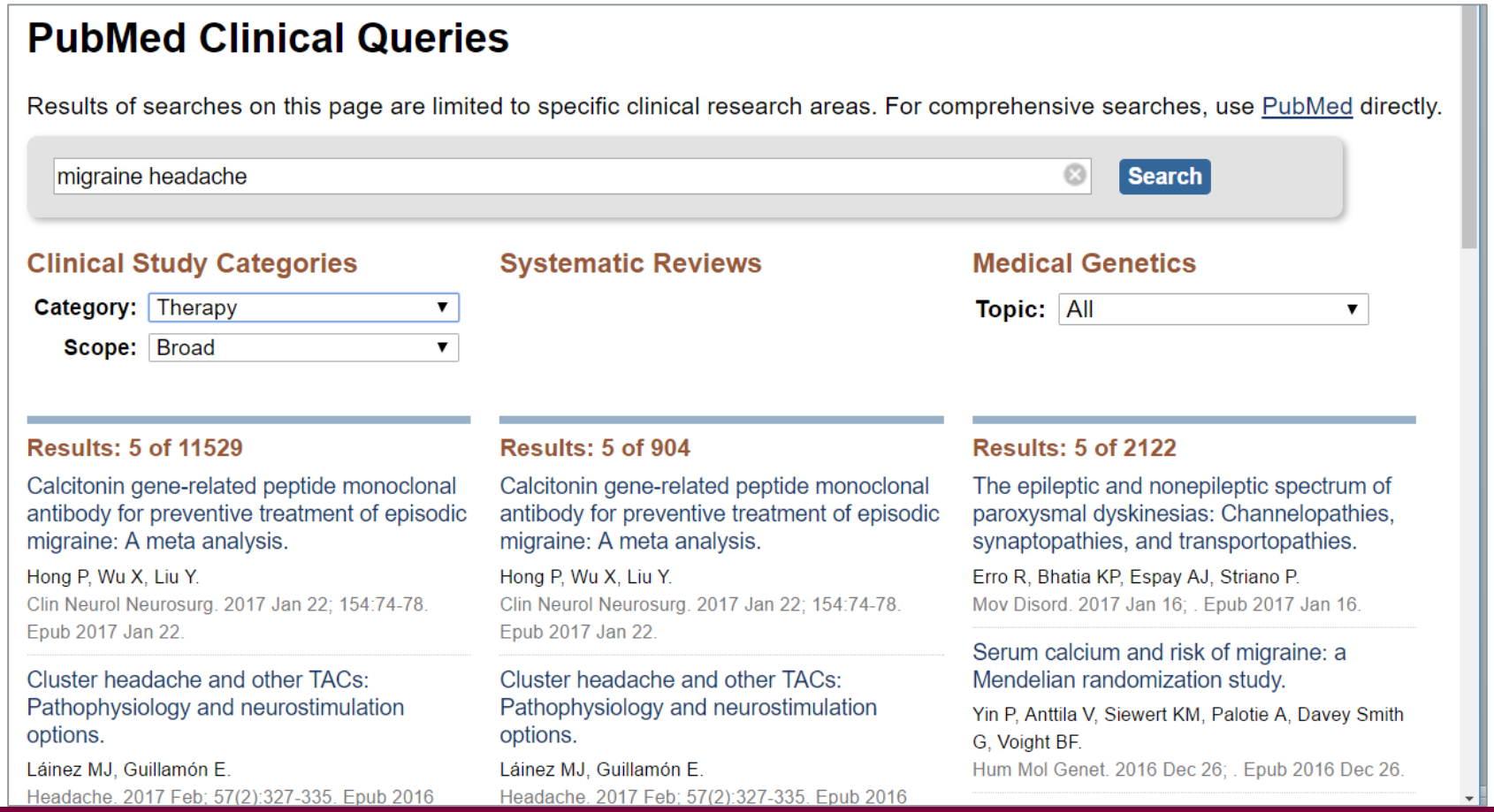
## PubMed Tools

- PubMed Mobile
- Single Citation Matcher
- Batch Citation Matcher
- Clinical Queries
- Topic-Specific Queries

## More Resources

- MeSH Database
- Journals in NCBI Databases
- Clinical Trials
- E-Utilities (API)
- LinkOut

| Study Type | Filter Type | Strategy |
|---|---|---|
| Therapy | Broad | ((clinical[Title/Abstract] AND trial[Title/Abstract]) OR clinical trials[MeSH Terms] OR clinical trial[Publication Type] OR random*[Title/Abstract] OR random allocation[MeSH Terms] OR therapeutic use[MeSH Subheading]) |
| | Narrow | (randomized controlled trial[Publication Type] OR (randomized[Title/Abstract] AND controlled[Title/Abstract] AND trial[Title/Abstract])) |



# Critical Appraisal

- Scientific strength of research (study design, population size, lack of bias)
- Applicability (generalizability) to your population
- Current, most recent evidence
- Saturation – having an exhaustive set
- Summarizing the literature on a given topic

# Summarizing

- Bundling like studies together: compare and contrast
- Documenting bottom line
- Determining conclusions
- Writing summaries: start of background
- Tracking references in EndNote

# Hamiliton Initiative Lit Summary

Risk, Relationships and Associations related **to ACSC** (20)

- Patient factors (7)
- Accessibility to PC (3)
- Practice-based Factors (9)
- Provider-Patient Relationship Factors (1)
- Defining ACSC (1)

Interventions for reducing ACSC (6)

Avoiding **Emergency Department** Use (8)

- Patient factors (1)
- Interventions (6)
- ER – Review of Risk identification, prevention interventions (1)

Physician Opinion re reducing avoidable hospitalization (Survey, Interview) (2)

# Critical Appraisal Tools

- Evidence Pyramid
- CASP: Critical Appraisal Skills Programme
- HiRU's Critical Appraisal Inclusion Criteria
- GRADE: Grading of Recommendations, Assessment, Development and Evaluation

# Evidence-based Healthcare Evidence Pyramid 5.0

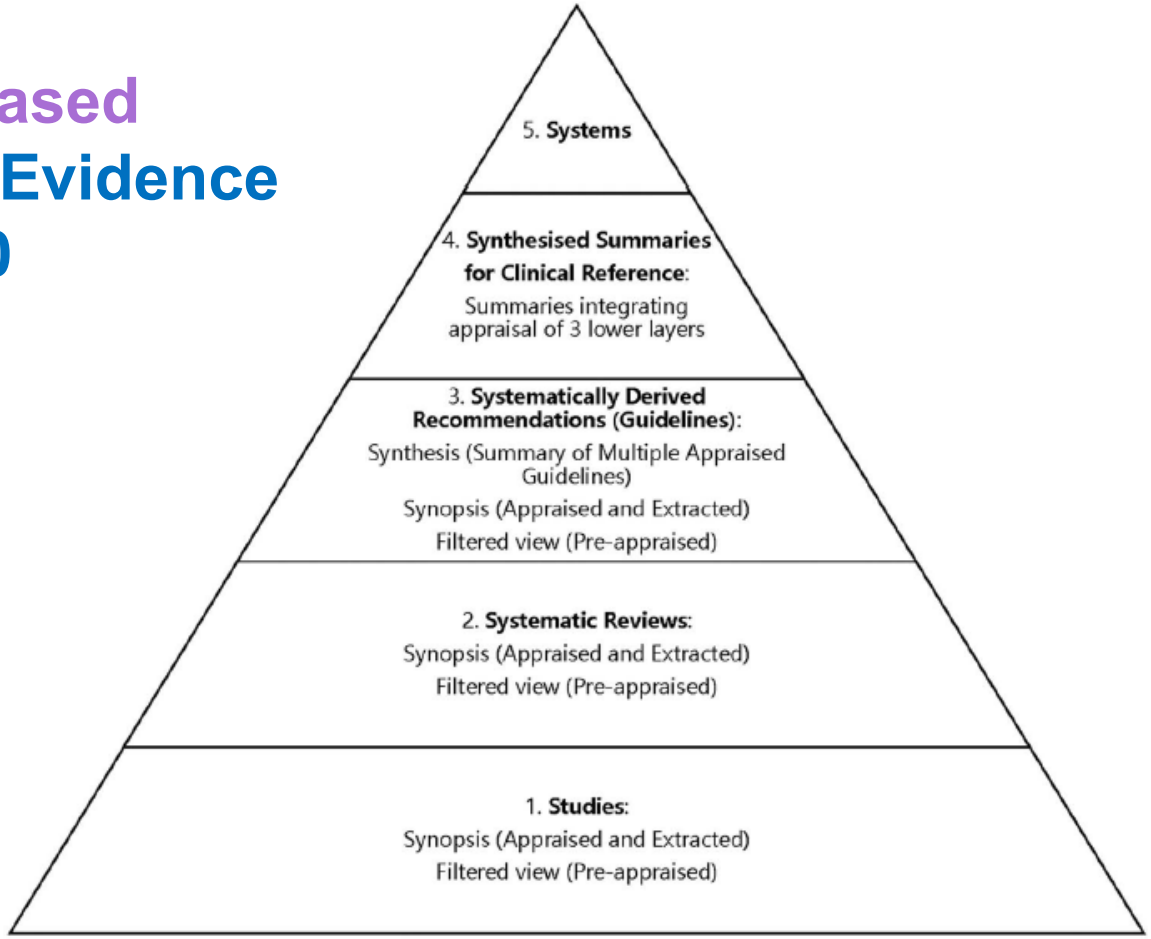
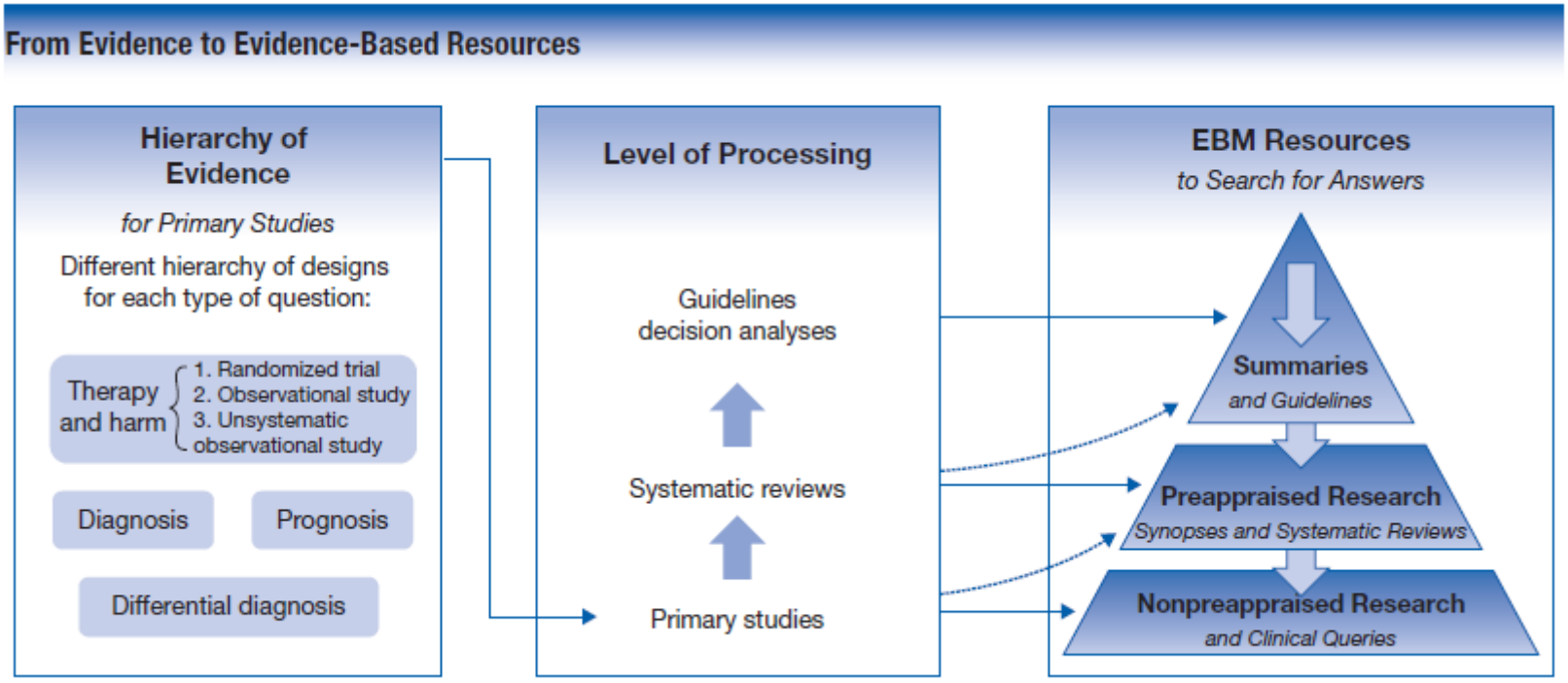



**Figure 2** Evidence-based healthcare pyramid 5.0 for finding preappraised evidence and guidance.

Haynes, RB, Alpers, B. 2016. Evidence Based Medicine. 21 (4), 123-25

**FIGURE 5-1**




Agoritsas T, T Vandvik PO, Neumann I, Rochwerg B, Jaeschke R, Hayward R, Guyatt GH, McKibbon A. Chapter 5. Finding Current Best Evidence, in JAMA Users' Guides to the Medical Literature: A Manual for Evidence-Based Clinical Practice, 3nd Edition, McGraw-Hill Medical, 2015.

# Evidence-based Medicine (EBM) Literature Sources

- Summaries and guidelines: e.g. Up To Date, Canadian Taskforces on Preventive Healthcare (CTFPHC) Guidelines
- Preappraised research: e.g. Cochrane Reviews, McMaster PLUS
- Nonpreappraised research e.g. PubMed Clinical Queries
- Federated searches e.g. MacPLUS Federated Search

# Critical Appraisal Skills Programme (CASP)

***Making sense of evidence***



The Critical Appraisal Skills Programme (CASP) is part of Better Value Healthcare, a training organisation led by Professor Sir Muir Gray, and based in Oxford. The programme has developed workshops and tools for critical appraisal covering a wide range of research. It has also developed finding the evidence workshops, interactive and e-learning resources.

The philosophy of CASP has always been about sharing knowledge and understanding, working in ways that are non hierarchical, multidisciplinary and using problem based approaches. This ensures that it is accessible and has practical day to day application.

# CASP CHECKLISTS

This set of eight critical appraisal tools are designed to be used when reading research, these include tools for Systematic Reviews, Randomised Controlled Trials, Cohort Studies, Case Control Studies, Economic Evaluations, Diagnostic Studies, Qualitative studies and Clinical Prediction Rule.

These are free to download and can be used by anyone under the Creative Commons License.

## CASP Checklists (click to download)

| | |
|---|---|
| CASP Systematic Review Checklist | CASP Qualitative Checklist |
| CASP Randomised Controlled Trial Checklist | CASP Case Control Checklist |
| CASP Diagnostic Checklist | CASP Cohort Study Checklist |
| CASP Economic Evaluation Checklist | CASP Clinical Prediction Rule Checklist |

# CASP: RCT Trial Checklist

## (A) Are the results of the trial valid?

Screening Questions

**1. Did the trial address a clearly focused issue?** ☐ Yes ☐ Can't tell ☐ No

Consider: An issue can be 'focused' In terms of

- The population studied
- The intervention given
- The comparator given
- The outcomes considered

## 2. Was the assignment of patients to treatments randomised?

☐ Yes ☐ Can't tell ☐ No

Consider:

- How was this carried out, some methods may produce broken allocation concealment
- Was the allocation concealed from researchers?

**Is it worth continuing?**

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# CASP RCT Trial Check List: Detailed Questions

3. Were patients, health workers and study No personnel blinded?
Consider: Health workers could be; clinicians, nurses etc; Study personnel – especially outcome assessors
□Yes □Can't tell □

4. Were the groups similar at the start of the trial? Consider: Look at Other factors that might affect the outcome such as age, sex, social class, these may be called baseline characteristics
□ Yes □Can't tell □No

5. Aside from the experimental intervention, were the groups treated equally?
□Yes □Can't tell □No

6. Were all of the patients who entered the trial properly accounted for at its conclusion? Consider: Was the trial stopped early? Were patients analysed in the groups to which they were randomised?
□Yes □Can't tell □No

# CASP RCT Trial Check List: What are the Results?

7. How large was the treatment effect? Consider: What outcomes were measured? Is the primary outcome clearly specified? What results were found for each outcome? Is there evidence of selective reporting of outcomes?

8.How precise was the estimate of the treatment effect? Consider: What are the confidence limits? Were they statistically significant?

9. Can the results be applied in your context? (or to the local population?) Consider: Do you have reason to believe that your population of interest is different to that in the trial If so, in what way?
□Yes □Can't tell □No

10. Were all clinically important outcomes considered? Consider: Is there other information you would like to have seen? Was the need for this trial clearly described?
□Yes □Can't tell □No

11. Are the benefits worth the harms and costs? Consider: Even if this is not addressed by the trial, what do you think?
□Yes □Can't tell □No

# HiRU's Critical Appraisal

**Basic** criteria for original or review articles:

- in English
- about humans
- about topics that are important to the clinical practice of medicine, nursing, rehabilitation, and other health professions, other than descriptive studies of prevalence
- analysis of each article consistent with the study question.

Studies of **prevention or treatment** must meet these additional criteria:

- random allocation of participants to comparison groups
- ≥ 10 patients per group (assessed for outcome)
- ≥ 1 specified outcome assessed in ≥ 80% of those randomized at any given follow-up point
- outcome measure of known or probable clinical importance
- subgroup analyses must be preplanned, with groups analyzed as they were randomized; analysis must test for interaction between ≥ 2 subgroups.

Studies of **diagnosis** must meet these additional criteria:

- inclusion of a spectrum of participants where some, but not all, have the disorder or derangement of interest
- inclusion of ≥ 100 participants, with ≥ 50 participants with the disease and ≥ 50 participants without the disease
- objective diagnostic ("gold") standard (e.g., laboratory test not requiring interpretation) OR current clinical standard for diagnosis (e.g., a venogram for deep venous thrombosis), preferably with documentation of reproducible criteria for subjectively interpreted diagnostic standard (i.e., report of statistically significant measure of agreement beyond chance among observers)
- each participant must receive both the new test and some form of the diagnostic standard
- interpretation of diagnostic standard without knowledge of test result
- interpretation of test without knowledge of diagnostic standard result.

Diagnostic tests may also be tested in randomized trials, in which case the criteria for prevention or treatment apply.

Studies of **differential diagnosis** must meet these additional criteria:

- a cohort of patients who present with a similar, initially undiagnosed but reproducibly defined, clinical problem
- explicit description of clinical setting, including the referral filter
- ascertainment of diagnosis for ≥ 80% of patients using a reproducible diagnostic work-up strategy for all patients and follow-up until patients are diagnosed or follow-up ≥ 1 month for acute disorders or ≥ 1 year for chronic or relapsing disorders.

Studies of **prognosis** must meet these additional criteria:

- inception cohort of patients at a similar and early point in the course of a disease or condition, all initially free of the outcome of interest
- prospective standardized data collection specifically for the purpose of the study (i.e., identifying and following up an inception cohort of patients with a disease)
- follow-up of ≥ 80% of patients until the occurrence of a major study endpoint or to the end of the study.

Studies of **clinical prediction guides** must meet these additional criteria:

- purpose is to validate or compare a rule/index/scale/model that combines ≥ 2 factors into some type of score/ranking that assigns individual patients to different levels of risk for a specific outcome (diagnosis, prognosis, treatment responsiveness) based on the presence/absence of these factors
- data for the prediction guide must be available before data on the outcome that it is predicting
- the guide must be generated in one or more sets of real (not hypothetical) patients (derivation or development cohort)
- the guide must be validated in another set of real (not hypothetical) patients (validation cohort); internal bootstrapping is not acceptable as validation
    - studies validating a previously derived clinical prediction guide must provide a reference for derivation of the guide and must assess ≥ 1 of the outcomes assessed in the derivation cohort
    - prediction guides developed using individual patient data from ≥ 1 study do not require separate validation
- study must provide information on how to apply the prediction guide in individual patients or cite a reference to this information.

Studies of **etiology of harm from medical interventions** must meet these additional criteria:

- explicit purpose is to assess adverse effects of an intervention
- prospective data collection with clearly identified comparison groups for those at risk for the outcome of interest (in descending order of preference: quasi-randomized controlled trial, nonrandomized controlled trial, cohort study with case-by-case matching or statistical adjustment to create comparable groups, nested case–control study)
- blinding (masking) of observers of outcomes to exposures (criterion assumed to be met if outcome is objective, e.g., all-cause mortality or objective test)
- if harm reported, relative risk (RR) or hazard ratio (HR) or equivalent ≥ 2.0, with a lower 95% CI that excludes 1.5
- if no harm reported, upper 95% CI of RR or HR or equivalent excludes 1.5.

Randomized controlled trials assessing adverse effects are evaluated using criteria for studies of prevention or treatment.

Studies of **quality improvement or continuing education** must meet these additional criteria:

- random allocation of participants or units to comparison groups
- ≥ 10 patients per group (assessed for outcome)
- ≥ 1 specified outcome assessed in ≥ 80% of those randomized at any given follow-up point
- outcome measure of known or probable clinical or educational importance.

Studies of the **economics** of health care programs or interventions must meet these additional criteria:

- the economic question addressed must be based on comparison of alternatives in real patients
- alternate diagnostic or therapeutic services or quality improvement activities must be compared on the basis of both the outcomes produced (effectiveness) and resources consumed (costs)
- evidence of both effectiveness and costs reported in single randomized controlled trial that passes criteria for prevention or treatment
- results should be presented in terms of the incremental or additional costs and outcomes of one intervention over another
- where uncertainty exists in the estimates or imprecision in the measurement, a sensitivity analysis should be done.

**Systematic review** articles must meet these additional criteria:

- explicit statement of the clinical topic
- identifiable description of the methods, including the databases searched and inclusion and exclusion criteria for selecting articles for detailed review; reviews of prognosis must have "inception cohort" as an inclusion criteria
- ≥ 1 major database searched.

Reviews that explicitly do not include ≥ 1 study that meets the above-noted criteria for treatment, diagnosis, differential diagnosis, prognosis, clinical prediction guides, etiology of harm from medical interventions, quality improvement, or economics are excluded.

**Individual patient data meta-analyses** must meet these additional criteria:

- includes data combined at a patient level from ≥ 2 original studies about prevention, treatment, diagnosis, differential diagnosis, prognosis, clinical prediction, etiology, quality improvement, or economics of health care.

These criteria are subject to modification if, for example, it is found feasible to apply higher standards that increase the validity and applicability of studies for clinical practice. The objective of the criteria screen is to include only the very best literature, consistent with a reasonable number of articles "making it through the filter."

*Updated 14 November 2013*

# GRADE

- Grading of Recommendations, Assessment, Development and Evaluation (GRADE) Working Group
- Widely seen as the most effective method of linking evidence-quality evaluations to clinical recommendations
- A common, sensible and transparent approach to grading quality (or certainty) of evidence and strength of recommendations
- Each outcome presented in a given systematic review or Clinical Guideline is scored on quality of its underlying evidence base
- Look for indication of GRADE ratings in the citations you find in your search retrieval

http://www.gradeworkinggroup.org/

- GRADE table presents each outcome presented in a review or guideline and outlines:
- details of studies contributing data to it
- treatment comparison involved (e.g., drug A versus placebo, drug A versus drug B)
- number of people included in the comparison.
- an overall GRADE score (from 4 to 0) based on our assessment of the overall quality of evidence for that outcome.

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# Health Information Research Unit

The Health Information Research Unit (HIRU) in the Department of Health Research Methods, Evidence, and Impact (HEI) at McMaster University conducts research in the field of health information science and is dedicated to the generation of new knowledge about the nature of health and clinical information problems, the development of new information resources to support evidence-based health care, and the evaluation of various innovations in overcoming health care information problems.

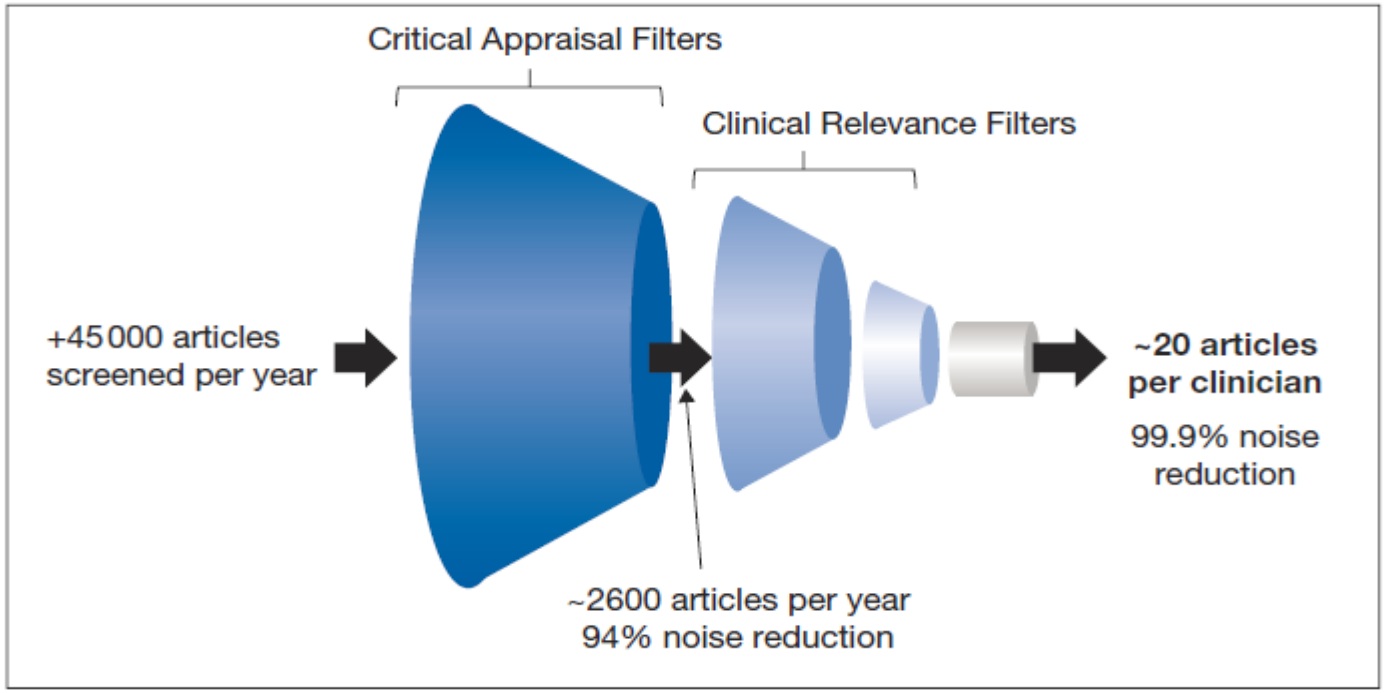
## Our Mission...

...is to improve the effectiveness and efficiency of health care by providing innovative evidence-based information products and systems to health professionals, patients, policy makers, and the public.

Hi, I'm Jen

**FIGURE 5-2**

## Example of Preappraised Research: McMaster *PLUS*

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Agoritsas T, T Vandvik PO, Neumann I, Rochwerg B, Jaeschke R, Hayward R, Guyatt GH, McKibbon A. Chapter 5. Finding Current Best Evidence, in JAMA Users' Guides to the Medical Literature: A Manual for Evidence-Based Clinical Practice, 3nd Edition, McGraw-Hill Medical, 2015.

# EvidenceUpdates

from BMJ

EvidenceUpdates has now become **EvidenceAlerts**, same source (McMaster University's Health Information Research Unit), new sponsor (EBSCO Health's DynaMed Plus).

Please take note of the new URL and update your bookmarks:
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DynaMed Plus and McMaster University's Health Information Research Unit are collaborating to provide you with access to current best evidence from research, tailored to your own health care interests, to support evidence-based clinical decisions.

This service is unique: all articles (from over 120 premier clinical journals) are pre-rated for quality by highly trained research staff, then rated for clinical relevance and interest by at least 3 members of a worldwide panel of practicing physicians. Here's what we offer:

- A searchable database of the best evidence from the medical literature
- An email alerting system
- Links to selected evidence-based resources

**Hit Parade: The most often read articles in all disciplines, in the past 30 days**

1. **Clinical Outcomes of Metformin Use in Populations With Chronic Kidney Disease, Congestive Heart Failure, or Chronic Liver Disease: A Systematic Review.**
   Ann Intern Med *(Review)*
2. **Screening for abdominal aortic aneurysm in asymptomatic adults.**
   J Vasc Surg *(Review)*
3. **Beta-blockers for hypertension.**
   Cochrane Database Syst Rev *(Review)*

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- Exercise during pregnancy protects against hypertension and macrosomia: randomized clinical trial.
  Am J Obstet Gynecol. 2016 May;214(5):649.e1-8. doi: 10.1016/j.ajog.2015.11.039. Epub 2015 Dec 15. (Original)
- Effect of antihypertensive treatment at different blood pressure levels in patients with diabetes mellitus: systematic review and meta-analyses.
  BMJ. 2016 Feb 24;352:i717. doi: 10.1136/bmj.i717. (Review)
- Compression stockings for preventing deep vein thrombosis in airline passengers.
  Cochrane Database Syst Rev. 2016 Sep 14;9:CD004002. (Review)
- 2016 updated EULAR evidence-based recommendations for the management of gout.
  Ann Rheum Dis. 2017 Jan;76(1):29-42. doi: 10.1136/annrheumdis-2016-209707. Epub 2016 Jul 25. (Review)
- Diabetes Medications for Adults With Type 2 Diabetes: An Update
  Rockville (MD): Agency for Healthcare Research and Quality (US); 2016 Apr. No. 16-EHC013-EF (Review)

Best new evidence for health care

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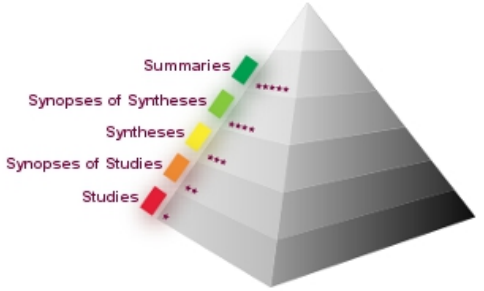


New Evidence-Based Medicine: An Oral History (video)
New Evidence-Based history in the making: the first 20 years of the Cochrane Collaboration (video)

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**These are the most read* articles** we've found across all disciplines.**

| | | |
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| 1. | Beta-blockers for hypertension.<br>Cochrane Database Syst Rev. 2017 Jan 20;1:CD002003. doi: 10.1002/14651858.CD002003.pub5. (*Systematic Review*)<br>Read 2798 times | |
| 2. | Clinical Outcomes of Metformin Use in Populations With Chronic Kidney Disease, Congestive Heart Failure, or Chronic Liver Disease: A Systematic Review.<br>Ann Intern Med. 2017 Jan 3. doi: 10.7326/M16-1901. (*Systematic Review*)<br>Read 2679 times | |
| 3. | Screening for abdominal aortic aneurysm in asymptomatic adults.<br>J Vasc Surg. 2016 Dec;64(6):1855-1868. doi: 10.1016/j.jvs.2016.05.101. (*Systematic Review*)<br>Read 2147 times | |

* by physicians around the world in the past 30 days
** excluding articles with relevance or newsworthiness scores below 6 (on a scale of 1 to 7)

From: MacPlus@mcmasterhkr.com
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| **Effect of a Long-Term Intensive Lifestyle Intervention on Cognitive Function: Action for Health in Diabetes Study.** *J Am Geriatr Soc* | | |
| General Practice(GP)/Family Practice(FP) | 5 | 5 |
| General Internal Medicine-Primary Care(US) | 5 | 5 |
| **Yoga treatment for chronic non-specific low back pain.** *Cochrane Database Syst Rev* | | |
| General Practice(GP)/Family Practice(FP) | 6 | 5 |
| General Internal Medicine-Primary Care(US) | 6 | 5 |
| **Folic Acid Supplementation for the Prevention of Neural Tube Defects: An Updated Evidence Report and Systematic Review for the US Preventive Services Task Force.** *JAMA* | | |
| GP/FP/Obstetrics | 6 | 5 |

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Viswanathan M, Treiman KA, Kish-Doto J, et al. **Folic Acid Supplementation for the Prevention of Neural Tube Defects: An Updated Evidence Report and Systematic Review for the US Preventive Services Task Force.**
JAMA. 2017 Jan 10;317(2):190-203. doi: 10.1001/jama.2016.19193. *(Systematic Review)* PMID: 28097361

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|---|---|---|
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**Abstract**

Importance: Neural tube defects are among the most common congenital anomalies in the United States. Periconceptional folic acid supplementation is a primary care-relevant preventive intervention.
OBJECTIVE: To review the evidence on folic acid supplementation for preventing neural tube defects to inform the US Preventive Services Task Force for an updated Recommendation Statement.
DATA SOURCES: MEDLINE, Cochrane Library, EMBASE, and trial registries through

STUDY SELECTION: English-language studies of folic acid supplementation in women. Excluded were poor-quality studies; studies of prepubertal girls, men, women without the potential for childbearing, and neural tube defect recurrence; and studies conducted in developing countries. Data Extraction and Synthesis: Two investigators independently reviewed abstracts, full-text articles, and risk of bias of included studies. One investigator extracted data and a second checked accuracy. Because of heterogeneity, data were not pooled. Main Outcomes and Measures: Neural tube defects, harms of treatment (twinning, respiratory outcomes).
RESULTS: A total of 24 studies (N > 58860) were included. In 1 randomized clinical trial from Hungary initiated in 1984, incidence of neural tube defects for folic acid supplementation compared with trace element supplementation was 0% vs 0.25% (Peto odds ratio [OR], 0.13 [95% CI, 0.03-0.65]; n = 4862). Odds ratios from cohort studies recruiting participants between 1984 and 1996 demonstrated beneficial associations and ranged from 0.11 to 0.27 (n = 19982). Three of 4 case-control studies with data from 1976 through 1998 reported ORs ranging from 0.6 to 0.7 (n > 7121). Evidence of benefit led to food fortification in the United States beginning in 1998, after which no new prospective studies have been conducted. More recent case-control studies drawing from data collected after 1998 have not demonstrated a protective association consistently with folic acid supplementation, with ORs ranging from 0.93 to 1.4 and confidence intervals spanning the null (n > 13990). Regarding harms, 1 trial (OR, 1.40 [95% CI, 0.89-2.21]; n = 4767) and 1 cohort study (OR, 1.04 [95% CI, 0.91-1.18]; n = 2620) found no statistically significant increased risk of twinning. Three systematic reviews found no consistent evidence of increased risk of asthma (OR, 1.06 [95% CI, 0.99-1.14]; n = 14438), wheezing, or allergy. Conclusions and Relevance: In studies conducted before the initiation of food fortification in the United States in 1998, folic acid supplementation provided protection against neural tube defects. Newer postfortification studies have not demonstrated a protective association but have the potential for misclassification and recall bias, which can attenuate the measured association of folic acid supplementation with neural tube defects.

**Comments from Clinical Raters**

**Public Health**
It is interesting that the postfortification studies do not show a protective benefit of folate supplementation. The author's conclusions are very measured because of the limitations of the newer data and so it's a bit unsatisfying that they do not conclude with any statement about whether fortification should continue.

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Rapp SR, Luchsinger JA, Baker LD, et al. **Effect of a Long-Term Intensive Lifestyle Intervention on Cognitive Function: Action for Health in Diabetes Study.**
J Am Geriatr Soc. 2017 Jan 9. doi: 10.1111/jgs.14692. *(Original Study)* PMID: 28067945

**Group(s):** Look AHEAD Research Group

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| Physician Disciplines | Relevance to practice | Is this news? |
|---|---|---|
| Endocrine | ■■■■■□□ | ■■■■■□□ |
| General Internal Medicine-Primary Care(US) | ■■■■■□□ | ■■■■■□□ |
| General Practice(GP)/Family Practice(FP) | ■■■■■□□ | ■■■■■□□ |
| Neurology | * | * |
| Physical Medicine and Rehabilitation | * | * |
| Public Health | * | * |
| Special Interest - Obesity -- Physician | * | * |

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## Abstract

OBJECTIVES: To assess whether randomization to 10 years of lifestyle intervention to induce and maintain weight loss improves cognitive function.
DESIGN: Randomized controlled clinical trial.
SETTING: Data obtained as part of the Action for Health in Diabetes (Look AHEAD) trial (NCT00017953) and Look AHEAD Continuation study (U01 DK057136-15).
PARTICIPANTS: Overweight and obese individuals with type 2 diabetes mellitus aged 45 to 76 (N = 3,751).
INTERVENTIONS: Intensive lifestyle intervention (ILI) for weight loss through reduced caloric intake and increased physical activity compared with a control condition of diabetes support and education (DSE). MEASUREMENTS: Certified examiners who were masked to intervention assignment administered a standard battery of cognitive function tests (Modified Mini-Mental State Examination, Rey Auditory Verbal Learning Test, Digit Symbol Coding, Trail-Making Test, Modified Stroop Color-Word Test) to participants 10 to 13 years after enrollment.
RESULTS: Assignment to lifestyle intervention was not associated with significantly different overall (P = .10) or domain-specific (all P > .10) cognitive function than assignment to diabetes support and education. Results were fairly consistent across prespecified groups, but there was some evidence of trends for differential intervention effects showing modest harm in ILI in participants with greater body mass index and in individuals with a history of cardiovascular disease. Cognitive function was not associated with changes in weight or fitness (all P > .05).
CONCLUSION: A long-term behavioral weight loss intervention for overweight and obese adults with diabetes mellitus was not associated with cognitive benefit. Trial Registration clinicaltrials.gov Identifier: NCT00017953.

## Comments from Clinical Raters

**General Internal Medicine-Primary Care(US)**
Diabetes is associated with worse cognitive function in later life. An intensive lifestyle intervention to increase physical activity and reduce weight in overweight or obese diabetics did achieve those goals. Such success did not, however, translate to improvement in scores of cognitive function later in life. Indeed, patients with some cognitive deficits at baseline actually fared worse with the intensive lifestyle intervention leading to poorer cognitive outcomes. Lifestyle modification in overweight and obese diabetics remains a laudable goal, but these results are a sobering reminder that such interventions may not lead to desired outcomes.

**Public Health**
This is a long term follow-up (about 10 years) of patients with diabetes mellitus taking insulin enrolled in the Look Ahead Lifestyle Intervention trial. They were seen weekly for 6 months, then 3 times a month for 3 months, and then 2 per month. This study attempts to determine if the cognitive impairment thought to occur in patients with diabetes treated with insulin could be improved with long-term intensive lifestyle interventions. Unfortunately cognitive assessment was not done prior to randomization or during the early phase of the study. Nonetheless, the sample size was large. The question is of interest but the long term nature of the intervention with drop-off in participation makes it improbable that a positive effect, if it exists, could be detected.

**Special Interest - Obesity -- Physician**
Despite the authors best efforts, actual change in fitness, weight, and HbA1c were fairly minimal. Thus, one would not expect much change in cognitive function. Compared to the original cohort, the participants were younger which may have made it harder to detect a change. Effecting long lasting change in fitness, weight, and HbA1c remains one of the major challenges in medicine. Since this study showed significant differences in cognitive function in those with lower HbA1c, we can continue to hope that behavioral interventions may yet prove effective.

# Browsing Topics

Reputable Primary Care-specific Journals

- Annals of Family Medicine
- Family Practice
- Canadian Family Physician
- BMC: Family Practice

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# Thank you!

# Questions?

McMaster University

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