

## Using the PICO Model to Search and Critically Appraise Relevance

The PICO framework used in evidence-based medicine can be used to create a searchable question in public health and to critically appraise the relevance of the literature you identify.

Sometimes you will need additional background information, either from basic reference sources or knowledge specific to your local practices, to work through the question.

- P Patient, population, problem
- I Intervention/Item of Interest (program or treatment or test or exposure or prognostic factor)
- C Comparison (if any)
- O Outcome

Use the PICO to create a searchable question along the lines of the following:

In the **Patient/Population with this Problem**, does the **Intervention** more than the **Comparison** (if any) result in the **Outcomes**?

### Worksheet

Case: The Health Promotion-Disease Prevention division is working with community-based organizations to reduce smoking in the 50+ population. All sorts of interventions have been proposed, some general and some targeted. A smoke free law is starting on the books this fall since those have been generally successful nationwide. Is there evidence that law would be sufficient to reduce older adult smoking?

**Background questions** (things you need to know):

- What is the most current prevalence of smokers aged 50+? (Location-specific)
- How much smoking by older adults is done in public places as opposed to homes, etc.? (General knowledge question)

**P (Population or Patient or Problem):** smokers over age 50 in my area

**I (Intervention or Test or Prognostic Factor or Risk Factor):** smoke free law

**C (Comparison, if one):** no smoke free law

**O (Outcome(s)):** reduction in smoking

**Foreground question** (searchable):

*In older adult smokers, will implementing smoke-free laws reduce smoking?*

### Searching Issues:

- Access
  - Free versus paid
  - Functionality and speed
- Vocabulary
  - The language of public health
  - Built-in or external thesauri
- Levels of Available Evidence
- Primary source versus pre-digested and summarized
- Links to Full-Text
- Keeping Up for ongoing areas of inquiry

### Database(s) or resources that you would search and issues:

- PubMed – Free, MeSH
- Ageline – Paid, subject indexing
- Cochrane Database of Systematic Reviews – Paid
- Google Scholar - Free

### Terms that you might use in the searching:

Smoking

Tobacco Smoke Abuse

Smoking Cessation

Tobacco Use Cessation

Middle Aged, Adult, Older Adult or Elderly

Anti-Smoking Legislation

[OR combine with legislation & jurisprudence subheading in PubMed]

Smoking bans

Social control policies [MeSH]

***Possible Database Search: (smoking OR tobacco use) AND (middle aged OR elderly) AND (Social control policies OR legislation OR bans)***

### **Evidence Based Resources to search – browsing categories due to limited number of entries**

Community Guide – search: smoking bans

Results: Reducing Exposure to Environmental Tobacco Smoke: Smoking Bans and Restrictions

NCI Research Tested Intervention Programs – Tobacco – Adults and Older Adults

#### **Clear Horizons**

Self-help guide and telephone counseling protocol specifically tailored for the smoking habits, quitting needs, and lifestyles of older smokers. (1991)

**Criteria Matched:** Adults (40-65 years), Older Adults (65+ years), Tobacco

Cochrane Collaboration **Tobacco Addiction Group (62)**

Effects of government policy on tobacco use (6), restrictions on smoking in public places (2)

<http://tobacco.cochrane.org/our-reviews>

## Searching: Case Study Exercises

### Structure:

Participants will form groups of 2 or 3 members. Each group will select one case study question (have alternates in case your choice is taken by another group). No question will be assigned to more than one group.

### Task:

The task is to prepare and present an analysis of the information needed using the worksheet.

Your group will have \_\_\_ minutes to collaborate on completing the worksheet.

Together you will:

- Formulate background questions
- Break the case into the PICO model (detailed below)
- Generate a single searchable foreground question

Looking at that foreground question, you will:

- Identify a few relevant resources/databases that you would investigate if time allowed
- Suggest search terms
- Choose one of the databases available at the session in which to execute a strategy
- Execute the strategy and locate a relevant abstract

### Feedback:

Each group will have the opportunity to share its investigation and demonstrate at least one possible resource to the class participants who will provide suggestions and feedback on the approach.

At the end of the class, participants will receive a handout with sample strategies and teaching points for all the case studies.

**Permission is granted to reuse these in your teaching materials for practitioners and students as long as you cite the instructors and the course as the source. This would not apply to any course that you are being paid specifically to teach. Suggested citation:**

**Allee, Nancy; Alpi, Kristine & Simpson, E. Hathaway. Evidence-Based Public Health: A Medical Library Association Continuing Education Course, 2010.**

## **Worksheet:**

Case selected: (choose 1 plus alternates from list on the following pages)

Background questions (things you would like to know to really investigate this case):

P (Population or Patient or Problem)

I (Intervention or Screening Test or Prognostic Factor or Risk Factor)

C (Comparison, if one)

O (Outcome(s))

Foreground question (searchable):

Database(s) or resources that you would search if you had access to everything:  
Note which you would have at your own institutions.

Terms that you would use in the searching:

Strategy for the database(s) available in class:

## **Public Health Question Case Examples**

### **Case #1: Food Scarcity and the Elderly**

Care of the aging population in the community is currently provided by a variety of government, for-profit, not-for-profit and religious organizations, as well as individuals. Recent news reports suggest that elders are not getting enough to eat as demands on food pantries and local elder care organizations have increased. What was the baseline on hunger in the elderly in the US before the financial crisis? Are there programs in place to measure and address this issue.

### **Case #2: Correctional Health**

You are the recently-hired health administrator at a large urban jail on the West Coast. Inmate suicide is a major problem at your new institution. You've been called into to collaborate with the counseling and guard representatives on a plan to prevent inmate suicides while reducing the costs associated with suicide watches.

### **Case #3: Public Health Dentistry**

Your patron is a practicing dentist in the community who wants to make sure that she and her hygienists detect oral cancer when it is present during cleanings. She wants to know the rates of oral cancer in various populations, the sensitivity and specificity of screening tests and the outcomes of early detected oral cancer.

### **Case #4: Emergency Response**

You are a regional EMS commander attending a state-level emergency preparedness meeting in preparation for the Senior Olympics being held in your state in July. Your workgroup must develop protocol for preventing and handling heat emergencies that might occur during the event for both participants and fans.

### **Case #5: Environmental Health**

Local landlords are reporting lots of complaints about bedbugs. As the science librarian at the public library, the tenant's association has asked you to support their building managers with guidance that shows what eradication strategies are successful and what health effects could result from treatments applied.

### **Case #6: Epidemiology - Counting the Homeless**

The Assembly is trying to address the issue of how many homeless are in the communities. One particular concern is accurately counting the number of homeless who die each year. You are the director of the state Vital Statistics program who is being asked to report this data on homelessness and you want to find best practice examples of the most accurate method(s) of obtaining this data.

### **Case #7: Public Health Laboratories**

You are a toxicologist at a large public health reference laboratory. In the event of a large chemical terrorism event involving nerve agents like sarin, you need to be able to handle a large number of samples quickly. Are there tests with decent sensitivity and specificity than can be done using urine samples?

### **Case #8: Public Health Law**

Many city and states public health laws include a provision for detention of people with infectious disease, such as tuberculosis, if necessary to ensure treatment or halt further spread of a condition. You hope to find evidence that detention is an effective public health practice or case law supporting detention that can be used to justify your agency's policy.

**Case #9: Maternal, Infant and Reproductive Health**

You are the head of the Maternal, Infant and Reproductive Health program in a city with a high rate of adolescent pregnancy. Many teenagers do not get prenatal care until late in the pregnancy. You are working with community-based organizations that serve teens to increase the uptake of prenatal care. Your group wants to look into the role of the male partner and whether his involvement affects prenatal care.

**Case #10: Restaurant Inspections and Foodborne Illness**

The question of whether restaurant inspections actually curtail foodborne illness outbreaks has been raised in your local press. The restaurant inspection program is one of the largest and most visible components of your county health department. You want to find out what inspection strategies are most predictive of outbreaks and how you might ensure that your program reflects these practices.

**Case #11: School Obesity Prevention**

You are a member of the school board for an inner city middle school where the children are mostly overweight. The school barely offers gym classes and there are vending machines everywhere. You want evidence about what works to prevent obesity and at what cost in order to prepare for a meeting with the principal.

**Case #12: Sexual Education Programs**

You are the school librarian in a rural Southern high school. The school nurse and counselors are getting lots of questions about the cervical cancer vaccine. They want to get permission from the superintendent to offer an educational session about HPV and the vaccine. They ask for information about rates of sexual activity and cervical cancer cases in the area as well as unbiased evidence on whether Gardasil is effective.

**Case #13: Substance Abuse Programs**

You are part of the utilization oversight team for a mid-sized city's state-funded substance abuse programs. There has been a lot of press about the use of spice. Your team wants to come up with some guidance for the social marketing group about the addictiveness and side effects of this substance.

**Case #14: Workplace Health**

You are a part-time health educator on contract to a customer service center in the suburban Midwest. You were hired to develop ergonomic and stress reduction interventions to create a healthier work environment for the mostly middle-aged, white, overweight employees. You've been asked to justify the continued funding of your position by providing data that workplace wellness interventions like the ones you're developing increase productivity or reduce absenteeism and turnover.

## **Worksheet:**

Case selected: (choose 1 plus alternates from list on the following pages)

Background questions (things you need to know to really investigate this case):

P (Population or Patient or Problem)

I (Intervention or Screening Test or Prognostic Factor or Risk Factor)

C (Comparison, if one)

O (Outcome(s))

Foreground question (searchable):

Database(s) or resources that you would search if you had access to everything:  
Note which resources you have at your own institutions.

Terms that you would use in the searching:

Strategy for the database(s) available in class:

## Critical Appraisal Exercise

The first step to identifying articles or reports for complete critical appraisal is to be able to critically appraise abstracts and decide their relevance to the search question.

Are the population and intervention similar enough to be useful? (RELEVANCE)  
Is this item quality evidence? (VALIDITY)

Always better to appraise full-text as abstract is often wishful or woefully incomplete.  
Realistically, most make the first cut by appraising the abstract (or executive summary)

The questions in this session are from the Centre for Health Evidence of the University of Alberta and are based on the Users' Guides to Evidence-based Medicine from JAMA (Copyright 1995, American Medical Association) which are no longer freely available. Similar appraisal checklists are available from the Duke Medical Center Library website at <http://www.mclibrary.duke.edu/subject/ebm?tab=appraising&extra=worksheets>

Most evidence-based medicine questions fall into one of these four categories:

**Therapy    Diagnosis    Prognosis    Harm/Etiology**

Public health, particularly occupational and environmental health, frequently deals with both harm and prevention. The therapy category is the one most used for interventions, whether preventive or corrective, however it is difficult to apply outside of trials.

*In older adult smokers, will implementing smoke-free laws reduce smoking?*

**The impact of a communitywide smoke-free ordinance on smoking among older adults.** Prochaska JD, Burdine JN, Bigsby K, Ory MG, Sharkey JR, McLeroy KR, et al. *Prev Chronic Dis* 2009;6(1). [http://www.cdc.gov/pcd/issues/2009/jan/07\\_0264.htm](http://www.cdc.gov/pcd/issues/2009/jan/07_0264.htm). Accessed 5/17/2010.

MeSH Terms: ITAL-relate to relevance; BOLD-relate to study design

- \* Adolescent
- \* Adult
- \* *Colorado*
- \* Data Collection
- \* Female
- \* Humans
- \* Local Government\*
- \* **Logistic Models**
- \* Male
- \* *Middle Aged*
- \* **Odds Ratio**
- \* **Questionnaires**
- \* *Smoking/legislation & jurisprudence\**



Here are questions for analyzing an article about harm.  
[Based on *How to Use an Article about Harm* from  
<http://www.cche.net/text/usersguides/harm.asp>]

### **I. Are the results of the study valid?**

Were there clearly identified comparison groups that were similar with respect to important determinants of outcome, other than the one of interest?

*In this case, exposure to smoke free legislation is the determinant of interest.*

Were the outcomes and exposures measured in the same way in the groups being compared?

Was follow-up sufficiently long and complete?

Is the temporal relationship correct?

Is there a dose-response gradient? (harm)

### **II. What are the results?**

How strong is the association between exposure and outcome, or intervention and outcome?

*For observational studies, the association is measured by the Odds Ratio.*

How precise is the estimate of the risk? *Precision measured by confidence intervals around the measure of association.*

### **III. Will the results help to improve the health of my community?**

Can the results be applied to caring for people in the community? *Are they generalizable – is the population similar enough?*

What is the magnitude of the risk?

Should there be an attempt to stop the exposure? (harm)

## Analyzing a Systematic Review Abstract

*Does regular helmet wearing reduce the number of head or facial injuries in urban children or adults? [Review what and where to search]*

### **Helmets for preventing head and facial injuries in bicyclists.**

Thompson DC, Rivara FP, Thompson R.

Cochrane Database Syst Rev. 2000;(2):CD001855.

<http://www.mrw.interscience.wiley.com/cochrane/clsysrev/articles/CD001855/frame.html>

Comment in: Ann Emerg Med. 2003 May;41(5):738-40.

**BACKGROUND:** Each year, in the United States, approximately 900 persons die from injuries due to bicycle crashes and over 500,000 persons are treated in emergency departments. Head injury is by far the greatest risk posed to bicyclists, comprising one-third of emergency department visits, two-thirds of hospital admissions, and three-fourths of deaths. Facial injuries to cyclists occur at a rate nearly identical to that of head injuries. Although it makes inherent sense that helmets would be protective against head injury, establishing the real-world effectiveness of helmets is important. A number of case-control studies have been conducted demonstrating the effectiveness of bicycle helmets. Because of the magnitude of the problem and the potential effectiveness of bicycle helmets, the objective of this review is to determine whether bicycle helmets reduce head, brain and facial injury for bicyclists of all ages involved in a bicycle crash or fall. **OBJECTIVES:** To determine whether bicycle helmets reduce head, brain and facial injury for bicyclists of all ages involved in a bicycle crash or fall. **SEARCH STRATEGY:** We searched The Cochrane Controlled Trials Register, MEDLINE, EMBASE, Sport, ERIC, NTIS, Expanded Academic Index, CINAHL, PsycINFO, Occupational Safety and Health, and Dissertations Abstracts. We checked reference lists of past reviews and review articles, studies from government agencies in the United States, Europe and Australia, and contacted colleagues from the International Society for Child and Adolescent Injury Prevention, World Injury Network, CDC funded Injury Control and Research Centers, and staff in injury research agencies around the world. **SELECTION CRITERIA:** Controlled studies that evaluated the effect of helmet use in a population of bicyclists who had experienced a crash. We required that studies have complete outcome ascertainment, accurate exposure measurement, appropriate selection of the comparison group and elimination or control of factors such as selection bias, observation bias and confounding. **DATA COLLECTION AND ANALYSIS:** Five published studies met the selection criteria. Two abstractors using a standard abstraction form independently abstracted data. Odds ratios with 95% CI were calculated for the protective effect of helmet for head and facial injuries. Study results are presented individually. Head and brain injury results were also summarized using meta-analysis techniques. **MAIN RESULTS:** No randomized controlled trials were found. This review identified five well conducted case control studies which met our selection criteria. Helmets provide a 63%-88% reduction in the risk of head, brain and severe brain injury for all ages of bicyclists. Helmets provide equal levels of protection for crashes involving motor vehicles (69%) and crashes from all other causes (68%). Injuries to the upper and mid facial areas are reduced 65%. **REVIEWER'S**

**CONCLUSIONS:** Helmets reduce bicycle-related head and facial injuries for bicyclists of all ages involved in all types of crashes including those involving motor vehicles.

Publication Types:

Review

Review, Academic

MeSH Terms:

Bicycling/injuries\*

Craniocerebral Trauma/prevention & control\*

Head Protective Devices\*

Human

**Questions to consider:**

[Based on *How to Use an Overview* from

<http://www.cche.net/text/usersguides/overview.asp>]

### **I. Are the results of the study valid?**

Did the overview address a focused question?

Were the criteria used to select articles for inclusion appropriate?

Is it unlikely that important, relevant studies were missed?

Was the validity of the included studies appraised? [Appropriate study designs?]

Were assessments of studies reproducible?

Were the results similar from study to study?

### **II. What are the results?**

What are the overall results of the review?

How precise were the results? [Statistical measures]

### **III. Will the results help to improve the health of my community?**

Can the results be applied to caring for people in the community?

Were all clinically and socially important outcomes considered?

Are the benefits worth the harms and costs?