



Evidence Based Medicine part 1 ..

Clinical Questions, PICO and Study Design



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Supporting your Knowledge for Healthcare

Sheffield Children's **NHS**
NHS Foundation Trust



PREPARING YOUR SEARCH

- Clinical Questions – PICO
 - Study Design and the Evidence Pyramid
 - Search Terms and Limits
- 
- 



CLINICAL QUESTIONS - PICO



Focus



Purpose



Clarify



Timeframe



TYPES OF QUESTIONS

Background Questions

How does deep vein thrombosis occur in the body?

What is Sepsis?

What are the clinical manifestations of Ebola?

What causes eczema

What are the complications of root canal treatment?

How is shortness of breath linked to smoking

TYPES OF QUESTIONS

Is surgery better than conservative treatment for preventing re-dislocation in adults with primary patella dislocation?

In children with suspected appendicitis can an MRI scan confirm or exclude a diagnosis

Does music therapy improve quality of life and depression symptoms in dementia sufferers?

Foreground Questions

Is the body mass index a reliable measure of obesity in children

In middle aged men who are overweight what are their perceptions of dieting?

P I C O

The Well-Built Clinical Question

Patient / Population/ Problem (**among**)

Intervention / Exposure (**does**)

Comparison (**versus**....)

Outcome (**affect**....)





P = Patient/Population of Interest

How would you describe a group of patients similar to yours?
What are the most important characteristics of the patient?

This may include the primary problem, disease, or co-existing conditions. Sometimes the sex, age or race of a patient might be relevant to the diagnosis or treatment of a disease



I = Intervention or Exposure

What therapeutic, diagnostic, preventive or other health care interventions are you interested in knowing more about?

What health care management strategies are you interested in comparing? It also means exposure or risk factor.



C = Comparison of Interest

Is there a comparison to be evaluated against the intervention? Only used if more than one intervention or if no intervention is a factor.



O = Outcome of Interest

What is the desired outcome to be evaluated?

How will the patient or population be affected, or not affected, by the intervention?

Question types: Treatment/therapy

Drug	Is paracetamol or ibuprofen better at reducing fever in young children?
Clinical therapy	Are sheepskin mattresses effective at preventing pressure ulcers?
Surgery	Is total hip replacement better than open reduction and internal fixation at fixing displaced femoral neck fractures?
Lifestyle	Can exercise help prevent obesity in children?
Social	Can music therapy help reduce agitation in dementia sufferers?
Service	How effective are nurse-led clinics for patients with coronary heart disease?

A treatment/therapy designed to improve a patient/population, state or condition

USING PICO REFINE TREATMENT/THERAPY QUESTIONS

A clinician wants you to undertake a literature search for him. He is interested in finding out whether ibuprofen is better than paracetamol at reducing fever in young children

P	
I	
C	
O	

USING PICO REFINE TREATMENT/THERAPY QUESTIONS

A clinician wants you to undertake a literature search for him. He is interested in finding out whether ibuprofen is better than paracetamol at reducing fever in young children

P	Young children with fever
I	Ibuprofen
C	Paracetamol
O	Reducing Fever

Question types: Diagnosis

Imaging	Can an MRI scan accurately diagnose acute appendicitus in pregnancy?
Biomarkers	What is the added value of heart fatty acid protein assay (HFABP) in the rapid diagnosis of acute myocardial infarction?
Measures of body functions	How sensitive is the initial ECG in predicting an acute myocardial infarction?
Physical examination	What is the diagnostic utility of the physical examination in detecting pulmonary hypertension?
Genetic testing	How useful is genetic testing in a prenatal diagnosis of muscular dystrophy?

A selection of diagnostic tests/procedures to confirm/exclude a diagnosis/ classification of a condition

USING PICO REFINE DIAGNOSIS QUESTIONS #1

Is an *MRI* scan more sensitive/specific than bone scintigraphy at diagnosing scaphoid fractures in the elderly?

P	
I	
C	
O	

USING PICO REFINE DIAGNOSIS QUESTIONS #1

Is an MRI scan more sensitive/specific than bone scintigraphy at diagnosing scaphoid fractures in the elderly?

P	Elderly Scaphoid fracture
I	MRI scan
C	Bone scintigraphy
O	Sensitivity/specificity

USING PICO REFINE DIAGNOSIS QUESTIONS #2

Can ultrasound accurately detect obstructive biliary disease in adults with acute abdominal pain?

P	
I	
C	
O	

USING PICO REFINE DIAGNOSIS QUESTIONS #2

Can ultrasound accurately detect obstructive biliary disease in adults with acute abdominal pain?

P	Adults with acute abdominal pain Obstructive biliary disease
I	Ultrasound
C	NOT APPLICABLE
O	Accurate diagnosis (as measured by sensitivity and specificity of test)

Question types: Aetiology/risk factors/harm

Risk –
Public Health

Does smoking increase the **risk of lung cancer**?

Risk –
Mental Health

Does smoking cannabis increase the **risk of schizophrenia**?

Risk –
Environment

Is exposure to radiation in the atmosphere a **risk factor for childhood leukemia**?

Possible causes of disease, harmful outcomes of an activity or exposure

USING PICO REFINE AETIOLOGY/RISKFACTOR/ HARM QUESTIONS

Are post-menopausal women on hormone replacement therapy at risk of developing breast cancer?

P	
I	
C	
O	

USING PICO REFINE AETIOLOGY/RISKFACTOR/ HARM QUESTIONS

Are post-menopausal women on hormone replacement therapy at risk of developing breast cancer?

P	Post-menopausal women
I	Hormone replacement therapy
C	NOT APPLICABLE
O	Breast cancer

Question types: Prognosis

Recurrence/Relapse	What is the likelihood of relapse in schizophrenia patients who smoke cannabis?
Recovery/survival/death	What is the likelihood of an otherwise healthy 18 year old with schizophrenia making a complete recovery ?
Complications of disease	Is it likely that an elderly man with moderate-severe rheumatoid arthritis will become bedridden ?
Timescales	What is the survival time of a middle-aged woman with localised breast cancer?
Prognostic risk factors	Is age at diagnosis a prognostic factor for children with acute lymphocytic leukemia?

What is the likely course/potential complications of a disease/illness/condition?

USING PICO REFINE PROGNOSIS QUESTIONS

What is the likelihood of a premature baby (born at 35 weeks) developing hearing problems?

P	
I	
C	
O	

USING PICO REFINE PROGNOSIS QUESTIONS

What is the likelihood of a premature baby (born at 35 weeks) developing hearing problems?

P	Premature baby
I	NOT APPLICABLE
C	NOT APPLICABLE
O	Development of hearing problems

Question types: Meaning

Patient experience	What are patient's experiences with attending the emergency department?
Patient satisfaction	Women's perceptions and satisfaction of emotional support following childbirth
Attitudes of healthcare staff	Nurses attitude towards patients who self-harm
Concerns	What are the main worries of parents whose children are to undergo surgery?

Questions about people's experiences, beliefs, opinions, attitudes, concerns etc.

USING PICO REFINE MEANING QUESTIONS

What are women's expectations or experiences of childbirth?

P	
I	
C	
O	

USING PICO REFINE MEANING QUESTIONS

What are women's expectations or experiences of childbirth?

P	Women who have given birth
I	NOT APPLICABLE
C	NOT APPLICABLE
O	Experiences or expectations

PICO summary by question type

Type of Question	Population or Problem	Intervention or Exposure	Comparison	Outcome
Treatment/therapy	Patients disease, condition or presentation (may include setting, age)	Drug, clinical therapy, surgery, psychological/ service intervention, lifestyle change, social activity, service	Another Intervention/ exposure or placebo or <i>may not be stated/ applicable</i>	Measurable, may be beneficial or harmful outcomes – e.g. survival, diarrhoea, pain, length of stay, cost,
Diagnosis	The target disease or condition (may also include age)	A diagnostic test or procedure	Gold standard/ reference test or <i>may not be stated/ applicable</i>	Measures of test utility; accuracy, sensitivity, specificity, precision, cost, safety, acceptability, etc.
Aetiology/ risk factors/ harm	Patient/population risk factors, current health disorders or condition (may include setting, age)	Intervention or exposure of interest (may include strength/ dose of risk factor or duration of exposure)	<i>May not be stated/ applicable</i>	Harmful outcomes; Rates of progression/ incidence of disease, mortality, etc.
Prognosis	Main prognostic factor or clinical problem in terms of severity/ duration	Exposure of interest is usually time but in terms of identifying concepts to search on this <i>may not be applicable</i>	<i>May not be stated/ applicable</i>	Measurable, may be harmful or beneficial; mortality, survival, rate of disease progression
Meaning**	Patient or population undergoing the phenomena of interest	<i>May not be stated/ applicable</i>	<i>May not be stated/ applicable</i>	Perceptions, experiences, beliefs, attitudes, opinions, perspectives, etc.

EXERCISE 1: IDENTIFY THE PICO

Does cognitive behavioural therapy improve self-esteem in adults with eating disorders?

How effective is vitamin 3D in preventing relapses in patients with multiple sclerosis?

Is a CT scan or ventilation perfusion scintigraphy better at detecting pulmonary embolism in pregnant women?

How does laparoscopic colectomy compare with open surgery in terms of cost-effectiveness, recurrence and survival rates in patients with colon cancer?

In children with pyrexia with suspected urinary tract infection, what is the sensitivity and specificity of dipstick urinalysis?

Does cognitive behavioural therapy improve self-esteem in adults with eating disorders?

P I C O

P	Adults with eating disorders
I	Cognitive behavioural therapy
C	None applicable
O	Improve self-esteem

How effective is vitamin 3D in preventing relapses in patients with multiple sclerosis?

P I C O

P	Multiple sclerosis
I	Vitamin 3D
C	No comparison
O	Preventing relapses

Is a CT scan or ventilation perfusion scintigraphy better at detecting pulmonary embolism in pregnant women?

P I C O

P	Pregnant women
I	CT scan
C	Perfusion scintigraphy
O	Detecting pulmonary embolism

How does laparoscopic colectomy compare with open surgery in terms of cost-effectiveness, recurrence and survival rates in patients with colon cancer?

P I C O

P	Colon Cancer
I	Laparoscopic colectomy
C	Open Surgery
O	Cost-effectiveness, recurrence and survival rates

In children with pyrexia with suspected urinary tract infection, what is the sensitivity and specificity of dipstick urinalysis?

P I C O

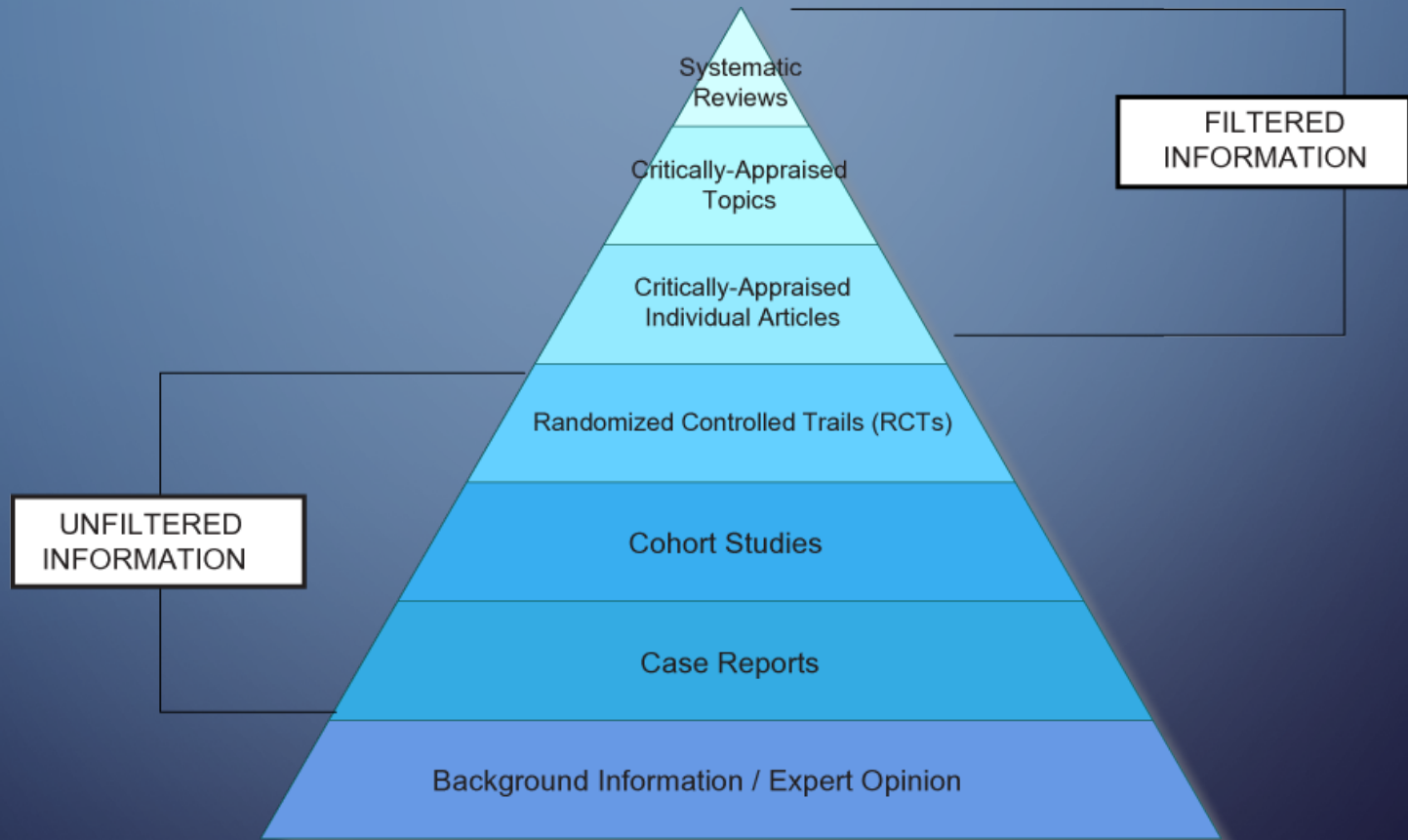
P	Children with pyrexia and suspected urinary tract infection
I	Dipstick urinalysis
C	None applicable
O	Sensitivity and specificity

Type of question and study design

Having decided what type of question you are asking you need to consider

What is the best **STUDY DESIGN** to answer your clinical question?

EVIDENCE PYRAMID



Type of Question	Type of Study/Methodology
Therapy	Double-Blind Randomized Controlled Trial
Diagnosis	Controlled Trial
Prognosis	Cohort Studies, Case Control, Case Series
Etiology	Cohort Studies
Prevention	Randomized Controlled Trial, Cohort Studies
Quality Improvement	Randomized Controlled Trials



SEARCH TERMS

A **search term** may be a single word, phrase, acronym or abbreviation that describes the concept, e.g. “Father Christmas”

A **synonym** is another word that can be used to describe the same thing, e.g. “Santa Claus”, “St Nicholas”.



SEARCH TERMS

Heart attack

Myocardial infarction

MI

CT scan

Computed tomography

Cat-scan

Computed axial tomography

Obesity surgery

Bariatric surgery

Gastric band

Weight loss surgery

Gastroplasty

Ibuprofen

Nurofen

Advil

Brufen

Rimafen

SEARCH TERMS

UK/US terminology

- Tumour / tumor
- Paediatrics / pediatrics
- Thalassaemia / thalassemia
- Oesophagitis / esophagitis

Medical / laymen's terms

- Chickenpox / varicella
- Whooping cough / pertussis
- Mumps / epidemic parotitis
- Vomiting / emesis

Acronyms / abbreviations

- MRI / magnetic resonance imaging
- MRSA / methicillin-resistant staphylococcus aureus
- COPD / chronic obstructive pulmonary disease

Drug brands

- Ibuprofen / nurofen / brufen
- Clopidogrel / Plavix / Grepid
- Simvastatin / Simvador / Zocor
- Oesophagitis / esophagitis

WORKED EXAMPLE: IDENTIFY SEARCH TERMS

In young children with a fever is ibuprofen better than paracetamol at reducing the fever?

	Search terms	Synonyms
P	Children, fever	Child, infant, infants, paediatrics, paediatrics, febrile, pyrexia
I	Ibuprofen	Brufen, Nurofen, Calprofen
C	Paracetamol	Calpol
O	Reducing fever	Temperature, reducing temperature, fever reduction, lowering

EXERCISE 2: IDENTIFY SEARCH TERMS

Does cognitive behavioural therapy improve self-esteem in adults with eating disorders?

Use of text-messaging in the self-management of long-term conditions

Is a CT scan or ventilation perfusion scintigraphy better at detecting pulmonary embolism in pregnant women?

EXERCISE 2: ANSWERS

Does cognitive behavioural therapy improve self-esteem in adults with eating disorders?

	Search terms	Synonyms
P	Adults eating disorders	Anorexia, appetite disorder, anorexia nervosa, bulimia, binge-eating,
I	Cognitive behavioural therapy	CBT, talking therapy, psychotherapy, psychological treatment
C	N/A	
O	Improvement in self-esteem	Self-confidence, anxiety, depression, improved confidence, self-respect, self-worth

EXERCISE 2: ANSWERS

Use of text-messaging in the self-management of long-term conditions

	Search terms	Synonyms
P	Patients with long term conditions	Chronic conditions, all specific ones eg asthma, diabetes COPD etc
I	Text messaging	SMS, messaging, texts, texting
C	N/A	
O	Self-management	Self-care, independence, self-reliance

EXERCISE 2: ANSWERS

Is a CT scan or ventilation perfusion scintigraphy better at detecting pulmonary embolism in pregnant women?

	Search terms	Synonyms
P	Pregnant women with suspected pulmonary embolism	Gravida, PE, pulmonary embolism
I	CT scan	Computerised tomography, computed tomography, CAT scan
C	Ventilation perfusion scintigraphy	Perfusion scan, VQ scan
O	Accurate detection	Diagnosis, detection



Evidence Based Medicine part 2 .. Doing a Literature Search



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