

Designing an analysis-focused Research Question

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Medical research uses the PICO framework to standardize and clarify research questions

- Frame research question with analysis in mind
- Focus design on key comparison and question
- PICO standardization -> more comprehensive searches

PICO FRAMEWORK

P	I	C	O
Patient, Population or Problem	Intervention or Exposure	Comparison	Outcome
<p>What are the characteristics of the patient or population?</p> <p>What is the condition or disease you are interested in?</p>	<p>What do you want to do with this patient (e.g. treat, diagnose, observe)?</p>	<p>What is the alternative to the intervention (e.g. placebo, different drug, surgery)?</p>	<p>What are the relevant outcomes (e.g. morbidity, death, complications)?</p>

P

In middle aged, male amputees suffering phantom limb pain

I

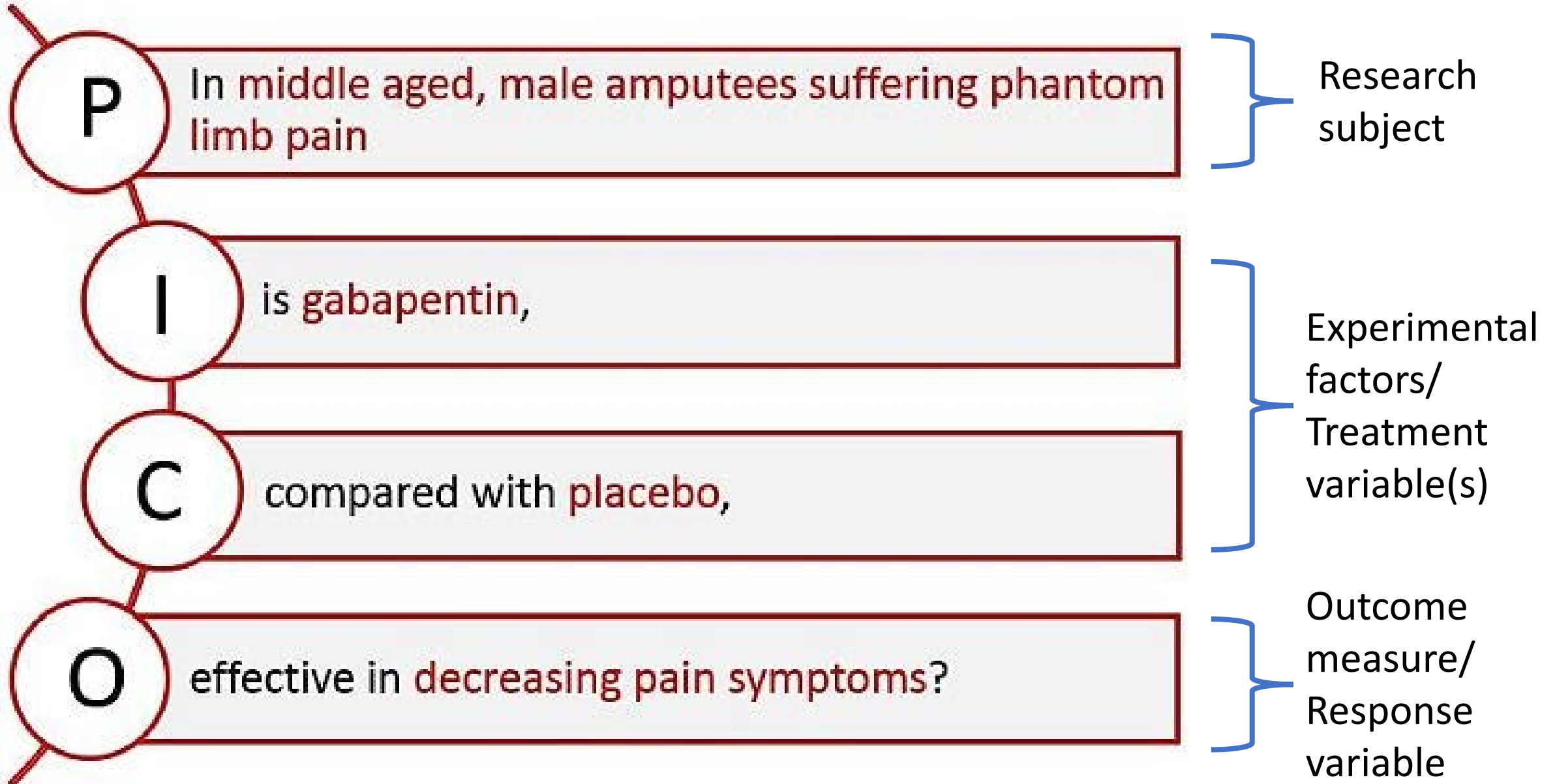
is gabapentin,

C

compared with placebo,

O

effective in decreasing pain symptoms?



How can we re-word our research questions to focus specifically on experimental tests and outcomes?

- Some research questions are quite broad (especially the title of a proposal)
- But specific aims of the experimental plans should outline testable “chunks” of the broader question (think *hypotheses*)

“An ethnographic comparison between research labs in India and Australia: Exploring scientists’ views on stem cell research and its ethics”

- This is beautiful and looks nice on a title page! BUT how do we re-word this to indicate the experimental question?

PICO FRAMEWORK			
P	I	C	O
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“An ethnographic comparison between research labs in India and Australia: Exploring scientists’ views on stem cell research and its ethics”

Do research scientists’ views on stem cell research and its ethics differ in India and Australia?

P – research lab scientists

I – stem cell research and its ethics

C – India and Australia

O - views

“Does P-glycoprotein attenuate Amyloid B-induced neurodegeneration in *C. elegans* Alzheimer’s Disease model?” (title page)

PICO FRAMEWORK			
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“Does P-glycoprotein attenuate Amyloid B-induced neurodegeneration in *C. elegans* Alzheimer’s Disease model?” (title page)

- In the *C. elegans* model of Alzheimer’s disease, does P-glycoprotein reduce Amyloid B-induced neurodegeneration?

“Does P-glycoprotein attenuate Amyloid B-induced neurodegeneration in *C. elegans* Alzheimer’s Disease model?” (title page)

- In the *C. elegans* model of Alzheimer’s disease, does P-glycoprotein reduce Amyloid B-induced neurodegeneration?

P – In the *C. elegans* model of Alzheimer’s disease

I – P-glycoprotein

C –?

O - reduce Amyloid B-induced neurodegeneration

Hypothesis: “The clearance of Amyloid-B by P-gp will attenuate the symptoms of neurodegeneration in *C. elegans* model”

Remember: hypotheses are testable – should follow the PICO format more closely than titles/broad research questions

- In the *C. elegans* model of Alzheimer’s disease, does clearance of P-glycoprotein reduce Amyloid B-induced neurodegeneration?

P – In the *C. elegans* model of Alzheimer’s disease

I – P-glycoprotein

C –clearance (implies comparison to non cleared control – look up)

O - reduce Amyloid B-induced neurodegeneration

Does DNA methylation play a role in regulating gene and transposable element expression during different developmental stages of Wheat Stripe Rust?

Does DNA methylation play a role in regulating gene and transposable element expression during different developmental stages of Wheat Stripe Rust?

In Wheat Stripe Rust, does the role of DNA methylation in regulating gene and transposable element expression differ among development stages?

P – research lab scientists

I – stem cell research and its ethics

C – different developmental stages

O - views

-> does this need to be multiple questions?

Using PICO(t) to develop a targeted research question

Background planning: think of the 5 W's and H for your topic:

Who - are the stakeholders, population a interest, involved parties

What - are the issues, problems, needs

Where - are you, is the focus of the study / interest (single or multiple locations? small or large group?)

When - will researched changes be implemented, have related events or studies taken place

Why - is this problem, need, issue being addressed; why is your review study critical to addressing it

How - will possible solutions, interventions, other aspects of the research be assessed for effectiveness, quality; how will results be delivered and/or implemented

Focus-in by using the PICO(T) method to further develop one or more specific questions:

P: Population/Problem - what is the main problem you are addressing, what are the characteristics of related and/or stakeholder population/s, settings?

I: Intervention / method to Implement to address the problem of interest

C: any **Comparison** methods or interventions to research

O: Outcome/s (measures reported in studies) of interest - what are *measurable outcomes (standardized measures if possible)* that would demonstrate the level of effectiveness of an intervention/implementation method or comparison that you are researching?

(T): (Time frame) – ...[is] there are specific time frames of interest for your research question and setting. In your context, is it important to review studies that have addressed the Problem / Population, Intervention/Implementation method, Comparison, and measured Outcomes within a specific period of time...