

# The PICOT method: why and how to use it?

## Introduction

The PICOT method should be used before making a literature search (it helps in finding the relevant keywords for the search), to formalize the objective(s) of a study one wants to carry out, or to formalize the objective(s) of one published study. This method makes the user produce a sentence containing all the relevant information. This sentence contains 5 parts referring to (PICOT) terms. These terms are: population (P), intervention (I), control (C), outcome (O), and time frame (T). You will find below how to use the PICOT method in order to formalize the objective of one published study, either an “intervention / therapy” study (to determine which treatment leads to the best outcome), an “etiology” study (to determine the greatest risk factors or causes of a health condition), or a “prognosis or prediction” study (to determine the risk factors of the complications of a condition). The use of the PICOT method for literature search or before carrying out a study follows the same steps as the one presented below. More details can be found in [1]. I also recommend the reading of the editorial by Jeffery (2015) in the JSAP journal [2].

## Interpretation of the 5 PICOT terms

### P – Population

The “population” is the target population of the study, ie, the population to which the authors (want to) extend their results. It must be emphasized that the (target) population is *not* the study sample. The target population is usually presented at the end of the introduction section, where the objective(s) is (are) written, and/or in the discussion section, where the authors generalize (infer) their results. The “population” is the answer of the following question: “What is the population patient addressed?”

### I – Intervention

The “intervention” term includes several potential meanings, depending on the type of the study. In an “intervention / therapy” study, the “intervention” group is the set of animals receiving the *studied* treatment. It could be the treatment by itself if the comparison (ie. “control”) group receives placebo, or it could be the new treatment if the comparison group receives a reference treatment. In “etiology” and “prognosis or prediction” studies, the “intervention” group is the set of animals exposed to the exposure of interest for which the authors showed / wanted to show that it is a risk factor for the (complications of) health condition. The “intervention” is the answer of the following question: “What did the authors test to improve the health condition, or what did they test to show that it worsens prognosis?”

### C – Control

As the “intervention” term, the “control” term includes several potential meanings, depending on the type of the study. In an “intervention / therapy” study, the “control” group is the set of animals receiving either the placebo or the treatment. In “etiology” and “prognosis or prediction” studies, the “control” group is the set of animals unexposed to the exposure of interest for which the authors showed / wanted to show that it is a risk factor for the (complications of) health condition. The “control” is the answer of the following question: “What was the alternative to the chosen intervention?”

## O – Outcome

The “outcome” is the judgment criteria which is supposed to be improved thanks to the “intervention”, or affected by the “intervention”. The “outcome” is the answer of the following question: “What will be improved or affected by the intervention?”

## T – Time frame

The “time frame” is the certain amount of time during which the authors wait for observing the occurrence of the outcome, from the time of inclusion into the study. It could be fixed by the authors for all animals (like in clinical trials), or variable among animals (like in cohort studies). In some studies, like in case-control studies, this information is not accessible, and the “T” term is therefore not relevant. The “time frame” is the answer of the following question: “How much time following the intervention (or the inclusion into the study) did the authors look at the occurrence of the outcome?”

## Insights from the literature

### Finding the PICOT terms by filling blanks

The figure below (from [3]) summarizes how to find the 5 PICOT terms, after having read a paper dealing with an “intervention / therapy”, an “etiology”, or a “prognosis or prediction” study.

Question type	Definition	Template
Intervention or therapy	To determine which treatment leads to the best outcome	In _____ (P), how does _____ (I) compared with _____ (C) affect _____ (O) within _____ (T)?
Etiology	To determine the greatest risk factors or causes of a condition	Are _____ (P) who have _____ (I), compared with those without _____ (C), at _____ risk for _____ (O) over _____ (T)?
Diagnosis or diagnostic test	To determine which test is more accurate and precise in diagnosing a condition	In _____ (P), are/is _____ (I) compared with _____ (C) more accurate in diagnosing _____ (O)?
Prognosis or prediction	To determine the clinical course over time and likely complications of a condition	In _____ (P), how does _____ (I) compared with _____ (C), influence _____ (O) over _____ (T)?
Meaning	To understand the meaning of an experience for a particular individual, group, or community	How do _____ (P) with _____ (I) perceive _____ (O) during _____ (T)?

### Example of a sentence built after using the PICOT method

In [1], an example of the use of the PICOT method led to the following sentence (in this example, there are two intervention groups, noted “I<sub>1</sub>” and “I<sub>2</sub>”): “In patients without preoperative anemia undergoing cardiac or orthopedic surgery (P), does treatment with intravenous iron alone (I<sub>1</sub>) or intravenous iron with recombinant erythropoietin (I<sub>2</sub>) compared with placebo (C), administered a day after surgery, increase hemoglobin concentration (O) 7 days after surgery (T)?”

### Comments on the “intervention” and “control” PICOT terms

The “intervention” and “control” terms could be hard to detect when reading a paper. While it is easy for an “intervention / therapy” study, it is much harder for “etiology” and “prognosis or prediction” studies. In order to generalize the idea for the 3 types of studies, we should talk about the “exposure of interest”. In an “intervention / therapy” study, the exposure of interest is the treatment, where “intervention” is “receiving treatment A” and “control” is “receiving placebo” or “receiving treatment B”. For “etiology” and “prognosis or prediction” studies, the exposure of interest is the characteristic (parameters such as demographic characteristics, biological markers, presence of symptoms, type of food, etc.), where “intervention” is “the set of animals who are considered as exposed ones”, and “control” is “the set of animals who are considered as unexposed ones”. As for an example, here is the following Result section of the abstract of [4]:

**RESULTS: Signs of cognitive impairment showed a prevalence of 22-5 per cent in geriatric dogs. Sex and age emerged as significant predictor variables. Females and neutered dogs were significantly more affected than males and entire dogs, respectively. Prevalence and severity increased with age. Although weight was not a statistically significant predictor variable, smaller animals had greater odds of showing age-related cognitive impairment. The most impaired behavioural categories were social interaction and house training.**

By reading the sentence in the box, we can say that there are 2 exposures of interest: sex and neutering status. For sex exposure, “intervention” is “females” and “control” is “males”; for neutering status exposure, “intervention” is “being neutered” and “control” is “being entire”.

### References

1. Thabane L, Thomas T, Ye C, Paul J. **Posing the research question: not so simple.** *Can J Anaesth* 2009,56:71-79.
2. Jeffery N. **Scaling the CRAG to smooth the path to publication in JSAP.** *J Small Anim Pract* 2015,56:423-424.
3. Stillwell SB, Fineout-Overholt E, Melnyk BM, Williamson KM. **Evidence-based practice, step by step: asking the clinical question: a key step in evidence-based practice.** *Am J Nurs* 2010,110:58-61.
4. Azkona G, Garcia-Belenguer S, Chacon G, Rosado B, Leon M, Palacio J. **Prevalence and risk factors of behavioural changes associated with age-related cognitive impairment in geriatric dogs.** *J Small Anim Pract* 2009,50:87-91.