Appearance of Population, Intervention, Comparison, and Outcome as research question in the title of articles of three different anesthesia journals: A pilot study

ABSTRACT

Background: It is well known in the evidence-based medicine practice that framing the research question is the most important and crucial part of the research integrity. Population, Intervention, Comparison, and Outcome (PICO) is a specialized framework used by most researchers to formulate a research question and to facilitate literature review. The aim of this study is to investigate the representation of the PICO frame in the title of published articles in three different anesthesia journals.

Methods: We performed this double-blind, pilot study on papers published in three anesthesia journals, including Anesthesia and Intensive care (a), Saudi Journal of Anesthesia (b), and Anesthesia Analgesia (c) from January 2016 to September 2017. We randomly selected 30 randomized controlled trials from each journal to check for the PICO frame in the title of each article. We used Chi-square test to compare the met variables in the three journals with respect to PICO frame. Met variables are those who met the PICO frame and not met are not. We assumed a statistically significant difference when P was <0.05.

Results: Ninety randomized controlled trials articles (n = 90) were included in this study (n = 30 each journal A, B, and C). Corresponding estimates of the percent of papers that failed (not met) to adopt PICO elements were as follow for journal A, B, and C, respectively: Population: 30%, 30%, and 20%; Intervention: 50%, 30%, and 26.7%; Comparison: 53.3%, 60%, and 53.3%; and Outcome: 30%, 6.7%, and 0.0% with significant differences between journals A and C (P < 0.05).

Conclusion: Researches adopting PICO elements usually receive higher citation percentages. There is a need to further investigate the PICO framework in a larger study to determine whether it can be well represented in the titles of different research designs. That, in turn, will help the precision of searches performed on a PICO-formatted screen to receive relevant citations.

Key words: Evidence-based medicine; population, intervention, comparison, and outcome framework; research

Introduction

It is well known in the evidence-based medicine (EBM) practice that framing the research question is the most important and crucial part of the research integrity. A successful research project depends on the value of a focused research question. Formulating a research question is the initial step to conduct a valid and valuable research.
Population, Intervention, Comparison, and Outcome (PICO) is a specialized framework used by most researchers to formulate a research question and to facilitate literature review. PICO stands for PICO.[1,2] Using this framework helps researchers to connect the different parts of the research question together toward a meaningful and valid research design.[3] PICO format was first coined in 1995.[4] Later, it was expanded to PICOT where T reflects the time frame over which the outcomes are assessed.[5] The general principle in the PICO format is that the title should reflect the research question if it does not, the abstract should, followed by the text. A well-built clinical question should have first, the question be directly relevant to the problem at hand. Next, the question should be phrased to facilitate searching for a precise answer. To achieve these aims, the question must be focused and well articulated for all 4 parts of its “anatomy” the PICO.[6] It is well known that the formulation of a well-focused research question including well-articulated PICO elements is the initial step for a well-designed study with high quality.[6] In the literature, few studies are available that examined the usability of the PICO framework and its application to assess the integrity of the research clinical question.[7] This study investigates the representation of the PICO frame in the title of published articles in three different anesthesia journals. To the best of our knowledge, no researcher has studied the PICO representation in the title of published articles before which reflects the research question.

Methods

We performed this double-blind, pilot study on papers published in three anesthesia journals, including Anesthesia and Intensive care (a), Saudi Journal of Anesthesia (b), and Anesthesia Analgesia (c) from January 2016 to September 2017. We used one online source to gather the articles, PubMed Central. We randomly selected 30 randomized controlled trials from each journal to determine the representation of the PICO frame in the title of each article which reflects the key research question. Two reviewers abstracted data from the titles of all included papers to determine whether PICO was used in framing the primary or key research question. The reason of selecting two leading journals with high impact factors (IF) (A: 1.695/2016, C: 4.014/2016) and one journal B which has not yet obtained an IF; but indexed in Emerging Sources Citation Index (ESCI) is to compare between all journals in terms of the PICO frame representation in the titles which will also act as self-auditing to journal B. The statistical analysis was performed using Statistical Package for the Social Sciences (SPSS) version 22.0 software (SPSS Inc., Chicago, IL, USA). We calculated the frequencies and percentages for all nominal met PICO variables for the three journals A, B, and C. We used Chi-square test to compare the met variables in the three journals with respect to PICO frame. Met variables are those who met the PICO frame and not met are not.

Table 1: Percentage of met/not met of Patient, Intervention, Comparison and Outcome elements of the three journals

|       | A (n=30), n (%) | B (n=30), n (%) | C (n=30), n (%) | P   |
|-------|----------------|----------------|----------------|-----|
| P     | Met            | 21 (70.0)      | 21 (70.0)      | 24 (80.0) | 0.600 |
|       | Not met        | 9 (30.0)       | 9 (30.0)       | 6 (20.0)  |     |
| I     | Met            | 15 (50.0)      | 21 (70.0)      | 22 (73.3) | 0.124 |
|       | Not met        | 15 (50.0)      | 9 (30.0)       | 8 (26.7)  |     |
| C     | Met            | 14 (46.7)      | 12 (40.0)      | 14 (46.7) | 0.835 |
|       | Not met        | 16 (53.3)      | 18 (60.0)      | 16 (53.3) |     |
| O     | Met            | 21 (70.0)      | 28 (93.3)      | 30 (100.0)| 0.001 |
|       | Not met        | 9 (30.0)       | 2 (6.7)        | 0        |     |

PICO: Patient, Intervention, Comparison and Outcome

Table 2: Comparison of the Patient, Intervention, Comparison and Outcome elements between journals A and C

|       | A (n=30), n (%) | C (n=30), n (%) | P   |
|-------|----------------|----------------|-----|
| P     | Met            | 21 (70.0)      | 24 (80.0) | 0.371 |
|       | Not met        | 9 (30.0)       | 6 (20.0)  |     |
| I     | Met            | 15 (50.0)      | 22 (73.3) | 0.063 |
|       | Not met        | 15 (50.0)      | 8 (26.7)  |     |
| C     | Met            | 14 (46.7)      | 14 (46.7) | 0.999 |
|       | Not met        | 16 (53.3)      | 16 (53.3) |     |
| O     | Met            | 21 (70.0)      | 30 (100.0) | 0.001 |
|       | Not met        | 9 (30.0)       | 0        |     |

PICO: Patient, Intervention, Comparison and Outcome

Table 3: Comparison of the Patient, Intervention, Comparison and Outcome elements between journals A and B

|       | A (n=30), n (%) | B (n=30), n (%) | P   |
|-------|----------------|----------------|-----|
| P     | Met            | 21 (70.0)      | 21 (70.0) | 0.999 |
|       | Not met        | 9 (30.0)       | 9 (30.0)  |     |
| I     | Met            | 15 (50.0)      | 21 (70.0) | 0.114 |
|       | Not met        | 15 (50.0)      | 9 (30.0)  |     |
| C     | Met            | 14 (46.7)      | 12 (40.0) | 0.602 |
|       | Not met        | 16 (53.3)      | 18 (60.0) |     |
| O     | Met            | 21 (70.0)      | 28 (93.3) | 0.020 |
|       | Not met        | 9 (30.0)       | 2 (6.7)   |     |

PICO: Patient, Intervention, Comparison and Outcome
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We assumed a statistically significant difference when \( P \) was <0.05.

Results

Ninety randomized controlled trials articles (n = 90) were included in this study (n = 30 each journal A, B, and C). Corresponding estimates of the percent of papers that failed (not met) to adopt PICO elements were as follow for journal A, B, and C, respectively: Population: 30%, 30%, and 20%; Intervention: 50%, 30%, and 26.7%; Comparison: 53.3%, 60%, and 53.3%; and Outcome: 30%, 6.7%, and 0.0% with significant differences between journals A and C (\( P < 0.05 \)) [Tables 1, 2 and Figures 1-5]. Comparing the corresponding estimates of the percent of papers that failed (not met) to adopt PICO elements between journals A and B revealed significant differences (\( P < 0.05 \)) [Table 3]. Nonsignificant differences were obtained on comparing the same between journals B and C (\( P > 0.05 \)) [Table 4].

Discussion

As a general principle, the title of an article should reflect the research question. In the current pilot study, Anesthesia Analgesia scored the highest among other two journals; Anesthesia and intensive Care and the Saudi Journal of Anesthesia in the appearance of the PICO elements in the tile of published randomized controlled trials. To our surprise, the Saudi Journal of Anesthesia was superior to the Anesthesia and Intensive Care in terms of the appearance of the PICO elements in the title of the studied articles. Saudi Journal of Anesthesia has not yet obtained an impact factor; however, it is indexed in PubMed central and ESCI. The PICO approach requires that the framing of the research question specify the target population, the intervention of interest, the comparator intervention, and key outcome. The population can be described by certain eligibility criteria,
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The intervention is a controlled maneuver or exposure that can be manipulated and is often a new, experimental, or innovative approach. The primary goal may be to compare the intervention with an alternative standard (control), placebo (no intervention), or approach. The effect is evaluated by comparing outcomes in the underlying intervention groups. It is important to mention that the PICO format is a useful tool to be used in comparative studies or studies of association between exposure and outcome. The reason of using the PICO format in the current study was the frequent citation of PICO framework in many literatures as the best framing tools of research questions in EBM. Furthermore, it was shown that the use of PICO elements was associated with improvement in search results for clinical information in PubMed. In the present study, Anesthesia Analgesia showed 100% representation of the PICO elements in the title of the studied trials followed by the Saudi Journal of Anesthesia. In reality, most peer-reviewed journals do not require using PICO format. It seems that Anesthesia Analgesia journal requires it since in 100% of the trials, in this study, the PICO framework was well represented. In the Saudi Journal of Anesthesia, the representation of the PICO framework was also well represented with 93.3%. Although the Saudi Journal of Anesthesia as most of the peer-reviewed journal do not require using the PICO elements in its reviewing process, the representation of the PICO format in the title of their articles reflects the steadiness of the reviewing process. This study has several limitations. First, as this study was designed as a pilot for a larger study, the sample size was small and may be not adequately powered to show a significant difference, though it showed. Second, the PICO framework can be represented either in the title, the abstract, the introduction, and finally the method section. Our study was limited only to the titles of articles. Third, we have selected only randomized controlled trials; however, other types of studies such as cohort designs, case–control, cross-sectional, and quasi-experimental designs warrant inclusion in the future studies.

**Conclusion**

A well-formulated research question is the initial step in conducting a quality research project in evidence-based clinical practice. The ideal approach is to recognize a research question keeping in mind the PICO framework. Researches adopting PICO elements usually receive higher citation percentages. There is a need to further investigate the PICO framework in a larger study to determine whether it can be well represented in the titles of different research designs. That, in turn, will help the precision of searches performed on a PICO-formatted screen to receive relevant citations.

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**Conflicts of interest**
There are no conflicts of interest.

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