PICO SEARCH ASSIGNMENT WORKSHEET

Brief description of patient problem/setting (summarize the case very briefly)

A 4 year old male w/ no significant PMHx BIB mother presents to the pediatric ED with a 2-day history of fever (max temp. 102.5°F), cough, and runny nose. His mother reports decreased appetite, mild fatigue, and one episode of vomiting earlier that morning, with no further episodes since. He has no respiratory distress. No recent travels or sick contacts. On physical exam, he is alert and interactive with a temperature of 101.2°F, mild nasal congestion, and clear lungs. In the ED, he is given Pedialyte for rehydration and undergoes an oral PO challenge. He is also given ibuprofen for fever control. A rapid POC flu/COVID test is performed and returns positive for influenza B. Supportive care is recommended, and the mother asks whether ibuprofen or acetaminophen would be better since she has both at home.

Search question: Clearly state the question (including outcomes or criteria to be tracked)

In febrile pediatric patients, does ibuprofen compared to acetaminophen result in greater fever reduction, improved comfort and symptom control?

Question type: What kind of question is this?

☐Prevalence	☐Screening	☐Diagnosis
☐Prognosis	**x Treatment**	☐Harm

Assuming that the highest level of evidence to answer your question will be meta-analysis or systematic review, what other types of study might you include if these are not available (or if there is a much more current study of another type)? Please explain your choices.

If a meta-analysis or systematic review is not available, I would include randomized controlled trials (RCTs) because they are the next highest level of evidence and provide strong evidence in the comparison of ibuprofen and acetaminophen for outcomes like fever reduction, comfort, and symptom control. RCTs are useful for this question because they directly compare the two medications in similar pediatric populations and help reduce bias through randomization. If more recent RCTs are available than existing studies, I would consider including them as well since they better reflect on current dosing practices and updated clinical recommendations. If RCTs are limited or not available, I would also consider prospective cohort studies. These studies can provide useful information by following febrile pediatric patients over time and evaluate how each medication performs in real clinical settings. Cohort studies may be helpful for assessing symptom relief, duration of fever control, and tolerability to medication. I would avoid or try not to rely on case reports or case series because they do not provide strong comparison data and are more prone to bias.

PICO search terms:

P	I	C	O
Pediatrics	Ibuprofen	Acetaminophen	Fever reduction
Children	Motrin	Tylenol	Symptom relief
Fever/febrile		Paracetamol	Efficacy

Pyrexia			Treatment outcome
			Comfort

Search tools and strategy used:

Please indicate what databases/tools you used, provide a list of the terms you searched together in each tool, and how many articles were returned using those terms and filters. Explain how you narrowed your choices to the few selected articles. For example, if your search returned 25 articles among the several databases used, what was the process used to determine which four articles to use?

Database	Search terms used	# or results	Filters applied
PubMed	("pediatrics") AND ("fever) AND ("ibuprofen" OR "Motrin") AND ("acetaminophen" OR "paracetamol" OR "Tyelnol") AND ("efficacy" OR "outcome" OR "relief")	13	Last 10 years, meta-analysis, randomized controlled trial, systematic review, English, Humans, Children: birth - 18, MEDLINE
EBSCO	(pediatric) AND (fever or febrile or temperature or pyrexia) AND (ibuprofen or Motrin) AND (acetaminophen or paracetamol) AND (efficacy or effectiveness)	14	Past 10 years, English, All child 0-18 years, Peer Reviewed, MEDLINE complete
Google scholar	("pediatrics" OR "febrile" OR "fever") AND ("ibuprofen" OR "Motrin") AND ("Acetaminophen" OR "paracetamol") AND ("efficacy" OR "outcome")	764	Time range: 2021-2026, Review articles, sort by relevance

For this PICO question, I used the following databases: PubMed, EBSCO, and Google Scholar. In the PubMed database, I applied the search terms and filters listed above, which resulted in 13 articles. I first reviewed the titles to gain a general understanding of each study's focus and

design. I then read the abstracts of articles relevant to my PICO question, which compared ibuprofen and acetaminophen for fever management and symptom relief in pediatric patients. Although there were several relevant studies, some were conducted internationally, such as New Zealand, which limits generalizability to the U.S. population. In the end, I selected two articles from PubMed: a systematic review and meta-analysis and a randomized controlled trial. Both compared the interventions of interest and were most applicable to answering my clinical question.

In the EBSCO database, applying similar search terms and filters resulted in 14 articles. Using the same approach, I reviewed titles to identify studies relevant to my PICO question, which narrowed the selection to three articles. After reviewing the abstracts, I selected one article: a systematic review evaluating parent and caregiver preferences when managing fever with ibuprofen and acetaminophen. The other two studies were randomized controlled trials. Although they were relevant to my PICO question, I chose to include the systematic review because it represents a higher level of evidence and provides a more comprehensive analysis compared to the individual trials.

Similar to my approach with EBSCO, I focused on studies relevant to my interventions of interest when searching in Google Scholar. The initial search yielded 764 results after applying filters. Because one of the filters was "sort by relevance," I reviewed the titles and abstracts of the first 10 articles. Ultimately, I did not select any articles, as the findings were repetitive of studies I had already included from my previous search. Additionally, some studies were lower levels of evidence, conducted in international populations, or had limited access to full text without a paid subscription.

Results found:

Identify at least 3 articles (or other appropriate reputable sources) that answer your specific question with the highest available level of evidence (you will probably need to look at more than 3 articles to get the 3 most focused and highest-level articles to address your question). Please make sure that they are Medline indexed.

Article 1

Citation:

Tan, E., Braithwaite, I., McKinlay, C. J. D., & Dalziel, S. R. (2020). Comparison of acetaminophen (paracetamol) with ibuprofen for treatment of fever or pain in children younger than 2 years: A systematic review and meta-analysis. *JAMA Network Open, 3*(10), e2022398. https://doi.org/10.1001/jamanetworkopen.2020.22398

Type of article: Systematic review and meta-analysis

Abstract:

Abstract

IMPORTANCE Acetaminophen (paracetamol) and ibuprofen are the most widely prescribed and available over-the-counter medications for management of fever and pain in children. Despite the common use of these medications, treatment recommendations for young children remain divergent.

OBJECTIVE To compare acetaminophen with ibuprofen for the short-term treatment of fever or pain in children younger than 2 years.

DATA SOURCES Systematic search of the databases MEDLINE, Embase, CINAHL, and the Cochrane Central Register of Controlled Trials and the trial registers ClinicalTrials.gov and the Australian New Zealand Clinical Trials Registry from inception to March 2019, with no language limits.

STUDY SELECTION Studies of any design that included children younger than 2 years and directly compared acetaminophen with ibuprofen, reporting antipyretic, analgesic, and/or safety outcomes were considered. There were no limits on length of follow-up.

DATA EXTRACTION AND SYNTHESIS Following the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guideline, 2 authors independently extracted data and assessed quality. Data were pooled using a fixed-effects method if I^2 was less than 50% and using a random-effects method if I^2 was 50% or greater.

MAIN OUTCOMES AND MEASURES The primary outcomes were fever or pain within 4 hours of treatment onset. Safety outcomes included serious adverse events, kidney impairment, gastrointestinal bleeding, hepatotoxicity, severe soft tissue infection, empyema, and asthma and/or wheeze.

RESULTS Overall, 19 studies (11 randomized; 8 nonrandomized) of 241 138 participants from 7 countries and various health care settings (hospital-based and community-based) were included. Compared with acetaminophen, ibuprofen resulted in reduced temperature at less than 4 hours (4 studies with 435 participants; standardized mean difference [SMD], 0.38; 95% CI, 0.08-0.67; $P = .01$; $I^2 = 49\%$; moderate quality evidence) and at 4 to 24 hours (5 studies with 879 participants; SMD, 0.24; 95% CI, 0.03-0.45; $P = .03$; $I^2 = 57\%$; moderate-quality evidence) and less pain at 4 to 24 hours (2 studies with 535 participants; SMD, 0.20; 95% CI, 0.03-0.37; $P = .02$; $I^2 = 25\%$; moderate-quality evidence). Adverse events were uncommon. Acetaminophen and ibuprofen appeared to have similar serious adverse event profiles (7 studies with 27 932 participants; ibuprofen vs aceteminophen: odds ratio, 1.08; 95% CI, 0.87-1.33; $P = .50$, $I^2 = 0\%$; moderate-quality evidence).

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JAMA Network Open. 2020;3(10):e2022398. doi:10.1001/jamanetworkopen.2020.22398

Abstract (continued)

CONCLUSIONS AND RELEVANCE In this study, use of ibuprofen vs acetaminophen for the treatment of fever or pain in children younger than 2 years was associated with reduced temperature and less pain within the first 24 hours of treatment, with equivalent safety.

JAMA Network Open. 2020;3(10):e2022398. doi:10.1001/jamanetworkopen.2020.22398

Key findings:

- Compared to acetaminophen, use of ibuprofen reduced temperature within 4-24 hours in pediatrics
- In pain outcomes, 69.2% of children on ibuprofen were pain free at 4-24 hours compared to 44% on acetaminophen
- Risk of serious adverse events of ibuprofen and acetaminophen were 1.4% and 1.3%, respectively
- Both medications had similar short-term safety profiles. Overall adverse events were uncommon.

Why I chose this article: I chose this article because it is a systematic review and meta-analysis, which represents the highest level of evidence. Additionally, it provides a detailed comparison between ibuprofen and acetaminophen in pediatric patients. This aligns with my PICO question in determining whether ibuprofen results in greater fever reduction, improved comfort, and better symptom control compared to acetaminophen. This study includes outcomes such as temperature reduction at different time intervals, likelihood of becoming afebrile, and pain relief within the first 24 hours. In the end, the findings showed that ibuprofen was more effective at reducing fever both within 4 hours and up to 24 hours. Furthermore, it demonstrated improved pain outcomes during that time frame. The study also confirmed that both interventions had similar safety profiles, a key factor when consider treatment options in pediatrics. Overall, this article helped answer my PICO question by providing high level of evidence that ibuprofen offers greater fever reduction (within first 24 hours) with comparable safety to acetaminophen.

Article 2

Citation:

Alqudah, M., Stubbs, M. A., Al-Masaeed, M., & Fernandez, R. (2025). An evaluation of parents' and caregivers' preferences managing fever in children based on experiences in using ibuprofen and paracetamol: A systematic review. *Journal of Pediatric Nursing, 80*, e272–e281. https://doi.org/10.1016/j.pedn.2024.12.018

Type of article: Systematic review of randomized controlled trials and cross-sectional studies

Abstract:

A B S T R A C T

Objective: This review aims to investigate parents' preference for and use of Ibuprofen and Paracetamol in managing and treating children's fevers as well as the factors influencing their decision-making and practices.
Introduction: Parents globally face concern over managing children's fever, seeking relief while ensuring safety, often relying on accessible medications like Paracetamol and Ibuprofen.
Inclusion criteria: The review included quantitative studies involving parents and caregivers managing fever in children aged 0–17 years. Studies published in English or in other languages with an English language version from January 2000 to March 2024 were included, excluding hospital-based or healthcare professional-managed studies.
Methods: Searches were conducted using MEDLINE, PubMed, SCOPUS, and CINAHL databases using specific search strategies. Titles and abstracts were screened online, and full reports were obtained for any publication considered useful for this overview. Methodological quality was assessed independently by two reviewers using the JBI critical appraisal instrument. Data extraction was performed in Excel, and statistical meta-analysis was undertaken using JBI SUMARI software.
Results: Approximately 27.4 % of participants utilized Ibuprofen, while 64.3 % opted for Paracetamol. Subgroup analyses revealed that 29.8 % and 63.2 % administered Ibuprofen and Paracetamol to children under five. Additionally, 20.3 % alternated between these medications. Syrup emerged as the preferred mode of administration, with prominent parental involvement in dosage determination. Factors influencing medication choices included efficacy, safety profile, age, weight, ease of administration, and healthcare provider recommendations.
Conclusion: The prevalence of Ibuprofen and Paracetamol usage for pediatric fever management varies significantly. Parental involvement is prominent, guided by factors like efficacy and healthcare provider recommendations. Understanding these dynamics is crucial for informed decision-making and optimizing pediatric medication practices.
Implications to practice: This review highlights the importance of enhancing parental education on antipyretic use, emphasizing safe dosage practices and clear communication with healthcare providers. Healthcare professionals should address misconceptions and provide tailored guidance, fostering more effective and safer fever management strategies for children.

Key findings:

- ~ 64.3% of participants used paracetamol/acetaminophen and 27.4% used ibuprofen for fever management
- Among children under the age of 5, 29.8% received ibuprofen and 63.2% received paracetamol. 23.6% alternated between ibuprofen and paracetamol.
- ~ 20.3% of participants alternate between ibuprofen and paracetamol
- Factors that influence caregiver choice included: efficacy and speed of action, safety profile and side effects, age and weight, ease of administration, and healthcare provider recommendations

Why I chose this article: I chose this article because it is a systematic review that helps me understand how ibuprofen and acetaminophen are actually used by parents and caregivers in real-world pediatric fever management. Even though my PICO question mainly focuses on whether ibuprofen results in greater fever reduction, improved comfort, and better symptom control compared with acetaminophen, this article adds important context to how caregivers choose between these medications and the factors that influence that decision. This is relevant because comfort and symptom control are not only related to how well a medication works, but also to whether caregivers feel confident giving it or choose it in the first place. The review showed that most caregivers preferred acetaminophen over ibuprofen, even though ibuprofen is often

known for its faster action and longer duration. Additionally, it showed that safety, efficacy, ease of administration, and provider recommendations strongly affect medication choice. I chose this article because it shows shows the behavioral side of fever management and complements findings from the other studies I selected. As a result, this can help me better understand how treatment decisions may affect symptom control in pediatric patients.

Article 3

Citation:

Khalil, S. N., Hahn, B. J., Chumpitazi, C. E., Rock, A. D., Kaelin, B. A., & Macias, C. G. (2017). A multicenter, randomized, open-label, active-comparator trial to determine the efficacy, safety, and pharmacokinetics of intravenous ibuprofen for treatment of fever in hospitalized pediatric patients. *BMC Pediatrics, 17*, 42. https://doi.org/10.1186/s12887-017-0795-y

Type of article: Randomized controlled trial

Abstract:

Abstract

Background: Oral antipyretics are commonly used to treat pediatric patients who develop fevers. However, patients presenting to the emergency department or undergoing surgery are frequently unable to tolerate oral antipyretics. Rectal formulations are available; however, this route of administration is unpredictable. The main objectives of this randomized controlled study was to evaluate the efficacy and safety of single or multiple doses of intravenous ibuprofen to acetaminophen (oral or suppository) in pediatric patients with fever and to assess plasma ibuprofen concentrations.

Methods: This multi-center study was conducted in hospitalized patients, ≤ 16 years, with a new onset of fever ≥ 38.3°C. Patients were randomly assigned to receive either 10 mg/kg intravenous ibuprofen or acetaminophen. Study drug was administered at hour 0, and thereafter every 4 h as needed, up to 5 days. The primary outcome was to evaluate the effect of a single dose of intravenous ibuprofen compared to acetaminophen in reducing temperature in the first 2 h after administration. Data were compared using an analysis of variance model for continuous measurements and Cochran-Mantel-Haenszel test of general association for categorical data. A two-sided testing was used and a p-value ≤ 0.05 was considered significant.

Results: A total of 103 patients received study medication. Intravenous ibuprofen resulted in a greater reduction in temperature as measured by the area under the change from baseline at 2 h ($p = 0.005$) and 4 h (<0.001); in a greater reduction in change from baseline temperature compared to treatment with acetaminophen, and it reduced fever throughout a 24 h dosing period. There were no differences in safety parameters or serious adverse events.

Conclusions: A single 10 mg/kg dose of intravenous ibuprofen provided a significant reduction of temperature for febrile pediatric patients compared to those that received 10 mg/kg acetaminophen at 2 h and 4 h post-treatment. A reduction in temperature was also demonstrated over 24 h; however the reduction was not considered statically significant. Intravenous ibuprofen provides an effective option for reducing fever in hospitalized pediatric patients.

Trial registration: The study was registered on ClinicalTrials.gov on 26 October 2009, Study Identifier: NCT01002573

Keywords: Antipyretic, Fever, Ibuprofen, NSAIDs, Pediatric

Key findings:

- Significant fever reduction as early as 30 minutes after IV ibuprofen administration compared to acetaminophen. Fever reduction was sustained throughout first 4 hours

- 70% of patients who received ibuprofen required multiple doses, compared to 47% in the acetaminophen group. Despite frequent dosing, length of hospital stay was similar between both interventions
- Time to becoming afebrile was shorter with ibuprofen
- Majority of adverse events (97%) were mild to moderate in both interventions
- Common adverse effects included vomiting, headache, nausea, and diarrhea, no major difference between groups

Why I chose this article: I chose this article because it is a randomized controlled trial. It provides detailed information on the timing of fever reduction, showing that ibuprofen produces a significantly greater reduction in temperature as early as 30 minutes and maintains this effect at 4 hours. Additionally, this study focuses on hospitalized pediatric patients, which is important because it focuses on a more acute or clinically significant population compared to outpatient settings in other studies. It also evaluates intravenous ibuprofen, which is not addressed in the other articles and is relevant for patients who cannot tolerate oral medications.

Clinical bottom line:

Overall, in febrile pediatric patients, the evidence suggests that ibuprofen provides slightly greater and faster fever reduction compared to acetaminophen, along with improved short-term comfort and symptom control, especially within the first 24 hours. Findings from systematic review and meta-analysis shows that ibuprofen is more effective at lowering temperature and improving pain outcomes, while maintaining a similar safety profile to acetaminophen. Findings from randomized controlled trials also support that ibuprofen works more quickly and sustains fever reduction, even in more acute or hospitalized pediatric patients. However, it is important to note that both medications are safe and effective, and the overall differences are modest. In addition, caregiver preference tends to favor acetaminophen, often due to perceived safety, ease of use, and provider recommendations. Therefore, while ibuprofen may offer slightly better clinical outcomes in terms of fever reduction and symptom control, either medication is appropriate. In the end, the final decision should be individualized based on the patient, caregiver comfort, and clinical context.