




## Research Corner

### Looking for High-Quality Research Evidence

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### Abstract

Forensic professionals need to have the highest level of research evidence to support their practice, in combination with patient preferences and the professional's skill level. It is not always easy to find the evidence quickly. This article includes a discussion of different levels of evidence and their implications for supporting practice change, where to find high-level evidence, and factors affecting credibility. This article is used ideally in combination with the information in a previously published article on trustworthiness of research results (Carter-Snell & Singh, 2024).

*Keywords:* evidence, research, quality, evidence-informed practice

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### Looking for High-Quality Research Evidence

You have had a turnover of staff and one of the newer nurses suggests you consider using one of the newer prophylactic broad-spectrum antibiotics for any of your patients who sustain open injuries from assaults. The team is concerned about treatment resistance with unnecessary antibiotics, but the nurse argues that many of their vulnerable are high-risk for infection and unlikely to return until an infection is in later stages. They had a few patients returning with severe infections and sepsis and they decided to initiate prophylaxis pre-discharge. As the clinical educator you are asked to investigate the evidence behind this and make a recommendation to the team. When you go online, you find numerous articles: a pharmaceutical site which quotes some statistics from a single study they funded, a few clinical case studies, and a series of research studies. How will you decide if there is sufficient evidence to support the practice? The purpose

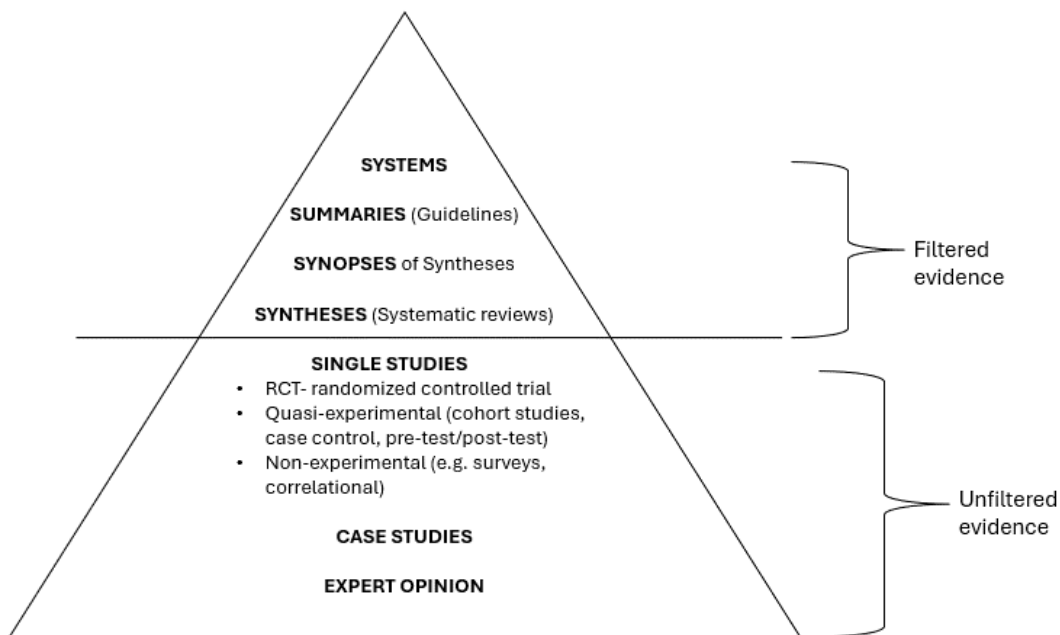
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of this brief article is to discuss levels of research quality, factors involved in choosing studies, and sources of strong evidence for practice.

### Levels and Quality of Research

There is a hierarchy, or levelling, of research evidence based on the type of study design (Figure 1). This pyramid is adapted from a combination of the “6S” pyramid (DiCenso et al., 2009) and other models that further differentiate single-study levels (Melnik & Fineout-Overholt, 2015; Woo, 2019). The “6S” consists of single studies, synopses of single studies (critiqued by other experts), syntheses (systematic reviews), synopses of syntheses, summaries, and systems.

**Figure 1.** Evidence Hierarchy



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At the base of this combined pyramid is expert opinion. A consensus statement among experts is sometimes all that is available with a new disease or innovation such as seen in the initial stages of COVID in the absence of research evidence. When nothing is known about a clinical issue, such as in the initial stages of COVID, experts collaborate to give their best assessment as to the nature of the problem. Often, as case studies emerge, data is gathered to begin exploring key variables, frequency, and relationships between factors, such as with correlational studies and cohort studies. Randomized controlled trials (RCT) are the highest level of single-studies research evidence, especially if both random assignment and random selection are used. There are many issues with single studies causing room for variability and misinterpretation as discussed in the trustworthiness article (Carter-Snell & Singh, 2024). The confidence in findings increases when multiple single studies are available with similar findings. Synthesis provides a higher level of confidence in findings, using systematic review techniques. This is helpful when single studies may have varying results and the effectiveness of the

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treatment is unclear. In a systematic review, efforts are made to locate all research done on a particular topic, and then assess the quality and potential bias of each of the studies. If studies are similar, then samples and results are pooled for one large sample and analyzed. This enables a clearer estimate of the effect of the intervention. In certain conditions, quantitative systematic reviews meet sufficient criteria to be statistically analyzed in a process known as “meta-synthesis”, which provides an estimate of the significance of the effect. If these criteria are not met, then the researchers use descriptive techniques to summarize the data. Some authors argue that systematic reviews of qualitative studies are lower in the hierarchy than for quantitative data, but there is not universal agreement on this. If there is more than one systematic review on a topic, as knowledge advances, the synthesis results in a synopsis of the reviews. The creation of clinical guidelines is considered higher than systematic reviews as experts are evaluating all the available data and combining them into clinical recommendations. At the top of the pyramid is “systems,” such as computerized systems for triage or wound care based on the best evidence.

Another system used for assessing the validity or strength of studies is a classification grading system. This is based on the type of study design as per the pyramid, assigning a number to the level of research (CEBM). An example from the Centre for Evidence-based Medicine is shown in Table 1.

**Table 1.** Levels of Evidence

Grade	Class	Description
A	Ia	Systematic review of randomized controlled trials (RCTs) with homogeneity/limited variability
A	Ib	Individual RCT with narrow confidence interval or strong cohort study (experimental studies)
B	IIa	Systematic review of homogenous cohort (quasi-experimental) studies with low variability
	IIb	Individual cohort study / low-quality randomized controlled trials
B	III	a) Systematic review with homogeneity using case control studies b) Individual case control studies or poor-quality cohort studies
C	IV	Case series (non-experimental) or poor-quality cohort or case control studies (quasi-experimental)
D	V	Expert opinion without explicit critical appraisal, using non-systematic reviews, or bench research

The grade of recommendation helps determine the strength of the research. This is used to support decisions to implement. There are numerous grading systems, but they are relatively consistent. Examples include the “Strength of Recommendation Taxonomy” or SORT grading (Ebell et al., 2004), the American Society of Plastic Surgeons (Burns et al., 2011), and the Agency for Healthcare Research and Quality (Berkman et al., 2015). These are combined in Table 2. Nursing authors have described a similar levelling system but instead of having subcategories as shown in Table 1, there are seven levels (Brunt & Morris, 2023). Regardless of

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the system used, it is clear that a systematic review with limited homogeneity (variability) between multiple single studies on the same topic are stronger sources of evidence. The choice to use the findings depends also on the patient population being studied, and the nurse's clinical expertise or ability to implement the intervention. The recency of the research is also important. If there is a systematic review from a few years ago but practices have changed (e.g. a new medication or new technique) and are not covered in the review, then it would be best to look for the most recent single study on the topic.

**Table 2.** Evidence level and strength of recommendations

<b>Grade</b>	<b>Evidence level</b>	<b>Typical Practice Recommendation</b>
A	Research findings are consistent and based on level I studies or multiple studies at level II, III or IV	Beneficial, strong evidence to recommend. High confidence in the findings.
B	Studies are level II, III, or IV, and somewhat consistent	Could be beneficial and implementation may be considered but watch for further research. Moderate confidence in findings.
C	Levels II, III, or IV but inconsistent findings	May be considered, limited confidence in findings/numerous deficiencies in evidence. Might consider if patient prefers.
D	Level V evidence: Based on consensus, usual practice, expert opinion, disease-oriented evidence (e.g. pathophysiologic indicators, vital signs), or case series	No evidence or confidence in evidence. May implement if strong patient preference.

Let's go back to our question at the beginning. Imagine in your search you found a good quality recent systematic review. It would be considered grade A and would be eligible for implementation. Grade B research findings would likely suggest waiting until further evidence is available, due to the inconsistent findings.

### Sources of Evidence

Where do you find the research? Fortunately, there are a growing number of sites that help us identify levels or quality of research quickly. Just a few examples of key databases are the Trip Medical Database, PubMed, and Health Evidence. These are available through most clinical libraries and university libraries but are also free to individuals online.

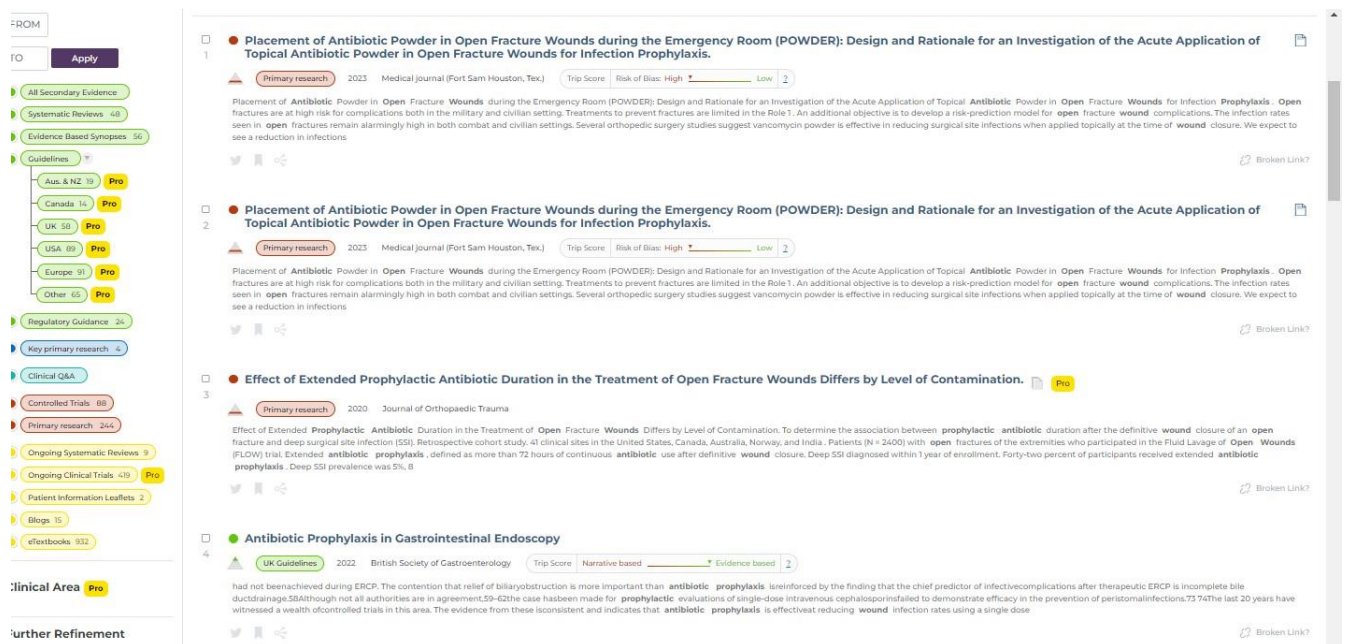
#### Trip Medical Database

This database is located at <https://www.tripdatabase.com/> to the public. There is a free version, and is searchable using the PICO or PICOT (Brunt & Morris, 2023) research format for your question: Population/problem, Intervention, Comparison, and Outcome (and Timing if using PICOT). For instance, if you wanted to know about efficacy of prophylactic antibiotics for wound

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care, the population would perhaps be open wounds or trauma, intervention would be antibiotics, the comparison (if known) would be specific types of antibiotics or with/without, and the outcome would be infection. If you don't know all the parameters, you can just insert a search term such as "prophylactic antibiotics for open wound care". An example of this open search is shown in Figure 2, a screen shot from Trip Medical Database. Note that on the left margin there are multiple choices. If you only want systematic reviews, there are 40 available highlighted in green. When clicked, only these will appear. There are numerous guidelines (a higher level than systematic reviews) for various countries. If the systematic reviews are not recent or relevant, then you can search the red tabs to look at the randomized controlled trials or primary research (244 available). On the right of the screen are the titles and abstracts. Below each title is a pyramid to show the level of evidence. The red primary research is shown for the first three studies listed. Guidelines are shown in article 4 for the UK and the pyramid and green color shows it is a high level of research. You would sort through these to see which is closest to answering the question, the level of research, and the recency of the findings. There are some related to the open wound question (e.g. the antibiotics for surgical wounds may be relevant but open trauma wounds may be contaminated and thus different). We keep looking.

**Figure 2.**  
*Trip Medical Database Search Results*



*Used with permission, C. Carter-Snell, 2024. Screenshot Trip Medical Database*

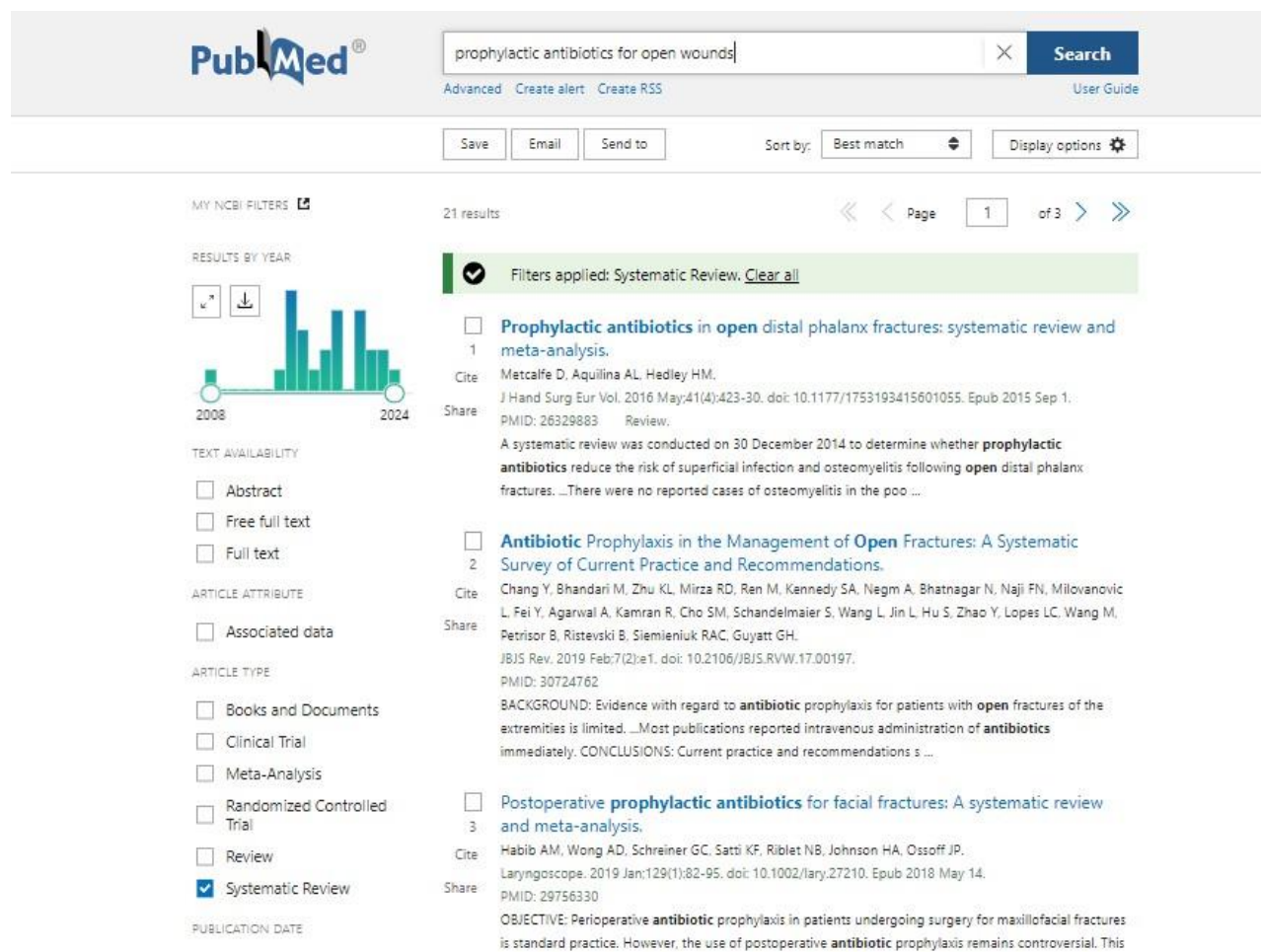
## PubMed

PubMed is a search engine linked to millions of journals and articles in biomedicine. The abstracts are provided, and searches can be conducted based on the type of evidence. There are links to some of the full articles but, if not free open source, the hospital or university library may be able to provide access. Figure 3 shows the results of a search on PubMed again for "prophylactic antibiotics for open wounds". The option for systematic reviews was selected in the

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left margin and 21 systematic reviews were found. Again, none of them are directly related to our question, but may provide some valuable information and the reference lists may provide strong single studies to examine.

**Figure 3.**  
*PubMed Search Results*



*Used with permission, C. Carter-Snell, 2024. Screenshot PubMed Database*

## Health Evidence

This site (<https://www.healthevidence.org/>) is operated by the National Collaborating Centre for Methods and Tools, based in McMaster University in Canada. This site provides access to thousands of systematic reviews in health care. The search for “prophylactic antibiotics for open wound care” had no results, so instead only “prophylactic antibiotics” was searched (Figure 4). Like Trip Medical, the quality of the study is shown, this time using a green wave to the right of varying depth.

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The studies shown indicate the title, year, and strength of study. The fifth article has a caution red mark, which indicates the findings are over 10 years old when clicked. You would have to scroll through these to see if any are relevant to your question. Again, there are no systematic reviews, so we have to look at high-quality single studies.

### Figure 4.

#### Health Evidence Search Results

The screenshot shows the Health Evidence website interface. At the top, there is a search bar with the text "Search" and a magnifying glass icon. To the right of the search bar are links for "Subscribe", "Log in", and "EN FR". Below the search bar is a navigation menu with links for "Home", "Search", "Tools & Resources", "About Us", and "My Account". Below the navigation menu is a link for "ADVANCED SEARCH | SEARCH HISTORY".

The main content area displays the search results for "prophylactic antibiotics". It indicates that 9 results were returned. The results are listed in a table with columns for "Article", "Authors", "Date", and "Rating".

Article	Authors	Date	Rating
1 <input type="checkbox"/> <a href="#">The efficacy and safety of hydroxychloroquine for COVID-19 prophylaxis: A systematic review and meta-analysis of randomized trials</a>	Lewis K, et al.	2021	4 stars
2 <input type="checkbox"/> <a href="#">Non-antibiotic interventions for prevention of urinary tract infections in children: A systematic review and meta-analysis of randomized controlled trials</a>	Meena J, et al.	2021	4 stars
3 <input type="checkbox"/> <a href="#">Routine antibiotic prophylaxis after normal vaginal birth for reducing maternal infectious morbidity</a>	Bonet M, et al.	2017	4 stars
4 <input type="checkbox"/> <a href="#">Antenatal and intrapartum interventions for preventing cerebral palsy: An overview of Cochrane systematic reviews</a>	Shepherd E, et al.	2017	4 stars
5 <input type="checkbox"/> <a href="#">Antibiotics for preventing meningococcal infections</a>	Zalmanovici, T.A., et al.	2013	3 stars
6 <input type="checkbox"/> <a href="#">A meta-analysis of the efficacy of ocular prophylactic agents used for the prevention of Gonococcal and</a>	Darling, E.K., et al.	2010	4 stars

Related Material:

- Search Tips
- Glossary of Terms
- Tutorials

Results Options

- Export References
- Save articles
- Save this search
- Print

Hoping for more results?

- Contact us

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There are many other sources which describe other reviews of the research evidence. The Cochrane Collaboration ([www.cochrane.org](http://www.cochrane.org)) is a source specifically for systematic reviews. Researchers register their study and must follow the Cochrane methods to conduct the review. Teams of specialists have formed Cochrane groups to study specific issues (e.g. cardiology, respiratory), but individual researchers can also register their reviews. Their database can be searched for relevant systematic reviews in progress or completed and the abstracts are available. The full article will be available through a professional or academic library. It will be lengthy, as it must follow extensive publishing guidelines for systematic reviews such as PRISMA (Heinrich & O'Connell, 2024), including a listing of all articles included and their characteristics. As an example, perhaps you want to know about the effectiveness of prophylactic antibiotics for open wound care after an assault. If you go to the Cochrane Database evidence library and use a search term such as "oral antibiotics for wound care", at the time of this writing there are 27 results. They cite the year of the systematic review and the title, providing an abstract of each. Most of them are specific to other illnesses or surgeries. There are no articles for blunt open injuries. The closest article is one titled "Comparing different types of antibiotics given routinely to women at caesarian section to reduce infections". This is a surgical incision done under relatively sterile

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conditions. Do you anticipate similar risks and outcomes? It is likely that the assault injury is more contaminated and may have greater risks and greater numbers of pathogens involved, which changes the type of prophylactic considered. It would still be worthwhile to get the whole article and see if any were emergency caesarians or what pathogens were examined in the review, but you may need to look for single studies if there are no systematic reviews available.

Two examples of nursing-specific resources include Joanna Briggs Institute and Evidence-based Nursing. Joanna Briggs Institute (<https://jbi.global/jbi-ebp-database>) has a database of evidence-based resources and guidelines. There are also helpful resources for conducting scoping and systematic reviews. Evidence-Based Nursing (<https://ebn.bmj.com/>) is a journal which publishes articles that critically appraise research. This is considered the “synopsis” level of evidence in the pyramid. Professional and academic library staff are extremely knowledgeable about databases and sources of evidence that are relatively quick to use and helpful. It is well worth meeting with them to find out what is available in their library and how to search easily.

### **Factors Affecting the Quality or Credibility**

Once you have found studies relevant to your question, you must look at the credibility of the studies in addition to the level of evidence. The factors affecting the trustworthiness of the studies, including research methods and results/significance, are discussed in detail in a previous article (Carter-Snell & Singh, 2024). The focus of this section is at a higher level – the credibility of the source of the research. Factors to consider include the following: publisher/publication bias, author, and year.

Publication bias exists when only studies with significant positive results are published (Nair, 2019). This may be due to authors not submitting the studies, or to the publisher or funding agent not wanting to show negative or non-significant results. A study that is funded by the manufacturer should be examined to see if there is a range of positive and negative studies or only positive studies. Ethics boards of universities and hospitals also look for this before approving studies to ensure the funder cannot influence the study or outcome, but after the study is complete, the funder may choose not to post the negative findings. Non-significant findings are needed to get the full picture of the effects and researchers are increasingly encouraged to publish these. A strong study with non-significant results may mean that other treatment choices can be made that are more efficient or cheaper. Similarly, a study with negative results suggests that further information is needed before using the treatment. Funding from university grants is less likely to result in bias, as they are typically funds to help get new researchers started rather than to show effectiveness of a product. Large national grants are also less likely to result in bias; they put out calls for proposals on various topics and the researcher submits their proposal and methods. The strongest team and study are chosen for the funding by a peer-review process. They then post the results of the study when available, regardless of the outcome.

The authorship may also affect the credibility of the study. The author’s information is generally posted along with the article. Does their team have research preparation? Do they have expertise in the area of study? A bachelor’s degree requires an introductory research course, aimed at preparing nurses to assess and use research in practice. A graduate degree includes preparation to conduct research either as a member of a team (e.g. master’s), or independently



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(e.g. PhD). The credentials after the authors' names will give an indication of these qualifications. If their degrees are not stated, you may see their affiliations listed. If they are faculty at a university, they typically require a minimum of a master's degree, thus have some additional research preparation. Their expertise may be indicated by additional certifications (e.g. SANE-A) or by their place of work (e.g. a domestic violence unit, corrections). It may also be seen in the reference list; see if any of the authors are cited in the references in this area.

The journal itself is another source of credibility. Is it peer-reviewed and scholarly, or a journal aimed at the public (e.g. Times)? A peer-reviewed article is considered more scholarly and credible as other researchers have been asked by the journal to review the article for quality of research methods, trustworthiness of findings, and presence of scholarly writing. The journal can be searched online and will indicate on its website if part or all of the journal is peer-reviewed.

The *Journal of the Academy of Forensic Nursing* (JAFN) requires peer review of both the research articles and the practice perspectives. It is a blind review, meaning that the reviewers do not know the names of the authors and the authors are not told who is reviewing the article. Other sections of JAFN, such as this Research Corner and the Journal Research Reviews are not peer-reviewed. Another aspect to consider is the publisher of the journal. Is the journal published by a reputable, well-known publisher (e.g. Elsevier, Oxford, Lippincott)? In that case it is considered more credible. Some journals are considered "predatory" – they may have names similar to well-known journals, but they have limited peer reviews, if any, and are only seeking the authors' fee for publications. Their editorial board is often non-existent, and the mix of articles published may not even relate to the title of the journal. Many journals have now become "open access", meaning that anyone can see and download the article without paying. This is a strategy to reduce the typical 5–10-year gap between research completion and clinical uptake. Instead, if an article is accepted, the journal may choose to charge a fee to the authors instead of the readers. This fee ranges from \$500 to as high as \$5,000. Predatory journals take advantage of this and are only seeking the author's fee (Lourenço Correa, 2022). There are open-access journals, like JAFN, that can publish without charging the authors a fee. The Directory of Open Access Journals (DOAJ) provides a list of journals that have met strong ethical standards and are not predatory. Journals apply to this organization and, if they meet the standards, their name and publishing fees, if any, are posted on the website (<https://doaj.org/>).

Reference lists also are an indicator of credibility (Coughlan et al., 2007; Ryan et al., 2007). Are the references relevant and mostly current (e.g. within five years)? They may have older references that are "gold-standard" because primary sources are preferred. For instance, if the article is about stress, the authors may rightly reference the original book by Selye on fight or flight and general adaptation published in 1974. Also see if most of the references are from credible journals or from public non-scholarly sources such as newspapers, websites, or popular magazines.

The format and writing would be another area to examine. A well-known writing style and format in nursing is APA style (American Psychiatric Association-APA, 2019). The publication manual sets guidelines for scholarly writing, referencing, levels of headings, and even types of

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headings. The standard format most styles use is an introduction, which typically states the problem, the literature, and then the gaps in the literature to support the need for the study. Subsequent headings include “Methods” (research design, sample, location, data collection, and planned analyses), “Results” (data and statistical or analytic results), “Discussion” of the results and possible explanations, perhaps supported by additional literature, and a “Conclusion” or brief overview of the study results and impact such as the impact on education, research, or clinical. Journals use variations of this format but are quite similar. Do the authors follow a similar scholarly format? Is the article written in a scholarly fashion or very informal?

### Conclusion

Evidence-informed practice is based on using the best level of evidence available to answer your clinical question combined with patient preference and clinical expertise. When seeking to answer a question, look first for the highest level of research evidence that is relevant and recent. Evaluate its credibility and trustworthiness before using the findings in practice. Knowledge of research quality is also important for forensic nurses in court. Findings cited in court as an expert should be supported by strong scientific evidence. In the case study provided above, there are related or peripheral studies but no repeated single RCTs or any systematic reviews that address the question. It would be likely that you would hold off on the change until more information is available.

Significant volumes of good-quality research are being produced daily and clinicians should be identifying the highest level of evidence available to support their practice. Very seldom do we make changes based on a single study, but we might change based on a relevant systematic review or series of single studies. Knowing where to quickly find high-level research supports and potentially improves our clinical practice.

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