

## Step 5 – Apply

‘Apply’ consists of summarizing the results of your evidence and integrating this into the various sections of the practice question.

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### 1. Knowledge Pathway (KP) Format

The [PEN Style Guide](#) has been developed to help you create your content in a standardized way. It includes the Knowledge Pathway format, plain language tips, acceptable fonts, key grammar tips, spelling and the correct way to cite pathway references among many other important format issues. As you review the following section, you’ll find it is helpful to have the [Practice Question \(PQ\) template](#) handy to refer to.

**Note:** If you are developing new content, you can also ask a member of the PEN Team for the blank WORD PQ template.

A Knowledge Pathway (KP) may include:

- Practice question(s)
- Background document
- Summary of Recommendations and Evidence (will be written by the PEN Team)
- Practice Guidance Toolkit (will be written by the PEN Team)
- Related Tools and Resources.

We ask authors to think about all aspects/knowledge objects (practice questions – Key Practice Points, Comments, Rationale; Background; and Tools and Resources) as they develop their KP to ensure all that is needed to guide practice has been included. In addition, we encourage you to think about the simplest, most time effective way of presenting the information in the key practice points for busy dietitians to use. How do dietitians look for information, what kinds of things do they need? Remember, dietitians don’t necessarily need more information; they need it organized, prioritized, evaluated, synthesized and accessible!

### Revising Knowledge Pathways

On a regular basis, KPs are revised and the frequency of this revision process depends on volume of new research on the topic or is aimed to be completed at least every five years. Revision involves:

### Role of PEN Team Members in revising Knowledge Pathways

PEN Team member	Responsibility
Editor	<ul style="list-style-type: none"> <li>Creates existing content as an MS WORD document - this includes the KP content and the titles and URLs of any related content (to alert the writer to any potential overlap).</li> <li>Edits the submitted content and ensures that the content is consistent with PEN guidelines and other PEN content.</li> <li>Sends the author the Author Sign Off.</li> <li>Develops Summary of Recommendations and Evidence in conjunction with other team members</li> </ul>
PEN Content Manager	<ul style="list-style-type: none"> <li>Consults with stakeholders for input on practice questions and requests country-specific guidelines (if relevant)</li> <li>Facilitates external review through PEN Content Management System</li> </ul>
PEN Resource Manager	<ul style="list-style-type: none"> <li>Develops Practice Guidance Toolkit (if applicable)</li> <li>Develops Summary of Recommendations and Evidence in conjunction with other team members</li> <li>Reviews Tools and Resources (TRs)</li> </ul>
PEN Author Evidence Analyst	<ul style="list-style-type: none"> <li>Reviews existing practice questions (PQs) and considers new PQs (including those submitted by PEN users) in consultation with PEN Team mentor</li> <li>Conducts a search strategy and incorporates new evidence into the PQs.</li> <li>Reviews related TRs at a high level (recommending removal of those that no longer match the evidence and recommending new ones)</li> <li>Updates the background document (if relevant)</li> </ul>

## 2. Writing the Practice Question (PQ)

You may find it useful to the [PQ template - Non GRADE](#) in front of you while you go through this section. The template lays out all of the necessary components of a PQ:

- **Key Practice Point (KPP)**
  - Recommendation
  - Evidence Summary
  - Grade of Evidence
  - Remarks
- **Evidence Statements**
- **Comments**
- **Rationale**
- **References**

**Note:** It is recommended to start with Evidence statements as these will inform your KPP, then include Comments and Rationale at the end if appropriate.

When writing a practice question, make each key practice point relevant to our audience by using the concepts of validity, importance and applicability.

**Validity** – Can I trust the information? (state the source, level of evidence using PEN grade levels)

**Importance** – Will the information make an important difference to my practice? (Are the outcomes ones practitioners or clients would care about?)

**Applicability** – Can I use this information in my practice setting? (consider access or cost issues etc.) or with my patients/clients?

Writing content for the PEN System means following guidelines for professional ethics and integrity. One of the many aspects of professional integrity is acknowledging the work of others that one uses in their own written work. Lack of proper acknowledgement is plagiarism, which is considered a serious misconduct both in the academic and scientific worlds. If you are not certain if something you have written could be considered as plagiarism, please flag it in the document submitted for editing and the PEN Editor will review it. See [PEN Plagiarism Guidelines](#) for further information on plagiarism.

### a Evidence Statements

Evidence statements are not just a summary or a paraphrase of the article abstract. Authors should summarize the study and results and put them into context for the reader using their critical appraisal skills.

This section is comprised of a lettered list. Each lettered point is known as an 'Evidence Statement' and describes a single article. Be as succinct as possible when summarizing and critically appraising the evidence (systematic reviews, primary research, position papers, guidelines etc.) into evidence statements. When writing this section, it is helpful to think about the information in the PICO format, describing population, intervention, comparison and outcome. Include the following information:

#### Typical information to include in an evidence statement:

<b>Type of study / population</b>	Systematic review: <ul style="list-style-type: none"> <li>note date of search</li> <li>provide a brief description of the question addressed,</li> <li>report number / type of articles and participants included (e.g. 12 RCTs, n=375 adults)</li> </ul>
	Primary study: <ul style="list-style-type: none"> <li>indicate type of study (e.g. RCT, uncontrolled trial, cohort, cross-sectional, case-control)</li> <li>report number / characteristics of participants</li> </ul>
	Clinical practice Guideline: <ul style="list-style-type: none"> <li>note date of guideline</li> <li>indicate if search strategy was conducted</li> <li>indicate type of study(s) used to support recommendation</li> </ul>
<b>Intervention / Exposure and Comparison</b>	<ul style="list-style-type: none"> <li>describe intervention (include dose / duration, if relevant) or exposure and comparison condition</li> <li>detailed inclusion criteria do not generally need to be reported</li> <li>methods can be incorporated into the main findings (e.g. body fat as assessed by DEXA decreased by 12%)</li> </ul>
<b>Main findings / Outcomes</b>	<ul style="list-style-type: none"> <li>only report on those that are relevant, patient important outcomes relating to the PQ (e.g., mortality, morbidity, functional status, quality of life) rather than every reported outcome. Use surrogate outcomes (e.g., biomarkers, bone density) only if no information is available on patient important outcomes. You can refer to International Consortium of Health Outcomes to help identify relevant outcomes: <a href="http://www.ichom.org/medical-conditions/">http://www.ichom.org/medical-conditions/</a>.</li> <li>include odds ratio (OR), relative risk (RR), hazard ratio (HR), mean difference (MD) and Confidence Intervals (CI), <i>P</i>-value etc. when appropriate. Present data using this format: RR 1.30, 95%CI 0.82 to 1.54.</li> </ul>
<b>Study author's main conclusions</b>	<ul style="list-style-type: none"> <li>reference the article when citing the author's conclusions</li> </ul>
<b>Quality assessment</b>	<ul style="list-style-type: none"> <li>indicate the critical appraisal tool used and the quality of included study(s)</li> <li>limitations noted in the article should be distinguished from those identified by the PEN author. When describing author's limitations, ensure the reference number is at the end of the sentence. A</li> </ul>

	transitional statement or phrase can help, e.g. The following limitations have been identified by the author of the study.... (reference). Additional limitations to note are....
<b>Conflict of interest / other source of bias</b>	<ul style="list-style-type: none"> <li>comment on conflict of interest if obvious (e.g. as identified by the author of a systematic review). Since it is not mandatory for authors to report conflict of interest in all publications, it is not always possible to establish whether conflict of interest is present.</li> <li>Comment on any other source of bias (e.g. if there is only one research group who has published all of the evidence)</li> </ul>
<b>Reference</b>	<ul style="list-style-type: none"> <li>the number of the reference in brackets is to be used, not the author's name and publication year.</li> </ul>

Examples of clear succinct evidence statements:

*Systematic Review (example):* [Q: Does involvement in food preparation and cooking improve nutrition knowledge, skills, attitudes and dietary quality?](#)

*Meta-analysis (example):* [Q: Does immunonutrient supplementation improve outcomes in surgical patients?](#)

*Individual Study (example):* [Q: Are prebiotics effective in the management of adult lactose intolerance?](#)

## b. Key Practice Points (KPPs)

When a reader looks at the PEN System online, they initially see the KPP that provides a succinct evidence-based recommendation or 'answer' to the practice question. Generally there will be three parts to the KPP: **Recommendation, Evidence Summary and Remarks.**

If the user chooses to drill deeper, they can read the supporting research that is provided in the Evidence Statements and additional details in the Comments or Rationale sections (see details below – these are not included in the KPP definition). If the Evidence Summary is very practical (e.g. where there is a lack of scientific evidence and expert opinion is used), there may not be a need for all three sections in the KPP.

- **Recommendation** is a one or two sentence take-home message. Include a practice recommendation (e.g. no recommendation, recommendation for or against an intervention) if feasible. This is not graded as it is based on the graded evidence in the Evidence Summary (and there may be different grades in the evidence).
  - A few words can be used to reflect the quality of the evidence and size of the effect informing the recommendation (e.g. 'X' probably reduces outcome or 'X' may reduce outcome...). See example recommendation statements in the [PEN Evidence Grading Checklist](#).  
Country-specific recommendations from clinical practice guidelines or health government agencies that are graded and used in the Evidence Summary are considered to be part of the overall Recommendation. However when Country-specific recommendations are not graded and reflected in the Evidence Summary, and thus not reflected in the overall PEN recommendation, they should be added as a separate section in the Recommendation titled Country-specific Recommendations (e.g. <https://www.pennutrition.com/KnowledgePathway.aspx?kpid=2814&pqcatid=146&pqid=732>).
- **Evidence Summary** should be a succinct summary and critical appraisal of each article used to answer the question. Simple language should be used when possible. Supporting research and/or evidence is provided in the Evidence Statements. The Evidence Summary should include all of the studies and/or clinical practice guidelines etc. captured in the Evidence Statements, with the exception of country-specific recommendations that are not graded and are included in the Recommendation section under the Country-specific Recommendations heading. Information not included in the Evidence Statements should not be included in the Evidence

## Summary.

When crafting the Evidence Summary, consider including the following information (as summarized from the evidence):

- study design
- population (if guidance targets a specific group, e.g. age, gender)
- key conclusion/answer to the practice question – specify effect size (e.g. OR, RR) or amounts if applicable (e.g. x amount of a supplement daily); detailed statistics are not required.
- limitations of the evidence may be included if critical, in this case they would also be included in the evidence statements.
- future research needed/suggested if critical to clarify or enhance the understanding of the issue (either here or in the Comments section).

In some cases, rewording the practice question to include the population supported by the evidence may be warranted.

If there are a number of studies used to answer the question (e.g. different populations or interventions), it can be helpful to organize the topic by subheadings.

Example: [Q: What is the role of diet in \*Helicobacter pylori\* prevention or treatment?](#)

Evidence Summaries are given a Grade of Evidence using the [PEN Evidence Grading Checklist](#)

**Note** that if conclusions in the evidence summary have more than one grade of evidence (e.g., due to different interventions or outcomes), the grade should be indicated after each conclusion.

Examples where different interventions as part of the same KPP are given more than one grade of evidence:

[Q: What are the optimal dietary strategies for the management of cancer treatment-induced diarrhea?](#)

[Q: What is the impact of calcium or dairy product intake on non-heme iron absorption and is there an effect on iron status among healthy adults?](#)

- **Remarks (optional)** includes contextual information needed to inform the Recommendation or Evidence Summary. Its content can be derived from the Evidence Statements, Comments and Rationale sections but every effort should be made to use clear and simple language. It will usually indicate what to consider in discussion with clients. This section is not referenced and does not include any new information not already reported in the PQ. A grade of evidence is not applied to this section. Remarks only need to be reported where relevant and can include:
  - context for the topic/issue including description of the intervention or content from Rationale or Comments sections of the practice question
  - implementation considerations (e.g. risk/benefit ratio, convenience and burden, costs, nutrient information, patients' value and preferences, health status, co-morbidities, lifestyle, culture etc.)
  - considerations related to subgroups, monitoring and evaluation, need for future research
  - links to standard [international collections](#) that help guide practice, as appropriate to the topic or links to other content in the PEN System that is relevant.

Information from the KPP will be used in the Summary of Recommendations and Evidence.

Examples of clear, succinct KPPs:

[Autism Summary of Recommendations and Evidence](#)

[Caffeine Summary of Recommendations and Evidence.](#)

### c. Comments and Rationale

These sections are optional but can help to provide contextual information to support information in the Remarks.

#### Comments

Include relevant information to support the KPP that does not belong in the evidence statements. Statements should be referenced and these references become part of the main reference list for the practice question.

Example – if the practice question is about chromium, the comment might include sources of chromium in foods, different valences of chromium – food versus chemical and industrial, length of trials and lack of clarity on safety.

#### Rationale

This section allows explanation of the proposed or known mechanisms of action, reasoning behind research hypotheses and explanations for theories. It should be referenced and these references become part of the main reference list for the practice question.

### d. References

PEN references must be written in a specific format. This is easily done in PubMed by clicking on “cite” – choose Format: NLM, then copy and paste into a Word document and add the PubMed URL. If reference citation software is used, select ‘National Library of Medicine’ as the citation style and then add the PubMed URL. See examples below. Additional examples are shown in the [PEN Style Guide](#). Please check references for proper format and to ensure that all references in the reference list are included in the practice question text in the correct numerical order and all of the references used in the PQ text are captured in the reference list.

#### Examples

Journal reference:

Yuan X, Wang J, Yang S, Gao M, Cao L, Li X, Hong D, Tian S, Sun C. Effect of the ketogenic diet on glycemic control, insulin resistance, and lipid metabolism in patients with T2DM: a systematic review and meta-analysis. *Nutr Diabetes*. 2020 Nov 30;10(1):38. doi: 10.1038/s41387-020-00142-z. PMID: 33257645; PMCID: PMC7705738. Abstract available from: <https://pubmed.ncbi.nlm.nih.gov/33257645/>

PEN content:

Dietitians of Canada. What health-related outcomes and safety concerns are associated with green tea consumption, including both beverage and supplement forms, among adults? In: Practice-based Evidence in Nutrition [PEN]. 2020 Oct 4 [cited 2021 Apr 25]. Available from: <http://www.pennutrition.com>. Access only by subscription. Click Sign Up on PEN login page.

### e. Keywords and Glossary

#### Keywords:

List all key words specific to new practice questions, not the knowledge pathway, with no punctuation separating each word (e.g. infant feeding vitamin C iron). For existing practice questions, the current key words will be provided in the MS Word document and these key words should be reviewed and modified (additions/deletions) as needed. These key words will help PEN users search for relevant information on the PEN website.

#### Glossary

Provide definitions of key terminology used in the pathway that a dietitian may be unfamiliar with. Include the reference used for the definition. Paraphrasing is preferred to a direct quote. If material is a direct quote, quotations should be used. To avoid unnecessary work, it is best to check and make sure the term is not already in the PEN glossary. If it does exist, a change can be recommended if needed. For more information see PEN Glossary: <https://www.pennutrition.com/GlossaryList.aspx>

### f. Search strategy

A search strategy is included with all content sent for review and is published with the PQ. Refer to Step 3 – [Acquire](#).



### 3. Background Content

Background documents are created for some KPs, particularly for those non-clinical topics that do not have a Practice Guidance Toolkit. Templates have been created to guide the development of backgrounders depending on the topic. See:

[Background Template Clinical](#) and  
[Background Template Non-Disease Related](#).

A list of resources to guide development of background documents has also been created. See: [PEN Background Resources](#).

### 4. Summary of Recommendations and Evidence

The author is not responsible for creating the Summary of Recommendations and Evidence. It is created by a member of the PEN Team once the new or revised knowledge pathway is finalized.

### 5. Practice Guidance Toolkit

The author is not responsible for creating the Practice Guidance Toolkit. It is created by a member of the PEN Team once the new or revised knowledge pathway is finalized. For additional information, see the [Practice Guidance Toolkit Template](#)

### 6. Tools and Resources

The author is not responsible for identifying all related tools and resources; however, it is helpful to provide suggestions of non-PEN developed resources to include or exclude in a knowledge pathway. For full KP updates, a list of the tools/resources that are currently part of the KP, will be included in the MS Word document provided by the Editor. See [PEN Guidelines for Third Party Tools](#).

### 7. Review Process of PEN Content

#### *External Review*

Each evidence analyst/writer is assigned a member of the PEN Team to provide mentoring during the writing process. Once the PEN content has been drafted, the author should review the [PEN Writer's Checklist \(Appendix 1\)](#) and [PEN Reviewer Guidelines](#) to make certain the content is ready for review. The assigned PEN Team member will provide preliminary feedback. When it is determined that the content is ready for external review, the PEN Team member will send out the content in a WORD document to identified reviewers.

Sometimes authors suggest reviewers, but most times it is the PEN Team who identify the reviewers with expertise in the topic area both from academia and practice. This is a critical stage in the KP development as it adds credibility to what is written for the PEN System.

**Note:** It is the authors responsibility to respond to any questions raised by the reviewer and justify to the reviewer any feedback not incorporated into revisions (e.g. if feedback is not according to PEN process).

#### *Editing*

Once the evidence analyst (EA)/writer has incorporated or responded to the reviewers' feedback and the Responsible Administrator (RA) has reviewed the content and determined the content is ready for editing, the MS WORD document is sent to the PEN Editor. The PEN Editor ensures that the content is well written, follows the relevant PEN guidelines and that it is consistent with existing PEN content. If the content is not acceptable, it is returned to the EA/Writer or the RA. If the document is accepted for by the Editor, it enters the editing/publishing cycle, with an anticipated publication date of twelve weeks or less.

## 8. Supporting Resources

- [PEN Quick Update process](#)
- [PEN RISR: Rapid Incorporation of Systematic Reviews](#)



## Appendix 1 PEN® Writer's Checklist

Before submitting your MS WORD document for editing please check that your document is ready. Include information on the reviewer's including their name, email address and country of origin.

### *For all content – new or updated:*

- ☐ I read the [PEN® Writers Guide on plagiarism](#). **Note:** modifying just a few words is an inadequate summary and appraisal.
- ☐ All of the evidence statements are reflected in the Key Practice Point (KPP). **Note:** extra information from articles may be included in the Comment section. Evidence statements are NOT to be summaries or replications of study abstracts.
- ☐ When appropriate, I have included a Rationale statement for a Key Practice Point. This includes a proposed mechanism of action (e.g. biochemical interaction contributing to the effect). This is very useful to the reader.
- ☐ All of the comments from reviewers have been incorporated or addressed in my author's MS WORD working document. **Note:** authors should save the copy with the reviewer's comments, indicating that you have addressed each one with a check mark or why you didn't address them in case the reviewer asks why the comment wasn't addressed once the content is posted in the PEN System. The Editor does not need to see the comments, but it is good to have such a document if there are questions as to why the content changed. Do not use the reviewers' documents as your draft for submission for editing, as the reviewer may change or delete information without track changes.
- ☐ I have noted in a Comment bubble any of the submitted content (with the source) that requires copyright permission e.g. a table from an article.
- ☐ I have linked all journal articles in the reference section to PubMed abstracts, when available. **Note:** if an article is not found in PubMed, try to find a link to the abstract elsewhere.
- ☐ I have ensured that all references in the reference list match those in the written content, all are used, are in the correct order, and are formatted exactly according to the [PEN Style Guide](#)
- ☐ All of the relevant key words have been included.
- ☐ I have scanned the provided list of tools and resources (TRs), particularly for third party, non-PEN-developed resources and have provided suggestions for including any relevant TRs that are not listed according to the [PEN Guidelines for Third Party Tools](#).

### *For reviewing and updating an existing knowledge pathway or a practice question:*

- ☐ I started with the clean copy of the existing PEN content that I received from a PEN Team member.
- ☐ I used Track Changes when making my edits in the MS WORD document. **Note:** if the changes are too significant to use track changes, please note in the document.
- ☐ I updated practice questions by conducting a new literature review, reviewing and updating each KPP, each article and each evidence statement. **Note:** if there are no changes for an evidence statement, it is assumed that the evidence statement has been reviewed and it is still up-to-date.
- ☐ I have indicated, using a Comment bubble, if the related practice questions (if titles and links included in the MS WORD document) are or are no longer consistent with the new/updated content.
- ☐ For updated content, I have indicated the type of update:
  - Reviewed and no new evidence identified that changes current recommendations

- New evidence added that supports current recommendations
- New evidence added that resulted in change to recommendations
- New evidence added that supports current practice recommendations and has resulted in a change in the grade of evidence

- ☐ I added any new practice questions to the MS WORD document following the updated/reviewed existing practice questions. I have clearly indicated which ones are new by adding a Comment bubble. **Note:** this can be done by using comment boxes or a bolded heading at the start of the new practice question section.
- ☐ I have scanned the provided list of tools and resources (TRs), particularly for third party, non-PEN-developed resources and have provided suggestions for including any relevant TRs that are not listed according to the [PEN Guidelines for Third Party Tools](#).