Adjusting Results
and
Creating a Working Set
Learning Objectives

1. Identify Good Search Techniques
2. Demonstrate how to broaden and narrow results with search terms
3. Apply AND and OR to searches properly
4. Express the iterative process of adjusting a search to find a working set
5. Explain what a working set is and what it is used for
The techniques discussed in this tutorial are part of the Acquire portion of the 5 A’s of the EBD Cycle. You have asked your question and are now working on acquiring information to answer it.
Good Search Techniques can help!

You may find as you search the database that the number of results you are getting for one of your search terms is too many or too few.

Using Good search techniques will help you adjust your results.
Searching for concepts individually lets you apply these good search techniques:

Adjusting terms to be broader or narrower, if the first term you’ve tried isn’t working.

Combining terms using Boolean operators. Or

Eliminating the least important concept altogether if you need to.
Reminder of Our Selected Initial Search Terms

**Foreground Question:** In patients requiring a tooth extraction who have undergone head and neck radiotherapy does hyperbaric oxygenation or antibiotics lead to greater prevention of osteoradionecrosis?

<table>
<thead>
<tr>
<th>Importance</th>
<th>Search Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>Osteoradionecrosis</td>
</tr>
<tr>
<td>#2</td>
<td>Hyperbaric oxygenation</td>
</tr>
<tr>
<td>#2</td>
<td>Antibiotics</td>
</tr>
<tr>
<td>#3</td>
<td>Tooth extraction</td>
</tr>
</tbody>
</table>

As a reminder, these are the search terms we’ve initially selected for our foreground question ranked in order of importance. We will be entering them into a database one at a time.
Broadening and Narrowing Your Search Terms

Let’s look first at how to adjust your results by broadening and narrowing your search terms
Suppose when you search tooth extraction you’re getting too many results. What might be a more specific term? When considering what could be more specific it’s helpful to think of the patient who started the EBD process.

John needs teeth 7 and 8 extracted. These are both anterior teeth. Articles about anterior tooth extraction would be more useful than those about posterior tooth extraction. This is a good narrower term. It will often bring back fewer results that are also more specific to our EBD question.
Suppose you’re getting too few results. While we ideally would want articles discussing tooth extraction since that is what John is receiving, any type of wound can lead to osteoradionecrosis. Therefore, we can broaden our search to include oral surgical procedures in general and then use our clinical expertise to make connections to our patient.
Applying Boolean to Search Terms

Applying Boolean to search terms to adjust results
Boolean operators allows you to connect and define the relationship between your search terms. The three Boolean operators are AND, OR and NOT.

NOT is an advanced search technique, so for this tutorial we will focus on AND and OR.
AND looks for articles that contains all of the terms being connected by AND. If an article is about one of the terms but doesn’t mention any of the other terms in the string, it won’t show up.

Using AND narrows your search, and the more terms you AND together, the narrower your search becomes.

If you don’t tell a computer precisely what to do with your search terms it will automatically AND everything together.

osteoradionecrosis AND hyperbaric oxygenation AND antibiotics AND tooth extraction

All four of these terms must show up in the record for the article or it will not come up in the search results.
OR looks for articles that contain either term by itself or both terms together. For example, if I run this search: hyperbaric oxygenation OR HBOT, I get articles mentioning hyperbaric oxygenation, articles mentioning HBOT, and articles mentioning both.
Many concepts can be referred to in multiple ways. When there’s more than one term for the same concept we call these synonyms. Putting in all of the synonyms for a concept and ORing them together helps us not miss articles that might use one synonym but not the other for the concept we want. In dentistry, synonyms are often acronyms. Other things to consider are singular versus plural and British versus American spellings. Considering all of these questions gives us this list of synonyms for our search terms.

<table>
<thead>
<tr>
<th>Search Term</th>
<th>Synonyms</th>
</tr>
</thead>
<tbody>
<tr>
<td>osteoradionecrosis</td>
<td>ORN OR osteoradionecroses</td>
</tr>
<tr>
<td>hyperbaric oxygenation</td>
<td>HBOT</td>
</tr>
<tr>
<td>antibiotics</td>
<td>antibiotic</td>
</tr>
<tr>
<td>tooth extraction</td>
<td>tooth extractions</td>
</tr>
</tbody>
</table>

* Synonym use is an Excellent search strategy.
Order of operations matters in searching, so be cautious when assembling it.

If you decide to use AND & OR together within the same search string, be sure to place the terms you are planning to OR inside parentheses.
Otherwise, the computer would retrieve articles about osteoradionecrosis AND hyperbaric oxygenation as well any articles about HBOT, regardless of whether osteonecrosis was also mentioned.

Let’s see what this might look like in a database.
Some databases insert parentheses in what can look like an arbitrary manner. To ensure correct order of operations, it’s important to use the Advanced Search Builder and Search History. First, run each term you want to use individually.

Then, for any terms you want to combine with an OR, add them to the search builder, and change the Boolean field to OR.

Third, click “add to history.”
Order of Operations Matters

* Each concept now can be treated as a unit in the builder.

Now each concept, whether an individual keyword or multiple keywords combined with OR, can be treated as a unit in the builder. Notice that PubMed added what may seem like arbitrary parentheses? If you keep each concept to an individual line in the builder, you don’t have to worry about the parentheses as PubMed will ensure they ultimately use correct order of operations. So, the next and final step is to add each concept to the builder and click search.
See how PubMed has, in this final search, inserted parentheses in such a way that correct order of operations is ensured.

While you can type in parentheses yourself, the more complex a search is, the more likely that is to go awry. It’s best practice to use the search builder.
Creating a Working Set

Now it’s time to try out these different techniques in order to move toward creating a working set.
Here’s what happens when you run each of these terms individually in PubMed. You won’t easily find an answer to your question if you keep all of your terms separate, so let’s combine them together.

<table>
<thead>
<tr>
<th>Search Term</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>osteoradionecrosis</td>
<td>2,141</td>
</tr>
<tr>
<td>hyperbaric oxygenation</td>
<td>11,149</td>
</tr>
<tr>
<td>antibiotics</td>
<td>728,057</td>
</tr>
<tr>
<td>tooth extraction</td>
<td>22,705</td>
</tr>
</tbody>
</table>
This is a Poor search. It retrieves only 8 results but also it doesn’t attempt any of the iterative process of searching. Other techniques should be tried to take this to a Good search.

With only 8 results, does it make sense to narrow or broaden this search? With so few results, broadening your search seems most logical. Let’s do so by changing tooth extraction to oral surgical procedures.
<table>
<thead>
<tr>
<th>Good Search Technique</th>
<th>Actual Search String</th>
<th>Number of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>BROADEN one term</td>
<td>osteoradionecrosis AND hyperbaric oxygenation AND antibiotics AND oral surgical procedures</td>
<td>14</td>
</tr>
</tbody>
</table>

The number nearly doubles to 14 results.

If you narrow the term instead ...
<table>
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<tbody>
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<td>osteoradionecrosis AND hyperbaric oxygenation AND antibiotics AND oral surgical procedures</td>
<td>14</td>
</tr>
<tr>
<td>NARROW one term</td>
<td>osteoradionecrosis AND hyperbaric oxygenation AND antibiotics AND <em>anterior tooth extraction</em></td>
<td>1</td>
</tr>
</tbody>
</table>

You would only have one article, which is not sufficient.

What happens if you eliminate the least important concept, tooth extraction?
<table>
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</tr>
<tr>
<td>NARROW one term</td>
<td>osteoradionecrosis AND hyperbaric oxygenation AND antibiotics AND anterior tooth extraction</td>
<td>1</td>
</tr>
<tr>
<td><strong>ELIMINATE</strong> the least important term</td>
<td>osteoradionecrosis AND hyperbaric oxygenation AND antibiotics</td>
<td>38</td>
</tr>
</tbody>
</table>

This increases the results quite a bit from 8 to 38.
What happens if you take the initial search but instead OR together the Intervention with the Comparison?

But wait, why would you do this?
Many EBD searches are looking for an article directly comparing an Intervention and a Comparison to each other. If none or very few of these exist or if the ones that do exist are of a low quality, then you would look for the best article about the Intervention as well as the best article about the Comparison and compare them to each other yourself using your clinical expertise. In order to see articles about either the Intervention OR the Comparison, simply put parentheses around them and change the AND to an OR.
When you do this it really increases your results, giving you 59 articles, which looks like an appropriate strategy for this question. Keep in mind, the techniques you employ will vary depending on your topic. You may find that using multiple techniques simultaneously works best. In this case, looking at the results, you decide using just the technique of combining the Intervention and Comparison with an OR works best.

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<tr>
<td>NARROW one term</td>
<td>osteoradionecrosis AND hyperbaric oxygenation AND antibiotics AND anterior tooth extraction</td>
<td>1</td>
</tr>
<tr>
<td>ELIMINATE one term</td>
<td>osteoradionecrosis AND hyperbaric oxygenation AND antibiotics</td>
<td>38</td>
</tr>
<tr>
<td><strong>OR the Intervention with the Comparison</strong></td>
<td>osteoradionecrosis AND (hyperbaric oxygenation OR antibiotics) AND tooth extraction</td>
<td>59</td>
</tr>
</tbody>
</table>
This search string, which you deemed most appropriate for retrieving articles on your topic, and its results are considered the working set. The search string is specific and not overly narrow, and the results contain articles for the next phase of the EBD Cycle, Appraise the quality of the evidence.

But how do you know when your working set is appropriately sized?
The goal is to efficiently screen the most relevant articles on your topic as well as not miss any that could potentially be relevant. Keeping in mind that the dental literature is specific and limited compared to other topics, aiming for 50 to 100 results is ideal. For some searches that range will not be possible. If you’ve really tried and can’t quite get there, it’s appropriate to go a bit smaller or a bit larger but no working set should have less than 20 or more than 300. These are both signs that something in the searching technique is off and needs to be adjusted.
To find the Working Set in PubMed, go to the Advanced Search Builder page and look at the search History. (Remember, everyone’s search history looks different). To share your working set, simply copy/paste the search string and number of results from the set you’ve identified as the most appropriate to take into the next phase of EBD.

Now that you have a working set, you can start selecting articles and appraising the evidence.
References


Here are our references.
References


Thank you.