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Financial disclosers

• None
Learning objectives / outcomes

• Analyze arguments for and against the use of the word "infiltrate" in chest radiology.
• Demonstrate through analogy how the use of the term "infiltrate" may lead to miscommunication.
• Discuss proposed ways to avoid this miscommunication.
The “i” word

• Use of the word "infiltrate" in chest radiology reports is controversial.

• To begin, How do you define “infiltrate”?...
The Fleischner Society’s definition

- Infiltrate
  - “...a region of pulmonary opacification caused by airspace or interstitial disease...”
  - “...controversial because it means different things to different people ...”
The Fleischner Society’s definition

- Infiltrate
  - “…a region of pulmonary opacification caused by airspace or interstitial disease…” ¹
  - “…controversial because it means different things to different people …” ¹
  - “The term is no longer recommended…” ¹
  - “…opacity, with relevant qualifiers, is preferred.”¹
The Fleischner Society’s definition

- Infiltrate
  - “...a region of pulmonary opacification caused by airspace or interstitial disease...”
  - “...controversial because it means different things to different people ...”
  - “The term is no longer recommended...”
  - “...opacity, with relevant qualifiers, is preferred.”

How do they know “infiltrate” means different things to different people?
Let’s look at their source...
“Infiltrate” means different things to different people

• The chief evidence for this comes from a physician survey in 2005. ²

• Relevant key findings come from this question:
  • “Check any of the following terms you think are consistent with or implied by the descriptive term *infiltrate*.”
    • The authors then provided a list of terms
    • Let’s look at this list and their results...
Terms implied by “infiltrate.” Results:

<table>
<thead>
<tr>
<th>Descriptive Term</th>
<th>Total No. of Responses*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacterial pneumonia</td>
<td>115 (76.2)</td>
</tr>
<tr>
<td>Nonspecific pneumonia</td>
<td>107 (70.9)</td>
</tr>
<tr>
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<td>94 (62.3)</td>
</tr>
<tr>
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<td>92 (60.9)</td>
</tr>
<tr>
<td>Consolidation</td>
<td>85 (56.3)</td>
</tr>
<tr>
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</tr>
<tr>
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</tr>
<tr>
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<td>18 (11.9)</td>
</tr>
<tr>
<td>None</td>
<td>5 (3.3)</td>
</tr>
<tr>
<td>Other</td>
<td>8 (5.3)</td>
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Mean number of terms: 5.7 (standard deviation, ±3.2; median, 6.0)

Let’s analyze these results...
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The top 4 terms have something in common...

The next closest term is considered applicable by only about half of respondents.

Mean number of terms: 5.7 (standard deviation, ±3.2; median, 6.0)

The large mean is emphasized by the surveyors as indicating why “infiltrate” should be avoided...

...But it is the large standard deviation which provides the best argument against the use of “infiltrate”...
Analyzing the survey results:

Mean: 5.7 (standard deviation ±3.2)

- One standard deviation around the mean = ~68% of the population.
- The results of the survey indicate ~68% of the physicians fall in a range that believe infiltrate can refer to as few as 2.5 terms or as many as 8.9 terms.

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In addition, this suggests that ~32% of physicians fall even further towards either extreme.

And based on the results table, probably those with the fewer terms are thinking infiltrate = pneumonia.

Are there other studies to support these findings?...

Analyzing the survey results:

Mean: 5.7 (standard deviation ±3.2)
Additional surveys

• At least two additional studies have demonstrated that some physicians believe “infiltrate” implies pneumonia.\textsuperscript{3,4}
Conclusions from the surveys

• “Infiltrate" means different things to different physicians

- Some have a very broad differential
- Others have a very narrow differential (specifically pneumonia)

• To illustrate how this *ambiguity* leads to miscommunication and potential problems with patient management, let's look at an analogy...
Analogy: Argument Against the Use of “Coke”

- Portions of the United States have a narrow definition for “coke” (specifically Coca-Cola), while others have a broad definition (any soda/pop).
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- Portions of the United States have a narrow definition for “coke” (specifically Coca-Cola), while others have a broad definition (any soda/pop).

If you use “coke,” which do you mean?

- Any soda/pop

Some will think you mean Coca-Cola

May end up with Coca-Cola when what you want is Sprite or 7up.

Some will think you mean Any soda/pop

You may appear indecisive. May end up with Sprite or 7up, instead of Coca-Cola.
Analogy: Argument Against the Use of “Coke”

- Portions of the United States have a narrow definition for “coke” (specifically Coca-Cola), while others have a broad definition (any soda/pop).

  If you use “coke,” which do you mean?

- A word that means different things to different people leads to miscommunication.
- We want to avoid miscommunication.
- Therefore, avoid “coke”.

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- If you use “coke,” which do you mean?
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Argument Against the Use of “Infiltrate”

• Some have a broad differential for “infiltrate” (as broad as general opacity), while others have a narrow differential (specifically pneumonia).
Argument Against the Use of “Infiltrate”

- Some have a broad differential for “infiltrate” (as broad as general opacity), while others have a narrow differential (specifically pneumonia).

If you use “infiltrate,” which do you mean?

- General opacity
- Pneumonia

Some will think you mean

- Pneumonia
- General opacity

Patient may get treated for pneumonia when another etiology was implied.

Radiologist may appear to be hedging. Patient may not get treatment for their pneumonia.
Argument Against the Use of “Infiltrate”

• Some have a broad differential for “infiltrate” (as broad as general opacity), while others have a narrow differential (specifically pneumonia).

- General opacity
- Pneumonia

- If you use “infiltrate,” which do you mean?
- Some will think you mean
  - General opacity
  - Pneumonia

- Some will think you mean
  - Pneumonia
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- Patient may get treated for pneumonia when another etiology was implied.
- Radiologist may appear to be hedging. Patient may not get treatment for their pneumonia.

• A word that means different things to different people leads to miscommunication.
• We want to avoid miscommunication.
• Therefore, avoid “infiltrate”.
Key point in the argument against the use of “infiltrate”

• Some physicians have a very broad differential for "infiltrate", while others have a very narrow differential, specifically pneumonia. This leads to miscommunication. So, avoid "infiltrate."

• Let's look at counterarguments...
Counterargument #1: Comparing “infiltrate” to other words

- Other words are **vague**, but we still use them. ⁵
  - Example: Opacity

  But everyone knows “opacity” is a vague term. The problem with “infiltrate” is not the vagueness. It’s that some think it is a vague term and some think it is a specific term (pneumonia).

- Other words have **large differentials**, but we still use them. ⁶
  - Example: solitary pulmonary nodule (SPN)

  But everyone knows SPN has a wide differential. If some people thought SPN had a wide differential, while others thought it always meant granuloma, SPN would be problematic.

Problem with “infiltrate” is not the wide differential. The problem is some have a specific differential and some have a wide differential.
Counterargument #2: Appeals to authority

• “Infiltrate” is used in a given textbook.⁷
• “Infiltrate” is used by a given experienced radiologist.

But don’t take their word for it. Why do these authorities use the term “infiltrate”? What is their underlying reasoning?
Counterargument #3: Appeals to popularity

- “Infiltrate” is used by many radiologists/clinicians.

But just because many people do or believe something does not make that something correct.
• We know the correct definition of “infiltrate”. Radiologists shouldn’t change their language just because clinicians don’t know enough.\(^5\)

But radiologists do not agree on the “correct” definition of infiltrate.\(^3\)

We shouldn’t expect clinicians to be experts in radiology.

Even if you claim you know the “correct” definition, if others do not know the correct definition, you will not communicate effectively.
Counterargument #5: Lack of synonyms for infiltrate

• No word describes an infiltrate better than “infiltrate”.\textsuperscript{8,9}

This brings to mind an adage: “a limited vocabulary is no excuse for profanity.”

• Similarly, does use of “infiltrate” imply a need to expand our vocabulary?
• What are synonyms for infiltrate? (permeate?, percolate?, surreptitiously entering?)\textsuperscript{8}
• Admittedly, in searching for synonyms, it is difficult to find an equivalent word.

But not everyone agrees on what is the definition of “infiltrate.”
What to use instead of “infiltrate”?

• “Opacity” + qualifiers \(^{1,2}\)

• More specific terms or diagnosis.
  • Ex: pneumonia, edema, etc.

• This is an area for further discussion.
Counterargument #6: “Infiltrate” + descriptors

• Use of “infiltrate” is okay, if not used by itself. ³

Two kinds of qualifiers that can be used with “infiltrate”

Those that do not decrease the ambiguity

Those that do decrease the ambiguity

To clarify the difference between these kinds of qualifiers, let’s return to the analogy with “coke.”
Analogy: Two Kinds of Qualifiers for “Coke”

• Words that **do not** decrease the ambiguity
  - Ex: “cold”, “in a can”, “with ice”...

  Adding these words does not clarify how broad or narrow a definition of “coke” is intended.
  A “cold coke” could still be interpreted as meaning coca-cola or any soda/pop.

• Words that **do** decrease the ambiguity
  - Ex:
    - “I would like a coke, specifically a Coca-cola"
    - "I would like a coke. Any kind of soda would be good."

Somewhat forces the listener to realize how broad or narrow is the intended definition.
Decreases the chance for miscommunication.
Two Kinds of Qualifiers for “Infiltrate”

• Words that **do not** decrease the ambiguity
  • Ex: “nodular”, “reticular”, “interstitial”, “alveolar”...

Adding these words does not clarify how broad or narrow a definition of “infiltrate” is intended.

An "interstitial infiltrate" could still be interpreted as meaning pneumonia or a broader differential.

• Words that **do** decrease the ambiguity
  • Ex:
    • “Infiltrate in the right middle lobe, likely representing pneumonia.”
    • “Infectious or noninfectious infiltrate in the right middle lobe.”

Somewhat forces the clinician to realize how broad or narrow is the intended differential.

Decreases the chance for miscommunication.
Conclusions

• “Infiltrate” is ambiguous (some physicians have a very broad differential, while others have a very narrow differential, specifically pneumonia).

• This ambiguity leads to miscommunication.

• Two ways to avoid this miscommunication:
  1) Avoid the use of the term “infiltrate.”
  2) Don’t use “infiltrate” in isolation. Clarify how broad of a differential is intended.


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