Physicians can simplify some treatment decisions by treating only when the patient's disease probability exceeds a threshold probability. Similar to Djulbegovic et al.'s (2014) questions, except theirs asked about the threshold per se.

Threshold Probability Strategy
- Physicians can simplify some treatment decisions by treating only when the patient's disease probability exceeds a threshold probability.
- Treatment threshold probability is based on the utilities of the two possible mistakes:
  - to fail to treat disease (Miss) and
  - to unnecessarily treat a patient without the disease (False Alarm)

Utility of Outcomes of Decision Situation
- The utility of each can be judged by giving a probability to the outcomes:
  - True Negatives (TN): No disease and not treated
  - True Positives (TP): Disease and treated
  - False Positives (FP): No disease and treated
  - False Negatives (FN): Disease and not treated

<table>
<thead>
<tr>
<th>Give No Antibiotics</th>
<th>Strain Throat (with antibiotics)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Strain Throat</td>
<td>Strain Throat (w/o antibiotics)</td>
</tr>
</tbody>
</table>

Choose to Treat if it has a Higher Expected Utility
- Expected utility depends on probability of disease, as well as on utilities of the outcomes.
- EU(treat sore throat with antibiotics) = p(strep) * u(antibiotics|strept) + (1−p(strep)) * u(antibiotics|not strept)
- EU(do not treat) = p(strep) * u(no antibiotics|strept) + (1−p(strep)) * u(no antibiotics|not strept)

Judgment of 2 Utility Differences
- Response is on a utility difference scale:
  - Similar to Djulbegovic et al.'s (2014) questions, except theirs asked about "negret" with anchor at midpoint.

Judgment of 1 Utility-Difference Ratio
- Response is on a utility difference scale:
  - A patient has strep in the throat.
  - The patient has a sore throat.
  - The decision to treat is a choice between comfortable probabilities of disease.

Physician Use of Treatment Threshold Probability Strategy
- Do clinicians know about the treatment threshold strategy?
- Do they base thresholds on own assessments of utility?
- Do they have a threshold probability for each particular clinical situation?
- Do utility-derived thresholds depend on the utility-assessment method?

How Accurately do Physicians Judge Treatment Threshold Probabilities?
- We ask people to judge:
  - Gist (ordinal judgment): Whether it is worse to “miss” than to “false alarm”
  - Precise: 4 utilities
  - 2 utility differences
  - 1 utility difference ratio

Method
- Sample: A web survey (Qualtrics) was promoted among convenience samples of primary care clinicians and residents, medical and physician assistant students, undergraduate students, and the public (patients).
- Threshold judgment method: Each respondent provided judgments to support four different calculations of their treatment threshold:
  - Pro/Con bias. Bias in description of the situation was varied (presenting more detailed reasons either in favor of treating strep throat, or against everusing antibiotics).
  - Benefit or harm framing. Descriptions of the judged outcomes and the probabilities were varied.
  - Task order, and order of presentation of responses within tasks, were randomly varied.

Threshold Probability Setting: Stated vs. Derived
- Stated threshold was higher (0.58)
- Lower quality responses: means varied more
- Correlations between methods are higher with higher quality judgments (see Figure 6)

Correlations Among Methods
- Highest and “acceptable” levels of quality

Summary
- Clinicians & (6) are aware of treatment threshold probability strategy
  - 46% follow it, only 14% actually explicitly use it
  - We can’t say “clinicians generally decide by referring to a threshold probability”
- Respondents’ precise estimates contradicted their gist utility judgments
  - More precise thresholds were often not consistent with the importance of the situation
  - Many people stated threshold was > 50%, while their utility judgments implied thresholds < 50% (see Figure 5)

Implications
- The robustness and utilitarianism of clinicians’ threshold judgments suggests
  - They aren’t using a well-founded treatment threshold probability strategy,
  - And if we want to use them, we should calculate it for them and provide them with aids for assessing disease probability, rather than relying on clinician judgment of either “thresholds” or “utilities.”

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