Improving Medical Decision Making

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Background
Psychology is vital for medicine if it strives for the ideals of informed patients and shared decision making. These four projects aim at understanding and improving medical decision making by drawing on ABC’s core concepts, such as ecological rationality and heuristic decision making.

What do women know about mammography screening?

Background and research question:
- Mammography screening has benefits and harms. Research indicates that 1 less woman out of 1000 die of breast cancer, but every second woman can expect one or more false positives. There are unnecessary lumpectomies and mastectomies for cancers women would never noticed in their life-time, and about 5 in 10,000 women get breast cancer from the X-rays. Moreover, out of 10 women who get a positive mammogram, only 1 has cancer.
- In order to make an informed decision and to avoid unnecessary panic after a positive mammogram, women need to know this basic information. How well are women informed, and does a visit to a mammography center improve their knowledge?

Method:
- Interviews with 58 Women 40+, before and after their visit to an information day at a mammography center

Results:
- Women overestimate the benefits of mammography by an order of magnitude or more.
- Women also overestimate the positive predictive value.

Conclusions:
- Shared decision making and informed consent is impossible given that women are not informed about the benefits and harms of screening.

Helping elderly to understand information about medical screenings

Background and research question:
- Information about medical screenings is often represented in terms of conditional probabilities. This format makes it difficult to evaluate how likely it is that one has the disease after a positive test (positive predictive value).
- Our previous studies have shown that using natural frequencies instead of conditional probabilities vastly improves understanding, because they simplify mental computations:

- Conditional probabilities: “Probability of colorectal cancer is 0.3%. If you have it, the probability of a positive test is 50%. If you don’t, it’s 3%. If you get a positive test, what is the probability you have cancer?”

- Natural frequencies: “Of 10,000 people, 30 will get colon cancer. Of those 30, 15 will test positive. Of the 9,970 without cancer, 300 will test positive. If a person gets a positive test, what is the probability that he or she has cancer?”

- Can elderly people profit from natural frequencies as much as younger adults? So far this has not been studied, yet it is important because the elderly undergo medical screenings more frequently.

Method:
- Two tasks involving descriptions of medical screenings.
- Sample: Students: 18-35 y., n=115
- Elderly: 62-77 y., n=67

Results:
- Elderly: Conditional probabilities: 17%
- Elderly: Natural frequencies: 14%
- Students: Conditional probabilities: 58%
- Students: Natural frequencies: 56%
- 1 task: 82%; 2 tasks: 69%

Conclusions:
- Elderly patients can profit from natural frequencies just as much as younger adults.
- This holds for both lower and higher numeracy respondents (not shown).

How do cancer patients decide on pharmacodiagnostic tests?

Background and research question:
- Which strategies are used by cancer patients when deciding whether or not to take a pharmacodiagnostic test?
- For describing decision-making processes, usually only integrative, compensatory models like regression models are used. Their ability to provide a valid description of human judgments has been questioned due to their inherent complexity. In this study we test two compensatory models against a sequential, noncompensatory model.

Method:
- Online/Paper-Pencil Study:
  - 116 Germany/ 111 US cancer patients
  - 9 case vignettes set up by three cues
  - Binary choice: Having/not having the test
  - Other measures: Demography, treatment history
  - Three models tested: Franklin’s Rule (cue-weighing compensatory model); Dawes’ Rule (until-weighing compensatory model); Fast and Frugal Tree (ordering, noncompensatory model)

Results:
- The Fast and Frugal Tree predicts choices better in both the German and the US sample.
- This suggests that patients rely on a sequential rather than an integrative process to decide on pharmacodiagnostic tests.

Outreach
The basic research by the Medical Decision Making Group is complemented by training of medical professionals and students based on these theoretical concepts and findings. In 2006 and 2007 we have trained about 1,000 gynecologists, anesthesiologists, general practitioners, and health care students in understanding and communicating medical risks.