New Hampshire Comprehensive Cancer Collaboration
Together-Eliminating Cancer

EMERGING ISSUES BRIEF

Cognitive biases and decision making: The importance of understanding how patients process information

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While cancer remains the second most common cause of death in the US, reductions in smoking and improvements in early detection and treatment have resulted in a 25% drop in cancer death rates from 1991 to 2014.[1] Despite these advancements, cancer remains one of the most feared medical diagnoses.[2,3] At the time of initial diagnosis, patients often describe feeling shocked and overwhelmed.[3] While processing this emotional experience, patients are also asked to digest complicated and stress inducing information about their future. Because good patient-provider communication is associated with improved emotional and physical health, it is important for care providers to understand how a patient processes information during these encounters.[4] This understanding is essential for achieving more effective shared decision making.

Dual process theories and human decision making

To understand patient-provider communication it is important to understand the different systems involved in human decision making and how they apply to cancer patients. According to dual process theories, human decisions are governed by two systems, System 1 and System 2.[5] System 1 is automatic, fast, and does not require the use of cognitive resources. Conversely, System 2 is slow, analytical, and requires cognitive effort. To illustrate the difference between Systems 1 and 2, consider the following problem:

A bat and a ball cost $1.10 together. The bat costs a dollar more than the ball. How much does the ball cost?

When this problem was given to a sample of undergraduate students, over 80% incorrectly said that the ball cost $.10 (1.10 + .10 = 1.20).[5] The correct answer is $.05 (1.05 +.05 = 1.10). Why did so many undergraduates answer incorrectly? The reason is that most used System 1. They automatically substituted the "*more than*" statement (the bat costs $1.00 *more than* the ball) with the absolute statement (the bat costs $1.00). This substitution makes the math easy to understand without using the more in depth processing of System 2.

The decision making networks of the human brain have evolved to use System 1 for most of our daily decisions. System 2 is reserved for situations that require deeper levels of processing (e.g., doing taxes). Normally, the division of responsibility between the systems is efficient and optimizes cognitive performance. However, under conditions of uncertainty and high stress—e.g., being diagnosed with cancer—System 1 tends to dominate and results in systematic errors in judgment, or *cognitive biases*.[6] For example, in the bat and the ball problem, the use of System 1 led to a cognitive bias known as the *substitution bias*. Peters et al. (2008) have suggested that the distress of a cancer diagnosis and the need for quick decisions causes patients to use System 1 over System 2.[7] To illustrate the potential that cognitive biases have to influence patients' reasoning and shared decision making, consider the following two hypothetical situations that describe the *availability* and *anchoring* biases, respectively.

Availability Bias

A 56 year-old male diagnosed with colorectal cancer refuses treatment due to concerns about side-effects and poor quality of life. Although his physician tries to explain that side-effects can be medically managed, he continues to refuse. Unbeknownst to the physician, the patient's mother had colorectal cancer 15 years earlier and the patient helped care for her. The patient's mother struggled with pain, nausea and vomiting which resulted in poor quality of life before her death. While the physician is discussing the patient's current treatment, the patient is recalling memories of his mother.

In this situation, the patient's decision can be attributed to the availability bias—the tendency to make a judgment on the probability of an event occurring based on the ease with which you can think of examples.[6] The more vividly an event is recalled, the more strongly one believes it will occur. The availability bias often results in errors in reasoning because the ease with which you can recall an event does not usually reflect the actual probability of an

event occurring in real life. A patient who has witnessed others suffer due to cancer-related treatments is more likely to assume that they too will suffer and may be more avoidant of treatment compared to others who have not had the same experience.

Anchoring Bias

A 25 year-old female with a family history of breast cancer elects to have genetic testing for the BRCA1/2 genes. Test results indicate that she has a BRCA1 mutation. In follow up, the physician provides information about the BRCA gene including that the risk of developing breast cancer by age 70 is 55-65% but that not everyone with this mutation develops cancer. Toward the end of the appointment the patient spontaneously states "I can't believe I'm going to get cancer."

The patient's statement is an example of the anchoring bias. Specifically, the patient got fixated (anchored) to the 55-65% risk estimate, and was unable to update her expectation about the future with the additional information, "not everyone with this mutation develops cancer". The above example also highlights another known cognitive effect referred to as the primacy/recency effect. This refers to the observation that people better recall information that is presented at the beginning or end of a conversation than information presented in the middle. In this situation, the 55-65% risk estimate is an emotionally arousing piece of information that was presented first; thus, it is more likely to be remembered.

Strategies to address cognitive biases

To facilitate communication, consider implementing one or more of the following strategies:

- Ask patients about both the occurrence *and* experience of cancer among their family and friends.

Understanding patients' previous experiences with cancer will help reveal if someone is at risk of the availability bias. Exploring patients' previous experiences provides some insight into their conceptualization of their own cancer, and can stimulate discussion on similarities and differences from the past, including advancements in medical treatment.

- Consider the order in which information is presented.

The anchoring bias is more prevalent when numerical values are provided; thus, consider spending more time explaining any values (e.g., relative risk, survival rate).

- Provide written material to patients when possible.

Research has shown that people tend to forget 40-80% of medical information provided.[8] The provision of written information will decrease patients' reliance on their memory and their use of information that may be influenced by their experience and cognitive biases.

Summary

Patient-provider communication is an essential aspect of a cancer patient's journey. Whether at the time of diagnosis, change in treatment, or recurrence, patients experience a myriad of emotions including fear, anger, and sadness, which impacts their emotional and physical well-being. Patients' often struggle with the uncertainty of their future, and consequently process information through System 1 and emotional mechanisms that influence their perception and decision making. Providers play a vital role in helping patient think about their cancer and their care plans. To date, much of the research on cognitive biases in medical decision making has focused on providers, but recognizing the patient's experience is also a critical element toward more effective patient-provider communication and

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