

Medical Decision Making in Situations That Offer Multiple Alternatives

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Objective.—To determine whether situations involving multiple options can paradoxically influence people to choose an option that would have been declined if fewer options were available.

Design.—Mailed survey containing medical scenarios formulated in one of two versions.

Participants.—Two groups of physicians: members of the Ontario College of Family Physicians (response rate=77%; n=287) and neurologists and neurosurgeons affiliated with the North American Symptomatic Carotid Endarterectomy Trial (response rate=84%; n=352). One group of legislators belonging to the Ontario Provincial Parliament (response rate=32%; n=41).

Intervention.—The basic version of each scenario presented a choice between two options. The expanded version presented three options: the original two plus a third. The two versions otherwise contained identical information and were randomly assigned.

Outcome Measures.—Participants' treatment recommendations.

Results.—In one scenario involving a patient with osteoarthritis, family physicians were less likely to prescribe a medication when deciding between two medications than when deciding about only one medication (53% vs 72%; $P < .005$). Apparently, the difficulty in deciding between the two medications led some physicians to recommend not starting either. Similar discrepancies were found in decisions made by neurologists and neurosurgeons concerning carotid artery surgery and by legislators concerning hospital closures.

Conclusions.—The introduction of additional options can increase decision difficulty and, hence, the tendency to choose a distinctive option or maintain the status quo. Awareness of this cognitive bias may lead to improved decision making in complex medical situations.

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ONE of the most important elements in health care is people's capacity to make sound decisions. Any effective operation, drug, or other intervention can be harmful if the decision about when to use it is made incorrectly. However, research indicates that intuitive thought processes are imperfect and susceptible to error.^{1,2} Similar to errors in vision, hearing, and memory, some mistakes in intuitive de-

cision making are common and predictable.³ Medical decision making may be particularly prone to error because of the urgency, complexity, and uncertainty inherent to clinical situations. Furthermore, errors can have important consequences because of the magnitude and irreparability of patient outcomes. Recognizing predictable errors is a key step for learning sound clinical judgment and a prerequisite for improving medical decision making.⁴

How do people make decisions in complex situations? Research in cognitive psychology and consumer behavior has shown that people evaluate alternatives differently when choosing from a number of similar options than when considering just

a single alternative.⁵⁻⁹ The economist Schelling, for example, tells an anecdote about going to a bookstore to buy an encyclopedia, discovering that two different encyclopedias were on sale that day, and purchasing neither because he lacked a clear reason for choosing one over the other.⁵ Such behavior can be troubling if either encyclopedia would have been satisfactory when evaluated in isolation. The tendency to delay or avoid making a choice when faced with multiple attractive alternatives is a cognitive bias. In complex situations, this tendency can deter the decision maker from achieving optimal outcomes.

Consider a past experiment involving personal decisions about school work.¹⁰ One group of university students was presented with the following hypothetical problem:

You plan to spend the evening in the library working on a short paper due the following day. As you walk across campus you discover that an author you have always admired is about to give a public lecture. Do you proceed to the library anyway or go to the lecture instead?

By random assignment, a second group received a version that presented not one but two alternatives to the option of studying in the library:

You plan to spend the evening in the library working on a short paper due the following day. As you walk across campus you discover that an author you have always admired is about to give a public lecture and that—in another hall—they are about to screen a foreign movie that you have been wanting to see. Do you proceed to the library anyway, go to the lecture instead, or go to the movie?

In both versions the initial plan was to go to the library. The first version presented a single alternative (the lecture), whereas the second version offered two alternatives (the lecture or the movie).

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Results showed that more respondents in the second version than the first version chose to go to the library (40% vs 21%; $P < .005$). The conflict in choosing between the lecture and the movie, the authors suggest, led some respondents to avoid this decision altogether and follow the original plan. As a consequence, the original plan was selected more often in the context of two rather than one competing alternatives. Regardless of whether the library represented an optimal use of time, it is paradoxical that the library was chosen more frequently when more alternatives were available.

In this study we explore medical decision making involving multiple alternatives for situations having no easy answers. Are physicians more likely to forgo an option and retain the status quo when a clinical problem has many rather than few similar treatment options? Similarly, are legislators more likely to dismiss an option and retain the status quo when a health policy problem has many rather than few proposed solutions? The tendency to choose an alternative that would have been declined if fewer options were available, we hypothesize, can be observed in medical situations. In particular, we propose that this bias can be found in physicians evaluating clinical scenarios and in legislators considering health policy problems. Our study question was, "Can a greater number of alternatives paradoxically influence decision makers to choose an option that would have been declined if fewer alternatives were available?"

METHODS

We tested two groups of physicians and one group of legislators. The first physician group consisted of a random sample of physicians belonging to the Ontario College of Family Physicians, the professional organization of family physicians in Canada's most populated province.¹¹ The second physician group consisted of all neurologists and neurosurgeons practicing in North America and participating in the North American Symptomatic Carotid Endarterectomy Trial, a study of patients with carotid artery disease.¹² The legislator group consisted of elected politicians serving during 1993 in the Ontario Provincial Parliament, the governing body responsible for funding public hospitals in the province.¹³

For each of the three groups, we developed a brief questionnaire that contained scenarios relevant to the participants. All scenarios described a hypothetical situation that provided no obviously superior management alternative. The scenarios were formulated

in one of two versions. The basic version presented two options. The expanded version presented three options: the two that appeared in the basic version plus a third. The third option in the expanded version was designed to be similar, but not identical, to one of the options in the basic version. The two versions otherwise provided identical information and were randomly assigned to participants within a group. In all cases, respondents received the survey by mail, completed it at their leisure, and returned their responses anonymously.

The scenario presented to the family physicians involved the choice of whether to start a new medication. Half were presented with the following hypothetical problem:

The patient is a 67-year-old farmer with chronic right hip pain. The diagnosis is osteoarthritis. You have tried several nonsteroidal anti-inflammatory agents (eg, aspirin, naproxen, and ketoprofen) and have stopped them because of either adverse effects or lack of efficacy. You decide to refer him to an orthopedic consultant for consideration for hip replacement surgery. The patient agrees to this plan. Before sending him away, however, you check the drug formulary and find that there is one nonsteroidal medication that this patient has not tried (ibuprofen). What do you do?

The other family physicians received a version that presented not one but two possible medications:

The patient is a 67-year-old farmer with chronic right hip pain. The diagnosis is osteoarthritis. You have tried several nonsteroidal anti-inflammatory agents (eg, aspirin, naproxen, and ketoprofen) and have stopped them because of either adverse effects or lack of efficacy. You decide to refer him to an orthopedic consultant for consideration for hip replacement surgery. The patient agrees to this plan. Before sending him away, however, you check the drug formulary and find that there are two nonsteroidal medications that this patient has not tried (ibuprofen and piroxicam). What do you do?

The respondent's task in the first version was to choose between two alternatives: "refer to orthopedics and also start ibuprofen" and "refer to orthopedics and do not start any new medication." The respondent's task in the second version was to choose between three alternatives: "refer to orthopedics and also start ibuprofen," "refer to orthopedics and also start piroxicam," and "refer to orthopedics and do not start any new medication."

The scenario assigned to neurologists and neurosurgeons presented a situation in which several patients were

awaiting carotid artery surgery but prioritization was necessary because of a temporary limitation in operating room availability. The respondent's task in each version was to select the patient on whom to operate first. Half the respondents received a basic version in which two patients were described:

Two patients are scheduled for carotid endarterectomy, but one operating room slot has been taken by emergency cases (more slots will not be available for 2 weeks).

Patient 1 is a 52-year-old employed journalist with transient ischemic attacks experienced as transient aphasia. She has had one such episode occurring 10 days ago, which lasted approximately 12 hours. Angiography shows a 70% stenosis of the left carotid. Past medical history is remarkable for past alcoholism (no liver cirrhosis) and mild diabetes (diet controlled).

Patient 2 is a 72-year-old retired policeman with transient ischemic attacks experienced as left hand paralysis. He has had two such episodes during the last 3 months with the last occurring 1 month ago. Angiography shows a 90% stenosis of the right carotid. He has no concurrent medical problems and is in generally good health.

If asked for your opinion, on which patient would you operate first?

The other half received an expanded version describing the original two plus an additional third patient:

Three patients are scheduled for carotid endarterectomy, but two operating room slots have been taken by emergency cases (more slots will not be available for 2 weeks).

Patient 1 is a 52-year-old employed journalist with transient ischemic attacks experienced as transient aphasia. She has had one such episode occurring 10 days ago, which lasted approximately 12 hours. Angiography shows a 70% stenosis of the left carotid. Past medical history is remarkable for past alcoholism (no liver cirrhosis) and mild diabetes (diet controlled).

Patient 2 is a 72-year-old retired policeman with transient ischemic attacks experienced as left hand paralysis. He has had two such episodes during the last 3 months with the last occurring 1 month ago. Angiography shows a 90% stenosis of the right carotid. He has no concurrent medical problems and is in generally good health.

Patient 3 is a 55-year-old employed bartender with transient ischemic attacks experienced as transient monocular blindness. She has had one such episode 1 week ago, which lasted less than 6 hours. Angiography shows a 70% stenosis of the ipsilateral ca-

rotid. Past medical history is remarkable for ongoing cigarette smoking (since 15 years of age at a rate of one pack per day).

If asked for your opinion, on which patient would you operate first?

The scenario sent to legislators discussed health care expenditures and presented the decision of whether to recommend the closing of an individual hospital. Hospital A was a 100-bed community hospital providing approximately 200 jobs in a small urban area served by two other hospitals. Reports had suggested that the quality of care was lower at hospital A than at its neighboring hospitals and that costs per standardized case were much higher in hospital A. There were three malpractice suits outstanding against the hospital. Hospital B was a 350-bed teaching hospital providing approximately 500 jobs in a large urban area served by three other hospitals. Reports had suggested that the quality of care and utilization rates were unfavorable at hospital B compared with its neighboring hospitals. Half the legislators received a basic version that described one hospital (hospital A), whereas the other half received an extended version that described two hospitals (hospital A and hospital B). The respondent's task in both versions was to decide whether a hospital should be closed. In both versions, the default option of making no recommendation was available.

RESULTS

Family Practitioners

A total of 373 family practitioners were mailed a questionnaire and 287 replied for a response rate of 77% (76% for the basic version and 78% for the expanded version). One scenario described a 67-year-old man with chronic right hip pain related to osteoarthritis. We found that more physicians chose the default option ("refer to orthopedics and do not start any new medication") in the expanded version, in which two medications were available, than in the basic version, in which only one medication was left to be tried (72% vs 53%; $P < .001$). Apparently, the uncertainty in deciding between two similar medications led some physicians to avoid this decision altogether and recommend not starting any new medication. The discrepancy occurred in both the early and late replies to the survey and among those who were practicing both inside and outside metropolitan Toronto.

Neurologists and Neurosurgeons

A total of 419 neurologists and neurosurgeons were mailed a questionnaire

and 352 replied for a response rate of 84% (for both the basic version and expanded version). One scenario presented a situation in which several patients were awaiting carotid artery surgery but prioritization was necessary because of a temporary limitation in operating room availability. We found that more physicians chose to operate on patient 2 in the expanded version, in which the choice was between patients 1, 2, and 3, than in the basic version, in which the choice was between patients 1 and 2 (58% vs 38%; $P < .001$). Whereas patient 2 might be considered a reasonable candidate, selecting one of two similar women over the other is harder to justify, both to oneself and to others. Apparently, the difficulty in deciding between the two similar patients, patients 1 and 3, led many physicians to avoid this decision and recommend operating on patient 2 instead. The discrepancy occurred in both US and Canadian physicians, neurosurgeons and neurologists, and early and late replies to the survey.

Legislators

A total of 128 legislators were mailed a questionnaire and 41 replied for a response rate of 32% (30% for the basic version and 34% for the expanded version). The scenario discussed health care expenditures and presented the decision of whether to close an individual hospital. We found that more legislators chose the default option ("refuse to provide a judgment") in the expanded version than in the basic version (64% vs 26%; $P < .05$). Note that the decision to defer judgment is different than decisions in the previous clinical problems, which required choosing a treatment. The decision to defer may be defensible, but it seems to partially depend on the ease of selecting from among the available options. Apparently, the difficulty in deciding between the two hospitals in the extended version led some respondents, who otherwise would have supported closing a hospital, to avoid the decision and decline to provide a judgment. This pattern reflects a general tendency to resort to the status quo when facing difficult decisions, and has important policy implications.¹⁴

COMMENT

Our results indicate that adding new options can increase the probability of choosing a previously available alternative or, in particular, of maintaining the status quo. This paradoxical finding was observed in medical decisions made by clinicians and in policy decisions made by legislators. The observed pattern of results cannot be attributed to differences in information or incentives and

violates assumptions of the classical theory of choice. Furthermore, the results cannot readily be explained by random answers or deceptive responses, which would all work against the observed pattern. Although the foregoing choices are hypothetical in nature, similar results have been found in real decisions about money and small gifts.⁵ The increased tendency to select a previously available option when facing a greater number of competing alternatives appears to be a cognitive bias: preference between two options shifts due to the availability of a third option that increases the difficulty of making a choice but is itself not chosen.

We studied only a few simplified problems, yet medical care frequently presents large numbers of treatment options. The pharmaceutical compendium now lists 13 medications for treating Parkinson's disease, 31 for chronic bronchitis, and 91 for hypertension.¹⁵ The plethora of options extends beyond medications to include guidelines, tests, and procedures; for example, six different approaches are available for periodic colonoscopic surveillance, eight diagnostic tests for hypothyroidism, and 36 different treatments for back pain.¹⁶⁻¹⁸ Complex decisions are also encountered by patients who, for example, need to purchase health insurance and choose between multiple similar benefit packages.^{4,19} Making such decisions can be difficult because alternatives typically have favorable and unfavorable features, many of them uncertain, that preclude the decision maker from identifying an option that is superior in all respects.

Several explanations might contribute to the apparent increased attractiveness of some options in complex decisions. Tversky and Shafir⁵ suggest that adding an option that has advantages and disadvantages may increase decisional conflict, exacerbate the difficulty of making a choice, and compel people to delay the decision. Fuchs²⁰ proposes that the "technological imperative" makes the prospect of doing nothing seem unappealing in medical situations; perhaps the imperative to intervene is stronger when there are few alternatives and the intervention is obvious than when there are multiple alternatives and the decision is tough. Fischhoff²¹ observes that justifying a decision after the fact often requires a succinct argument and is usually easier for situations having few rather than many options. Bell²² argues that the anticipation of regret also influences decisions: when treatment is followed by an adverse event (such as a recommended medication producing an allergic reaction) regret may be especially poignant if other similar treat-

ments were available that might have avoided the undesirable outcome.

We emphasize that psychological factors are often mild and by no means rampant in medical decisions. Some situations are straightforward and do not tap a physician's uncertainties or limitations. Physicians tend to work in collegial settings and, therefore, may be guided by colleagues, patients, and the medical literature before making a choice. The present study suggests, however, that people do not always resolve medical decisions by analyzing benefits and harms in a reliable manner. Instead, people may resort to intuitive judgments that render them prone to cognitive biases. Psychological theory predicts that these cognitive biases will appear when people have difficulty deciding between conflicting alternatives, face situations

of substantial uncertainty, or consider outcomes that have long-term consequences.¹² Written scenarios do not always convey the conflict, uncertainty, and long-term consequences of real-world circumstances and, thus, our results may underestimate the importance of psychological factors in difficult situations.⁵

Thinking harder will not eliminate a cognitive bias any more than staring intently will make a visual illusion disappear. Instead, physicians need to recognize specific biases and consider possible corrective procedures. For example, selecting an option from a group of similar options can be difficult to justify and thus may increase the apparent attractiveness of retaining the status quo. To avoid this tendency, the decision maker should identify each poten-

tially attractive option and compare it directly with the status quo, in the absence of competing alternatives. If such direct comparison yields discrepant judgments, the decision maker should reflect on the inconsistency before making a final choice. Research in nonmedical settings indicates that such debiasing procedures can enhance many different types of judgments²³ and suggests opportunities for future studies on physicians. An awareness of inconsistencies might lead to improved medical decision making in complex situations.

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