

EMPIRICAL STUDY

Patient decision making in the face of conflicting medication informationEMILY ELSTAD, MPH¹, DELESHA M. CARPENTER, PhD²,
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When patients consult more than one source of information about their medications, they may encounter conflicting information. Although conflicting information has been associated with negative outcomes, including worse medication adherence, little is known about how patients make health decisions when they receive conflicting information. The objective of this study was to explore the decision making strategies that individuals with arthritis use when they receive conflicting medication information. Qualitative telephone interviews were conducted with 20 men and women with arthritis. Interview vignettes posed scenarios involving conflicting information from different sources (e.g., doctor, pharmacist, and relative), and respondents were asked how they would respond to the situation. Data analysis involved inductive coding to identify emergent themes and deductive contextualization to make meaning from the emergent themes. In response to conflicting medication information, patients used rules of thumb, trial and error, weighed benefits and risks, and sought more information, especially from a doctor. Patients relied heavily on trial and error when there was no conflicting information involved in the vignette. In contrast, patients used rules of thumb as a unique response to conflicting information. These findings increase our understanding of what patients do when they receive conflicting medication information. Given that patient exposure to conflicting information is likely to increase alongside the proliferation of medication information on the Internet, patients may benefit from assistance in identifying the most appropriate decision strategies for dealing with conflicting information, including information about best information sources.

Key words: *Medical decision making, medication adherence, doctor-patient communication, heuristics and biases, arthritis, information seeking*

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As the US population rapidly ages, chronic diseases are an ever-increasing concern (Wu & Green, 2000), and with increasing numbers of adults using medication to treat and manage their conditions, proper adherence to medications is of paramount importance. Approximately 50% of those living with chronic disease fail to take their medications as prescribed (Lee, Grace, & Taylor, 2006), which can lead to substantial worsening of disease and premature death, as well as increased healthcare costs (McDonnell & Jacobs, 2002; Rodgers & Ruffin, 1998; Senst et al., 2001). Medication adherence is of particular concern for individuals with arthritis because of the chronicity of this

disease, which often requires lifelong medication therapy.

Individuals living with arthritis make medication-related decisions in an environment abundant with different sources of information, including friends, family members, the Internet, advertisements, pamphlets, healthcare providers, past experience, and support groups for medication information (Carpenter, Elstad, Blalock, & DeVellis, in press; Carpenter et al., 2010; Lim, Ellis, Brooksby, & Gaffney, 2007; Lorish, Richards, & Brown, 1989; Salt & Peden, 2011). Information may be actively sought (e.g., the Internet) or passively received (e.g., advertisements). Although greater amounts

of information can improve medication adherence (Lipton, Byrns, Soumerai, & Chrischilles, 1995; Peterson, Takiya, & Finley, 2003), more information may also mean a greater opportunity to encounter conflicting information. Conflicting medication information is defined as contradictory information about medication issues (e.g., time of day to take medication, how to take medication, dosing, duration, side effects, or side effect severity) from different sources (Carpenter et al., 2010). Conflicting information is concerning because it has been found to decrease medication adherence (Carpenter et al., in press, 2010) and is associated with worse perceptions of care among patients (Zapka et al., 2004), increased anxiety (Pollock, Grime, Baker, & Mantala, 2004), altered risk perceptions (Han, Moser, & Klein, 2006), and decreased ability to assess the reliability of information sources (McIntosh & Shaw, 2003).

The literature has only just begun to document the extent to and conditions under which patients receive conflicting information. Several studies have found that between 25 and 80% of patients may receive conflicting information about their illness and its management (Blendon, Schoen, DesRoches, Osborn, & Zapert, 2003; Carpenter et al., 2010; Coleman, Smith, Raha, & Min, 2005), across diseases as diverse as cancer (Gray, Fitch, Phillips, Labrecque, & Klotz, 1999; Mills & Davidson, 2002), cardiopulmonary disease (Trewin & Veitch, 2003), rheumatic disease (Carpenter et al., in press, 2010; Lim et al., 2007), low back pain (McIntosh & Shaw, 2003), and mental illness (Pollock et al., 2004). Notably, patients most often receive conflicting information from two doctors (Carpenter et al., in press). Receiving conflicting information from two trusted sources may further complicate decision making. Arthritis patients who received greater amounts of conflicting information had worse medication adherence even when accounting for patient age, race, arthritis medication regimen complexity, perceived arthritis severity, and number of years living with arthritis (Carpenter et al., in press).

Although we know that conflicting information is associated with negative outcomes for patients, we do not know how patients process conflicting information or how conflicting information results in outcomes such as worse medication adherence. The purpose of this paper is to elucidate how patients react to conflicting information about their medications and how they process conflicting information in their decision making. We specifically investigated the cognitive decision making strategies that patients use and the sources they turn to when presented with conflicting medication information.

Methods

The INFORM study

The Information Networks for Osteoarthritis Resources and Medications (INFORM) study is a mixed methods study of information seeking behavior and receipt of conflicting medication information among men and women with arthritis. The study involved a cross-sectional quantitative online survey of 329 individuals with arthritis and a qualitative telephone interview with 20 of these individuals. This paper uses data from the 20 qualitative interviews.

Sample

We chose patients with arthritis as an exemplar population among which to study conflicting medication information as their trajectory of illness is often characterized by ongoing pain management with medication and arthritis patients often desire information about their medications (Fraenkel, Bogardus, Concato, & Felson, 2001; Kjekken et al., 2006). Our sample included individuals with a self-reported diagnosis of rheumatoid arthritis and/or osteoarthritis, who were at least 18 years of age, were able to read and write in English, had access to the Internet, and were currently taking at least one oral medication to treat their arthritis on a routine basis. Individuals taking medications only on an "as needed" basis were not eligible. On the online survey, patients were given the opportunity to indicate an interest in sharing more detail about their experiences with conflicting information. Twenty patients who indicated such an interest were selected to participate in the qualitative telephone interview. Purposive sampling was used to obtain a mix of participants who: represented varied racial, gender, age, and educational backgrounds; had both rheumatoid arthritis and osteoarthritis; and had received varying amounts of conflicting medication information.

Vignettes

As previous research indicated that patients have difficulty recalling a specific time when they received conflicting information (Carpenter, 2009), we determined that using vignettes, in which concrete examples of people and their behaviors offer respondents an opportunity to provide their comment or opinion (Finch, 1987; Hazel, 1995), was the most appropriate method for eliciting meaningful responses for our research question. In the qualitative paradigm, vignettes are used for different purposes, one of which is to allow for situational context

(Hazel, 1995) and are invaluable as a research tool when respondents have not had (or cannot remember) their own personal experience with the issue or situation at hand (Reynold, 2002). Vignettes are commonly used as a way to explore individuals' decision making strategies among patients (Anthony, 2007; Swenson, Zettler, & Lo, 2006; Vellinga, Smith, Van Leeuwen, Van Tilburg, & Jonker, 2005) and their providers (Anderson, Fuller, & Dudley, 2007; Atwal, McIntyre, & Wiggett, 2012; Long-Sutehall et al., 2011; Sweeney & Doody, 2010).

We developed a semistructured interview guide involving vignettes prompting patients to describe how they would hypothetically resolve situations in which they received conflicting information (see Table I). The vignettes were constructed collaboratively by the study's research team, which included a psychologist with in-depth knowledge of interpersonal influences on arthritis management (the third author), an arthritis risk communication specialist (the fourth author), and a health behavior and medication adherence expert (the second author). The development of the vignettes was informed by qualitative and quantitative findings from a previous

study by the research team documenting the most common topics for which vasculitis patients conflicting medication information (Carpenter et al., 2010). This approach allowed us to provide patients with scenarios similar to ones they might encounter in their own lives as arthritis patients so we could describe the scope of their decision making in response to receiving conflicting medication information. The overarching aim of the vignettes was to pose scenarios in which the patients imagined themselves receiving varying kinds and amounts of conflicting information. The vignettes built upon each other in a chronological, additive fashion, forming a trajectory from no conflicting information in vignette 1 to complex conflicting information from two expert sources in vignette 4.

Data collection

The 30-minute interviews were conducted over the telephone by the first and second author during the summer and fall of 2010. All interviews were audio-recorded and transcribed verbatim by a professional transcription company.

Table I. Study vignettes.

Vignette number	Source(s) of conflicting information	Vignette
Vignette 1	N/A (Doctor presents risk of side effects)	"Your doctor just gave you a prescription for a new arthritis medicine. He tells you that the medicine is safe and works well for people with arthritis like yours. However, he warns you that the medicine may cause side effects like upset stomach. What would you do after you got this information?"
Vignette 2	Cousin and pharmacist	"Imagine that your cousin, who also has arthritis, calls you. His doctor gave him the same new medicine that your doctor gave you, and he loves it. He did have an upset stomach at first, but it went away when he took the pills with food. You've been feeling sick to your stomach since you started taking these new arthritis pills, but your pharmacist said that you should not take the pills with food. What would you do after talking to your cousin?"
Vignette 3	Doctor and medication package insert	"Imagine you just told your spouse that you were taking a new arthritis medicine. They ask to look at the information sheet (also called an insert) that comes in the medication package. After reading the information sheet they tell you that they are worried that this medicine may cause liver problems. You look at the information sheet and you see that a very small number of patients get liver problems with this medicine, but you don't remember your doctor saying anything about liver problems. What would you do next?"
Vignette 4	Doctor and pharmacist	"Imagine a couple of months go by, and your arthritis isn't bothering you as much as it did. You take the pills with food, and you don't have an upset stomach now. When you talk to your doctor though, she thinks the medicine isn't working as well as it could because you're taking it with food. She decides to raise the dose from one pill to two pills per day. When you go to pick up the pills at the pharmacy, the pharmacist tells you that two pills is higher than usual. He says you should stop taking the medicine with food and that you should only take one pill instead of the two pills your doctor recommended. What would you do now?"

N/A=Not Applicable.

Data analysis

Our analytic strategy involved both inductive and deductive components. Our analysis began with induction and involved open-coding followed by axial-coding (Strauss & Corbin, 1990). In the preliminary process of open-coding, the first author read the transcripts and recorded initial codes and memos by hand in the margins. Recurrent, salient, or intriguing themes were noted. This was followed by axial-coding, whereby connections were made between categories and some categories were combined or reconceptualized. We conducted concurrent data collection and analysis in an iterative process that involved open-coding and analyzing transcripts as interviews were conducted, in order to ensure that our discussion guide elicited rich responses and effectively addressed our research questions. Concurrent data collection and analysis also allowed us to determine that thematic saturation was reached at the completion of 20 interviews, as no new themes were emerging. Emergent themes were combined with structured codes (codes in accordance with research questions) in a hierarchical codebook devised collaboratively by the first and second authors. Focused coding was conducted using *Atlas.ti* software (Muhr, 2004), which facilitated the application of codes across the 20 interviews. Interviews were “double-coded” by the first and second author, who met on a regular basis throughout the coding process to discuss and reach consensus on all coding. Coding reports were generated, aggregating responses to the four vignettes. Decision strategies were enumerated across the four vignettes.

Subsequent to noting emergent themes in our data, we consulted the decision science literature as this is a rich resource for understanding how patients make health decisions. In particular, bounded rationality and prospect theory are two theories that broadly describe how individuals make decisions in “real world” situations (e.g., health-related decisions), rather than under idealized circumstances. Bounded rationality assumes that individuals make decisions in an environment of limited information, time, and cognitive ability (Simon, 1955, 1972). The theory of bounded rationality holds that individuals often do not use calculated, rational decision making for everyday decisions; rather, they rely upon intuitive, subconscious, and highly efficient strategies to overcome the difficulties posed by uncertainty (Tversky & Kahneman, 1974). Prospect theory specifically addresses decisions that involve risk and holds that individuals make choices based on the potential value of losses and gains rather than the final outcome (Kahneman &

Tversky, 1979). We reference these theories in our analysis as dealing with conflicting medication information necessitates varying degrees of risk-taking, especially given the uncertainty posed by conflicting information and the time constraints patients likely face in their day-to-day lives.

Ethical considerations

This study was approved by the university’s Institutional Review Board (Approval #09-2293) on January 1, 2010, and all participants indicated agreement to participate after being read the study fact sheet and informed consent information over the telephone.

Results

Study participants were 31–84 years old (mean age = 55.5 years, SD = 12.7 years), predominantly female ($n = 13$), white ($n = 12$), medically insured ($n = 19$), and had attended college ($n = 17$). Nine patients reported having rheumatoid arthritis, five had osteoarthritis, four had both, and two could not recall what type of arthritis they had.

We identified the use of several decision making strategies in response to receiving conflicting medication information, including the use of trial and error, rules of thumb, weighing benefits and risks, and seek more information. These decision strategies are described in detail below.

Trial and error

One of the most common ways in which patients resolved conflicting information (reported in response to the first three vignettes, see Table II) was through trial and error. Using “trial and error” involved taking the medication and seeing how one felt afterward. In response to the first vignette (which contained no conflicting information and dealt with whether to take an arthritis medication, given the potential for upset stomach), several patients said they would try taking the medication with food and “see what happens.” The second vignette dealt with how the patient would take his/her medication after receiving conflicting information from the pharmacist (who says not to take the medication with food) and a cousin (who says that taking the medicine with food reduced upset stomach). Some patients said they would try taking the medication with food even though the pharmacist had warned against it. For example, one 53-year-old woman said she would “probably try [the medication] with food and see if it makes a difference.” Similarly, one patient said she would

Table II. Patient use of decision strategies by vignette ($n=20$)*.

Vignette	Source of conflicting information	Representativeness heuristic	Proximal trust	Trial and error	Weigh benefits and risks	Seek more information
Vignette 1	N/A (Doctor presents risk of side effects)	0	0	15	3	7
Vignette 2	Cousin and pharmacist	5	4	8	1	12
Vignette 3	Doctor and medication package insert	0	2	2	4	18
Vignette 4	Doctor and pharmacist	0	10	0	1	9
Total		5	16	25	7	46

*Row values refer to the number of patients who used a particular decisional strategy for each vignette. Totals reflect the number of times a particular decisional strategy was used across all four vignettes and may add to greater than 20. Responses were not totaled across vignettes as patients could use more than one decisional strategy per vignette.

N/A=Not Applicable.

take her medication with food despite the doctor's warnings, since her cousin had done so successfully:

If it's a cousin that I know has the exact same kind of arthritis and stuff that I have and they're taking it with food with no side effects and I'm taking without food and I'm sick as a dog, I'm going, "well, ok, let's try it with some food and see if it makes any difference." *Female, age 40*

In response to the first two vignettes, this kind of decision making is not surprising given the low severity/danger associated with risk of upset stomach and the desirability of the outcome (pain management). Some patients said they would use trial and error in response to the third vignette, which introduced the risk of serious liver problems associated with the medication. For example, one 50-year-old patient said she would take the medication "for three to four weeks or whatever, [but then] they'll check my blood work to make sure I'm not having any issues." The kind of trial and error we found in response to conflicting information (i.e., vignettes 2–4) was more measured (e.g., involving checking in with the doctor) than was the kind of trial and error we found in response to vignette 1 (which involved no conflicting information), which was more experimental (e.g., "just try it and see if it works"). However, this finding may be confounded by the increased risk involved in the vignettes that involved conflicting information.

Rules of thumb

In response to vignettes 2, 3, and 4, patients used "rules of thumb" to decide how to take their arthritis medication (see Table II). For example, in response to the second vignette, patients used the *representativeness heuristic*, a process in which decision makers rely upon a similar problem with which they have prior

experience (Kahneman & Tversky, 1979). A few patients indicated that they would take their arthritis medication with food because they had taken medication with food in the past or based on the notion that all medications should be taken with food:

I would take the pills with food ... All of that arthritis medicine I took with food, because it would tear my stomach up. *Female, age 31*

I would take it with food ... Well, because I think you need something in your stomach when you take any kind of medication. *Male, age 51*

In the examples above, the patients demonstrate "attribute substitution" by basing their decisions to take their medication upon a prototypical instance or example of the attribute (Shah & Oppenheimer, 2008), substituting their experience with other medications for the current medication.

Another rule of thumb that patients used was relying upon proximal trust of their preferred healthcare giver. Patients in this study expressed proximal trust in response to the second, third, and fourth vignette (see Table II). In response to the fourth vignette, in which the doctor and pharmacist are pitted against each other regarding proper medication dosage, patients were generally polarized in their decisions to "go with" the doctor or the pharmacist's opinion. Some patients demonstrated a strong affective preference for and trust in their pharmacist, as in one 58-year-old woman who said she would "listen to the pharmacist ... because the pharmacist should know more than the doctor does. I trust them more." Another patient expressed an affective preference for pharmacists based on the fact that her sister was a pharmacist:

Yeah, my sister is a pharmacist, and I mean, yes, I put a lot of trust in pharmacists ... I have to.

If I have any questions about my medications, I can go to my sister, and she's a very reliable source ... I would lean more with my sister than the doctor. *Female, age 55*

However, the doctor's advice was preferred by other patients:

I would disregard the pharmacist's comments and go with the doctor's plan ... I'm going to be terribly prejudiced ... [but] sometimes I think pharmacists overstep their boundaries ... I will privilege the doctor, especially a specialist, over a pharmacist, in my hierarchy of information. *Female, age 31*

These comments demonstrate that patients may be affectively swayed by certain information sources when resolving conflicting information about their medications. Thus, proximal trust in a certain caregiver is a rule of thumb that resembles the affect heuristic, which is characterized by the use of an automatic, affective response to the subject at hand (Finucane, Peters, & Slovic, 2003). As the affect heuristic is generally considered to be semantically close—if not equivalent—to bias (Shah & Oppenheimer, 2008), this rule of thumb may be thought of as an expression of peoples' conscious or unconscious biases about information sources and/or caregivers.

Weighing benefits and risks

All four vignettes elicited the calculated response of weighing the benefits and risks of choosing a certain action, indicating a slower, more deliberate decision making strategy. For example, in response to vignette 1, one female patient (age 70) said that she would ask if "the benefit of the drug outweighs the side effects." In response to the first vignette, which contained no conflicting information but posed a situation involving minimal risk and uncertainty about future side effects, one patient reported that he would weigh the benefits and risks as well as assess possible alternatives:

I would ask, would the benefit outweigh the side effect, is there anything else that effective that I could take with less side effects ... and if I did end up taking this, is there anything I can do to sort of lessen the side effects? *Male, age 43*

Several patients indicated that they would weigh benefits and risks in response to the first vignette (see Table II), indicating that this decision making

strategy was not a unique response to receiving conflicting information.

In response to the third vignette, patients used trade-offs, a common response to uncertainty and conflict (Brandstatter & Gigerenzer, 2006), indicating that they would trade the remote risk of potential side effects (liver problems) in the future for pain relief in the present. In some cases, patients perceived the situation as a choice between suffering now and suffering later:

I was taking ... It was one of the drugs. And supposedly it, in the long run, may cause lymphoma. And the question [my doctor] asked is, would you rather go through the pain and suffering now without the drug, or would you rather, say in 20 years down the road, have to deal with lymphoma, which means that I may get something that may be treatable. So yeah, I feel like I've been in that situation kind of before, and I decided to take the drug, take that risk, because if the liver problem was to happen, hopefully there will be a treatment for it. But when I was not taking arthritis medication, I was so miserable I would almost do anything to be without that pain, so I would take the medication. *Male, age 43*

I would rather risk getting liver problems or kidney problems than to have the pain. I think the suffering that I do when I don't take the medicine is greater than the risk. *Female, age 59*

In the face of risk of severe side effects in the future, we know that individuals often choose the future risk over the present pain (Scholten & Read, 2010), and this was reflected in the choices made by the patients quoted above.

Seek more information

Across all four vignettes (i.e., all three vignettes that posed conflicting information and the first vignette, which posed no conflicting information), patients expressed the desire for more information to aid in their decision making, either from the original source of information or from (a) different source(s). For example, in response to the third vignette, which posed risk of liver problems, the following patients reported that they would seek information from three different sources before deciding to take the medication:

I would ask my pharmacist about it and then I'd also call my doctor about it. And I would also look on the Internet. And I'd compare all the

information that I got and if [the risk was] slight, and the medication helped, I'd probably still take it. *Female, age 59*

I would probably try to read up on it some more ... I would ask my physician, the handout, the PDR [Physician's Desk Reference]. *Female, age 53*

The other three vignettes elicited similar responses in their varying contexts. For example, to the fourth vignette, one patient said she would "look it up on the Internet" to resolve the conflicting information between doctor and pharmacist. In response to the first vignette (which contained no conflicting information), patients said they would seek more information to supplement that received from their doctor by questioning the pharmacist or reading the medicine package insert. Generally, seeking more information was a popular way in which patients made medication-related decisions under uncertainty, both in the face of conflicting information (i.e., vignettes 2–4) and when no conflicting information was involved (i.e., vignette 1) (see Table II).

Calling the doctor was one of the most popular ways of seeking more information to resolve conflicting medication information (see Table II), as in the following examples:

Call her. I have to say, I'm just so blessed to have a doctor that tells you, any time you have a question or a doubt about anything to pick up the phone and call. *Male, age 60*

I would call the doctor and tell him what the pharmacist said and ask him why there was a difference between what the two said about the drug. *Female, age 62*

Calling the doctor was a strategy cited by many people in response to the last three vignettes, which involved conflicting information. The decision to call the doctor may reflect patients' reliance on the doctor to make the decision for them. Indeed, some patients indicated that this would be their preferred outcome:

I would certainly be on the phone trying to find somebody, that doctor or somebody in that office, that could tell the difference between what the pharmacist says and what the doctor says, and somebody would have to come up with a solution for me. *Female, age 64*

If [the doctors] can't answer you on the spot, they let you know in a day or two. They find the answer somewhere. *Male, age 84*

Patients' preferences for calling the doctor may reflect the trust people have in their doctors or a sense that calling the doctor is the "prudent" thing to do when one receives conflicting information.

Discussion

In this study, we sought to understand how patients make medication-related decisions in the face of conflicting information from different sources. Arthritis patients dealt with conflicting information by using various decision making strategies that involved intuitive, effort-reductive cognitive processing such as rules of thumb or heuristics, as well as more analytical cognitive processing such as weighing benefits and risks. They also reported that they would use trial and error, which may be described as a "spontaneous" decision style (Scott & Bruce, 1995), and seeking more information (including, importantly "calling the doctor"), which in some cases may reflect a dependent decision style (Scott & Bruce, 1995).

The use of rules of thumb in decision making was a unique response to conflicting medication information, as patients used rules of thumb only when the vignettes involved conflicting information (vignettes 2–4) and not in response to vignette 1, which involved no conflicting information. The use of rules of thumb (or "heuristic processing") is theorized to involve *attribute substitution*, a psychological process whereby the individual substitutes an easily calculated attribute for a more complex or uncertain one (Kahneman & Frederick, 2002). This finding may be reflective of the patients' desire to simplify a more complicated decision making process through effort-reductive heuristic strategies. For example, not surprisingly, proximal trust was cued in response to vignettes 2–4, which included conflicting information from sources with which we might expect patients to have affective ties, such as a relative, doctor, or pharmacist. The representativeness heuristic was cued in response to the second vignette only, wherein the conflicting information may have cued reliance upon past experiences in decision making. The mental substitution involved in the representativeness heuristic posits an assumption that past cases are representative of the present case, resulting in the decision to take the new arthritis medication with food. However, the *status quo bias* offers an alternative explanation of this finding; it is possible that patients reported that they would not change an established medication regimen due to a lack of compelling incentive to change their behavior, prioritizing avoiding the loss of a system that works for them over the potential for gain through trying something new (loss aversion)

(Kahneman, Knetsch, & Thaler, 1991; Samuelson & Zeckhauser, 1988).

Patients tended to rely upon trial and error more heavily when conflicting information was not a factor in their decision making (i.e., in response to vignette 1 in which the doctor presents the risk of side effects). Patients relied less upon trial and error when conflicting information involved greater risk (e.g., of liver problems) and involved expert sources (doctor and pharmacist). This may suggest that this more spontaneous approach (Scott & Bruce, 1995) is less appealing as a way to resolve conflicting information when greater risk is involved.

Weighing benefits and risks was more common across all four vignettes than was making trade-offs, and the use of trade-offs was observed when risks were highest and expert sources were involved in the conflict. When the risk of an adverse side effect exists in the future and the patient must make a trade-off between costs and benefits that will occur at disparate points in time, they are thought to be making an intertemporal trade-off, which are typified by devaluing the future and privileging the present (Lowenstein & Elster, 1992). It is not surprising that patients who receive conflicting information might favor the present in their medication decisions given the severity of arthritis pain.

Patients expressed their wish to triangulate conflicting information with more information from additional sources in order to make a more informed decision. This finding is in line with previous research showing that most patients want information about available treatment options (Levinson, Kao, Kuby, & Thisted, 2005) and treatment risks (Ziegler, Mosier, Buenaver, & Okuyemi, 2001), especially given that this type of information is not routinely provided during office visits (Daltroy, 1993; Scherwitz, Hennrikus, Yusim, Lester, & Vallbona, 1985). We further know that dissatisfaction with the amount or type of medication information discussed during a medical visit can drive patients to seek additional information from other sources (Lim et al., 2007).

In this study, patients relied heavily upon “calling the doctor” as a way to resolve conflicting medication information. Patients may simply trust their doctor to resolve the conflict and make the decision in their best interest. Indeed, we know that, while patients typically express strong preference for information about their illness and its treatment (Biley, 1992; Deber, 1994), most prefer not to be responsible for making treatment decisions on their own (Beisecker & Beisecker, 1990). While calling the doctor is not likely to be a bad decision strategy, a blind reliance upon the provider for decision

making may not be an appropriate decision making strategy for value-sensitive health decisions.

There are several important implications of this study. First, we found that patients used rules of thumb as a unique response to receiving conflicting information, which may be non-ideal as a decision strategy as it elides context-specific information. However, balancing this finding was the fact that people often resort to seeking more information or calling their doctor—in itself a kind of rule of thumb. Indeed, the finding that some patients opted to seek more information to make decisions about their medications under uncertainty (across all four vignettes, regardless of the presence of conflicting information) is promising, as it may indicate that arthritis patients are interested in making informed decisions. However, it remains unclear whether patients who opt to triangulate conflicting information make a “better” decision when they get more information. Indeed, it is possible that seeking more information could result in patients receiving *more* conflicting information rather than resolution, and a more informed decision may not equate the “correct” or “best” decision. The fact that some patients proposed using trial and error as a decisional strategy for dealing with conflicting medication information has major implications, especially if the patient is altering medication regimens based on information from non-professional sources, such as family members. Patients who adapt their medications based on information from non-professional sources may compromise the drug’s effectiveness, which could negatively impact clinical outcomes and quality of life.

Some limitations of this study should be mentioned. First, our sample was relatively homogenous as all participants were Internet users, and the majority was medically insured and fairly well educated. As a result, patients in this study may have higher literacy levels and qualitatively different experiences of conflicting information compared with the general population. Second, the hypothetical nature of the vignettes means that decisional behaviors addressed in these analyses are speculative rather than observed behavior. However, given the subtle and complex nature of conflicting information, and the fact that patients often have difficulty recalling an instance of receiving conflicting information when prompted (Carpenter, 2009), the use of vignettes is a strength of our study as they allowed us to reveal information that was unobtainable through a traditional open-ended qualitative line of questioning. The use of vignettes also allowed for standardization (i.e., that every patient was presented with the same vignettes) and the ability to disentangle variation in patient decision making

from variations in conflicting information. However, we recognize that, by using vignettes, we limited the scope of conflicting information and sacrificed a degree of subjectivity, a major advantage of qualitative research (Bernard & Ryan, 2010).

Although it is commonly thought that numerical data are incompatible with the constructivist stance of qualitative research, we chose to enumerate the use of decisional strategies across the four vignettes, not to establish statistical significance or causality, but because we believe doing so strengthened the presentation of our findings in two ways: First, it contributed to the “internal generalizability” of our findings (Maxwell, 2010), establishing that decisional processes were in fact characteristic of our sample. Second, simple quantification allowed us to characterize the diversity of decisional processes and their patterns, which might not have been apparent through qualitative presentation alone (Maxwell, 2010; Sandelowski, 2001). Further quantitative research would be necessary to establish any kind of correlations or statistical significance, and the need for such quantification is one implication of our findings. It would be particularly interesting to compare patient decision making across situations of uncertainty involving conflicting information to those involving no conflicting information in a quantitative study.

By clarifying the ways in which patients make decisions in the face of conflicting medication information, our study suggests lines of inquiry that may be fruitful to explore related to patients’ medication adherence-related decisions. We found that patients used both simple and complex decision strategies to deal with conflicting medication information, some that may be effective or appropriate and others that may be less so, depending on context. For example, in situations of conflicting information around low-risk decisions, patients may benefit from the trade-off between accuracy and effort achieved through the use of heuristics; that is, costs of effort may surpass gains in accuracy (Gigerenzer, 2011; Payne, Bettman, & Johnson, 1993). Deliberate, analytical decision making may be best when stakes are higher.

Further research is needed to inform the development of decision making interventions to help patients effectively and appropriately resolve conflicting medication information and improve medication adherence. Such research may provide rationale for fostering “good” heuristics or rules of thumb (Gigerenzer, 2011) or increasing awareness of cognitive biases, which can minimize the undesirable effects of these biases (Higgins & Bargh, 1987). Efforts should be made to reduce the amount of conflicting information patients receive through

improved communication between providers (e.g., doctors and pharmacists) and patients, as well as better coordination of information across sources and services.

Conclusions

This study deepens our understanding of the decisional strategies patients use to resolve conflicting medication information. We found that arthritis patients use rules of thumb, trial and error, weigh benefits and risks, and seek more information when they receive conflicting medication information. Patient exposure to conflicting information is likely to increase alongside the proliferation of medication information on the Internet. Thus, the extent to which conflicting information compromises patients’ medication-related decisions (in particular medication adherence) is of foremost importance to providers and health educators. Health services interventions are needed to help patients effectively and appropriately address conflicting medication information, for example, through improved patient-provider communication about medication information sources.

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