"How are patient characteristics relevant for physicians' clinical decision making in diabetes?: An analysis of qualitative results from a cross-national factorial experiment"

Karen E. Lutfey,
New England Research Institutes Watertown, MA United States

Stephen M Campbell, PhD,
University of Manchester

Megan R Renfrew, MA,
New England Research Institutes

Lisa D Marceau, MPH,
New England Research Institutes

Martin Roland, DM, and
University of Manchester

John B McKinlay, PhD
New England Research Institutes

Abstract

Variations in medical practice have been widely documented and are a linchpin in explanations of health disparities. Evidence shows that clinical decision making varies according to patient, provider and health system characteristics. However, less is known about the processes underlying these aggregate associations and how physicians interpret various patient attributes. Verbal protocol analysis (otherwise known as 'think-aloud') techniques were used to analyze open-ended data from 244 physicians to examine which patient characteristics physicians identify as relevant for their decision making. Data are from a vignette-based factorial experiment measuring the effects of: (a) patient attributes (age, gender, race and socioeconomic status); (b) physician characteristics (gender and years of clinical experience); and (c) features of the healthcare system in two countries (USA, United Kingdom) on clinical decision making for diabetes. We find that physicians used patients' demographic characteristics only as a starting point in their assessments, and proceeded to make detailed assessments about cognitive ability, motivation, social support and other factors they consider predictive of adherence with medical recommendations and therefore relevant to treatment decisions. These non-medical characteristics of patients were mentioned with much greater consistency than traditional biophysiologic markers of risk such as race, gender, and age. Types of explanations identified varied somewhat according to patient characteristics and to the country in which the interview took place. Results show that basic demographic characteristics are inadequate to the task of capturing information physicians draw from doctor-patient encounters, and that in order

Correspondence to: Karen E. Lutfey, klutfey@neriscience.com.

to fully understand differential clinical decision making there is a need to move beyond documentation of aggregate associations and further explore the mental and social processes at work.

Keywords

USA; UK; clinical decision making; Diabetes; medical practice variation; health inequalities

Introduction

Variations in medical practice have been widely documented and are a linchpin in explanations of health disparities. Social scientific and epidemiological researchers have observed variations in disease prevalence and medical practices across (Rubin, Peyrot & Siminerio, 2006) and within countries (Millett, Gray, Saxena, Netuveli, Khunti & Majeed, 2007), and for conditions ranging from coronary heart disease (Popescu, Vaughan-Sarrazin & Rosenthal, 2007) to schizophrenia (Kelly, Dixon, Kreyenbuhl, Medoff, Lehman, Love et al., 2006). These differences hold for various aspects of clinical decisions including diagnosis, ordering tests (Popescu et al., 2007), selecting medications (Grant, Wexler, Watson, Lester, Cagliero, Campbell et al., 2007), asking questions, writing prescriptions, giving lifestyle advice and making referrals (McKinlay, Link, Arber, Marceau, O'Donnell, Adams et al., 2006).

Investigations into the predictors of practice variation have focused largely on patient and provider characteristics. King and Kerr (1996) note that research into heart disease has been gender biased and "gender blind" research has resulted in questionable treatment regimens and sub-optimal care for women (Pinn, 2003). Similarly, patient race has been shown to be a significant predictive factor in a number of treatment decisions and outcomes (Schulman, Berlin, Harless, Kerner, Sistrunk, Gersh et al., 1999), including diabetes (Harris, 2001). Older patients have been found to receive both delayed treatment and fewer diagnostic interventions (Gatsonis, Epstein, Newhouse, Normand & McNeil, 1995), fewer prevention drugs (Stafford & Singer, 1996), and fewer prescriptions that are known to be effective (Soumerai, McLaughlin, Spiegelman, Hertzmark, Thibault & Goldman, 1997). In terms of socioeconomic status (SES), Scott et al (1996) found that physicians were more likely to order further tests and less likely to prescribe medications for high SES patients compared with their lower SES counterparts. Provider attributes such as gender (Britt, Bhasale, Miles, Meza, Sayer & Angelis, 1996; Collins, Katona & Orrell, 1995) and level of experience (Bach, Pham, Schrag, Tate & Hargraves, 2004; Collins et al., 1995) have similarly been shown to be significant predictors of variability in clinical decisions.

In sociology, there is a long tradition of examining the nature of medical practice and the process of clinical decision making. For example, much attention has been allocated to uncertainty and risk inherent in medical work, and how providers are socialized to manage such uncertainty (Bosk, 1979; Fox, 1957; Light, 1972; Sharpe & Fadin, 1998). Some researchers have argued that uncertainty is so pervasive and inherent in medical work that medical error cannot be readily separated from the work itself, claiming that "mistakes are an indigenous feature of the work process as it unfolds" (Paget, 1988). In the context of diabetes care, physicians constantly face uncertainty as they must try to ascertain how closely patients will follow treatment regimens in order to prescribe treatment regimens that will be maximally effective in terms of lowering glucose levels without leading to hypoglycemia (Lutfey, 2003, 2005). Methodologically and theoretically, sociologists have used ethnographic and conversation analytic approaches to examine in detail the *in situ* practices of medical work and how they operate in actual practice settings (Heritage & Maynard, 2006). Such studies have shed light on how physicians make attributions about the causes of illness (Gill, 1998), manage

authority in the delivery of diagnoses (Perakyla, 1998); and the delivery of bad news (Maynard, 2003).

At the same time, a sizeable literature has developed in social psychology and economics focused on how physicians process information during patient-provider encounters, including how prejudice, stereotyping, and uncertainty can affect assessments of patients and decisions about their treatment (Balsa & McGuire, 2001; Institute of Medicine, 2003; van Ryn & Burke, 2000). For example, van Ryn (2000) suggests that racial differences may stem from providers evaluating black patients more negatively than whites as a result of negative stereotyping. By contrast, Balsa and McGuire (2001) suggest that the problem is one of white physicians having difficulty making sense of minority patients' symptom presentation and relying on statistical averages of their previous experience with people from that group (a process they term "statistical discrimination"). Others have suggested that interaction between race-concordant doctor-patient dyads might differ from race-discordant pairs, possibly reflecting underlying differences in attitudes or communication (Cooper, Roter, Johnson, Ford, Steinwachs & Powe, 2003).

Substantively, these bodies of work are related to the present topic insofar as they are concerned with the processes underlying clinical decision making and potential sources of bias that lead to the aggregate associations observed in a variety of domains. Relative to the large epidemiologic literature concerned with demographic predictors of medical practice variation, however, we still know relatively little from a social science perspective about the mental reasoning processes involved when physicians are assessing patients, and how they come to see various patient characteristics as relevant to their work. We build on and extend previous work by using open-ended think-aloud data from a cross-national videotaped vignette experiment to examine which patient characteristics physicians identify as relevant for their clinical decision making and why they are important. Below, we describe in detail how physicians articulated the relevance of patient characteristics for their treatment decisions in a case of diagnosed diabetes. As detailed in the next section, the experimental design of our study provides the unique opportunity to examine how physicians' explanations vary even when the presentation of the case is identical across vignettes.

Data & Methods

A factorial experiment was used to simultaneously measure the effects of: (a) patient attributes (age, gender, race and socioeconomic status); (b) physician characteristics (gender and years of clinical experience); and (c) features of the healthcare system in three countries (United States, United Kingdom, and Germany) on medical decision making for two common medical problems, pre-diabetes and diagnosed diabetes with an emerging complication. A full factorial of $2^4 = 16$ combinations of patient age (35 vs. 65), gender, race (Black [in the US and UK] vs. White [in the US, UK, and Germany] vs. Hispanic [in the US only]) and socioeconomic status (SES) (lower vs. higher, depicted by current or former employment as a janitor or lawyer) were used for the video scenarios. One of the 16 combinations was shown to each physician for each medical problem (first, the pre-diabetes condition and second, the diabetes complication condition). For comparison purposes, the present analysis uses a subset of the larger dataset restricted to black and white patients from the US and UK (N=256, 64 in each cell).

To be eligible for selection, physicians had to: (a) have completed a medical residency program in either internal medicine or family practice (general practice in the UK); (b) actively provide primary care at least 50% of the time; (c) have < 5 years clinical experience or > 15 years experience (since graduation from medical school in the US and since qualification as a general practitioner [GP] in the UK); and (d) work within the designated geographic area and have a medical degree from a recognized academic institution in the country of sampling. The full set

of 384 interviews (16 pairs of vignettes × 2 physician genders × 2 physician levels of experience × 3 countries × 2 replications) were conducted over a period of 3 years in 2005–07. Each physician participant was provided a stipend of $100 or equivalent to partially offset lost revenue and to acknowledge their participation.

After viewing each vignette, physicians were asked how they would treat the patient in terms of asking for additional information, performing physical examinations, ordering tests, prescribing medications, giving lifestyle advice, and referring to other physicians. For the diagnosed vignette only, an additional open-ended think-aloud segment was used to explore physicians' thought processes during decision making. Verbal protocol analysis (also known as "think aloud") is a recognized technique for capturing ongoing or recently completed decision processes (Biggs, Rosman & Sergenian, 1993) and avoids imposing structure on the physician's decision making, a feature of much closed-ended questioning in research on clinical decision making. Interviews were transcribed in full and are the focus of the present analysis (12 audiotapes, 1 from the UK and 11 from the US, were excluded from analyses due to technical problems, N=244 transcripts).

Every study represents a balance between internal and external validity. We recognize that our vignette-based approach differs in important ways from the processes of patient-physician interaction and clinical decision making as they occur in "real world" settings. Most importantly, vignettes do not allow for interaction between the "patient" and physicians, which means that physicians do not influence the trajectory of the patient's report by probing for detail, asking new questions, or clarifying points that are unclear, all of which have been shown to influence clinical assessments (Heritage & Maynard, 2006). Instead, physicians observed an uninterrupted interaction between a patient and a physician (depicted by a voice-over) asking questions and responding to the patient. In a study design allowing for constant feedback from the physician during the vignette, it may be possible to determine more precisely the exact moments in the vignette that lead to particular assessments and the observed variation; however, ongoing verbalization of thoughts may also be disruptive to the sustained concentration characteristic of clinical decision making in naturalistic settings.

In terms of the balance between internal and external validity, vignettes offer several key advantages over alternative methods. A critical benefit of vignettes is that they allow for the manipulation of several variables at once and the measurement of unconfounded effects, thereby "isolating physicians' decision making from other factors in the environment" (Veloski, Tai, Evans & Nash, 2005). That is, standardization of the patient presentation is what allows for an experiment, and the ability to disentangle variation in clinical decision making from variations in patient presentation. Furthermore, vignette-based studies allow for the collection of a large amount of information simultaneously from a large number of subjects, make efficient use of time, and are cost-effective, while also avoiding observer effects and ethical challenges commonly associated with standardized patients and medical record reviews (McDaniel, Beckman, Morse, Silberman, Seaburn & Epstein, 2007; Veloski et al., 2005).

In a direct comparison of vignettes, standardized patients, and chart abstraction, Peabody and colleagues (Peabody, Luck, Glassman, Dresselhaus & Lee, 2000) found that vignettes were a valid and comprehensive method for measuring quality of outpatient care. Additional studies comparing vignettes with standardized patients and other methods corroborate the result that vignettes are ecologically valid for studies of medical decision making (Dresselhaus, Peabody, Lee, Wang & Luck, 2000; Veloski et al., 2005). Many studies have successfully used vignettes, including medical school curricula (Mazor, Haley, Sullivan & Quirk, 2007; Ogden, Edwards & Stricken, 2003) to mimic cognitive diagnostic processes in live clinical interactions (Hulsman, Mollema, Oort, Hoos & de Haes, 2006; Wofford & Singh, 2006).

To address external validity and concerns that physicians may behave differently with a videotaped patient under experimental conditions compared with real patients in an everyday clinical setting, we took five precautionary steps: (1) ensuring clinical authenticity of the videotape presentation by basing scripts on clinical experience and using professional actors/ actresses (similar studies have used this approach successfully - Feldman, McKinlay, Potter, Freund, Burns, Moskowitz et al., 1997; J. B. McKinlay, Lin, Freund & Moskowitz, 2002); (2) asking physicians to compare the presentation of the patient in the vignette to patients they encounter in everyday practice (76% of the physicians in the US and UK sample thought the patient in the vignette was "very" or "reasonably" typical of their regular patients); (3) having physicians view the tapes in the context of their daily practice in between patient appointments; (4) specifically instructing physicians to view the patient as one of their own and to respond as they would typically in their practice; (5) encouraging the physicians to take notes during the vignette to mimic as closely as possible the process of collecting information and assembling a differential diagnosis.

We implemented a modified version of Strauss and Corbin's (1990) three step approach to coding and analysis (open coding, axial coding, and selective coding) to account for a team-based approach of multiple coders. During open coding, transcripts were reviewed line-by-line by KL and SC, core concepts were identified, and a preliminary coding scheme was developed and tested on a subset of the data. After coding for larger themes, detailed coding (axial and selective) was performed to identify sub-themes and relationships between codes. Coders were blind to all country, patient, and physician experimental factor assignments during this process. The final codebook included 35 codes with detailed inclusion and exclusion criteria, examples of text segments, and other notes to assist multiple coders. Atlas.ti was used to assist with the coding and management of the data.

To address the challenges of inter-coder agreement (Farmer, Robinson, Elliott & Eyles, 2006), we implemented a rigorous coding agreement process that upheld the primary principles of monitoring agreement between coders without sacrificing the integrity of the data by using ill suited measurement tools (Morse, 2006). Our approach consisted of (1) two coders (KL, SC) double-coding a subset of transcripts to monitor coding agreement and (2) bi-weekly transatlantic phone calls to discuss coding inconsistencies and code criteria. Inter-coder agreement improved regularly over the initial coding period. This process assured agreement between coders and maintained the integrity of the data.

Results

Patient demographic characteristics

Bayesian reasoning about diagnostics would suggest that patient characteristics (age, race, and gender) should figure prominently in physician CDM insofar as they provide important information about prior probability that a given patient will experience a given condition or problem (e.g., epidemiologic base rates). For example, among U.S. adults over the age of 20 years, there is a 9.6% diabetes prevalence, but this figure increases to 20.9% for adults over the age of 60 and is also higher for Hispanic/Latino populations (14%) and non-Hispanic Blacks (15%) than for non-Hispanic whites (8.7%)(National Institute of Diabetes and Digestive and Kidney Diseases, 2005). From a Bayesian perspective, racial/ethnic variations in the diagnosis and management of diabetes should reflect these rates as they inform the likelihood that a given patient has a specific condition or will develop a life-threatening comorbidity.

However, we find that physicians relied little on patient demographic characteristics as marked of epidemiologic base rates. Using ANOVA, statistical analyses of our quantitative data show patient characteristics manipulated in our experimental design (age, race, gender, and SES) have no significant main effects on any in a series of CDM outcomes, including information-

seeking, test ordering, prescriptions, referrals, lifestyle advice, or time to follow-up (although there are some two- and three-way interactions between patient characteristics, provider attributes and country, which are outside the scope of this paper). Our qualitative data are consistent with this pattern in that physicians infrequently mentioned these patient characteristics, and when they did mention them, rarely referred to them in an epidemiologic context.

For example, despite the racial/ethnic differences in diabetes prevalence cited above, physicians rarely mentioned patient race. When they did, it was often in reference to specific racial/ethic groups having more deleterious cardiovascular risk profiles than others. Likewise, gender in isolation was mentioned by only a few physicians, but usually in relation to the patient's position within a wider family context and females often being better able to take care of themselves. Age was mentioned more frequently, often as a risk factor in terms of a likely progression of diabetes and the development of neuropathy, cardiovascular disease, and other associated conditions. Age was also important for explaining how it can be more difficult for younger people with fewer obvious symptoms to acknowledge both the seriousness of the diagnosis of diabetes and instigate the recommended changes to lifestyle, particularly diet. Developing a neuropathy at the age of 35 was seen as unusual, unlucky, and probably associated with type 1 diabetes (although this was not stipulated in the vignette), as well as a sign of a poor likely prognosis with ongoing complications:

> Partly her age, because she's 65, so the older you get the more complications you get. (239364)

> He's a young guy, and he's going to be potentially dealing with this for 40 years. So the biggest challenge is for him to keep interested in his own care. That's a challenge in young people. (183428).

More often, physicians often referred to combinations of patient characteristics. For example, race, gender and age in combination within a family context were often seen as a barrier to successful self-management of diabetes due to peer and family pressure over lifestyle, especially diet:

> Frequently, women of her generation and her cultural background are really family matriarchs. And providing calorie-dense foods, which are often fatty, is part of how they take care of their families. And then it's very difficult for them to eat in a manner that's different from that. (158069)

> I mean it says in the beginning he's a 35-year-old lawyer. So, to a certain extent that means that you would hope that he's the sort of person who would take a certain responsibility for his health and will want to do the best for himself. (239059).

Patient SES, a fourth patient characteristic manipulated in our experiment, was discussed much more often, but usually in the context of one of the below themes.

Physical symptoms

As expected, physicians discussed the physical symptoms reported in the vignette at length, particularly the patient's elevated blood pressure, family history of hypertension, and burning sensation in the feet suggestive of the development of a possible neuropathy. However, despite identical presentations of the symptoms across vignettes, physicians had highly varied interpretations of their meaning, with some physicians being dismissive of an isolated blood pressure while others felt it showed that blood pressure was not well controlled and required action. As with demographic characteristics, physical symptoms were rarely considered in isolation, but in combination with other patient characteristics. For example, physicians disagreed over whether the patient's expressed concern about blood pressure represented

anxiety that would hinder or possibly motivate self-management of the diabetes (a point elaborated in the next section). Still, most emphasized the importance of addressing the patient's short-term concerns as well as the doctor's long-term concern about peripheral neuropathy or the development of vascular problems in the feet:

> I think I'd be wanting to explore his concerns and anxieties primarily, particularly of his presenting complaint today, but I'd also like to examine the possibility that he might have peripheral neuropathy or peripheral vascular disease. So my objectives would be two-fold really. Both those issues. (215782)

> I mean the fact that he was so worried about his diabetes and what his blood pressure and wants to get a home monitor, that's a good sign. (200387).

Many felt that doing so would motivate the patient, thus facilitating better patient engagement with understanding the importance of lifestyle modifications to improve diabetic outcomes.

Psychological and Cognitive characteristics

In the vast majority of cases, physicians translated patient characteristics to clinical decision making by making assessments of their cognitive, psychological, and emotional characteristics, and projecting how those characteristics would affect their health behavior. For the management of diabetes and the prevention of further complications, physicians rely on patients to adhere to a series of recommendations that are managed as part of their everyday lives, such as diet, exercise, medication, and glucose monitoring. Because physicians cannot control these aspects of diabetes care, their assessments of how patients will execute treatment plans are pivotal for CDM (Lutfey & Freese, 2005).

Physicians took several different types of behavior as evidence of compliance with medical recommendations, sometimes beginning with the simple observation that the patient adhered to recommendations just by coming to the scheduled appointment. Weight management and HbA1c levels (a blood test measuring average glucose levels over the previous three months) were taken as evidence of effective health behavior, as explained by these physicians:

> Her HbA1c is already 6.9, so she's no slacker. (163123).

> If she was getting a letter grade I'd say she'd get a B. She gets her eyes checked. She says she watches her weight. She's concerned about her blood pressure. Her blood sugar is not badly controlled, so she's doing a fair job, B. (165216)

A key concern for physicians was how to elicit this type of behavior among patients. Most commonly, physicians discussed *cognitive* understandings of diabetes as the foundation for motivating behavior. They asserted that to the extent that patients have a thorough understanding of why diabetes complications emerge and how they are threatening to health, they will be motivated to act in their own best interests by controlling their glucose levels and related health indicators. Patients who were perceived to be intellectually capable of understanding the nature of diabetes (whether or not they already have that substantive information) could be mobilized to act in their own best interests by complying with the medical recommendations. As one physician explains, with patients who have cognitive understanding of the problem, part of the "buy in" work is already done:

> He seems educated, sophisticated. He's concerned. He had family concern. So my conclusion is that he's going to do well. Patients who don't have that, because the disease is silent, really don't understand why you're bothering with the sugar thing, they're not going to do well. Part of the goal that has already been accomplished with this patient is there is adequate buy-in in managing his disease except for the fact that he forgets his pills once in a while. (183428)

While physicians described cognitive ability as a desirable foundation for good diabetes management, they were careful to note that not all smart people were willing to adhere to treatment regimens and others who were less "bright" could be successful if properly motivated. In addition to cognitive skills, then, physicians also assessed existing levels of patient motivation as well as the extent to which they might be convinced to follow treatment recommendations (noting that too much or inappropriately-focused motivation could also undermine treatment):

> Well, I think, although he comes across as you know not very bright in the consultation, this sort of patient, if I picked him up right anyway, he seems to be the sort of person who once you actually got the point through across to him, he will follow through on it as he has done with his diet. (213435).

> But they can become neurotic and overly dependent on the doctor or a martyr to the condition and monitoring and over-medicalize diabetes. (21783)

> He was smartly dressed in a collar and tie, which can be misleading but is indicative of someone who cares about their appearance rather than someone that might turn up sort of unsheveled, dirty, etc. So he's someone who has, you know, I presume from what I've seen, good levels of self-care. (203446)

Motivation was also seen as a characteristic that could be strengthened or undermined by emotions, particularly anxiety. Again, despite identical presentations, physicians articulated quite varied interpretations of patients' anxiety levels, the underlying reasons for worry, and the extent to which those emotions could be harnessed in support of effective diabetes management.

> Okay, he's going to worry too much. He's going to bug me about his blood pressure. But you can also cash in on that and you can let him grow and compliment him on his ability to take control and help him take control over other things too and educate him. (195788)

> He's a professional person and you'd think that he'd be able to take on board knowledge. But he's so scared, he probably can't or he won't. And if they're not taking it all on board, that's the biggest challenge. (231546)

Lifestyle and Social Support

Beyond a patient's cognitive and psychological traits, physicians were also very attentive to perceived social support. For example, societal behavior patterns encouraging too much reliance on cars, eating fast food and unhealthy lifestyle choices was described as a type of social influence that undermined patient motivation and adherence. While physicians can give advice, information and encouragement, it is often ignored:

> I have hundreds and hundreds of diabetics and I probably have only a dozen who exercise and want to drop their weight, [after which] their blood pressure goes down, their A1c's go back to normal…But the majority of them don't do that. The majority of them stay noncompliant. (109939)

> It's the fact that we are human beings and we are stressed. We live in a very stressful environment. And eating is part of the pleasure. It doesn't talk back. It gives immediate gratification. And we all like to eat. I love to eat. And I understand that. And it is very, very difficult to be disciplined 24/7. (145341).

Beyond broad social influences, perceived positive support from a spouse or family was often seen as potentially facilitating patients' motivation. Active engagement of a spouse represented not only a lack of barriers to lifestyle change (especially diet), but also increased familial investment in following physicians' recommendations, as described in these excerpts:

> I think he's obviously concerned about his own health, so he would take an adequate interest in it. And two, you have support. His wife is also involved and concerned about his health. (107454)

> Obviously he's got a supportive spouse, which always helps. He seems to be taking an interest in his condition. (214021)

In combination with perceived high levels of self-motivation and cognitive ability, positive social support was seen as potentially synergistic with a patient's own motivation and therefore as a predictor of global ability to cope with diabetes, sometimes termed "health literacy" (185167) or capacity to "take ownership" of diabetes (201555):

> He seems reasonably concerned. He seems like he's keeping his follow-ups. He's got an involved family and a good support structure. So I think I have reasonably high hopes for him that he'll do okay. (183428)

> I believe that she has help with her healthcare, she has a positive family reinforcement at home. It seems like her home care environment is good. (194293).

However, this benefit from spousal involvement was described as being contingent on both parties having a positive approach; otherwise, patients could use spouses as crutches for their problems or be distracted by an unsupportive spouse. Despite identical vignette presentations, physicians varied in their interpretations of the involvement of the spouse, with some noting that the spouse 'pushed,' 'nagged,' 'nudged,' 'bothered,' 'pressured,' 'bullied,' or 'sent' the patient to the appointment:

> The husband is doing something for her, whether he's testing her blood or what, but she's putting her problems off on other people. She needs to take control of that. So that's what my long-term goal would be. (179493)

> He seems pretty motivated. He seemed to be appreciative of his wife's concern as opposed to feeling as if it were a hostile intrusion in his autonomy. So he sounded pretty cooperative. It sounds good. (160711).

Some saw this as reinforcing the patient's own motivation, whereas others felt that the patient would not have presented, and would not subsequently comply or take responsibility, without the intervention of the spouse. Even this type of aggressive or "nagging" input from spouses, however, was seen as facilitating the physicians' medical goals of managing diabetes.

Style of interaction

The way in which the patient was perceived to have interacted with the doctor was also seen as a factor in influencing the doctors' decisions about the patient. Some doctors felt that the patient had volunteered information and been interactionally engaged and attentive. However, others felt the opposite and stated that the patient had not been forthcoming with information and that the patient's anxiety would act as an obstacle to self-managing their diabetes, as described here:

> There are certain visual cues that you get from observing a patient, the way they answer, the way he hesitated answering. It seems that he's going to need a little more work than someone else that has a similar problem…They minimize things, and they're either in denial or they choose not to put too much emphasis on it. (147838).

Other doctors felt that the patient had been evasive, vague or glib and too relaxed in their presentation and that their answers to questions were inconsistent: for example, expressing concern about hypertension but not complying with medication prescribed to address that problem.

> The biggest problem for him would probably be an honest assessment from him. Unless he was pushed, he didn't give you everything that was going on, which is why I think he would be moderately successful, not astoundingly successful. If he gives me a true explanation of what's going on in the beginning, [then I] can deal with things a little bit better. (186638)

> And she did underplay a few symptoms, which might be potentially significant. (202797).

An imprecise style of interaction was sometimes considered evidence of untruthfulness or poor understanding of the situation, thereby detracting from perceived motivation.

Variation by experiment design factors

Given the breadth of information physicians gleaned from patient vignettes, a next question is how those interpretations varied according to the characteristics of the patient in the vignette. As explained above, these qualitative data are embedded in a larger, quantitative experimental structure wherein patient characteristics are systematically manipulated as part of the study design and the presentation of symptoms is identical across vignettes.

First, we note that there is some evidence of Bayesian reasoning insofar as physicians who viewed the black patient made more mentions of race, those who viewed the high SES patient more often mentioned SES, and so on (Table 1). Given marked racial/ethnic disparities in diabetes and the particular morbidity risks for younger people experiencing a complication, we would expect age and race to be the most relevant categories for those physicians appealing to base rates as prior probabilities. However, those topics are only raised in 6% and 31% of those cases, respectively. SES markers from the vignette (occupation) were mentioned with equal frequency (in 32% of cases) but as discussed above were used to infer additional information relevant to health behavior. Second, we note that physical symptoms were mentioned in the majority of cases (80%), and with only modest variation according to the patient characteristics in the vignette.

Critically, psychological and cognitive issues were discussed in the vast majority (95%) of the cases. Furthermore, despite identical patient presentations, physicians were varied in how they interpreted information, more often mentioning cognitive and psychological characteristics with women and lower SES patients compared to other groups. Similarly, social support and style of interaction were mentioned in 44% and 38% of the cases respectively, much more frequently than age. Commensurate with the pattern in psychological factors, style of interaction was mentioned more frequently with female and black patients, although social support was more frequently raised with male and low SES patients, perhaps a function of gender- and class-based assumptions about differences in which patients depend on others for support in their health behavior as opposed to being self-reliant.

Despite some differences, these overall patterns are consistent between countries (see Table 2). While UK physicians mentioned patient race more frequently, this still only occurred in 8% of the cases (compared to 3% of US interviews). The differences that are present show that UK physicians more often explained their decisions based on patient age, physical symptoms, and style of interaction. By contrast, US physicians mentioned SES and social support slightly more often. However, both groups discussed psychological/cognitive and various social characteristics at length and these topics featured much more prominently in both sets of transcripts than biophysiological markers such as race, gender, and age.

Conclusion

Previous research on clinical decision making shows that physicians' diagnostic and treatment decisions vary according to patient characteristics, physician attributes, and the countries in which they are practicing. Less is known about the decision making route by which providers arrive at these endpoints and why they make such varied decisions. The present study helps fill such gaps in our knowledge by examining open-ended interview data from a large vignette-based factorial experiment to identify which patient characteristics physicians identify as relevant to their decision making and how they perceive their relevance. Based on analysis of open-ended think aloud data embedded in a larger factorial experiment, we found physicians relied heavily on perceived social, cognitive, and psychological characteristics of patients for their clinical decision making, including intellectual ability, motivation, quality of social support, lifestyle, anxiety levels and style of interaction. Cognitive and psychological traits in particular were addressed by almost all respondents, more frequently than physical symptoms and in three times more cases than any individual demographic characteristic. In the context of Bayesian decision theory—which would suggest physicians should rely on physical symptoms and epidemiologic base rates for assessing the likelihood of a complication developing—this is a major but understudied influence on decisions. Despite identical presentation in the vignettes, providers were varied widely in their interpretations of patient characteristics (e.g., weight, concern over blood pressure, involvement of spouse).

These explanations also varied according to the characteristics of the patients in the vignettes. For example, physicians who viewed female patients or low SES patients were more likely to mention cognitive and psychological cues compared to physicians who viewed other patients. While previous research on country differences in medical practice have shown that country effects are often much stronger than patient or physician effects (McKinlay et al., 2006), these patterns were largely consistent in both the US and the UK.

These results extend existing knowledge about decision making by revealing some common features to providers' interpretations of presenting information in the case of diabetes care. At least for condition such as diabetes, which requires extensive self-management, physicians consistently made efforts to evaluate patients' capacities for understanding and taking care of their health outside of a medical context. These wide-ranging evaluations are outside the scope of the demographic variables typically addressed in studies of decision making. Therefore, these results help explain part of the medical practice variation observed and underscore that Bayesian evaluations of epidemiologic base rates are not the only process at work.

It is entirely possible that physicians also use patient characteristics in a Bayesian fashion, and that those explanations are not explicitly articulated in our interview data. Similarly, these data do not attempt to address implicit cognitive or psychological processing that physicians may not be able to articulate in a traditional think aloud format. Therefore, it is possible that these processes occur in tandem with more implicit biases that may operate at a subconscious level for physicians, and those processes are beyond the scope of the present analysis. It is also possible that patient characteristics would play a more prominent role in the vignette depicting undiagnosed diabetes (rather than diagnosed diabetes) as physicians may rely more heavily on epidemiologic base rates for initial diagnostic rather than subsequent treatment decisions. However, these results are consistent with previous ethnographic and interview data in the area of diabetes care and provide new information about how patient characteristics are relevant for CDM, which may operate in addition to other types of cognitive processing.

These findings show that patient characteristics have broad importance for physicians beyond epidemiologic base rates. Based on short vignette exposures, most physicians made elaborate and penetrating observations and assumptions about patients' personalities and behavioral

propensities. Yet, this aspect of CDM is not well represented in health-related research and policy. Policy efforts to encourage physician's use of practice guidelines (including base rates) may be misguided if physicians interpret patient characteristics as relevant for *behavioral* rather than *biological* purposes.

Acknowledgements

REFERENCES

Bach PB, Pham HH, Schrag D, Tate RC, Hargraves JL. Primary care physicians who treat blacks and whites. N Engl J Med 2004;351(6):575–584. [PubMed: 15295050]

Balsa AI, McGuire TG. Statistical discrimination in health care. J Health Econ 2001;20(6):881–907. [PubMed: 11758051]

Biggs SF, Rosman AJ, Sergenian GK. Methodological issues in judgment and decision-making research: Concurrent verbal protocol validity and simultaneous traces of process. Journal of Behavioral Decision Making 1993;6:187–206.

Bosk, C. Forgive and Remember: Managing Medical Failure. Chicago: University of Chicago Press; 1979.

Britt H, Bhasale A, Miles DA, Meza A, Sayer GP, Angelis M. The sex of the general practitioner: a comparison of characteristics, patients, and medical conditions managed. Med Care 1996;34(5):403–415. [PubMed: 8614163]

Collins E, Katona C, Orrell M. Management of depression in the elderly by general practitioners: II. Attitudes to ageing and factors affecting practice. Fam Pract 1995;12(1):12–17. [PubMed: 7665032]

Cooper LA, Roter DL, Johnson RL, Ford DE, Steinwachs DM, Powe NR. Patient-centered communication, ratings of care, and concordance of patient and physician race. Ann Intern Med 2003;139(11):907–915. [PubMed: 14644893]

Dresselhaus TR, Peabody JW, Lee M, Wang MM, Luck J. Measuring compliance with preventive care guidelines: standardized patients, clinical vignettes, and the medical record. J Gen Intern Med 2000;15 (11):782–788. [PubMed: 11119170]

Farmer T, Robinson K, Elliott SJ, Eyles J. Developing and implementing a triangulation protocol for qualitative health research. Qual Health Res 2006;16:377–394. [PubMed: 16449687]

Feldman HA, McKinlay JB, Potter DA, Freund KM, Burns RB, Moskowitz MA, Kasten LE. Nonmedical influences on medical decision making: an experimental technique using videotapes, factorial design, and survey sampling. Health Serv Res 1997;32(3):343–366. [PubMed: 9240285]

Fox, R. Training for Uncertainty. In: Merton, RK.; Reader, G.; Kendall, P., editors. The Student-Physician. Cambridge: Harvard University Press; 1957. p. 207-241.

Gatsonis CA, Epstein AM, Newhouse JP, Normand SL, McNeil BJ. Variations in the utilization of coronary angiography for elderly patients with an acute myocardial infarction. An analysis using hierarchical logistic regression. Med Care 1995;33(6):625–642. [PubMed: 7760578]

Gill VT. Doing Attributions in Medical Interaction: Patients' Explanations for Illness and Doctors' Responses. Social Psychology Quarterly 1998;61(4):342–360.

Grant RW, Wexler DJ, Watson AJ, Lester WT, Cagliero E, Campbell EG, Nathan DM. How doctors choose medications to treat type 2 diabetes: a national survey of specialists and academic generalists. Diabetes Care 2007;30(6):1448–1453. [PubMed: 17337497]

Harris MI. Racial and ethnic differences in health care access and health outcomes for adults with type 2 diabetes. Diabetes Care 2001;24(3):454–459. [PubMed: 11289467]

Heritage, J.; Maynard, DW., editors. Communication in Medical Care: Interaction between primary care physicians and patients. Cambridge, UK: Camridge University Press; 2006.

Hulsman RL, Mollema ED, Oort FJ, Hoos AM, de Haes JC. Using standardized video cases for assessment of medical communication skills: reliability of an objective structured video examination by computer. Patient Educ Couns 2006;60(1):24–31. [PubMed: 16332467]

Institute of Medicine. Unequal Treatment: Confronting Racial and Ethnic Disparities in Healthcare. Washington, D.C: The National Academies Press; 2003.

Kelly DL, Dixon LB, Kreyenbuhl JA, Medoff D, Lehman AF, Love RC, Brown CH, Conley RR. Clozapine utilization and outcomes by race in a public mental health system: 1994–2000. J Clin Psychiatry 2006;67(9):1404–1411. [PubMed: 17017827]

King KM, Kerr JR. The women's health agenda: evolution of hormone replacement therapy as treatment and prophylaxis for coronary artery disease. J Adv Nurs 1996;23(5):984–991. [PubMed: 8732527]

Light DW. Psychiatry and Suicide: The Management of a Mistake. American Journal of Sociology 1972;77(5):821–838.

Lutfey K. The Influence of Clinic Organizational Features on Providers' Assessments of Patient Compliance with Medical Treatment Regimens. Research in the Sociology of Health Care 2003;21:63–83.

Lutfey K. On practices of 'good doctoring': reconsidering the relationship between provider roles and patient adherence. Sociol Health Illn 2005;27(4):421–447. [PubMed: 15998345]

Lutfey K, Freese J. Toward Some Fundamentals of Fundamental Causality: Socioeconomic Status and Health in the Routine Clinic Visit for Diabetes. American Journal of Sociology 2005;110(5):1326–1372.

Maynard, DW. Bad News, Good News: Conversational Order in Everyday Talk and Clinical Settings. Chicago: University of Chicago Press; 2003.

Mazor KM, Haley HL, Sullivan K, Quirk ME. The video-based test of communication skills: description, development, and preliminary findings. Teach Learn Med 2007;19(2):162–167. [PubMed: 17564544]

McDaniel SH, Beckman HB, Morse DS, Silberman J, Seaburn DB, Epstein RM. Physician self-disclosure in primary care visits: enough about you, what about me? Arch Intern Med 2007;167(12):1321–1326. [PubMed: 17592107]

McKinlay J, Link C, Arber S, Marceau L, O'Donnell A, Adams A, Lutfey K. How do Doctors in Different Countries Manage the Same Patient? Results of a Factorial Experiment. Health Services Research 2006;41(6):2182–2200. [PubMed: 17116115][Erratum in 2141(2186):2303]

McKinlay JB, Lin T, Freund K, Moskowitz M. The unexpected influence of physician attributes on clinical decisions: results of an experiment. J Health Soc Behav 2002;43(1):92–106. [PubMed: 11949199]

Millett C, Gray J, Saxena S, Netuveli G, Khunti K, Majeed A. Ethnic disparities in diabetes management and pay-for-performance in the UK: the Wandsworth Prospective Diabetes Study. PLoS Med 2007;4(6):e191. [PubMed: 17564486]

Morse J. Inference, evidence, and verification: Creating a legitimate discipline. [keynote address]. International Journal of Qualitative Methods 2006;5(1):1–7.

National Institute of Diabetes and Digestive and Kidney Diseases. National Diabetes Statistics Fact Sheet: General information and national estimates on diabetes in the United States, 2005. Bethesda, MD: U.S. Department of Health and Human Services, National Institute of Health; 2005.

Ogden PE, Edwards JC, Stricken AG. Portable interactive faculty development for multiple site clinics using computer-based CD-ROM modules. Med Educ 2003;37(11):1043–1044. [PubMed: 14629441]

Paget, MA. The Unity of Mistakes: A Phenomenological Interpretation of Medical Work. Philadelphia: Temple University Press; 1988.

Peabody JW, Luck J, Glassman P, Dresselhaus TR, Lee M. Comparison of vignettes, standardized patients, and chart abstraction: a prospective validation study of 3 methods for measuring quality. Jama 2000;283(13):1715–1722. [PubMed: 10755498]

Perakyla A. Authority and Accountability: The Delivery of Diagnosis in Primary Health Care. Social Psychology Quarterly 1998;61(4):301–320.

Pinn VW. Sex and gender factors in medical studies: implications for health and clinical practice. Jama 2003;289(4):397–400. [PubMed: 12533102]

Popescu I, Vaughan-Sarrazin MS, Rosenthal GE. Differences in mortality and use of revascularization in black and white patients with acute MI admitted to hospitals with and without revascularization services. Jama 2007;297(22):2489–2495. [PubMed: 17565083]

Rubin RR, Peyrot M, Siminerio LM. Health care and patient-reported outcomes: results of the cross-national Diabetes Attitudes, Wishes and Needs (DAWN) study. Diabetes Care 2006;29(6):1249–1255. [PubMed: 16732004]

Schulman KA, Berlin JA, Harless W, Kerner JF, Sistrunk S, Gersh BJ, Dube R, Taleghani CK, Burke JE, Williams S, Eisenberg JM, Escarce JJ. The effect of race and sex on physicians' recommendations for cardiac catheterization. N Engl J Med 1999;340(8):618–626. [PubMed: 10029647]

Scott A, Shiell A, King M. Is general practitioner decision making associated with patient socio-economic status? Soc Sci Med 1996;42(1):35–46. [PubMed: 8745106]

Sharpe, VA.; Fadin, AI. Medical Harm: Historical, Conceptual, and Ethical Dimensions of Iatrogenic Illness. New York: Cambridge University Press; 1998.

Soumerai SB, McLaughlin TJ, Spiegelman D, Hertzmark E, Thibault G, Goldman L. Adverse outcomes of underuse of beta-blockers in elderly survivors of acute myocardial infarction. Jama 1997;277(2):115–121. [PubMed: 8990335]

Stafford RS, Singer DE. National patterns of warfarin use in atrial fibrillation. Arch Intern Med 1996;156(22):2537–2541. [PubMed: 8951296]

Strauss, A.; Corbin, J. Basics of qualitative research: Grounded theory procedures and techniques. Newbury Park, CA: Sage; 1990.

van Ryn M, Burke J. The effect of patient race and socio-economic status on physicians' perceptions of patients. Soc Sci Med 2000;50(6):813–828. [PubMed: 10695979]

Veloski J, Tai S, Evans AS, Nash DB. Clinical vignette-based surveys: a tool for assessing physician practice variation. Am J Med Qual 2005;20(3):151–157. [PubMed: 15951521]

Wofford JL, Singh S. Exploring the educational value of clinical vignettes from the Society of General Internal Medicine national meeting in the internal medicine clerkship: a pilot study. J Gen Intern Med 2006;21(11):1195–1197. [PubMed: 17026730]

Table 1

Major coding categories and their frequencies according to patient characteristics.

Codes	Male	Female	Black	White	35 yrs	65 yrs	Lower	Upper	Number of Codes Applied	Number of Interviews Codes Applied To	Percentage of Total Interviews
Experimental Factors	156	153	176	133	213	96	139	170	309	149	61%
Race	6	10	14	2	10	6	8	8	16	14	6%
Gender	2	6	6	2	3	5	3	5	8	8	3%
Age	54	56	61	49	83	27	68	42	110	76	31%
SES	58	47	54	51	60	45	27	78	105	77	32%
Weight	33	34	40	27	45	22	40	27	67	56	23%
Physical Characteristics	202	219	202	219	219	202	230	191	421	197	80%
Psychological/Cognitive	363	424	382	405	390	397	418	369	787	232	95%
Other Social Characteristics	91	76	77	90	83	84	98	69	167	116	48%
Social Support	80	64	66	78	71	73	87	57	144	107	44%
Lifestyle	6	3	8	0	7	2	5	4	9	7	2%
Style of Interaction	59	71	73	57	61	69	70	60	130	92	38%
Generic Patient Characteristics	271	277	278	270	285	263	274	274	548	211	86%
Total	1381	1440	1437	1383	1530	1291	1467	1354	2821	244	244

Table 2

Major coding categories and their frequencies by country.

Codes	United Kingdom			United States		
	Number of Codes Applied	Number Interviews Codes Applied To	Percentage of Interviews	Number of Codes Applied	Number of Interviews Codes Applied To	Percentage of Interviews
Experimental Factors	171	80	63%	138	69	59%
Race	12	10	8%	4	4	3%
Gender	5	5	4%	3	3	3%
Age	67	46	36%	43	30	26%
SES	43	33	26%	62	44	38%
Weight	37	31	24%	30	25	21%
Physical Characteristics	291	116	91%	130	81	69%
Psychological/Cognitive Characteristics	435	118	93%	352	114	97%
Other Social Characteristics	87	58	46%	80	58	50%
Social Support	70	50	40%	74	57	49%
Lifestyle	6	4	3%	3	3	3%
Style of Interaction	81	54	43%	49	38	32%
Generic Patient Characteristics	268	110	87%	280	101	86%
Total	1573	127	127	1248	117	117