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## What do physicians gain (and lose) with experience? Qualitative results from a cross-national study of diabetes

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### Abstract

An empirical puzzle has emerged over the last several decades of research on variation in clinical decision making involving mixed effects of physician experience. There is some evidence that physicians with greater experience may provide *poorer* quality care than their less experienced counterparts, as captured by various quality assurance measures. Physician experience is traditionally narrowly defined as years in practice or age, and there is a need for investigation into precisely what happens to physicians as they gain experience, including the reasoning and clinical skills acquired over time and the ways in which physicians consciously implement those skills into their work. In this study, we are concerned with 1) how physicians conceptualize and describe the meaning of their clinical experience, and 2) how they use their experience in clinical practice. To address these questions, we analyzed qualitative data drawn from in-depth interviews with physicians from the United States, United Kingdom, and Germany as a part of a larger factorial experiment of medical decision making for diabetes. Our results show that common measures of physician experience do not fully capture the skills physicians acquire over time or how they implement those skills in their clinical work. We found that what physicians actually gain over time is complex social, behavioral and intuitive wisdom as well as the ability to compare the present day patient against similar past patients. These active cognitive reasoning processes are essential components of a forward-looking research agenda in the area of physician experience and decision making. Guideline-based outcome measures, accompanied by underdeveloped age- and years-based definitions of experience, may prematurely conclude that more experienced physicians are providing deficient care while

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overlooking the ways in which they are providing more and better care than their less experienced counterparts.

### Keywords

USA; UK; Germany; diabetes; clinical experience; qualitative; clinical decision-making; chronic disease management; physicians

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## INTRODUCTION

An empirical puzzle has emerged over the last several decades of research on variation in clinical decision making involving mixed effects of physician experience. There is some evidence that physicians with greater experience provide *poorer* quality care than their less experienced counterparts, as captured by various quality assurance measures (Allen, 2005; Choudhry, Fletcher, & Soumerai, 2005). For example, younger physicians have shown greater adherence to disease management guidelines (Jacques, Jones, Houts, Bauer, Dwyer, Lynch et al., 1991; Kenny, Smith, Goldschmid, Newman, & Herman, 1993) and have been found to be more likely than more experienced physicians to carry out integral components of a “comprehensive diabetic examination” (McKinlay, Gerstenberger, Marceau, Link, & Handy, 2009). In the context of the evidence-based medicine movement to improve quality by standardizing treatment, this variation in clinical decision making by physician experience is a persistent and nagging policy challenge.

Empirically, physician experience is typically measured by age or number of years in clinical practice. Theoretically, it has often been conceptualized as a subconscious psychological process leading physicians to be cognitively biased in ways that are invisible to them. While this tradition has generated a great deal of important research, we assert that in order for this work (and its associated policy agenda) to move forward from the present impasse, there must be further methodological and theoretical development of the underlying concept of “experience”. Specifically, there is a need for investigation into precisely what happens to physicians as they gain experience, including the reasoning and clinical skills acquired with years in clinical practice and the ways physicians consciously implement those skills into their work. In a departure from traditional individualistic, psychological emphasis on clinical reasoning as a subconscious process, we focus on social, interactive, and processual aspects of experience that *can* be made explicit. We use qualitative think-aloud data from a study of clinical decision making around diabetes to ask:

1. How do physicians themselves conceptualize and describe the meaning of their clinical experience?
2. How do they use their experience in clinical practice?

Our study aims to move existing literature on this topic forward in several ways by: examining physicians’ explicit reasoning processes for interpreting patients’ social characteristics; using a qualitative analysis, which allows for a more nuanced understanding of information physicians consider relevant to their work; providing policy relevant implications; and proposing potential explanations for mixed results observed in extant studies by showing how experienced physicians draw on a wide range of factors not fully captured by evidence-based measures of quality.

## BACKGROUND

The effect of increasing years of clinical experience on quality of care is an often disputed relationship, situated within an environment of tension between the vogue of patient centered care and the evidence-based medicine movement (Greenhalgh, Flynn, Long, & Tyson, 2008; May, Rapley, Moreira, Finch, & Heaven, 2006). This discord is well evidenced in a controversial report by Choudhry and colleagues (2005) that reviewed 59 studies of physician practice to determine the relationship between clinical experience and performance. Choudhry reported that 52% of the assessed studies demonstrated a negative association between increased experience and performance. However, letters in response to Choudhry's review provide an important context for the discussion of physician experience and quality of care; taking issue with Choudhry's definition of physician "performance", Samuels, Ropper and Szabo hold that clinical guidelines and practice standards do not epitomize quality care, and that experience brings physicians subtle skills not captured by standard evidence-based measures (Samuels & Ropper, 2005; Szabo, 2005).

Some of these "subtle skills" or cognitive processes involved in clinical decision making have been described previously (Andre, Borgquist, Foldevi, & Molstad, 2002; Farmer & Higginson, 2006; Gabbay & le May, 2004; Greenhalgh et al., 2008; Tamayo-Sarver, Dawson, Hinze, Cydulka, Wigton, & Baker, 2005). For example, the use of heuristics in clinical practice has been described in relation to "rules of thumb" or tacit knowledge (Andre et al., 2002; Greenhalgh et al., 2008). In particular, Andre and colleagues' (2002) findings were inconclusive as to whether the use of tacit knowledge increased with clinical experience or not. Gabbay and le May describe the ways in which individual and collective physician experience informs tacit guidelines deemed "mindlines"; clinicians rarely use evidence directly from research or guidelines, rather they rely on "mindlines" informed by brief reading, conversations with colleagues, and their early training (Gabbay & le May, 2004, 2009). Indeed, physicians have been found to consult outcomes research only at the limits of their own experience (Tannenbaum, 1994). These studies have addressed the cognitive and heuristic processes involved in clinical practice, but our agenda of describing how physicians define and use their experience is a unique contribution to the clinical decision making literature.

The acquisition of expertise in clinical practice is commonly thought to be gained through extensive experience (Benner, 1984; Dreyfus & Dreyfus, 1980; Ericsson, 2004; Ericsson, 2009; Jensen, Resnik, & Haddad, 2008; Smith, Goodwin, Mort, & Pope, 2003), with experience, clinical reasoning and decision making posited as facets of expertise (Ericsson, 2004; Jensen et al., 2008). In her work on expertise in nursing, Benner found that nursing skill involved more than just technique learned from books; it included perceptions and decision making in concert with practical knowledge (Benner, 1984). Building on this notion, Jensen and colleagues propose that the deliberate act of clinical decision making and the critical analysis involved in clinical reasoning interact dialectically, constantly engaging and influencing each other (Jensen et al., 2008). Within this scenario, experience functions as the context in which the process of clinical reasoning/decision making takes place (Higgs & Jones, 2000).

In their well-known work on skill acquisition, Dreyfus and Dreyfus maintain that expert performance is automatic and non-reflective when situations are familiar, and that knowing *how* to do things involves both experiential and tacit knowledge (Dreyfus & Dreyfus, 1980). The notion that clinical reasoning is a subconscious or implicit process and that experience as it relates to this process is indefinable is pervasive in the cognitive psychology literature. "Non-analytic reasoning" in clinical decision making is hypothesized to take place with sufficient automaticity that it occurs without awareness (Eva, 2005; Hatala, Norman, & Brooks, 1999). If clinical decisions are made subconsciously, then physicians would constantly be at risk of

being influenced by non-analytic bias (Brooks, LeBlanc, & Norman, 2000; Eva & Brooks, 2000). In this paper, we move beyond conceptualizing physician experience as a primarily cognitive experience and show how some reasoning processes previously assumed to be subconscious can in fact be made explicit through analysis of qualitative data.

Literature on expertise and experience in clinical decision making most often assumes a context of diagnostics and treatment of acute illness; however, the practical differences between a doctor's visit in which the main goal is to diagnose or treat an acute illness and a visit with the purpose of on-going disease management provide distinct contexts for experience to play out. Lutfey and Freese (2007) have drawn attention to the ambiguities introduced by chronic illness care for the medical error paradigm, and this relationship holds true for the necessary repositioning of experience within a context of chronic disease care, especially as the epidemiologic transition advances around the world.

## METHODS

Qualitative data were drawn from in-depth interviews with physicians from three countries (United States, United Kingdom, and Germany). These interviews were conducted as a part of a parent study consisting of a factorial experiment of medical decision making around diabetes described in detail elsewhere (Lutfey, Campbell, Renfrew, Marceau, Roland, & McKinlay, 2008). The study upon which this article is based was subject to appropriate ethical review by the New England Research Institutes Institutional Review Board (IRB). Physicians viewed a 5–7 minute video vignette portraying a primary care interaction between a patient (facing the camera) and a physician (depicted by voiceover). In the video vignette, the “patient” presents with diagnosed diabetes and displays symptoms suggestive of an emerging foot neuropathy, reports “burning in the feet” that “comes and goes”. The “patient” is moderately overweight, but reports following his/her treatment regimen.

After viewing the 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. An additional open-ended interview segment was also used to explore how treatment decisions were made. We used verbal protocol analysis (also known as “think aloud” methods), a recognized qualitative interviewing technique for capturing ongoing or recently completed decision processes (Biggs, Rosman, & Sergenian, 1993) without imposing structure on the physician's thought processes. During the “think aloud” portion of the interview, physicians were asked with open-ended probes to explain how they arrived at the clinical decisions they explained in the previous part of the interview. The one-page discussion guide was structured around the following six open-ended questions: (1) What would your goal be with this patient? (2) How successful do you think this patient would be in managing his/her condition? (3) How did you draw these conclusions about what you think will happen with this patient's diabetes? (4) Would you be able to treat this patient as you would like? (5) What are your biggest challenges/opportunities with patients like this? (6) Based on your own clinical experience, what would you predict will happen with this patient?

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 (“less experienced”) or > 15 years experience (“more experienced”) (since graduation from medical school in the US, since qualification as a general practitioner in the UK, or since year of licensure in Germany); and (d) work within the designated geographic area and have a medical degree from a recognized academic institution in the country of sampling. A letter of introduction was mailed to prospective participants and screening telephone calls were conducted to identify

eligible physicians. If a physician screened eligible, an appointment was scheduled for a one-hour in-person interview. 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 to acknowledge their participation. Only the qualitative data gathered from the parent study were used in our analyses as they were most appropriate toward our aim of describing physician experience. Interviews were transcribed in full and are the focus of the present analysis. Sample characteristics are displayed in Table 1. Thirty-one audiotapes (26 from the US, 1 from the UK and 4 from Germany) were excluded from analysis due to technical problems, yielding n=353 transcripts.

We used a modified version of Strauss and Corbin's three step approach to coding and analysis (open coding, axial coding, and selective coding) (Strauss & Corbin, 1990). During open coding, transcripts were reviewed line-by-line by the first author and a research assistant, core concepts were identified, and a preliminary coding scheme was developed and tested on a subset of the data. Atlas.ti was used to assist with coding and management of 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 factorial design of this experiment provides for the manipulation of multiple independent variables and the assessment of interactions among them, allowing for the possibility of comparing qualitative analyses across subgroups. While it is unusual to have qualitative data embedded within an otherwise highly structured quantitative study design, this experimental framework provides many benefits to our qualitative analyses. First, all the physicians in our study viewed the same signs and symptoms of disease, and such standardization is not possible in studies without vignettes. Because each physician saw the same medical case, we are assured that differences in how they describe or reason about the case are not due to variations in case load (as might be the case in ethnographic or interview studies).

Based on our comparative analyses of themes across the three countries and by experience level, we determined that there were no significant qualitative differences in the findings by country. These null qualitative results are consistent with 3-country statistical analyses of the quantitative portion of the data; these results show significant differences in care among the three countries, but the effects of physician experience only vary by country for two types of outcomes (both of which are types of questions physicians would ask patients) (von dem Knesebeck, Bonte, Siegrist, Marceau, Link, Arber et al., 2008). In other words, physician experience does not, on the whole, affect physicians differently across countries. For these reasons, our results present quotes from less and more experienced physicians of all three countries side-by-side, and we do not emphasize differences by experience level. Our analytic strategy is to present the most germane, representative quotes to exemplify each theme; quotes are labeled as "less experienced" or "more experienced" and with country identifiers not to highlight differences across experience levels or countries, but to demonstrate representation and breadth of comments. The overarching goal of this analysis to move beyond limited definitions of "age" and "years of experience" by providing "thick description" (Geertz, 1973) of how physicians perceive their own experience.

## RESULTS

In our examination of the meaning of physician experience and what it brings to clinical practice, we found that experience was more multi-faceted than the statistical definition "years in practice". In Section I of our results, we weave the denotation and process of obtaining experience into a single section, given the empirical/experiential feedback loop inherent in the

task of describing physicians' understandings of their experience. In Section II, we describe how physicians apply their experience to diabetes management practice.

### I. What does experience denote and how is it obtained?

**Years in practice**—Consistent with the commonly used statistical definition of clinical experience, some physicians defined their experience by the number of years they had been practicing medicine or knowledge gathered over the course of time:

Thirty years experience, plus evaluating her on a first time visit. (U.S., more experienced)

With experience... at least experience over 10 years, I have very few patients who are that interested not do well, in my experience. (U.S., less experienced)

Interestingly, both more and less experienced physicians referenced their years in practice. The act of referencing years of experience denotes a sense of certainty or authority around decision-making, which was present regardless of whether a physician had ten or thirty years of experience. Beyond being simply a reason to boast, however, clinical experience brought physicians real skills and knowledge, as described below.

**Clinical/medical knowledge**—Based in part on their experience, physicians in our study made predictions about the likely course of the vignette patient's diabetes, as in the following examples:

I think that she will probably continue to do well for another five to 10 years, and progressively her legs will hurt her more, and she'll become less physically active, and she'll slowly gain a little bit of weight, and she'll probably have a heart attack within the next five to 10 years. (U.K., less experienced)

I think she's going to have dialysis at 55 and she'll be partially blind and have vascular complications by 55... Diabetes is very unforgiving... Even with her buy-in... Diabetes always wins. (Germany, less experienced)

Based on existing ethnographic research, we know that physicians' expectations and these types of assessments are central to their decisions about optimal treatment regimens for patients (Lutfey & Freese, 2007). At the same time, their ability to generate these prognoses on the basis of a single viewing of a short vignette reveals some key factors about how physician experience operates in the context of diabetes management. First, experience treating past patients with diabetes, in addition to their medical training, has brought physicians the ability to predict the likely physiological course of diabetes, including the development of leg pain and weight gain, and the more concerning sequelae of diabetes, such as blindness and heart attack. However, these statements show us that experience brings more than just the ability to make medical or biological predictions; as described above, diabetes management is viewed as a battlefield where the biological progression of this chronic disease meets the behavioral changes required to control it, and in the end, "diabetes always wins". In this sense, understanding physiological trajectories associated with diabetes also inherently requires a simultaneous appreciation of how social processes are intertwined with biological control. To successfully manage patients, physicians must draw on both types of experience and use them together.

Within the ability to predict the likely biomedical course of diabetes, physicians' outlooks on the physiological progression of the disease varied dramatically. As described in our methods, the patient characteristics viewed by each physician were systematically manipulated as a part of the quantitative parent study design such that physicians viewed different actors with different characteristics; however, the presentation of symptoms was identical across vignettes.



Despite viewing the same symptom presentation, physicians differed in their areas of emphasis and outlook:

Her diabetes will over the years become harder to control... That's the natural history of the disease. She will get the classic neuropathy and other problems of the disease and it'll just run its natural course, despite her best efforts. (U.S., less experienced)

I think that her diabetes is already fairly well controlled and I think in working with her you could get her hypertension, and if she had high cholesterol or smoking or whatever, you would get that under control too. So I think she would have a good overall prognosis in terms of the lower risk for immediate complications. (U.S., less experienced)

These statements demonstrate the subjectivity of the notion of potential for success at diabetes management as the former physician quoted above is decidedly more pessimistic in attitude than the latter. The amount of variability in physician perceptions is beyond the scope of this paper; however, this is less relevant for the purposes of the current paper than is the fact *that* physician perceptions differed despite viewing the same symptom presentation and the content of their perceptions.

Additionally, we found that the word “control” was a linchpin in the conversation on diabetes management (see quotes above). “Control” is a word that implies both the biological and behavioral regimen necessary for successful diabetes management. The notion of getting diabetes “well controlled” or “under control” signifies an interdependent relationship between the biological/medical and behavioral/social forces to be managed. These interdependent forces were also at play in physician experience; that is, experience brought physicians the ability to marshal both biological/medical and behavioral/social knowledge.

**Social/behavioral knowledge**—Experience brought physicians the ability to make judgments about the vignette patient’s likelihood of compliance with diabetes management behaviors. These judgments were made based on observed past behavior (e.g., “from experience I know that it is difficult for a patient to stick to a diet”). Physicians also learned to interpret social cues by reading patient behavior and assessing communication:

You have to communicate with the patient as a human being. That’s important... physician-patient communication... Talk with the patient, listen and find out what is wrong and what is important for the patient... [It’s] a question of experience I think... I listen to what the patient says, right from the beginning... The way the patient enters the office, everything that is behind it... I act like a detective. (Germany, less experienced)

Previous research has identified the “detective” as one role physicians assume as a diagnostic strategy (Lutfey, 2005). As described above, experience brings the ability to detect social clues—to draw conclusions based not only on physiological markers or symptoms, but on the way a patient speaks, the way she behaves, the way she “enters the office and everything that is behind it”. The following statements illustrate judgments made about the vignette patient’s predicted behavior and management success, based on notably different interpretations of the vignette patient’s behavior:

I think I draw my conclusions on the way she gave the answers. You know, are you checking your sugars? ... I’m not really getting any definite answers. A lot of vagueness. Here’s a patient who’s diabetic with high blood pressure... If she’s still overweight, there’s an issue about compliance in her lifestyle there, so I find with that category of patients when you’re trying to do lifestyle changes with them, they’re very difficult for them to make... That’s where I get my opinion from... It’s just experience. (U.S., less experienced)

She was asking questions that are intelligent and actually have to do with problems that diabetics have...She has some fear. So that would be a good motivator, and she seems interested in her own care. She says that she wants to keep control of it, so there's no reason to think that she won't, if given a chance. (U.K., more experienced)

It is noteworthy that physicians' interpretations of the same behavioral cues were selectively different. The first physician quoted above drew conclusions about the patient's likely interest in lifestyle change based on a perceived "vague" style of answering questions. The second physician observed that the patient asked questions, which was interpreted as a sign of intelligence and interest in self-care. Across the overall sample, physician comments did not demonstrate a trend towards a certain type of judgment by level of experience, suggesting that experience teaches physicians to pick up on different kinds of social cues, resulting in different conclusions about the patient. Physicians may bring their own subjective approach to each individual patient and to chronic disease management in general.

**Intuition**—Some physicians described their clinical intuition as a gestalt, expressing difficulty in parsing its component parts in elusive comments like, "It's my experience, my feeling for the situation; I just perceive somehow" (Germany, more experienced). However, other physicians described the nature of their clinical intuition in detail, allowing for analysis of the ways in which intuition manifests as a component of experience. We found that intuition played out in practice as guesswork informed by the management of socio-behavioral knowledge. For example, while the following physicians ascribe their impressions to intuition (or a "gut feeling"), their actual reasoning can be described as an impression that the patient is attempting to conceal something based on his/her specific behaviors:

The assessment is partly a visceral thing... There is this striking discrepancy between her cheerfulness and her remarks "it's not that bad", and what she really means, what really is behind it. This discrepancy is something I feel, but it is also reflected in her wording. For me, that's always a signal when somebody makes ambiguous remarks like: "Actually I am quite fine". She immediately withdraws her statement. So there are two dimensions, on the one hand the rational dimension, and on the other hand my gut feeling. (U.K., more experienced)

He dissimulates, only after being asked about it he admits that he has sensory disturbances in his feet. Initially he said that he was fine. That's the intuition I have as a physician, I feel that he paints a false picture of himself. (Germany, more experienced)

These physicians describe a complex mix of affective response and careful interpretation of patient behavior. They note the discrepancy between tone and words spoken and interpret the act of rescinding a statement to mean the patient is withholding information or dissimulating. While the notion of intuition implies a perception of truth independent of any reasoning process, clinical intuition played out as a way in which physicians learned to interpret patient behavior over time and did in fact involve a kind of analytic reasoning. This kind of skill was attainable only through experience; as one physician put it, clinical intuition is "not something you can read in a book... It's a question of experience" (U.K., less experienced).

In tune with Gabbay & le May's "mindlines", or collectively reinforced, internalized, tacit guidelines informed by experience and conversation with medical colleagues (2004), we found that physicians gained their experience in part through their professional interactions:

Happily we are two physicians working here... I say, "It's funny, something is wrong with him". And my colleague says, "You know, you are right. Something is wrong. He simulated, or lied or something is rotten". We nearly always agree. You can't have



that in an office where you work alone, but it's really good. We swap ideas on the patients. (Germany, more experienced)

The heuristics employed by physicians in decision-making have been described previously (Andre, Borgquist, & Molstad, 2003; Elstein, 1999; Gabbay & le May, 2004; Greenhalgh et al., 2008; McDonald, 1996; O'Neill, 1995; Todd & Gigerenzer, 2000). For our purposes, it is important that experience—be it of interactions with patients or colleagues—seems to hone instinct and intuition and help physicians translate behavioral “language” into predictions about potential for lifestyle change.

**Mistakes**—The literature suggests that making mistakes is an important way in which physicians gain their experience (Croskerry, 2003; Institute of Medicine, 2000). However, only a few physicians in our study referenced their mistakes as a critical component of their experience, as in the following example:

At some point you always [have] a sort of crucial experience. You swear to yourself that you'll never make the same mistake again. That's also part of experience, when you gain your experience you make errors, that's learning by error. (U.S., more experienced)

More striking than these comments were the “negative cases”; the vast majority of physicians in our study did *not* mention their mistakes as a part of their experience.

From a theoretical perspective, it is remarkable that so few physicians mentioned the value of learning from error. This finding could be explained in a number of ways: First, physicians may simply focus on what *to do* rather than what *not to do*. Second, while studies have found that physicians are usually unaware of their cognitive errors (Gandhi, Kachalia, Thomas, Puopolo, Yoon, Brennan et al., 2006; Graber, Franklin, & Gordon, 2005), the ambiguities posed by differences between chronic and acute illness care necessarily redefine the notion of error as it relates to diabetes; as such, physicians may not consider sub-optimal disease management resulting in sequelae progressively over time to be a “mistake” (Lutfey & Freese, 2007). Finally, it is possible that physicians are reluctant to draw attention to perceived incompetency.

## II. How experience is used in practice

**Typologies used to assess barriers to good outcomes**—Common among physicians was the belief that clinical experience involved learning to assess social cues through observations of and interactions with patients, and that the memory of past interactions impacted their present-day decision-making. For example, one physician described the process of comparing to past patients:

One averages the experience of others with the same condition...and uses that as a benchmark against which we project the trajectory of any one patient... Obviously there are risk factors... and there are other social and... psychological issues, which would modify their trajectory along that prognostic line. So, intuitively that is kind of synthesized [and]...weight[ed] as to how they would perform against the average. (U.K., more experienced)

This physician describes a complex process of devising “averages” or “benchmarks” over time, used in combination with social and cognitive cues from individual patients to inform clinical decisions. We refer to these “averages”—these impressions of commonly seen biological or behavioral traits—as typologies of knowledge (Greenhalgh et al., 2008). Amongst cognitive psychologists this process has been referred to as “pattern recognition” or “non-analytic reasoning” (Eva, 2005; Schmidt, Norman, & Boshuizen, 1990), but since we found that this process was not entirely “non-analytic”, we prefer the word typologies. We found that

typologies were derived by a mental process of cataloguing past patients with diabetes, illustrated by the following statements:

I think you first of all make yourself a picture of the patient ...and you compare the patient to other patients, experience you have with other patients. (Germany, more experienced)

One always tends to abstract and to put into categories, following one's experience. (Germany, less experienced)

Specific typologies tended to delineate types of patients that physicians had seen over the years with similar behavioral traits, for example patients with diabetes who are motivated versus those who are not, those who are compliant and those who are not, and so on:

I think there are some patients...with the best [intentions] in the world, whatever you do... they don't understand despite you warning them that diabetes represents potential complications later in life. (U.K., less experienced)

Most people do not check their sugars on a regular basis ... I find that recurrently, when people come in, they say they want to make changes... and they leave the office and it's like they weren't even here. No changes occurred in their nutrition or exercise. And they come back six months later, same issue... They want a quick fix, I guess. (U.S., more experienced)

Well, my patient population here I would say is lower/middle class, so they do have some financial issues... They can afford the basic medicines, but anything that has a high co-pay, they take sporadically or they just refuse to take it. (U.S., less experienced)

Various barriers to good diabetes outcomes can be identified in these typologies of patients. The statements above demonstrate financial, cognitive and attitudinal barriers to successful diabetes management. Experience, in the form of typologies, functions to help physicians identify potential problems patients may have with disease management.

We know that physicians like their healthy patients more than their unhealthy ones (Hall, Epstein, DeCiantis, & McNeil, 1993), and that physicians' liking for their patients is positively correlated with better patient health (Hall, Horgan, Stein, & Roter, 2002). It is possible that the use of typologies as a cognitive tool may function to carry over physicians' affective reactions to past patients onto new patients. Groopman warns against allowing prior knowledge to overwhelm a present day decision, and suggests that giving the patient the benefit of the doubt, and "taking them at their word" is one way in which physicians can "think afresh" about new patients or rethink the diagnosis of an old patient (Groopman, 2007). In the context of chronic disease management, relying too heavily on typologies could overwhelm an individual patient's unique potential for behavior change.

Typologies are formed *inductively*, over time, from experience with patients; however, for some physicians, typologies solidified into "accepted rules" or "laws" used to make assumptions *deductively* about patient behavior. Physicians made deductions about potential for management success based on typologies of patient characteristics described previously (Lutfey et al., 2008), such as demographic and physical characteristics, psychological and behavioral traits, as well as perceived social support and interaction style. Based on these typologies, physicians deductively formed "arguments" about the likelihood of compliance and management success, as in the following examples:

Patients who are a bit "simple" have more difficulties understand[ing] what the treatment really is about and implement[ing] the aims of treatment. (Germany, more experienced)

Women tend to be a lot more compliant in my experience with things that you recommend to them than the men do. (U.S., less experienced)

Adipose diabetics are rather non-compliant. (Germany, more experienced) These statements demonstrate the tension between knowledge and assumption in the process of using typologies to inform decisions. These physicians have assumed similar behavior and diabetes management potential of the vignette patient as past patients with similar characteristics (e.g. those who are “adipose”, “simple-minded” or “female”). For these physicians, typologies have hardened into behavioral “rules” that guide their practice decisions. While typologies may be related to prejudice or discrimination, and certainly other studies have shown how certain types of people are treated differently within the medical system (Institute of Medicine, 2001), the issue of treatment disparities associated with patient characteristics is outside the scope of this paper.

## DISCUSSION

In this paper, we use qualitative data from a factorial experiment of clinical decision making for diabetes to analyze the ways in which physicians describe their experience and how it influences their clinical decision making. We found that what physicians actually gain over time to constitute their experience is complex social, behavioral and intuitive wisdom. In practice, experience played out as typologies of past patients used to assess barriers to good outcomes.

Our results show that common measures of physician experience—age and years in clinical practice—are inadequate to the task of fully understanding what experience means to physicians, which skills they acquire over time, and how they implement those skills in their clinical work. While subconscious psychological processes are critical and certainly contribute to some aspects of observed variations in decision making, our findings show evidence of additional, conscious processing that has varied implications for treatment decisions. What physicians actually gain over time is complex social, behavioral and intuitive skills and knowledge about how to “read” social/behavioral cues, intuit signs beyond the patient’s words, and compare the present day patient against similar past patients. These active cognitive reasoning processes are essential components of a forward-looking research agenda in the area of physician experience and decision making.

The specific example of type 2 diabetes used in this study may limit the generalizability of our findings to clinical decision making involving chronic illnesses like metabolic and cardiovascular diseases. Such diseases require long-term management rather than the short-term treatment required for health problems such as infectious disease or injury. Long-term disease management requires the use of social skills and the marshaling of knowledge of the patient’s behavior in a much more involved and complex way than is necessary for referring, prescribing or treating an acute health problem. Further, type 2 diabetes requires more complex management on the part of the physician and more time and attention on the part of the patient than other chronic diseases such as heart disease or obesity. Thus, type 2 diabetes may represent an extreme example of physicians’ reliance on social skills and typologies in their practice.

Our work builds directly on previous efforts by researchers who have tried to understand mixed results wherein physician experience (as measured by age or years) is sometimes positively and sometimes negatively associated with high quality outcomes. For example, Choudhry and colleagues suggest that physicians who have been in practice longer may be less likely to adhere to practice guidelines due to cohort effects whereby older physicians may have less familiarity with disease management guidelines and are less accepting of them (Choudhry et al., 2005). The inadequacy of continuing professional education in medicine has also been suggested as a potential culprit (Grimshaw, Shirran, Thomas, Mowatt, Fraser, Bero et al., 2001). Copious and mercurial guidelines are often a source of frustration for clinicians who perceive them to

be poorly conceived, unhelpful in the task of treating individual patients, and a superficial gauge of quality medical practice (Lutfey & Freese, 2007; Samuels & Ropper, 2005). Our findings add to this list by showing how increased experience translates into increasingly elaborate cognitive schemas for understanding types of patients, their health behaviors, and disease trajectories. Over time, the use of these typologies—while necessary for the practical completion of their everyday work—may contribute to increased cognitive rigidity and decreased ability (and perceived need) to incorporate new information such as guidelines. By comparison, less experienced physicians have a smaller store of these skills and may therefore be more readily able to integrate such information. These processes are not simply subconscious, invisible biases that affect physicians' work without their knowledge, but are actively and consciously shaped, implemented, and refined over time. Furthermore, it is possible that physicians with greater years in practice have seen more iterations of guidelines, potentially increasing their frustration relative to physicians with fewer years in practice. Such frustration may stem from the fact that more experienced physicians already carry the information contained in guidelines in their heads, or from the fact that guidelines simply do not address the non-medical (e.g. social) issues of real and present concern to the physician (Gabbay & le May, 2009).

In our study, the fact that physicians were easily able to make predictions about the diabetes management potential of a mock patient after viewing only a short vignette suggests that physician decision making may be heavily influenced by experience with prior patients, or as has been suggested previously, by heuristics, rules of thumb or “mindlines” (Andre et al., 2002; Gabbay & le May, 2004; Greenhalgh et al., 2008). This conscious use of typologies and deductive reasoning is not captured in measures of physician age or years in clinical practice, yet it may contribute to some of the mixed results reviewed at the outset of our paper. On one hand, physicians gain powerful cognitive tools from experience with past patients, but on the other, they should remain wary of assumptions built into their reasoning that may discount an individual patient's unique potential for behavior change. This type of imbalance between patient-specific information and epistemological priors has been discussed at length in literature on sources of variation in clinical decision making, typically with reference to overreliance on epidemiologic base rates at the expense of patients' presenting symptoms (Balsa & McGuire, 2001; Balsa, McGuire, & Meredith, 2005; Elstein, 1999; Klein, 2005). In the present case, however, the prior that potentially biases decision making is not related to epidemiology or *physiological* patterns of disease, but to *social typologies* about patients and their predicted behavior and abilities. Understanding the content of these typologies may be one key to understanding observed multivalent variations in decision making by physician experience.

The valence of physicians' prognoses in our study varied from optimistic and positive to pessimistic bordering on fatalistic (e.g., “diabetes always wins”) and subjectively varied by physician. We know that physicians experience feelings of frustration and failure associated with diseases that resist therapy (Groopman, 2007) and by extension, with their sickest patients (Hall et al., 1993), as well as with patients who themselves resist therapy (O'Dowd, 1988); it follows that physicians may have a similar reaction to managing patients with chronic disease requiring behavior change, as they will inevitably encounter non-compliance. Frustration associated with behavioral noncompliance may be even stronger than frustration associated with diseases that resist therapy, for in the former scenario, patients have the agency to undertake behavioral change, but physicians do not have the agency to make them do so. Feelings of fatigue or frustration associated with noncompliant past patients may extend to new patients who are similar to past patients through the use of typologies, and to subsequent encounters with past patients. Further research is needed to determine whether physician frustration and other affective responses to chronic disease management are associated with poorer quality of care or outcomes.

More generally, these results build on other studies concerned with the ways in which clinical guidelines systematically overlook the importance of social information in clinical decision making and neglect to supply providers with structured guidance for how to interpret these aspects of their work (Gabbay & le May, 2009; Lutfey et al., 2008; Lutfey & Freese, 2007). While this problem is not specific to physician experience, this may be yet another instance in which clinical guidelines measure one type of (physiological) outcome that may not capture the whole picture. As a result, key components of physician experience (e.g., social typologies or intuition) are not measured by the standard outcomes or clinical guidelines that traditionally define “quality care”. This mismatch between assumptions about what is gained with experience and the reality of physicians’ descriptions may provide further explanation of why “experience” is not consistently associated with higher quality of care; as they are currently devised, clinical guidelines, which take into account process and outcomes measures, do not constitute an appropriate yardstick for measuring physicians’ success in relation to their experience.

Process measures (e.g. sending a patient for a foot or eye exam) function as a more proximate measure of a physician’s success at encouraging patient adherence, while outcome measures (e.g. HbA1c or LDL) may be a more distal reflection of physician success; however, both kinds of measures incompletely appraise physician success in relation to their experience and are systematically biased. Consider the example of a non-adherent “problem patient” in a less- and more-experienced physician’s practice: the “more experienced” physician, who has honed her social skills and ability to interact with difficult patients succeeds in convincing the “problem patient” to show up to his appointments. This “more experienced” physician hopes that, if the patient continues to prioritize his medical appointments, over time he will show improvements in adherence. Meanwhile, the “less experienced” physician fails to “make a connection” with a comparable “problem patient”, and as a result, this patient does not even show up to his appointment. This scenario unjustly results in better outcomes for the “less experienced” physician, whose performance on process and outcome measures of diabetes control elides the scores of the non-adherent patient. Furthermore, patients may have higher satisfaction with physicians who have gained social skills through experience, and increased satisfaction may lead to increased adherence to medical recommendations. Alternatively, these other aspects of experience may lead doctors to be more cost- and time- effective because they are readily able to identify types of cases, even if they do not take specific actions as dictated by guidelines. These examples demonstrate that, if they are to be a true measure of the influence of physician experience on clinical decision making, process measures should be revised to capture the social, behavioral, and intuitive skills gained with experience that help physicians overcome the ongoing challenges of chronic disease management. In short, guideline-based process and outcome measures, accompanied by underdeveloped age- and years-based definitions of experience, may prematurely conclude that more experienced physicians are providing deficient care while overlooking the ways in which they are providing more and better care than their less experienced counterparts.

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## References

- Allen, S. Greater risk seen with older doctors. *Boston Globe*; Boston: 2005.
- Andre M, Borgquist L, Foldevi M, Molstad S. Asking for ‘rules of thumb’: a way to discover tacit knowledge in general practice. *Fam Pract* 2002;19(6):617–622. [PubMed: 12429664]



- Andre M, Borgquist L, Molstad S. Use of rules of thumb in the consultation in general practice--an act of balance between the individual and the general perspective. *Fam Pract* 2003;20(5):514–519. [PubMed: 14507790]
- Balsa AI, McGuire TG. Statistical discrimination in health care. *J Health Econ* 2001;20(6):881–907. [PubMed: 11758051]
- Balsa AI, McGuire TG, Meredith LS. Testing for statistical discrimination in health care. *Health Serv Res* 2005;40(1):227–252. [PubMed: 15663711]
- Benner, PE. From novice to expert: excellence and power in clinical nursing practice. Menlo Park, CA: Addison-Wesley; 1984.
- 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.
- Brooks LR, LeBlanc VR, Norman GR. On the difficulty of noticing obvious features in patient appearance. *Psychol Sci* 2000;11(2):112–117. [PubMed: 11273417]
- Choudhry NK, Fletcher RH, Soumerai SB. Systematic review: the relationship between clinical experience and quality of health care. *Ann Intern Med* 2005;142(4):260–273. [PubMed: 15710959]
- Croskerry P. The importance of cognitive errors in diagnosis and strategies to minimize them. *Acad Med* 2003;78(8):775–780. [PubMed: 12915363]
- Dreyfus, HL.; Dreyfus, SE. A five-stage model of the mental activities involved in directed skill acquisition. Berkeley: University of California at Berkeley; 1980.
- Elstein AS. Heuristics and biases: selected errors in clinical reasoning. *Acad Med* 1999;74(7):791–794. [PubMed: 10429587]
- Ericsson KA. Deliberate practice and the acquisition and maintenance of expert performance in medicine and related domains. *Acad Med* 2004;79(10 Suppl):S70–81. [PubMed: 15383395]
- Ericsson, KA. The development of professional expertise. Cambridge: Cambridge University Press; 2009.
- Eva KW. What every teacher needs to know about clinical reasoning. *Med Educ* 2005;39(1):98–106. [PubMed: 15612906]
- Eva KW, Brooks LR. The under-weighting of implicitly generated diagnoses. *Acad Med* 2000;75(10 Suppl):S81–83. [PubMed: 11031182]
- Farmer SA, Higginson IJ. Chest pain: physician perceptions and decision-making in a London emergency department. *Ann Emerg Med* 2006;48(1):77–85. [PubMed: 16781923]
- Gabbay J, le May A. Evidence based guidelines or collectively constructed “mindlines?” Ethnographic study of knowledge management in primary care. *BMJ* 2004;329(7473):1013. [PubMed: 15514347]
- Gabbay, J.; le May, A. Practice made perfect? Discovering the roles of a community of general practice. In: Le May, A., editor. *Communities of practice in health and social care*. Oxford: Blackwell; 2009.
- Gandhi TK, Kachalia A, Thomas EJ, Puopolo AL, Yoon C, Brennan TA, et al. Missed and delayed diagnoses in the ambulatory setting: a study of closed malpractice claims. *Ann Intern Med* 2006;145(7):488–496. [PubMed: 17015866]
- Geertz, C. *The Interpretation of Cultures*. New York: Basic Books; 1973.
- Graber ML, Franklin N, Gordon R. Diagnostic error in internal medicine. *Arch Intern Med* 2005;165(13):1493–1499. [PubMed: 16009864]
- Greenhalgh J, Flynn R, Long AF, Tyson S. Tacit and encoded knowledge in the use of standardised outcome measures in multidisciplinary team decision making: a case study of in-patient neurorehabilitation. *Soc Sci Med* 2008;67(1):183–194. [PubMed: 18403078]
- Grimshaw JM, Shirran L, Thomas R, Mowatt G, Fraser C, Bero L, et al. Changing provider behavior: an overview of systematic reviews of interventions. *Med Care* 2001;39(8 Suppl 2):II2–45. [PubMed: 11583120]
- Groopman, J. *How Doctors Think*. New York: Houghton Mifflin; 2007.
- Hall JA, Epstein AM, DeCiantis ML, McNeil BJ. Physicians’ liking for their patients: more evidence for the role of affect in medical care. *Health Psychol* 1993;12(2):140–146. [PubMed: 8500441]
- Hall JA, Horgan TG, Stein TS, Roter DL. Liking in the physician--patient relationship. *Patient Educ Couns* 2002;48(1):69–77. [PubMed: 12220752]



- Hatala R, Norman GR, Brooks LR. Impact of a clinical scenario on accuracy of electrocardiogram interpretation. *J Gen Intern Med* 1999;14(2):126–129. [PubMed: 10051784]
- Higgs, J.; Jones, M. *Clinical reasoning in the health professions*. Boston: Butterworth Heinemann; 2000.
- Institute of Medicine. *To err is human: Building a safer health system*. Washington, D.C.: National Academy Press; 2000.
- Smedley, BD.; Stith, AY.; Nelson, AR., editors. *Institute of Medicine. Unequal treatment: confronting racial and ethnic disparities in health care*. Washington, DC: 2001.
- Jacques CH, Jones RL, Houts P, Bauer LC, Dwyer KM, Lynch JC, et al. Reported practice behaviors for medical care of patients with diabetes mellitus by primary-care physicians in Pennsylvania. *Diabetes Care* 1991;14(8):712–717. [PubMed: 1954806]
- Jensen, G.; Resnik, L.; Haddad, A. Expertise and clinical reasoning. In: Higgs, J.; Jones, M.; Loftus, S.; Christensen, N., editors. *Clinical reasoning in the health professions*. Boston: Butterworth Heinemann; 2008.
- Kenny SJ, Smith PJ, Goldschmid MG, Newman JM, Herman WH. Survey of physician practice behaviors related to diabetes mellitus in the U.S. Physician adherence to consensus recommendations. *Diabetes Care* 1993;16(11):1507–1510. [PubMed: 8299440]
- Klein JG. Five pitfalls in decisions about diagnosis and prescribing. *BMJ* 2005;330(7494):781–783. [PubMed: 15802723]
- 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 KE, Campbell SM, Renfrew MR, Marceau LD, Roland M, McKinlay JB. How are patient characteristics relevant for physicians’ clinical decision making in diabetes? An analysis of qualitative results from a cross-national factorial experiment. *Soc Sci Med* 2008;67(9):1391–1399. [PubMed: 18703267]
- Lutfey KE, Freese J. Ambiguities of chronic illness management and challenges to the medical error paradigm. *Soc Sci Med* 2007;64(2):314–325. [PubMed: 17050055]
- May C, Rapley T, Moreira T, Finch T, Heaven B. Technogovernance: evidence, subjectivity, and the clinical encounter in primary care medicine. *Soc Sci Med* 2006;62(4):1022–1030. [PubMed: 16162385]
- McDonald CJ. Medical heuristics: the silent adjudicators of clinical practice. *Ann Intern Med* 1996;124(1 Pt 1):56–62. [PubMed: 7503478]
- McKinlay JB, Gerstenberger E, Marceau LD, Link C, Handy O. Variability in the diagnosis and clinical management of diabetes mellitus by primary care doctors: results of a factorial experiment. 2009
- O’Dowd TC. Five years of heartsink patients in general practice. *BMJ* 1988;297(6647):528–530. [PubMed: 3139188]
- O’Neill ES. Heuristics reasoning in diagnostic judgment. *J Prof Nurs* 1995;11(4):239–245. [PubMed: 7665799]
- Samuels MA, Ropper AH. Clinical experience and quality of health care. *Ann Intern Med* 2005;143(1):84. author reply 86–87; discussion 87. [PubMed: 15998761]
- Schmidt HG, Norman GR, Boshuizen HP. A cognitive perspective on medical expertise: theory and implication. *Acad Med* 1990;65(10):611–621. [PubMed: 2261032]
- Smith A, Goodwin D, Mort M, Pope C. Expertise in practice: an ethnographic study exploring acquisition and use of knowledge in anaesthesia. *Br J Anaesth* 2003;91(3):319–328. [PubMed: 12925468]
- Strauss, A.; Corbin, J. *Basics of qualitative research: Grounded theory procedures and techniques*. Newbury Park, CA: Sage; 1990.
- Szabo RS. Clinical experience and quality of health care. *Ann Intern Med* 2005;143(1):85. author reply 86–87; discussion 87. [PubMed: 15998763]
- Tamayo-Sarver JH, Dawson NV, Hinze SW, Cydulka RK, Wigton RS, Baker DW. Rapid clinical decisions in context: a theoretical model to understand physicians’ decision-making with an application to racial/ethnic treatment disparities. *Research in Sociology of Health Care* 2005;23:183–213.
- Tannenbaum SJ. Knowing and acting in medical practice: the epistemological politics of outcomes research. *Journal of Health Politics, Policy and Law* 1994;19:27–44.

- Todd PM, Gigerenzer G. Precis of simple heuristics that make us smart. *Behav Brain Sci* 2000;23(5): 727–741. discussion 742–780. [PubMed: 11301545]
- von dem Knesebeck O, Bonte M, Siegrist J, Marceau L, Link C, Arber S, et al. Country differences in the diagnosis and management of coronary heart disease - a comparison between the US, the UK and Germany. *BMC Health Serv Res* 2008;8:198. [PubMed: 18823556]

**Table 1**

Characteristics of the study sample

Countries	Sample Total (N=384)	Number Excluded from Analysis <sup>1</sup>	Study Total (n=353)	Physician Gender		Physician Experience Level <sup>2</sup>		Vignette Patient Race/Ethnicity		
				Male	Female	Less	More	White	Black	Hispanic
U.S.A.	192 (50%)	26 (7%)	166 (47%)	85 (51%)	81 (49%)	86 (52%)	80 (48%)	58 (35%)	58 (35%)	50 (30%)
U.K.	128 (33%)	1 (0%)	127 (36%)	64 (50%)	63 (50%)	60 (47%)	67 (53%)	63 (50%)	64 (50%)	0
Germany	64 (17%)	4 (1%)	60 (17%)	32 (53%)	28 (47%)	32 (53%)	28(56%)	60 (100%)	0	0
<b>Total</b>	<b>384</b>	<b>31 (8%)</b>	<b>353</b>	<b>181 (51%)</b>	<b>172 (49%)</b>	<b>178 (50%)</b>	<b>175 (50%)</b>	<b>181 (51%)</b>	<b>122 (36%)</b>	<b>50 (14%)</b>

<sup>1</sup> Interview transcripts were excluded due to technical difficulties or audio recorder error.

<sup>2</sup> "Less experienced" is defined as < 5 years clinical experience and "more experienced" is defined as > 15 years experience (since graduation from medical school in the US, since qualification as a general practitioner in the UK, or since year of licensure in Germany).