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Making decisions in the mechanistic, probabilistic and scientific domains of medicine: a qualitative study of medical practitioners

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Abstract

Rationale, aims and objectives: To find out how medical practitioners perceive the processes of decision-making in the context of the individual patient and to examine the importance of decision- making in the development and identity of medical practitioners throughout their clinical lives and to suggest how these perceptions might influence medical pedagogy.
Method: A qualitative study of medical practitioners of varying ages and specialties, using loosely structured biographical interviews that were read to determine the different ways in which decisions were constructed and recalled and the impact these decisions were felt to have on both the decision-maker and others for whom the decision was salient.
Results: Personal decisions about career choice were important because they shaped the life of the practitioner and made a significant impact on those around them. Professional decisions were made in the domains of the mechanistic and probabilistic scientific world of medicine and in the domain of human relationships, emotions and suffering. There was often a tension between the different domains and the context of the life-world often modified decisions that might logically have been determined by evidence-based medicine and its bio-knowledge.
Conclusions: Decisions had a strong effect on the development of identity within the field of practice. Individuals came to see themselves as doctors who made certain kinds of decisions of immediate relevance to the individual patient. Teaching medical students and graduates how to apply evidence to their decisions and how to use formal computational decision aids may well have a useful place in pedagogy, but the impact of decision-making on the lives of doctors and their individual patients deserves at least equal emphasis.

Keywords

Bio-knowledge, decisions, identity, life-world, personal development

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Introduction

Those with an interest in formal decision analysis have found rich soil in the field of medicine, because so much of medical practice is concerned with decisions and with the exercise of critical judgement [1-16]. Attempts to ensure quality, coherence and standardisation of medical decision-making have led to the development of algorithms for evidence-based practice and decision-aids, or decision trees that would enable clinicians reliably and consistently to select tests or therapies that produce the 'best' outcomes according to the 'best' evidence - the branch with the best score indicating the 'right' decision. While many refinements of this consequentialist approach have been advocated, including ones that incorporate possible regret [17] and values [18,19], it remains unclear how well such decision aids or computational approaches to decision-making accurately capture the decision-making processes of clinicians in their day-to-day work and the meaning of decision-making in the personal and professional lives of the doctors themselves.

In addition to their clear role as outcomes of a deliberative or logical process of reasoning, decisions are also widely recognised as playing a significant part in personal development and enculturation [11,16,20-24]. Teaching students and graduates how to make appropriate decisions using the special knowledge of medical discourse is, therefore, a major part of the telos of medical education. Imparting knowledge and acquiring it are both essential, but deploying it through decision-making is the mark of the 'finished' student, the graduate, the expert. Successful deployment *is* expertise. We talk about the role of '*experience'* as though we absorb its lessons by osmosis [25,26]. But experiential learning is more than a passive process. Decisions mark most experiences – to go there, to take part in that, to stay rather than to go, to yield or resist, even to survive or die. We actively seek the experiences of professional involvement, of aesthetic engagement, of travel, of relationships. We 'take' or even 'seize' opportunities by deciding.

Decisions, therefore, are *critical experiences* [27] , and they shape our sense of self, our personal and professional identities, both in our own eyes and in the eyes of others. They contribute to the intricate complex of our moral selves. There are adventures that seize us – natural disasters, crimes, wars, random events – but even when the ship sinks or the countryside catches fire we must decide.

Decisions are also the nub of *regrets* [1,17,25,26,28-38]. After making a decision with a negative outcome, we may resolve never to make a particular mistake again – we learn from a retrospective regret. Risk aversion is the habit of anticipating and avoiding choices that may lead to future regret – an impossible avoidance at times, but a habit that contributes significantly to a sense of identity [27,39]. As sources of potential regret and as critical experiences, decisions also contribute to our moral development [27,30].

While enormous attention has been devoted to the place that evidence plays in decision-making and the degree to which clinical decisions adhere to accepted scientific and professional norms, much less is known about the ways in which doctors actually perceive the processes involved in making decisions and how decisions shape their personal and professional lives. We report the results of a qualitative study of the values and formative experiences of clinicians of varying ages, backgrounds and specialties, seeking to draw out of their narratives references to their decisions and the ways in which decision-making contributes to their development and identity.

Methods and materials

In this study, medical practitioners associated with the Sydney Medical School (Sydney, Australia) were invited to reflect upon their perceptions of the ways in which values matter in their practices and their educational experiences. Interviews were semi-structured, with participants encouraged to reflect on episodes in their careers that had stayed in their minds because of their moral dimensions. They were also asked to talk about specific issues such as the cost of healthcare, the availability of health services, the adequacy of education provided by the medical curriculum that they had received or were teaching, the place of evidence and research in medical education and practice and the impact of role models and mentors. Interviews were conducted by a medical practitioner and a psychology graduate, either together or separately. All interviews were anonymised with coded numbers used for each participant. Ethical clearances were obtained from the University of Sydney.

Participants included 7 women and 12 men aged from 28 to 76 from 9 different medical specialties. Transcripts were thematically coded for 'decision-making' and a process of dialectical empiricism [40] used to categorise the emergent themes into more abstract concepts, using constant comparison [41-46] and reformulation of research questions and theories [47]. Agreement about themes, codes and categories was reached at regular meetings of the research group. The research group characterised discourse about decisions by reference to processes of choice, whether made about personal life, career or medical practice.

The selected quotes in the Results section give typical examples emerging from the data.

Results

Personal decisions

Entry into medicine

Not surprisingly, the original decision to choose medicine as a career is highly salient - even to those who have been

in practice for many years. P12, a surgeon, is devoted to his clinical practice, but recognises its huge personal demands. He warns against deciding to enter medicine solely because of its perceived intellectual challenge:

P12. It can be very satisfying, but it's a real life. It's not a career, it's more than a career if you want to do it well, and that's where your satisfaction will be. If you want to do it as a job, it's enormously frustrating and time consuming and exhausting, both emotionally and physically. So either you've really got to say 'This is going to engulf my life, and then I will get enjoyment out of the frustrations' and that. But if you did it just for a career because it was hard to get into and it meant I'm bright, then I think it's not. It's a humanity.

P7 has a family background of professional excellence and in a sense his decision to enter medicine was predetermined. But there is another side to his nature, his habitus, determined by his interest in social justice. His decisions and choices, his exempla, all reflect this commitment:

P7. I'm a hereditary doctor – I come from a medical family, and one with quite a long history of being involved in medical fields of one sort or other. So if I go over to PA where I was a resident, I could look on the walls and see my father and my grandfather in the photos of residents and superintendents and things like that… And having an interest in social justice, in equity issues or things like that, also I suppose inclined me towards medicine as a way of being able to put that forward and put my interests forward.

P8, by contrast, defies her family history to do medicine:

P8. No family members at all. My parents both left school at 13, and no one had ever been to university until my older sister said she'd like to be a school teacher. And nobody in my generation, we now have one person in the next generation in medicine, but that's it.

Subsequent career choices

The choice of specialty is also something that participants describe at length. Some, like P14, must find their definitive careers by trial and error:

P14. I passed the physicians' exam, the writtens and the clinicals first go, so that was quite good from my point of view. And then decided to do nuclear medicine and ultrasound, and quickly realised after about the first two weeks, I thought this isn't the right thing for me. So the question was how I extricated myself out of that whilst maintaining some of the skill-base that I actually developed, particularly in ultrasound and imaging…So I continued that for another two years to complete that diploma, and then moved to endocrine training, and did a year of clinical and then the rest of the time was a PhD and completed that advance training. So by about '87 I'd finished all of that…

P5, by contrast, always followed a direct path to a chosen career, recognising a strong motivation to become a surgeon:

P5. Then I was an intern, I went straight into internship, and I knew very early, again, that I wanted to do surgery, I decided that pretty much as a medical student, so I did my surgical primary and my intern year, and followed a pretty routine pathway into surgical training, I did the required number of years, then applied, and more or less got the position straight away, then became a surgical registrar and did my surgical training, and everything just sort of flowed along.

The importance of authenticity features heavily in these accounts. P11 believes that there is a place in medicine for all kinds of personality:

P11. So if you don't deal well with patients, you can go into pathology. If you really want to do caring and sharing stuff, even though psychiatrists aren't very good at it, then go off to do psychiatry. I don't think there is a core personality that makes you a doctor, or more a better doctor.

P6 has found the importance of following genuine inclinations, rather than becoming trapped in a predetermined career path:

P6. So I left [hospital X], under a sort of lot of 'You're ruining your life, your life will be over'. That said, the few people I did consider significant mentors, many of whom were surgeons (and I'd always enjoyed surgery), but I knew that that wasn't my ultimate career destination. But the people who I saw as really good people were the ones who said 'Oh we think you'll be a great rural GP. Go off, have fun'.

Career decisions are also shaped by participants' personal interest in worlds outside traditional clinical practice. P5 and P11 both recognise the existence of life beyond clinical medicine, and the need to acknowledge other desires and ambitions:

P5. The madness is working ridiculous hours, putting work ahead of family, getting up at 5.00am to go rowing, sending emails at 2.00am, just that sort of

thing, thinking 'Why would you do all that when you've got all this other stuff on your plate?'

P11. I guess you're dead for a long time, so it's something I wanted to do. I guess there was a little bit of 'I want to achieve something outside of medicine'. So I finished that. Then I went and worked for the AMA [Australian Medical Association], so that was lobbying and policy development, and that was in Canberra

Professional decisions

In their day-to-day professional lives, clinicians make decisions in two different worlds, the world of bio-knowledge and the life-world. By bio-knowledge, we mean the kind of knowledge that practitioners have of the workings of the body, its anatomy, biochemistry and physiology, together with the probabilistic knowledge of evidence-based medicine (EBM). Knowledge of the life-world refers to the knowledge of human behaviour, relationships, interests and suffering that are essential to the practice of medicine.

Bio-knowledge

Because bio-knowledge represents the science of medicine, the basic knowledge of bodily structure and function and the evidence that supports particular treatments, advocates of EBM naturally advocate its observance and implementation in the course of clinical decision-making. P2 does so with the caveat that the individual patient's welfare is always paramount:

P2. Um, well I think there are two components, the one is improvement in the way evidence is used to develop policy, and I think probably the more important one is individual clinicians' understanding of evidence, and how to use it for decision making. And by evidence, I mean, I think the critical paradigm there is the weighing up of benefits of harms.

Making a clinical decision that proves to be 'wrong' in terms of bio-knowledge is, of course, a dreadful thing to live with, but errors provide evidence, warnings about what not to do in future decisions. Regret is a powerful stimulus to thought and self-evaluation, and regrettable decisions may at times be made into wider teaching:

P15. Things that I've done? The things that I remember are the cases that I've done the wrong thing and it's awful. You just feel sick, just terrible. But I was doing night shift one night and I had a pregnant woman who went into respiratory failure, and I didn't know why, and I'd treated her for the wrong thing and I just felt terrible. Then it was like one of those cases that was put up for grand rounds as an example of what not to do in a night shift, and trying to teach everybody else, but I felt terrible.

Life-world

But doctors also work continually in the 'life-world', the world of values and human relationships, of individual differences, nuances and cultural preferences:

P9. I think the preferences and attitudes and values of the person who is the patient, they are obviously critically important. And I think drawing that EBM picture with the evidence and the person's circumstances and their preferences. I don't know if I've just brainwashed myself into thinking that's actually the way. But I think that's actually quite a good model.

Tensions

Working in two worlds of knowing inevitably brings tensions. EBM (bio-knowledge) tends to produce protocols that express epidemiological evidence about 'best practice', but doctors often find themselves faced by contextual nuances when they deal with individual patients and cannot easily 'generalise' the results of empirical research to the core of individual people. Even those devoted to 'scientific medicine' and evidence-based practice feel the tension:

P9. It's so hard, because at a macro level I think it actually is very scientific. But I think when you look at the individual bits and pieces of it, it can seem much less so because there are so many other considerations on a patient to patient basis

As do those whose first concern is for the human welfare of their patients:

P10. I'm a quality of life believer, so improve the quantity and quality of life. And empathetic, in an evidence-based way. And I suppose also to be responsible for health resources as well. Be conscious of the whole unit, how it fits in with the whole economy and the universe and those sorts of things. It's a very hard general sort of question, isn't it?

Balance is seen to be an important way of resolving these tensions between bio-knowledge and life-world oriented decision-making.

P12. I think a lot of our decisions are not based on scientific evidence, but I mean medicine is a humanity, and it is a balance of science and non-science in a way, and I think you've got to work out what the balance is...So I think you should always know the science, but be able to look at it critically. And the

more you are better at looking at that, the more you realise how poor it is sometimes, and then you can make that decision.

'Kind of doctor'

Decision-making is a powerful way to fashion identity. Doctors identify themselves in part by their pattern of decision-making, as 'that kind of doctor' who makes 'that kind of decision.' P9 identifies himself as conservative and as making his decisions within guidelines:

P9. Yeah, probably I'm reasonably conservative anyway, and also I do spend a substantial amount of time talking about the options with people beforehand, so there probably aren't that many things where I really feel that I've done something that was kind of way out of standard, or against…

P6, by contrast, identifies himself as a person who works away from prevailing views, but does so with due and appropriate thought about context and consequences:

P6. So I've often done things that were counter to what the prevailing view was in terms of what you should do in terms of a medical career and never regretted it. And I think probably because it's not something I did. I'm not a rash person, I don't make rash decisions, so if I do something that seems a bit unusual, I've thought through it.

P19, a younger practitioner, acknowledges that intuition drives his decisions, but that evidence modifies and informs his actual practice because of the kind of person he is:

P19. Naturally I think I am much more of an activist, a more intuition driven person, I impose these rules so I don't get too unsafe with my practice. And being from that spectrum, so I'm better with communication and those kind of things, then personally I need to make sure I set myself rules, 'This is how I'm going to deal with this' so that I run the scientific pathway and don't miss things.

P13 presents himself as a rebel, an innovator, a pioneer. His identity is bound to these perceptions of himself:

P13. And you know that I was the first person to ever do [certain operations] and you probably don't know that I was censured… It didn't stop me... I get a lot of opposition for doing operations for the first time.

Inhibited decisions

Bureaucracy

Bureaucracy powerfully influences modern lives in all their ramifications and medicine is no exception. For most doctors, bureaucracy is an enemy, potential enemy or source of tension over decisions about 'best practice'. Some doctors, however, embrace bureaucracy because they see it as one way to ensure better, more efficient and fairer practice. Decisions about relationship to bureaucracy mark individual doctors as 'conformers' who make the best of the rules of their field of practice, or 'resisters' who argue with, dispute and sometimes contravene, those rules. Others are 'fatalists', who simply try to work within constraints. P5 adopts a certain fatalism toward bureaucracy, believing it too powerful to fight:

P5. I don't have a great optimism that the things that I do, or we all do, make a great deal of difference. We write, we complain, we bring it to the notice of the relevant administrators; it's a perennial problem. So I do feel a certain amount of powerlessness about changing that…

P7 is angrier, more reactive, toward a particular bureaucrat, whom he considers to embody the worst of health governance:

P7. And the CEO lies directly to the people that … about the budgetary independence. He's been extraordinarily destructive, not only to mental health, but to other aspects of the provision of health. And he is a lying, conniving bully.

P14, however, has become a bureaucrat, a senior administrator who would wish to persuade his colleagues to conform:

P14. I think the profession as a whole has become a little bit cleverer in the sense of how to do that. They still rationalise that it's for the patient's benefit. In the overall scheme of things there's very little understanding that this is the tax-payer's dollars we're spending generally, and somehow we're going to have to account for that sooner or later back to the community that funds us.

Our results reveal that for many medical practitioners, decisions are a powerful means to establish identity. They tell of personal decisions that include the choices involved in entering medicine and in fashioning careers. They make professional decisions in their daily work that involve both bio-knowledge and knowledge of the life-world. They acknowledge the tensions that develop between these two domains, and they recognise that each decision contributes to the kind of doctor they become. They talk also about the

ways that bureaucracies inhibit decision making, and they respond to these inhibitions with fatalism, resistance or conformity.

Discussion

Doctors make decisions all their working lives, but they do not seem to use the decision aids and computational techniques of formal decision analysis in their professional work [7,9,48]. Instead, when they speak of their decisions - including those using bio-knowledge - they frame them as insights, examples of moral quandaries, confirmations of professional competence, justifications of personal values and as bearing on the life-world of themselves or others. The life-world decisions they make – about career, family, relationships and 'humane' decisions in practice – are remembered and narrated as critical episodes in a life course.

In medicine, it is frequently impossible to dissociate the domains of life-world and bio-knowledge in the decisions made by doctors every day. Personal life-world considerations influence the scope of use for a doctor's bio-knowledge. Bio-knowledge decisions, in turn influence the life-worlds of others, while their success or failure determine the reputation of the practitioner and his relationships with peers, patients, standards of practice, statutes and so on. There is a constant dialectic between the interlocked parts of a practitioner's life.

We emphasise that we did not specifically ask interviewees how they make clinical decisions (although we recognised that clinical decision-making is central to their roles and practices). We simply asked people about their lives and careers and they spontaneously told us about the kinds of decisions that they made, decisions that they interpreted as exempla of the development and enactment of their professional moral selves. They did this unprompted. And when we asked them for memorable episodes, decisions figured prominently in the stories they told. For these reasons we are much less concerned, in interpreting our findings, with the pre-existent work on medical decision-making, including diagnosis and its errors [3,4,6,9,13,15,18,49,50], than we are with the function of narrative as retrospective meaning-making [51-60].

In understanding the descriptions of decisions provided by our participants we have made use of Bourdieu's concepts of *habitus* and *field* [39]. We construe habitus to mean the person produced by genetic make-up, conditioned by the family and culture in which they develop. It is the result of explicit and explicit education, physical and mental attributes and experiences encountered during development. Field we interpret as the domain in which a person lives and fulfils a role. One person inhabits multiple fields – family, work, recreations, shared interests, and so on. For our purposes, field in this study embraces the domain of medical practice and its specialisations. Field modifies habitus, habitus expresses and modifies field. Doctors bring their habitus into the field of medicine and each acts on and modifies the other. Field also endows a person with *social capital*, a position in the wider community from which to operate. By seeing themselves as entitled to be a particular kind of doctor, our participants confirm the social capital that comes from their membership in the field of medicine

With this interpretive framework in mind, it is not surprising that interviewees should feature decisions and their moral significance in their biographical narratives, because decision-making is a fundamental part of their enactments within their professional field-enactments that are judged by patients and peers alike – and because decisions must reflect choices between the professional and personal spheres. This construction of decisions asks us to share meaning and moral significance with people whose professional identity and standing are based on the 'rightness' and appropriateness of their decisions. Therefore we hear about meaning, context and life-world impact, about regret and its avoidance and not about the formal processes by which decisions are reached.

Decisions are also biographically constructed in reflection as means to demonstrate what sort of doctor the narrator has become, the habitus operating within the field of medicine [39]. P2, for example, has become the kind of person who wants to harness information in order to allow doctors to choose treatments that will avoid harm; P5 is the kind of doctor who accepts with fatalism the constraints of bureaucracy; P7 is a hereditary doctor committed to social justice; P8 has no family tradition of medicine, but chose medicine as her career; P12 is one who guides his decisions by science when he can, while acknowledging that many decisions have their grounding in human relationships and individual judgement; P13 is a polymath, a rebel whose decisions are based in his own faith in his own gifts; P5 and P7 are people who have decided to resist bureaucracy when they can; while P14 seeks to persuade people that bureaucracy leads to greater equity and to rational governance.

What is novel about this work is to find that decisions are such central means for fashioning identity, such exempla of moral position and development, such important validators of 'goodness' in the field of action, such manifests of habitus. A doctor's *reputation*, especially with patients, depends as much on the 'style' of his or her decisions as on their rightness. Work from Japan and the United States among young adults, for example, shows different preferences for decision-making style, but clear recognition of its importance [61]. EBM defines the spectrum of results that doctors should be able to achieve, but has to leave room for the individual skill and wisdom with which a doctors deploys the knowledge-base [62]. There may, for example, be several ways to deal with advanced cancer. One oncologist may decide what is 'best' for certain kinds of patient and advise a milder palliation, while another, also deciding what is 'best', suggests a more aggressive approach and recommends major surgery. Neither is wrong or right, but each will develop a particular reputation, one for consideration and acceptance of limitations,

the other for never giving up. Both may be assessed by peers as good in their individual ways. Those who refer patients to them will do so because of their reputations as particular kinds of doctor. That assessment is based on their decision habits or decision styles.

The identity of a professional is, therefore, inextricably bound to and shaped by decisions. Each time someone recounts a decision, he is saying implicitly 'I chose to do this because I am a person of such a kind.' This implication attaches to decisions in their broadest application, to self-referential decisions regarding career, to professional decisions that reflect the kind of practitioner who makes such decisions and to the decisions of others who are admired or criticised. Decisions in this broad context may reflect intelligence, wisdom, knowledge, empathy, intersubjectivity, intuition and may therefore contain both cognitive and ethical components. They place interviewees culturally, professionally and personally. In ethical terms, decisions are moral not, simply because of the decision made or the outcome(s) achieved, but because they exemplify cardinal virtues of medical practice [63] – prudence, phronesis, courage, temperance, justice, faith, hope, charity.

The stories told by the clinicians in this study reveal that decisions made in clinical practice do not fit neatly with older decision theories [7,9,10,14,16,64]. They are acts of will that attempt to produce the best outcome for everyone involved in the clinical transaction, something that is acknowledged in more recent writings on clinical decision making [2,5,13,50,61,65-70]. The assessment of 'best' seems to rest in a more intuitive appreciation of individual context than in the calculated probabilities of decision trees [71]. The decisions described by the medical practitioners in our study illustrate how clinical practice is characterised not by uniformity or certainty, but by *exceptions* and *uncertainty*, and how clinical decisions inevitably are driven by the desire to provide benefit and avoid regret [17,30,34,38]. While the clinicians in this study did not describe making precise estimates of benefit, cost or regret in the course of their decision-making, each of these factors had a major influence on their decisions. P15 summarises the power of regret about prior wrong decisions when she reflects that 'You just feel sick, just terrible' at the realisation of a significant error.

Decisions are essential components of identity, both as habitus and as field [39]. Decisions construct identity in dialectics between life-world and bio-knowledge, conformity and resistance, boldness and restraint, perceptions of role-models and of villains, individuality and collegiality – between apparent dichotomies that repeatedly ask people to place themselves somewhere along a scale between extremes. Decisions have moral attributes. They are sometimes presented as the result of fundamental dispositions of character [72], and sometimes as acts of will [73]. There are many attributes and acquisitions that contribute to assessments of a person's reputation and to the trust that others are prepared to give her, but habits of decision are vital to the reputation of and the trust invested in a medical practitioner.

While this study is confined to the perceptions and experiences of clinicians associated with one medical school in Sydney, Australia, we suggest that the insights it provides are likely to have broad resonance with other medical centres and almost certainly for other professions. Decisions that influence other people's lives and welfare cannot be reduced solely to decision trees, even those that allow for values [19], because decisions so profoundly affect the decision-makers and their evolving identity, as well as the present and future of decision-recipients. Decisions have immediate effects, but their delayed ones require time, further experience and reflection that cannot be captured by any simple algorithm. Teaching about decisions in medicine at least needs to recognise, acknowledge and make manifest the life-shaping impacts of decision-making.

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