

Doctors' perspectives on their innovations in daily practice: implications for knowledge building in health care

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CONTEXT When individuals adapt their practice in order to solve novel or unexpected problems of practice, they are creating new knowledge. This form of innovation development is understood as a core competency of adaptive expertise and the basis for knowledge building community practice. However, little is known about the ways in which this knowledge, produced through daily, innovative problem solving, is developed, identified and shared by health care professionals.

METHODS Following this line of inquiry, we conducted semi-structured interviews with a saturation sample of 15 clinical faculty staff at the University of Toronto.

RESULTS A grounded theory analysis of the results showed that our participants held the view that innovation was focused on outcomes, developed through research practice and diffused for adoption in the broader community. As a result, their own individual improvements to daily practice were excluded from this view of innovation. Furthermore, their perceptions of innovation limited participants' engagement in the sort of collaborative process that is central to the practice of knowledge-building communities.

CONCLUSIONS This research demonstrated that thinking about innovation and innovative practice must be changed in order to foster the development of knowledge-building communities in medicine.

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INTRODUCTION

The regular development of new knowledge is a core value in any profession that seeks to ensure that its standards of practice continuously evolve and improve. This is unquestionably true in medicine, where optimal patient care depends on sustained efforts by health care professionals to adapt and advance their practice. In recent years, within the prevailing culture of evidence-based medicine, the process of improving practice has tended to focus on the adoption of innovations developed through systematic, research-based inquiry. These innovations are produced by researchers and, through a process of knowledge translation, made available for use by practitioners in their daily work. In this model, the production of new knowledge is dissociated from practitioners' daily activities and isolated as its own process.

The effective translation of innovations into practice unquestionably plays a vital role in health care. However, the emphasis on externally produced and institutionally sanctioned innovations has marginalised the perceived value and impact of knowledge produced by practitioners in the course of their daily practice, particularly with respect to its perceived value for the broader health care community. Knowledge production in practice takes place in health care when practitioners work to adapt their practice to the challenges of their environment, which include problems pertaining to diagnosis and patient management, and issues of efficiency, organisation and collaboration. By addressing these problems of practice, practitioners are, in effect, creating knowledge and

Overview

What is already known on this subject

The regular development of innovations is a core value in medical practice.

What this study adds

Participants espoused a view of innovation that resulted in a critical dissociation in doctor practice: practitioners were engaged in innovative practice but simultaneously failed to value their ideas as a vital part of innovation in health care practice.

Suggestions for further research

This area might be investigated further by systematic research on the educational, organisational, and cultural factors that shape the dominant view of innovation in health care, along with examination of innovative practice across levels of expertise within the health professions and within and between inter-professional health care teams.

innovating. This process of knowledge production is deeply embedded in local practice and is therefore not the focus of knowledge translation discourse or formal research-based inquiry. Nonetheless, the importance and value of knowledge production embedded in practice cannot be underestimated. By fostering a workplace where knowledge produced in daily practice is an object of reflection and collaborative idea improvement, we could potentially generate solutions to many of the problems that occur regularly in health care practice.¹ Ignoring or devaluing the potential impact of the knowledge that practitioners develop in their daily work represents a missed opportunity for both individual and community practice improvement. Indeed, this form of knowledge production has been conceptualised as an integral competency of adaptive expertise and as the foundation of knowledge-building communities.

Adaptive expertise

Adaptive expertise is best characterised as an approach to practice that effectively balances the efficiency and innovation dimensions of problem solving.² In this model of expertise, an efficiency orientation is understood as a problem-solving approach that relies on the

effective and efficient application of past knowledge and experience to problems of practice. Experts who rely on this approach to problem solving are characterised as 'routine experts'. Routine experts excel in familiar, routinised tasks; however, their performance suffers in situations where past knowledge is inadequate or inappropriate for a particular problem. In these instances, adaptive experts are able to adopt an innovation orientation to their practice, essentially using problem solving as an opportunity to innovate, thereby creating new knowledge and potentially improving their future practice.³ In this way, knowledge is produced as an activity of practice and innovation is understood as a process embedded in daily practice rather than solely as the application of new knowledge through a process of knowledge translation.

Knowledge building

Adaptive experts evolve and improve their own practice through a process of innovative problem solving. At the community level, groups evolve and improve their practice through a process of knowledge building. Knowledge building is the social activity by which communities create new knowledge through a process of collaborative, iterative idea improvement. In a knowledge-building framework, innovation is an ongoing, dynamic interaction between individuals and their social context,^{4,5} whereby ideas are made available to others and are iteratively transformed and improved through the sharing of a variety of perspectives. In this way, existing ideas and practices are transformed and developed.⁴ By contrast with models of learning, knowledge building does not focus solely on individuals' acquisition of knowledge⁶ or on the ways in which knowledge is embedded in practice communities.^{7,8} Instead knowledge-building theory emphasises the 'collaborative mastery of culturally new practices and knowledge'⁹ and presents knowledge as public, improvable ideas that can be evolved by members of the community.

Current research

Despite the importance of innovative practice for adaptive expertise and knowledge building in health care, very little is known about the ways in which knowledge is created through daily practice and identified and shared by health care professionals for the purpose of knowledge building. The purpose of this research, therefore, was three-fold. Firstly, we sought to understand more about how doctors defined 'being innovative', particularly in relation to their own efforts to evolve their practice. Secondly, we investi-

gated how these views of innovative practice affected their efforts to share their ideas with others. Finally, we sought to understand the perceived factors affecting the likeliness of doctors to engage in innovative practice and identify and value their own new knowledge.

METHODS

Setting

The research was conducted over a 10-month period at the University of Toronto Faculty of Medicine and its affiliated teaching hospitals.

Participants

Our participants were licensed doctors who hold joint appointments in a clinical department in the Faculty of Medicine at the University of Toronto and at an affiliated teaching hospital ('clinical faculty' [CF]). In addition to their clinical responsibilities, CF have significant involvement in academic work, which may include research, teaching, or administrative responsibilities to varying degrees. For this research, the sample was limited to CF who were internists and whose practice was primarily clinical rather than research-focused or administrative. The sample was narrowed in this way for two reasons. Firstly, our goal was to examine 'daily innovative practice', by which we mean the innovations that develop as a product of daily clinical work. We were not looking for examples of innovation that stemmed from deliberate research practice, where innovation is a primary, explicit goal. Secondly, for this first study we sought a fairly homogenous sample as a starting point for our ongoing research programme. Once ethical approval of the study had been obtained, prospective participants were recruited via e-mail in May 2005, September 2005 and January 2006. Saturation sampling¹⁰ resulted in 15 participants taking part in the study.

Data collection

In order to inform our evolving model of innovative practice in medicine, we employed grounded theory methodology for data collection and analysis. Participants were asked to participate in a 45–60-minute semi-structured interview. In line with the principles of grounded theory, data collection continued until theme saturation was reached.¹⁰ The interview protocol was developed from a literature review of innovation in organisations, piloted and adjusted according to the pilot participants' feedback. Open-ended questions included questions about participants'

perceptions of innovation (e.g. 'Can you tell me what it means to you to be innovative?'), their own daily innovative practice (e.g. 'Can you describe an example of an innovation in your daily practice?'), their knowledge-sharing patterns (e.g. 'Do you share your innovations with your colleagues?') and factors impacting their ability to engage in innovative practice (e.g. 'Are there factors that you feel influence your ability to be innovative at work?' 'What changes would increase the potential for you and your colleagues to be innovative?'). Interviews were audiotaped, transcribed and entered into NVivo qualitative data analysis software (QSR International Pty Ltd, Doncaster, VIC, Australia) to facilitate the analysis.

Data analysis

A grounded theory analysis of the transcripts provided the framework for the reporting of this research. We engaged in a continuous matching of existing or emerging theories against the data being generated. Preliminary categories were identified during data collection through constant comparative analysis.¹¹ During data collection, the researchers sought to purposefully investigate emerging themes and identify negative examples of the initial structure in order to ensure representativeness of the resulting categories. During the final data analysis, a single researcher read the interview transcripts and identified the coding structure through the iterative relating and grouping of codes. The development of codes at each level of analysis was documented to enhance confirmability.¹⁰

RESULTS

Our research sought to understand how individual practitioners viewed their role in the development and practice of knowledge-building communities. The results showed that as adaptive experts, our participants were consistently engaged in a process of improving and changing their practice in response to practice challenges:

'Not a day goes by where I'm not re-evaluating the way I do things and looking for ways to do a better job.' (CF 10)

Doctors advanced their practice in a number of different areas of their work, including efforts to address patient education challenges:

'So much of what I do is patient-centred care looking at education, I decided that I could reach out to a broader audience by creating a website...' (CF 1)

and working to develop tools to improve the management of their practice:

‘We designed a little palm pilot-based tool to keep track of patients that we saw and procedures that were done to help us submit back to payers.’ (CF 3)

However, although participants were actively engaged in adapting their practice to daily challenges, they did not interpret these activities as innovative and, consequently, did not see their value beyond the scope of their own practice. Instead, they emphasised innovation being as the outcome of an extraneous, research-based process. Thus they characterised themselves not as knowledge *producers*, but as knowledge *users*. This understanding of innovation and the resulting characterisation of themselves limited participants’ engagement in the sort of collaborative knowledge creation process that is central to the practice of knowledge-building communities. Four overlapping themes in our data illustrated the contrasts between our participants’ understanding of innovation and the model of innovation inherent in models of adaptive expertise and knowledge building.

Innovation as an outcome

According to models of adaptive expertise and knowledge building, the development of new ideas through practice, however small, is a crucial component of innovative practice at both individual and group levels. However, our participants focused on innovation solely as a large-scale outcome:

‘I think that if you take a look at what’s really considered innovative, it’s probably people that came up with the initial discoveries; the light bulb, the steam engine. That’s real innovation.’ (CF 3)

Accordingly, they measured the innovativeness of their daily practice against this ideal:

‘I think that those little things are just so minor, it’s kind of just what you do on the side to make things work a little more smoothly... it’s not really that innovative.’ (CF 6)

Participants did not consistently produce large-scale innovations during the course of their daily practice and this shaped their view of themselves as knowledge users rather than knowledge producers:

‘I’m not sure that we would really be considered to be innovators. I think the important thing to realise is we’re just taking ideas and building on them.’ (CF 3)

In their role as knowledge users, participants commented that innovation in daily clinical practice was about incorporating innovation and new knowledge from the literature into practice:

‘What it means is to follow the literature and look for ways to improve patient care.’ (CF 11)

Innovation as an individual trait

Although knowledge-building theory views innovation as engagement in an ongoing, collaborative process, our participants consistently thought of being innovative as an individual ‘trait’:

‘Well I’m personally an innovator by nature. I like to think outside the box and use my experience to try different things...’ (CF 10)

or ‘ability’:

‘I think it requires the ability to think of things novelly [sic] and to get new approaches and new ideas.’ (CF 12)

The view of innovation articulated by our participants returns us to the individualist, ‘trait approach’ to innovation,¹² which proposes that certain individuals have ‘personal qualities that predispose them to innovative behaviour’.¹⁰ Our participants focused solely on their individual competency to improve their own practice:

‘Innovation is about using whatever knowledge and skills I have to do what I need to do in as little time as possible.’ (CF 4)

Sharing as ‘diffusion of innovative outcomes’

Knowledge-building theory emphasises the importance of collaborative knowledge building, of taking ideas and new knowledge and sharing them with a broader community for the purpose of idea improvement. By contrast, our participants espoused a ‘diffusion model’ of knowledge sharing, emphasising the adoption of innovations and diminishing the value of sharing improvable ideas:

‘You know, sometimes I tell people what I do, but do they adopt that process? I have no idea.’ (CF 10)

Moreover, participants often felt that their daily innovations were not ‘worthy’ of being shared with colleagues:

'I'd probably be embarrassed talking about it to anyone else. Because they've probably done way more than that. I don't think I've done anything worthy of sharing, to be honest.' (CF 6)

Compartmentalised innovative practice

Within a knowledge-building framework, innovation is a process embedded in the execution of daily practice: knowledge is created as individuals engage in daily practice, adapt their practice to address challenges and inconsistencies, and share their knowledge and ideas with a broader community of practitioners. However, our participants saw innovation as a compartmentalised, 'extra' activity. Participants felt that their view of innovation was consistent with their professional culture:

'I think the culture is, is that you are, again, not meant to be innovative in your clinical work as much as you're meant to be innovative in your research.' (CF 9)

As a result, they made a distinction between their roles as innovators in clinical practice and comparative roles in other areas of their work:

'I don't know if I am innovative in my practice, actually. Do I create new things or new ways of doing things? I don't know that I do, clinically, as much as I do in the research side.' (CF 6)

Participants also felt that they had to choose between using the time they had available either to be innovative or to fulfil other work responsibilities:

'I have all these great ideas and stuff I want to do but I find that it's difficult with administrative and patient commitments.' (CF 7)

DISCUSSION

Throughout this study, our participants espoused a view that innovative activity is solely focused on outcomes, developed through research practice and diffused for adoption in the broader community. As a result, their own individual efforts to improve their personal daily practice were explicitly excluded from this view of innovation. These findings demonstrate a critical dissociation in doctor practice: practitioners are engaged in producing knowledge through innovative daily practice, but they simultaneously fail to value this knowledge as a vital part of a collaborative innovation process. It was apparent, therefore, that

participants' view of innovation was inconsistent with the concept of innovation as embodied in knowledge-building theory. Rather, their construction of innovation was highly consistent with the 'top-down' model implied by the knowledge translation approach and they saw themselves as end-users of innovations in the knowledge diffusion pathway. There are two related implications of the knowledge translation construction of innovation that are particularly relevant to our results: one concerns the view of knowledge production as separate from daily practice and the other refers to the perceived dichotomy between knowledge users and knowledge producers.

Firstly, consistent with the knowledge translation construction of innovation, our participants seemed to view knowledge production as a research-based activity that was necessarily separate from, and took place in addition to, daily practice. As an example, participants commented frequently that time was a barrier to their ability to be innovative, indicating that they lacked the time as individuals to be able to engage in the research and development process that would result in the production of innovations. The perceived dichotomy between practice and innovation, reflected in our participants' belief about where and how knowledge is produced, is captured in Bereiter's distinction between knowledge that is *implicit in* work and knowledge that is the *product of* work.¹³ Although it is true that as practitioners enact their work routines, they are utilising knowledge to meet their clinical goals, it is also true that as they adapt their practice in new ways to meet novel challenges, they are generating new knowledge as a product of that work. This knowledge is not the result of compartmentalised research practice aimed at knowledge production, but, rather, is deeply embedded in the knowledge producer's daily practice. The knowledge produced through this embedded process of adapting practice differs from 'new' knowledge as envisioned in the knowledge translation framework in that it is not to be considered a finished 'product'. Rather it is best understood as an improvable idea. Accordingly, from a knowledge-building perspective, the purpose of sharing such knowledge is not to encourage widespread, uniform adoption, but to make these improvable ideas available to the larger community for adaptation and improvement.

Secondly, related to participants' beliefs about where and how knowledge is produced is the perceived dichotomy of knowledge users and knowledge producers. Our participants saw themselves solely as knowledge users and viewed innovations as external

products and procedures that they were expected to incorporate into their daily work. This was clearly not the case in that they were continually working to adapt their practice to address new challenges, thereby generating new knowledge and ideas for improving the daily practice of health care. Their view of themselves simply as knowledge users limited the potential of these daily innovations: because the practitioners themselves did not value these innovations as having potential impact beyond their own practice, they did not share them with others. This not only limited others' ability to take advantage of these innovations, but also did not allow others to iteratively improve on these ideas. Because individuals were constrained to evolving each innovation by themselves, each idea was limited by the individual's knowledge and experiences. In short, because of their model of innovation, our participants excluded themselves from participating in a knowledge-building community¹⁴ and therefore they lacked the knowledge and support to identify, value and invoke collaborative, iterative knowledge creation processes.

IMPLICATIONS

When knowledge production is understood as a distributed process that is embedded in practice and shared for the purposes of iterative improvement, individuals can legitimately participate in the collaborative practice of innovation without having to carve out separate segments of time that are specifically dedicated to 'innovation'. Daily adaptations produced by practitioners can be viewed as *improvable ideas*¹⁵ and systematically subjected to a community effort to evaluate, elaborate and refine them. As a result, these currently idiosyncratic innovations could potentially serve as a foundation for communities of practitioners to collectively engage in a continual process of improving practice. The first step in this process is for practitioners to recognise and value the important role that their daily adaptations can play in the embedded, collaborative process of innovation. To this end, practitioners must begin to see themselves as knowledge producers as well as knowledge users. If daily practice is to be systematically improved, workers must view their practice as a source of knowledge and the basis for knowledge creation, not solely as a platform on which to apply new knowledge. If we maintain our current, exclusive emphasis on the production of sanctioned innovations and their translation into practice, daily adaptations will be neither systematically evaluated nor developed in a productive manner for the improvement of health care practice.

CONCLUSIONS

This research demonstrated that in order to foster the development of knowledge-building communities in medicine, we need to change our thinking about innovation and innovative practice. Thus far, innovation in medicine has relied on a knowledge translation model of innovation, emphasising the effective and efficient incorporation of new research into daily practice. This exclusive emphasis has led to the devaluing of ideas generated through the daily innovative practice of health care workers for the purpose of practice-based, collaborative knowledge building. However, daily adaptations are an important part of expert health care practice and thus we need to foster their development in order to systematically transform them into constructive community practice improvements.

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