



Managing Knowledge in UK Primary Healthcare: Some Mixed Messages

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ABSTRACT

Knowledge is increasingly recognised as a vital resource in the development of successful organisations. Much of the published work in this area has arisen in a business and management context, but applies equally to many customer-driven industries, including the caring professions. In particular, dissemination of knowledge leading to improved treatment and prevention of disease is an integral element of the primary healthcare sector. Arguably, advances in information and communications systems and technology have transformed the ability of organisations to manage and create such knowledge. There is increasing evidence, however, that many organisations, including those involved in primary health care, have yet to fully embrace and exploit these developments effectively.

This paper, utilising research based on a national survey of general practitioners throughout England, identifies potential barriers inhibiting knowledge creation and management. More specifically, this research explores how, drawing upon developments surfacing in business, the primary health care sector might address these shortcomings.

The paper concludes that while there has been significant investment in new technologies within the sector, without similar investment in developing the organisational context of primary healthcare providers, the potential to develop and manage knowledge leading to improved performance could remain largely under exploited.

INTRODUCTION

The creation of knowledge has been an integral feature of society's development. In particular, advances in science and technology have played a pivotal role in shaping the modern world. While such progress has produced largely beneficial effects and presented opportunities for further development, an expanding knowledge base also creates new challenges.

More specifically, medical research has produced new and more effective approaches to the treatment and prevention of disease, as well as improvements in patient care. Indeed, it has been estimated that the stock of medical knowledge doubles every 19 years (Wyatt, 1999). Such rapid advances pose problems for healthcare professionals in terms of information and knowledge overload. Advances in technology have, to a large extent, assisted many organisations in managing knowledge more effectively, but the creation, application and dissemination of medical knowledge must also be viewed in the context of the treatment of individual patients (McWhinney, 1996). Furthermore, within the UK, the introduction of national standards and guidelines, together with the introduction of clinical governance, has transformed the institutional environment in which primary healthcare takes place (DH, 1997).

Against this backdrop, this paper discusses the findings of a UK based survey of general practices and gives some tentative indications of the status of knowledge creation, transfer and management within the primary healthcare sector, and suggests that the socio-technological context of knowledge will assume an increasingly important role in facilitating effective knowledge management.

LEARNING AND KNOWLEDGE MANAGEMENT

Knowledge is both dynamic and context specific, dependent on time and environment, but essentially a shared collection of principles, facts, skills, and rules that inform decision-making, behaviour

and actions, and created through social interactions between individuals and organisations (Stonehouse and Pemberton, 1999; Nonaka *et al.*, 2000). Knowledge management is therefore primarily concerned with leveraging existing knowledge within an organisation to create new knowledge that benefits customers and enhances organisational performance (Macdonald, 1999; Pemberton & Stonehouse, 2000).

Explicit knowledge is generally agreed, objective and context free, the meaning of which is clearly stated, and which can readily be recorded and stored. *Implicit*, or *tacit*, knowledge is context specific, referring to uncoded and intangible knowledge of individuals, but typically difficult to record and store. The interaction between explicit and tacit knowledge is a characteristic of knowledge management in a practical setting.

The role of technology in facilitating knowledge creation, management and transfer should also be acknowledged, acting as an effective platform for dealing with explicit knowledge, but far less successful in handling and managing tacit knowledge. It is for this reason that there is now a growing awareness of the importance of the social context in which knowledge is managed and its role in marrying implicit and explicit knowledge to enhance organisational performance (Nonaka *et al.*, 2000; Pemberton and Stonehouse, 2000).

Knowledge is also inextricably linked to learning, whether individual or organisational. Within an organisation, individual learning can be accelerated by information and knowledge sharing, openness, questioning, debate and discussion designed to improve existing practices. Organisational learning, the subject of much of Argyris' and Senge's work, is ultimately dependent upon individual learning and the extent to which the latter is fostered, shared and co-ordinated throughout the organisation (Senge, 1990; Argyris, 1992).

The *organisational context* is also critical in this process and embraces leadership, culture, structure, infrastructure and communications (Stonehouse and Pemberton, 1999). Its presence supports and enhances the learning of individuals and groups, leading to effective knowledge management.

An understanding of the link between organisational learning and knowledge management can also be explained by reference to knowledge 'facilitators' and 'inhibitors' (Stonehouse *et al.*, 2001). The former, the means by which new knowledge is created through individual and organisational learning, is governed by the context or social architecture of the organisation. The latter refer to barriers to knowledge creation and management such as lack of expertise, a deficient infrastructure or even poor individual technical skills. The existence of an appropriate organisational context ultimately supports individual and organisational learning by developing knowledge facilitators and eliminating knowledge inhibitors.

THE PRIMARY HEALTH CARE PERSPECTIVE

The emergence of knowledge management as an issue within organisations can be seen across a range of sectors and industries. While there are several reasons for this, developments in information and communications technology have been at a catalyst in the process. This is certainly true of the UK's National Health Service (NHS), which together with profound changes relating to the structure and culture of those organisations operating within it, has seen the Government's aim of modernising the NHS taking shape (DH, 1997).

Historically, the NHS has relied upon the training, skills and professionalism of general practitioners (GPs) to deliver good quality services in a professional manner. The focus, however, now centres on quality of clinical care, improved performance and accountability monitored through performance indicators and clinical audit.

The success of these developments relies strongly on utilising information and expertise to create relevant knowledge designed to aid clinical decision-making, as well as improving the management of primary care. Developing a conducive culture has also been identified as a vital ingredient of managing the process (van Zwanenberg and Harrison, 2000).

Other structural, environmental and socio-cultural changes are emerging within the NHS, not least a fundamental change in the relationship between patient and doctor. Previously passive, many patients are now empowered, actively engaging in dialogue with their GPs using knowledge acquired from the Internet, leading to a patient-oriented (as opposed to a professionally-oriented) service (Irvine & Haman, 2001).

There is also a shift towards collaborative partnerships between primary care, social services, secondary care and education to provide a 'seamless' and integrated approach to health and social care relying heavily on the sharing of information and knowledge across organisational and professional boundaries (Irvine & Haman, 2001).

RESEARCH APPROACH

Methodology

The remainder of this paper is devoted to research undertaken by SCHIN (Sowerby Centre for Health Informatics at Newcastle) in March 2000, designed to shed light on the extent to which GPs have embraced the notions of organisational learning and knowledge management in their practices. In gathering such data, a greater understanding and insight of the issues of relevance are identified, allowing more informed discussion of the likely future developments in this area.

The use of a questionnaire to collect data pertaining to a number of issues was deployed, primarily using closed response questions and with a number of themes explored including:

- General details of the practice
- Extent of use of clinical computer systems
- Types of system in use
- Use and application of systems
- Extent and usefulness of the Internet
- Sources of medical information
- Learning and cultural environment
- Knowledge management

(Not all these issues are relevant to this paper and more detailed analysis of technological developments in primary healthcare has been discussed in Pemberton *et al.* (2001)).

The questionnaire was distributed to a random sample representing 10% of all GP practices throughout England. Each questionnaire was sent to a randomly chosen GP within the selected practice yielding one questionnaire per practice. In total, 896 questionnaires were distributed between February - March 2000. After a follow-up mailing in May 2000, 488 usable questionnaires were returned, representing a 54% response rate. It should be noted that self-selection bias was potentially a problem here, but comparative analysis with earlier surveys (DH, 1993; SCHIN, 1998) suggests satisfactory randomisation.

The data were analysed using SPSS. When examining associations between variables, a non-parametric rank correlation test has been performed. All significant associations are reported based on a significance level of less than 1%, the null hypothesis based on the premise of independence of the two factors/variables being examined. An indication of the sample size on which the test is performed is also given.

Findings and Discussion

The research provides a number of valuable insights into the current status of knowledge-based practice in primary healthcare.

The vast majority of primary healthcare practices possess much of the technology required to support effective knowledge management. Indeed, only 19 of the 488 practices surveyed do not have a clinical computer system corresponding to only 4% of respondents. Of those having access, 94% of respondents report that the clinical computer system is available to all GPs from their consulting rooms.

Table 1 gives a comparative summary of the percentage of practices using their systems for various applications with the two previous surveys.

While there are some exceptions, the results suggest that, over the seven years covered by the three surveys, an increasing trend towards computerising many of the routine tasks performed by GPs is now apparent. This is consistent with the relative ease with which explicit knowledge can be captured and recorded, a category that many of the routine tasks fall into. The more technical and knowledge-based tasks using clinical systems during consultations, both viewing and viewing/recording, show decreases from the previous SCHIN survey. While there is no firm evidence to suggest why this should be so, it is worth noting that respondents have an average of nineteen years of clinical experience. This corresponds to a significant amount of tacit knowledge which combined with GPs' variable technical skills and, in some cases, ambivalence towards technology (Pemberton *et al.*, 2001), may go some way to explaining these results.

Table 1: Comparative usage of tasks

TASK	SCHIN 2000 % (n = 469)	SCHIN 1996 % (n = 778)	DH 1993 % (n = 5282)
Repeat Prescribing	99.8	93	94
Acute Prescribing	90.6	73	58
Use during consultation (viewing only clinical data)	47.4	77	63
Use during consultation (rec. & view clinical data)	73.4	81	66
Data collection for annual report	89.3	76	80
Referral letters	61.8	49	51
Appointments	65.0	36	-
Searches/audits	94.2	66	68
Maintenance of practice formulary	40.3	22	-
E-mails	30.0	12	-

In terms of access to the Internet, an even split is recorded with 49% reporting access (typically via NHSnet¹), with 48% not having such a facility. Lack of Internet access represents a major barrier or inhibitor in respect of a GP's ability to utilise on-line medical knowledge. A mixture of opinion surrounds the Internet's usefulness, with over half (55%) of respondents feeling it is invaluable or of some use. Others are less convinced, with a quarter of respondents finding little use for it. Attitudes towards Internet usefulness is strongly correlated with the perceived level of computing skills within a practice, with a greater degree of usefulness associated with practices reporting higher proficiency of computer skills ($n = 222$). Larger practices, assessed in terms of either the number of full-time GPs or list size, also appear more likely to have Internet access, with strong associations identified in both cases ($n=465$ and $n=470$ respectively). More specifically, GPs in practices without Internet access appear to have little perception of its potential usefulness. In effect, lack of Internet access and perceived deficiencies in computer skills represent potentially important barriers to the development of effective organisational learning and knowledge management in primary healthcare practice.

Respondents were also asked to indicate, from a list of options, the facilities used to aid decision-making within the practice. Table 2 shows the frequency of use of these aids, arranged in descending order of citation (+ indicates computer-based aids).

Table 2: Use of decision-making aids

Decision-making aid	% (n=488)
Computerised drug interactions/contra-indications ⁺	60.9
British National Formulary	49.6
Drug and Therapeutics Bulletin	35.7
Paper journals	30.9
Computerised protocols ⁺	29.1
Work colleagues	23.6
Medline searching ⁺	20.5
Computerised clinical systems ⁺	20.1
Internet sites ⁺	18.4
Electronic journals ⁺	15.4
MIQUEST ⁺	4.7
CAPSULE ⁺	0.2

A mixture of computer- and document-based approaches are clearly adopted by GPs and while it is encouraging that computerised drug interactions/contra-indications are the most commonly used decision aid within GP practices, documents and human input still figure prominently. Where Internet access is present, there is naturally a trend towards utilising computer-based applications with computerised drug interactions, medline, e-journals and Internet sites all showing strong correlations ($n=476$). The same associations are identified in relation to the usefulness of the Internet ($n=223$). The use of e-mails is, unsurprisingly, strongly linked to the latter ($n=223$).

Conversely, where there is no access to the Internet, distinct patterns emerge, with some of the strongest associations identified between the use of paper journals, reliance on work colleagues, the Drug and Therapeutics Bulletin and British National Formulary. All pair wise associations are highly significant ($n=223$).

The capability to acquire new knowledge is greatly enhanced by the presence of technology, be it clinical computer systems or access to the Internet (or other external links). The above results appear to suggest, however, that a two-tier primary health care sector might be emerging, with those practices having higher level computer skills and access to Internet, better placed to develop their knowledge systems in comparison to those without.

When examining the culture in which GPs operate, a number of observations can be made. Over 80% of respondents claim to have insufficient protected time to learn and develop new knowledge during their working week and nearly a third (31%) feel frustrated by the

failure of colleagues to communicate their newly acquired skills and knowledge to others in the practice, despite 82% of respondents reporting the relative openness and approachability of other practice colleagues. Indeed, only 29% of respondents indicate that practice meetings to discuss clinical issues take place on a regular basis. The important issue of tacit knowledge transfer, a critical means of improving performance, is clearly inhibited under these circumstances. On a more positive note, the potential for organisational learning exists, with 60% of respondents stating that practice meetings are flexible and allow new issues to be explored.

On the issue of technology, over 90% of respondents do not refer to their clinical computer system as a guidance tool during consultations and approximately 80% do not feel that they learn new patient management knowledge from such systems. Furthermore, where such knowledge is generated, nearly 90% do not tell colleagues about it.

Clearly, these results lend weight to the notion that knowledge transfer may be significantly inhibited in many cases.

IMPLICATIONS

The findings presented in this paper give some tentative indications of the status of knowledge creation, transfer and management within the primary healthcare sector.

Undoubtedly, the rapid increase in medical knowledge and improvements in patient care has been facilitated by the development and deployment of computer technology in primary healthcare. At the same time, the potential to capitalise and exploit knowledge within this sector has yet to be fully realised. There are several important reasons for this.

Although technology is increasingly available to support the effective use of knowledge creation, transfer and management, both in terms of access to clinical computer systems and the Internet, the necessary organisational context is often not in place. There are early indications from this research that the culture in many primary healthcare practices is not open to the sharing and communication of new ideas and knowledge. In fact, it would appear that in many cases, practitioners have yet to embrace the demands of clinical governance and their patients. In the latter case, patients have a role to play by changing the culture of the consultation process through their own independent access to new medical knowledge, being better informed than ever before. More specifically, many gain such knowledge directly from the Internet or through knowledge-based medical systems such as NHS Direct².

The notion of inhibitors and facilitators is also a useful vehicle for understanding issues in the application of knowledge within this sector. This exploratory research suggests that there are various knowledge inhibitors present within the current culture of primary healthcare, but an absence of certain knowledge facilitators. For example, the results highlight several aspects of practice culture that hinder the dissemination and sharing of medical knowledge. As a consequence, the sharing of experiences between GPs is often not occurring and thus tacit knowledge is not communicated or shared effectively. This is particularly important in the context of primary healthcare, where medical knowledge must be accompanied by knowledge of the patient in arriving at an accurate diagnosis and treatment.

On a technological level, there is clearly scope to make further gains in relation to accessing, generating and using knowledge. It is encouraging to note that routine tasks such as repeat and acute prescribing, as well as annual data collection and audits are widespread computer applications in primary care (Pemberton *et al.*, 2001), but there are still areas where the potential of technology has yet to be realised. For example, less than half of the survey's respondents have access to the Internet severely limiting a GP's ability to gather pertinent and relevant knowledge of use in patient diagnosis and treatment. Furthermore, the development of knowledge management tools is not being exploited in the consultation process. Such tools are developing quickly, but there is evidence that practitioners prefer not to utilise them, even when available.

Other authors have commented on the individualistic nature of GPs, but this trait presents a real danger in that failure to share both tacit knowledge and good practice may be at the expense of patients. While there is little doubt that individual learning takes place within GP practices, the move towards organisational learning, of which individual learning is an important element, is at best piecemeal. The goal must be to ensure that the leadership, culture, structure and infrastructure exists to create an organisational context in which the importance of knowledge is recognised and the mechanisms to develop knowledge facilitators and eliminate knowledge inhibitors are in place. Ironically, the preliminary findings presented here suggest that such a concept is barely recognisable in the practices surveyed and there is still much to do to ensure that knowledge is managed effectively in the UK primary health care sector.

ENDNOTES

1 NHSnet is a secure wide area network providing GPs with the facility to send e-mail, access the Internet, link to health authority systems and make on-line patient bookings for minor hospital-based surgery.

2 NHS Direct offers a 24-hour nurse-led helpline providing confidential healthcare advice and information within the UK

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