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# Communication in Information Seeking Behaviour – Part one

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## Abstracts

*Much research has been carried out into information behaviour over many years. In every field, researchers study information seeking and use in yet another context (culture, organization, health, community, domain, and so on) without regard to any understandings of information seeking and use in other contexts.” This research set out to address these criticisms by building on existing models from library and information science and from communication studies to develop a new representation of information behaviour – one that encompasses seeking, use and communication of information. The ISCM model has been used to examine information behaviour in health care in order to investigate its validity and the insights that it can provide. By testing the model’s validity, the research also investigates the practical relevance of the models on which it is based and the elements of information behaviour that they identify. Health care was chosen to test the model because it has been a fertile field for exploration of information behaviour. The information needs and behaviour of physicians: content analysis of individual studies to examine further the applicability and validity of the Information Seeking and Communication Model a number (5) of studies of physicians’ information behaviour have been analysed in more detail using deductive content analysis. The findings indicate that, the specific collaborative information behaviours observed in the study were collaborative information seeking, collaborative information processing, and collaboration in decision making and taking action, and a related activity was information sharing. These findings indicate that the ISCM adequately represents key features of information users’ behaviour and factors affecting it. The five studies together provide evidence that all of this is true with regard to physicians’ information behaviour. They provide examples of the activities of physicians in seeking information and some of the thoughts and feelings they may have as they seek information. They also provide examples of physicians’ processing and assessing information and using it to make decisions, take actions or to increase their knowledge.*

## **1. Introduction**

The term “information behaviour” has been defined in different ways. One widely quoted definition is that of Wilson, who describes it as “the totality of human behaviour in relation to sources and channels of information, including both active and passive information use” (Wilson 2000: 3). Pettigrew et al. (2001: 5) refer to information behaviour as “the study of how people need, seek, give, and use information in different contexts, including the workplace and everyday living.” Ingwersen and Jarvelin define it as the “generation, acquisition, management, use and communication of information, and information seeking” (Ingwersen and Jarvelin, 2005: 259).

The term has thus been taken to encompass a number of 2 different activities and, in particular, information seeking and acquisition, use of information, and communication. Much research has been carried out into information behaviour over many years. Studies of information seeking and use date back at least as far as the Royal Society Scientific Information Conference of 1948, at which several papers on the information behaviour of scientists were presented Wilson (1999: 8). The information behaviour of health professionals has been studied since at least the early 1940s Sherrington (1965). Research into communication has an even longer history: Lasswell’s studies of propaganda and mass communication, for example, date back to the 1920s Laswell (1927).

Many theories and models of information behaviour have been developed as a result of this research (Fisher et al. 2005; Case, 2012; McQuail and Windahl, 1993; Baran

and Davis, 2003). Most, however, are restricted in their scope. Those developed in library and information science (LIS) typically focus on the information seeker and information-seeking behaviour. Mass communication models, on the other hand, mostly focus on the communicator and the effectiveness of the communication process, particularly from the perspective of the communicator. Since so many theories and models have been formulated it is legitimate to ask what their value is and how far they build on each other to develop understanding of information behaviour in a practically relevant way.

Theoretical frameworks from library and information science are often based on work done solely or mostly by one researcher in a particular environment (Foster et al. 2008), and it has been suggested McKechnie et al. (2001) that they have had little impact outside the LIS field. Over the years there have been criticisms that LIS research often fails to build on existing theory: "Throughout the period [since the Royal Society conference in 1948] the one constant complaint of commentators has been that researchers have not built upon prior research in such a way as to cumulate a body of theory and empirical findings that may serve as a starting point for further research" (Wilson, 1999).

Case (2002: 284-287) reviewed the criticisms of research into information behaviour and asked "Has any other literature generated so many complaints of low quality, or exhibited so many signs of being over studied?" Referring to the practical value of the research and theories developed he commented: "what of the utility of 3 information behavior studies?... to read some of today's information seeking research it would seem that we have now reached the point where the scholarliness of the studies correlates with their degree of uselessness for institutional purposes.... Certain themes and sources are cited by one study that are picked up in later studies, but without

necessarily leading either to an advancement of theory or to an accumulation of comparable findings.”

In similar vein, Dervin (2003) remarked on the narrowness of focus of much research: “In every field, researchers study information seeking and use in yet another context (culture, organization, community, domain, and so on) without regard to any understandings of information seeking and use in other contexts.” This research set out to address these criticisms by building on existing models from library and information science and from communication studies to develop a new representation of information behaviour – one that encompasses seeking, use and communication of information.

The new model has been used to examine information behaviour in health care in order to investigate its validity and the insights that it can provide. By testing the model’s validity, the research also investigates the practical relevance of the models on which it is based and the elements of information behaviour that they identify. Health care was chosen to test the model because it has been a fertile field for exploration of information behaviour. There have been many studies of the information behaviour of health professionals, especially that of physicians (e.g. Coumou and Meijman, 2006; Davies, 2007; Dawes and Sampson, 2003; Gorman, 1999; Lacey Bryant, 2000) and the model can build on the extensive existing research. Physicians have to deal with a large volume of information every day. They need details of the patients they are treating, the conditions being treated and appropriate medicines, and they may need a range of other information (Gorman, 1995; Smith, 1996). To meet these needs they may actively seek information from a number of sources, including colleagues, journals, books, websites and other computer-based sources (Bennett et al, 2005; Davies, 2007; Smith, 1996).

In the UK a large amount of information is also proactively communicated to physicians by a variety of individuals and organizations including colleagues, professional bodies such as the Royal College of Physicians and the Royal College of General Practitioners, the National Health Service (NHS) and associated bodies such as the 4 National Institute for Health and Care Excellence (NICE), and also by the pharmaceutical industry. Much of this information seeking, use and communication takes place in the context of evidence based clinical practice, which has played a significant role in influencing information behaviour in health care in recent years (Evidence-Based Medicine Working Group, 1992).

In the context of the use of medicines the term that is more often used is evidence-based medicine (EBM), which has been defined as “the integration of best research evidence with clinical expertise and patient values” (Sackett et al. 2000). In order to understand what this means in practice it is important to clarify what constitutes “best research evidence”. NICE aims to foster EBM by providing national guidance on health care. It is “the independent organization responsible for providing national guidance on the promotion of good health and the prevention and treatment of ill health ... Ensuring care provided is based on the best evidence available” (Chidgey et al. 2007). Thus to a significant extent it acts as an arbiter of what is the “best” evidence for the UK National Health Service.

In determining what is the most appropriate treatment for a particular condition NICE considers not only clinical effectiveness but also cost. From NICE’s perspective, “The development and use of clinical guidance based on assessment of clinical and cost effectiveness is probably the most important approach to ensuring patients derive the full benefits from clinical research” (Chidgey et al. 2007). Based on his or her clinical experience and expertise, however, a physician may have a different view about the

best treatment for an individual patient and the relevance of cost considerations. One of the criticisms of evidence-based medicine has been that it may threaten the autonomy of the doctor-patient relationship (Cohen et al. 2004).

## **1.2 Research Question and Objective**

*How do physicians communicate while seeking for information?*

1. To review existing literature on information seeking behaviour
2. To link communication to information seeking
3. To explore information seeking behaviour of physicians
4. To make recommendation for further research

## **2.1 Literature Review**

Information-seeking behaviour can be seen as a subset of information behaviour. Information-searching behaviour, concerned particularly with the interactions between the information user and information systems, is in turn a subset of information-seeking behaviour. An important element of the wider concept of information behaviour is communication. However, most model of information behaviour from the field of library and information science do not explicitly include communication or do not cover it in any detail. Their focus is on the information user and the user's needs. But as Bao and Bouthillier (2007) point out, "In information-sharing activity, information provider's behavior is not passively driven or solicited by information needs of the user; without information provider's motivations of sharing, information sharing behavior will not happen. "The widely cited model developed by Krikelas (1983) refers to "information giving", defined as "the act of disseminating messages ... in written (graphic), verbal, visual or tactile forms". However, apart from stating that individuals may be both senders and receivers of information, Krikelas has little to say about this aspect of information behaviour. The models of Wilson (1999) and Ingwersen and Jarvelin (2005) show the links between communication and information seeking.

## 2.2 Wilson's model of information seeking and communication

Wilson's 1999 model links information seeking to communication, and thus the information provider:

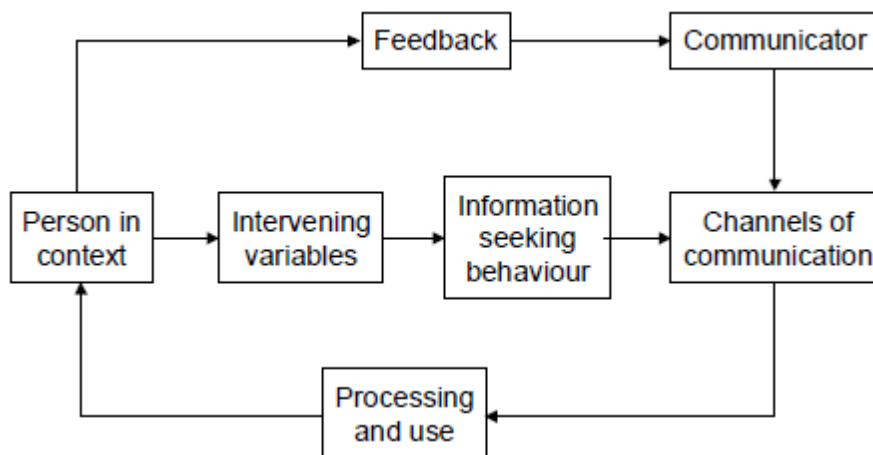


Figure 1. Wilson's model of information seeking and communication

Wilson uses the term "channels of communication" in this model to mean information sources. This differs somewhat from his use of the term as an intervening variable under "source characteristics" in his 1996 model, where it refers to a means of communication such as talking or mass media. Both are different meanings of "channel" from that used in communication theory, where channel refers to the physical means of carrying a signal Windahl et al (2009: 17). This model gives a deliberately simplified view of information seeking, and it is necessary to refer back to the earlier models in order to explore the different elements of information behaviour and the factors affecting it.

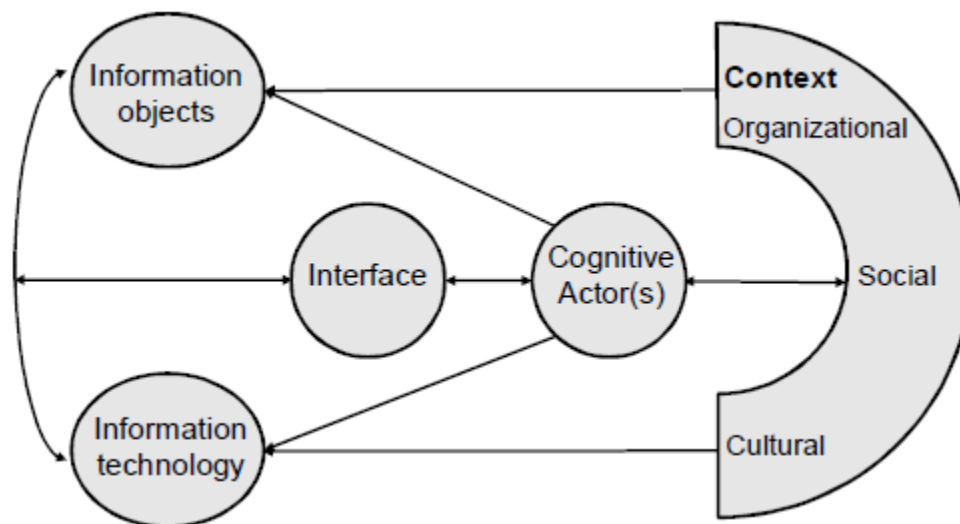
## 2.3 Ingwersen and Jarvelin model

Figure 2 shows one of the graphical representations of the cognitive model of information behaviour developed by Ingwersen and Jarvelin (2005). The model focuses on information seeking and retrieval but it includes the various "cognitive actors" involved:

- Authors of information objects
- Information seekers
- Designers of database structures and systems, interfaces, retrieval functionalities etc.



- Human indexers
- Selectors deciding on the availability of information objects (examples mentioned by Ingwersen and Jarvelin include journal editors, database producers, reviewers and conference organizers)
- Communities of individuals organized in a social, cultural or organizational context.



**Figure 2 Ingwersen and Jarvelin model**

The inclusion in this model of information providers (authors), as well as information seekers, and of selectors, system designers and indexers makes it a more general representation of information behaviour than those already discussed. The graphical representation of the model is fairly simple but Ingwersen and Jarvelin provide much more detail of the framework and underlying concepts in their written description of it (Ingwersen and Jarvelin, 2005,). One factor of great importance in the model is context. Unlike Leckie et al. (1996), Ingwersen and Jarvelin refer to the different contexts of the information seeker, the author, the selector and the other actors involved. Authors are influenced by their context to communicate information and the intended meaning of that information is also affected by the context. NICE, for example, which is charged with the responsibility of providing “national guidance on the promotion of good health and the prevention and treatment of ill health” (<http://www.datadictionary.nhs.uk/>), produces guidelines in order to influence health care professionals’ clinical practice.

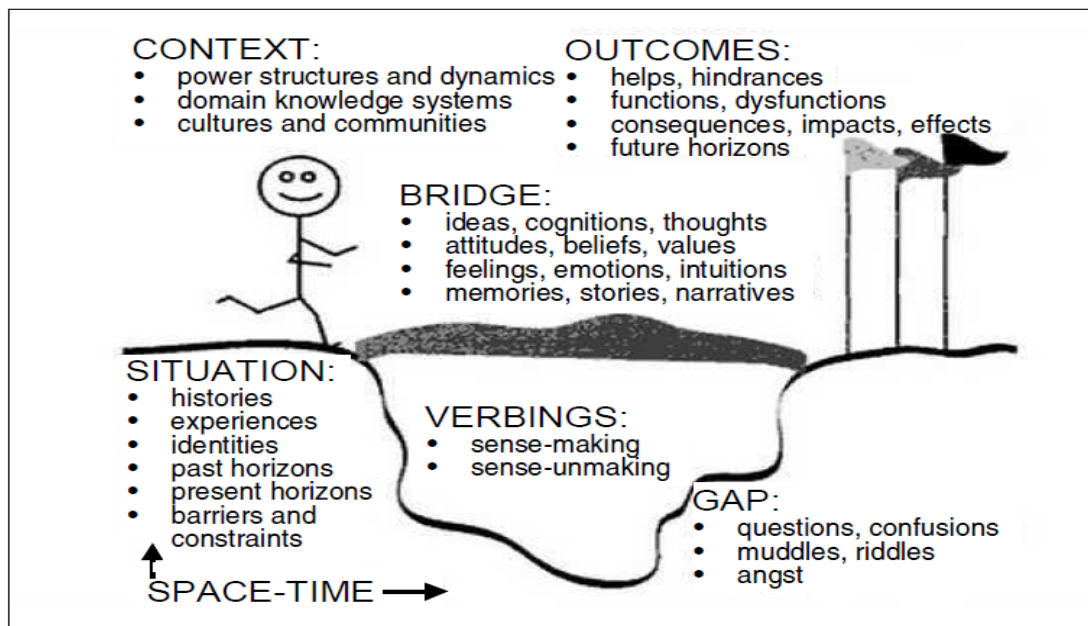
The pharmaceutical industry communicates information through advertising and other means in order to bring its products to the attention of health care professionals and to increase sales. The recipients interpret the information, and “their context determines the nature of the interpretations that are made” (Ingwersen and Jarvelin 2005: 260). Thus the intended meaning and the received meaning may not be the same. For example, a guideline produced to reflect best clinical practice, which is based on evidence from clinical trials, may not be regarded by a physician as best practice because it does not take into account his/her medical knowledge or the differences between patients in clinical trials and those seen in everyday practice (Feinstein and Horwitz, 1997; Tonelli, 2006). When considering the information activities associated with health care provision, the differences in context between the various players involved – physicians, NHS bodies, NICE, the pharmaceutical industry – need to be taken into account.

#### **2.4 Dervin’s Sense-Making**

Dervin’s Sense-Making (Dervin, 2005; Dervin et al., 2003) was not developed as a model but as a framework for research, “a conceptual tool of broad applicability for use in understanding the relationship of communication, information, and meaning” Tidline (2005). It is included here because it has had much influence on studies of information behaviour, in both communication and LIS disciplines Tidline (2005), and because Dervin has summarized its key ideas in the form of a diagram (Figure3), which can be seen as a model. This representation of Sense-Making shows a person facing a “gap” – a situation that the person needs to make sense of. As described by Romanello et al. (2003), this representation consists of the:

1. “Situation or the time-space contexts within which sense is constructed;
2. Gap or the “information needs,” or questions people have as they construct and deconstruct sense while moving through time-space that need bridging;
3. Verbings: sense-making and sense-unmaking of the individual;

4. Bridge or the assemblage of ideas, emotions, attitudes and memories, from the past, present and future moments that the individual constructs to negotiate the gaps and uses to move from one moment to the next; and
5. Outcomes or the information uses or helps and hurts that the individual puts into newly created sense.



**Figure 3: Sense-Making Metaphor**

Moving across time and space facing a gap, building a bridge across the gap, and then constructing and evaluating the uses of the bridge. (Dervin 2005 and Dervin et al, 2003: 238).

### 3.1 Method and Analysis

The information needs and behaviour of physicians: content analysis of individual studies to examine further the applicability and validity of the Information Seeking and Communication Model a number of studies of physicians' information behaviour have been analysed in more detail using deductive content analysis. The technique is described below in section 4.4. and the findings are presented in the subsequent sections of this chapter. Five studies of physicians' information behaviour were analysed:

- Reddy and Jansen (2008) studied collaborative information behaviour in hospital health care teams in the USA using observation and questioning. Many studies and models of information

behaviour focus on an individual information user's perspective. It was therefore of interest to discover what additional insights could be obtained from this study of collaboration in information behaviour and how well the ISCM represents such behaviour.

- Prosser et al. (2003) interviewed general practitioners in the UK in order to explore the influences and information sources affecting their prescribing decisions.
- Lacey Bryant (2004), using a case-study approach, interviewed general practitioners in the UK to investigate their individual information needs and information seeking behaviour.
- Green and Ruff (2005) used focus group discussions to investigate the problems encountered by junior hospital doctors in the USA when seeking to answer their clinical questions.
- Hughes et al. (2010) studied the online searching activities of hospital- and clinic-based physicians in the UK and their judgements of information quality from diaries recording their clinical information searches and by interviewing them.

**These studies were selected because:**

- a) All involved direct interviews with or observation of physicians
- b) Each report is detailed and includes quotations from the physicians or vignettes describing activities observed during the study
- c) Together they cover both primary and secondary care physicians (general practitioners and hospital doctors)
- d) Together they cover a number of different aspects of information behaviour:
  - Information needs
  - Individual information seeking activities
  - Collaborative information seeking activities
  - The use of different types of information sources, including printed Sources, people, databases and websites
  - Problems encountered in information seeking
  - Factors affecting the evaluation and use of information
- e) All were published within the ten years before this thesis was written

The aims of analysing these studies in more detail are to add to the findings from the literature review presented in the previous section of this chapter by determining:

- (i.) whether the concepts identified in the ISCM are all relevant to the information behaviour reported in these five studies
- (ii.) Whether these studies describe any aspects of information behaviour not adequately covered by the concepts identified in the ISCM
- (iii). How well the ISCM's representation of information behaviour and the factors affecting it accounts for the findings reported in these studies

### **3.2 Method**

Content analysis is a well-established technique for analysing texts and other communications for their content using quantitative or qualitative methods (Krippendorff, 2004). Quantitative content analysis has been defined as “the systematic assignment of communication content to categories according to rules, and the analysis of relationships involving those categories using statistical methods” (Riffe et al, 2005: 3). It has been used for over a century to analyse the content of newspapers and, more recently, other media (Krippendorff, 2004).

Quantitative analysis can be used to count words and their frequency of occurrence but it does not provide insights into the deeper meaning represented in the text. Qualitative content analysis was therefore used in this research. Qualitative content analysis has been increasingly used in the humanities and social sciences, using close reading of text for detailed analysis of its meaning: “Qualitative content analysis goes beyond merely counting words to examining language intensely for the purpose of classifying large amounts of text into an efficient number of categories that represent similar meanings” (Hsieh and Shannon, 2005). It has been defined as “a research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns” (Hsieh and Shannon, 2005).

Coding may be applied to a word, a phrase, a sentence or sometimes a paragraph. Graneheim and Lundman (2004) in describing the techniques of qualitative content analysis refer to such a portion of text as a meaning unit: “words, sentences or paragraphs containing aspects related to each other through their content and context.” Content analysis may be used inductively, categorizing elements of the text into categories generated from the text itself (Forman and Damschroder, 2007). Alternatively it may be used deductively (deductive or directed content analysis), employing terms derived from a theory or model (Elo and Kyngäs, 2007; Hsieh and Shannon, 2005; Mayring, 2000). In this chapter deductive content analysis is used to analyse how the ISCM relates to the information behaviour of physicians. In the next chapter it is used to analyse the information behaviour of the pharmaceutical industry.

### **3.3 Coding terms**

A code book was produced representing the features of and factors affecting information behaviour shown in the ISCM and discussed in part 3. The full code book is shown in the Appendix and the main terms are listed in Table 1.

<b>Coding Terms</b>	<b>Used for</b>
<b>Information</b>	Information; data; content of an information product; also used for information provided as guidance, advice or advocating a course of action.
<b>Utility</b>	Perceived usefulness, relevance, importance, timeliness, accessibility or ease of use of information or of a source.
<b>Credibility</b>	Perceived trustworthiness, reliability, accuracy, objectivity, authority, completeness and lack of bias of information or of a source; homophily of a source.
<b>User</b>	May be an individual, group or organization that: <ul style="list-style-type: none"> <li>- uses information e.g. to take a decision or action</li> <li>- seeks information</li> <li>- has information needs</li> <li>- receives communications</li> </ul>
<b>User's Content</b>	The user's environmental and personal context including: living or working environment, resources and technology available, culture, job role, knowledge, expertise and Psychological factors.
<b>User's needs, want goal.</b>	Personal or job-related information needs, desires or aim that may lead to information.
<b>User's Perceptions</b>	Perceptions of self and self-efficacy; perception of a knowledge gap; perceptions of others including sources and information providers.
<b>User's motivating Factors</b>	Factors motivating a user to seek information.
<b>User's inhibiting Factors</b>	Factors inhibiting a user from seeking information.
<b>Sources</b>	General term covering information products, communication media or the providers of information (Definitions below). These more specific terms are Preferred when coding text.
<b>Provider</b>	Individuals, groups and organizations that produce, supply or communicate information, or facilitate or control access to it.
<b>Provider Content</b>	The provider's environmental and personal context including, where relevant: living or working environment, resources and technology, culture, job role, knowledge, expertise and psychological factors.
<b>Provide, needs wants, goal</b>	Personal, job-related or organizational information needs, desires or aims that may lead to production and dissemination of information

<b>Provider's Perceptions</b>	Perceptions of an individual provider or an organization of itself; perceptions of others including users.
<b>Provider's Motivating Factors</b>	Factors motivating provider to communicate information.
<b>Provider's inhibiting Factors</b>	Factors inhibiting a provider from communicating information
<b>Information Products</b>	Literature, databases, websites, presentations, TV and radio programmes and other outputs from information providers.
<b>Communications</b>	The process of communicating, disseminating or sharing information by an information provider or by a user.
<b>Communications Mediums</b>	The medium or channel through which information is communicated, e.g. the Internet, traditional publishing, mass media.
<b>Choose Source</b>	A user's decision about which information source(s) to use when searching for information.
<b>Seek/Search for Information</b>	Wilson's concepts of active, ongoing and passive search. The activities involved in seeking information – e.g. using a search engine to search the Internet, using a database such as PubMed, or asking a question of a colleague or other source.
<b>Feeling and Thoughts</b>	Feelings and thoughts when seeking information such as those represented in Kuhlthau's model
<b>Find Information</b>	Finding information as a result of information seeking
<b>Assess/Process Information</b>	Analysing, evaluating, interpreting and organizing information found by searching or received through communication. This refers to a user of information but may also apply to a provider, in which case the provider is also a user using information in order, for example, to produce an information product.
<b>Information Use</b>	Using information to:
<b>Act/decide</b>	Take action or make a decision on the basis of the information.
<b>Produce Information Products</b>	Producing information in printed, electronic or other form (use the term "information products" as above)
<b>Communicate</b>	Disseminating or sharing information (use the term "communication" as above)
<b>Information Non-Use</b>	Ignoring information or dismissing information received or found

**Table 1: Main coding terms used in the content analysis**



### **3.4 Coding procedure**

The coding terms were used to analyse reports from the literature on physicians' information behaviour. The sections of each report describing the findings were read in detail and each portion of text referring to features of information behaviour or factors affecting it was coded with relevant terms from the codebook wherever possible. If any text did not seem to be adequately represented by the existing codes a new term was added. At the end of the analysis of each report, any new terms and the concepts they represented were reviewed to determine how far the model covered them and whether it needed to be modified.

#### **4.1 The information needs and behaviour of physicians: content analysis of research findings in the literature**

As described in section 3.1 above, five studies were selected (Reddy and Jansen, 2008; Prosser et al., 2003; Lacey Bryant, 2004; Green and Ruff, 2005; and Hughes *et al.*, 2010). The analyses of the findings of these studies are described in the following sections. The analysis of the study by Reddy and Jansen (2008) is discussed first at greater length in order to give a detailed description of the content analysis method.

#### **4.2 Reddy and Jansen (2008)**

##### **Study details**

Reddy and Jansen (2008) studied collaborative information behaviour in two hospital-based health care teams in the USA: the surgical intensive care unit (SICU) in a large urban teaching hospital and the emergency department (ED) in a small rural non-teaching hospital. Their findings were obtained using an ethnographic approach, with observation and questioning of staff about how they obtained information, and covered three main aspects of information behaviour:

- Communication
- Information needs
- Role of information retrieval technologies

The field notes and interviews were transcribed and were then analysed to identify categories and the relationships between them.

### **Content analysis and applicability of the ISCM**

Most of the coding terms relating to the information user were relevant to this study, as can be seen from the following extracts.

#### **– Extract RJ1**

*“Because the work was often rapid-paced in the SICU and ED, communication was essential to finding needed information. In both units, team members were physically co-located and, therefore, much of the interaction was face-to-face.”*

#### **(Page 263)**

Here the authors set the scene, describing the environmental context of the information users, noting that they have information needs and that communication with colleagues was an important way for users to find information. The extract includes several concepts from the ISCM:

- Information users (“team members”)
- Information users’ environmental context (a “rapid-paced” working environment where “team members were physically co-located”)
- Motivating factor for particular information behaviour (the rapid pace, which made communication with colleagues “essential to finding needed information”)
- Communication (two-way)
- Finding information
- Users’ needs (“needed information”)
- Communication medium (“much of the interaction was face-to-face”)

#### **– Extract RJ2**

*“John, a resident, is checking on some medication that the patient is receiving. He asks the nurse if she knows why the patient is receiving a medication that John is not familiar with. The nurse shrugs her shoulder and tells John to talk to Susan, the pharmacist. Susan who standing close by walks over and says, ‘I know what that medication does but I am not sure why this patient is getting it’.”*

#### **(Page 263)**

This vignette illustrates the sort of interactive communication between health care professionals that the authors observed. A number of concepts from the ISCM are relevant here, including:

- Information seeking through communication (“He asks the nurse ...”)
- Information user’s personal context – knowledge or lack of knowledge (“a medication that John is not familiar with”, “I know what that medication does”)
- Communication (“The nurse ... tells John to talk to Susan”, “Susan ... says...”)

– **Extract RJ3**

*“Both John and Susan then start looking for more information about why the patient is getting this medication. Susan is providing John information about the medication and the possible side-effects. During this process, they are continuously exchanging information until they piece together the story. They realize that the patient is getting the medication by mistake. They then stop the medication.” (Page 263)*

Key aspects of information behaviour in this extract are:

- Information seeking – collaboratively (“John and Susan then start looking for more information”)
- Information provider (“Susan is providing John information”)
- Communication – two-way (“they are continuously exchanging information”)
- Processing information – collaboratively (“they piece together the story”)
- Act – collaboratively (“They then stop the medication”)

The particular focus of Reddy and Jansen in this study is collaborative information behaviour and this extract provides examples of such behaviour. When analysing the text a new coding term, “collaborative information behaviour”, was initially used.

Once coding was complete the sections of text coded with this term were reviewed to determine if they represented concepts that were not included in the ISCM. The specific collaborative information behaviours observed in the study were collaborative information seeking, collaborative information processing, and collaboration in decision making and taking action, all of which are illustrated in this extract. A related activity was information sharing, which other authors have also described (Bao and Bouthillier, 2007; Pilerot, 2012; Talja, 2002); the two-

way communication in this extract is an example and it shows that a user of information (Susan) can become a provider of information to another user (John). The ISCM's representation of collaborative information behaviour and information is discussed further below (section 4.4).

– **Extract RJ4**

*“The team members are talking about a patient during morning rounds. They are concerned about the spike in the patient’s temperature and are not sure what is causing it. Because there are many different aspects of the problem they want to look at, the team splits up the tasks. Susan, the pharmacist, prints out a medication list to check what the patient is on. John, a resident, checks the culture book to see if the patient has any infections that might be causing this. Gina, a fellow, is checking the patient record system for information and Vasanth, another fellow, is checking the patient to try to get more information.”*

**(Page 264)**

Concepts from the ISCM in this extract include:

- Information users (“The team members”)
- Information users’ personal environment – lack of knowledge (“They ... are not sure what is causing it”)
- Information users’ needs/wants (“there are many different aspects of the problem they want to look at”)
- Users’ motivating factor for information seeking (“They are concerned about the spike in the patient’s temperature and are not sure what is causing it”)
- Information seeking – collaboratively (“the team splits up the tasks”, “check what the patient is on”, “checks ... to see if the patient has any infections”, “checking the patient record system for information”, “checking the patient to try to get more information”)
- Information products or sources (“medication list”, “culture book”, “patient record system”, “the patient”)
- Information

These four extracts and other parts of the text demonstrate the applicability of the following concepts from the ISCM:

- Information

- Information user
- User's context
- User's needs, wants, goals
- User's motivating factors
- Information seeking
- Find information
- Assess/process information
- Act/decide
- Information sources
- Information providers
- Information products
- Communication
- Communication medium

Other coding terms from the ISCM that were used in the content analysis were:

- Choose source (“He turned to the pharmacist because she had the specific domain knowledge” **page 263**)
- Provider's personal context – knowledge and expertise (“... she had the specific domain knowledge about the medication and could provide some insight into why the patient was taking this particular medication” **page 263**)

Terms that were not used in the analysis were:

- Utility
- Credibility
- User's perceptions
- User's inhibiting factors
- Provider's perceptions
- Provider's needs, wants, goals
- Provider's motivating factors
- Provider's inhibiting factors

- Feelings and thoughts
- Information needs not pursued
- Information ignored or dismissed
- Communication not received

The findings of the study did not overtly refer to the credibility or utility of information or sources or to users' perceptions of sources and so these concepts were not coded in the analysis. However, the information behaviour described does implicitly endorse the importance of these concepts. It is reasonable to assume that the health care professionals would not have collaborated in information seeking and sharing if they had not perceived each other to be credible sources. Because they worked together and each had specific knowledge and expertise, they were accessible and useful and thus had high utility. The focus of the study was on collaborative information behaviour within each hospital team. External providers, their needs and goals, motivating and inhibiting factors were not studied and so these concepts did not occur in the analysis. The study reported on collaboration leading to successful searching for and use of information. There was no discussion of factors inhibiting information seeking, information needs not being pursued or information being ignored and so these concepts were not identified in the analysis.

To prove the validity of the ISCM it is not necessary that every facet of information behaviour represented in the model should be demonstrated in every study. It is, however, important that any new coding terms arising during content analysis of a study's findings should be examined to determine whether they represent concepts that are not adequately covered by the model. During the initial content analysis a new coding term, "collaborative information behaviour", was used. As mentioned in the discussion of extract RJ3 above, the specific collaborative information behaviours observed in the study were collaborative information seeking, collaborative information processing, and collaboration in decision making and taking action, and a related activity was information sharing.

The analysis of the findings from this study provides support for many aspects of the ISCM's representation of information behaviour. Information users have information needs that derive from their working context. In this report John, the physician, is responsible for the care of a patient and needs to find out about the medication the patient is receiving and also to find a cause of the patient's spike in temperature. As suggested by the ISCM, information needs may derive not only from the environmental context but also from the user's personal context. In this case John's need for further information about the patient's medication is driven by his personal lack of knowledge about the particular medicine concerned.

The ISCM also refers to the role of motivating factors in encouraging particular information behaviour. In this report the rapid-paced environment in the hospital, with a need to take actions and decisions quickly, encourages communication between colleagues in order to find and share information. Once information has been obtained, the ISCM shows that the user may assess and process it before acting on it. In extract RJ3 the health care professionals process information, using it to "piece together the story" and then act on it – "They then stop the medication". The important influence of credibility and utility on information behaviour, as depicted in the ISCM, is implicit in the findings. If health care professionals rely on each other as information sources they must perceive each other to be credible. They also have high utility in that they work together and it is easy to ask each other questions. The findings have little to say about the model's depiction of the information provider except in so far as an information user may also be a provider, but evidence about information providers, their activities and the factors affecting them has been obtained from the empirical research involving pharmaceutical companies and NICE described in the second part of this research.

### **4.3 Prosser et al. (2003)**

#### **Study details**

Prosser et al. (2003) studied 107 general practitioners in the UK. The main aim of the study was to investigate the factors influencing physicians to prescribe newly launched drugs. The investigators carried out semi-structured interviews employing the critical incident technique to encourage the GPs to recall prescribing events, the reasons for prescribing a new drug and the sources of information that they used. The transcripts of the interviews were analysed using a grounded theory approach to identify categories of reasons for prescribing.

#### **Content analysis and applicability of the ISCM**

Common concepts in the findings concerned:

- Information
- Information users (physicians) and their context (working environment and expertise)
- Their actions/decisions in prescribing new drugs
- Sources and providers of information
- Credibility of information and sources
- Communication

All of these and other concepts were coded by terms derived from the ISCM and the majority of the coding terms listed in Table 1 were applicable. Although the study investigated the role of information providers and sources as influences on GPs, it did not provide details of the providers' contexts, goals, perceptions or motivating or inhibiting factors and so these coding terms were not used. No new concepts were identified from the analysis to suggest that any revision of the model is needed. The ISCM suggests that information users actively seek information to meet their needs when taking decisions or actions, or alternatively they may receive information that is communicated to them. The findings of this study indicate that the



latter form of information behaviour may be particularly relevant to general practitioners when deciding whether to prescribe new drugs:

– **Extract P1**

*“... Exposure to new drug information tended to be reactive, implicit and ad hoc. GPs undertook an active search for information on new drugs in only 33 (5%) incidents. Furthermore, in 227 cases (37%), the initial informant was both the only information source and the major prescribing influence. The pharmaceutical industry was the prime mover here in 208 incidents, especially the representative (179 incidents).” (Page 64)*

The ISCM highlights the influence of contextual factors (environmental or personal) on information behaviour. The reason why general practitioners may not seek information as in the above extract may be because of such factors and evidence for this is provided in extract P2.

– **Extract P2**

Reasons given for not reading scientific journal papers:

*“I mean, we’re faced with information overload. It really is a problem”....  
“I’m not a researcher, so I wouldn’t know whether a piece of research was good, bad or indifferent. There’s no easy way round it.” (Page 66)*

Because of “information overload” a GP may not have time in a busy working environment to find information about the latest research from scientific journals. In the ISCM’s terms, information overload or lack of time are inhibiting factors. Alternatively the GP may consider that his or her personal knowledge and skills are inadequate to assess such information.

Extract P1 illustrates the significant role that information providers can play in influencing decision making. According to the ISCM the recipient of information from a provider would assess the information, use it or ignore it and would be influenced by factors such as the utility and credibility of the source and information. The study findings provide support for this as shown in the following extract.

– **Extract P3**

*Ninety-two of the GPs saw representatives, and most (70%) regarded representatives as an expedient means of acquiring and processing drug information and keeping up to date with new products. Although GPs questioned the objectivity of the industry, they generally considered its information to be factually accurate, if selective.... Despite GPs' concern regarding commercial information, a long-standing and trusted relationship with a company or representative led to accepting drug information, and reduced the perceived risk.*

**(Page 64)**

The utility of company representatives as “expedient” sources of information influences general practitioners to use the information that they provide, which in turn influences the GPs’ prescribing decisions. Although the GPs believe that such information may be selective, they perceive it to be sufficiently credible – “factually accurate” – to use it, apparently without further assessment.

According to the ISCM, perceptions affect information behaviour and perceptions are affected by contextual factors, notably personal and psychological factors. This extract confirms this and illustrates the role played by interpersonal relationships. By establishing a personal relationship with an information user, a provider may influence the former’s perceptions of the provider. In this case a relationship built up over time between a general practitioner and a company representative can increase the GP’s trust and the perceived credibility of the information provided. Another example of the influence of information providers on decision making is shown in extract P4.

– **Extract P4**

*“The letters from the hospital don’t often explain very much, they just say, ‘I’ve decided to give Mrs So-and-so ...’ or rather they’re telling us to prescribe X for Mrs So-and-so. They don’t put in a logical argument as to why they want you to prescribe that drug.”* **(Page 66)**

In this example the information provided by the hospital is not meant simply to inform the GP but also to direct him/her in future prescribing decisions. The ISCM shows that information providers may also communicate with each other. For example an opinion leader may receive information from a provider (such as a company marketing a product) and then act as an information provider to others. Extract P5 gives a possible illustration of this aspect of the model.

– **Extract P5**

*“If the consultants who I perceive to be the better consultants are actively prescribing something then that would influence me. Occasionally, there may be a negative influence—someone who you don’t feel is that on the ball or someone who you know is maybe influenced by pharmaceutical companies.”*

**(Page 66)**

This extract again demonstrates the importance of perceptions: the GP is influenced by “consultants who I perceive to be the better consultants”. However, the GP perceives that some other consultants have less credibility – perhaps if their knowledge or expertise is inadequate (not “on the ball”) or if pharmaceutical companies have influenced them. The latter possibility implies communication between companies and these consultants, who then provide information obtained from the companies. This information may then be perceived by the GP to be less credible as it may favour the companies’ medical products.

A further influence on general practitioners’ prescribing decisions may come from their patients:

– **Extract P6**

*“The patient insisted that I prescribe it. Strictly I should not prescribe just according to patient demand. I wasn’t convinced it was a useful drug to prescribe ... I feel annoyed because patients hear about so-called revolutionary medicine and the lay press get hold of it. It’s the Daily Mail syndrome. You have a group of articulate, half informed, half knowledgeable patients who can be very pushy. They put their hands in their pockets and pull out a newspaper clipping about a drug they feel they should have.”* **(Page 67)**

This example shows the importance of the physician's context or working environment. A general practitioner may be confronted by a patient who has obtained information about a new drug from the media and who then demands to be treated with it. Thus the information that influences the physician's prescribing decision may come from the patient. Despite reservations about the credibility of such information (patients are only "half informed"), the GP may prescribe the drug.

The findings of this study provide support for a number of aspects of information behaviour as represented in the ISCM, including:

- The influence of communications from different information providers
- The importance of the information user's contextual factors and perceptions
- The effects of inhibiting factors on information seeking
- The significance of the credibility and utility of information and sources
- Communication between information providers

The analysis revealed no new features of information behaviour that would require a revision of the model.

#### **4.4 Lacey Bryant (2004)**

##### **Study details**

Lacey Bryant (2004) carried out in-depth interviews or group discussions with 58 general practitioners in the area of Aylesbury in the UK. The aims of the study were to investigate the physicians' information needs, the factors motivating them to seek information and their information seeking behaviour. A medical library was available locally which could be used by GPs, and some doctors' practices also had a librarian. The study also investigated the use of these services.

##### **Content analysis and applicability of the ISCM**

When the findings section of the report was subjected to content analysis it was found that the text could be adequately coded by the terms derived from the ISCM. The majority of the coding

terms listed in Table 2 were applicable. Since the study investigated physicians' information needs, their information seeking behaviour and factors affecting it, it was not surprising to find that frequently occurring concepts in the text concerned:

- Information
- The information user, including the user's context (working environment and role, career stage, expertise and knowledge), perceptions and information needs
- Information seeking
- Motivating and inhibiting factors
- Information sources
- Utility or credibility of information

Concepts relating to information providers were not found except in reference to librarians (see extracts LB3 and LB4 below). No new concepts were identified from the analysis to suggest that any revision of the model is needed. The findings endorsed a number of aspects of the ISCM's representation of information behaviour. The following extracts provide illustrations.

Extract LB1 demonstrates, as suggested by the ISCM, that the user's context affects his/her needs and wants and the motivating or inhibiting factors that influence the decision to seek information.

– **Extract LB1**

*“Articulated by every single informant, the clinical care of individual patients was the primary reason for seeking information. Information need was perceived as problem-orientated. One doctor coined the phrase ‘clinical conundrums’ to describe questions arising from the diagnosis and therapeutic management of patients. ‘Immediately wanting to find an answer to a specific question raised in a consultation with a patient, so it is very much patient-led in terms of going out and searching out for information.’”*

(Pages 87-88)

Here the information user's work (environmental) context is that of a physician providing care to patients. In this context information needs arise, including questions about diagnosis and treatment, which lead to a decision to seek information. One of the motivating factors affecting the decision is urgency:

"Immediately wanting to find an answer to a specific question".

The ISCM also shows that the user's personal context, which includes experience, knowledge and expertise, affects information needs and influences information seeking. Lacey Bryant's findings provide evidence of this, as illustrated by Extract LB2:

– **Extract LB2**

*"By the time you've finished your GP Training Scheme you should be right up to date on therapeutics. Where I never felt completely confident, to begin with, was on the subject of diagnosis ... After 10 years of experience ... your confidence from the point of view of diagnosis and prognosis is very much better but your knowledge of therapeutics is becoming out of date."* (Page 88)

Thus the physician's expertise increases over time, reducing the need to seek information in certain areas such as diagnosis and prognosis, but knowledge of other areas such as therapeutics may become outdated, leading to a need for more up-to-date information. Such knowledge gaps may motivate the physician to seek information, either because of a specific need or because of general interest. As Lacey Bryant reports: "specific gaps in knowledge on 'new' diagnoses and therapies motivate GPs to pursue information ... Information seeking is driven by 'personal interest and inclination to a large extent.'" (Page 88).

The study findings provide evidence for the ISCM's representation of the utility of a source as an important factor affecting its use and of the role of feelings and thoughts in information seeking:

### – Extract LB3

*“... having to go away and visit a library remotely makes it less likely to happen, and it’s very valuable to be able to pop upstairs to look at it and get back to the patient ... Using this one here [the library in the GP’s practice] is fine. It’s convenient, it’s small. That’s half the problem with the one at Stoke. It’s feeling a little bit lost there ... I think ‘Oh God, everyone’s wondering who I am’ ... but having said that I mean it’s a very user-friendly place.” (Page 90)*

In this case the utility of the library in the GP’s own practice – its convenient location and small size – is a motivating factor for its use. The lower utility of the library in the postgraduate centre at Stoke Mandeville Hospital, partly because of its more distant location, is an inhibiting factor. Feelings and thoughts during information seeking also have an effect: because of the library’s large size, the GP feels “lost” when using it and thinks that other people there wonder who (s)he is.

The preferred sources used by physicians in this study (page 89) were:

- A personal collection
- Electronic resources
- Colleagues and specialists
- A library

Utility or convenience again affected the choice of source. Those physicians who had a library in their own practice were more likely to use it rather than contacting colleagues or specialists.

The findings also provide evidence of the role of an information provider and the provider’s context:

### – Extract LB4

*“I’m not so at ease with librarians’ systems, library systems that I can go in without needing help. I need help because my time is so limited ... I do want a service, I’m afraid’ ... Library use is influenced by interpersonal relationships, as well as by the quality of the service. ‘... They are brilliant at getting things for me. So it’s about personal relationships.” (Page 91)*

The physician lacks expertise with library systems, which are the environment of the librarian or information provider, and needs the librarian's services. The physician's use of the librarian's services is affected by their utility ("they're brilliant at getting things for me"). This extract also illustrates the two-way flow of information as represented in the ISCM. The physician communicates with the provider to seek information, which the provider then supplies or communicates to the physician. The ISCM suggests that such communications are likely to be affected by contextual factors for both the user and the provider. The extract shows that this is indeed the case: an important contextual factor influencing the physician to seek information through the librarian is limited time. As in the study of Prosser et al. (2003) in extract P3 above, interpersonal relationships are identified here as being a factor in information behaviour, and they can be seen as part of the personal or psychological context of both the physician and the librarian. The findings of Lacey Bryant's study substantiate several aspects of information behaviour as depicted in the ISCM, including:

- The influence of the information user's environmental context (work) and personal context (experience, knowledge and expertise) in generating information needs and on information seeking
- The influence of utility on the user's choice of information and sources
- Feelings and thoughts during information seeking
- Communication and the two-way flow of information between users and providers.

#### **4.5 Green and Ruff (2005)**

##### **Study details**

Green and Ruff (2005) carried out focus group discussions with 34 resident physicians (recently qualified physicians who were undergoing training in hospitals) in the USA. The researchers then performed a thematic analysis of the transcripts from the discussions. The aim of the study was to elicit the barriers encountered by the physicians when trying to answer clinical questions and thus to understand better the obstacles to evidence-based medicine.



## **Content analysis and applicability of the ISCM**

When the findings section of the report was subjected to content analysis the term “barrier” appeared frequently in the text, as would be expected in view of the study’s aim, and it was used for different concepts. These different meanings were considered in order to find out whether they could be coded by the terms derived from the ISCM or whether they represented concepts not covered by the model. The eight types of barriers described by the authors were:

### **Technical or pragmatic barriers (Green and Ruff, 2005:177)**

- Access to electronic information resources
- Skills in searching information resources
- Clinical question tracking
- Time

### **Emotional or cultural barriers**

- Clinical question priority
- Personal initiative
- Team dynamics
- Institutional culture

The first of these, access to electronic resources, can be seen in the ISCM as an aspect of the user’s environmental context. Lack of access to computers can be an inhibitory factor preventing information seeking:

#### **– Extract GR1**

*“... Computer terminals were often not located at the point of care. They [resident physicians] often found themselves wasting precious time in search of computers at some distance from their patients. It’s often very useful to have one key clinical question and to answer it right on the spot because you need to act fairly soon and you have like three other patients to see and you may not get back to that clinical question in a timely enough manner if you don’t have the resources right there to be able to pursue that question.” (Page 178)*

The second barrier, skills in searching information resources, is part of the personal context but the discussion by Green and Ruff about this potential barrier also refers to other factors relevant to the ISCM, as illustrated in the following extract:

**– Extract GR2**

*“... Residents had difficulty knowing when to stop searching, because they remained uncertain of the validity, timeliness, or exhaustiveness of the information they retrieved. It was regarding an algorithm for brain Mets’ [metastases] of unknown primary. Maybe because I don’t have the skill, I didn’t know when enough was enough. OK, I had four articles ... and I found myself saying, “I need more. I need the latest data.” If the article was from ’96 I thought it was not up to date enough.... I think we need to know when we have a clinical question, when do we have an answer to it?”*

**(Page 178)**

In this example the level of skill in assessing information affects information seeking: if the physician is uncertain about the validity of the information found and whether it is up to date and complete, he or she will be uncertain whether or not to continue searching. Assessing the information and its validity depends partly on the user’s perception of its trustworthiness and truthfulness (credibility in the ISCM) and its relevance (utility). Assessing how up to date and complete it is will also affect the user’s judgement of its utility: if it is not up to date or if it is not deemed exhaustive enough its utility will be judged to be less than optimal. The third barrier, clinical question tracking, is described in the next extract:

**– Extract GR3**

*“If unable to respond to a question as a clinical scenario unfolded, residents often deferred the question to a later time... Residents forgot these questions, despite their good intentions, and lamented the lack of an adequate system to track them. I’ve had about five different systems in the last three years and there are remnants of all five around the house.... If they were all in one place, it’s easier. So I had a little notebook I was going to use but, over time, your shoulders get so sore. You start dropping things out of your white coat and you can’t stand to have something else weighing you down. So then it becomes scraps of paper.”* **(Page 178)**

Thus if the physician’s knowledge is insufficient to answer a clinical question he or she is likely to defer information seeking until later but may then forget to pursue the information need. In the ISCM’s terms the poor utility of the information source or “clinical question tracking” system

used in the physician's working environment, which may be only "scraps of paper", inhibits information seeking. Time, or lack of it, is the fourth barrier and this can be seen as part of the user's environmental context in the ISCM. The fifth factor, clinical question priority, relates to the urgency of the information need, its relevance to patient care and the feasibility or non-feasibility of treatment depending on medication costs. It thus covers a number of motivating or inhibiting factors resulting from the environmental context (urgency of treatment, funding of medication costs) or relating to the utility of the information (its relevance to patient care). The sixth barrier, personal initiative, can be seen to be part of the user's personal context, which includes psychological factors. The seventh, team dynamics, concerns the environmental context in which the physicians work, including their roles and responsibilities, and interpersonal relationships, which may be seen as part of the personal/psychological context. Good team relationships can have a positive psychological effect and act as a motivating factor, as illustrated in extract GR4:

– **Extract GR4**

*"The learning climate ... greatly influenced the residents' motivation to pursue their clinical questions... Sometimes when there's a really good team rapport, your whole motivation and your standards go up because everybody's really doing their work... The degree of decision-making autonomy also influenced residents' information seeking behavior... If you don't have control over that patient, you can come up with a really great answer, but if they're not used to using that drug and they're not comfortable with it, it's not going to get used... (Page 179)*

The eighth barrier, institutional culture, is also a feature of the environmental context in which the physicians work. All of these factors can thus be seen to be represented by concepts in the ISCM and they may act as barriers to information seeking, or inhibiting factors in the terminology of the ISCM. Content analysis revealed no new concepts that would necessitate revision of the model. The majority of the coding terms listed in Table 1 were used in the content analysis, the main exceptions being terms related to information providers, and there was also little specific reference to communication. These findings are not surprising as the

focus of the study was on physicians' information seeking behaviour rather than their communication activities or communications from external providers. Green and Ruff summarized their findings in the following diagram representing the barriers to information seeking and use (Green and Ruff, 2005: 180):

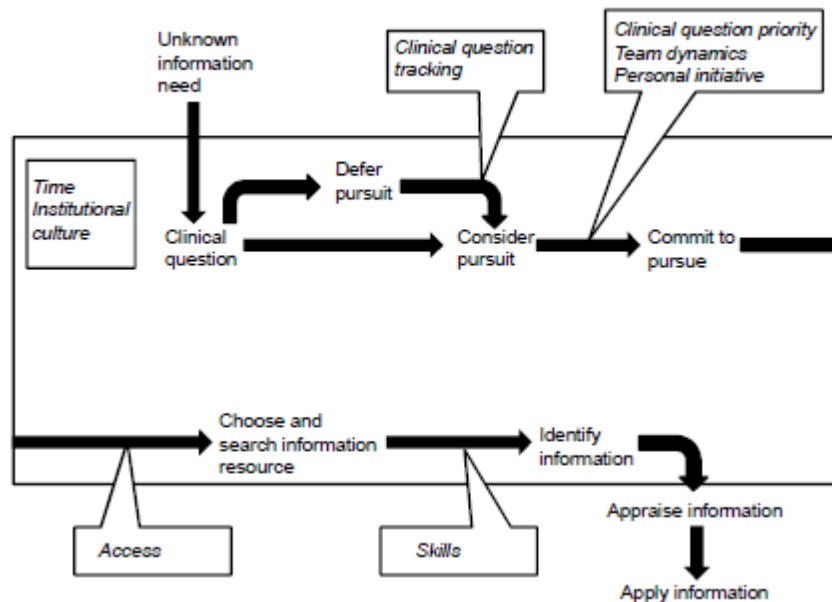


Figure 4. Conceptual model of barriers to answering clinical questions (Green and Ruff, 2005)

The diagram shows the path that a resident physician follows when dealing with an information need and the barriers or inhibiting factors that influence his or her information behaviour at each step. The physician may have an information need relating to the management of a patient or an initially “unknown information need” arising from discussions with a colleague. The physician may initially defer the decision about seeking information. If so, the likelihood that the clinical question will subsequently be pursued is influenced by the physician’s context, as suggested in the ISCM. In Green and Ruff’s representation a particular barrier is the lack of an effective question tracking system, which as noted above can be represented in the ISCM as a source of inadequate utility in the physician’s working environment (such as the “scraps of paper” referred to in Extract 2). If the physician considers pursuing the information need, the decision is affected by motivating and inhibiting factors linked to the physician’s context as shown in the ISCM. Green and Ruff here refer to three barriers: clinical question

priority, team dynamics and personal initiative. These factors are represented in the ISCM as environmental and personal aspects of the physician's context as discussed above.

In Green and Ruff's diagram a barrier to choosing and then using an information source is access. Similarly, the ISCM shows that choosing a source is influenced by its utility, one aspect of which is accessibility. Finding information then depends in part on the skills of the physician. Skills (or lack of skills) are shown as a barrier in Green and Ruff's representation. In the ISCM, skills form part of the user's personal context, which includes knowledge, education, training and experience, and the user's context affects all aspects of his/her information behaviour. Green and Ruff's diagram also shows barriers of time and institutional culture, which the authors say "loom over the entire process". They add: "It is also noteworthy that attitudinal or cultural barriers may lead a resident to abandon the pursuit of a question". In the ISCM time constraints and culture are seen as part of the user's environmental context. Finally the diagram refers to the physician appraising and applying information, steps which are shown in the ISCM as assessing and processing information followed by use of the information to take actions or decisions. Thus the findings of this study endorse many aspects of the ISCM's representation of information behaviour and in particular:

- Information needs deriving from the user's context
- The influence on information seeking of the information user's context including environmental culture, time pressures, systems and facilities, team relationships, clinical knowledge, skill in searching and skill in assessing information
- The effects of motivating factors on information seeking
- Needs not being pursued because of inhibiting factors
- The influence of utility and credibility on the user's choice of sources and use of information
- The assessment, processing and use of information by the user

## **4.6 Hughes et al. (2010)**

### **Study details**

Hughes et al. (2010) studied 35 hospital- and clinic-based physicians in the UK, all of whom had qualified from medical school between 2 and 3 years previously and whom the authors therefore deemed likely to be regular users of the Internet. The aims of the study were to investigate the information searching behaviour of these physicians when using online sources and their judgements about information quality. Over a minimum of five days at work the physicians completed online diaries detailing the websites they had used, why they had used them and any negative or positive incidents when using the Internet. The researchers then carried out a semi structured interview with each physician to obtain further details. The qualitative data from the diaries and interview transcripts were analysed by thematic analysis.

### **Content analysis and applicability of the ISCM**

When the findings section of the report was subjected to content analysis it was found that the text could be adequately coded by the terms derived from the ISCM. Commonly occurring concepts included:

- Information
- Information sources, including providers and information products
- The information user, including the user's context (working environment, role and tasks, clinical knowledge and experience in using websites)
- The user's perceptions of sources
- The credibility or utility of information/sources
- Choosing sources
- Information seeking
- Assessing and processing information and using it to take actions or decisions

The majority of the coding terms listed in Table 1 were applicable, the main exceptions being terms related to information providers. The latter finding is unsurprising as the focus of the

study was on physicians' information seeking behaviour rather than communications from external providers. No new concepts were identified from the analysis to suggest a need for revisions to the model.

The information needs that led to searching activities were of two main types: to obtain an answer to a particular clinical question or to find background information to increase knowledge as described in extract H1.

**– Extract H1**

*“Doctors had two dominant types of information need or search task: to solve an immediate defined problem (e.g., “the best beta blocker to use for someone with heart failure”) or to get background information on a subject. The former is to advance an immediate task in the clinical context and forms a closed question with a specific answer... The latter is an open question driven by the need to be knowledgeable about a subject... If it is a background or open question, then the impact on doctors' immediate decision making is reduced: To get some background information on something that I'm not really familiar with ... It tends not have a big influence on my management plan... To find out information about something that I did not really know about, but not necessarily to make clinical decisions on how to treat a patient.” (Page 439)*

This extract provides examples of the information user's context driving information needs as shown in the ISCM. The working or environmental context of the physician drives the need to find information about the best treatment for a particular patient. Both the working context and the personal context – the desire to increase knowledge and expertise – lead the physician to seek background information. The extract also demonstrates, again in accordance with the ISCM, that although those who seek information often use it to take decisions or actions this is not always the case immediately and another outcome may simply be an increase in knowledge (though this increased knowledge will influence future actions and decisions).

In the report the concept of bias in choosing sources was also frequently referred to. The authors found that physicians preferred to use websites with which they were familiar and which they believed would provide relevant information.

They observed that physicians used search engines to navigate to such websites, referring to this behaviour as “a distinct pattern not clearly noted in previous studies, and might be known as ‘known address bias’”. This finding is illustrated in the following extract:

– **Extract H2**

*This notion of address bias is used to orientate search engine use towards a site that the user believes may have appropriate information on the required subject, and if found in the search engine results, to navigate directly to that page within the preferred site. This was used by 48% of doctors... I put what I'm looking for, and then I put eMedicine and Wikipedia, and I put that through Google... If there is syndrome that I haven't heard of, then I would type into Google with the exact phrase... I would select the Web sites that I have heard of... (Page 439)*

The ISCM suggests that the information user's choice of sources is influenced by a number of factors and in particular by the perceived utility and credibility of the sources and the information that they provide. The study findings corroborate this aspect of the model. In extract H2 physicians navigated to websites of perceived high utility, i.e. websites that they believed from past experience would provide information relevant to their needs. The perceived credibility of websites is also important, as illustrated by the quotations in extract H3:

– **Extract H3**

*“I would trust it. It is written by doctors and generally reliable.” “There are various guides that you know are reliable, from word of mouth sites like NICE and BNF are accredited and evidence based. Things like PubMed too.” “I would only take it from a valid or official Web site such as a university Web site or similar.” “If it is from someone famous in the field, you are more likely to pay attention. If there is no author there or you do not know who put it there, then you are less likely to give it any credit.” “You get introduced to sites by senior people that you respect and that use them; they tell you to use them.” (Appendix, Pages 450-451)*

As described in part 3, credibility in the ISCM refers to perceived trustworthiness, reliability, accuracy and authority, and also to the concept of homophily (Rogers, 2003) – that people are more likely to be influenced by those who are similar to them (homophilous) than by those



who are different (heterophilous). Extract H3 shows that physicians may consider information to be trustworthy if it comes from a homophilous source – other physicians. They may also regard information as credible if it comes from sources recommended (“from word of mouth”) by colleagues or from official sources such as NICE, the BNF (British National Formulary) or university websites. Credibility also relates to authority – “someone famous in the field” or “senior people”. The quotations in this extract seem to endorse the ISCM, but one of the authors’ comments requires clarification. When discussing the way in which physicians judge information and websites, Hughes et al. state: “In looking at the criteria doctors apply, the credibility construct is not as useful as information quality or cognitive authority in detailing doctors’ information judgments”. This view arises from their terminology. As discussed in part 3, the terms quality, credibility and cognitive authority used by Hughes et al. have much overlap in meaning. In the ISCM the broad terms credibility and utility encompass the concepts that underlie quality and cognitive authority. The study’s findings confirm the importance of these two overarching characteristics of information and sources as represented in the ISCM. The ISCM suggests that, having found information, the user assesses and processes it, using it to take actions or decisions or to increase his/her knowledge.

The study findings substantiate the model in this regard but also show that physicians often process information without properly evaluating it themselves (extract H4). Instead, they may assess information as credible because they obtain it from websites that they regard as reliable. Alternatively if information ties in with their existing knowledge they may judge it as appropriate without further investigation.

– **Extract H4**

*“If they are sites I rely on anyway, then a lot of it I won’t [validate] unless it’s a point of specific interest. So, probably about 5–10% of the time I’ll look at references and things... Generally when you are looking for something, say, for example, you want details of a particular symptom or disease, I vaguely know what to expect. If it seems sensible we use, which may not be very good practice, but it is something we do all the time... As stated previously, these evaluative judgments were, in fact, very rare. Moreover, only a few participants actually reported retrieving information from a*

*Web site new to them... Overall, the search process is highly biased towards sources of known information quality and cognitive authority...*" (Page 441)

The findings of this study support several aspects of the ISCM's representation of information behaviour, including:

- The influence of the information user's environmental context (work) and personal context (lack of knowledge) in generating information needs
- The influence of the user's perceptions of utility and credibility on the choice of information and sources, and the influence of the user's environmental context on these perceptions
- Information seeking and the activities involved
- The user's use of information to take decisions or actions or to increase knowledge

### **5.1 Review of the Information Seeking and Communication Model**

These findings indicate that the ISCM adequately represents key features of information users' behaviour and factors affecting it. However, the following modifications to the diagrammatic form of the model seem worthwhile. The study by Reddy and Jansen (2008) described in section 4.2 refers to collaborative information behaviour and information sharing between users. To make it clearer that information behaviour may involve information seeking, processing of information and taking decisions and actions on a joint basis and to depict information sharing more explicitly, the model can be amended to show more than one "information user" box as in Figure 5, with a two-way arrow (arrow) to show information sharing between users. This revision also has the merit of showing the parallels between users and providers: just as there may be several providers, who may communicate with each other (arrow), there may be several users, who may communicate with each other (arrow).

The model shows the outcome of successful information seeking as actions or decisions. The "Actions Decisions" box is intended to represent examples of outcomes of information seeking. Another outcome may be filling gaps in knowledge as noted in the description of the ISCM in part 4 and as found by Lacey Bryant (2004) and Hughes *et al.* (extract H1 above). To reflect this, the wording in the box can be changed to "Outcomes: actions, decisions, knowledge". Finally, for consistency, it is appropriate to use similar wording in the two boxes referring to

the handling of information. The model describes the handling of information received in communications as “Assess, use or ignore communication”, whereas that for information found through seeking is “Assess and process information”. The meaning of the latter can be clarified by changing the wording to “Assess, use or dismiss information”.

The revised model incorporating all these changes is shown in Figure 5

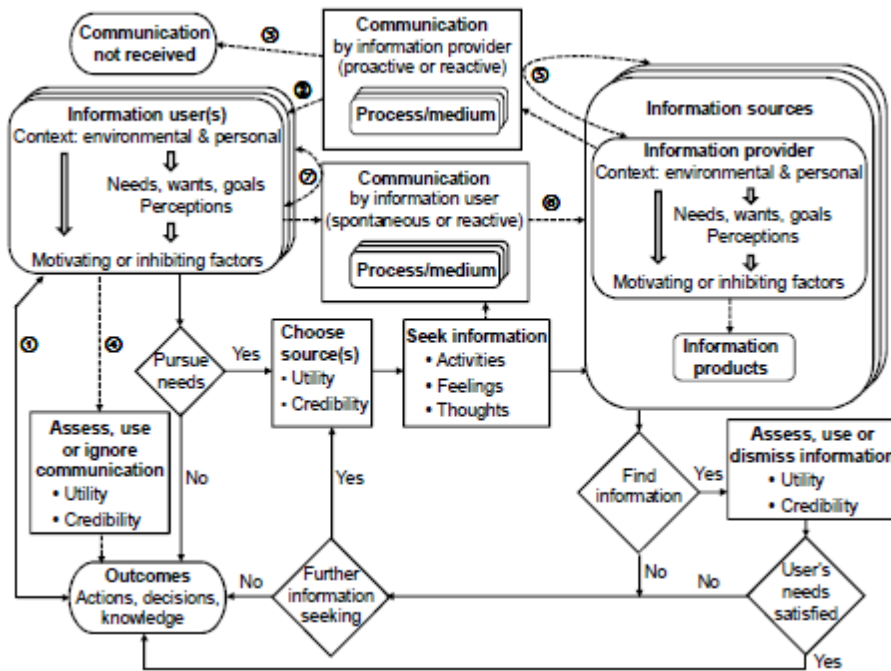


Figure 5. Revised information-seeking and communication model

## 5.2 Part Five- Summary and conclusions

The review of the literature on the information behaviour of physicians provides support for most of the concepts underlying the Information Seeking and Communication Model. Detailed content analysis of five representative reports from the literature provides substantial evidence of the validity of the model as it applies to physicians. According to the ISCM the information user’s context, including the working environment (role, tasks, resources available, time pressures, culture and other factors) and personal environment (knowledge, training, experience, psychological and other factors), plays a fundamental role in the user’s information behaviour. It not only stimulates the user’s information needs, it also colours the user’s perceptions of himself or herself, of others and of information and sources.

The model shows utility and credibility of information and sources as particularly important perceptions affecting the user's choice of sources and use of information. Contextual factors also determine motivating and inhibiting factors that encourage or discourage the user when deciding whether or not to seek information. The five studies together provide evidence that all of this is true with regard to physicians' information behaviour. They provide examples of the activities of physicians in seeking information and some of the thoughts and feelings they may have as they seek information. They also provide examples of physicians' processing and assessing information and using it to make decisions, take actions or to increase their knowledge. The model also depicts a two-way flow of information, as shown in Figure 3 and by the exchange of information between providers represented by arrow - in Figure 5 or between users represented by arrow. The user and provider roles are thus interchangeable: a user can become a provider and vice versa. This aspect of information behaviour was demonstrated in the study of Reddy and Jansen (2008), which reported that physicians and other health care professionals may act in collaboration to seek information, share it and use it together. The modified version of the ISCM in Figure 5 shows single or multiple information users to emphasize that information users do not necessarily act alone. The literature reviewed here on physicians' information behaviour therefore endorses much of the model. However, it provides little or no detail about the actions of external information providers, the contextual factors that affect them, their goals, or their activities in producing information products or in communicating. Evidence about the information behaviour of information providers and the validity of the model as applied to them was obtained by empirical research into the activities of pharmaceutical companies and the National Institute for Health and Care Excellence (NICE). Recommendations will be in part two of this research.

## References

- Andrews J.E., Pearce K.A., Ireson, C. and Love M.M. (2005) Information-seeking behaviours of practitioners in a primary care practice-based research network (PBRN). *Journal of the Medical Library Association* 93(2): 206-212.
- Anfara V.A., Brown K.M. and Mangione T.L. (2002) Qualitative analysis on stage: making the research process more public. *Educational Researcher* 31(7): 28-38.
- Anonymous (1995) Evidence-based medicine, in its place. *Lancet* 346: 785.
- Anonymous (2001) Why not zanamivir? *Drug and Therapeutics Bulletin* 39: 9-10.
- Anshel M.H. (2001) Qualitative validation of a model for coping with acute stress in sport. *Journal of Sport Behavior* 23(3): 223-246.
- Bacigalupe G. (2011) Is there a role for social technologies in collaborative healthcare? *Families, Systems, & Health* 29(1): 1-14.
- Bandura A. (1977) Self-efficacy: toward a unifying theory of behavioural change. *Psychological review* 84: 191-215.
- Bandura A. (1994) Self-efficacy. In: Ramachandran V.S., ed. *Encyclopaedia of Human Behavior*, Academic Press, New York, Vol.4, 71-81.
- Bao X. and Bouthillier F. (2007) Information sharing as a type of information behavior. *Proceedings of the 35th Annual Conference of the Canadian Association for Information Science*, McGill University, 10 - 12 May 2007, Montreal, Quebec. Available at: [http://www.caais-acs.ca/proceedings/2007/bao\\_2007.pdf](http://www.caais-acs.ca/proceedings/2007/bao_2007.pdf)
- Baran S.J. and Davies D.K. (2003) *Mass Communication Theory Foundations, Ferment and Future*. Third Edition. Wadsworth/Thomson Learning, Belmont, CA
- Bates M.J. (2002) Toward an integrated model of information seeking and searching. Paper presented at the 4th International Conference on Information Needs, Seeking and Use in Different Contexts, Lisbon, September 11-13, 2002. Available at: [http://www.gseis.ucla.edu/faculty/bates/articles/info\\_SeekSearch-i-030329.html](http://www.gseis.ucla.edu/faculty/bates/articles/info_SeekSearch-i-030329.html)

- Bates M.J. (2005) An introduction to metatheories, theories, and models. In: Fisher K.E., Erdelez, S. and McKechnie L. eds. *Theories of Information Behavior*, Information Today, Inc., Medford, New Jersey, pp. 1-24.
- Bawden D. (2006) Users, user studies and human information behaviour. A threedecade perspective on Tom Wilson's "On user studies and information needs". *Journal of Documentation* 62(6): 671-679.
- Baxter, J. and Eyles J. (1997) Evaluating qualitative research in social geography: establishing 'rigour' in interview analysis. *Transactions of the Institute of British Geographers*. 22(4): 505-525.
- Bennett N.L., Casebeer L.L., Kristofco R. and Strasser S.M. (2004) Physicians' Internet information-seeking behaviours. *Journal of Continuing Education in the Health Professions* 24: 31-38.
- Bennett N.L., Casebeer L.L., Kristofco R. and Collins B.C. (2005) Family physicians' information seeking behaviours: a survey comparison with other specialties. *BMC Medical Informatics and Decision Making* 5:9 doi: 10.1186/1472-6947-5-9 Available at: <http://www.biomedcentral.com/1472-6947/5/9>
- Berben S.A., Van De Belt T.H., Engelen L.J.I. and Schoonhoven L. (2011) Social media in european hospitals: a descriptive study. Paper presented at Medicine 2.0'11: 4th World Congress on Social Media, Mobile Apps, and Internet/Web 2.0 in Medicine, Health & Biomedical Research, Stanford University, USA, 16-18 September 2011. Available at: <http://www.medicine20congress.com/ocs/index.php/med/med2011/paper/view/576>
- Beverley C.A., Bath, P.A. and Barber R. (2007) Can two established information models explain the information behaviour of visually impaired people seeking health and social care information? *Journal of Documentation* 63(1): 9-32.
- Black, E.W., Thompson, L.A., Duff, W.P., Dawson, K., Saliba H. and Black N.M.P. (2010) Revisiting social network utilization by physicians-in-training. *Journal of Graduate Medical Education*, June 2010: 289-293.

Black I. and Tagg S. (2007) A grounded theory of doctors' information search behaviour. Implications for information provision, pharmaceutical market entry and development. *Journal of Marketing Management* 23(3-4): 347-366.

Boissel J.P., Amsallem E., Cucherat M., Nony P. and Haugh M.C. (2004) Bridging the gap between therapeutic research results and physician prescribing decisions: knowledge transfer, a prerequisite to knowledge translation. *European Journal of Clinical Pharmacology* 60(9): 609-16.

Booth, A. and Brice, A. (2004) Appraising the evidence. In: Booth, A. and Brice, A., eds. *Evidence-based Practice for Information Professionals: a Handbook*. Facet Publishing, London, Chapter 9.

Bradley J. (1993) Methodological issues and practices in qualitative research. *Library Quarterly* 63(4): 431-449

Buchan H., Sewell J.R., Sweet M. (2004) Translating evidence into practice. *Medical Journal of Australia* 180 (Supplement): S43-S44.

Cantrill J.A. (2008) Measuring the appropriateness of long-term prescribing in United Kingdom general practice – is the British National Formulary the 'Gold Standard'? *Journal of Clinical Pharmacy and Therapeutics* 25(5): 341-346.

Cardarelli R., Licciardone J.C. and Taylor L.G. (2006) A cross-sectional evidence based review of pharmaceutical marketing brochures and their underlying studies: is what they tell us important and true? *BMC Family Practice* 7: 13-18.

Case D.O. (2002) *Looking for Information. A Survey of Research on Information Seeking, Needs, and Behavior*, Academic Press, San Diego.

Case D.O. (2012) *Looking for Information. A Survey of Research on Information Seeking, Needs, and Behavior*, Third Edition, Emerald Group Publishing Limited, Bingley, UK.

Case D.O., Andrews J.E., Johnson J.D. and Allard S.L. (2005) Avoiding versus seeking: the relationship of information seeking to avoidance, blunting, coping, dissonance, and related concepts. *Journal of the Medical Library Association* 93(3): 353- 362.

- Casebeer L., Bennett N., Kristofco, R., Carillo A. and Centor R. (2002) Physician Internet medical information seeking and on-line continuing education use patterns. *Journal of Continuing Education in the Health Professions* 22: 33-42.
- Charlton B.G. and Miles A. (1998) The rise and fall of EBM. *Quarterly Journal of Medicine* 91:371–374.
- Checkland K., Harrison S. and Marshall M. (2007) Is the metaphor of ‘barriers to change’ useful in understanding implementation? Evidence from general medical practice. *Journal of Health Services Research Policy* 12(2): 95-100.
- Chidgey J., Leng G. and Lacey T. (2007) Implementing NICE guidance. *Journal of the Royal Society of Medicine* 100: 448-452.
- Choo C.W., Detlor B., and Turnbull D. (2000) Information seeking on the web: an integrated model of browsing and searching. *First Monday* 5(2). Available at: <http://firstmonday.org/htbin/cgiwrap/bin/ojs/index.php/fm/article/view/729/638>
- Choo C.W., Furness C., Paquette S., van den Berg H., Detlor B. and others. (2006) Working with information: information management and culture in a professional services organization. *Journal of Information Science* 32(6): 491-510.
- Choudhry N.K., Fletcher, R.H. and Soumerai, S.B. (2005) Systematic review: the relationship between clinical experience and quality of health care. *Annals of Internal Medicine* 142: 260-273.
- Chu, L.F., Young, C., Zamora, A., Kurup, V. and Macario, A. (2010) Anesthesia 2.0: Internet-based information resources and Web 2.0 applications in anesthesia education. *Current Opinion in Anaesthesiology*, 23(2): 218–227.
- Cochrane A.L. (1972) *Effectiveness and Efficiency. Random Reflections on Health Services.* London: Nuffield Provincial Hospitals Trust.
- Cochrane L.J., Olson C.A., Murray S., Dupuis M., Tooman T. and Hayes S. (2007) Gaps between knowing and doing: understanding and assessing the barriers to optimal health care. *Journal of Continuing Education in the Health Professions* 27(2): 94-102



Cohen A.M., Stavri P.Z. and Hersh W.R. (2004) A categorization and analysis of the criticisms of Evidence-Based Medicine. *International Journal of Medical Informatics* 73: 35-43.

Cohen D.J. and Crabtree B.F. (2008) Evaluative criteria for qualitative research in health care: controversies and recommendations. *Annals of Family Medicine* 6: 331- 339.

Cohn J.N. (1996) Evidence-based medicine: what is the evidence? *Journal of Cardiac Failure* 2(3): 159-161.

Coiera E. (2006) Communication systems in healthcare. *Clinical Biochemist Reviews* 27(2): 89–98.

Coiera E. (2008) Communication in emergency medical teams. In: Crosskerry P., Cosby K. S., Schenkel S. and Wears R. (eds.) *Patient Safety in Emergency Medicine*. Lippincott Williams and Wilkins, Philadelphia.

Coiera E. and Tombs V. (1998) Communication behaviours in a hospital setting: an observational study. *British Medical Journal* 316: 673–676.

Collier J & Iheanacho I. (2002) The pharmaceutical industry as an informant. *Lancet* 360: 1405-9.

Connelly D.P., Rich E.C., Curley S.P., Kelly J.T. (1990) Knowledge resource preferences of family physicians. *Journal of Family Practice* 30(3): 353-9.

Coumou H.C.H. and Meijman F.J. (2006) How do primary care physicians seek answers to clinical questions? A literature review. *Journal of the Medical Library Association* 94(1): 55-60.

Covell D.G., Uman G.C. and Manning P.R. (1985) Information needs in office practice: are they being met? *Annals of Internal Medicine* 103(4): 596-9

Cullen R. (2002) In search of evidence: family practitioners' use of the Internet for clinical information. *Journal of the Medical Library Association* 90(4): 370-379.

Cullen R., Clark M. and Esson R. (2011) Evidence-based information-seeking skills of junior doctors entering the workforce: an evaluation of the impact of information literacy training during pre-clinical years. *Health Information and Libraries Journal* 28: 119-129.

- Curley S.P., Connelly D.P. and Rich E.C. (1990) Physicians' use of medical knowledge resources: preliminary theoretical framework and findings. *Medical Decision Making*: 10(4): 231-241.
- Davis D., Evans M., Jadad A., Perrier L., Rath D. and others. (2003) The case for knowledge translation: shortening the journey from evidence to effect. *British Medical Journal* 327: 33-35.
- Davies K. (2007) The information-seeking behaviour of doctors: a review of the evidence. *Health Information and Libraries Journal* 24(2): 78-94.
- Davies K. (2011) Information needs and barriers to accessing electronic information: hospital-based physicians compared to primary care physicians. *Journal of Hospital Librarianship* 11(3): 249-260.
- Dawes M. and Sampson U. (2003) Knowledge management in clinical practice: a systematic review of information seeking behavior in physicians. *International Journal of Medical Informatics* 71(1): 9-15.
- Delamothe T. (1993) Wanted; guidelines that doctors will follow. *British Medical Journal* 307: 218.
- De Leo, G., LeRouge, C., Ceriani, C. and Niederman, F. (2006). Web sites most frequently used by physician for gathering medical information. *American Medical Informatics Association (AMIA) Annual Symposium Proceedings*, p. 902. Available at: [http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1839616/pdf/AMIA2006\\_0902.pdf](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1839616/pdf/AMIA2006_0902.pdf)
- DeLorme D.E., Huh J. and Reid L.N. (2011) Source selection in prescription drug information seeking and influencing factors: applying the comprehensive model of information seeking in an American context. *Journal of Health Communication* 16(7): 766-87.
- De Lusignan S. (2003) The National Health Service and the Internet. *Journal of the Royal Society of Medicine* 96: 490-493.
- Denzin N.K. (1978) *The Research Act: a Theoretical Introduction to Sociological Methods*, McGraw-Hill, New York.
- Dervin B. (2003) Human studies and user studies: a call for methodological interdisciplinary.

Information Research 9(1): paper 166. Available at: <http://InformationR.net/ir/9-1/paper166.html>

Dervin B. (2005) What methodology does to theory: sense-making methodology as metaphor. In: Fisher K.E., Erdelez, S. and McKechnie L. eds. *Theories of Information Behavior*, Information Today, Inc., Medford, New Jersey, pp. 25-29.

Dervin B., Foreman-Wernet L., Lauterbach E. (2003) *Sense-Making Methodology Reader. Selected Writings of Brenda Dervin*. Cresskill, New Jersey: Hampton Press Inc.

Detlefsen E.G. (1998) The information behaviours of life and health scientists and health care providers: characteristics of the research literature. *Bulletin of the Medical Library Association* 86(3): 385-390.

Dillon A. (2007) Library and information science as a research domain: problems and prospects. *Information Research*, 12(4) paper colis03. Available at: <http://InformationR.net/ir/12-4/colis/colis03.html>

Djulfbegovic B., Guyatt G.H. and Ashcroft R.E. (2009) Epistemologic inquiries in evidence-based medicine. *Cancer Control* 16(2): 158-168.

Doney L., Barlow H. and West J. (2005) Use of libraries and electronic information resources by primary care staff: outcomes from a survey. *Health Information and Libraries Journal* 22: 182-188.

Dorsch J.L. (2000) Information needs of rural health professionals: a review of the literature. *Bulletin of the Medical Library Association* 88(4): 346-354.

Doumit G., Gattellari M., Grimshaw J., O'Brien M.A. Local opinion leaders: effects on professional practice and health care outcomes. *Cochrane Database of Systematic Reviews* 2007, CD000125. DOI: 10.1002/14651858.CD000125.pub3. Available at: [http://www.mrw.interscience.wiley.com/cochrane/clsysrev/articles/CD000125/pdf\\_fs.html](http://www.mrw.interscience.wiley.com/cochrane/clsysrev/articles/CD000125/pdf_fs.html)

Ebell M. (1999) Information at the point of care: answering clinical questions. *Journal of the American Board of Family Practice* 12(3): 225-235.

Ellis D. (1989) A behavioural approach to information retrieval system design. *Journal of Documentation* 45(3): 171-212.

Ellis D. (1993) Modeling the information-seeking patterns of academic researchers: a grounded theory approach. *Library Quarterly* 63(4): 469-486.

Ellis D., Cox D. and Hall K. (1993) A comparison of the information seeking patterns of researchers in the physical and social sciences. *Journal of Documentation* 49(4): 356-369.

Ellis D. and Haugan M. (1997) Modelling the information seeking patterns of engineers and research scientists in an industrial environment. *Journal of Documentation* 53(4): 384-403.

Ellis D. (2005) Ellis's model of information-seeking behavior. In: Fisher K.E., Erdelez, S. and McKechnie L., eds. *Theories of Information Behavior*, Information Today, Inc., Medford, New Jersey, pp. 138-142.

Elo S. and Kyngäs H. (2007) The qualitative content analysis process. *Journal of Advanced Nursing* 62(1): 107-115.

Ely J.W., Osheroff J.A., Chambliss M.L., Ebell M.H. and Rosenbaum M.E. (2005) Answering physicians' clinical questions: obstacles and potential solutions. *Journal of the American Medical Informatics Association* 12(2): 217-224.

Evidence-Based Medicine Working Group (1992) Evidence-based medicine. A new approach to teaching the practice of medicine. *Journal of the American Medical Association* 268(17): 2420-2425.

Falagas, M., Pitsouni, E., Malietzis, G., & Pappas, G. (2008). Comparison of PubMed, Scopus, Web of Science, and Google Scholar: Strengths and weaknesses. *The FASEB Journal*, 22, 338–42.

Feather N.T. (1967) An expectancy-value model of information-seeking behavior. *Psychological Review* 74(5): 342-360.

Feinstein A.R. and Horwitz R.I. (1997) Problems in the "Evidence" of "Evidence based Medicine". *American Journal of Medicine* 103(6): 529-535.

Ferner R.E. and McDowell S.E. (2006) How NICE may be outflanked. *British Medical Journal* 332: 1268-1271.

Fisher K.E., Erdelez, S. and McKechnie L. eds. (2005) *Theories of Information Behaviour*, Information Today, Inc., Medford, New Jersey.

- Fleming T.R. and DeMets D.L. (1996) Surrogate endpoints in clinical trials: are we being misled? *Annals of Internal Medicine* 125: 605-613.
- Ford N. (2012) *Introduction to Information Behaviour*. London: Facet Publishing.
- Ford N., Miller D. and Moss N. (2001) The role of individual differences in internet searching: an empirical study. *Journal of the American Society for Information Science and Technology* 52(12): 1049-1066.
- Forman J. and Damschroder L. (2007) Qualitative content analysis. In: Jacoby L and Siminoff LA. (eds) *Empirical Methods for Bioethics: A Primer (Advances in Bioethics, Volume 11)*, Emerald Group Publishing Limited, Bingley, UK, pp.39-62.
- Foster A. (2004) A non-linear model of information seeking behavior. *Journal of the American Society for Information Science and Technology* 55(3): 228-237.
- Foster A., Urquhart C. and Turner J. (2008) Validating coding for a theoretical model of information behaviour. *Information Research* 13(4) paper 358 Available at <http://informationr.net/ir/13-4/paper358.html>
- Fourie I. (2009) Learning from research on the information behaviour of healthcare professionals: a review of the literature 2004-2008 with a focus on emotion. *Health Information and Libraries Journal* 26: 171-186.
- Freeman A.C. and Sweeney K. (2001) Why general practitioners do not implement evidence: qualitative study. *British Medical Journal* 323: 1-5.
- Gagliardi A.R., Brouwers, M.C., Palda, V.A., Lemieux-Charles L. and Grimshaw, J.M. (2011) How can we improve guideline use? A conceptual framework of implementability. *Implementation Science* 6:26.
- Gerbner G. (1956) Toward a general model of communication. *Audio-Visual Communication Review* 4: 171-199.
- Gjersvik P., Nylenna M. and Aadland O. (2002) Use of the Internet among dermatologists in the United Kingdom, Sweden and Norway. *Dermatology Online Journal* 8(2): 1

Glasziou P., Del Mar C. And Salisbury J. (2003) Evidence-based Medicine Workbook. London: BMJ Books.

Gleick J. (2012) The Information. Fourth Estate, London.

Godbold N. (2006) Beyond information seeking: towards a general model of information behaviour. Information Research 11(4) paper 269 Available at <http://InformationR.net/ir/11-4/paper269.html>

Goldacre B. (2012) Bad Pharma. Fourth Estate, London.

Goldenberg M.J. (2006) On evidence and evidence-based medicine: lessons from the philosophy of science. Social Science & Medicine 62: 2621-2632.

Goldenberg M.J. (2009) Iconoclast or Creed? Objectivism, pragmatism, and the hierarchy of evidence. Perspectives in Biology and Medicine 52(2):168–187.

Goldenberg M.J. (2010) From Popperian science to normal science. Commentary on Sestini (2009) 'Epistemology and ethics of evidence-based medicine'. Journal of Evaluation in Clinical Practice 16: 306-309.

Goodall G.R. (2004) Information behaviour paradigms: A modest proposal for reform. Available at: [http://www.deregulo.com/facetation/pdfs/goodall\\_compQuestion2\\_final.pdf](http://www.deregulo.com/facetation/pdfs/goodall_compQuestion2_final.pdf)

Gorman P.N. (1995) Information needs of physicians. Journal of the American Society for Information Science 46(10): 729-736.

Gorman P. (1999) Information seeking of primary care physicians: conceptual models and empirical studies. In exploring the contexts of information behaviour. Proceedings of the Second International Conference on Research in Information Needs, Seeking and Use in Different Contexts, Sheffield, UK, 1998, edited by T.D. Wilson and D.K. Allen, Taylor Graham Publishing, London and Los Angeles, pp. 226-240.

Gorman P.N. and Helfand M. (1995) Information seeking in primary care: how physicians choose which clinical questions to pursue and which to leave unanswered. Medical Decision Making 15(2): 113-9.

Gorman, P.N., Yao P. and Seshadri V. (2004) Finding the answers in primary care: information seeking by rural and nonrural clinicians. Medinfo 11(Pt 2): 1133-7.

Gosall N. and Gosall G. (2012) *The Doctor's Guide to Critical Appraisal*. Third edition. Knutsford: PasTest.

Grahame-Smith D. (1995) Evidence based medicine: Socratic dissent. *British Medical Journal* 310: 1126-1127.

Graneheim U.H. and Lundman B. (2004) Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. *Nurse Education Today* 24: 105-112.

Gray J.A.M. (1997) *Evidence-based Healthcare. How to Make Health Policy and Management Decisions*. New York, Edinburgh, London: Churchill Livingstone. 273

Green J. and Britten N. (1998) Qualitative research and evidence based medicine. *British Medical Journal* 316: 1230-1232.

Green M.L. and Ruff T.R. (2005) Why do residents fail to answer their clinical questions? A qualitative study of barriers to practicing evidence-based medicine. *Academic Medicine* 80(2): 176-182.

Greenhalgh T. (2002) Integrating qualitative research into evidence based practice. *Endocrinology and Metabolism Clinics of North America* 31(3): 583-601.

Greenhalgh T. (2010) *How to Read a Paper. The basics of evidence-based medicine*. Fourth edition. Oxford: Wiley-Blackwell.

Grol R. and Grimshaw J. (2003) From best evidence to best practice: effective implementation of change in patients' care. *Lancet* 363: 1225-1230.

Gruppen L.D. (1990) Physician information seeking: improving relevance through research. *Bulletin of the Medical Libraries Association* 78(2): 165-172.

Gupta M. (2003) A critical appraisal of evidence-based medicine: some ethical considerations. *Journal of Evaluation in Clinical Practice* 9(2): 111-121.

Guyatt G.H. and Rennie D. (1993) Users' guides to reading the medical literature. *Journal of the American Medical Association* 270: 2096-7

Hughes B., Wareham J. and Joshi I. (2010) Doctors' online information needs, cognitive search strategies, and judgments of information quality and cognitive authority: How predictive judgments introduce bias into cognitive search models. *Journal of the American Society for Information Science and Technology* 61(3): 433- 452.

Hyldegård J. (2006) Collaborative information behaviour – exploring Kuhlthau's information search process model in a group-based educational setting. *Information Processing & Management* 42: 276-298.

Ingwersen P. and Järvelin K. (2005) *The Turn. Integration of Information Seeking and Retrieval in Context*, Springer, Dordrecht.

Jacobson L.D., Edwards A.G.K., Granier, S.K. and Butler C.C. (1997) Evidence based medicine and general practice. *British Journal of General Practice* 47:449- 452.

Järvelin K. and Vakkari P. (1990) Content analysis of research articles in library and information science. *Library and Information Science Research* 12: 395-421.

Järvelin K. and Vakkari P. (1993) The evolution of library and information science 1965-1985: a content analysis of journal articles. *Information Processing and Management* 29(1): 129-144.

Järvelin K. and Wilson T.D. (2003) On conceptual models for information seeking and retrieval. *Information Research* 9(1) paper 163 Available at <http://InformationR.net/ir/9-1/paper163.html>.

Johnson J.D. (1997) *Cancer-related Information Seeking*, Hampton Press, Cresskill, New Jersey.

Johnson J.D., Donohue W.A., Atkin C.K. and Johnson S. (1995) A Comprehensive Model of Information Seeking: tests focusing on a technical organization. *Science Communication* 16(3): 274-303

Johnson J.D., Andrews J.E. and Allard S. (2001) A model for understanding and affecting cancer genetics information seeking. *Library & Information Science Research* 23: 335-349.



Jones M.I., Greenfield S.M. & Bradley C.P. (2001) Prescribing new drugs: qualitative study of influences on consultants and general practitioners. *British Medical Journal* 323: 1-7.

Julien H & Duggan L.J. (2000) A longitudinal analysis of the information needs and uses literature. *Library & Information Science Research* 22(3): 291-309

Kasila K., Poskiparta M., Karhila P. and Kettunen T. (2003) Patients' readiness for dietary change at the beginning of counselling: a trans-theoretical model-based assessment. *Journal of Human Nutrition and Dietetics*, 16: 159-166.

Katz E. and Lazarsfeld P.F. (1955) *Personal Influence: the Part Played by People in the Flow of Communications*, Free Press, New York.

Kenny N.P. (1997) Does good science make good medicine? *Canadian Medical Association Journal* 157:33-6.

Kerins G., Madden R. and Fulton C. (2004). Information-seeking and students studying for professional careers: the cases of engineering and law students in Ireland. *Information Research*, 10(1), paper 208. Available at: <http://InformationR.net/ir/10-1/paper208.html>276

Kotler P. (1991) *Marketing Management: Analysis, Planning, Implementation, and Control*. Seventh edition. Prentice Hall, New Jersey.

Krikelas J. (1983) Information-seeking behaviour: patterns and concepts. *Drexel Library Quarterly* 19: 5-20.

Krippendorff K. (2004) *Content Analysis: An Introduction to Its Methodology*. Second edition. SAGE Publications, London.

Kuhlthau C.C. (1991) Inside the search process: information seeking from the user's perspective. *Journal of the American Society for Information Science and Technology* 42(5): 361-371.

Kuhlthau C.C. (1999) The role of experience in the information search process of an early career information worker: perceptions of uncertainty, complexity, construction, and sources. *Journal of the American Society for Information Science* 50(5): 399- 412.

Kuhlthau C.C. and Tama S.L. (2001). Information search process of lawyers: a call for 'just for me' information services. *Journal of Documentation* 57(1): 25-43.

- Kuhlthau C.C. (2005) Kuhlthau's information search process. In: Fisher K.E., Erdelez, S. and McKechnie L. eds. *Theories of Information Behavior*, Information Today, Inc., Medford, New Jersey, pp. 230-234.
- Kuhlthau C.C., Heinstrom J. and Todd R.J. (2008) The 'information search process' revisited: is the model still useful? *Information Research*, 13(4) paper 355. Available at <http://InformationR.net/ir/13-4/paper355.html>
- Kvale S. (2007) *Doing Interviews*, SAGE Publications, London.
- Lacey Bryant S. (2000) The information needs and information seeking behaviour of family doctors: a selective literature review. *Health Libraries Review* 17: 83-90.
- Lacey Bryant S. (2004) The information needs and information seeking behaviour of family doctors. *Health Information and Libraries Journal* 21: 84-93.
- Leckie G.J., Pettigrew K.E. and Sylvain C. (1996) Modeling the information seeking of professionals: a general model derived from research on engineers, health care professionals, and lawyers. *Library Quarterly* 66(2): 161-193.
- Leckie G.J. (2005) General model of the information seeking of professionals. In: Fisher K.E., Erdelez, S. and McKechnie L. eds. *Theories of Information Behavior*, Information Today, Inc., Medford, New Jersey, pp. 158-163.
- Levy R. (1994) The role and value of pharmaceutical marketing. *Archives of Family Medicine* 3: 327-332.
- Lexchin J. (1993) Interactions between physicians and the pharmaceutical industry: what does the literature say? *Canadian Medical Association Journal* 149: 1401-7.
- Lexchin J. (1997) What information do physicians receive from pharmaceutical representatives? *Canadian Family Physician*
- Lincoln Y.S. and Guba E.G. (1985) *Naturalistic Inquiry*. Sage Publications, Newbury Park, California.
- Locock L., Dopson S., Chambers D., Gabbay J. (2001) Understanding the role of opinion leaders in improving clinical effectiveness. *Social Science & Medicine* 53(6): 745-757

- Longmore M., Wilkinson, I.B. and Rajagopalan, S.R. (2004) Oxford Handbook of Clinical Medicine. Sixth edition. Oxford University Press, Oxford.
- McCaw B, McGlade K and McElnay J. (2007) The impact of the internet on the practice of general practitioners and community pharmacists in Northern Ireland.
- Wilson S.M. (1999) Impact of the Internet on primary care staff in Glasgow. *Journal of Medical Internet Research* 1(2): e7. doi: 10.2196/jmir.1.2.e7. Available at <http://www.jmir.org/1999/2/e7/HTML>
- Wilson T.D. (1981) On user studies and information needs. *Journal of Documentation* 37(1): 3-15.
- Wilson T.D. (1997) Information behaviour: an interdisciplinary perspective. *Information Processing & Management* 33(4): 551-572.
- Wilson T.D. (1999) Models in information behaviour research. *Journal of Documentation* 55(3): 249-270.
- Wilson T.D. (2000) Human information behavior. *Informing Science* 3(2): 49-55.
- Wilson T.D. (2005) Evolution in information behaviour modeling: Wilson's model. In: Fisher K.E., Erdelez, S. and McKechnie L. eds. *Theories of Information Behavior*, Information Today, Inc., Medford, New Jersey, pp. 31-36.
- Wilson T.D. (2010) Information sharing: an exploration of the literature and some propositions. *Information Research*, 15(4) paper 440. Available at <http://InformationR.net/ir/15-4/paper440.html>
- Wilson T.D. and Maceviciuti E. eds. (2012) *Theory in Information Behaviour Research: An Information Research Reader*. London: Facet Publishing.
- Wilson T. and Walsh C. (1996) Information behaviour: an interdisciplinary perspective. *British Library Research and Innovation Report* 10. Available at: <http://informationr.net/tdw/publ/infbehav/>
- Windahl S., Signitzer B. and Olson J.T. (2009) *Using Communication Theory*, second edition, Sage, Los Angeles.