


# BMJ Open What information sources do Dutch medical specialists use in medical decision-making: a qualitative interview study

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## ABSTRACT

**Objective** To explore what information sources medical specialists currently use to inform their medical decision-making.

**Design** Qualitative, semistructured interviews.

**Setting and participants** A total of 20 semistructured interviews were conducted with 10 surgeons and 10 internal medicine specialists who work in academic and/or regional hospitals in the Netherlands.

**Results** Medical specialists reported that they primarily rely on their general knowledge and experience, rather than actively using information sources. The sources they use to update their knowledge can be categorised into 'scientific publications', 'guidelines or protocols', and 'presentations and meetings'. When medical specialists feel their general knowledge and experience are insufficient, they use three different approaches to find answers in response to clinical questions: consulting a colleague, actively searching the literature and asking someone else to search the literature.

**Conclusion** Medical specialists use information sources to update their general knowledge and to find answers to specific clinical questions when they feel their general knowledge and experience are insufficient. An important finding is that medical specialists prefer accessible information sources (eg, consulting colleagues) over existing evidence-based medicine tools.

## INTRODUCTION

The original definition of evidence-based medicine (EBM) in medical decision-making is combining current best available evidence, patient preferences and medical specialists' expertise to provide the best healthcare for individual patients.<sup>1 2</sup> With every clinical encounter, a new clinical question could arise.<sup>3-5</sup> To answer these clinical questions, medical specialists can use an extensive amount of different information sources to extract the best available evidence for these medical decisions like textbooks, original scientific publications, consulting colleagues or EBM tools.<sup>6-8</sup> Examples of these EBM tools that have the mutual purpose of providing medical specialists with the best available

## STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ The used qualitative study design allows an in-depth understanding of the use of information sources by medical specialists in their working environment.
- ⇒ This study explored information source usage for clinical decision-making and updating knowledge, while previous research only focused on either clinical decision-making or updating knowledge.
- ⇒ This study provides no quantitative data on the use of information sources.
- ⇒ Interviews performed by a single researcher.

evidence to practise EBM are among others: systematic reviews and meta-analyses, medical scientific synthesis websites, evidence-based clinical practice guidelines and continuous medical education (CME) programmes.

The last decades, the total body of medical scientific knowledge as well as the different EBM tools that are used to disseminate evidence to medical specialists have grown enormously. It is unknown, however, how this increase of information sources has influenced medical decision-making by medical specialists.<sup>9 10</sup> To efficiently provide medical specialists in the future with the right evidence at the right time, it is important to understand what information sources are currently used by medical specialists in clinical practice in their medical decision-making. Earlier research on this subject is either from the non-digital era<sup>5 6</sup> or has merely focused on digital information sources.<sup>11-14</sup> Knowledge on current information source usage of medical specialists provides policymakers and developers of clinical practice guidelines valuable information to optimise the dissemination and implementation strategies of different EBM tools, which in turn, and in line with EBM, will provide medical specialists with easier ways of applying the best available evidence at the point of care.

The aim of this study was therefore to explore what information sources medical specialists currently use to inform their medical decision-making.

## METHODS

To explore the different information sources that medical specialists use in medical decision-making, we used a qualitative study design consisting of semistructured interviews with surgeons and internal medicine specialists. A qualitative study design was best fitting as the research questions demanded for an in-depth understanding of a real-world working environment. We selected surgeons and internal medicine specialists to cover both surgical and non-surgical physicians' use of information sources. Patient/public involvement was not feasible for this research question as it focuses on information source management of medical specialists. Privacy of respondents was secured following the Algemene Verordening Gegevensbescherming, which is the Dutch interpretation of the General Data Protection Regulation. All results were reported according to the COnsolidated criteria for REporting Qualitative research checklist.<sup>15</sup>

### Patient and public involvement

As this study focuses on the information source use of medical specialists, patients were not involved in this study.

### Participant selection

A list of all internal medicine specialists as well as surgeons within the Leiden region in the Netherlands was composed. This list consisted of 96 surgeons and 114 internal medicine specialists. The region includes two small general hospitals (480 and 350 hospital beds), two large regional teaching hospitals (950 and 850 hospital beds) and one academic medical centre (850 hospital beds). Initially, 10 surgeons and 10 internal medicine specialists were invited to participate in our interview. They were randomly selected from the previously mentioned list. Random sampling was chosen to avoid selection bias. The invitation email was sent by JH, department head in the university medical centre. When an invited surgeon or internal medicine specialist did not respond to our invitation, a reminder was sent after 1 and 2 weeks. After initial invitation and follow-up emails, FW reached out to potential respondents over the phone. When a possible participant did not respond or did not want to participate, the random draw was repeated until at least 10 surgeons and 10 internal medicine specialists were willing to participate. We chose a sample size of 20 respondents in line with current literature, which shows a probable minimum of 17 interviews to reach data saturation.<sup>16</sup> Eventually, 30 medical specialists had to be drawn from the composed list. Ten specialists either did not respond or did not want to participate. The main reason for declining participation given by the specialists was that they did not have time for an interview of 1 hour.

We aimed to plan more interviews only when the initial sample size was not sufficient to reach data saturation (see the Data analysis section).

### Data collection

An interview topic guide was developed in consensus with the whole research team. Two pilot interviews were conducted with surgeons to test comprehensibility. The pilot interviews were not included in the analysis. The topic guide (online supplemental appendix 1) included two main questions which focused on the information sources used in clinical decision-making. The first question focused on information sources used in clinical decision-making of the last clinical encounter before the interview was performed. With this question, we aimed to invite the respondents to stay close to their personal approach of information source usage. The second question described a hypothetical yet realistic situation where the medical specialists did not know what the best medical decision would be. All medical specialists will find themselves in this situation occasionally which demands for the active use of information sources.

All semistructured interviews were conducted via Microsoft Teams. Microsoft Teams was chosen as the COVID-19 pandemic hindered face-to-face contact and the research group possessed a professional Microsoft Office account which safeguarded data and privacy. The interviews were conducted in the last part of the pandemic period (second half of 2022). The normal daily activities of medical specialists were no longer interfered with by patients with COVID-19. All interviews were performed by FW, a medical doctor also trained in qualitative interviewing and analysis techniques. No prior relationship was established between researcher and respondents. After receiving verbal consent from respondents, the interviews were recorded. The files were saved in a secure folder only accessible by the project team. The total interview time was obtained from the length the Teams call was connected. Due to connection issues, the actual interview time could be slightly shorter. Video recordings were transcribed in full and anonymised by removing the names of hospitals and personal information from the transcript. Transcripts were not returned to the participants for comment or correction. No repeat interviews were performed. All interviews were in Dutch; quotes and other interview data posted in this paper were translated into English. Participants did not receive any financial compensation for their time.

### Data analysis

Inductive thematic coding was performed to analyse the different information resources used by medical specialists using ATLAS.TI software V.22. Without predetermined themes, we coded all information sources stated in the interviews, which we later grouped into different themes. Analysis and interviewing were alternated to improve interviewing quality and promote data richness. In line with current qualitative methodology, data collection and

**Table 1** Interview respondents' demographics

	Total (N=20)
Male	11
Age (year (SD))	51 (6.8)
Surgeon/internal medicine	10/10
Working environment	
Academic medical centre	7
Regional hospital	13
PhD title	
Yes	14
No	5
In training	1
Average interview duration (min (SD))	48.7 (6.9)

analysis were alternated until data saturation was reached. Data saturation limits were set in accordance with literature, where no new themes and no new coding for a minimum of three straight interviews were found.<sup>17</sup> To promote intercoder reliability, two separate coders (FW and JvD) analysed interviews and discussed on different interpretations of codes and themes. JvD is an experienced research assistant of the medical decision-making department of Leiden University Medical Center. In case consensus was not reached, a third reviewer (LvB-V) would be involved. The analysis of both surgical and non-surgical medical specialists was conducted together in order to include both these perspectives on information sources eventually leading to an extensive overview.

## RESULTS

We conducted 10 interviews with surgeons and 10 interviews with internal medicine specialists. Background characteristics of the interviewees are shown in table 1. After 13 out of the planned 20 interviews, data saturation was reached. All interviews were however completed and analysed as they were already previously planned with the respondents; no new codes were added in these remaining seven interviews, further confirming that we reached data saturation.

Thematic analysis of the interview transcripts revealed that the majority of medical decision-making about the care of individual patients of medical specialists is based on their general medical knowledge and experience.

Well yeah, I think most decisions are just made because you already know what the options for that certain diagnosis are. You do not really need to think about it because you just know from experience. Of course it can change somehow to specific patient related factors but the general idea is there. (Internal medicine specialist 1)

Medical specialists thus indicated that their general knowledge and experience are the initial source of information for their medical decision-making. They only actively use other information sources to inform their

medical decision-making when they perceive that their knowledge and experience are insufficient to answer point-of-care clinical questions. Besides answering clinical questions, medical specialists also acknowledged that they use information sources to keep their general medical knowledge in line with the most recent evidence. In order to explore information source usage for updating medical knowledge also systematically, we extended the interview guide after the first two interviews with the following question: 'What information sources do you use to keep your general knowledge up to date?'.

This extension of the interview questions enabled us to explore the complete picture of information source usage by medical specialists to inform medical decision-making, which can be subdivided to information sources used for (1) updating medical knowledge for future medical decision-making, and for (2) answering point-of-care clinical questions in situations where medical specialists perceive that their general medical knowledge and experiences are insufficient. Analysis of the interview transcripts showed that updating medical knowledge and answering point-of-care clinical questions are two different processes that made use of (partly) different information sources.

Figure 1 visualises the information source usage in these two distinctly different situations.

### Information sources used for updating medical knowledge

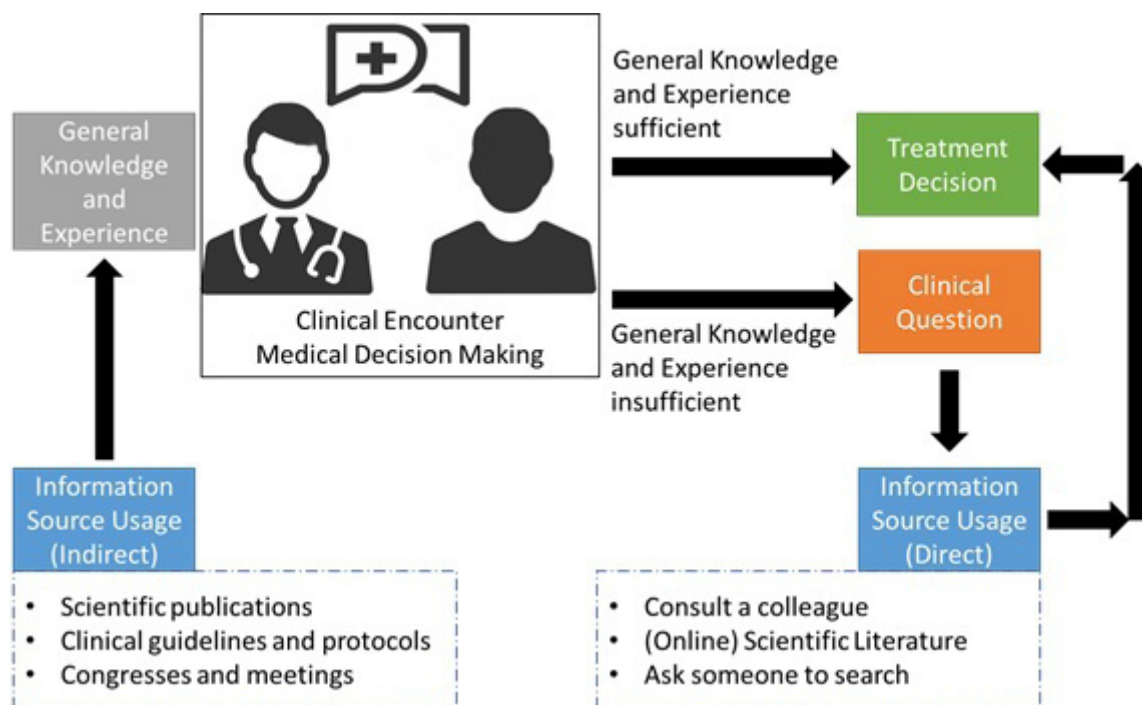
Medical specialists indicated that they use three main types of information sources to keep their general medical knowledge up to date: (1) scientific publications, (2) (inter)national clinical practice guidelines and local hospital protocols, and (3) presentations and meetings. Each of these main types can be subdivided into more specific information sources (see table 2). Because medical specialists use these information sources to update their knowledge and not to answer specific point-of-care clinical questions, we called these 'indirect information sources', as they indirectly influence medical decision-making.

The first type of information source includes (new) scientific publications. There are multiple ways in which these publications reach medical specialists. They are directly delivered by email to the respondent through an annual subscription on certain preselected scientific journals. They can also be delivered through an alert on PubMed with predefined parameters. Finally, the scientific associations of medical specialists send out preselected scientific publications.

The second type of information source includes (inter)national clinical practice guidelines and local hospital protocols. Respondents said they receive those guidelines through their respective associations of specialists. They stated that they usually scan these new documents to see what has changed since the previous edition of that guideline.

The last type of information source contains different forms of presentations and meetings. Part of the Dutch





**Figure 1** Information source usage of medical specialists.

CME programme, medical specialists need to gather a certain amount of accreditation points. These points can be awarded when attending designated congresses or following accredited courses. The medical specialists choose themselves what course or congress they want to attend and can pick from a wide variety. Furthermore, scientific research meetings and educational meetings during which short summaries are given of the best available evidence on a focused question (so-called ‘critically appraised topics’ (CATs)) are another source of indirect information.

### Information sources used for answering point-of-care clinical questions

When a patient presents itself with a pathology or specific case and the medical specialist perceives that his/her knowledge and experience are insufficient to surely decide what the best options are for that patient, medical specialists need to actively use information sources. The information sources used in this situation can be categorised in three different approaches to find answers to these point-of-care clinical questions. We named these ‘direct information sources’ as they directly influence medical decision-making by a medical specialist.

Table 3 includes an overview of these three approaches including the direct information sources used in these approaches.

The first approach is best summarised as ‘consult a colleague’, which consists of three different ways of asking for the opinion of a colleague. The first—and most preferred—option the respondents mentioned is to ask a colleague of their same specialty within the hospital what he/she would do in the specific case. Upon asking why this was the most preferred option, the majority of the

interviewees indicated that this was their preferred way of getting the answers to their point-of-care clinical questions because their colleagues are easy to reach and provide a quick response. The second option mentioned by the medical specialists in the interviews is to ask a colleague of the same specialty from a different hospital which is known to be an expert on the subject at hand. This can be a national or even international expert. The last option of posing questions to colleagues is during the change-of-shift report or multidisciplinary team meetings. These meetings are attended by multiple specialists, either from the same specialty or from different specialties altogether, and are therefore perfectly suitable for discussions about diagnostic or treatment decisions.

The second approach towards finding information to answer point-of-care clinical questions is described as ‘active search in (online) (scientific) literature’. This group contains a variety of different sources of (online) scientific literature, that is, PubMed, UpToDate, (inter) national guidelines, textbooks or online search engines. Guidelines were only mentioned when a medical specialist deemed himself/herself not to be an expert in that specific pathology. Information in guidelines on pathologies that are part of a medical specialists’ specialisation was considered to be part of their general knowledge by the interviewees.

The last approach of different information sources as stated by the respondents was ‘to ask someone to search for an answer to the point-of-care clinical question’. It is very common in Dutch hospitals to have scientific and educational meetings on fixed moments throughout the week. These meetings are also part of the curriculum of both medical students as well as residents. In those

**Table 2** Overview of different information sources stated by respondents in order to keep their knowledge up to date

Updating knowledge	
Indirect information sources	Quotes by respondents on stated information source
Scientific publications	
Subscription to scientific journal	'I have a subscription on a few big journals, the <i>Lancet</i> , <i>JAMA</i> , <i>The New England Journal of Medicine</i> . I briefly scan the titles usually to see if there is something relevant or interesting and then I decide to read the abstract or the whole paper.' (Internal medicine specialist 1)
Online alerts on PubMed	'On PubMed you can set an alert with different search parameters and frequencies for receiving the latest articles in your mailbox. It really depends on how much time I dedicate to it but I think it is a good way to see what is going on and what developments there are.' (Surgeon 4)
Literature through society of specialists	'Basically, all specialists are part of their respective scientific associations. For internal medicine this is the NIV (Netherlands Association of Internal Medicine). They provide us with a monthly newsletter containing some important, and sometimes unimportant (laughing), scientific publications.' (Internal medicine specialist 2)
Clinical guidelines or protocols	
Guideline national society of medical specialists	'Whenever a guideline is about to be updated we receive a concept version through the scientific association and are invited to give remarks. I usually scan these to see what has changed.' (Internal medicine specialist 1)
Guidelines international society of medical specialists	'I am also a member of the European society of vascular surgery (ESVS). In my opinion their guidelines are more extensive. Of course, you cannot read the whole thing but I do look at it when there is a relevant update.' (Surgeon 6)
Local hospital protocols	'In our hospital we have, in my opinion, a great way to update local protocols. Every colleague is responsible for certain protocols and to update them. And when it is updated we send them to all colleagues, residents and students. It's a great way to keep your knowledge up to par also for pathologies that you do not see every day.' (Internal medicine specialist 4)
Presentations and meetings	
Congresses	'Once or twice a year I go to an (inter)national congress. It is also to meet people but sometimes you hear about a new device or treatment that you want to try out.' (Surgeon 9)
Courses	'We have these 'nascholing cursussen' (Continue Medical Education courses). I have recently been to a Snapper cursus ( <a href="https://www.internisten.nl/vereniging/activiteiten/snapperinstituut">https://www.internisten.nl/vereniging/activiteiten/snapperinstituut</a> ) provided by the NIV. Which was really good! It is a few days and really high level. Very useful.' (Internal medicine specialist 2)
Scientific meetings in hospital	'Three times a year we have these so called Tumour boards, which is basically a dedicated meeting with all involved specialties for breast cancer in my case, but there is also one for colon cancer or melanoma for example. We keep ourselves updated about the latest research but also to make planning and logistics easier.' (Surgeon 5)
Presentation critically appraised topic by (junior) resident or intern	'Every other week we have some educational meetings in which a resident is paired with a surgeon to provide a presentation. These are very useful as it quite often entails a subject that has been questioned about in recent shift reports.' (Surgeon 4)

meetings, medical students and residents are asked to give short summaries of the best available evidence on a point-of-care clinical question (so-called 'CATs'<sup>18</sup>). This is introduced to promote critical thinking, EBM and information retrieval skills.

## DISCUSSION

A variety of information sources is used by medical specialists to inform their medical decision-making in daily clinical practice. Medical specialists regard their own general medical knowledge and experience as the main source of information in medical decision-making. Beyond this primary information source, two fundamentally distinct

situations were mentioned in which medical specialists use information sources: (1) information sources used while updating their knowledge (indirect sources) and (2) information sources used when addressing a specific point-of-care clinical question (direct sources). The information sources in these situations partially overlap (such as the use of guidelines) and in part are obviously different (such as attending a scientific congress for updating their knowledge).

The present study contributes significantly to the existing literature in two key areas. First, previous research has largely overlooked the importance of medical specialists' general knowledge and experience

**Table 3** Overview of different information sources stated by respondents when faced with a specific clinical question

Point-of-care clinical questions <i>Direct information sources</i>	Quotes by respondents on stated information source
Consult a colleague	
A direct colleague	'We have a very accessible culture here in our hospital, so when I have some doubts I will just ask a colleague what he/she would do. Either in person or over the phone. In the outpatient clinic it's easy but even during a night shift when there is honest doubt, every colleague would help out without a doubt.' (Surgeon 3)
A colleague from a different hospital	'Sometimes I just call or email someone from a different hospital about a very specific case. I know more or less who knows a lot about certain pathologies. You have your connections in that sense.' (Internal medicine specialist 4)
Multidisciplinary team meetings with multiple different specialists	'Every morning and afternoon we have the 'changing of shifts report'. As an emergency room (ER) internal medicine specialist in one of the busiest ER's of the Netherlands, I see all different kinds of patients and pathologies. So sometimes when I am not sure about something I consult my colleagues in the report, as at least one colleague from all sub-specialities (nephrology, infectiology, endocrinology etc) are present there you have a great deal of knowledge and experience present.' (Internal medicine specialist 8)
(Online) literature	
PubMed search	'Well first I would perform a PubMed search. Through the years you have become practical with the different search terms. So when I have a certain patient case and want to look if some new article are published on that subject I look there.' (Internal medicine specialist 2)
UpToDate search	'I really like UpToDate, to me they seem really thorough and professional in their searches. And also when I send them an email you see that it is run by people that actually like these subjects.' (Internal medicine specialist 2)
Cochrane Library	'Usually I start looking if there are any systematic reviews (SR) on my query. The Cochrane Library is, in my opinion, a highly respected institute for SRs and meta-analysis. So if there is a review in Cochrane library, I will definitely look into it to find an answer.' (Internal medicine specialist 3)
Textbooks	'Not so often, but sometimes, I have a look at a textbook, but just to check something simple of which I estimate it is not outdated yet. You are never sure though if it is still up to date. So textbooks should maybe be deemed obsolete, maybe only for pre-procedure anatomy checks.' (Surgeon 6)
Guidelines national society of medical specialists	'For a pathology I do not work with frequently I tend to look for a review article or sometimes the clinical practice guideline as well. You have <a href="http://www.richtlijndatabase.nl">www.richtlijndatabase.nl</a> (Dutch Medical Specialist Federation) where you can find guidelines on every subject. If you really know what you are looking for it can be helpful, they have to be recently updated though. If I see the guideline is more than 3 years old I will look for information in another way.' (Surgeon 2)
'To Google', online search engines	'Sometimes I just put my search terms in Google.com, it works very well, if you put the right terms you will usually find some of the latest published papers on the subject.' (Internal medicine specialist 1)
Ask someone to search for you	
Ask (junior) resident to perform a critically appraised topic (CAT) and report back to you	'During a morning round on the internal medicine ward I can think of multiple clinical questions that are interesting to look into. You just don't have the time really. So, I sometimes ask a resident to perform a so called CAT (critically appraised topic), which is also part of their curriculum. Which they then present at our weekly education meeting with other specialists and/or residents.' (Internal medicine specialist 8)

in shaping medical decisions. Instead, the focus has been primarily on predetermined information sources used to answer specific clinical questions.<sup>12 19 20</sup> Our qualitative methodology allowed respondents to share real-world experiences, revealing the critical role of general knowledge and experience in medical decision-making. It is important to note that this general knowledge may

not always align with the best available evidence, which is a fundamental principle of practising EBM. The vast and rapid expansion of medical scientific evidence poses challenges for individual medical specialists to keep their knowledge in line with the latest evidence. It can be inferred that the majority of medical decisions rely on the knowledge and expertise of medical specialists

rather than the best available evidence. Only when these specialists perceive that their knowledge is insufficient, they actively seek the latest available evidence. Second, the study sheds light on how medical specialists maintain and update their general knowledge. As this knowledge significantly impacts medical decision-making, understanding the various methods of staying up to date is crucial. Our respondents mentioned numerous ways of remaining current in their field.

The comprehensive overview of information sources obtained through this interview study could be instrumental for policymakers in ensuring that the best available evidence is presented in the preferred information sources of medical specialists. This, in turn, could enhance the quality and accuracy of medical decision-making.

The majority of information sources used by medical specialists to answer point-of-care clinical questions described in this study were consistent with current literature on this subject. Unlike the majority of quantitative survey research, the qualitative character of this study allowed us to gain more profound understanding of the information sources used to answer specific clinical questions. The results in this study show that although EBM is growing, the best available evidence is not always actively used in clinical practice. This is shown in the following insights. First, clinical practice guidelines (CPGs), a well-known EBM tool, were only named when the medical specialist did not perceive themselves to be up to date on that specific topic. It is questionable however if a medical specialist actually knows the specifics of every guideline on a pathology he/she works with regularly. This also goes against the current understanding of guideline developers on guideline usage. Guideline developers' aim for CPGs is that they will actively be used in clinical practice as they are a synthesis of the best available evidence.<sup>21</sup> When a medical specialist considers himself/herself to be up to date with the latest CPGs and therefore does not actively use this document in case of a clinical question, the actual purpose of a CPG becomes questionable.

Second, the results show that colleagues are preferred information sources for answering clinical questions because they are easy to reach and respond quickly. While colleagues' opinions could be valuable, they are not necessarily the equivalent of the best available evidence. Previous studies have shown that colleagues remain an important information source to answer clinical questions in spite of not being the best available evidence.<sup>22–24</sup> However, it could be advocated that seeking a colleague's opinion falls under the first pillar of EBM, since the clinical knowledge and expertise of an (experienced) colleague probably will have some overlap with best available evidence. The CPGs, on the other hand, do provide a synthesis of the best available evidence but are, in contrast to a colleague, rather inaccessible due to being large-sized documents and complex search tools. This was shown to be an important barrier to using these sound EBM tools in daily practice.<sup>25</sup> So, in order to improve the use of best available evidence in

evidence-based decision-making, policymakers and scientific associations should improve the accessibility of EBM tools like CPGs.<sup>26</sup> However, besides accessibility issues of EBM tools, there are also other factors that hamper the use of these tools in evidence-based decision-making, for example, the limited attention in EBM tools for individual preferences, circumstance and comorbidities. So, while accessibility of EBM tools may facilitate the use of best available evidence, it does not necessarily facilitate evidence-based decision-making.

We chose to select internal medicine specialists and surgeons as we hypothesised that these two distinctly different groups of medical specialists might use information sources in a different way. To combine both their views on information source usage, we were able to create a comprehensive overview of all information sources used by medical specialists.

Although this study provides important insights regarding information source usage of medical specialists, there are some limitations. First, to prevent response bias, we did not actively suggest information sources to our respondents. Although data saturation was reached, we cannot be sure that we indeed found all possible information sources used by medical specialists. Furthermore, the results may not be generalisable to other countries. After all, Dutch medical specialists all had similar education which could possibly differ from other countries and may influence the use of information sources for clinical questions. Specialty training in the Netherlands is considered of high level and includes specific attention towards EBM. Furthermore, studies from other countries on the use of information sources report comparable results.<sup>5 6 23</sup> Second, based on our research, we cannot determine to which extent the different information sources are used. However, qualitative research has the benefit that it explores deeper insights into real-world situations.<sup>27</sup> This allowed us to study information source usage in more detail and get more understanding about the information usage process, which could not be captured with quantitative data. Last, the results may be biased because all interviews were conducted by a single researcher. However, this researcher was trained in qualitative interviewing and analysis, and to improve the quality of interview data, coding and interviewing were alternated as advised by current literature.<sup>27</sup>

## Conclusion and future research

This interview study provides an overview of the information sources used by Dutch medical specialists in daily practice and whether sources are used to update general medical knowledge or to answer point-of-care clinical questions. This insight in current information source usage is the first step in initiatives that aim to improve the use of medical scientific evidence in medical decision-making. The existing gap between current information source usage and the desire for evidence-based decision-making based on real-time and up-to-date best available evidence highlight that improvements are possible.



Furthermore, it allows policymakers (guideline committees, EBM committees) to develop new EBM tools or improve dissemination strategies for existing EBM tools in such a way that they better connect with the routines of medical specialists' information source usage. When facilitated with the right information of high quality in an accessible way, a transition from experience-based decision-making towards more evidence-based decision-making could be made.

As the frequency of information source usage by medical specialists is still unknown, future research will be needed to quantify the use of different information sources. Furthermore, the preference of different information sources in different clinical situations needs further research as this will increase the total understanding of information source usage of medical specialists in clinical practice.

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**Contributors** FW wrote the ethical committee protocol, conducted interviews, performed the qualitative analysis and wrote the manuscript and acts as guarantor. JH, SR and LvB-V wrote the grant proposal, were present at project team meetings to discuss the developments of this study, corrected and added suggestions to the final manuscript.

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## Appendix 1: Interview Topic Guide

### General outline interview:

- Personal introductions
- Consent to record interview. Special attention for anonymous transcribing. Names, hospital names and other references leading to the respondent will not be transcribed.
- Explanation for the rationale of this interview:  
What information sources do medical specialists use to guide their medical decision making in clinical practice. Important to understand what the situation is now in order to assist medical specialists in the future with the right information at the right time.
- Explanation about the definition and scope of 'information sources':  
A broad interpretation of all different kinds of information used in medical decision making. We do not mean patient specific information (blood results, vital parameters, other diagnostic measures etc.)
- State our neutral scientific interest: we do not judge on what decision is made or what information sources are used to get to a decision.
- Invite the respondent to share their own experiences and personal ways in using information sources. Specifically not what they think should be the best strategy or what they have seen others do.

### Respondents background:

- Age: ....
- Sex M/F
- Working environment (multiple options possible):  
Academical hospital ☐ , Non-Academical hospital ☐ , Private clinic ☐
- Specialism: ....
- Years of experience as medical specialist:
- Other activities (active researcher and/or PhD degree, teaching, member of guideline committee etc.) ...

### Main interview questions:

- When you think back at the last patient with which you have decided on a medical treatment. What kinds of information have you considered in the decision making process?
  - What do you do when you do not know what the best option is for a patient? How do you answer such a clinical question?
  - (Added after in-between analysis of the first two interviews)  
What information sources do you use to keep your general knowledge up to date?
- Ques:
- All different information sources stated by respondent
- ☑ how do you use this information source?
- When respondent stops naming information sources?
- ☑ are there other information sources you use in different clinical situations?
- (Hospital ward, in the emergency room, during a night shift, outpatient clinics)