Barriers to GPs’ use of evidence-based medicine: a systematic review

INTRODUCTION
Evidence-based medicine (EBM) is the translation of results of clinical epidemiological studies into daily practice. The definition states that EBM is the conscientious, explicit, and judicious use of current best evidence, in combination with the physician’s clinical expertise and the preferences of the patient in making decisions about the care of individual patients.1–4 A visual illustration of the process of decision-making according to EBM in general practice is depicted in Figure 1.

Integration of the above-mentioned aspects of EBM — and thereby going beyond the direct use of research knowledge without integration of GP preferences and the situation of the patient — is needed to be able to help the individual patient best.5,6 However, various review studies from other healthcare professions document the existence of barriers that hinder the practice of EBM.7,8 Consequently, improvement of medical care and the treatment of the individual patient are at stake.7 Based on the model of evidence-based decision making [Figure 1], and keeping the aspects of EBM in mind, the barriers can be related to the evidence itself, to the expertise of the GP, the GP’s and the patient’s situation, and the GP’s clinical situation. Reducing or eliminating the barriers that prevent GPs from implementing EBM in all these areas can improve evidence-based practice,9 and knowledge of these barriers can assist in enhancement of the implementation of EBM through education.

The purpose of this study was to systematically review the evidence for all the barriers encountered by GPs in the use of EBM in clinical practice.

METHOD

Eligibility criteria
Studies meeting the following criteria were included in the review:

• primary studies [any language];
• studies about barriers in the practice of EBM;
• studies with GPs as subjects;
• studies with either of the following outcomes:
  • barriers to the practice of EBM; and
  • barriers to the practice of more than one of the EBM steps.

Studies that had primary care physicians as subjects and in which the outcomes of GPs were not presented separately were excluded. Before definite exclusion, the study authors were contacted to obtain data for GPs only. Studies in which the application or use of specific guidelines were described were also excluded, since barriers in these latter studies are mainly related to the logistical and clinical aspects of that particular guideline or disorder. The
language in which an article is written was not an exclusion criterion. If needed, relevant parts of the paper were translated. In cases where more information was needed to ascertain inclusion or exclusion, the authors of the study were contacted.

Information sources
A search for studies was carried out in MEDLINE® (PubMed®), Embase, CINAHL®, ERIC, and the Cochrane Library. The search was completed in February 2011.

The search strategy was based on the search terms from an earlier systematic review of barriers faced by resident doctors. It was developed by a clinical librarian and adapted for GPs (Box 1).8

Study selection
Before reviewing, the researchers discussed the inclusion and exclusion criteria in order to improve inter-rater reliability. Two reviewers independently appraised the titles of the studies retrieved from the literature search, to assess which studies were clearly irrelevant to the present study. Studies were excluded only if both reviewers considered a title unsuitable for inclusion. The same two reviewers independently appraised the abstracts of the studies that had not been excluded. These studies were excluded if both reviewers thought it appropriate to do so. If only one reviewer thought the study should be included, a decision was made through discussion with a third reviewer.

Two reviewers independently appraised the complete texts of the studies that had been included, based on their abstracts. If only one of the reviewers thought that the study should be included, a third reviewer determined whether the article should indeed be included.

Kappa with a 95% confidence interval (CI) was calculated, to quantify the agreement between the reviewers in the various stages. The flow chart of the selection process for this review is presented in Figure 2.

Quality assessment
Quality assessment was performed according to the criteria (Table 1) used in another review regarding EBM-related barriers:8

- the quality of quantitative studies (except those from randomised controlled trials [RCTs]) was assessed using adapted recommendations from the STROBE [Strengthening the Reporting of OBServational studies in Epidemiology] initiative;10
- the quality of qualitative studies was judged by applying adapted criteria proposed by Giacomini and Cook;11 and
- the quality of RCTs was assessed using criteria recommended by the Cochrane Collaboration.12

After pilot testing of the quality-assessment form on four studies, three reviewers independently appraised the included studies on methodological quality; in the case of disagreement, they consulted a fourth reviewer. They separately discussed each item on which there was disagreement among the reviewers. Agreement between reviewers was calculated using the percentage of agreement on all items. If it remained unclear whether an article met the quality criteria, the reviewers contacted the first author of the relevant publication in order to obtain additional information. If the matter of quality remained unclear, this was indicated on the form.

Figure 1. Conceptual model of evidence-based decision making in GPs, adapted from Sackett et al2 and Offringa et al.55
Data collection
A pre-specified data-extraction form was used to extract the following data from the studies: year of publication, period of data collection, study design, validity of instruments used, characteristics of the participating GPs (country, number of responders, and types of practices), response rates (Table 2), and the main outcomes of the study (Table 3). Only outcomes that were specifically denoted as barriers described in the practice of EBM were extracted. The definition of EBM used in the various studies was also explored. Because of the variations in design and outcomes, one researcher extracted the data and then one of three other researchers reviewed the data-extraction forms to assess reliability.

RESULTS

Study selection
The literature search led to identification of 14,700 studies (Figure 2). After screening for doubles and applying inclusion criteria to titles and abstracts, 169 articles remained for full-text assessment. During title screening, the agreement between the two reviewers was good: kappa was 0.73 (95% CI = 0.71 to 0.74). During abstract screening and full-text inclusion, the agreement between the two reviewers was fair, with a kappa of 0.34 (95% CI = 0.27 to 0.41) and good with a kappa of 0.71 (95% CI = 0.56 to 0.85), respectively. Twenty-two articles that satisfied all inclusion criteria were included in the review. 13–34

Study characteristics
Of the 22 studies that were included, nine concerned qualitative, 13–20,24 12 concerned quantitative, 21–32,34 and one concerned both qualitative and quantitative research methods. 33 One RCT was included in the review, but the barriers regarding EBM that were described in this study — and respectively included in this article — were described for the intervention group (specific access to literature) only. 23 The characteristics of the studies are shown in Table 2.

Quality assessment (Table 1)
After individual judgement, the reviewers agreed on 76% of all quality criteria that were scored. Of the qualitative studies, five scored positively on all aspects (resembling a low risk of bias within these studies), 13–17 while one study, which combined qualitative and quantitative methods, scored negatively on most quality aspects of the qualitative part of the study, and is therefore suspected of having a high risk of bias. 31 The quality of the quantitative studies was good: two studies had a positive score on all the items, 21,22 while the others had up to six items that were not adequate. Only one study had two items assessed as negative. 23

Synthesis of results
Because of the expected heterogeneity between study designs and presentation of outcomes, no attempt was made to pool the quantitative data. Based on the current definition of EBM, the barriers were categorised into the following areas: evidence, the GP’s preferences and expertise, the patient’s situation, and the GP's
setting. Categories were created according to Figure 1, in an attempt to position the extracted barriers more systematically. When barriers could be placed in more than one category, the choice was based on whether the barrier was more common (then it was placed in the category evidence or practice) or more individualistic (then it was placed into the category GP). To enhance understanding of the chosen categories, the categories are described in more detail next.

**Evidence**

The five-step model emphasises the search for evidence with respect to EBM: ask, access, appraise, apply, and audit. In practice, these five steps are used when facing a new clinical question, and are used less explicitly when managing patients with more common clinical problems, for which the physician already knows most evidence. Particularly in primary care, aggregated evidence such as guidelines or systematic reviews are the sources most referred to. However, a rational analysis of all evidence has to take place.

**The GP’s preferences and expertise**

In order to change their practice, GPs require both a positive attitude towards EBM and adequate knowledge and skills regarding the five steps of EBM. However, the GP’s clinical expertise and previous experiences are also important sources of information for clinical decision-making. The GP’s level of clinical experience or expertise therefore plays a role in clinical decision-making and influences the way in which problems are solved: more intuitively or rationally. GPs rely on so-called mindlines, which are ‘collectively reinforced, internalised, tacit guidelines’ that can be modified when integrating external information.

**The patient’s situation**

The situation of the patient can be described in terms of both the clinical situation of the patient, and the patient’s personal preferences. A patient’s preference is defined as ‘the desirability of a health-related outcome, process or treatment choice.’ Besides the research evidence and the contributions of the GP’s experience, patient preferences also need to be included in the process of decision-making. Patients expect to participate in the decision-making process, and contemporary patient-centred medicine has made the experience of patients and their role in clinical decision-making more prominent.
GP setting

There could well be barriers that apply to the GP setting, partly owing to the fact that primary care is considered different from the purely disease-centred secondary care where EBM was developed.42 Consultations in general practice are more complex than consultations in some specialties,43 and the patients in primary care also differ significantly from patients in secondary care regarding variation in disorders and disease stages.

Results of the studies

Definition of evidence-based medicine. Six of the included studies14,21,26,29,31,33 give a definition of EBM based on the definition of either Sackett et al12 or Haynes et al44. Studies that did not explicitly give a definition of EBM are studies about the implementation of evidence,13,17,22,25 or ones that give a more explanatory description about how evidence or EBM should be used.15,16,18,20,23,27,28,30,32,34. In all the studies, barriers related to one or more of the components of the conceptual model of EBM (evidence, the GP’s preferences, the patient’s preferences, the GP setting) were found. These barriers are summarised in Table 3.

Barriers related to evidence. Most of the 22 articles describe barriers that are related to the evidence itself.16–18,20–34. Some say that general practice lacks sound evidence,14,22,23,31,32,34 especially for the many problems faced by GPs.15 In one study sample, 34% of the surveyed GPs felt that there is a lack of evidence.24 Other studies found that the available evidence is perceived to be of inadequate quality.15,30 On the other hand, too much available evidence is also experienced as a problem.14,21 Furthermore, GPs say that the available evidence is contradictory,14,21,23,24 not up to date, and liable to time delays.15 Time delays mainly appear between the publication of research and eventual adjustment of practice.15

| Table 2. Characteristics of the studies included in this review |
| Author | Year of publication | Data collection | Study design | Instrument based on | Country | Participants, number GPs | Response rate, % |
| Sánchez López et al21 | 2010 | 2007 | Focus groups | Spain | 19 | 100 |
| Carlsen and Norheim17 | 2008 | 2007 | Semi-structured group interviews | Norway | 27 | 100 |
| Yew and Reid16 | 2008 | 2001 | Telephone interviews | Green22, Hyde23, Greenhalgh24 | US | 10 | 19/16 = 63 |
| Hannes et al15 | 2005 | 2002–2003 | Focus groups | Belgium | 31 | 100 |
| Tracy et al14 | 2003 | 2002 | Semi-structured interviews | Canada | 15 | (15/23) = 65 |
| Freeman and Sweeney26 | 2001 | Unknown | Balint style groups | UK | 19 | 100 |
| Cranney et al17 | 2001 | Unknown | Semi-structured interviews | UK | 34 | 9/76 practices = 12 |
| Oswald and Bateman19 | 2000 | Unknown | Interviews | UK | 6 | 100 |
| Mayer and Pterman18 | 1999 | 1996–1997 | Focus groups | Australia | 27 |
| Barghouti et al21 | 2009 | 2007 | Survey | Al-Almaie27, Al-Ansary26, McColl25 | Jordan | 141 | 71 |
| Trevena et al22 | 2007 | 2003 | Telephone interviews | Degner28 | Australia | 107 | (107/155) = 69 |
| Armin et al23 | 2006 | 2004 | Survey | Fedorowicz29 | Bahrain | 81 | (81/124) = 65 |
| Upton and Upton30 | 2006 | Unknown | Survey | Upton20 | UK | 302 | 60 |
| Chan and Teng21 | 2005 | 2003 | Survey | McColl25, Singapore | 40 | 40 |
| Butzlaff et al24 | 2004 | 2001 | Randomised controlled trial | Germany | 72 | 73 |
| Taylor et al26 | 2002 | 2000 | Survey and interviews | Australia | 89 | 86 |
| Young and Ward30 | 2001 | 1999 | Survey and interviews | McColl25, Young25, Young25 | Australia | 60 | 100 |
Table 3. Barriers to the use of evidence-based medicine (EBM) by GPs

<table>
<thead>
<tr>
<th>Evidence</th>
<th>GP’s preferences</th>
<th>Patient’s situation</th>
<th>Practice setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Translating trials into practice14,18,20</td>
<td>• Knowledge of EBM14,26</td>
<td>• Treatment expectations different from evidence15,22,23</td>
<td>• Applicability of evidence to general practice13,17,20,22,27</td>
</tr>
<tr>
<td>• Use of evidence is complicated23</td>
<td>• Difficulty keeping up14</td>
<td>• Adapting to preferences, beliefs, and demands different from evidence18,22,23</td>
<td>• Lack of time13,14,20,22,23,27,30</td>
</tr>
<tr>
<td>• Change of existing evidence16,17,20,27</td>
<td>• Lack of clarity in evidence 13,14,17</td>
<td>• Discussing with patient14</td>
<td>• To search for evidence13,17,20,22,27</td>
</tr>
<tr>
<td>• User-friendliness: need for summaries15,16,17,18,20,21</td>
<td>• EBM skills14,17,18,20,23</td>
<td>• Convincing and pressure to meet expectations15,20</td>
<td>• To access evidence13,17,20,22,27</td>
</tr>
<tr>
<td>• Lack of (qualitatively good) available evidence14,15,16,17,20,21,22</td>
<td>• Attitude towards EBM15,16</td>
<td>• Selling evidence to patients15</td>
<td>• To appraise evidence13,17,20,22,27</td>
</tr>
<tr>
<td>• Contradictions in evidence13,15,17,18,20,22,27</td>
<td>• Lack of clarity in evidence 13,14,17</td>
<td>• Fear of punishment or litigation13,17</td>
<td>• To keep up to date13,17,20,22,27</td>
</tr>
<tr>
<td>• Too much available evidence14,15,16</td>
<td>• Personal and professional experiences different from evidence13,14,15,16,17,18</td>
<td>• Confidence in GP reduced by guidelines13,17</td>
<td>• EB is a threat13,17,20,22,27</td>
</tr>
<tr>
<td>• Lack of resources14,15,16</td>
<td>• Fear of side effects13,14,15</td>
<td>• Relationship between GP and patient13,17</td>
<td>• Rural location13,17,20,22,27</td>
</tr>
<tr>
<td>• Available sources not helpful14</td>
<td>• Lack of clarity in evidence 13,14,17</td>
<td>• Morale13,17</td>
<td>• Money needed13,17,18,20,22,27</td>
</tr>
<tr>
<td>• Access (computers, internet, journals, databases, or libraries)14,15,16</td>
<td>• Practicalities of real life13,14,15,16</td>
<td>• Experiences of the patient different from evidence13,14,15,16</td>
<td>• For access to internet and resources13,17,20,22,27</td>
</tr>
<tr>
<td>• Lack of trust in origin14,15,16 and in independence of evidence sources14,15,16,17,18,19,20,21,22,23,24</td>
<td>• Lack of confidence13,14,15,16</td>
<td>• Clinical symptoms, disease13,14</td>
<td>• EB carries no financial gain13,17,20,22,27</td>
</tr>
<tr>
<td>• Level of evidence14,15,16</td>
<td>• Familiarity with new role13,14,15</td>
<td>• Tolerance of uncertainties13,14</td>
<td>• Lack of investment/incentives13,17,20,22,27</td>
</tr>
<tr>
<td>• Implications of the evidence13,15,16</td>
<td>• Personal and organisational inertia13,14,15,16</td>
<td>• Psychosocial context13,21</td>
<td>• EBM carries no financial gain13,17,20,22,27</td>
</tr>
<tr>
<td>• The language in which evidence is written13,16</td>
<td>• Influence of peers13,14,15,16,20</td>
<td>• Influence of media13,14,16</td>
<td>• EBM carries no financial gain13,17,20,22,27</td>
</tr>
<tr>
<td>• Lack of help in interpretation by experts/specialists13,15,16,17</td>
<td>• Influence of belief of peers13,14,15,16,20,21</td>
<td>• Words of GP and presentation of information used by GP13,14,15,16,17,20,22,27</td>
<td>• EBM carries no financial gain13,17,20,22,27</td>
</tr>
</tbody>
</table>

Access is the barrier most mentioned.18,19,21,22 It can be subdivided into lacking resources, no access to evidence, and computer- or internet-related problems.16,16,17,18,19,20,21,22,23,24 and therefore mainly entails technical difficulties.23 The accessibility of literature written in English is described as a problem for non-English GPs,25 as is the understanding of the English in which articles are written and the lack of evidence published in the GP’s own language.23 One study states that logistical problems such as access make GPs less enthusiastic about using EBM.16

There are many evidence resources, but only a small number are considered independent.15 GPs doubt the reliability of evidence,17 that is, whether a guideline is truly based on evidence,22 especially when evidence has been derived from certain sources that are biased by, for instance, industry (such as the pharmaceutical industry).19,20 commercial or consumer organisations, or the mass media.15

Barriers related to the GP’s preferences and expertise. In a quantitative study, 72% of the GPs reported encountering barriers to the application of EBM.20 The GP’s attitude influences the application of EBM. GPs are generally not positive about the usefulness of EBM.14,17 This is caused by the idea that EBM requires them to work strictly according to the guidelines.15,16,17,20,21 Furthermore, earlier
personal experiences in life or in clinical practice influence the use of evidence. \(^{26,34}\) For instance, deaths in the personal or practice environment due to strokes related to arrhythmias led to a more controlled anticoagulation treatment. \(^{36}\) The opinion of colleagues about EBM is considered important in the use of EBM, \(^{24,25,31}\) primarily because of the attitude of these colleagues influences the practice of EBM. \(^{31}\)

Lack of knowledge and skills also influences GPs’ use of EBM. \(^{15–17,24,30,31}\) Fifty-five point six percent feel that training in EBM is required, \(^{25}\) and that there is a lack of such training. \(^{13,28,29,32}\) A lack of skills in searching and in accessing resources is a barrier. \(^{27,30,33}\) Not knowing where to search, \(^{24,30}\) and difficulty in finding evidence (or finding it quickly), \(^{14,17,24}\) are among the barriers mentioned by GPs. Lack of appraisal skills, \(^{26,30,31}\) and of confidence in using those skills, \(^{19}\) are barriers related to critical revision of the evidence. Also, GPs find it hard to assess applicability. \(^{19,23}\)

Barriers related to the patient’s preferences. Patient-related barriers limit the use of EBM by GPs. \(^{17,18,20,24–26,30,31,33,34}\) Patients’ preferences, expectations, and beliefs have a major influence on EBM use, according to GPs. \(^{24,30,31,33,34}\) When the evidence-based preferences of the GP and the wishes of the patient do not match, the GP may feel a barrier to convincing the patient, \(^{17–26}\) because GPs feel pressured to fulfill patients’ wishes. \(^{17,19,24,34}\) This results from the fact that patients have strong ideas about what they want from their GP. \(^{19}\)

As concluded in a qualitative study, the quality of the relationship with a patient is considered a barrier to using evidence. \(^{31}\) Especially when GPs know their patients well, they find it hard to translate the evidence to their patients because they feel that deviating from guidelines based on experience or patient preferences is not evidence-based behaviour. \(^{36}\)

Barriers related to the general practice setting. There are several barriers relating to the general practice setting. \(^{13–18,21,25–27,31}\)

A main barrier is the applicability of evidence in general practice. \(^{13,14,17–19,27,30,31}\) The difference between primary care patients and the patients in the research population of secondary care is mentioned as a reason for this. \(^{13,24,31}\) which relates to the fact that research from clinical trials cannot be generalised to patients in general practice. \(^{14}\) As a result, GPs fear possible harm or side effects. \(^{17,19}\) Overall, GPs feel a lack of commitment to and ownership of the use of evidence, \(^{19}\) because the psychosocial context [treating patients rather than diseases] of general practice \(^{24}\) can make evidence irrelevant. \(^{18}\)

The barrier relating to the busy workload in general practice is expressed in the time that is available to GPs. \(^{14,20,25}\) Time for using the concept of EBM is described in many studies as a barrier. \(^{15–17,19–21,23–25,28–31,33}\) A shortage of time during consultations does not allow GPs to search for, \(^{17}\) or access, \(^{19,26}\) evidence, and they do not have time to reflect on their clinical practice. \(^{26}\) Time to search for and appraise articles is specifically mentioned in a qualitative study as an important barrier. \(^{31}\) GPs in this study consider time a more important barrier than lack of skills. \(^{21}\) GPs state that they have trouble keeping up to date; \(^{17,19}\) this applies especially to GPs who practise alone. \(^{19}\) Furthermore, a lack of managerial or institutional support is mentioned as a barrier. \(^{20,27}\) A lack of investment by health authorities is particularly described in two survey studies. \(^{26,31}\) Some GPs consider EBM not to be cost effective for themselves as practitioners, \(^{31}\) and feel they require additional financial resources for the facilities needed when using EBM. \(^{24,30,33,34}\) To them, seeing patients is more cost effective than spending time in the field of EBM; \(^{27}\) since, in their opinion, time per patient increases when EBM is used. \(^{21}\) For GPs, there is no financial gain in using EBM, \(^{24,21}\) because time spent on EBM is not paid for. \(^{15}\)

DISCUSSION

Summary

Consistent with the definition of EBM, all three components of EBM (and not only evidence) should be used in GPs’ decision-making. \(^{1}\) The majority of GPs consider EBM as a positive concept. \(^{21}\) However, over the years, many studies have revealed that barriers limit the use of EBM. \(^{7,8,46}\) The present review confirms that GPs also experience barriers that limit incorporation of the three aspects of EBM (evidence, the GP’s preferences, and patient preferences) and barriers related to the specific clinical setting of their work.

EBM in general practice. This review shows that time-related barriers can occur in each aspect of EBM and therefore affect the entire concept of EBM. It generally takes about 2 hours to thoroughly walk through all the steps of EBM when discussing a new clinical question. \(^{17}\) Doctors, however, generate about 45 questions every week and spend a maximum of 2–3 minutes to answer one question. \(^{42}\) Fortunately, not all questions are
new and a significant amount of evidence has been summarised in guidelines, syntheses, and synopses, reducing the amount of time needed to answer a question. However, assessing evidence does still require time, and GPs need to overcome their lack of time — the main barrier found in this review — in order to be able to apply EBM.

**Barriers in the use of evidence-based medicine by GPs.** The main barriers found in this review are similar to those found in other research articles about barriers experienced by GP trainees, doctors from other disciplines, or nurses. Considering primary care in particular, most research is performed in secondary care, and consequently there is a lack of evidence that is suitable for application in the clinical setting of general practice. Some GPs say they do not trust available evidence. This is not necessarily a bad thing, since guidelines are not meant to be unquestioningly accepted, although some trust is required to not dismiss all evidence as useless. So, although awareness of uncertainties in research is important, to understand the proper applicability, it should not lead to dismissal of all evidence, a concept called ‘clever nihilism’. Clever nihilism, a cynical attitude towards EBM, has been shown to occur in EBM learners when maturing from EBM-naïve to mature stages, and could have a major impact on the preparedness of GPs to learn the skills necessary and apply EBM in daily practice.

The relatively uncommon finding of this review is that GPs feel a need for incentives for working in an evidence-based manner, because the infrastructure that is needed for EBM requires financial input, and practising EBM requires time that is not reimbursable. Therefore, incentives may help in maintaining enthusiasm.

**Strengths and limitations**

The quality of the studies [Table 1] is adequate, although certainly not optimal, so the results and conclusions drawn from this review are derived from studies of moderate quality, and should be interpreted as such. In qualitative studies, this mainly entails lack of a description of how analyses were performed. In quantitative studies, more information about the selection and characteristics of the participants could have been given. A limit to this review is the inclusion of studies that were carried out using self-reported outcomes or self-composed, and/or not validated questionnaires. The barriers expressed during these sessions and on these questionnaires may be biased by hesitation to express socially undesirable opinions or practices. This would, however, have resulted in an underestimation of the barriers mentioned, only reinforcing the need to address these barriers. Other surveys were based on widely-used instruments such as the questionnaire from McColl et al, which enhances the validity and comparability of results. The quality of research studies needs explicit consideration for future studies.

This review study has some limitations. The inclusion criteria involve the inclusion of studies describing barriers that are experienced when using more than one of the EBM steps. It was decided to include studies that address more than one EBM step, because the researchers were not interested in all the detailed barriers that limit the use of specific steps, but wanted to describe barriers limiting the use of the entire concept of EBM. The same goes for barriers using one specific guideline. These kind of detailed barriers are usually more related to the specific content of that guideline or disease than to the concept of EBM itself.

Another limitation is that articles that discuss barriers regarding the use of one guideline or one illness were excluded. This was done to avoid the inclusion of barriers that are related to practical or logistical aspects of that particular guideline or illness, in clinical practice. When looking at the studies that were excluded based on this exclusion criterion, it was found that the excluded studies mainly discuss barriers that are related to the use of medication (such as side effects and non-compliance), to working with guidelines (such as blending in with routine practice and particular skills in the practice of the physician), or to care planning (such as clinical factors and additional tasks). Some of the excluded studies describe barriers to the implementation of a guideline that are consistent with the barriers mentioned in this study, although their main focus is not on barriers that are experienced regarding the use of guidelines in general. Although some studies do describe general barriers regarding the use of EBM in practice, the barriers mentioned in these studies are not different from the barriers found with this review.

Only digital databases were searched; no other sources (such as abstract books or conference handouts) were considered. Searching these resources could have led to the identification of additional studies. The topic of this review, however, requires a...
throughout the description of the questions asked and the answers given, which were expected not to be present in abstracts.

A very broad search was performed, as ‘evidence’ and ‘evidence-based medicine’ are commonly used as keywords. As a consequence, over 14,000 articles have been reviewed. An advantage of this broad search is that all possible articles were reviewed and therefore probably none were missed. The disadvantage is that working through the articles was very time consuming and, since the process started with a review of only the titles, an unjustified exclusion of articles could have occurred. A more specific search would, however, have led to relevant papers being overlooked. Using two or three reviewers for each stage has probably reduced the risk of missing relevant papers. However, when looking at the inter-rater agreement (kappa) of the abstract review, agreement is only fair (0.34). When taking a closer look at the cause of this poor kappa, it was found that the reason lies within the doubt about whether or not to include: some abstracts are hard to review and therefore were indicated by some reviewers with a question mark. In calculating kappa, all abstracts that were indicated with a question mark and that were seen by a third reviewer, were considered to show ‘disagreement between reviewers’, although the main cause was uncertainty, not disagreement.

Since, to the authors’ knowledge, no valid measure is available to assess the quality of observational studies, these studies were assessed using the recommendation of the STROBE initiative, as was done in earlier similar studies. The STROBE statement was intended as a checklist when submitting a paper to a journal and not for reviewing the quality of papers, the validity of this checklist, although intuitively acceptable, has not been formally tested and could be debated.

The barriers were organised into categories. These categories were chosen according to the model of EBM [Figure 1] and the barriers were placed under the categories. However, some overlay may exist due to the fact that the categories are broad and some barriers are related to more components of the EBM model. Although the grouping of barriers with categories was sometimes discussed, this does not influence the overall outcomes of this review.

The articles that were found date from 1997 onwards. The large range in years of publication of studies included in this review could well have highlighted barriers that are now outdated. However, similar barriers were found in both the early and the later articles, indicating that most barriers still need to be eliminated (Table 3).

A final limitation is that the included articles are derived from various countries with their various healthcare settings. In the UK, for example, guidelines are important in answering clinical questions. Furthermore, movements within healthcare systems, such as current implementation of pay-for-performance, influence evidence-based decision making. Except for barriers in access that more isolated practices experience, no studies were found on differences in barriers that are experienced by GPs in the use of EBM in practice, or changes in outcomes over time. Barriers are not described for the individual GP in particular, although barriers may vary from GP to GP.

**Implications for practice and research**

Although some say that training in EBM should focus on improving the skills that are needed to find and use research information, others say that training GPs in EBM should focus on what is required by the learners. Only providing knowledge and skills does not lead to success, since the integration and, consequently, the behaviour of GPs has to be improved. Respecting the outcomes of this review, the best educational method is integrating learning with clinical practice within the context of decision-making. Either way, teaching the skills needed for each EBM step is required in order to be able to use EBM, and these skills are needed in order to provide evidence-based care.

Further research in the area of EBM should focus on eliminating barriers to the use of EBM and on educational solutions and interventions for both formal education and practice. Adapting training to the needs of GPs would reduce the barriers found in this study. Although a lot still has to be accomplished at the level of knowledge and skills, the focus should also be on teaching GPs how, in clinical practice, to combine evidence, their own experience and preferences, and their patient’s preferences, and thereby overcome the barriers to the practice of EBM. Lastly, barriers towards the practice of EBM by GPs should be addressed at more levels than only the GPs themselves, as barriers related to factors other than the GP also limit their use of EBM. For instance, the influence of the media is stated as an important barrier when discussing evidence-based options with patients, and attention should be paid to the trustworthiness of the messages media broadcast.


