Evidence-based medicine use in pharmacy practice: a cross-sectional survey

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Abstract
Rationale, aims and objectives This study aimed to evaluate the awareness, attitude, knowledge and use of evidence-based medicine (EBM) among pharmacists in Jordan.
Methods A cross-sectional self-reported survey was conducted on 122 pharmacists (both hospital and community) who were asked to fill a validated structured questionnaire.
Results The participants showed a positive attitude towards EBM; more than 80% thought that EBM improves patient care, improves quick knowledge update, helps to unify the quality of care provided, is a good educational tool and a convenient source of advice. But despite this positive attitude, pharmacists showed partial understanding of the technical terms used in EBM; also they relied on their own judgment, medical representatives and standard textbooks in making their decision, resources that can no longer be considered sufficiently updated and/or evidence based. Patient overload, lack of personal time and limited access to EBM sources were the most commonly identified barrier to practicing EBM. Also this study suggest that pharmacist’s experience is negatively associated with EBM knowledge score (Spearman’s rho value $-0.187$, $P$-value 0.04).
Conclusions In spite of the positive attitude towards EBM, this study showed numerous personal and institutional barriers towards implementing EBM in Jordan, which necessitate immediate action by all health care decision makers to formulate a national plan to overcome such barriers, and to further investigate the evidence that teaching, learning and daily application of EBM in practice can improve the quality of care and reduce the cost.

Introduction
Improving health care efficiency and effectiveness is one of the main challenges facing health care providers in their daily practices. It was reported that, on average, Americans receive half of the recommended medical care process [1]. This can be attributed to the large gap between what health care providers know and what they practice [2]; therefore, a clinical decision is often deviated from the recommended guidelines. So it is of necessity that all health care providers including pharmacists, who are involved in direct patient care, keep both their knowledge and skills updated and evidence based.

Health care practitioners should note that despite the availability of a large number of relevant and high-quality publications, guidelines and recourses, they will be confronted with an increasing amount of irrelevant and useless information. Hence, a successful practitioner needs to have enough skills to evaluate literature [3]. The recent transition to evidence-based medicine (EBM) was strongly recommended as a master key to ameliorate these challenges; this fundamental change claimed to support clinical practice by providing simple accessible rules, guidelines and evidence-based practice to achieve the best health services.

The principles of EBM have become a core concept of undergraduate, postgraduate, continuing medical education, courses and workshops offered to health professionals [4–7]. EBM is defined as the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients. It combines clinical judgment and experience, best available scientific evidence and patient preferences to improve medical decision making [8]. One of the aims of EBM was to support health care providers with tools to appropriately evaluate the research evidence that substantiates various therapies and integrate that evidence with clinical expertise and patient’s values in medical decision making [9]. Nowadays EBM is assuming increasing importance and prominence in the field of pharmacy, and pharmacists feel an ethical duty to provide advice that is objective and evidence based.

On the other hand EBM has faced large criticism at so many levels. Deficiencies within its scientific method and its framework,
a neglect to acknowledge patients personal needs and to integrate both their values and preferences with the evidence, significant difficulty in its practical applicability, and the lack of the evidence that EBM improves patient outcomes are the core points in such criticism [10–22]. Over the years, EBM practitioners had failed to sufficiently answer and verify such deficiencies in the concept of EBM and its applicability [23,24].

Among the most recent responses to EBM critics was a special report published to verify such criticism by Djulbegovic et al. who had failed to verify the limitations to EBM, instead they extremely highlighted both its strengths and its promising potential development in the future [23]. There is a growing pressure to establish a mature debate on evaluating the use of ‘evidence’ as a ‘base’ for clinical decisions. Such call for debate does not question the need for the personalization of health services, the contribution it has to the improvements in the level of care provided to the patients and the possibly better clinical outcome [23]. Nevertheless, it stresses on the necessity for any proposed model to be based on a practice that takes both the concept of care and cure into consideration [14].

Several studies have assessed the awareness, attitude and knowledge towards EBM among primary health care physicians in Jordan. These studies identified the perceived barriers for practicing EBM and stressed on the educational needs to integrate such practice into routine patient management [25,26]; however, to our knowledge this is the first study to evaluate the awareness, attitude, knowledge and use of EBM among pharmacists in Jordan. Therefore, the aim of this study was to describe awareness, knowledge and attitudes towards EBM among pharmacists in Jordan in order to identify barriers to the implementation of EBM into practicing pharmaceutical care.

Methodology

Study design, settings and study subjects

This is a cross-sectional study that was commenced in February 2013 and continued for 5 months. One hundred and twenty-two pharmacists (both community and hospital pharmacists) were included in the study. Each pharmacist was asked to fill a validated structured questionnaire delivered by hand. Participant pharmacists were from independent pharmacies, chain pharmacies and from both public and private hospitals.

Questionnaire

Although some of the questions used have been adopted from previously validated questionnaires [25,26], content validity was achieved by distributing the questionnaire to five pharmacists recruited to complete the validation process. The initial draft of questionnaire was hand delivered to those pharmacists to help reviewing the structured questionnaire and perform any amendments needed.

The final form of the questionnaire consisted of pharmacist demographic data, and a total of seven main questions that covered three main areas of interest: (1) believes and attitudes of pharmacists towards EBM; (2) pharmacists’ knowledge about EBM; and (3) barriers to practicing EBM by pharmacists.

To assess the level of EBM awareness, we computed a score to reflect the level of knowledge of the pharmacists. We used all the questions regarding understanding of basic EBM terms among pharmacists to compute this score for each participant. The total score in this construct ranged from 0 to 24. One point was granted for each term if the pharmacists answer was ‘some understanding’ and two points were granted if the answer was ‘understand and could explain to others’. We then categorized the participants to have an adequate or inadequate EBM awareness; if the awareness score was greater than the median (i.e. 12.0 for this population), they were classified to have adequate awareness, and otherwise they were classified to have inadequate awareness.

Statistical analysis

Data were analysed using Statistical Package for Social Science version 17 (SPSS software version 17.0; SPSS, Inc., Chicago, IL, USA). The descriptive analysis was performed using mean and standard deviation for continuous variables and percentages for qualitative variables. Independent sample t-test and one-way analysis of variance were used to calculate P-values when necessary. Statistical analyses using Spearman correlation were performed to find out the statistical significance between EBM knowledge and different factors.

Results

The demographic details of the pharmacists included in the study are shown in Table 1. The mean age of the pharmacists interviewed was around 31 years, and the average year of experience was 5.94 years. In this study, 60.7% of the participants were community pharmacists while 39.3% were hospital pharmacists. Females accounted for 70.3% of pharmacists.

The majority of pharmacist showed a positive attitude towards using EBM in their daily practice, as shown in Fig. 1, more than 80% of the participants believe that EBM improves patient care, helps to unify the quality of care provided, improves quick knowledge update, is a good educational tool and a convenient source of advice. Whereas 19.7% of them think it is difficult to base their advice based on evidence, 20.7% thought that EBM is of limited value in pharmacy practice and around 33% believe this kind of practice is not applicable to their culture.

Table 1 Demographic characteristic of the study sample (n = 122)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age [years; mean (SD)]</td>
<td>31.08 (7.77) (min: 22, max: 67)</td>
</tr>
<tr>
<td>Gender [female; n (%)]</td>
<td>86 (70.5%)</td>
</tr>
<tr>
<td>Years of practice [years; mean (SD)]</td>
<td>5.94 (6.48) (min: 0.2, max: 41)</td>
</tr>
<tr>
<td>Site of work; n (%)</td>
<td>Community pharmacy 74 (60.7%); Hospital pharmacy 48 (39.3%)</td>
</tr>
<tr>
<td>Educational level; n (%)</td>
<td>BSc in pharmacy 86 (70.5%); PharmD 20 (16.4%); Masters 15 (12.3%) PhD 1 (0.8%)</td>
</tr>
</tbody>
</table>

BSc, bachelor of science; PharmD, doctor of pharmacy; PhD, doctor of philosophy; SD, standard deviation.
Our results indicate that only few pharmacists have adequate knowledge in EBM concepts. Table 2 indicates that less than 50% of the pharmacists have enough knowledge and the ability to explain basic EBM terms and apply them in their practice.

When we assessed the knowledge score, we found that 50.8% of pharmacists surveyed have adequate EBM knowledge score (EBM knowledge score ≥12). We found also a weak negative correlation between EBM knowledge score and pharmacist’s age (Spearman’s rho value = -0.206, P-value 0.023) and years of experience (Spearman’s rho value = -0.187, P-value 0.04). Table 3 shows the association between level of EBM knowledge and socio-demographic characteristics among pharmacists.

In addition, the type of sources that pharmacists use in their practice (Table 4) was assessed and we concluded that more than 80% of pharmacists use their own judgment in caring for patients, 72% of them rely on medical representatives for medical information, and 54.5% rely on textbooks.

### Table 2: Level of understanding of basic EBM terms among pharmacists

<table>
<thead>
<tr>
<th>No.</th>
<th>Term</th>
<th>Do not understand and not willing to know</th>
<th>Do not understand but would like to</th>
<th>Some understanding</th>
<th>Understand and could explain to others</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Relative risk</td>
<td>1 (0.8%)</td>
<td>28 (23.0%)</td>
<td>51 (41.8%)</td>
<td>42 (34.4%)</td>
</tr>
<tr>
<td>2</td>
<td>Absolute risk</td>
<td>2 (1.6%)</td>
<td>27 (22.1%)</td>
<td>49 (40.2%)</td>
<td>44 (36.1%)</td>
</tr>
<tr>
<td>3</td>
<td>Systematic review</td>
<td>5 (4.1%)</td>
<td>35 (28.7%)</td>
<td>36 (29.5%)</td>
<td>46 (37.7%)</td>
</tr>
<tr>
<td>4</td>
<td>Odds ratio</td>
<td>9 (7.4%)</td>
<td>58 (47.5%)</td>
<td>32 (26.2%)</td>
<td>23 (18.9%)</td>
</tr>
<tr>
<td>5</td>
<td>Meta-analysis</td>
<td>11 (9.1%)</td>
<td>39 (32.2%)</td>
<td>41 (33.9%)</td>
<td>30 (24.8%)</td>
</tr>
<tr>
<td>6</td>
<td>Clinical effectiveness</td>
<td>6 (5.0%)</td>
<td>13 (10.6%)</td>
<td>47 (39.2%)</td>
<td>54 (45.0%)</td>
</tr>
<tr>
<td>7</td>
<td>Number needed to treat</td>
<td>9 (7.5%)</td>
<td>26 (21.7%)</td>
<td>46 (38.3%)</td>
<td>39 (32.5%)</td>
</tr>
<tr>
<td>8</td>
<td>Confidence interval</td>
<td>7 (5.8%)</td>
<td>43 (35.8%)</td>
<td>39 (32.5%)</td>
<td>31 (25.8%)</td>
</tr>
<tr>
<td>9</td>
<td>(P)-value</td>
<td>12 (9.9%)</td>
<td>31 (25.6%)</td>
<td>47 (38.8%)</td>
<td>31 (25.6%)</td>
</tr>
<tr>
<td>10</td>
<td>Heterogeneity</td>
<td>11 (9.2%)</td>
<td>34 (28.3%)</td>
<td>38 (31.7%)</td>
<td>37 (30.8%)</td>
</tr>
<tr>
<td>11</td>
<td>Publication bias</td>
<td>13 (10.8%)</td>
<td>41 (34.2%)</td>
<td>31 (25.8%)</td>
<td>35 (29.2%)</td>
</tr>
<tr>
<td>12</td>
<td>Sensitivity</td>
<td>8 (6.6%)</td>
<td>19 (15.7%)</td>
<td>35 (28.9%)</td>
<td>59 (48.8%)</td>
</tr>
</tbody>
</table>

EBM, evidence-based medicine.
In our study patient overload and time factor were identified as the most common barriers facing implementing EBM in pharmacy practice (Fig. 2). It has been also shown that the scarce financial capabilities also limited the access to different EBM sources. Other barriers were also listed in Fig. 2.

Discussion

Pharmacists represent an integral part in the health care system. In Jordan, many patients seek medical advice first from pharmacists before visiting a physician. Despite all efforts to stop this practice, many pharmacists in Jordan do not hesitate to prescribe drugs even without a prescription. Because pharmaceutical care is an essential corner in providing effective health care services, providing evidence-based pharmaceutical care may reflect positively on the patients and community’s health, may provide more effective use of resources and may allow better communication with the patient about the rationale of treatment [27,28]. To date a large deficiency remains between the best evidence and its implementation in clinical practice [2,29]. In fact, several surveys have concluded that clinical decisions are rarely based on the best available evidence [27,30].

Before designing a strategy for the application of EBM among pharmacists, the attitude and the opinions of pharmacists should be explored; as sceptical opinions influence the application of EBM negatively either by a direct or by an indirect impact. To our knowledge, this cross-sectional survey is the first to study the attitude and perceptions of pharmacists towards evidence-based practice in Jordan and worldwide.

More than 90% of pharmacists had positive attitudes that EBM improves patient care, which is consistent with evidence from the medical literature among physicians [31–33]. This positive attitude is a good sign for promoting the use of EBM in clinical practice that may improve patient management.

Regardless of this highly favourable belief, only 58.7% of the pharmacists rated their clinical practices to be typically, more than 50% of the time, evidence based. Reason for such low practice rate is that many of those who practiced long before the implementation of EBM feel it undermines their clinical expertise and the value of their experience to a degree.

Also this rate is consistent with our finding that 50.8% of surveyed pharmacists have adequate knowledge in EBM concepts according to their EBM knowledge score. Self-reported evidence-based practices of pharmacists were comparable with other studies evaluating physicians’ practice based on evidence in Jordan [25], Saudi Arabia [32], Canada [33] and United Kingdom [34]. The rate of Australian physicians was a little bit higher (70%) [35]. We should not forget that these estimates are subjective assessments, but on the other hand objective measures of the proportion of general practice that is evidence based are also fraught with difficulties due to unclear definitions of interventions, and levels of evidence and availability and use of valid audit tools.

One way to assess the level of EBM among pharmacists is to study the type of sources that pharmacists use in their practice. We found that more than 80% of pharmacists use their own judgment in caring for patients, 72% of them rely on medical representatives for medical information and 54.5% rely on textbooks. Relying on own judgment, medical representatives and standard textbooks can no longer be considered sufficiently updated and are not evidence based.

Although Cochrane database is one of the best resources of reliable evidence for health care providers, we found that 63.9% of surveyed pharmacists had never or rarely used the Cochrane database. Comparatively, around 95% of Jordanian general practitioners have never used the Cochrane library, 70% of Kuwaiti physicians never or rarely used the Cochrane library and 67% of primary care physicians were not aware of the Cochrane library in Malaysia [25,36,37]. On the contrary, the Cochrane library was the second most accessed database among primary care physicians in Canada [31].

The situation is somewhat better for PubMed/MEDLINE, which is one of the most utilized web sites for searching for clinical evidence. Only 39.4% of Jordanian pharmacists have never or rarely used PubMed/MEDLINE, compared with 13% in Saudi physicians [38], and only 6% of the Malaysian primary care doctors [37]. As the desire to adopt EBM in the developed world is heading to be translated into reality, the use of EBM resources is very essential in their daily practice. For instance, a study from Denmark showed that 88% of the hospital physicians use PubMed/MEDLINE frequently [39].

In order to implement EBM in their practice, pharmacists need to understand and use terms that are critical to our ability to evaluate published evidence. Pharmacists showed partial understanding of the technical terms used in EBM, which is supported by other surveys that investigated this issue in physicians [25,34,40]. Just to give an example, more than 60% of pharmacists confessed that they do not clearly understand the meaning of the P-value, confidence intervals, odds ratios, systematic review or relative risk. These are basic terminologies that are critical to our ability to evaluate published evidence. The deficiency in understanding basic terms with regard to EBMs was also reported in many other studies [25,38]. Understanding of these basic terms is concluded to be higher in developed countries as 70.1% of the hospital doctors could understand and explain to others the meaning of meta-analysis [39]. This difference is attributed to the fact that developed countries have become much more evidence based in recent years [33]. It is important to point out that the self-rating of these skills was not tested in practice, and rates may be even overestimated.

We evaluated socio-demographic factors that may affect EBM knowledge score. Neither gender nor site of work (hospital versus community pharmacy) affected the EBM knowledge score. On the other hand, pharmacists with a doctor of pharmacy (PharmD)
degree and pharmacists with a master degree had higher EBM knowledge scores compared with pharmacists with a bachelor degree. We believe that this can be attributed to the recent introduction of more EBM and research methodology courses for PharmD and master programmes in Jordan.

Our results also suggest that the pharmacist’s experience is negatively associated with EBM knowledge score (Spearman’s rho value $-0.187$, $P$-value $0.04$). The same correlation was found among Kuwaiti physicians [36]. A recent review suggested that doctors who have been in practice longer might be at risk for a decline in clinical knowledge and performance [41].

This study showed that patient overload followed by lack of personal time were among the most commonly mentioned barrier to the practice of EBM. The obstacle of insufficient time was iterated in many other studies [34,37,40,42,43]. We believe that the number of pharmacist assistants dispensing drug should be increased in both community and hospital pharmacies to allow the practice of EBM. The cost-effectiveness of such increase in the number of employees and the willingness of these institutions to undergo such changes is among the restrictions to apply EBM practice.

Limited access to EBM sources and no access to international journals or guidelines were the second most commonly identified barrier to practicing EBM. This arises from the misconception that practicing EBM may not result in financial gain. Pharmacists who practice EBM will identify and apply the most efficacious interventions to maximize the quality of life for individual patients; this would lower rather than raise the cost of their care. Other studies found that lack of knowledge is the main barrier for EBM practicing [32,43–45].

So one of the most important means of encouraging the practice of EBM is to make updated resource of evidence such as Cochrane library readily available, particularly in low-income countries [46], this practice can be also encouraged by the presence of clinical librarians as indicated by Gavgani and Mohen [47].

### Table 4 Resources for decision making used by pharmacists

<table>
<thead>
<tr>
<th>No.</th>
<th>Resource</th>
<th>Always</th>
<th>Often</th>
<th>Sometimes</th>
<th>Rarely</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Own judgment</td>
<td>18 (14.8%)</td>
<td>42 (34.4%)</td>
<td>40 (32.8%)</td>
<td>18 (14.8%)</td>
<td>4 (3.3%)</td>
</tr>
<tr>
<td>2</td>
<td>Consulting colleagues</td>
<td>23 (18.9%)</td>
<td>42 (34.4%)</td>
<td>40 (32.8%)</td>
<td>14 (11.5%)</td>
<td>3 (2.5%)</td>
</tr>
<tr>
<td>3</td>
<td>Medical representatives</td>
<td>13 (10.5%)</td>
<td>36 (29.5%)</td>
<td>39 (32.0%)</td>
<td>19 (15.6%)</td>
<td>15 (12.3%)</td>
</tr>
<tr>
<td>4</td>
<td>Textbooks</td>
<td>35 (28.9%)</td>
<td>31 (25.6%)</td>
<td>31 (25.6%)</td>
<td>18 (14.9%)</td>
<td>6 (5.0%)</td>
</tr>
<tr>
<td>5</td>
<td>International guidelines</td>
<td>30 (24.8%)</td>
<td>27 (22.3%)</td>
<td>29 (24.0%)</td>
<td>26 (21.5%)</td>
<td>9 (7.4%)</td>
</tr>
<tr>
<td>6</td>
<td>British Medical Journal</td>
<td>13 (10.7%)</td>
<td>11 (9.0%)</td>
<td>22 (18.0%)</td>
<td>48 (39.3%)</td>
<td>28 (23.0%)</td>
</tr>
<tr>
<td>7</td>
<td>PubMed/MEDLINE</td>
<td>16 (13.1%)</td>
<td>21 (17.2%)</td>
<td>37 (30.3%)</td>
<td>30 (24.6%)</td>
<td>18 (14.8%)</td>
</tr>
<tr>
<td>8</td>
<td>Lancet</td>
<td>10 (8.3%)</td>
<td>9 (7.4%)</td>
<td>19 (15.7%)</td>
<td>39 (32.2%)</td>
<td>44 (36.4%)</td>
</tr>
<tr>
<td>9</td>
<td>BMJ Publishing</td>
<td>9 (7.4%)</td>
<td>9 (7.4%)</td>
<td>20 (16.5%)</td>
<td>41 (33.9%)</td>
<td>42 (34.7%)</td>
</tr>
<tr>
<td>10</td>
<td>Clinical evidence</td>
<td>15 (12.4%)</td>
<td>19 (15.7%)</td>
<td>36 (29.8%)</td>
<td>27 (22.3%)</td>
<td>24 (19.8%)</td>
</tr>
<tr>
<td>11</td>
<td>Cochrane Database of Systematic Reviews</td>
<td>9 (7.4%)</td>
<td>13 (10.7%)</td>
<td>22 (18.0%)</td>
<td>40 (32.8%)</td>
<td>38 (31.1%)</td>
</tr>
<tr>
<td>12</td>
<td>National Guideline Clearinghouse</td>
<td>10 (8.3%)</td>
<td>6 (5.0%)</td>
<td>22 (18.2%)</td>
<td>37 (30.6%)</td>
<td>46 (38.0%)</td>
</tr>
<tr>
<td>13</td>
<td>Journal of Evidence-Based Medicine</td>
<td>12 (9.8%)</td>
<td>7 (5.7%)</td>
<td>17 (13.9%)</td>
<td>42 (34.4%)</td>
<td>44 (36.1%)</td>
</tr>
</tbody>
</table>

### Figure 2 Barriers to evidence-based medicine (EBM) (percentage of pharmacists who agreed on different statements).

EBM is difficult to understand
EBM is a research and not applicable
EBM is too complicated
EBM too difficult/theoretical to apply to practice
EBM different from professional value
EBM is a threat to clinical freedom
No financial gain in using EBM
Lack of clear presentation of evidence
Too much evidence are available
No Internet connection
Lack of critical appraisal skills
The absence of an effective computer system
No access to international journals or guidelines
Poor attitudes of patients
Limited access to EBM sources
Lack of personal time
Patient overload
It is worth mentioning here that we are aware of some methodological weaknesses of our study; as the questionnaire relied on pharmacist’s self-rated assessment of their own practice and beliefs, pharmacists might have felt pressured into completing the questionnaire or might have been unwilling to reveal their practice deficiencies. Also, the research has been conducted over a short period of time, which might affect the objectivity of the responses and introduce some overestimation in both the knowledge and the practice of EBM.

In conclusion, in spite of the conflict in the results we have gathered, where we find a very high favourable attitude of pharmacist towards EBM but negative attitude against its applicability, this result agrees with both: what we have seen among physicians at earlier stages of introducing the EBM concept and what is highlighted in the literature [48]. The lack of rationalism and the use of empirical observation as a source of knowledge has been widely criticized [49]. In fact, there are multiple uncertainties reported in the literature, those not only include EBM applicability, but also the foundation of the whole concept, its definition, the specific relationship between knowledge and action in clinical practice, and whether it can improve both the process and outcome of clinical interventions [50,51].

This study showed numerous personal and institutional barriers towards implementing EBM, which necessitate immediate action by all health care decision makers to formulate a national plan that should either face the fact that we have serious deficiencies in this approach and the need to address such deficiencies and resolve them if the current model is capable of that, or else face the reality that it is time to scientifically build a model of care that is informed but not based on the evidence, testing the applicability of such model is an essential need to ensure the accomplishment of any proposed outcomes.

References


