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RESEARCH ARTICLE

The DARTS tool for assessing online medicines information

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Abstract *Objective* The use of the Internet as a source of medicines information is increasing. However, the quality of online information is highly variable. Equipping Internet users to distinguish good quality information is the aim of a new five-item quality assessment tool (DARTS) that was developed by the Working Group on Information to Patients under the Pharmaceutical Forum established by the European Commission. The objective of this study was to investigate how people with depression assess the quality of online medicines information and to study their opinions about the DARTS tool in assisting in this process. *Setting* Focus group discussions with Internet users were conducted in metropolitan Helsinki, Finland. *Method* Six focus group discussions (67–109 min duration) were conducted with people with depression ($n = 29$). The DARTS tool was used as a stimulus after open discussion in relation to the evaluation of the quality of Internet-based medicines information. The focus groups were digitally audiotaped and transcribed verbatim. The transcripts were thematically content analysed by two researchers. *Results* Focus group participants were generally critical of the information they retrieved. However, few participants systematically applied quality assessment criteria when retrieving online information. No participants had knowledge or experience of any quality assessment tools. The DARTS tool was perceived as being concise and easy to use and understand. Many participants indicated it would allay some of their concerns related to information quality and act as a reminder. While several participants felt the tool should not be any more extensive, some of them believed it should include a more in-depth explanation to accompany each of the quality criteria. *Conclusions* The DARTS tool may act as a prompt for people with depression to assess the quality of online information they obtain. The five DARTS criteria may form the basis of a systematic approach to quality assessment and the tool may also act as a reminder of quality issues in general. Further studies are needed to assess the actual value of the DARTS tool as well as its value in relation to other quality assessment instruments.

Keywords DARTS-tool · Drug information · Finland · Patient information · Patient participation · Qualitative evaluation

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Impact of findings on practice

- Awareness of quality assessment tools of online medicines information is low among Finnish Internet users with depression.
- This study highlights the need to evaluate the quality of online medicines information.
- Internet users with depression are generally critical of the online medicines information but few systematically assessed the quality of information they obtained online.

- The DARTS tool may act as an easy-to-use reminder for consumers to assess the quality of online medicines information they retrieve.

Introduction

According to a study conducted in seven European countries, 71% of Internet users had used the Internet for health purposes [1]. However, there are significant challenges associated with the use of online health information, including the difficulty in finding accurate and high quality medicines information [2]. Educating consumers to distinguish between trustworthy and less trustworthy medicines information is a way of facilitating consumer access to good quality health information [3]. A range of quality assessment tools and quality criteria have been developed to assist consumers to evaluate online health information. However, a review of 273 quality assessment tools concluded that few of these tools are likely to be usable by Internet users [4]. The existing tools may be too complicated and consumers may lack understanding, time, energy and interest to use these tools in practice [5, 6].

People with mental disorders are frequent users of online health information [7–9] and also more likely than those with other long term illnesses to search for medicines information online [10]. Those suffering from stigmatised illnesses may choose to seek information anonymously, preferring online or telephone-based information to information provided face-to-face by health professionals [11, 12]. People with depression have also reported their dissatisfaction with the quality and quantity of medicines information provided by their health professionals [13, 14]. Assisting people with depression to evaluate medicines information is important because the quality of depression and antidepressant related websites is highly variable [15–18].

The Pharmaceutical Forum was established by the European Commission in 2005 to improve the performance of the pharmaceutical industry in terms of its competitiveness and contribution to social and public health objectives [19]. The DARTS (Date, Author, References, Type, and Sponsor) tool was developed under one of the three Working Groups of the Pharmaceutical Forum, the Working Group on Information to Patients, to assist patients appraise the quality of online medicines information (Fig. 1). The tool was not created to replace existing and more exhaustive check-lists or quality criteria. The purpose of the DARTS tool was to act as a short and easy-to-use reminder for Internet users to assess quality when retrieving online medicines information. It was published on the website of the Pharmaceutical Forum in May 2007 [20].

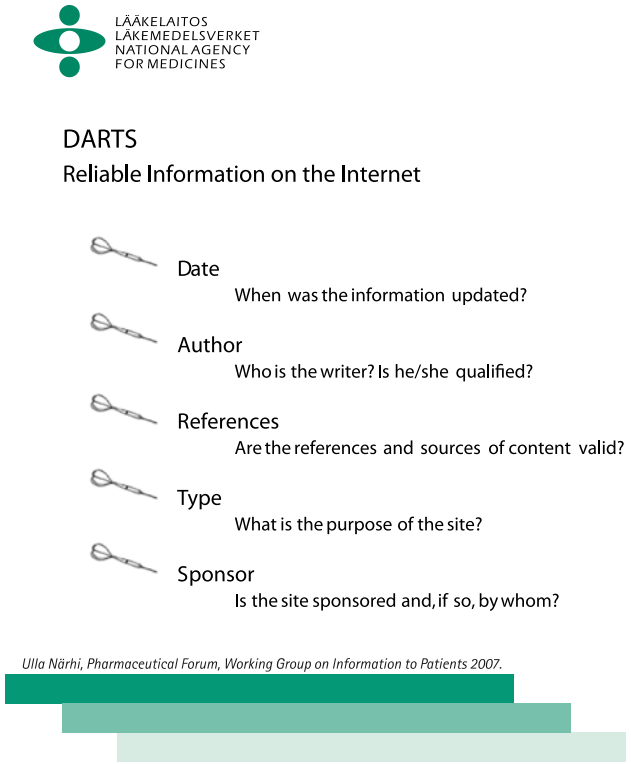

Fig. 1 The DARTS tool that was developed for consumers to evaluate the quality of health information on the Internet

Aim of the study

The aims of this study were to investigate how people with depression assess the quality of online medicines information and to study their perceptions of the DARTS tool.

Method

The DARTS tool was developed by incorporating content from existing tools and a systematic review of quality criteria [2]. The inclusion of scientific references, name and affiliation of the author, the date the site was last updated and the absence of financial interests have earlier been associated with one or more markers of reliable online medicines information [21, 22]. The type of the site (e.g. disclosure of target audience, scope and purpose) is an additional quality criterion described as having high face-validity [23]. The acronym "DARTS" was selected to facilitate the use of the tool (Fig. 1).

Focus groups were chosen as the method to assess how people with depression use the Internet and the likely usefulness of the DARTS tool. This method provided an opportunity for participants to stimulate each other to be explicit in their views, perceptions, and reasons [24]. The study was conducted in conjunction with a larger research

project which investigated the role of the Internet as a source of information about antidepressants [25].

The five quality criteria of the DARTS tool were translated into Finnish for use in Finland by the National Agency for Medicines [26]. The Finnish and the English version of the tool had the same content. However, the Finnish version was named "KATSE" ("watchful eye").

Previous literature was used as the basis for developing a focus group discussion guide [11, 27]. This paper reports discussion related to theme six in the discussion guide of the study (Appendix 1). The guide was pre-tested for appropriateness and comprehensiveness, and to establish face and content validity, using a convenience sample of people with depression ($n = 6$). No significant changes were made to the discussion guide based on the pre-test. Focus group participants were specifically asked (1) to describe criteria they use, or could use, to assess the quality of online medicines information (this was asked before showing the DARTS tool), (2) when presented with the DARTS tool, to describe the potential strengths and weaknesses of the DARTS tool when used in practice, and (3) to describe how quality assessment tools could be disseminated to patients and consumers for wider uptake and implementation. The DARTS-tool was used as a stimulus after open discussion in relation to the evaluation of the quality of Internet-based medicines information.

The inclusion criteria for participants were (1) use of the Internet as a source of antidepressant medicines information during the previous 12 months, (2) present or past use of an antidepressant medicine, (3) a present or past diagnosis of depression and (4) age of 18 years or older. People who had received prior training as a health or information technology professional were excluded from participation. In order to achieve a cross-section of participants, people were recruited with the assistance of three organisations: (1) Mieli Maasta Ry Depression Alliance, a national non-governmental patients' organisation [28] (2) the Finnish Students Health Service, a national foundation providing health and mental health care to all university students in Finland [29] and, (3) NYYTI, a peer-support centre for students that develops and produces services to promote mental well-being by the Internet [30]. Participants were recruited via a recruitment letter placed on the above organisations' websites, information boards and newsletters. In addition, a recruitment letter was sent to peer-support group leaders for the purposes of informing their group members about the study.

Twenty-nine Internet users with depression from the capital area volunteered to participate in the study (26 female, 3 male) (Table 1). Six focus group discussions (67–109 min duration) were conducted across metropolitan Helsinki between February and April 2007. The same independent moderator conducted all focus groups and ensured all participants had an equal opportunity to engage in the discussion. Two assisting researchers observed and took notes. After obtaining written informed consent from all participants, each focus group was digitally audiotaped. Participants also completed a short survey instrument to gather demographic data and details about previous Internet usage. Data were collected and analysed until saturation was received: the same themes emerged recurrently, and no new ideas were provided.

The digitally audiotaped focus groups were transcribed verbatim. Each transcript was repeatedly read by a

Table 1 Demographic characteristics of the focus group participants ($n = 29$)

	%	*n*
Gender		
Female	90	26
Male	10	3
Age		
20–30	28	8
31–50	21	6
51–69	52	15
Education (years)		
8–9	31	9
10–12	7	2
13–23	32	18
Membership of patient organisation		
Yes	55	16
No	45	13
Employment status		
Full or part time	24	7
Unemployed	7	2
Retired	35	10
Student	35	10
Initial diagnosis of depression		
1–4 years ago	21	6
More than 4 years ago	72	21
Not reported	7	2
Duration of current antidepressant therapy		
Under 2 months	7	2
2 to 12 months	14	4
More than 1 under 4 years	28	8
More than 4 years	24	7
Not currently using antidepressant	28	8
Internet experience (years)		
Under 1	14	4
1 to <2	3	1
2 to <3	10	3
3 to <4	–	–
4 to <5	7	2
≥5	66	19

researcher, while listening to the audiotapes, and the key themes that were inductively derived from the data were identified. Single words, sentences or groups of sentences related to a particular theme were coded. A second researcher then verified the key themes identified by the first researcher, and any differences of interpretation were resolved through discussion. Once key themes were identified, the transcripts were purposively re-read to detect any discussion that deviated from these themes.

The study was conducted in accordance with the World Medical Association Declaration of Helsinki [31]. The study was deemed exempt from requiring formal ethics committee approval by the Faculty of Pharmacy, University of Helsinki.

Results

Quality assessment processes described by people with depression

Participants were critical of the online medicines information they retrieved, but they did not systematically assess the quality of the information obtained. No participants were familiar with previously developed quality assessment tools. In all groups, participants were concerned about not being properly able to assess the quality of online medicines information. One participant mentioned that she does not have enough knowledge to appraise information quality and questioned whether she could trust any online information. Another indicated that she does not take into account the quality of the information she accesses online.

> If you want to use the Internet as a source of medicines information, you really need to know the sites and authorities you can trust…If you get lost into the virtual world and end up reading whatever information, you will do more harm than good. (Female, FG 4)
> ……
> I really can not trust the whole Internet, you really cannot know if somebody has, for example, changed the texts. (Male, FG 4)

When asked to describe their own quality assessment processes, participants reported comparing information obtained online to other online and off-line sources of medicines information. If conflicting information was obtained, some participants described how they printed the information and discussed it with friends, family and/or their physician. Some participants compared the information to patient information leaflets (PIL). The initial appearance of the website often influenced whether or not people continued to read the medicines information presented on that site. The most trusted websites were those maintained by regulatory authorities and pharmacies. Websites maintained by pharmaceutical companies, discussion forums, websites with promotional material and sites maintained by individual people were the least trusted sources of online medicines information. However, even sites people rated as untrustworthy were often read because of curiosity or due to the need for peer support. Participants most often searched for medicines information from websites presented in their preferred language.

> Sometimes it is very difficult to recognise [good quality information], since I am not, I mean that if you are not a specialist in some area. At least I can't recognise I have to take the information just like it is…and if you really are in need of information, you sometimes feel that you are like pushed into the corner with the situation. (Female, FG 1)

When asked to nominate criteria that could potentially be used to assess information quality, participants described criteria that were classified as site specific, information specific, site and information related, and person specific criteria (Table 2). Type, owner and sponsor of the site were

Table 2 The quality criteria described by focus group participants

Criteria	FG1	FG2	FG3	FG4	FG5	FG6
Site specific criteria						
Type of site		X	X	X	X	X
Owner of the site		X	X	X	X	X
Sponsor[DARTS]	X	X		X	X	
Interactivity	X				X	
Image of the site/site owner		X				
Information specific criteria						
Accuracy	X	X	X		X	X
Author[DARTS]	X	X		X	X	X
References[DARTS]	X		X		X	X
Vocabulary and writing style	X		X		X	X
Site and information specific criteria						
Purpose[DARTS]		X		X	X	X
Updating and currency[DARTS]		X[1]		X[1]	X	X[1]
Appearance	X	X			X	
Advertisements		X	X[1]			X
Links		X			X[1]	
Language		X				
Person specific						
Personal relevance	X			X	X	

[DARTS] Criteria included in the DARTS tool

[1] Criteria mentioned after showing DARTS

Criteria that were used or could be used by the participants ($n = 29$) of the focus group discussions for appraising Internet-based medicines information. The DARTS tool was presented for participants during the focus group (FG) discussions after asking about the quality criteria they used

Table 3 Strengths and weaknesses of DARTS

Strengths	Quotes
Short and concise nature	"My opinion is that there is just suitable amount of issues mentioned, so that you won't get the feeling that I can't go on any longer with this list." (Female, FG4)
Coverage of relevant issues	"Everything is covered here, you can just open the site and check if you can find this, and this, and this information… there should not be more information, otherwise it will just cause confusions." (Female, FG2)
Usefulness for many purposes	"This definitely should be integrated to elementary school teaching, at the stage children start using the internet. And then for the elderly, for example I have friends/relatives who have been prescribed antidepressants…" (Female 1, FG6)
Children, elderly, those beginning the use of the Internet and/or antidepressant	
Consumers and information providers	
To other written material	
Easy to understand	"These words are well defined, so that they are easily understandable, and in addition, generally this is really clear, and then it is good that this paper version is laminated, in many ways this is good." (Female, FG2)
Good reminder	"This is a useful reminder. Although you would know that you should consider this kind of issues, you do not always consider." (Female, FG5)
Weaknesses	
Time-consuming to use	"In some courses in our university, it is emphasised that this kind of issues should be considered when searching information. However, if I would like to have some information fast, then I really wouldn't go through all these issues." (Female, FG5)
Further clarification of criteria needed	"Experts, professors, or people with Ph.D. degree in England and US and wherever, you can not really say anything without knowing the history of the person or checking somewhere who the person is, the title really does not guarantee that the author is an expert in that field." (Female, FG1)
May increase suspicions	"Only (negative) issue that came to my mind is, if somebody is sickly suspicious, then this can even increase suspiciousness, you can find conspiracies and whatever everywhere." (Female, FG5)

Strengths and weaknesses of the DARTS tool as described by the focus group participants ($n = 29$). The most representative quote is chosen from each theme, FG = focus group

commonly mentioned criteria in relation to the site specific criteria. The date the site was updated was only mentioned in one focus group before the DARTS tool was shown to the participants.

> Well, considering the pharmacy sites, I can trust them quite well; however, I still wonder a little, can I really trust that information. (Male, FG 4)
>
> It is always good to be critical. (Female, FG 4)
>
> And, considering the pharmaceutical company sites, then you always need to remember that business is involved. If it is like a clean database, so that there are monographs of different medicines, and no other aim but delivering information, and some sponsor that you can trust, for example a regulatory authority, then you believe, and trust…but you still are a little bit concerned about the information quality. (Female, FG 4)
>
> And the single, private person sites are the opposite, when you read them; you need to be particularly critical. (Female, FG 4)

Strengths and weaknesses of DARTS in practice

Despite participants having different levels of experience and expertise in using the Internet, most believed that the DARTS tool would assist them to discriminate between high and low quality online medicines information. Perceived strengths of the DARTS tool were its short length, concise nature and coverage of relevant issues (Table 3). Disadvantages perceived by the participants included that DARTS would be too time-consuming to use in practice, that the criteria required further explanation to be properly useable, and that the DARTS criteria should be in your head and not on paper.

Implementation and dissemination strategies

Participants stated that the DARTS tool could be disseminated via magazines, pharmacies, physicians' offices, the Internet, mental health care clinics, pharmaceutical company websites, libraries, schools, universities and campaigns on television. Participants agreed that the

DARTS tool should be made as easily and as widely available as possible, and preferably in consumers' preferred language. One participant suggested that the DARTS tool should appear high in the list of hits when somebody writes antidepressant or the name of a specific medicine into an Internet search engine. In addition, many participants mentioned that everybody should have competency to appraise information—not only in relation to antidepressant medicines but also to medicines and health in general. Therefore, some participants suggested that the use of the DARTS tool should be integrated into elementary school, high school and university curricula. The usefulness of the tool was also perceived to extend to other written material other than just online information, and not only for consumers, but also for information providers.

> DARTS should definitely be promoted via the net. It should 'pop-up' [in the list of hits] always when somebody writes words like antidepressant or a treatment of depression into a search engine. (Female, FG 2)
>
> ……
>
> …for example in communication studies, there has been a lot of discussion about importance of having the media critics course into elementary and high school studies, maybe this could be part of that kind of course. (Female, FG 2)
>
> ……
>
> Definitely the best place to provide DARTS to the consumer is the computer itself, because it is the most effective way, because you always see it when you search information. In addition, it could be available in pharmacies. (Female, FG 2)

Discussion

The development of the DARTS tool was consistent with the described need for further guidance about how to assess the quality of online medicines information [2, 22, 32]. Many participants believed the DARTS tool would allay some of their concerns in relation to the quality of online medicines information. When prompted to suggest potential quality assessment criteria, participants described criteria already included in DARTS and other quality assessment tools [33–39]. This supported the notion that the DARTS tool may act as a valuable reminder for people with depression to consider quality assessment criteria when accessing online medicines information.

The DARTS tool may not be specific only to medicines information. The criteria were selected for inclusion in the tool because they have been associated with one or more markers of reliable medicines information. However, the usefulness of the tool may extend to evaluating patient information in general. The DARTS tool could also be useful for healthcare professionals when discussing information with patients.

The focus groups highlighted the fact that awareness about existing quality assessment tools has remained low [40]. Regardless of their complexity and relative merits, quality assessment tools will only enable patients to discriminate trustworthy information if the tools are familiar to patients and they know how to use them [4, 5, 41]. The simplified 5-item DARTS tool may offer advantages over other quality assessment tools in this regard. Although participants also described potential quality assessment criteria which were not part of the DARTS tool, the brevity and concise nature of the DARTS tool was particularly appreciated by the majority of focus group participants. Suggested strategies to disseminate and implement the DARTS tool may improve the uptake in practice. The DARTS tool may also be suitable for use in conjunction with search algorithms such as FA4CT [42], a new quality appraisal process which encourages patients to compare information from multiple sources. Given that quality criteria can be easily manipulated by, for example, setting an automatic display (for example on a date of update), comparing information from multiple sources is particularly important although DARTS or other checklist-type of tools for assessing online medicines information could be used.

Many other quality assessment tools are only available in English [33–39]. The people with depression in our study expressed their desire to use quality assessment tools and to access medicines information in their preferred language. The complexity and length of time required to use other quality assessment tools may be further compounded by language barriers. The concise nature of the DARTS tool facilitated easy translation into Finnish. The ease of translation is an important consideration when recommending a quality assessment tool for use across a linguistically diverse region such as Europe.

The quality assessment criteria described by the people with depression in our study were similar to those reported in studies of other consumer groups [26, 43]. Websites containing promotional material and those maintained by pharmaceutical companies were considered least trustworthy, a finding which was consistent with previous studies [6, 22, 44]. Focus group participants preferentially sought information from those websites they perceived as reliable. Previous studies have reported that Internet users deal with "information overload" via developing loyalty to particular brands or sources of reliable information [45]. These findings suggest the DARTS tool may also be useful among other groups of consumers.

The DARTS tool has already been published on the website of the European Commission (Pharmaceutical Forum) [20] and on the website of Finnish drug regulatory authority [25]. This can be regarded as favourable, since increased political attention and publicity may lead to increased awareness on quality issues among patients as well as information providers. Further studies are needed to evaluate the actual usefulness of the DARTS tool in practice. Future research is also needed to establish the usefulness of the DARTS tool in relation to other quality assessment tools. However, since checklists and other quality criteria may not necessarily be the best method of facilitating patients' access to accurate and balanced medicines information, other strategies should also be employed. These may include the semantic web approach [46] and national portals of medicines information.

Limitations

While the DARTS criteria were based on previously established markers of reliable medicines information, the reliability and validity of the tool has not been established. This limitation is common to most other quality assessment tools that have been developed [47, 48].

Three organisations were utilised to identify a cross-section of people with depression in the capital area. Approximately half of the participants belonged to a mental health support group. Although previous research has suggested the views of members and non-members of mental health support groups may be similar, the focus groups may not have included participants who represented the views of all Internet users with depression [49, 50]. Twenty-six of the 29 participants were female. Depression is more prevalent among Finnish females than males [51], but males were underrepresented among the participants. Additional quantitative research and random sampling techniques would be required to obtain generalisable results and to assess the relative importance of the various quality assessment criteria identified by the focus group participants.

Conclusions

Few Internet users with depression used a systematic approach to assess the quality of online medicines information, and there was a low awareness of quality assessment tools. A short tool such as DARTS may serve as a valuable reminder to patients to assess information quality when accessing online medicines information. Due to the concise nature of the DARTS tool it may be more user-friendly than other quality assessment tools. Further studies are needed to evaluate whether participants would use DARTS in practice and what is the value of the zDARTS tool in relation to other quality assessment tools.

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Conflicts of interests During the study, UN and AK worked for the National Agency for Medicines, Finland. UN was a member of the European Commission Pharmaceutical Forum Working Group on Information to Patients. At the moment, she works for the European Commission.

Appendix 1. Focus group guide

1. Experiences in receiving information on antidepressants (in general)
2. Antidepressant-related information needs
3. Experiences in using different sources of medicines information
4. The internet as a source of medicines information
5. The methods and process of searching for Internet-based medicines information
6. The evaluation of the quality of Internet-based medicines information
7. Perceived impact of Internet-based medicines information

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