

General practitioners and online continuing medical education – which factors influence its use?

Hausärzte und Online-Fortbildungsangebote (CME) – welche Faktoren beeinflussen die Nutzung solcher Angebote?

Abstract

Introduction: Although several online continuing medical education (CME) offers exist, the utilization of these by physicians is still low. In this study, we aimed to investigate the attitude towards and use of the Internet and online CME in German general practitioners (GPs) and to identify potential starting points to increase the use of online CME.

Methods: In June 2006, a standardized 6-page questionnaire with 27 questions on the topic “Internet and online continuing education” was sent to all general practitioners in 6 districts (n=1304) of South Baden and South Württemberg in Germany. Data were analyzed using descriptive statistics, and exploratory regression analyses were performed to identify predictors of online CME usage. Furthermore, selected barriers were investigated in detail.

Results: A total of 351 questionnaires were sent back, of which 349 could be included in the analysis (27% response rate). The sample is representative of the population contacted with respect to gender and qualifications. Univariate analyses showed that users of online CME were two years younger than non-users on average. Users spent two hours more on the Internet per week than non-users, and had been using the Internet for one year longer. Finally, users had better Internet skills, more often had previous experiences with online CME, and assessed the effectiveness of online CME to be higher and perceived fewer problems than non-users.

Discussion: Measures to implement and increase the use of online CME can be aimed at different levels. The most important starting points are likely to be offering GPs the possibility to gain experience with online CME and improving their attitudes towards online CME. But for some physician populations, e.g. elderly or physicians with less Internet experience, e-learning might be an inferior option in comparison to traditional CME.

Keywords: Internet, online continuing medical education, physicians

Zusammenfassung

Einleitung: Es gibt zwar inzwischen zahlreiche medizinische Online-Fortbildungsangebote (CME), aber die Nutzung dieser Angebote durch Ärzte ist gering. Das Ziel dieser Untersuchung war es, die Einstellungen gegenüber und die Nutzung von Internet und Online-Fortbildungen durch Hausärzte zu erfassen und mögliche Ansatzpunkte zur Erhöhung der Nutzung von Online-CME-Angeboten zu identifizieren.

Methodik: Im Juni 2006 wurde ein 6-seitiger standardisierter Fragebogen mit 27 Fragen zum Thema „Internet und Online-Fortbildung“ an alle Ärzte aus 6 Kreisen (n=1304) der KV-Bezirke Südbaden und Süd-Württemberg versandt. Die Daten wurden deskriptiv-statistisch und regressionsanalytisch ausgewertet. Darüber hinaus wurden Hindernisse bei der Nutzung von Online-Angeboten untersucht.

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Ergebnisse: 351 Fragebögen wurden zurückgesandt, 349 konnten in die Analyse eingeschlossen werden (27%). Die Stichprobe ist in Bezug auf Geschlecht und Fachrichtung repräsentativ für die angeschriebene Gesamtstichprobe. Univariate Analysen zeigten, dass die Nutzer von Online-CME-Angeboten im Durchschnitt 2 Jahre jünger waren als Nicht-Nutzer. Die Nutzer verbrachten zwei Stunden pro Woche mehr im Internet als Nicht-Nutzer und nutzten das Internet bereits ein Jahr länger. Nutzer schätzten ihre Internetkenntnisse besser ein als Nicht-Nutzer, hatten häufiger bereits Erfahrung mit Online-Fortbildungsangeboten, schätzten die Effektivität von Online-CME-Angeboten höher ein und erlebten weniger Hindernisse bei der Nutzung solcher Angebote.

Diskussion: Maßnahmen zur Erhöhung der Nutzung von Online-CME-Angeboten können an verschiedenen Stellen ansetzen. Ein wichtiger Ansatzpunkt ist, Ärzten die Möglichkeit zu geben, Erfahrungen mit solchen Angeboten zu sammeln und die Einstellung in Bezug auf die Einschätzung der Effektivität von Online-Angeboten zu verbessern. Für einige Ärzte-Populationen, beispielsweise ältere oder Ärzte mit wenig Internet-Erfahrung, mögen allerdings traditionelle CME-Fortbildungen besser geeignet sein als Online-CME-Angebote.

Schlüsselwörter: Internet, medizinische Online-Fortbildungsangebote, Ärzte

Introduction

There is an increasing trend for developing e-learning modules for general medical training and continuing education (CME). Most of these products use the Internet, and thus offer physicians the great advantage of flexibility of time and place [1]. In several studies, the effectiveness of e-learning in terms of the increase in knowledge level has proved to be comparable to traditional learning through in-person instruction or paper-based material [2], [3], [4]. In some studies, it even showed itself to be more efficient than traditional forms of learning [5], [6]. The technological requirements for using e-learning offers, especially Internet-based ones, are widely in place. In the United States there were 71% Internet user in 2007 [7]. The use of the Internet in Germany has increased rapidly since 1993 [8], and from 1997 to 2007, the amount of people using the Internet rose from 6.5% to 62.7% [9]. Results of studies from our own group have shown that almost all GPs (94.5%) have Internet access, most of them with a fast Internet connection [10]. Self-assessment of Internet skills by GPs was also found to be quite good. The effectiveness of online CME was assessed as "medium" to "high" [10]. Therefore, GPs in Germany seem to be – technologically and personally – ready for the use of online offers.

There are many online CME offers on clinically relevant themes in existence, which can be found in databases and under several links in the Internet [11]. LRSMed (Learning Resource Server Medicine) for example offers search capabilities for multimedia learning software modules, which are deployed for free in the World Wide Web. 2010 e-learning software modules are listed there at the moment [12].

The quality of e-learning offers is heterogeneous, and there are many different providers, e.g. publishing companies, pharmaceutical companies or universities. So it is important to consider reliability of the providers or a certification of an offer to assess its quality [11].

E-Learning offers have proved to be effective in studies and physicians are prepared to use them. However, current data from our own studies [10] and studies by Butzlaff et al. show that the current use of online CME by physicians is quite low [13].

The aim of this study was to investigate the attitude towards and the use of the Internet and online CME in German general practitioners (GPs) and to identify potential starting points for interventions to increase the use of online CME.

Methods

Setting

This survey is part of the project "Outpatient Quality Management of Alcohol-Related Disorders in Primary Care" (AQAH), which is funded by the German Ministry for Education and Research [14]. In the first funding period of the project, a comprehensive quality management (CQM) system for primary care was developed and its effects on the detection and treatment of alcohol-related disorders were investigated in a randomized controlled pre-post design. The aim of the subsequent three year bi-center project was to transfer and disseminate the CQM system into routine care in the regions of South Baden and South Württemberg by optimizing the CQM approach and investigating the transfer into routine care in a randomized trial.

In the context of this project, a needs assessment for online CME was conducted. Based on this, the platform <http://www.alkohol-leitlinie.de/> was developed. The platform offers extensive information for patients with alcohol-related disorders, their relatives, physicians and other experts working with this patient population. A set of guidelines, an e-learning tool and a documentation system are available on the site.

Study population

The study was intended to address a representative sample of the GP population in the South Baden and South Württemberg regions of Germany. All GPs in 6 districts (n=1304) of South Baden and South Württemberg were contacted. In June 2006, the questionnaire was posted to the GPs with a request to complete it and send it back to the research center. Data for the present study were collected between June and September 2006. In order to determine the causes of non-response, a standardized telephone survey was conducted in 140 randomly selected non-responders in May 2007.

Instrument

The applied standardized questionnaire contained 27 questions that were grouped into three main sections. In the first section, the GPs were asked to answer questions on their attitude towards and use of the Internet. The second section focused on their attitude towards and use of online CME. Detailed descriptive results regarding these sections are reported elsewhere [10]. The third section collected data that described the demographic characteristics of the practice and the GP. Most questions were either of a dichotomous nature or used ratings on five-point Likert scales.

Statistical analyses

The representativeness of the sample was tested by comparing the distribution of sex and qualification data between study and reference population via chi-squared test.

In order to promote the comprehensibility of the reported findings, all items were treated as either interval-scaled or dichotomized. In general, outcomes were grouped into the proportions "low" and "high". In a first step, univariate analyses were carried out in order to gain a rough view of the associations between demographic data/data on Internet know-how/data on the attitude towards online CME and current use of online CME. The following independent variables were included: (A) demographic characteristics: (A1) sex, (A2) age, (A3) years in practice, (A4) patients seen per quarter-year, (A5) population amount of the region; (B) Internet know-how: (B1) hours spent on the Internet per week, (B2) years of Internet use, (B3) Internet skills; (C) attitude towards online CME: (C1) previous use of online CME, (C2) assessment of effectiveness of online CME, (C3) number of perceived problems with

online CME. The target variable was the current use of online CME (non-users: rarely/never; users: sometimes/often/very often). In the case of dichotomous predictors, chi-squared tests were conducted (Fisher's exact test in the case of low cell frequencies), and t-tests were performed on interval-scaled predictors.

In the second step, two logistic regression analyses were performed. In the first step, the target variable was current use of online CME, and in the second step the assessment of effectiveness of online CME formed the target variable. In the analyses, we used a priori assumption concerning the direction of associations and a stepwise backward computation algorithm based on Wald statistics. Some variables in the regression analyses were dichotomized domain scores, dividing the population into "high" and "low" proportions by adding up the proportion of GPs who answered "medium", "high", and "very high" versus those who answered "low" and "very low". Associations were expressed as adjusted odds ratios with 95% confidence intervals. All analyses were of an exploratory nature and should be interpreted as such. Findings with an alpha error probability of $p \leq 0.05$ were considered to be statistically significant. Results with $p \leq 0.10$ were seen as "tendencies" and are also reported. Due to the exploratory character of the study, multiple testing based alpha error inflation was not corrected.

Data management was carried out using Microsoft Access for Windows 2000. Data were analyzed using SPSS for Windows 15.0.

Ethical approval

The study protocol was approved by the Ethics Committee of the Albert Ludwigs University Freiburg, Germany.

Results

Study sample

A total of 351 questionnaires were returned, yielding a return rate of 27% (see Figure 1). The majority of GPs in the analyzed sample were male (72.5%), the mean age was 51.4 years (standard deviation 7.7 yrs, range 28–66 yrs), and they had been practicing for an average of 14.9 years (SD 9.0 yrs, range 1–36 yrs). 43.5% of the GPs worked in a group practice. 59.1% had an average number of different patients seen per quarter-year of fewer than 1000, while 40.9% saw 1000 or more. 57.6% of the GPs worked in a rural practice (fewer than 25,000 residents), and 42.4% in a more urban region (more than 25,000 residents).

The tests concerning distribution of gender and qualifications showed no significant differences between sample and reference population (χ^2 test; $p > 0.05$). Based on the large number of cases, these non-significant results support the assumption that the study sample is representative for the reference population concerning sex and qualifications.

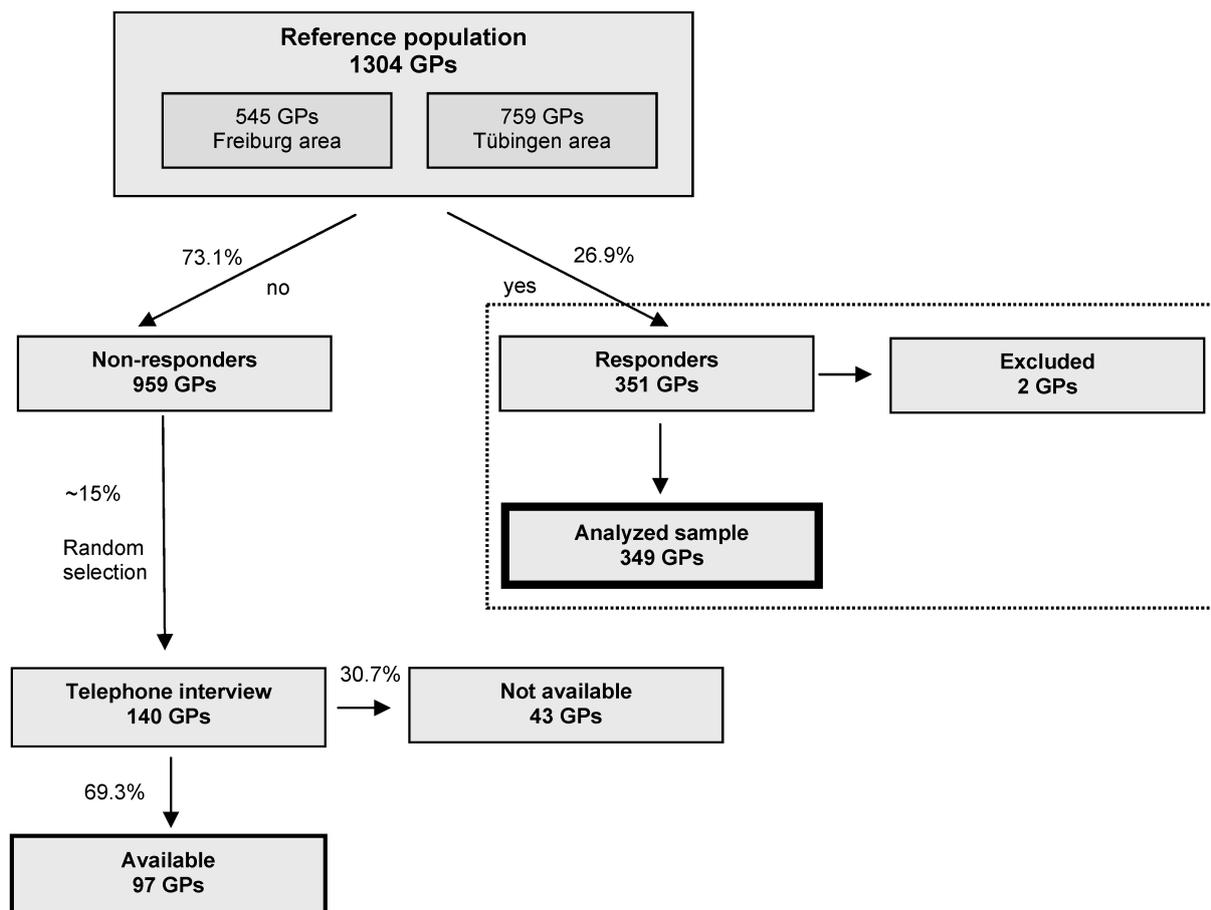


Figure 1: Sampling procedure

The 140 randomly selected non-responders for a telephone survey made up 14.6% of all non-responders. Ninety-seven (69.3%) of them were available for the telephone survey, and 44 cited a reason for not responding to the posted questionnaire. The main reasons were lack of time (19 GPs) and not being interested in the topic (16 GPs). Four GPs stated that they could not see any sense in the survey, three GPs judged the instrument as being too lengthy, and two claimed that there was no incentive to answer the questionnaire. Twenty-three (23.7%) of the 97 available GPs agreed to answer the questions on the topic "Internet and online continuing education". The mean age of these GPs was 50 years and they had been practicing for an average of 16.3 years. 95.7% stated to have Internet access and to use the Internet since 7 years. 47.6% assessed their Internet-skills as "good" or "very good". 52.1% stated to use online continuing education "rarely" or "never". These results were comparable to the data of the responders of the postal survey.

Univariate analyses

Results regarding the associations of demographic data/data on the use of the Internet/data on the assessment of online CME and current use of online CME are reported in Table 1. Users of online CME were two years

younger ($p=.023$) and had two fewer years in practice ($p=.036$) than non-users. Users of online CME also spent two hours per week more on the Internet than non-users ($p<.001$) and had been using the Internet for one year longer ($p=.014$). Users reported higher Internet skills ($p<.001$) and indicated more often previous experiences with online CME ($p<.001$), assessed the effectiveness of online CME higher ($p<.001$) and also perceived fewer problems than non-users ($p<.001$).

Multivariable analyses

Figure 2 shows the results of multivariable analyses between current use of online CME and the assessment of effectiveness of online CME and various other variables. Previous use of online CME predicts higher current use of online CME, and higher assessment of effectiveness, fewer perceived problems and more hours per week spent on the Internet also result in higher current use of online CME. Previous use of online CME and fewer perceived problems result in a higher assessment of the effectiveness of online CME.

Table 1: Univariate analysis of associations between demographic data/data on the use of the Internet/data on the assessment of online CME and current use of online CME

	Non-users of online CME (rarely/never)	Users of online CME (sometimes/often/very often)	Test for difference between groups	
	(n=195)	(n=148)	(df)	p
Demographic characteristics				
<i>Sex (%)</i>				
male	72.0	73.6	Chi ² (1)=0.11	.738
female	28.0	26.4		
<i>Age; years</i>				
mean (SD)	52.2 (7.6)	50.2 (7.7)	t(336)=2.28	.023
<i>Years in practice</i>				
mean (SD)	15.9 (9.1)	13.8 (8.8)	t(329)=2.10	.036
<i>Patients seen per quarter-year (%)</i>				
<1000	62.5	53.1	Chi ² (3)=7.62	.055
≥1000	37.5	46.9		
<i>City (%)</i>				
<25000 residents	53.2	62.9	Chi ² (3)=3.68	.298
≥25000 residents	46.8	37.1		
Internet know-how				
<i>use of the Internet; hours per week</i>				
mean (SD)	2.8 (2.7)	4.8 (4.5)	t(229.3)=-4.71	<.001
<i>use of the Internet for; years</i>				
mean (SD)	7 (3.1)	8 (2.8)	t(320)=2.46	.014
<i>Internet skills (%)</i>				
high (medium/good/very good)	69.4	89.0	Chi ² (4)=22.30	<.001
low (poor/very poor)	30.6	11.0		
Attitude towards online CME				
<i>previous use of online CME (%)</i>				
yes	35.4	91.7	Chi ² (1)=107.41	<.001
no	64.6	8.3		
<i>assessment of effectiveness of online CME (%)</i>				
high (middle/good/very good)	54.2	90.5	Fisher's exact=98.46	<.001
low (poor/very poor)	45.8	9.5		
<i>perceived problems with online CME</i>				
mean (SD)	3.4 (2.4)	1.2 (1.7)	t(327.2)=9.49	<.001

CME = continuing medical education; df = degrees of freedom; SD = standard deviation

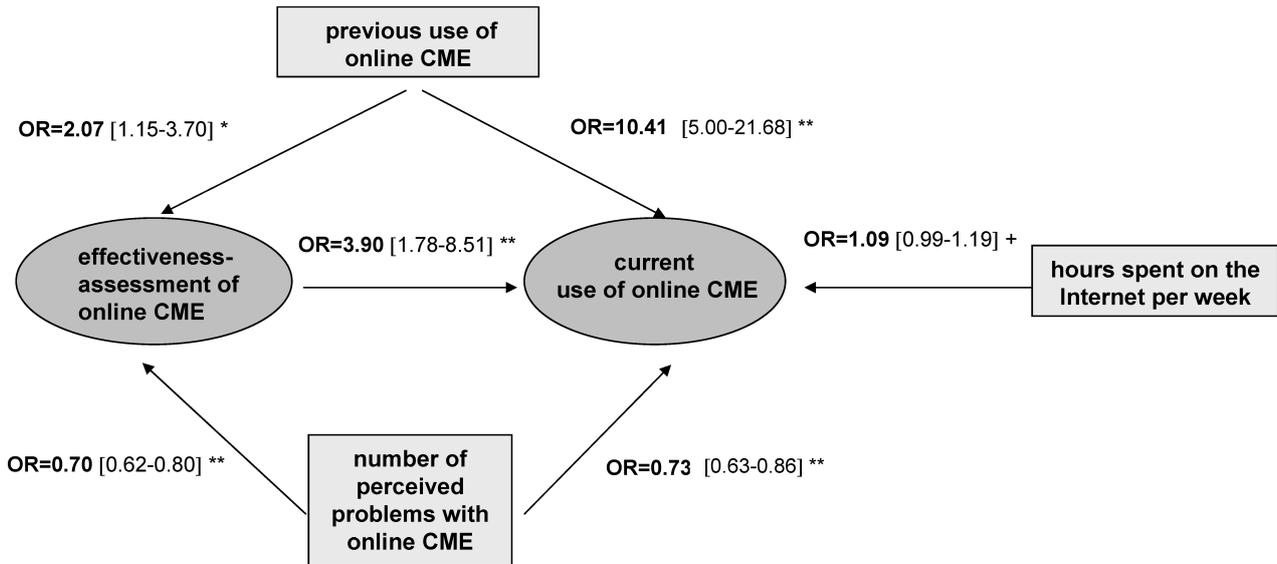


Figure 2: Relationship between current use, assessment of effectiveness, previous use of online CME, number of perceived problems with online CME and hours spent on the Internet per week (logistic regression analyses, OR=adjusted odds ratio, with 95% confidence intervals, + p≤0.10, * p≤0.05, ** p≤0.001)

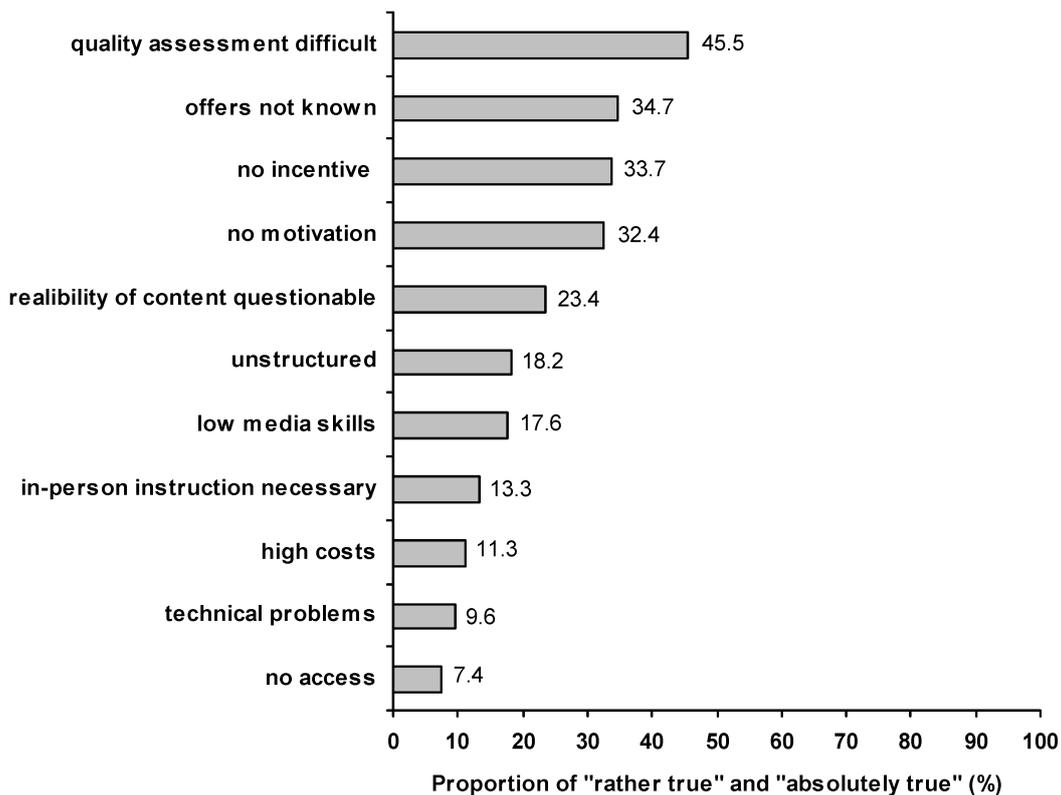


Figure 3: GPs' assessment of perceived problems in the use of online CME, using a five-point Likert scale from "absolutely false" to "absolutely true"; n=307 to 332

Barrier analysis

The responding GPs perceived especially the assessment of the quality of online CME offers as a great problem, not knowing which criteria could be consulted to distinguish offers of high quality from such of low quality. Lack of knowledge regarding online CME offers and where to find them, no incentive and no motivation to use them

were seen as further problems. Concerning these aspects, the reported proportions "rather true" to "completely true" fell between 32.4% and 45.5% (see Figure 3). Only a minority of GPs stated technical problems (9.6%) and lack of access (7.4%) as difficulties in the use of online CME.

Discussion

This survey provides information about the attitudes and needs of GPs with regard to online CME and factors of influence on their current use of online CME.

All variables concerning Internet know-how and attitude towards online CME proved to be good predictors for the current use of online CME. A higher assessment of the effectiveness of online CME proved to be associated with higher current use of online CME. Fewer problems seen by the GPs in the use of online CME also resulted in a higher use of online CME. However, the best predictor for current use of online CME was previous use of online CME. These results underline the importance of giving physicians the opportunity to gain experience with online systems, for instance in continuing education courses, or even better already during their academic training. In the context of such courses, it is possible not only to provide physicians with the opportunity to gain experience with online systems in order to overcome inhibitions, but also to highlight the effectiveness of e-learning to the physicians, which itself leads to an increased probability of utilization.

Finally, the problems seen in the use of online offers also have to be solved in order to increase the use of these offers by physicians. The main problems do not concern technology, but rather the quality assessment of such offers and the problem of not knowing where to find them. These problems might be solved by making online offers easier to find, for example by providing links to them on Internet pages often used by physicians. The providers of online offers could help to solve the problem of quality assessment by offering information about the quality of their systems that is easy to find and understand. One possibility, for example, would be to register their page with the Health On the Net Foundation [15] in order to obtain a logo demonstrating that they satisfy several quality criteria.

Some methodological shortcomings of the present study should be considered. The results are based on 351 questionnaires representing only 27% of the addressed population. This response rate is not unusual in postal surveys, but it limits the external validity of the drawn conclusions. Representativeness of the sample for the reference population can be assumed regarding gender and qualifications, but other factors (e.g. attitude towards the use of the Internet and of online CME) might have led to a self-selective non-responder bias. The telephone survey of the non-responders mainly found time-related reasons for not answering the questionnaire. Although the data of the non-responders in the telephone interview were comparable to the data of the responders, we cannot exclude a specific motivational bias. Furthermore, the investigation of causal relationships in cross-sectional studies is always subjective and can only be supported, but not proven, by the data.

The positive feature of the study is that it offers starting points to increase and implement the use of online CME,

which is an effective method for continuing education with many advantages.

E-Learning has proven to be effective in several studies [2], [3], [4], offers many opportunities for illustration and the great advantage of flexibility of time and place – and its dissemination has to be assumed to increase rapidly in the future. In spite of all the advantages of e-learning, the problems of e-learning should not remain out of consideration. E-learning might not be the right way of learning for everybody, it is impersonal and the professional exchange with colleagues gets lost. So for some physician populations, e.g. elderly or physicians with less Internet-experience, e-learning might be an inferior option in comparison to traditional CME. Unfamiliarity with computers is still perceived as one important barrier to using Internet-based programs [16]. Moreover, the present study showed that having experience with online courses is the best predictor for its current use. E-Learning is also not suitable for all contents. It offers good possibilities for illustration, e.g. in medical imaging, but reaches its limitations in areas in which direct patient contact is essential for learning, for example. So e-learning certainly cannot replace traditional learning and in-person instruction, but web-based CME can complement traditional CME activities [17], when reasonably utilized and making optimal use of the advantages.

The Internet offers many useful resources for physicians [18], but is still underused. Although most physicians use the Internet, it is mainly for personal purposes, and not for CME programs [10], [19].

Therefore, our main conclusion is that physicians should have the opportunity to gain experience with online systems and receive responses to their problems and uncertainties. The hitherto very low incentive to use online CME is a further important barrier to the broad use in continuing medical education. Thus, it can be assumed that all of the educational efforts can only be effective when supported by a higher incentive to use online CME, e.g. gaining more credits for using it. Considering the fact that German physicians have to collect 250 CME credits in five years, there is no incentive to use an online CME offer if they only receive one credit for it. With a CME-article one can gain three credits – with an interactive e-learning-tool of high quality often only one credit, with e-learning tools differing from traditional learning-units, e.g. presenting case-studies and questions on diagnostics and treatments, no credits at all.

With in-person training session one cannot gain more credits per learning-unit either, but these continuing education offers often take several hours, so that one can gain more credits all in all. Because of that, these offers might be more attractive. But time and costs incurred for traveling to in-person trainings have to be considered, too.

These findings provide a solid basis for the development of dissemination and implementation strategies that may lead to a higher utilization of online CME offers by primary care physicians.

Conclusions

- One of the most important starting points to increase the use of online CME might be to offer physicians the possibility to gain experience with such systems.
- Pointing out the effectiveness of e-learning could be a further incentive to increase the use of online CME.
- The problems seen in the use of online CME by GPs must be solved, especially the problem of quality assessment of offers and the difficulties in finding them.

Notes

Conflicts of interest

None declared.

References

- Sönnichsen AC, Waldmann UM, Vollmar HC, Gensichen J. E-Learning: Aktueller Stand und Chancen in der Allgemeinmedizin [E-Learning: Current status and opportunities in general medicine]. *GMS Z Med Ausbild.* 2005;22(3):Doc61. Available from: <http://www.egms.de/en/journals/zma/2005-22/zma000061.shtml>
- Chumley-Jones HS, Dobbie A, Alford CL. Web-based learning: sound educational method or hype? A review of the evaluation literature. *Acad Med.* 2002;77(10 Suppl):S86-93.
- Fordis M, King JE, Ballantyne CM, Jones PH, Schneider KH, Spann SJ, Greenberg SB, Greisinger AJ. Comparison of the instructional efficacy of Internet-based CME with live interactive CME workshops: a randomized controlled trial. *JAMA.* 2005;294(9):1043-51. DOI: 10.1001/jama.294.9.1043
- Wutoh R, Boren SA, Balas EA. eLearning: a review of Internet-based continuing medical education. *J Contin Educ Health Prof.* 2004;24(1):20-30. DOI: 10.1002/chp.1340240105
- Bell DS, Fonarow GC, Hays RD, Mangione CM. Self-study from web-based and printed guideline materials: a randomized, controlled trial among resident physicians. *Ann Intern Med.* 2000;132(12):938-46.
- Cook DA, Dupras DM, Thompson WG, Pankratz VS. Web-based learning in residents' continuity clinics: a randomized, controlled trial. *Acad Med.* 2005;80(1):90-7. DOI: 10.1097/00001888-200501000-00022
- Medienforschung.orf.at. Internet user in Europe [homepage on the Internet]. Available from: http://mediaresearch.orf.at/c_international/console/data/d_3_5_1.htm
- Wikimedia Foundation Inc. Internet. In: Wikipedia – The free encyclopedia [in German]. 2009. Available from: <http://de.wikipedia.org/wiki/internet>
- ARD.de [homepage on the Internet]. ARD/ZDF-Onlinestudie 2007 [ARD/ZDF-Online-study 2007]. Available from: <http://www.ARD-ZDF-Onlinestudie.de>
- Ruf D, Berner MM, Kriston L, Maier I, Härter M. Hausärzte online: Gute Voraussetzungen, aber geringe Nutzung des Internets zur Fortbildung [General practitioners online: The conditions are good, but use of the Internet for continuing medical education is low]. *Z Evid Fortbild Qual Gesundheitswes.* 2008;102(5):291-7. DOI: 10.1016/j.zefq.2008.02.023
- Ruf D, Berner MM, Kriston L, Härter M. E-Learning – eine wichtige Unterstützung in der medizinischen Aus-, Fort- und Weiterbildung? [E-learning – an important contribution to general medical training and continuing education?]. *Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz.* 2008;51(9):1061-9. DOI: 10.1007/s00103-008-0635-1
- LRSMed: Learning Resource Server Medicine. Medical E-Learning Software on the Web. Essen: IMIBE; 2008. Available from: <http://mmedia.medizin.uni-essen.de/portal/>
- Butzlaff M, Koneczny N, Floer B, Vollmar H, Lange S, Kunstmann W, Köck C. Hausärzte, Internet und neues Wissen: Nutzung und Effizienzeinschätzung von Fortbildungsmedien durch Allgemeinärzte und hausärztlich tätige Internisten [Family physicians, the internet and new knowledge: utilization and judgment of efficiency of continuing education media by general physicians and internists in family practice]. *Med Klin (Munich).* 2002;97(7):383-8. DOI: 10.1007/s00063-002-1170-8
- Mänz C, Berner MM, Lorenz G, Härter M, Bermejo I, Berger M, Buchkremer G, Mundle G. Projekt AQAH: Ambulantes Qualitätsmanagement alkoholbezogener Störungen beim Hausarzt [Out patient quality management of alcohol-related disorders in primary care (AQAH)]. *Suchtmedizin.* 2003;5(1):1-8.
- Health On the Net Foundation. Health On the Net [homepage on the Internet]. Geneva: HON. Available from: <http://www.hon.ch/>
- Gagnon MP, Légaré F, Labrecque M, Frémont P, Cauchon M, Desmartis M. Perceived barriers to completing an e-learning program on evidence-based medicine. *Inform Prim Care.* 2007;15(2):83-91.
- Dickmann C, Habermeyer E, Spitzer K. WWW-based continuing medical education: how do general practitioners use it? *Stud Health Technol Inform.* 2000;77:588-92.
- Anthes DL, Berry RE, Lanning A. Internet resources for family physicians. *Can Fam Physician.* 1997;43:1104-13.
- Lim RF, Hsiung BC, Hales DJ. Lifelong Learning: Skills and Online Resources. *Acad Psychiatry.* 2006;30(6):540-547. DOI: 10.1176/appi.ap.30.6.540

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