

**Felicity Goodyear-Smith**

MBChB, MGP, FRNZCGP, is Associate Professor, Department of General Practice and Primary Health Care, University of Auckland, New Zealand. f.goodyear-smith@auckland.ac.nz

Ngaire Kerse

MBChB, PhD, FRNZCGP, is Associate Professor, Department of General Practice and Primary Health Care, University of Auckland, New Zealand.

Jim Warren

BSc, PhD, is Professor of Health Informatics, Epidemiology and Biostatistics, University of Auckland, New Zealand.

Evaluation of e-textbooks

DynaMed, MD Consult and UpToDate

Aim

To evaluate the acceptability and utilisation of three electronic textbooks: DynaMed, MD Consult (including FirstConsult) and UpToDate.

Method

Two hundred general practitioners accessed three e-textbooks through a web portal. General practitioners completed an electronic survey and used a random selection during a telephone interview to answer four clinical questions: screening, diagnosis, treatment and prognosis.

Results

One hundred and twenty-two GPs made at least one hit through the study website. Eighty-four GPs completed the emailed questionnaire and 77 completed the telephone interview (36% of enrolled, 61% of users). Fifty-one percent of users accessed the e-textbooks less than 10 times over 8 months. There was no significant difference in preference for, or usage levels of, the three e-textbooks. During the telephone interview the three texts performed similarly in terms of time to answer and satisfaction with answer.

Conclusion

There was no clear 'winner' between the three e-textbooks.

■ **With the increasing practice of evidence based medicine and the explosion of medical knowledge regarding diagnosis and management of conditions, printed medical textbooks have a short useful lifespan. General practitioners are increasingly using the internet to find answers to clinical questions. These sources of information are not always reliable. One study of 23 primary care physicians found that when they sought answers to 46 clinical questions using electronic resources of their own choice, they did not always find the correct answers and sometimes changed a correct response to an incorrect one based on the information they obtained.¹ However, a similar study that provided clinicians with a proscribed set of resources (including PubMed and MIMS) found an increased rate of correct answers.²**

The Google search engine, and more recently Google Scholar, which is more likely to find peer reviewed journal articles,³ is replacing PubMed as the first port of call.⁴ However the results of using these resources varies widely depending on which search terms are used, and are likely to have many hits and misses. While using Medline is likely to give more accurate results, its use is generally too time consuming to be of value to answer clinical questions at the time at which they arise.⁵

Over the past decade there has been the development of a number of interactive electronic resources that allow rapid access to evidence based, continuously updated answers to clinical problems using the internet. As availability of fast internet access increases for GPs, such resources offer the opportunity to gain evidence based answers to clinical questions at the time they come up. If they are able to provide the answer to a particular clinical question these e-textbooks are likely to be more reliable.

Such resources are proliferated with variable reports of their use and usefulness by GPs. The resources vary with respect to their cost (both individual subscriptions and site licences), their presentation, the way they are structured, the quality and quantity of content and their search functions.

A randomised trial of one e-textbook (Dynamic Medical, or DynaMed) found that clinicians with access to the resource answered more clinical

Bruce Arroll

MChB, PhD, FRNZCGP, is Professor, Department of General Practice and Primary Health Care, University of Auckland, New Zealand.

questions without increasing overall search time compared with those using their usual information sources.⁶

Our initial pilot studies involved eight available resources: Clinical Evidence <http://clinicalevidence.bmj.com/cweb/index.jsp>; Skolar MD www.skolar.com/; Trip Database www.tripdatabase.com/index.html; Prodigy www.prodigy.nhs.uk; E-medicine www.emedicine.com/; DynaMed www.ebscohost.com/dynamed/; MD Consult www.mdconsult.com; and UpToDate www.uptodate.com.

The aim of the study was to evaluate the acceptability, utilisation and perceived usefulness of the three e-textbooks: DynaMed, MD Consult (including FirsrtConsult) and UpToDate. These results aimed to inform the possible purchase of a subscription for one of these resources for New Zealand GPs.

Method

An initial pilot with nine GP members of Auckland Faculty Board informed the subsequent design. The study population were the first consecutive 200 GPs recruited from Members and Fellows of the Northland and Auckland faculties of the Royal New Zealand College of General Practitioners (RNZCGP). General practitioners were excluded if they had no email address available from the college database, no broadband internet access, were members of Auckland Faculty Board or were going to be on leave during the study period. All eligible GPs were emailed an invitation to participate accompanied by a participant information sheet. A positive response to the invitation was considered informed consent.

The study had University of Auckland Human Participants Ethics Committee approval.

Free access for study participants to the three e-textbooks was arranged through the publishers of these resources. Access to MD Consult and DynaMed was available for the full 8 months of the trial, but only 1 month for UpToDate.

A website was developed to act as the participating GPs gateway for accessing the online textbooks. The GPs were instructed to use this gateway for all access to the e-textbooks during their period of participation. Each participant was given a personalised web address with their enrolment email, through which the GP was identified to the website and greeted by name. The website provided participants with a reference copy of the project information sheet and simple instructions for use of the three e-textbooks (the same length for each). Access to all three e-textbooks for 1 month was available and ongoing access to all three was variable.

The GPs were asked to bookmark this site, to visit at least weekly for the first 3 weeks, and to only access the three resources via this bookmark. The website implemented a block randomisation of the

GP participants to the six possible orderings of the three e-textbooks. Starting from the day of their first access to the website, each participant was offered a link to a single e-textbook. After 1 week this link changed to offer instead a link to a second e-textbook, and then to offer just a link to the last e-textbook on the third week. From day 22 and thereafter the GP was presented with links to all three e-textbooks, given each time in a different random order. The rationale was to enforce each participant to use each e-textbook for 1 week, but thereafter to give the participants the freedom to choose. The time stamp of each access made through the gateway was recorded to an automated log.

After they had had the opportunity to access all three e-textbooks, the GPs were asked to complete an electronic survey that collected demographic data and their order of preference for the three resources regarding availability of good quality evidence and answers to their clinical questions in a form that is fast, easy to use and reliable. Faculty members had previously had 6 months free access to DynaMed; Procure GPs had free access to MD Consult; UpToDate a 1 month free trial; and the occasional GP had funded their own resource. General practitioners therefore were asked about their prior use of the three e-textbooks.

A telephone interview was then conducted with the GPs. They were logged into all three e-textbooks in different browser windows via their personalised URL. They were given four case scenarios presented in random order and asked to use a specified e-textbooks to answer the questions. The order of use of the textbooks was decided randomly. The scenarios dealt with screening, diagnosis, treatment and prognosis. The accuracy of information provided by the e-textbooks was verified for each case. Each GP answered four questions using different e-textbooks for each. The time in seconds they took to find the answer was recorded by the interviewer and they were asked whether they found an answer, how satisfied they were with that answer, and how they found each e-textbook's searching process. They were paid a small honorarium in recognition of the time they gave to the trial.

During the interview, comments made by the GPs and qualitative responses to direct questions were recorded verbatim. A multi-method approach combined quantitative statistical analysis and thematic analysis of free text responses. The quantitative data were analysed using Microsoft Excel and SPSS. Descriptive statistics were used to present mean preferences, timing of access and utilisation. Chi-square statistic and t-tests were used to compare subgroups depending on the distribution of the data using AcaStat's STATCALC.

Results

Recruitment and participation

Emailed invitations were sent to 991 GPs. The proposed sample size was 100 GPs although the researchers had concerns at reaching this number of consenting participants. However in the first 24 hours following the email, 172 GPs had responded, with 108 agreeing to participate, 36 declining and 28 not eligible. By 48 hours 346 (35%) had responded, of whom 208 consented (70% of eligible GPs who had responded), 88 declined and 50 were ineligible. At this point an email was sent explaining that recruitment was closed. The first 100 GPs consenting

were entered in the trial, and the further 108 were placed on a wait list in case any of the initial 100 withdrew.

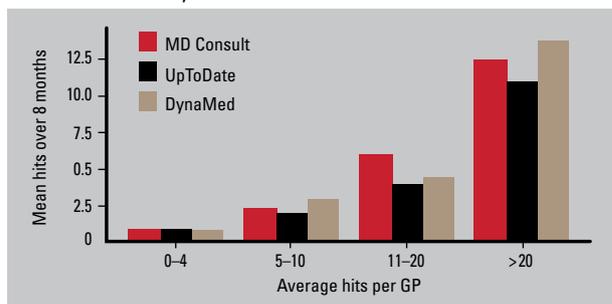
Of the 208 enrolled GPs, 122 made at least one hit on the e-textbooks through the study website (termed 'users'). Eighty-four GPs completed the emailed questionnaire part of the study (40% of enrolled, 67% of users; 39 women [46%], 45 men [54%]). They had been graduated for an average of 21 years (minimum 4, maximum 35 years) with 51% being graduated between 17–26 years. Two-thirds of the GPs (n=56) were New Zealand graduates. Of these, 77 completed the telephone interview (36% of enrolled, 61% of users).

Access to the MD Consult text was interrupted unexpectedly over two time periods causing some delay in access. Telephone interviews were conducted between one and 6 months after enrolment.

Utilisation

Figure 1 illustrates the access pattern of the GPs to the e-textbooks. Of the 122 GPs who made at least one access to an e-textbook via the gateway, including all who completed the study and others who consented but were not able to be reached for interview, the majority generated less than 20 hits. Figure 1 shows that 51% of GPs accessed the e-textbooks <10 times over the trial period. Over the 8 month study period 30% of enrolled GPs used the e-textbooks through the portal <5 times, 21% 5–10 times, 25% 11–20 times, and high users were those that contributed >20 hits during the 8 months (24%). There are no significant differences in usage levels of the three e-textbooks over the trial period. High users (>20 hits in total) had similar usage of all three e-textbooks to those using the resources less often – they did not use one particular text more than the others and had the same pattern of use as those using the resources less often. Overall GPs appeared to use MD Consult and DynaMed more than UpToDate, however this apparent difference did not reach statistical significance ($p=0.2$). There is a surge in access early in the trial period, peaking at over four accesses per GP per month in August tapering to a low level of access, <0.5 accesses per GP per month, in December and January. Examining the record of all 122 who accessed the site, 19 (16%) did not access MD Consult, 27 (22%) did not access UpToDate and 23 (19%) did not access DynaMed at all. Considering all three, 24 (20%) GPs accessed only one electronic text, 21 (17%) accessed only two and 77 (63%) accessed all three e-textbooks. One GP contributed over 100 hits to the site.

Figure 1. Frequency of access per GP to any e-textbook over the 8 months of the study



Interview findings

Previous experience in computer use was reported by the majority of GPs. They reported that they were very or extremely experienced at email (57, 71%), searching the internet (48, 53%), and word processing (37, 44%). The majority (68, 81%) had fast speed internet access at home or in the office (73, 87%). Ten GPs (12%) had no office internet access.

When asked their favourite e-textbook in the questionnaire, 35 (43%, 95% CI: 32, 54) named UpToDate; 25 (31%, CI: 12, 42) MD Consult; 16 (19%, CI: 13, 32) DynaMed; and 8 (10%, CI: 4, 18) 'none'. For high users (>20 uses over the trial period) preferences differed from lower frequency users (χ^2 17.24 df, $p=0.002$); before the telephone interview 11 of 26 high users preferred UpToDate (42%) compared with 24 of the 96 lower frequency users (25%); seven of the high users and 17 lower frequency users preferred MD Consult (27 vs. 18%); eight and eight preferred DynaMed (28 vs. 8%) and one and seven expressed no preference (4 vs. 7%). While overall high users were more likely to prefer UpToDate, when the group was considered as a whole there was no clear winner.

Table 1 shows the time to reach an answer by scenario and e-textbook. There is no simple dominant trend in terms of particular e-textbook being faster or slower across all scenarios. Satisfaction with answers varied across textbooks and clinical scenarios.

There were similar numbers of GPs with pretrial experience of the e-textbooks: 19 (23%) with UpToDate, 25 (30%) with MD Consult and 24 (29%) with DynaMed, and years of experience ranged from <1–5 years with a mean of 2.1 (SD: 2.3), 1.8 (1.5), and 0.8 (0.36) for UpToDate, MD Consult and DynaMed respectively.

After the telephone interview, views of the most preferred textbook were in the same order as previously with 31 (43%) rating UpToDate as most preferred, 27 (38%) and 21 (29%) ranking MD Consult and DynaMed as most preferred, respectively. These differences were nonsignificant ($p=0.40$). Comparing the highest users with less frequent users after the telephone interview showed no statistically significant difference in the pattern of preferences (χ^2 1.5 df 4, $p=0.48$).

Gender of GP was not related to utilisation ($p=0.84$). While the year of graduation was associated with user status with greater years since graduation being associated with more frequent access ($p=0.048$), there was one outlier in the data set, a GP who had over 90 years and many years since graduation. When this GP was excluded, the association between years since graduation and utilisation became insignificant ($p=0.63$).

Review of the comments made by GPs when asked to search for answers to specific scenarios show the heterogeneity of their responses and preferences. For UpToDate, searching was easy but often too much information was provided. Searching was easy for MD Consult but often the pages were slow in loading and there were concerns that information might not be comprehensive enough. Some GPs found DynaMed easy, others found the searching awkward but felt that it provided 'good information once you get there'.

Overall the data indicate that none of these three e-textbooks is a definitive 'winner' with respect to ease and speed of use nor quality of information obtained.

Table 1. Time (in seconds), achievement of an answer and satisfaction per case by e-textbook

Mean	N	Obtained answer	Happy with answer*	Speed in seconds (mean) (SD)
Case scenarios			Mean (SD)/10	
Treatment				
Evening primrose oil – DynaMed	25	21	6.7 (3.4)	105 (47)
Evening primrose oil – MD Consult	15	14	7.2 (2.8)	127 (56)
Evening primrose oil – UpToDate	16	13	6.9 (3.7)	104 (50)
Prognosis				
Fatty liver – DynaMed	13	13	6.7 (2.1)	96 (45)
Fatty liver – MD Consult	28	28	8.3 (2.3) **	97 (97)
Fatty liver – UpToDate	20	19	7.0 (3.1)	130 (64)
Diagnostic				
BNP test for COPD – DynaMed	17	15	7.1 (3.5)	138 (112)
BNP test for COPD – MD Consult	12	9	7.3 (3.5)	165 (88)
BNP test for COPD – UpToDate	18	15	6.8 (3.2)	188 (94)
Screening				
US for ovarian cancer – DynaMed	15	13	7.6 (2.9)	123 (63)
US for ovarian cancer – MD Consult	17	15	7.7 (2.7)	123 (113)
US for ovarian cancer – UpToDate	20	19	7.6 (2.7)	98 (45)
Total time				
DynaMed	41			114 (75)
MD Consult	44			121 (73)
UpToDate	45			117 (71)

* Participants scored their satisfaction with the answer out of 10 with 10/10 being extremely satisfied and 0/10 not at all satisfied
** $p=0.03$ MD Consult vs. DynaMed, $p=0.10$ MD Consult vs. UpToDate
US = ultrasound; BNP = B-type natriuretic peptide; COPD = chronic obstructive pulmonary disease

Discussion

More GPs reported a nonstatistically significant preference for UpToDate as their textbook of choice (43%). However, during direct use of the e-textbooks in a telephone interview to answer standardised questions, MD Consult was the only textbook with a statistically significant advantage in satisfaction and that was for the answer to only one of the four question categories. The e-textbooks were utilised at similar frequencies and performed under standardised conditions at about the same speed. The results of our attempt to determine the most acceptable, 'best' e-textbook can be interpreted as largely a tie between these three e-textbooks as reflected by the qualitative comments. Costs of the textbooks vary depending on the type and time span of subscription and this may be a contributor to choice.

Electronic textbooks have been touted as instrumental in improving evidence based practice. There are examples of widespread implementation of easy access,⁷ however, utilisation has seldom been studied. Evaluation of uptake of electronic and internet resources by students has been positive,⁸ however, utilisation in general practice has seldom been studied. Before the study routine use of e-textbooks was reported by participants to be relatively rare. Once enrolled in the study just over half of those interested actually logged in and then over the months of the study most GPs' usage consisted of less than 10 hits. A notable minority used the textbooks more frequently. In other

settings UpToDate has been used by 75% of medical students offered access.⁹ Overall satisfaction with the three texts was high and access speeds were variable. Before studying the impact of clinical practice, acceptability would seem to be proven here. Despite this satisfaction however, utilisation could only be described as modest.

Acceptability of electronic learning resources is related to individual learning style, the resources themselves, training and technical support.¹⁰ We were unable to examine characteristics of users in detail, but frequent users did show a greater preference for UpToDate than those who used the resources less frequently. Gender and years of experience were not related to utilisation in our analysis.

Strengths of the study

The high level of interest in the study and ease of gaining consent to participate resulted in full recruitment of 100 GPs to the trial. The random presentation of e-textbooks in the trial period, and of scenarios and e-textbooks in the interviews, reduced the possibility of selection bias and the website portal ensured full accounting for utilisation.

Limitations of the study

Despite an initial positive and rapid response by GPs to participate, there was attrition at every step of the study process. Hence, the number of GPs completing each scenario under standard conditions was small, limiting the power of the study to detect potential differences.

The choice of clinical scenarios, although developed using a rigorous process, was not comprehensive and important differences between content and search processes of the texts could have been missed. Problems with maintaining continued access to all three e-textbooks for the trial GPs (due to expiry of evaluation access codes and unexpected suspensions) may have given uneven exposure of GPs to each textbook. Delays in completion of the telephone interviews may have impacted on recall of preferences, but would not have impacted on performance at the time of the telephone interview. It is possible that GPs accessed the e-textbooks outside of the gateway provided, thus underestimating utilisation.

Conclusion

This study was unable to show a clear preference or superior utility among three e-textbooks designed for use in clinical practice. Definitive evidence of impact on clinical practice of electronic access to health information is awaited.¹¹ It would appear the exact form of e-textbooks may not matter and what is needed is comparisons of simple electronic resources with more complex knowledge based systems and decision support. Studies of the impact of electronic resources on outcomes of clinical practice, as well as barriers and enablers of their use, are needed.

Conflict of interest: none declared.

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