Online-learning: exploring practices among Foundation doctors

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Abstract

Introduction: Postgraduate medical education involves the use of online-learning tools. However, there is a paucity of data on the use of online-learning among doctors who are in their 1st and 2nd years of professional work after graduating from medical school (also known as Foundation doctors). Our aim was to explore the use of online-learning among Foundation doctors.

Methods: A cross-sectional study was carried out, using convenience sampling. During one month, 66 Foundation doctors from across 2 district hospitals and 1 teaching hospital in Southeast England filled out a specially designed questionnaire. Data were collected and analyzed using Microsoft Excel™, and reported in numbers and percentages.

Results: The majority of Foundation doctors (86.4% (n=57)) reported using online-learning packages. These are the tools which consist of key information on a particular topic, and may be interactive and broken down into several smaller modules. Less than half embarked on online-learning in their 1st month of employment, with a decline in the numbers who started in the later months. Of those who reported completing online-learning packages, 57.9% (n=33) reported completing non-compulsory modules, 66.7% (n=38) reported completing a range of 0-15 modules per week, and 75.4% (n=43) completed the modules without skipping components. More Foundation doctors reported using online-learning for lifelong learning (63.6% (n=42)) and filling knowledge gaps (51.5% (n=34)) than improving their practice following a mistake (24.2% (n=16)). Additionally, online-learning was used less frequently than medical websites or search engines, for the aforementioned purposes.

Conclusion: Most Foundation doctors use online-learning, but this needs to be incorporated into their postgraduate learning activities earlier in their career and directed more towards improving their clinical practice.

Keywords: Cross-sectional studies, Education, Distance, Hospitals, Teaching

Introduction

As Ally (1) describes, there are several terms that are used interchangeably with online-learning, such as e-learning and distance learning. Different technologies are also employed. These are some of the factors that have contributed to the existence of several definitions for online-learning. However, Ally goes on to describe the common criteria for online-learning which include the learner being at a distance from the tutor or instructor and using 'some form of technology (usually a computer) to access

the learning materials'. A definition offered by Brown (2) seems to be the most useful one for the readers of our paper; 'teaching and learning that are delivered, supported, and enhanced through the use of digital technologies and media' (no page numbers).

In addition to allowing learning at a specific time when the content is most useful to the learner, online-learning also gives working professionals the flexibility to build studying into their working life (3). Ally (1) also describes how online-learning enables on-the-job learning, quick delivery of updated versions, and personalisation of learning materials. Therefore, online-learning may be a useful tool for postgraduate training departments who are required to provide quality training as described in the Gold Guide (4). However, concerns about online-learning include the build-up of discrete disconnected learning objects (3). The adverse effects of spending lengthy periods of time sitting in front of a computer screen should also be considered (5, 6).

Nevertheless, in a study by Autti et al. (7), 57% of the doctors using internet-based courses stated learning more effectively using e-learning compared to conventional lectures. Other studies have also shown positive feedback from doctors for online-learning (8, 9). Furthermore, several studies have also shown that online-learning is an effective method for doctors to attain knowledge and improve their clinical practice (10-12).

However, there is a paucity of data on the use of online-learning among Foundation doctors. These are the doctors who are in their 1st (Foundation Year 1, F1) and 2nd (Foundation Year 2, F2) years of professional work after graduating from medical school. This is a time when they are required to adapt rapidly to new clinical environments. Online-learning modules could have an important role in improving the clinical practice of newly-qualified doctors. These online-learning modules or packages are the tools which consist of key information on a particular topic, and may be broken down into several smaller modules. The format is usually an online presentation, and may include interactive activities within the module or at the end in order to assess learning.

Data that are useful include how soon after their employment they start using these resources, how many modules they actually complete (including non-compulsory modules) and whether their colleagues are recommending this learning method to them. Also, it is necessary that the doctors use online-learning modules to fulfil their duty to lifelong learning, fill gaps in their knowledge and learn from errors.

Furthermore, online-learning is not limited to completing isolated online modules. Instead, doctors can take online distance learning courses and achieve an accredited qualification. Our aim was to explore the use of online-learning among Foundation doctors.

Methods

A cross-sectional observational study was carried out using a questionnaire. Overall, there were 261 Foundation doctors targeted using convenience sampling over three hospital sites in Southeast England. 66 completed questionnaires were collected during one month.

Inclusion criteria: Foundation doctors (including those re-taking any of these years), from two district hospitals and one teaching hospital.

Exclusion criteria: Medical students, doctors who have completed their foundation training, foundation doctors who declined to participate or returned grossly incomplete questionnaires.

The questionnaire was designed specifically for this research project and incorporated Likert-type scales (13). A range of questions were asked to explore the online practices of the Foundation doctors. This included the onset of completion of online modules, the number of modules completed, and whether these were compulsory and completed in full. We also asked the doctors about their reasons for using these tools, their comparability to other learning tools and whether their colleagues were recommending them. Lastly, we also wanted to explore any concerns regarding the adverse effects of online-learning resources.

The questionnaire format was deemed best for this setting. The answers could provide us the breadth required, whilst still producing a systematic written record for efficient analysis of the results. However, a low response rate can affect the reliability of the results from a questionnaire. Therefore, using convenience sampling, a hard copy of the questionnaire was handed out at teaching sessions to increase the response rate as the Foundation doctors could complete and return the questionnaires immediately. In contrast, an electronic format would not have had this advantage and may have led to a lower and slower response rate. Additionally, the validity of our results could be affected by recall bias, prescriptive or leading questions, as well as difficulties with participants understanding and directly answering the questions asked.

An explanation of the purpose of the questionnaire was given and informed consent obtained. The work was carried out in accordance

with the Declaration of Helsinki, including, but not limited to, the anonymity of the participants being guaranteed and the informed consent of participants being obtained. The project was informally ethically approved as the participants were NHS staff recruited by "virtue of their professional role" as advised by the Health Research Authority (14). This was confirmed by the local hospital's research department.

Three hospital sites, with a total of 261 Foundation doctors, were chosen due to their proximity to the author's location, making travelling to the teaching sessions more convenient. Based on 66 completed questionnaires, a response rate of 25.3% could be calculated if 261 questionnaires were handed out. However, an actual response rate was difficult to calculate as the number of questionnaires handed out was not recorded since the physical attendance in the teaching sessions varied greatly. Furthermore, questionnaires were handed out at the same teaching sessions on different occasions to reach as many eligible participants as possible, introducing the risk of some participants receiving the questionnaire more than once.

The data was analysed using Microsoft Excel 2013 ™, and the results reported using numbers and percentages. Answers were recorded as "unknown" if the question was not answered, and if the answer was incomprehensible or did not directly answer the question. In question 11, the side effects that were being implied were those such as musculoskeletal and vision problems due to spending prolonged time in front of computer screens.

Results
Descriptive statistics
The questionnaire was completed by 41 doctors in their 1st (Foundation Year 1, F1) year of professional work, and 25 doctors in their 2nd (Foundation Year 2, F2) year of professional work. Their age ranged from 24 – 35 years, with a median of 26.6 years. Males comprised 54.5% (n=36) and females 45.5% (n=30) of the subjects.

Completion of online-learning modules
Overall, 86.4% (n=57) of Foundation doctors reported using an online-learning package(s). However, 3.0% (n=2) were not using any online-learning packages, and there was no record for the remaining 10.6% (n=7).

Furthermore, of the Foundation doctors (86.4%, n=57) who said that they were using online-learning packages;

- Almost two thirds (61.4%, n=35) used one source, 19.3% (n=11) used 2 sources, and another 19.3% (n=11) used 3 different sources.
- Over half of them (57.9%, n=33) completed non-compulsory online-learning modules and the rest did not.
- Almost two thirds (66.7%, n=38) reported completing a range of 0-15 modules per week; 28.1% (n=16) were not completing any modules and there was no record for the remaining 5.3% (n=3).
- Three quarters (75.4%, n=43) completed the whole module compared to the 12.3% (n=7) who skipped the components to reach the end. Another 10.5% (n=6) did both, and there was no record for the remaining 1.8% (n=1).

Month in which online-learning started
The results in Figure 1 show that 42.4% (n=28) of the Foundation doctors started completing online-learning modules in their 1st month of employment. This is compared to 4.5% (n=3)
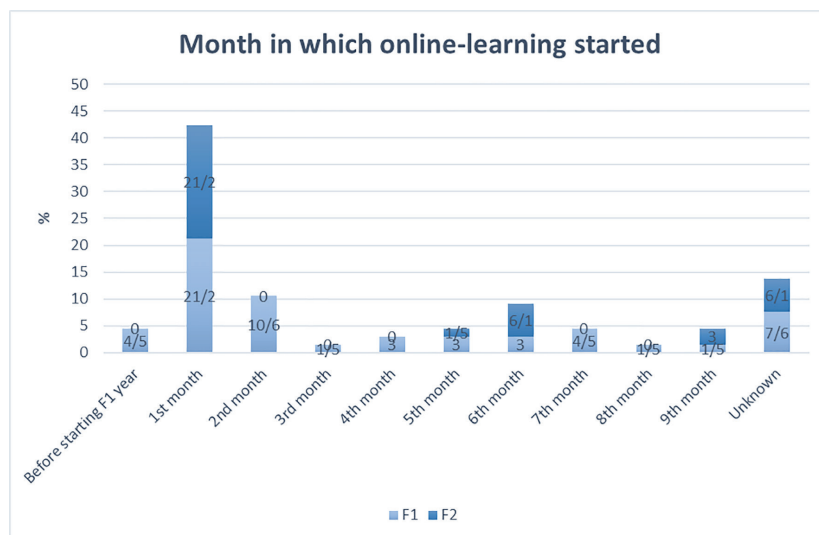

Figure 1: Month in which the participants began using online-learning during their first year of Foundation Training. Responses from doctors: F1, Foundation Year 1; F2, Foundation Year 2.

who began before starting their F1 year and a combined total of 39.4% (n=26) who started between the 2nd to the 9th month.

Use of online-learning in professional life

Table 1 shows that 63.6% (n=42) of the participants used online-learning as a way of fulfilling their duty to lifelong-learning. In contrast, 51.5% (n=34) used this method to fill the gaps in their knowledge, and only 24.2% (n=16) used online-learning to improve their practice after making a mistake. Of the Foundation doctors who was not using online-learning for these purposes, noted down the alternative methods he used as the following: medical websites, Google™ and Wikipaedia™, mobile phone applications, journals, guidelines, exam question banks, textbooks, revision notes from medical school, teaching from senior colleagues, and reflection.

Rating different methods of learning

Figure 2 shows the ratings given for different methods of learning used to consolidate knowledge acquired during clinical practice, fill knowledge gaps, learn from mistakes and maintain a duty to lifelong learning. Online-learning modules were used regularly for the above purposes by 36.4% (n=24) of the Foundation doctors, but none used it on a daily basis. Journals were used regularly

or daily by 33.3% (n=22); the figure is the same for regular or daily use of question banks. Only 19.7% (n=13) used medical school revision notes regularly or daily.

The more popular methods of learning used regularly or daily were medical websites (87.9%, n=58), Google™, Wikipaedia™, and other general internet articles (78.8%, n=52), and books (54.5%, n=36).

When asked for alternative methods not already listed, the use of medical guidelines was the only method given.

Recommendations by colleagues

Around 1 in 4 (25.8% (n=17)) of Foundation doctors said that they were encouraged to complete online-learning modules by their colleagues. However, 63.6% (n=42) said that this did not occur; instead, other learning methods such as online question banks, medical websites and journals were advised. There was no record for the remaining 10.6% (n=7).

Distance learning

A total of 4.5% (n=3) had completed a distance learning course, whilst 54.5% (n=36) had considered it. Distance learning courses did not appeal to a further 28.8% (n=19) and there was no record for the remaining 12.1% (n=8).

Table 1: Use of online-learning in professional life*

	Practising lifelong-learning	Filling of knowledge gaps	Improving practice after mistakes
Yes % (n)	63.6 (42)	51.5 (34)	24.2 (16)
No % (n)	31.8 (21)	45.5 (30)	68.2 (45)
Unknown % (n)	4.5 (3)	3 (2)	7.6 (5)

*Reported use of online-learning by Foundation doctors as a way of fulfilling duty to lifelong learning, filling knowledge gaps and improving practice after making a mistake. n, number of doctors
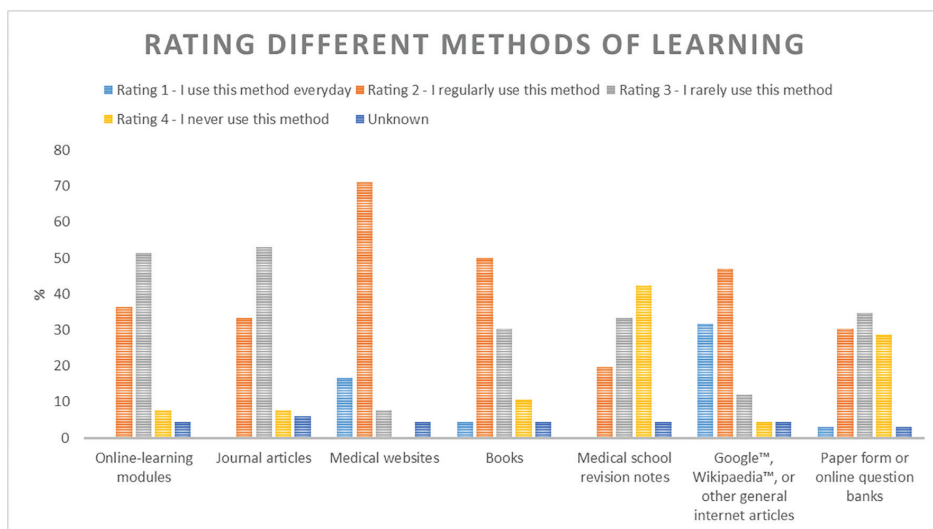

Figure 2: Rating the use of different methods of learning used to consolidate knowledge acquired during clinical practice, fill knowledge gaps, fulfil duty to lifelong-learning, and learn from mistakes.

Adverse effects of online-learning

The side effects of online-learning were a concern for 3.0% (n=2) of the Foundation doctors. Concerns noted included the potential for damage to eyesight. This is compared to 47.0% (n=31) who had no concerns. There was no record for the remaining 50.0% (n=33).

Discussion

Albeit a preliminary one, this study succeeded in exploring the online-learning practices of Foundation doctors. The key findings showed that the majority of Foundation doctors use online-learning in their professional life, with over half of them accessing non-compulsory material. However, not all began using online-learning by their 1st month of employment. Reasons for this became clearer when we considered that online-learning was not recommended to the majority of these doctors by their more senior colleagues, and there was a preference for using other learning methods, particularly in relation to the improvement of clinical practice after making a mistake. Furthermore, there was a low uptake of distance learning courses. However, extrapolation of such meaning from the results should be substantiated by further research. It is also apparent that regarding adverse health effects of using computers there is a need to carry out further investigation as the opinions of half of the participants were not clear.

Overall, this study was a key in that such detailed information about the online-learning practices of Foundation doctors do not seem to have been recorded before. This information can be used to help design improved learning materials for new doctors, setting them up for better careers.

A study by Ruf et al. (15) found frequent or very frequent usage of online continuing medical education modules by General Practitioners to be as low as 19.9%. This is compared to 36.4% of our Foundation doctors, a proportion not much higher, who stated that they used online-learning packages regularly. Another study by Ali et al. (16) on the teaching preferences of postgraduate trainees in a hospital found that lectures, bedside teaching and journals were more popular than e-learning. This is similar to the results of our study which also found that other methods, such as medical and non-medical websites, were more popular. In contrast, Autti et al. (7) found that 57% of the doctors preferred e-learning compared to conventional lectures. Furthermore, a study by Goh and Clapham (17) on the attitudes to e-learning among Foundation Year 1 doctors found equal preference for lectures versus a

blended programme of lectures and online-learning sessions. This shows that although more research is now required to investigate why certain resources might be preferred over online-learning, this learning method does have a place in postgraduate medical training.

Although most Foundation doctors have participated in online-learning at some point, there needs to be an improvement in how the material is incorporated into their continuing professional development plan, to help improve their clinical practice. Gaskell et al. (18) found that creating compulsory e-learning modules improved the completion rates of mandatory training, compared to face-to-face talks. Although our study showed that over half of Foundation doctors were completing non-compulsory modules, trials could be done to determine whether more of them would begin completing modules earlier in their first job if it is made part of the compulsory portfolio of the evidence of career progression. Senior colleagues should also be encouraged to recommend this learning method, as well as others that they deem suitable.

However, more work needs to be done to improve the state of the online-learning materials currently available. Concerns about the discrete and disconnected plethora of online-learning materials must be managed. This could be achieved by increasing collaboration among the educators and creating more organised databases that contain learning content which meets the Foundation training curriculum. Further concerns by the users of these materials could be determined by obtaining feedback for different online-learning programmes in order to create more learner-centred resources (19-21). Given the advantages of online-learning, tackling these issues may help to improve its uptake, with the particular motive of using it to improve the users' clinical practice.

The limitations of this study included the small sample size which could have affected the reliability of the study. A larger study would be beneficial in evaluating and comparing the online-learning practices of Foundation doctors. It may also be useful to compare the practices of doctors of different levels of seniority. Furthermore, quota sampling may also be used in future studies to ensure an accurate representation of the current population of Foundation doctors, by using categories such as preferred learning styles, and the structure of the medical degree that the participant completed. Also, using a questionnaire format leads to recall bias which could have affected the validity of the results.

As reflected by questions with answers

containing a higher proportion of "unknowns" such as that regarding the side effects of online-learning, amendments are required to make the questions easier to answer. Importantly, the questionnaire should include questions that allow the participants to qualify their answers. This will be particularly important when investigating why certain behaviours occur. For instance, why the Foundation doctors do not use online-learning as soon as they start their job, why they prefer other learning methods and the reasons for low uptake of distance learning courses. This may require developing the questionnaire further in pre-study focus groups and consulting expert literature on questionnaires.

Conclusion

In conclusion, although it was a preliminary study with a small sample size, we could determine the online-learning practices of Foundation doctors. The results of this study can be used by the authorities in postgraduate medical education to aid development in this area. We found that most Foundation doctors use online-learning, but with the development of better online-learning resources and in conjunction with other learning methods, this needs to be utilized earlier in their career and to be more directed towards improvement of their clinical practice.

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Contributors

FKK designed the research project, collected responses from the participants, and drafted the paper. DC critically reviewed the manuscript. All authors contributed to the analysis and interpretation of the data, as well as the revision of the paper and approved the final version of the manuscript for publication.

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