Original article

Evaluation of 2nd and 4th year University of Sonora Medical School students' knowledge of academic publications

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Abstract

Objective: To determine the extent of knowledge and frequency of use of medical literature by 2nd and 4th year medical students.

Methods: 203 medical students participated in the cross-sectional study (2nd year=101, 4th year=102). Students were asked to determine the frequency of reading medical articles, access to biomedical databases, and ability to access as well as to understand Internet search engines.

Results: The fourth year medical students frequently read medical papers more often than the 2nd year students (57% vs 28%, P<0.001). Surprisingly 95% of both groups were unaware of availability and access to complete medical papers (P=0.987). PubMed was the most consulted service for 70% of participants. Professors instructed 70% of the 2nd year students and 46% of the 4th year students (P<0.001). Both groups demonstrated equivalent knowledge on medical article structure (78% vs 76%, P=0.645).

Conclusion: Medical students in fourth year of enrolment read scientific papers more frequently than students in second year. Mexican medical websites and databases are generally unknown to medical students. Orientation and exhortation from medical educators to students into the use of Internet search engines and databases is imperative for modern medical education.

Keywords: scholarly journal, article, knowledge, medical students

Introduction

Medical education should include teaching the student to read and understand research articles, theoretical texts, and factual investigations (world of facts), and conducting theoretical research (universe of ideas). Reading in a critical manner is a necessary experience for a medical student. This is necessary for the student's medical career as well as for the subsequent benefit to patients[1].

Medical students and educators should communicate with one another in order to understand health topics and recent trends in particular subjects. Communication helps to establish, support and improve knowledge among peers and professors[2,3]. This is the basis of medical practice. Communication includes, but is not limited to, verbal, non-verbal and written language. In this regard, written communication is fundamental to medical education since it is present in medical books, medical publications and patients' clinical histories. Writing style may contain non-verbal elements. Non-verbal communication may be expressed by the word and sentence arrangement, as well as graphical schemes and drawings. Furthermore, electronic communication is now being used throughout the medical community. Patients' rights to this information have often resulted in misunderstandings and subsequent litigation. In fact, physicians must learn to be clear and accurate in written as well as oral communications[4,5].

For more than three decades it has been suggested that medical students should develop the necessary skills to recognise and distinguish the number and diverse sources of information available, and to evaluate the most appropriate, useful and relevant evidence reported therein. It is also necessary for the medical student to be able to recognise if an author of a medical article is manipulating data for a specific purpose,[1-5, 6] or plainly misleading the public. This allows the student to acquire new knowledge to identify and solve clinical situations, and, consequently, to become more competent.[6-9]

Medical students have access to networks during their medical education and will continue to be connected as licensed medical doctors. The medical students' knowledge may be influenced by a wide variety of available information. This is prevalent within our profession. The students' interest in and knowledge of medical publications should be encouraged while attending medical school. The aim of this study is to investigate the extent of knowledge and frequency of use of medical literature by 2nd and 4th year medical students.

Methods

Design and study population

This is a descriptive study of all 2nd and 4th year medical students enrolled in the Bachelor of Medicine course during March 2016 at the University of Sonora, Department of Medicine and Health Sciences, Hermosillo, Sonora, Mexico.

Questionnaire

All students were asked ten questions. The *survey* included multiple-choice and Likert *scale questions*. Four responses were evaluated with the Likert scale, three responses for positive and three for negative choice were included. Three questions had a choice of four options and three questions were complementary responses. Questions included: advice given from educators, awareness of Internet sites, and

ability to access complete texts from the Mexico websites. Variables analysed included: student's knowledge of the articles structure and order; student's awareness of Mexican journal articles; and student's ability to write an article.

The questions were organised in such a manner that the first three responses (item 1) assessed less frequent reading of medical articles, while more frequent reading was shown in responses to the subsequent questions.

Procedure

The objective of the research was explained to students. They gave verbal consent before completing the survey. The survey was anonymous and self-administered. The participation was voluntary. The questionnaire was given to the 2nd and 4th year medical students after reading a medical article.

Two individuals not working in the medical field and two medical students participated in the validation of this study. The pilot study evaluated the form, substance and comprehension level of medical students. The pilot study generated the ten test questions and answer options listed below.

1. How frequently during the previous semester did you read a medical article? [Never/Almost never/Occasionally/With little frequency/Very frequently/Always]

2. What are the means to obtain the article or articles you read? [Library/Free distribution journals from laboratories of medical products/Review from College/Internet]

3. Do you know any website in Mexico that contains full-text journals? [Yes/No; if so, Which?]

4. Which of the following query pages more frequently do you use for search? [Google/Academic Google/PubMed/Redalyc/Latindex/Periodic UNAM/EBSCO/Medigraphic/Imbiomed]

5. Are you registered in any repository from above? [Yes/No; if so, Which?]

6. Does your instructor advise you on the pages that you can consult, or places where you can have access to medical journals? [Never/Almost never/Sometimes/With little frequency/Very frequently/Always]

7. What is the most common organisation of a medical article, according to the models given below? Underline the correct paragraph:

a) Title, Background, Design, Material and Methods, Findings and discussion, references, tables and figures.

b) Title, Objectives, Summary, Material and Methods, discussion, conclusions, references.

c) Title, Brief Introduction, Executive Summary, Material and Methods, Results, Discussion and Conclusions.

d) Title, Abstract, Introduction, Material and Methods, Results, Discussion, Conclusions, Bibliography, tables and figures.

8. Have you had any knowledge or information on the structural model of medical supplies? [Never/Almost never/Sometimes/With little frequency/Very frequently/Always]

9. Do you know at least three Mexican medical journals with national circulation? Which?

10. As a student, you have been invited to participate in the publication of a medical article. [Never/Almost never/Sometimes/With little frequency/Very frequently/Always]

Data analysis

The data were stored, organised and processed in the SPSS statistical package (IBM SPSS statistics Base 22). Using descriptive analysis, numerical variables were evaluated using average and standard deviations as well as frequency and percentage. Chi-square test was used to evaluate the hypothesis regarding the relationship of the sample groups and their approach to reading medical articles (item 1). The sample student groups and professor's attitude to perform such evaluations were determined as well as the counseling given by the instructors (item 6). The correlation of the sample groups with the appropriate knowledge of the format of a medical article (item 7), the correlation of the sample groups with the attitude and knowledge of information regarding the structural model of medical items (item 8) and the correlation of the sample groups with the participation in the development of a research article (item 10). All estimates were done with a significance of 95%.

Results

The frequency of reading medical articles by both groups is presented in Table 1. Most of the 2nd year medical students read medical articles with little frequency (41%) while the the 4th year students read them very often (57%).

Table 1. Reading frequency of medical articles by medical students in the 2nd and 4th years

Frequency	2nd year (n=101)	4th year (n=102)	Statistics
	n (%)	n (%)	*P*
Never and hardly ever	7(7)	5(5)	-
Occasionally	24(24)	5(5)	<0.001
With little frequency	41(41)	27(26)	0.038
Very often	28(28)	57(56)	<0.001
Always	1(1)	8(8)	-

Internet search engines were the prevalent means of access to research articles in both groups. Of the 2nd year students, 91% used the Internet and 14% the library; 8% read college student journals and 5% read a free magazine offered by laboratories of medical products. Almost all (98%) 4th year students reported the use of the Internet, 6%; the library, 3% the college journals, and 2% free magazines of medical laboratories.

The access to full-text journals in Mexico was unknown to 95% (n=193) of all students. Regarding the Mexican Internet access to medical articles, 2nd year students were acquainted with the Periodic UNAM (n = 2) and Redalyc (n = 3), whereas 4th year students were acquainted with Periodic UNAM (n = 1), Medigraphic (n = 3) and Imbiomed (n = 1).

The results of the most frequently accessed search engines are presented in Table 2. Most of the students use PubMed (2nd year = 83%, 4th year = 71%, *P*= 0.045), followed by Google academic (2nd year = 80%, 4th year = 60%, *P* = 0.002) and Google (2nd year = 65% , 4th year = 64%, *P* = 0.662).

Table 2. Most frequently accessed websites in search of medical articles

Search engine	2nd year (n=101)	4th year (n=102)	Statistics
	n (%)	n (%)	*P*
Google	66(65)	65(64)	0.662
Academic Google	81(80)	61(60)	0.002
PubMed	84(83)	72(71)	0.045
Redalyc	27(27)	4(4)	-
Latindex	0(0)	2(2)	-
Periodic UNAM	12(12)	16(16)	0.542
EBSCO	7(7)	11(11)	0.460
Medigraphic	12(12)	35(34)	<0.001
Imbiomed	2(2)	7(7)	-

Most of the participants from both groups were not registered in medical repositories (2nd year=12%; 4th year=9%). There was up to 88% participants from 2nd and 91% from 4th year who did not register with any repository.

There was no statistical association (*P* = 0.474) between the students' knowledge of Mexican websites and the medical articles to which they have access, or repository registration. 2nd year students were registered in PubMed (n = 10), EBSCO (n = 1), Redalyc (n = 1) and academic Google (n = 2); 4th year students in PubMed (n = 3), EBSCO (n = 2), Medigraphic (n = 2), and in Imbiomed (n = 2).

70% of 2nd year students were advised by their instructors what pages to read vs 46% of the 4th year students (*P* < 0.001) .

The participants' knowledge of a medical article organisation was determined. 78% of 2nd year students answered correctly and 76% of 4th year students.

Information or knowledge regarding the structural model of medical articles was addressed in item 8: 2nd year students reported a 35% favourable answers; similarly, 4th year showed 34% favourable answers.

Only one student of the 2nd year could identify Mexican medical journals (*Mexican Gazette of Oncology*, *Mexican Journal of Cardiology* and *Mexican Journal of Dermatology*), whereas the majority (99%) could not. In addition, almost all (97%) 4th year students did not have any knowledge of Mexican journals. Three 4th year students named *Mexican Gazette of Oncology*, *Mexican Journal of Pediatrics*, *Mexican Public Health*, *Medical Gazette of Mexico*, *IMSS Medical Journal* and *Journal Surgeon General*.

Most of the students were not invited to write a medical article (2nd year=97%, 4th year= 91%).

Discussion

The present study aimed to explore the frequency of reading medical articles within the 2nd year medical students whose curriculum includes research methodology I and II. These courses do not include specific guidance for analysis of medical articles, in which teachers supposedly strive to include reading and appreciation of medical literature. A third of students does not read medical articles. It is known that the critical analysis and introspective use of information from scientific sources is essential to solve medical situations in everyday clinical practice as well as in prevention, diagnosis and evaluation of treatment response.[1] In fact, critical evaluation of a scientific report is considered a key informative experience for the academic improvement of every medical student. Critical thinking allows the future physician to discriminate and have an insight into the vast universe of information. Eventually, this insight will prove a benefit to future patients. Lacking ability to analyse, to be critical and introspective towards medical literature, would be a detriment to patients.[1,5,7]

Both groups used the Internet to access medical literature in more than 90%, and a small number used the library or consulted college journals. It is noteworthy that 95% of students in both groups were unaware of the existence of electronic means to access articles in full-text. When students were asked about Mexican journals, only 2% could identify UNAM, Redalyc, Medigraphic and Imbiomed. In general, PubMed was the most identified, being the most common and knowledgeable within the medical school library system. Students' registration in medical repositories varies from 2% to 9%. This could be added to the Matthew Effect in Science,[10] probably related to the instructor's inability to provide and promote journals published in Mexico to medical students.

The advice provided by the instructor was more favorably received by the 2nd year students. This may be related to the courses on research methodology which will be required in the following semester of medical training. In subsequent medical training this type of training is limited, almost absent. The student, thus, has less contact with research information unless fostered by the instructor. The comments by the participants of this survey included that at least one optional[1,6-9] related research project should be performed. A recently published survey, conducted in Peru[11], which also included undergraduate students, reported students' interest to participate in scientific research and publication; however, the training to foster these skills within medical degree programmes was perceived as poor.

The authors of this article consider it appropriate to include elective courses on critical reading, writing, learning general information on medical issues and publication of

articles as part of the bachelor's degree programme. This training would strengthen the students' knowledge in research methodology and improve their writing skills for eventual scientific publications.

Conclusions

Medical students have little knowledge regarding access to Mexican scientific journals, printed journals or Internet access. 2nd and 4th year medical students showed similar proficiency regarding access to medical articles. It is necessary that the professors teach students to critically read, write, and publish articles while attending medical school.

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