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## WEB PAPER

# Publication practices of medical students at British medical schools: Experience, attitudes and barriers to publish

M. F. GRIFFIN &amp; S. HINDOCHA

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## Abstract

**Introduction:** With research playing a vital role in improving clinical practice, it is important that medical students understand the role of research and submitting articles for publication. Therefore, the aim of this study was to ascertain the experience, motivation and attitude of publishing of medical students.

**Methods:** A cross-sectional survey of British medical students from seven medical schools in the United Kingdom.

**Results:** Seventy-two of 515 had submitted an article for publication with a total of 124 articles being submitted. The main motivation to publish was for career progression. For the students that had not published, not having an opportunity to perform research was felt to be the main barrier. Only 49% of students had taken part in a research or audit project. Sixty-two percent of students stated they were not encouraged by the seniors to participate in research projects. From 515 medical students, only 88 students had submitted an article for a scientific meeting.

**Conclusions:** Students have a positive attitude towards publishing and they feel it is important. However, it is clear that students require and would welcome education in writing papers and abstracts, skills that they will need in their postgraduate careers.

## Introduction

Research is important to improve health care (Global Forum for Health Research 2004). Medical students can play a role in the research productivity at an institution (Aslam et al. 2005). It has been shown that performing research allows medical students to gain critical thinking skills, ability to evaluate literature, provides lessons in teamwork, gain experience in writing and practice in communicating data with the scientific field (Frishman 2001; Houlden et al. 2004). Furthermore, performing undergraduate research, whether organised or extracurricular, has shown to support the student's attitude to research later in their career and possibility of career in academic medicine (Segal et al. 1990; Brancati et al. 1992; Reinders et al. 2005). This, coupled with the fact that the increasing competition for doctors for jobs has meant publishing (George & Moreira 2009), is now a form of assessment of career and personal development; it highlights the importance of assessing medical students publishing practices.

A few small studies have looked at the number of papers published by medical students, for instance, 17 publications from 201 students from the University of New Mexico School of Medicine (Rhyne 1997). A further study from the University of Calgary demonstrated a significant increase in medical student research manuscript submissions from 11% to 59% after a formal research programme was introduced. However, though few studies have looked at the rate of publishing by medical students, information regarding the motivation, experience and attitudes towards publishing remains limited.

## Practice points

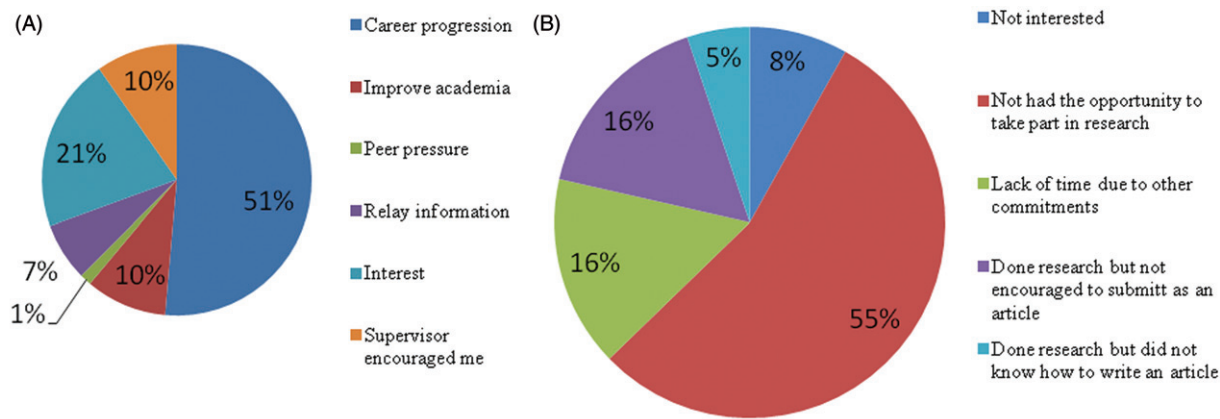
- With the increase in pressure to publish for doctors, medical students will need to be able to submit papers for publication.
- Though medical students have a positive attitude towards publishing, few medical students are submitting articles.
- More opportunities to perform research and teaching will aid medical students to increase their publishing potential.

Therefore, this study aimed to assess the publishing practices of British medical students to investigate potential barriers to performing research and submitting papers.

## Methods

A 44-item questionnaire was distributed to medical students from year 1 to year 5 in seven medical schools in the United Kingdom using an on-line survey software (survey monkey). The questionnaire (Appendix 1) consisted of questions regarding their experience and motivation to publish articles whilst at medical school. The inclusion criterion was to include UK medical students across all years. Questionnaires that were not completed were excluded. Five hundred and fifteen completed surveys were returned. The results were put into Excel and then analysed using Stats Direct and Excel analysis tools.

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**Figure 1.** (A) Reasons why students submitted articles and (B) reasons why students had not submitted articles.

**Table 1.** Demographics of the medical students analysed.

	Number of students
Medical school	
Southampton	23
Warwick	29
UCL	38
Cardiff	125
Peninsula	38
Manchester	203
Edinburgh	59
Medical school year	
1	81
2	37
3	91
4	95
5	117
Intercalating	94
Gender	
Male	129
Female	386

**Table 2.** Demographics of the students that had submitted articles for publication.

	Number of students submitted an article
Medical school	
Southampton	1
Warwick	4
UCL	8
Cardiff	6
Peninsula	2
Manchester	34
Edinburgh	17
Total	72
Medical school year	
1	3
2	1
3	3
4	14
5	22
Intercalating	29
Total	72
Gender	
Male	23
Female	49
Total	72

## Results

### Demographics of the medical students

The medical students that participated in the survey were from either Manchester, Southampton, Cardiff, Peninsula, Warwick, University College London (UCL) or Edinburgh Medical School. The age, year and sex of the medical students varied and the medical students were represented from all years between first and fifth years including some postgraduate medical students (Table 1).

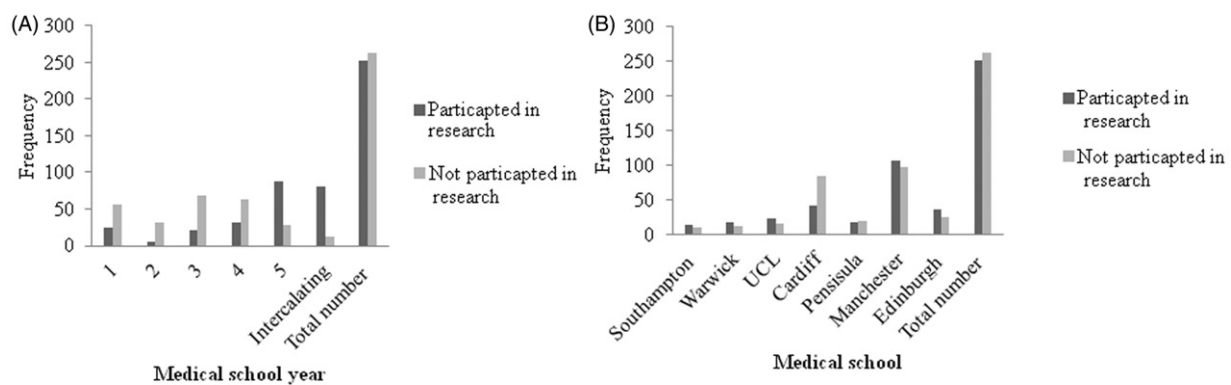
### Publishing status of the medical students

Only 14% (72/515) of the medical students surveyed had submitted an article for publication while at medical school. The demographics of the students that had submitted articles are shown in Table 2. Most of the students that had submitted articles were in fifth year and doing an intercalated degree, accounting for 31% and 40% of the total number of students, respectively. There was a significant difference in the articles submitted by fifth years compared to first (Fisher's exact test,

$p=0.0018$ ), second (Fisher's exact test,  $p=0.0160$ ) and third years (Fisher's exact test,  $p=0.0005$ ) but not when compared to fourth year (Fisher's exact test,  $p=0.4670$ ) or students completing intercalated degrees (Fisher's exact test,  $p=0.0522$ ; Table 2). Gender did not affect whether students submitted articles (Fisher's exact test,  $p=0.8908$ ). The medical school that students attended did affect their publishing practice (Chi-square test,  $p=0.0002$ ). When comparing the largest two medical schools that participated in the survey, there was a significant difference (Chi-square test,  $p=0.001$ ) between the number of students submitting articles at a problem-based learning medical school (Manchester) and a integrated style medical school (Cardiff). Of those students that had been published, there was a variety in the articles published with a total of 124 articles being submitted (Table 3). The main motivation to submit articles agreed by 51% of the students was for career progression with the majority submitting articles to

**Table 3.** Type of articles submitted including the outcome of submissions.

	First author	Second author	Third author	Fourth author	Other author
Original paper	27	8	5	2	2
Review	13	2	1		
Case report	8	1	1		
Letter	10	4			1
Abstract	21	3	2		1
Other	11		1		
	Accepted without revision	Accepted with revision	Revision in progress	Rejected outright	
Original paper	7	15	13	9	
Review	3	7	5	1	
Case report	1	1	6	2	
Letter	6	6	1	2	
Abstract	19	2	5	1	
Other	4	4		4	

**Figure 2.** (A) Research participation across different year groups and (B) research participation across the medical schools.

journals that they felt had a high likelihood of manuscript acceptance (Figure 1A). The outcome of their submissions again was varied with only 32% accepted without revision (Table 3). For the 86% of students that had not published, 55% agreed that they had not published because they had not had the opportunity to take part in research (Figure 1B).

#### Research participation of the medical students

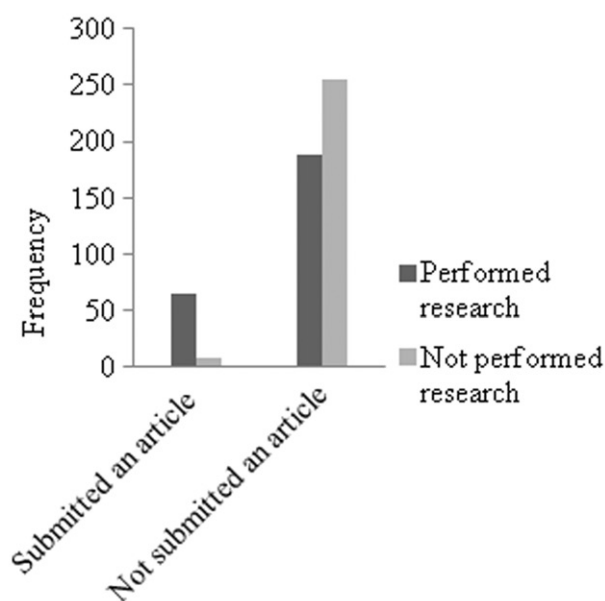
Including all of the respondents, only 49% had taken part in an audit or a research project. Those that were in fifth year had taken in the most of the projects showing a significant difference between fifth year and first, second, third and fourth years medical students (Fisher's exact test,  $p > 0.001$ ; Figure 2A). Most of the projects that the medical students had participated in involved going through patient's notes and questionnaire studies accounting for 59% of all projects. Of the students that had participated in research, 50% stated that they organised projects in the career they wish to pursue. A greater number of students who had published had performed research (64/72) compared to students that had not performed participation in research (8/72) (Fisher's exact test,  $p < 0.001$ ; Figure 3). The medical school the student attended significantly affected whether or not they had published (Chi-square test,  $p < 0.001$ ; Figure 2B).

#### Teaching and opportunity to take part in research

Eighty-six percent agreed that they would like more opportunity to take part in research or audit. Ninety-one percent of students felt that they would like to take part more in clinical research and only 52% agreed they would like to take part more in laboratory research. Sixty-two percent felt they had not been encouraged by the seniors to take part in research. Fifty-seven percent of the students agreed that they would like to take part in research or publication to gain experience. Only 12% of students had applied for ethics for a research project. The main reason the medical students felt why they did not have this experience was that they did not have the opportunity to perform research.

#### Journal reading, presentations and posters

Seventy-eight percent of the students read journal articles, with 90% agreeing it was for either interest or to improve their knowledge. Of those students who do not read journal articles, they felt that they had not been encouraged to do so and felt journal articles were too difficult to understand. Evaluating the medical students' experience at scientific meetings, only 17% had submitted an article for podium or poster presentations. The main reason the students had not had this experience was that they did not know they could submit articles. Of the



**Figure 3.** Research participation correlated with whether students had submitted articles.

medical students that had submitted abstracts, 66% were accepted for posters and 34% for podium presentations, giving of a total of 38 podium presentation and 77 poster presentations. These presentations ranged between international conferences (31%), national presentations (46%), regional conferences (14%) and audit meetings at their hospitals (9%).

#### Teaching received on writing papers

Only 49% felt they knew how to critique a paper. Regarding the experience in writing papers, only 52% agreed they knew how to write an abstract and 46% agreed they could write a paper. Analysing the students' teaching experience, only 22% and 30% felt they had been taught how to write a paper and an abstract, respectively. Overall, 11% stated they knew the process of submitting an article for publication, with 92% agreeing that they could not submit a paper without supervision. Eighty-six percent of the medical students felt it was important to publish papers and 90% felt they would like teaching in writing papers, 87% for abstracts and 91% regarding the publishing practices. When including both the students that submitted articles and had not submitted articles, the main reason students felt it was important to publish was to improve career progression.

#### Knowledge in the importance of publishing

Fifty-nine percent knew that medical students are expected to have performed audits and started to submit papers during their foundation years and time at medical school. Furthermore, only 59% knew that publishing and performing research is the way in which you are judged whilst at medical school. Whilst participating in the survey, 81% agreed that due to the survey they would seek out opportunities to perform research and audits.

## Discussion

It is clear from this study that only a minority of medical students are submitting articles for publication which agrees with other studies that quote 8–17.6% of medical students either had anticipated or published articles (Arriola-Quiroz et al. 2010; Rhyne 1995). Of the students that had submitted an article, 70% were either in fifth year or doing an intercalated degree. Some articles have stated higher values, for example, one German study illustrated that 28% had publications with 7.8% first authorships (Cursiefen & Altunbas 1998) and 41% of 991 American medical students had published an article after performing a research project (Dyrbye et al. 2008). The differences may be accounted for by different students medical school curriculum, which was evident in this study when comparing a integrated taught medical school at Cardiff and a problem-based learning course at Manchester.

Interestingly, the main motivation for those who had published was for career progression, which demonstrates that the students are taking into consideration postgraduate challenges whilst at medical school. However, it is clear that not all of the students knew that publishing is imperative for their careers as only 60% knew this is how they would be judged for job applications and that they would have been expected to submit articles during their foundation and medical school years. With the British National Foundation training programme awarding points for publications (The Foundation Programme 2010) and publication status being used to assess for specialist training posts, it is important that this knowledge is clear to all medical students early on in their medical education (Medical Specialty Training England 2010).

For those that had not published, it is clear that the main barrier was not having the opportunity to perform research; hence, they felt they have nothing to declare as a publication. A survey of Australian medical researchers showed that research infrastructure support is vital to research productivity

**Table 4.** Summary of the statistical comparison made.

Comparison	Probability (statistical test used)
Publication number by	
Fifth and first years	$p = 0.0018$ (Fisher's exact test)
Fifth and second years	$p = 0.0160$ (Fisher's exact test)
Fifth and third years	$p = 0.0005$ (Fisher's exact test)
Publication number – male versus female	$p = 0.8908$ (Fisher's exact test)
Publication number at different medical schools	$p = 0.0002$ (Chi-square test)
Participation in research and audit	
Fifth and first years	$p < 0.001$ (Fisher's exact test)
Fifth and second years	$p < 0.001$ (Fisher's exact test)
Fifth and third years	$p < 0.001$ (Fisher's exact test)
Fifth and fourth years	$p < 0.001$ (Fisher's exact test)
Participation in research and publication versus publication and no participation in research	$p < 0.001$ (Fisher's exact test)

(Shewan et al. 2002) and another study showed that after organised research projects medical students can gain publications and presentations at conference (Zorzi et al. 2005). Obligatory involvement in research has been demonstrated to improve students attitude towards research as well as their knowledge (Segal et al. 1990). Other studies have found lack of time, neglect of normal studies and concern that student papers are rarely cited to be the barriers to medical student research participation (Diez et al. 2000; Aslam et al. 2005). In many developing countries, initiatives are being carried out to encourage research among undergraduates, which have shown to be successful (Aslam & Waheed 2005; Zier & Stagnaro Green 2001); therefore, improvements in British undergraduate research should be promoted.

Encouragingly, 78% read journal articles which is considerably higher than a study of doctors in Faisalabad where only 20% read journals monthly and 38% of postgraduates read journal articles only once in 6 months (Aslam et al. 2004). Reading journal articles is important as medical journals have a key role in the practice of evidence-based medicine (Sackett & Rosenberg 1995; Bordley et al. 1997). Only 49% knew how to critique an article. The ability to critique is important as doctors are expected to read the literature when faced with clinical problems, therefore being able to evaluate an article rather than taking it at face value if of utmost importance (Guyatt et al. 1994; Jaeschke et al. 1994). Hence, it is clear that teaching on the ability to critique articles needs to be introduced into undergraduate medical curriculum.

Only 50% of the students had been involved in research whilst at medical school despite numerous studies highlighting that medical school experience is strongly associated with postgraduate research participation (Aslam et al. 2005). In one Indian study, 91% of the newly qualified doctors reported no population-based research experience in medical school (Chaturvedi & Aggarwal 2001).

Sixty-two percent agreed that they were not encouraged by their seniors to get involved in research or audit projects. Positive role models and adequate mentorship are imperative to student research and, if unsupported, students can discontinue their work (Aslam et al. 2005).

The medical students agreed that publishing is important. This positive attitude towards research was also demonstrated

in a study where 97% of students considered research as a useful alternative to elective (Frishman et al. 2001) and an average positive attitude score was found towards science and science research in a group of year 2 Croatian medical students (Hren et al. 2004). Furthermore, 70% and 78% agreed they had not received teaching on writing abstracts and papers, respectively, despite welcoming such teaching. Few studies have demonstrated that teaching on writing papers can increase publication productivity (Jackson 2009; Temple-Smith et al. 2009). Furthermore, courses teaching research methodology have shown to be effective in motivating medical students to solve scientific problems and embark on an academic career (Fang 2003) and a study concerning Pakistan medical students demonstrated that teaching could improve the knowledge about health research (Khan & Khawaja 1993).

Regarding the students' participation in poster and podium presentations, only 17% had submitted an article for scientific meetings and with 42% stating they did know they could submit articles, it is evident that awareness of scientific meetings needs to be made clear to medical students. Scientific meetings are important places to learn the skills of being able to communicate your knowledge to the wider community and therefore would be beneficial to a medical student to experience (Ridde & Mohindra 2009).

There are strengths to this study which make the reported analysis reliable including the large population, using several institutions, looking at medical students from all years and trying to understand potential barriers to publishing practices. Furthermore, we have identified a questionnaire that can be successfully implemented to medical schools to monitor the publication practices of medical students in the future. A summary of the statistical comparisons made from the questionnaire is given in Table 4. One improvement to the study would be to assess how factors such as funding, student debt and opportunity to do intercalated degrees or higher degrees influence publishing practices of medical students.

## Conclusions

In conclusion, this study highlights clearly that only a small percentage of British medical students are submitting papers



for publication and presenting at conferences despite students viewing publication status being important for career progression. This can be improved by providing more accessible opportunities to take part in research or audit and encouragement and guidance from their mentors. Knowledge of how to write papers and abstracts as well as the publication practices is low among medical students though such skills are used as postgraduate criteria when being selected for jobs. Our findings show that teaching in writing papers would be welcomed by medical students. Education and awareness of how to successfully write scientific articles and abstracts should be made available for students at medical school as this will give them a strong foundation to embark on their postgraduate medical career where they will be expected to have these skills.

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**Declaration of interest:** The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

## Notes on contributors

M. F. GRIFFIN, MRes, University of Manchester, is pursuing an academic surgery post with special interest in undergraduate education and teaching. S. HINDOCHA, MBChB, MD, MRCS, StR Plastic Surgery, Mersey Deanery and Clinical tutor, University of Manchester, is pursuing a career in academic surgery with a sub-specialty interest in hand surgery. He is a previous research fellow from the Royal College of Surgeons of England.

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## Appendix

### The survey of medical students publishing practices

1. Medical school. Please state.....
2. Age:
3. Gender: M ☐ F ☐
4. Medical school year:  
One ☐ Two ☐ Three ☐ Four ☐ Five ☐ Intercalating between 2+3rd ☐ Intercalating between 3+4th ☐  
Intercalating between 4th+5th ☐
5. Have you ever submitted an article for publication? Y ☐ N ☐  
*If the response is No, please go to question 10*
6. If yes, can you please specify how many and please state the rank of author your were?

	1st	2nd	3rd	4th	Other
Original paper					
Review					
Case Report					
Letter					
Abstract					
Other					

7. What was the **MAIN** motivation to consider publication?  
Career progression ☐ Improve academia ☐ Peer pressure ☐ Relay information ☐  
For interest ☐ Supervisor encouraged me to ☐ Other (please state).....
8. Please rank on a scale of 1–5 (**1=most important; 5=least important**), the factors that affected your choice of journal for submission.  
Journal prestige ☐ Relevance to career ☐ Likelihood of manuscript acceptance ☐  
Rapidity of manuscript turnaround ☐ Previous submission to the same journal ☐  
Other (please state) ☐.....
9. What was the outcome of your submission/s? (Please provide numbers applicable to each category if possible)

	Accepted without revision	Accepted with revision	Revision in progress	Rejected outright
Original paper				
Review				
Case Report				
Letter				
Abstract				
Other				

*Please answer the next question if the response to question 4 was 'No'*



10. If have not published, why not? Please rank on a scale of 1–5 (**1=most important; 5=least important**), the factors that prevented you from submitting a biomedical article?
- ☐ Not interested ☐ Not had the opportunity to take part in research ☐ Lack of time due to other commitments ☐ Done research but not encouraged to submit as an article. Lack of guidance and supervision ☐ Done research but did not know how to write an article ☐ Other, please state
11. Have you been involved in...? Audit ☐ Research project ☐ Both research or audit ☐ neither
12. If yes, how many? ..... Audit ..... Research project.....
13. If yes, what sort of project were they?
- Questionnaire based ☐ Case series ☐ Case control study ☐ Laboratory based ☐  
 Going through patient notes ☐ Randomised control trial ☐ Other please specify ☐
14. Did you organize them in your specialty you wish to pursue? Yes ☐ No ☐
15. Would you like more opportunity to take part in research/audit projects? Yes ☐ No ☐
16. Would you like more opportunity to take part in clinical research? Yes ☐ No ☐
17. Would you like more opportunity to take part in laboratory research? Yes ☐ No ☐
18. Are you encouraged by your seniors to get involved in? Audits ☐ Research ☐ Not at all ☐
19. Would you like the opportunity to take part in...?
- a. ☐ Research/audit in chosen specialty only b. ☐ Research audit in any areas to just gain experience c. ☐ Research audit in any areas so just gain a publication d. ☐ Either of b or c
20. Have you applied for ethics for a research project? Yes ☐ No ☐
21. If no why not? Not needed to apply for ethics ☐ Supervisor did it for me ☐ Avoided projects with ethics as did know how to ☐ Other please specify ☐
22. Do you know you will be expected to have performed audits, started to submit papers during your foundation years and time at medical school? Yes ☐ No ☐
23. Do you know that performing audits, submitting papers, performing research is the way in which you are judged for jobs later in your career? Yes ☐ No ☐
24. Do you read journal articles? Yes ☐ No ☐
25. If yes, why? Interest ☐ To improve knowledge ☐ To critique articles Other ☐
26. If no, why? Too difficult to understand ☐ Not interested ☐ Not been encouraged to do so ☐  
 Not feel a good place to gain knowledge ☐ Other ☐
27. Do you know how to critique a paper? Yes ☐ No ☐
28. Do you feel you know how to write an abstract for an article or conference? Yes ☐ No ☐
29. Do you feel you know how to write a paper? Yes ☐ No ☐
30. Have you been taught how to write an abstract? Yes ☐ No ☐
31. Have you been taught how to write a paper? Yes ☐ No ☐
32. Do you feel you know the process of submitting an article? Yes ☐ No ☐
33. Would you feel confident in submitting an article without supervision? Yes ☐ No ☐
34. Would you like teaching in how to write a paper? Yes ☐ No ☐
35. Would you like teaching in how to write abstract? Yes ☐ No ☐
36. Would you like teaching in publishing practices? Yes ☐ No ☐
37. Do you feel it is important to publish a paper? Yes ☐ No ☐
38. Why it is important to you to publish. Please rank on a scale of 1–5 (**1=most important; 5=least important**)?
- ☐ Do improve career ☐ For interest ☐ Peer pressure ☐ To relay information ☐ Important skill to learn ☐ Other, please state
39. Have you submitted an abstract to a conference? Yes ☐ No ☐
40. Have you presented a poster/oral presentation at a conference? Yes ☐ No ☐
41. If so how many?
- Poster ..... Oral Presentation .....
42. Were they ....?
- International Conference ☐ National meeting ☐ Audit meetings at hospital ☐
43. Are you encouraged by your seniors to get involved in ...? Audits ☐ Research projects ☐
44. Has this survey made you think you should start seeking out opportunities to perform research/audit? Yes ☐ No ☐