

PERCEPTIONS AND VIEWS OF MEDICAL STUDENTS ABOUT RESEARCH AND RELATED ISSUES.

Prof. Syed Imran Mehmood*

Abstract:

Background: There are decreasing numbers of physician-scientists at the global level. A review of the literature reveals a lack of interest in research when examining the perceptions of and attitudes towards research among medical students. The present study aims to explore these perceptions and attitudes to identify factors that could encourage students to choose research careers.

Aims: To understand (1) the perceptions and attitudes among undergraduate (UG) medical students regarding research and (2) the factors contributing to a willingness to take up research as a career.

Methods: This is a questionnaire-based cross-sectional study, conducted in the College of Medicine of King Khalid University among 590 undergraduate students. A questionnaire examining student perceptions and attitudes regarding medical research was used. SPSS software version 16 was used to analyse the results. Various statistical tests - Chi-square test, t-test, odds ratio - were used to analyse the data with a significance level of 0.05.

Results: The questionnaire had a response rate of 93% (550 of 590 students returned the questionnaire). Around half of the students felt that research in the field of medicine is important, while only a minority felt that research would be their future career. The greatest barriers to involvement in research in medical school appear to be time, the availability of research mentors and training in research methodology. Furthermore, students consider research as an activity with low status and financial benefits.

Conclusion: Although medical students feel that research should be part of medical education, they are neither inspired nor enthusiastic about choosing research as a career. Aside from there being insufficient time in the programme allocated to science education, the lack of sufficient staff members able to act as role models for students could play an important role.

Introduction:

Research as part of medical education has been the subject of several international studies (Ley, 2005; Goyal et al, 2006). Advances in biomedical research during the last decade have highlighted the need to attract greater numbers of physicians to careers that include research (Houlden et al., 2004). In particular, physician participation in research is essential to increase the number of clinical and research studies performed (Zier et al., 2006). Moreover, clinician participation is a basic requirement of translational research. Consequently, it is important to make students aware of the relevance of research during their medical training and encourage them to participate in it (Reinders et al., 2005).

Physician-scientists are defined as individuals with medical degrees who perform medical research as their primary professional activity (Ley et al., 2005). This group is a vital force in transforming clinical observations into testable research hypotheses and translating research findings into medical advances. Physician-scientists are also a critical resource for ensuring excellence in medical education, since they teach students that the basis of medicine is science and that scientific rigour should apply to patient care and research. In general, the new generation of students needs these specialized perspectives to lead in evolving fields such as

genetic medicine, pharmacogenetics and bioinformatics. As this research is translated into patient treatment protocols, there is great need for physician scientists with the necessary training and skills to ensure that these protocols are designed and evaluated in ethical and rigorous clinical trials.

Over the last twenty-five years, the number of physician-scientists has not kept pace with the overall growth in the medical research community and there is worldwide concern about a decline in the number of physicians participating in scientific research. Many factors, such as insufficient attention to research and poor training in research skills during medical education, and higher financial returns from clinical careers and reductions in research budgets along with increased competition for research funding, could have contributed to this decline (Houlden et al., 2004; Bansal, 1996). The difficulty of providing a useful research experience in the modern training medical school curriculum is yet another reason (Frishman, 2001; Kempf et al., 1991), as is the accessibility of the discipline to trainees who have no real understanding of what it means to be physician-scientists before their career choices are made (Neilson et al., 1995).

Numerous research articles have been written in the last couple of years about the disappearance of young physician-scientists and, unfortunately, this decline in the number of new physician-investigators remains steady (Houlden et al., 2004). The trend of decline in the

* Director Medical Education, Muhammad Medical College, Mirpurkhas.

physician-scientist pipeline has led some thoughtful observers to conclude that the physician-scientist is an endangered species or at least a threatened one (Zemlo et al., 2000).

A review of the literature reveals that there is a paucity of information on the awareness, perceptions and attitudes of medical students with respect to research (Wynngaarden, 1979).

This alarm has been sounded globally and evidence is therefore also needed from a Middle Eastern context to confirm or disprove it. Furthermore, data about the factors which determine a medical student's choice to pursue a research career are also lacking for the Gulf region, which has led to the present study to elicit medical students' perceptions and attitudes regarding research and related issues.

Methods:

Context:

The College of Medicine of King Khalid University is located in Abha on the southwest coast of Saudi Arabia. The University was founded in 1998 and currently numbers around 8,000 students. It has a strong regional position and is among the best in Saudi Arabia. The College of Medicine uses a traditional curriculum and approach, with medical students being trained over six years for a Bachelor's in Medicine and a Bachelor's in Surgery (MBBS), including one preparatory year and one additional clerkship year. The main objective of this training programme is to educate and train future doctors and surgeons to render effective and exemplary healthcare appropriate to the needs of the urban and rural populations of Saudi Arabia. In the first three years all the discipline-related programme components have learning goals and assignments devoted specifically to research skills. Students develop competences in general subjects such as literature searches, methodology and statistics. In the second part of the programme (starting in the fourth year), there are two specific mandatory course units which provide a good basis for inculcating an interest in research and the potential of students in this regard. These two-month course units are embedded in the community medicine programme of the curriculum and deal with questionnaire construction, data collection, basic SPSS skills and report writing in the first course unit, and with auditing and research methodology in the second course unit. An evidence-based medicine (EBM) course unit is also offered as an optional course unit. As the Saudi Arabian Ministry of Higher Education, with the support of the National Commission for Accreditation and Assessment, seeks to promote the inclusion of research in the undergraduate curriculum, the government provides universities with additional money for this purpose.

Participants:

This cross-sectional study was conducted in the College of Medicine of King Khalid University and included 590 undergraduate students studying medicine in academic year 2010-2011. Male and female teaching campuses are separate in Saudi Arabia. The number of places allo-

cated to males is slightly higher than the number available for females (1.7:1). Consent was voluntary and participation confidential, with anonymity guaranteed. Under Saudi Arabian law, educational studies using questionnaires are exempt from Institutional Board Review.

Questionnaire:

The questionnaire was devised to collect data on the students' attitudes regarding:

1. The importance of research in the field of medicine
2. Their command of various research-related activities, such as writing a research proposal, conducting a study and publishing in a journal (all with adequate supervision from staff members)
3. The choice of research as a career.

The questionnaire consisted of a combination of Yes/No questions and items which asked for a response on a Likert scale ranging from 1 (not very significant) to 5 (very significant). It was subjected to a validation process which included submitting the questionnaire to medical students and educational experts to check for item appropriateness and comprehensiveness (face and content validity). A pilot study of 60 students was conducted to test the questionnaire and the feedback used to rephrase some questions to make them clearer.

Data Analysis:

Data was entered in SPSS version 10 and the results were analysed. Descriptive statistics were obtained, including mean, standard deviation (SD), data represented in frequencies, odds ratios with 95% confidence intervals, and different year cohorts were compared using a Chi-square test. A year-wise trend analysis was also carried out through percentages and further investigated through a Chi-square test. The significance level was 0.05.

Results:

Of the 590 students, 550 took part (representing a 93% response rate); 348 were male and 202 were female. The distribution among the study years was: first year 25%, second year 22%, third year 24%, fourth year 17% and fifth year 12%. The mean age (\pm SD) of the respondents was 21.5+2.5 years (male, 21.8+3.6; female 20.7+3.2). The majority of the students were in the 18-20 and 21-23 age groups (39% and 44% respectively). Fifteen percent of the students were in the 24-26 age group and 2% were in the 28-30 age group.

Table 1 depicts the students' opinions about the significance of research to the community and the influence of incentives in choosing a research career. Both male and female students scored between 1.72 and 1.84 on a 5-point Likert scale, reflecting the students' opinion that research has only a modest impact on the community and does not have great appeal as an important part of their career. These opinions were not significantly different between men and women.

Table 1. Significance of research to the community and career (responses given on a Likert scale ranging from 1 (lowest) to 5 (highest))

	Likert scale									
	1	2	3	4	5	No response	Mean	SD	t-statistics	p
Significance of research to the community										
Male	100	106	14	10	5	123	1.72	0.8	1.546	0.123
Female	97	55	10	10	12	18	1.84	0.91		
Influence of financial incentive in opting for research career										
Male	95	110	12	8	7	116	1.74	0.91	0.181	0.857
Female	100	58	8	12	13	11	1.72	0.85		

Table 2 shows the odds ratios for several questions dealing with how research is incorporated into the medical programme. A significant majority of students felt that they did not have adequate time in the programme to pursue research ($p=0.002$), did not receive adequate training in research methodology ($p=0.00001$) and that the supervision associated with conducting research was insufficient ($p=0.028$). The responses to the question of whether the programme had stimulated their interest in research did not yield a clear-cut opinion. Furthermore, financial incentives do not appear to act as a positive stimulus in the students' interest in research as a career.

Table 2. Students' opinions on how research is incorporated into the medical programme (odds ratios analysis)

	Yes	No	No response	Chi-Square	Odds ratio	95% C.I	P-value
Has the medical programme stimulated your interest in research?							
Male	168	136	44	0.225	1.091	0.76-1.56	0.635
Female	103	91	8				
Do you feel that the medical programme gives you the opportunity to gain skills in medical education?							
Male	125	178	45	3.64	1.45	0.992-2.12	0.057
Female	62	28	112				
Do you have adequate time in medical training to pursue research?							
Male	125	179	44	5.81	1.605	1.09-2.36	0.002
Female	57	131	14				
Do you receive adequate training in research methodology in medical school?							
Male	43	260	45	14.14	4.32	1.98-9.98	0.00005
Female	7	183	12				
Are research supervisors readily available to offer guidance in conducting research in medical school?							
Male	46	255	47	4.09	1.8	1.01-3.8	0.028
Female	17	172	13				
Would you take up research as your career option if there were financial incentives?							
Male	122	191	35	1.022	0.829	0.576-1.193	0.179
Female	84	109	9				

Table 3. Yearly analysis of research factors.

	Year I students n=144 (26%)	Year II students n=132 (24%)	Year III students n=101 (18%)	Year IV students n=75 (14%)	Year V students n=98 (18%)
Do you think research in the medical field is important?					
Yes	80 (56%)	65 (49%)	70 (69%)	39 (52%)	45 (46%)
No	50 (35%)	45 (34%)	25 (25%)	28 (37%)	25 (26%)
Don't know	14 (10%)	22 (17%)	6(6%)	8 (11%)	28 (29%)
Is it important for medical students to know about research methodology?					
Yes	90 (63%)	90 (68%)	70 (69%)	55(73%)	60 (61%)
No	54 (38%)	42 (32%)	31 (31%)	20(27)	38 (39%)
What do you think of a research career for a doctor?					
Good	35 (24%)	34 (26%)	30 (30%)	22 (29%)	30 (31%)
Financially bad option	34 (23%)	35 (27%)	30 (30%)	16 (21%)	30 (31%)
No status/ respect	30 (21%)	26 (20%)	15 (15%)	21 (28%)	15 (15%)
Not good	32 (22%)	22 (17%)	15 (15%)	10 (13%)	14 (14%)
Don't know	13 (10%)	15 (11%)	11(11%)	6 (8%)	9 (9%)
Have you been a part of a research team in addition to your curriculum?					
Yes	110 (76%)	70 (53%)	58 (57%)	40(53%)	88(90%)
No	34 (24%)	62 (47%)	43 (43%)	35 (47%)	10 (10%)
Are you familiar with the writing of a research protocol?					
Yes	80 (56%)	80 (61%)	60 (59%)	35 (47%)	50 (51%)
No	64 (44%)	52 (39%)	41 (41%)	40 (53%)	48 (49%)
Have you made an attempt to publish?					
Yes	90 (63%)	70 (53%)	45 (45%)	45 (60%)	47 (48%)
No	54 (37%)	62 (47%)	56 (55%)	30 (40%)	51 (52%)

Table 3 shows the yearly trend analysis concerning students' attitudes towards research. In general, around 50-60% of the students feel that research in the medical field is important and that medical students should know about research methodology. With respect to the participants' opinions on research careers for doctors, 24-31% were positive. The other three-quarters considered that it would be a bad option financially and that research had no status or that it was a bad option for doctors. With respect to their experience with research, the majority of students had participated in a research team (up to

90% of fifth-year students), while around 50% of them had made an attempt to publish the results of research. No significant yearly trend was observed for any of the questionnaire items on the students' opinions about research and their ideas about research as an aspect of their future.

Table 4 depicts the sources of information used for research, with the library being the most vital source for all students, followed by conferences/seminars and internet technology. Again, no yearly trend was revealed.

Table-4 Sources of information for research

	Year I students	Year II students	Year III students	Year IV students	Year V students
	n=144 (26%)	n=132 (24%)	n=101 (18%)	n=75 (14%)	n=98 (18%)
Library	49(34%)	66 (50%)	35 (34%)	32 (42%)	43 (44%)
Conferences/Seminars	44 (31%)	32 (24%)	15 (15%)	11 (15%)	22 (22%)
Internet	43 (29%)	31(23%)	45 (45%)	27 (36%)	25 (26%)
Don't Know	8 (6%)	3 (2%)	6 (6%)	5 (7%)	8 (8%)

Discussion

There is no doubt that research is an important aspect in the education of medical students. Currently, healthcare decision-making is largely reliant on evidence-based medicine and understanding and using scientific methods has become an important component of the medical profession (Bornstein & Emler, 2001). Training in health research is thus an important part of any modern undergraduate medical education programme (Illing, 2007; Scaria, 2004). It is therefore imperative to instil reasoning and critical thinking skills in medical students to enable them to become real academics (Aslam et al., 2005). However, research education has another goal, namely making students enthusiastic about research and identifying ambitious students with an interest in conducting research, either in combination with a clinical career or as their main activity. Unfortunately, a considerable number of medical graduates around the world lack the desire to pursue a career in medical research (Campbell et al., 2001; Loder, 2000). This has caused a decline in the number of young physician-scientists over the last decades (Nielson, 2003; Brancati et al., 1992) necessitating the early identification of potential future scientists at the undergraduate level (Kupfer et al., 2002).

The current study was initiated to assess perceptions and attitudes among undergraduate medical students towards research in an Arab country in the Gulf region, and to obtain insight into the factors responsible for their unwillingness to take up research as a career. In general, the study results confirm those of studies around the world: students' ambitions for research in Saudi Arabia are also very modest. Although around 50% of the students agreed that research in the medical field is important, it is of great concern that only a minority felt that research would be their future career option. Even more alarming is the finding that many students felt that research had only a modest impact on the community.

How can we explain these findings and how should we proceed to improve student interest in research? The greatest barriers to involvement in research in medical school appeared to be time, the availability of research mentors and training in research methodology. Furthermore, our students considered research as an activity with low status and financial benefits. However, only a minority of the respondents would have had a more positive attitude towards pursuing a research

career were the financial conditions better. Obviously, financial benefits do not act as a positive incentive. This is in contrast with findings in other countries where good financial support systems and exclusive support programmes for research increase the likelihood of students taking up research as their career choice or ensuring that they familiarize themselves with research, irrespective of their future careers (Kassebaum et al., 1995).

In general, there were no significant gender differences observed in relation to the preference for a research career. In contrast, such a difference was found in other studies. The results of a study of Pakistani undergraduates showed that male students had more positive attitudes towards research (Khan et al. 2006). Furthermore, a North American study also found a preponderance of males opting for research careers (Guelich, 2002). An explanation for this sex difference is not clear and could reside in factors such as socioeconomics, culture and demographics, but remains to be elucidated.

What can the explanation for our findings be and what should be done to improve student interest in research as a career? One of the most relevant factors is the teacher/researcher as role model. Staff attitudes in conveying the right perceptions about research are more important than their mere availability (Burgoyne et al., 2010). The great majority of students (nearly 90%!) participating in our study reported difficulty in obtaining research supervisors. It is difficult to explain this finding. Most Saudi Arabian universities only have a few native Saudi staff members, the vast majority of university staff originate from other countries. This could prevent students from identifying themselves with these teachers/researchers as role models. Furthermore, due to faculty staff shortages teachers/researchers have many other commitments, resulting in less time for research education.

There are also other causes definitely hindering student participation in research activities, such as the insufficient exposure to research, the lack of time and the lack of knowledge and skills (research methodology). In our study, time was regarded as a significant obstacle to pursuing research during medical training. This is in agreement with the findings of other studies, reporting that most students feel that inadequate time is allotted to research activities (Gill, 1984; Neilson et al., 1995; Siemens et al., 2010). With respect to the relevance of mas-

tering research methodology, it has been found that training undergraduates in research methodology is known to improve students' awareness and skills and help them develop positive attitudes towards research (Goldstein et al., 1997; Lloyd et al., 2004).

In conclusion, although medical students feel that research should be part of medical education, they are neither inspired to or enthusiastic about choosing research as a career. Of course, this study's findings should be interpreted cautiously for several reasons. Firstly, they reflect the opinion of students from only one institution. Secondly, the survey is cross-sectional rather than a prospective follow-up of the same population. However, even with these restrictions, the main challenge remains how students' ambitions towards research can be stimulated during medical education. Fang et al. (2003) reported that awardees of the Howard Hughes Medical Institute HHMI Cloister Programme were significantly more likely than non-awardees to pursue research careers, as reflected in their higher rates of receipt of NIH postdoctoral awards and faculty appointments with research responsibilities. This reflects the importance of a good support programme to facilitate research careers. In a study in Canada a mandatory critical enquiry elective was introduced during medical training, resulting in a significant increase in the number of students expressing an interest in pursuing a research career. Some other studies have also reported an increase in the likelihood of students to take up research careers after exposure to research activities (Houlden et al., 2004; Hren et al., 2004; Solomon et al., 2003). Extracurricular participation in research during medical school also encourages students to pursue research careers. Students with extracurricular research experience have a greater scientific output after graduation than peers without such experience, and the former publish more articles after graduation than the latter (Reinders et al., 2005). Making research part of the core curriculum and at the same time creating adequate extracurricular opportunities for students to get to know or to get involved in research will improve their attitudes towards research (Remes et al., 2000). The current study results could contribute to the debate on how these suggestions can be implemented in the medical curricula of Saudi Arabia.

References:

1. Aslam F, Shakir M, Qayyum MA. 2005. Why medical students are crucial to the Future of research in south Asia. *PLoS Med* 2:e322.
2. Bansal RK. 1996. Research stimulating programme for interns. *Ind J Med Sci* 50:185-189.
3. Bornstein BH, Emler CA. 2001. Rationality in medical decision making: a review of the literature on doctors' decision-making biases. *Journal of Evaluation in Clinical Practice* 7:2 : 97-107
4. Brancati FL, Mead LA, Levine DM, Martin D, Margolis S, Klag MJ. 1992. Early predictors of career achievement in academic medicine. *J Am Med Assoc* 267:1372-6.
5. Burgoyne LN, O'Flynn S, Boylan GB. 2010. Undergraduate medical research: the student perspective. *Medical Education Online* 15: 5212 - doi: 10.3402/meo.v15i0.5212
6. Burgoyne LN, Flynn S, Boylan GB. 2010. Undergraduate medical research: the student perspective. *Med Educ Online*: 15: 3402/meo.v15i0.5212.
7. Campbell EG, Weissman JS, Moy E, Blumenthal D. 2001. Status of clinical research in academic health centers. View from the research leadership. *JAMA* 286 (7):800-6.
8. Fang D, Myer RE. 2003. Effect of two Howard Hughes Medical Institute research training programmes for medical students on the likelihood of pursuing research careers. *Acad Med* 78 (12): 1271-1280.
9. Frishman WH 2001. Student research projects and theses: Should they be a requirement for Medical school graduation? *Heart Dis*.3:140-144.
10. Gill, GN. 1984. The end of the physician-scientist. *Am Scholar* 53:353-368.
11. Goldstein JJ, and Brown MS. 1997. The clinical investigator: bewitched, bothered, and bewildered - but still loved. *J Clin Invest* 99:2803-2812.
12. Goyal MS, Mutiyil JP, Racob KS. 2006. Attitude: Concern and conduct of research among medical students. *Natl Med J India* 19:346-7.
13. Guelich JM, Singer BH, Castro MC, Resonberg LE. 2002. A gender gap in next generations of physician scientist: Medical Student's interest and participation in research. *J Invest Med* 50:412-418.
14. Houlden RL, Raja JB, Collier CP, Clark AF, Waugh JM. 2004. Medical students' perceptions of an undergraduate research elective. *Med Teach* 26:659-61.
15. Hren D, Lukić IK, Marušić A, Vodopivec I, Vujaklija A, Hrabak M, et al. 2004. Medical students' attitude towards and knowledge about science and scientific research. *Med Educ* 38: 81-6.
16. Illing J. 2007. Thinking about research: frameworks, ethics and scholarship. Edinburgh, UK: ASME.
17. Kassebaum DG, Szenas PL, Ruffin AL, Masters DR. 1995. The research of career interests of graduating medical students. *Acad Med* 70(9):848-52.
18. Kempf JP, Sodeman W, Claybrook JR, Rand C. 1991. A follow-up of a programme to foster medical students' interest in research and academic careers *Acad Med*.66:122.
19. Khan H, Khawaja MR, Waheed A, RaufMA, Fatmi Z. 2006. Knowledge and

20. attitudes about health research amongst a group of Pakistani medical students. *BMC Medical Education* 6:54 doi:10.1186/1472-6920-6-54
21. Kupfer DJ, Hyman SE, Schatzberg AF, Pincus HA, Reynolds CF. 2002.
22. Recruiting and retaining future generations of physician scientists in mental health. *Arch Gen Psych* 59:657-60.
23. Ley TJ, Rosenberg LE. 2005. The Physician-Scientist Career Pipeline in 2005: build it, and they will come. *JAMA*294(11):1343-1351.
24. Loder N. 2000. Dutch institute forced to respond to crisis in recruitment of postdoctoral researchers. *Nature* 403:235.
25. Lloyd T, Philips BR, Aber RC. 2004. Factors that influence doctors participation in clinical research. *Med Educ* 38(8):848-851.
26. Neilson EG, Ausiello D, and Demer LL. 1995. Physician-scientists as missing persons. *Association of Subspecialty Professors. J Invest Med* 43:534-542.
27. Nielson EG. 2003. The role of medical school admissions committee in the decline of physician-scientists. *J Clin Invest* 111:765-67.
28. Reinders JJ, Kropmans TJ, Cohen-Schotanus. 2005. Extracurricular research experience of medical students and their scientific output after graduation. *J Med Educ* 39(2):237.
29. Remes V, Helenius I, Sinisaari I. 2000. Research and medical students. *Med Teach* 22:164-7.
30. Scaria V. 2004. Whisking research into medical curriculum: The need to integrate research in undergraduate medical education to meet the future challenges. *Calicut Medical Journal* 2:el.
31. Siemens RD, Punnen S, Wong J, Kanji N. 2010. A survey on the attitudes towards research in medical school. *BMC Med Educ*10:4.
32. Solomon SS, Tom SC, Pichert J, Wasserman D, Power AC. 2003. Impact of Medical students' research in the development of physician, scientists. *J Invest Med* 51:149-56.
33. Wyngaarden JB. 1979. The clinical investigator as an endangered species. *N Engl J Med* 301:1254-1259.
34. Zemlo T, Garrison H, Partridge N, Levy T. 2000. The physician-scientist: Career issues and challenges at the year 2000. *FASEB J* 14:221-230.
35. Zier K, Friedman E, Smith K. 2006. Supportive programmes increase medical students' research interest and productivity. *J Invest Med* 54:201-7