

Understanding the psychosocial and physical work environment in a Singapore medical school

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ABSTRACT

Introduction: This study aims to understand the physical and psychosocial work environment, expectations and the perceived levels of stress encountered of medical students in Singapore.

Methods: A cross-sectional study employing a self-administered work environment questionnaire was applied over a one-week period to the entire 2003/2004 medical school cohort (1,069 students, response rate 85 percent) from the first to fifth (final) years at the National University of Singapore.

Results: 3.3 percent had at least one needlestick injury within the academic year. The majority (especially the clinical students) also had musculoskeletal complaints (neck and back mainly) within the last three months. Using the General Health Questionnaire, it was found that 49.6 percent encountered significant stress and 64.6 percent reported that more than 60 percent of their total life stress was due to medical school. The most important psychosocial stressors were: too much work and difficulty in coping. The clinical students were particularly concerned about being good medical students and doctors. The reasons for choosing Medicine as a career and social health (health, study and sleep habits) were also studied.

Conclusion: The health risks of a medical student are primarily psychosocial in nature. The biggest challenges are work demands, maintaining a work-life balance and managing the psychosocial work environment.

Keywords: medical students, musculoskeletal complaints, needlestick injury, physical work environment, psychosocial health, stress

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INTRODUCTION

It is often said that undergraduate medical schools offer one of the most stressful courses within the university of any country, and the health of medical students has sometimes been neglected. Students are exposed to various psychosocial and physical hazards. At the time of this study, Singapore had only one medical school, the Yong Loo Lin School of Medicine, which has a five-year undergraduate programme. The first two years are largely pre-clinical years with grounding in basic human sciences such as anatomy, physiology and biochemistry; and the later clinical years are where students have clinical rotations through the healthcare facilities, i.e. hospitals and polyclinics. There is also an annual programme quota, and a selection process is required. Graduates undergo a one-year training as a House Officer before obtaining their full medical licence as a Medical Officer.

A number of foreign medical schools have written about the psychological stressors of medical students. In Singapore, there has only been a published study done on 135 first-year medical undergraduates comparing their stress levels with that of first-year law undergraduates.⁽¹⁾ Even less is known of the physical hazards encountered. As the medical school evolves and studies how best to improve the curriculum to produce even better doctors, it becomes even more necessary to fully appreciate the physical and psychosocial work environment, and lifestyle habits of our medical students. This cross-sectional study aims to profile the physical and psychosocial work environment of our undergraduate medical students, and strives to understand the perceived stress among the medical undergraduates, their psychosocial work environment, healthy lifestyle habits and general well-being.

METHODS

The questionnaire was divided into "physical health" and "psychosocial health" sections. The "physical health" portion comprised questions pertaining to the prevalence of needlestick injuries (within the academic year – last eight months) and musculoskeletal complaints occurring

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during the course of work. Needlestick injuries were defined as injuries from handling needles/syringes only. Prevalence over a three-month period was used for musculoskeletal complaints and positive responses were taken as those which were encountered daily or frequently (more than three times per week).

The “psychosocial health” section utilised the General Health Questionnaire (GHQ-12) to evaluate stress levels.⁽²⁻⁴⁾ It used 12 questions to assess the general levels of happiness, anxiety, depression, stress and sleep disturbance. One point was awarded for a “less than usual” or “much less than usual” response while no point was given for a “more than usual” or “same as usual” response. A GHQ score of 4 or more (out of a maximum of 12) is used to identify potentially stressed respondents.

Psychosocial work environmental factors were drawn from the experiences of other medical school surveys as well as from members of the research group.⁽⁵⁻⁸⁾ These were subjective responses and they were ranked according to a positive response. We also included a section on the reasons for choosing Medicine as a career and how they had changed throughout medical school, so as to better understand the changing expectations of our medical students (if any).^(9,10) As a measure of psychosocial outcome, we also asked questions about their social health, including health, study and sleep habits.

The questionnaire was self-administered and anonymous, and further refined after conducting a pilot survey among 30 members of the project group. The survey was conducted intensively over a one-week period from February 27 to March 4, 2004. All undergraduate medical students (first to fifth year) from the 2003/2004 cohort were included, less foreign exchange students, third-year students from Community Health Project Group 6 which conducted the study, and transfer students who enrolled after the start of academic year 2003/2004. Data was analysed using the Statistical Package for Social Sciences version 12.0 (SPSS Inc, Chicago, IL, USA).

RESULTS

While we had initially compared data between the different years, the analysis was found to be more meaningful most of the time when compared between the pre-clinical and clinical years. There was also little difference in gender and ethnic comparisons for the various work environmental exposures and outcomes. We used the Singapore National Health Survey, 1998 as a means of comparison to the general population, for the analysis of healthy lifestyle habits.⁽¹¹⁾

Despite the short survey period, we were able to garner 909 (out of 1,069 eligible students) responses or 85.0% response rate (Table I). Additional demographical information were: age ranged from 17 to 25 years, with age between the years being one year apart; gender

Table I. Response rates among the medical students.

Year of study	Response rate
Year 1	89.1% (212/238)
Year 2	97.8% (221/226)
Year 3	77.6% (152/196)
Year 4	79.1% (167/211)
Year 5	79.3% (157/198)
Pre-clinical	93.3% (433/464)
Clinical	78.7% (476/605)
Total	85.0% (909/1069)

Table II. Distribution of needlestick injuries by year of study.

Year of study	1	2	3	4	5
Number of needlestick injuries (%)	0	2 (0.9)	8 (5.3)	15 (9.0)	5 (3.2)

Table III. Causes of needlestick injuries.

Cause of needlestick injury	Prevalence (%)
Venepuncture	11 (36.7)
Uncapping	8 (26.7)
Recapping	2 (6.7)
Stray needles	2 (6.7)
Others	7 (23.2)
Total	30 (100)

Table IV. Prevalence over a three-month period of musculoskeletal complaints.

Affected area	Three-month prevalence n (%)	
	Pre-clinical	Clinical
Upper back and neck	258 (59.6)	340 (71.8)
Lower back	218 (50.8)	338 (71.6)
Shoulders and arms	194 (44.8)	268 (56.3)
Wrists and hands	152 (35.1)	210 (44.1)
Lower limbs	185 (42.7)	324 (67.9)

– males 60%, females 40%; and doctor-parents – none 93%, one doctor-parent 5%, both doctor-parents 2%.

There were a total of 30 (3.3%) respondents who indicated that they had suffered from a needlestick injury in their current academic year (eight months at time of survey). The incidence was highest among fourth year students (15), compared with first year students (0), as they did not handle needles/syringes (Table II). 28 of the students had a single needlestick injury, while two had a needlestick injury on two separate occasions. None had three or more injuries. Most needlestick injuries occurred

Table V. Correlation of work stressors and stress among pre-clinical and clinical students.

Pre-clinical students	Clinical students
Cannot cope with amount I have to study (0.421)	Cannot cope with amount I have to study (0.367)
Lack of time for personal activities (0.414)	Course is too difficult for me (0.320)
Stressed by having to get good grades (0.347)	Lack of time for personal activities (0.306)
Do not have time to complete my work (0.329)	Lack confidence to be successful doctor (0.302)
Afraid of failing/repeating course (0.315)	Lack confidence to perform well as medical student (0.287)

Table VI. Reasons for choosing Medicine as a career and staying in Medicine.

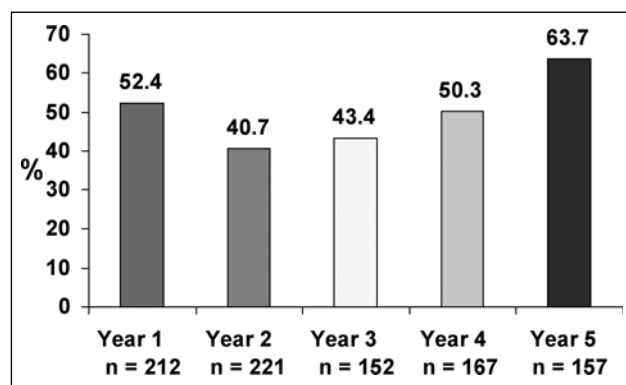
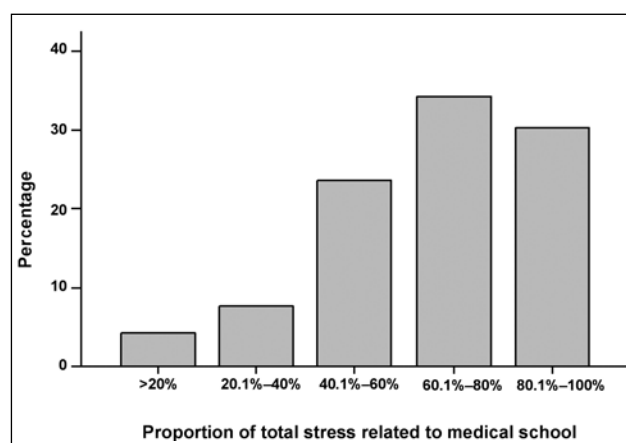
Reasons for choosing Medicine	Proportion of students (%)	Reasons for staying in Medicine	Proportion of students (%)
Save lives	55.0	Save lives	56.1
Out of interest	53.9	Out of interest	53.4
Job stability	27.5	Job stability	32.5
Not interested in any other courses	22.9	Not interested in any other courses	27.5
Childhood ambition	19.8	Childhood ambition	19.0

during the venepuncture process and uncapping of needles (Table III). Only nine students claimed to have reported their injury to the hospital, 15 admitted to not making any report, and the rest did not respond to the question.

The three-month prevalence of musculoskeletal complaints is shown in Table IV. The most frequent complaints involved aches and pains in the neck/upper back and the lower back. The other areas were less affected. However, the clinical students had a higher prevalence of musculoskeletal complaints than pre-clinical students (statistically significant, $p < 0.05$). It was noted that clinical students also needed to “maintain uncomfortable postures” (85.1% versus 64.4%) and “stand to the point of discomfort” (94.1% versus 40.4%) more frequently than pre-clinical students.

Based on a GHQ score of 4 and above, 49.6% (451) of medical students appeared to be stressed, where clinical students were slightly more highly stressed (52.5%) compared with pre-clinical students (46.7%). The comparisons between year of study are shown in Fig. 1a. When asked about the perception of work stress in medical school, 64.6% felt that it contributed to more than 60% of their total life stress, and of this group, 46.8% said it contributed to more than 80% (Fig. 1b). The median perceived levels ranged from 70% to 77.5%. There was no significant difference between the pre-clinical and clinical students. Table V shows the main factors associated with work stress (GHQ-12) for pre-clinical and clinical students.

There was no statistical significance when the above factors were compared between the two groups. However, 25.6% (233) of respondents (41.2% in clinical versus 8.1% in pre-clinical students) claimed to have been subjected to some form of public scolding or humiliation

**Fig. 1a** GHQ stress level (≥ 4) among medical students.**Fig. 1b** Proportion of life stress attributable to medical school.

by tutors, and 26.1% (237) claimed unfair grading during tests/examinations.

The main reasons for choosing Medicine as a career

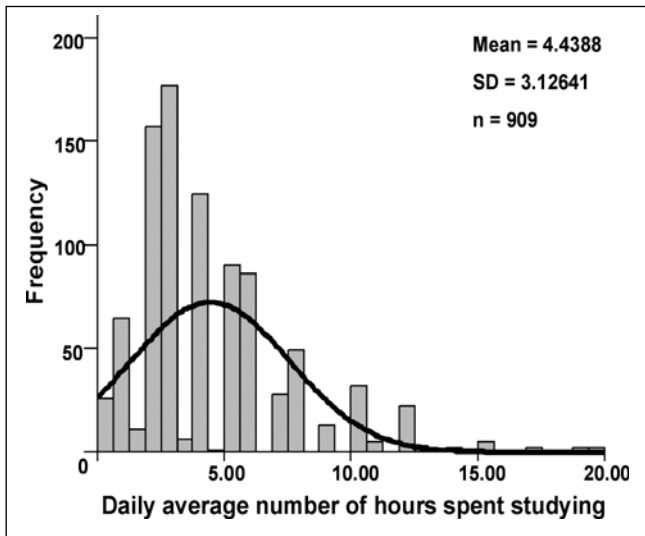


Fig. 2a Frequency distribution of study habits among medical students.

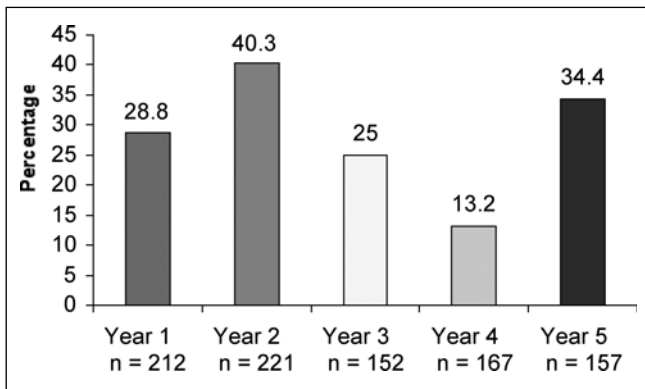


Fig. 2b Medical students with sufficient sleep.

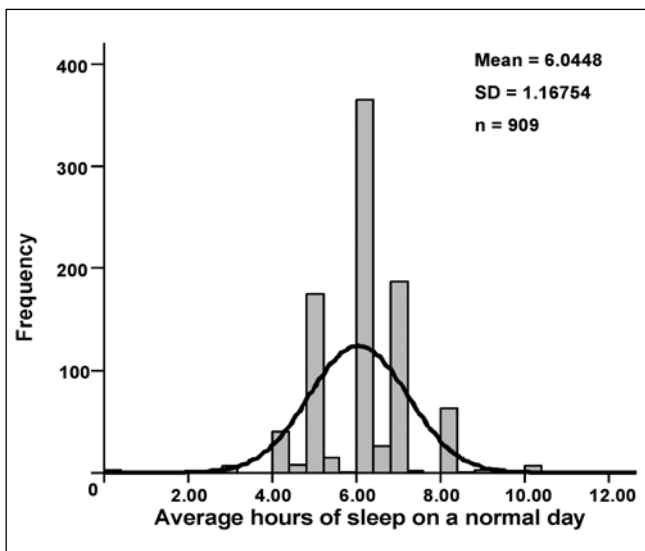


Fig. 2c Hours of sleep in medical students.

before coming into medical school and how they had changed since then (up to three choices were allowed) are listed in Table VI. When asked if they “regretted choosing medical school”, only 8.7% agreed/strongly agreed, and 74.7% said that they would choose Medicine again if they were given another opportunity.

There were 14 (1.5%) current smokers, and more males (2.2%) than females (0.5%) smoked. This is far below the national average of 18% prevalence (based on the Singapore National Health Survey, 1998).⁽¹¹⁾ There was no correlation with GHQ-12 scores (Spearman’s correlation coefficient was 0.04). Clinical students were also six times as likely as pre-clinical students to smoke. Regular alcohol consumption was defined as having a drink four or more times a week, and 7.7% met this criterion. There was no difference between clinical or pre-clinical students but more males than females drank. This was slightly lower than the national average. There was no correlation with GHQ-12 scores. Overall, 21% of the students exercised regularly (at least three times per week of 20 minutes’ duration each), 50% exercised occasionally, and 29% do not exercise at all. The proportion of male and female students who participated in regular exercise (26.4% and 13.1%) was similar to the national average for that age group (25.1% and 11.3%).

The frequency distribution of study habits is shown in Fig. 2a. The median number of hours spent studying outside school hours was 4.0 hours. 48.6% studied up to three hours per day, 33.1% between three and seven hours, and 18.2% more than seven hours a day. More females (27.6%) studied more than seven hours a day compared with their male counterparts (20.3%). 71.0% of students had insufficient sleep (defined as at least seven hours of sleep daily). The frequency distribution between the years is shown in Figs. 2b–2c, and more Years 2 and 5 students had more sleep than the others.

DISCUSSION

A limitation of this study was that it was conducted as part of a community health project by third-year medical students on students within the same medical school. The questionnaire was designed to obtain descriptive statistics and there was no available validated instrument to meet all our objectives. Wherever possible, validated instruments were incorporated, such as the GHQ-12 (for psychological well-being).⁽²⁻⁴⁾ Most of the other sections, like sources of stress, reasons for going to medical school and needlestick injuries, were self-developed and structured to be as direct as possible. It was also not possible to narrow down the specific causes for stress, especially whether the stress was a culmination of the medical school environment or due to individual factors (such as the imposition by self to over-achieve). There was also the possibility of bias in the form of response

bias (over-reporting or exaggerated response of ill-health by the students). The study was also conducted near to the end of the academic semester when examinations were looming. As such, the results may need to be interpreted conservatively. Nevertheless, the results have provided useful information about the working environment of our medical students.

The current prevalence of needlestick injuries has decreased significantly. In a similar study done in third-year medical students in our medical school in 1993, 35.1% of third-year students sustained at least one needlestick injury in that academic year.⁽¹²⁾ This is attributed to the greater awareness and proper training in the handling of sharp instruments within the medical curriculum. Back then, the teaching of venepuncture was informal and occurred within the wards. These figures also compare favourably with published data from other medical schools such as Birmingham, UK (14.6%, year 2000) and Malaysia (14.1%, year 2003).^(13,14) The current deficiency perhaps lies in the notification process, as 50% of the afflicted indicated that they did not report their needlestick incident.

Musculoskeletal complaints, particularly those of the neck and lower back, were significant among medical students, especially among those in the clinical years. This was probably attributed to the long hours spent standing and walking within the wards with patients, looking for appropriate cases, following the ward rounds and bedside tutorial sessions. This was aggravated by prolonged sitting during studying, especially if there was prolonged flexion of the neck while reading. There were no other available studies of medical students for comparison. Fortunately, such complaints are likely to be transient and diminish during the holiday periods. It would also help if the students were able to get regular exercises and learn to take rest breaks at work.

The undergraduate medical course is inherently a "stressful" one, not just because of the need to learn copious amounts of new information, but the constant requirement to interact with patients and translate clinical knowledge into practice. It is not enough to just make the right diagnosis, the medical student also has to communicate well to patients and other healthcare professionals as part of the management process. The use of information technology adds another dimension to modern medicine. Medical training pedagogy involves the use of electronic presentations and typed case reports. Thus work demands are high in medical studies, and this was the highest ranked stressor among the medical students. Another factor that apparently contributes to stress is that of personal expectations and peer competition. This is especially so in pre-clinical students who consistently highlighted that their biggest stressors were the fear of failing and repeating their course as well as having to get good grades. This is less so in the clinical

students whose focus is probably on passing the course and being good doctors, rather than just good grades.

The clinical students have also highlighted their insecurities in a system that primarily utilises academic grades in assessing good medical students and doctors. It is at this phase that they begin to question whether just clearing examinations would make them good enough medical practitioners. There is no perfect assessment framework in this particular area at this juncture for undergraduate medical students, and a mentorship or coaching programme could be helpful in this exceptional instance. It is here also that the students are exposed to clinical tutors from different disciplines and hospitals. It is important for these tutors not only to teach, but to adopt the optimal teaching methods, to avoid student perception of tutoring as a form of public humiliation and discrimination.

In the management of expectations and the effectiveness of our selection of students into the medical course, it is encouraging to note that the majority of students chose Medicine because they wanted to "save lives" and were "interested in the course". Only a handful of students expressed regret in taking up the course. This is in contrast to a number of other medical studies in the past where students felt that a medical career was associated with a poor quality of life and regret.⁽¹⁵⁾ A recent study among 16 US medical schools showed these results: among senior medical students, 42% reported having experienced harassment and 84% belittlement during medical school. These types of abuse were caused by other students (11% and 32% experienced harassment or belittlement, respectively); residents (27% and 71%), pre-clinical professors (9% and 29%), clinical professors (21% and 63%), and patients (25% and 43%).⁽¹⁶⁾ Affected students were significantly more likely to be stressed, depressed, suicidal, to drink alcohol or to binge drink, and to state that their faculty did not care about medical students. Although our survey results in this aspect were not as comprehensive, they do suggest that our perceived "ill-treatment" is lower (and less severe) than that of US medical schools. We wanted to understand whether there were any unhealthy lifestyle habits as a consequence of work stress. There was no association with smoking, alcohol intake or lack of exercise. The prevalence of smokers and drinkers was also much lower than the national average. What we noted was that students spent relatively long hours studying and hence, had shorter sleeping hours.

In conclusion, there are certain health hazards during the course of work of a medical student, and these are not that much different from those of the working healthcare worker. The main challenges of medical school appear to be the work demands, maintaining a work-life balance, and managing the psychosocial environment. It is

important that these issues be considered and addressed by medical schools as well as medical students.

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REFERENCES

1. Ko SM, Kua EH, Fones CS. Stress and the undergraduates. *Singapore Med J* 1999; 40:627-30.
2. Guthrie E, Black D, Bagalkote H, et al. Psychological stress and burnout in medical students: a five-year prospective longitudinal study. *J R Soc Med* 1998; 91:237-43.
3. Toews JA, Lockyer JM, Dobson DJ, et al. Analysis of stress levels among medical students, residents, and graduate students at four Canadian schools of medicine. *Acad Med* 1997; 72:997-1002.
4. Helmers KF, Danoff D, Steinert Y, Leyton M, Young SN. Stress and depressed mood in medical students, law students, and graduate students at McGill University. *Acad Med* 1997; 72:708-14.
5. Guthrie EA, Black D, Shaw CM, et al. Embarking upon a medical career: psychological morbidity in first year medical students. *Med Educ* 1995; 29:337-41.
6. Firth J. Levels and sources of stress in medical students. *Br Med J (Clin Res Ed)* 1986; 292:1177-80.
7. Radcliffe C, Lester H. Perceived stress during undergraduate medical training: a qualitative study. *Med Educ* 2003; 37:32-8.
8. Aktekin M, Karaman T, Senol YY, et al. Anxiety, depression and stressful life events among medical students: a prospective study in Antalya, Turkey. *Med Educ* 2001; 35:12-7. Comment in: *Med Educ* 2001; 35:6-7.
9. Fields SA, Toffler WL. Hopes and concerns of a first-year medical school class. *Med Educ* 1993; 27:124-9.
10. Chuck JM. Do premedical students know what they are getting into? *West J Med* 1996; 164:228-30. Comment in: *West J Med* 1996; 165:398.
11. Ministry of Health, Singapore. Singapore National Health Survey 1998. Available at: www.moh.gov.sg/corp/publications/. Accessed March, 2004.
12. Chia HP, Koh D, Jeyaratnam J. A study of needle stick injuries among medical undergraduates. *Ann Acad Med Singapore* 1993; 22:338-41.
13. Sullivan M, Masters O, Venkatesan P. Needlestick injuries amongst medical students in Birmingham, UK. *J Hosp Infect* 2000; 44:240-1. Comment on: *J Hosp Infect* 1994; 26:149-50.
14. Norsayani MY, Noor Hassim I. Study on incidence of needle stick injury and factors associated with this problem among medical students. *J Occup Health* 2003; 45:172-8.
15. Morrissey M, Leonard BE. A survey of final year medical students at University College, Galway. *Ir Med J* 1993; 86:154-5.
16. Frank E, Carrera JS, Stratton T, Bickel J, Nora LM. Experiences of belittlement and harassment and their correlates among medical students in the United States: longitudinal survey. *BMJ* 2006; 333:682. Comment in: *BMJ* 2006; 333:809. *BMJ* 2006; 333:664-5.