ORIGINAL ARTICLE

Patient safety in the undergraduate curriculum: medical students' perception

Gilberto KK Leung 梁嘉傑
Nivritti G Patil 彭　達

Objective Patient safety has emerged as a distinct health care discipline and an undergraduate programme on patient safety is being introduced at the authors' institution. The present study aimed to assess medical students' perceptions and knowledge on patient safety issues.

Design A self-administered voluntary questionnaire survey.

Setting Li Ka Shing Faculty of Medicine, The University of Hong Kong, Hong Kong.

Participants A total of 130 fourth-year medical students.

Main outcome measures Students' baseline perceptions and knowledge on patient safety issues.

Results The majority of students agreed that medical errors were inevitable but over 25% opined that "competent physicians do not make errors". The majority disapproved the practice of non-disclosure of error; whilst 6% would not address 'near-miss' events, and almost 10% did not support an active reporting system. Nearly half of the students were neutral on the notion that uncertainty should not be tolerated in patient care, and over 80% agreed that the most effective strategy to prevent error was "to work harder and be more careful". A knowledge gap in patient safety issues existed. Over 80% of students supported the introduction of our new undergraduate programme.

Conclusion Medical students were aware of medical errors being an inevitable barrier between intended 'best care' and what was actually provided to patients. Students appeared to lack the appreciation of non-physician–based causes of errors, and the importance of a multidisciplinary approach to the management of incidents. A formal curriculum on patient safety is urgently needed in this locality, and such an initiative was supported by the medical students who were surveyed.

Introduction

In recent years, patient safety has emerged as a distinct health care discipline emphasising incident management and risk reduction strategies.[1-3] The alarming numbers of patients reportedly harmed and even killed by medical errors have prompted the development of numerous trans-disciplinary, evidence-based strategies to improve patient safety.[4] In Hong Kong, this change in health care culture is signified by the establishment of the Advanced Incident Reporting System and risk management task forces by the Hospital Authority.

Recent media coverage of medical incidents has not only raised considerable public concerns but also disseminated a number of arguably misguided opinions and misconceptions among health care professionals and students alike. It is increasingly recognised that undergraduate education plays a major role in the promulgation of the correct concepts, skills, and knowledge about patient safety.[5,6] Medical students are now encouraged to be conversant with the principles of patient safety, and in a number of medical schools, these have already become a core component of undergraduate curricula.[7-9] At the authors' institution, a pilot programme on patient safety for third-year medical students is being introduced in the academic year 2009-2010, in collaboration with the Quality and Safety Division of the Hospital Authority Head Office. To better define and design our new programme, we have conducted, and reported herewith, the results of a questionnaire survey on our current students who have had no prior exposure to any formal teaching on the subject. We aimed at investigating the students' knowledge

Key words
Curriculum; Education, medical, undergraduate; Medical errors; Safety management; Students, medical

Hong Kong Med J 2010;16:101-5

Centre of Education and Training, Department of Surgery, The University of Hong Kong, Queen Mary Hospital, Pokfulam, Hong Kong
GKK Leung, MB, BS, FHKAM (Surgery)
NG Patil, MB, BS, FHKAM (Surgery)

Correspondence to: Dr GKK Leung
Email: gilberto@hkucc.hku.hk

醫科本科課程中的病人安全問題：醫科學生的認知

目的 病人安全已確立成為一門醫療科目，而本文作者所服務的大學醫學院正開辦病人安全的大學本科課程。本研究旨在評估醫科學生對有關病人安全的課題的認知和知識。

設計 自願參加的自填式問卷調查。

安排 香港大學李嘉誠醫學院。

參與者 130名四年級醫科學生。

主要結果測量 學生對有關病人安全的課題的基本認知及知識。

結果 大部分學生同意醫療過失屬無可避免，但25%以上認為“有能力的醫生不會出錯”。大部分受訪者對不公佈醫療事故的做法並不贊成，但6%表示不會披露「虛驚事件」，幾乎10%不支持主動通報系統。接近一半受訪者對於在護理患者過程不許有含糊之處持中立態度，而80%認為防範事故最有效的方法就是“更勤奮工作，更小心謹慎”。受訪者欠缺與病人安全相關課題的知識。八成以上學生支持大學新增的本科課程。

結論 醫科學生明白到醫療過失是造成理想中“最週全的護理”與實際給予病患者的照料之間出現落差的障礙所在，而且是無可避免的。對於造成過失與醫生無關的因由，以及對於實行醫療事故跨部門管理的重要，學生的了解看來相當貧乏。因此，以病人安全為中心的正規課程非常迫切，而醫科學生亦支持有關的新方案。

and perceptions on patient safety issues, and their attitudes towards the introduction of our new undergraduate programme.

Methods

A voluntary questionnaire survey was conducted on fourth-year medical students of the University of Hong Kong, during a whole-class orientation session in July 2009. The questionnaire was adapted from that used in a study previously reported by Madigosky et al.[9]

The questionnaire of the present study dealt with 25 items grouped in three sections. The 11 items in Section 1 were an assortment of statements which may or may not be consistent with the current teachings on patient safety. They were designed to assess the students' perceptions on the causes and handling of medical errors. Section 2 (6 items) focused on self-appraisal (not actual information recall) of their knowledge on patient safety issues. Section 3 (8 items) addressed attitudes towards the teaching of patient safety and their inclusion within the medical curriculum. Responses to each item were graded using a 5-point ordinal scale (1=strongly disagree/very poor, 2=disagree/poor, 3=neutral/fair, 4=agree/good, 5= strongly agree/very good).

Results

Of a total of 130 students, 96 completed the questionnaire, yielding a response rate of 74%. In the following summary of our findings, for ease of presentation, the term 'majority' was defined as 'greater than 50% of respondents'. The term 'supported' was used when the respondents either 'agreed' or 'strongly agreed' with an item. The term 'objected' was used when the respondents either 'disagreed' or 'strongly disagreed' with an item.

The first four 'Attitude items' addressed the causes of medical errors (Table 1). While the majority

TABLE 1. Student responses to Section 1 (attitude items) of the questionnaire on patient safety (n=96)

Item No.	Attitude items	% Of students*				
		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1	Making errors in medicine is inevitable.	2	9	17	68	4
2	There is a gap between what physicians know as “best care” and what is being provided on a day-to-day basis.	0	3	32	57	7
3	Competent physicians do not make medical errors that lead to patient harm.	1	45	28	24	2
4	Most errors are due to things that physicians cannot do anything about.	3	57	37	3	0
5	If I saw a medical error, I would keep it to myself.	10	53	31	7	0
6	If there is no harm to a patient, there is no need to address an error.	13	61	20	6	0
7	Only physicians can determine the causes of a medical error.	3	56	26	14	1
8	Reporting systems do little to reduce future errors.	9	62	20	8	1
9	After an error occurs, an effective strategy is to work harder and to be more careful.	0	3	9	70	18
10	Physicians should not tolerate uncertainty in patient care.	1	27	45	27	0
11	The culture of medicine makes it easy for providers to deal constructively with errors.	0	21	52	26	1

* Because of rounding, not all percentages total 100

TABLE 2. Student responses to Section 2 (knowledge items) of the questionnaire on patient safety (n=96)

Item No.	Knowledge items*	% Of students†				
		Very poor	Poor	Fair	Good	Very good
12	The number of preventable adverse events each year in HAHO.	29	50	19	2	0
13	The number of preventable adverse events each year reported by international bodies, eg IOM Report: To Err is Human.	31	51	17	1	0
14	Estimate of the percentage of hospitalisations with adverse events.	27	50	19	4	0
15	Characteristics of a successful error reporting system.	25	53	19	3	0
16	Definition of latent factors.	29	55	14	2	0
17	You are well informed on 'patient safety'.	6	38	49	6	0

* HAHO denotes Hospital Authority Head Office, and IOM Institute of Medicine of the National Academies
† Because of rounding, not all percentages total 100

TABLE 3. Student responses to Section 3 (teaching of patient safety) of the questionnaire on patient safety (n=96)

Item No.	Teaching of patient safety	% Of students*				
		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
18	Physicians should routinely spend part of their professional time working to improve patient care.	0	0	15	78	7
19	'Patient safety' is an important topic.	0	0	10	67	23
20	Learning how to improve patient safety is an appropriate use of time in medical school.	1	0	15	73	12
21	You would like to receive further teaching on patient safety.	1	0	20	70	9
You would like to receive teaching on the following:						
22	Supporting and advising a peer who must decide how to respond to an error.	0	6	20	71	2
23	Analysing a case to find the cause of an error.	0	2	9	80	10
24	Disclosing an error to a patient.	0	2	11	72	15
25	Disclosing an error to a faculty member.	0	3	29	61	7

* Because of rounding, not all percentages total 100

of the students supported that 'medical errors are inevitable' and that what is considered as 'best care' may not always be provided, 11% objected to the proposition that medical errors are inevitable (items 1 and 2). Over one-fourth of the students supported the notion that 'competent physicians do not make errors' (item 3). The majority also objected to the proposition that most errors are due to non-physician–related factors (item 4).

Items 5 to 11 addressed the management of medical errors. While the majority disapproved the practice of 'non-disclosure', 6% agreed that there was no need to address an error which has not harmed patients (ie 'near-miss' events) [items 5 and 6]. Approximately 70% of the students objected to the idea that a reporting system did not help to diminish future errors, and around 60% objected that the participation of personnel other than physicians would not help to determine the cause of error (items 7 and 8). On the other hand, nearly half of the students were neutral on the notion that physicians should not tolerate uncertainty in patient care, and over 80% supported that the most effective strategy to prevent errors is 'to work harder and be more careful' (items 9 and 10). The majority, however, was 'neutral' as to whether the culture of medicine was conducive to the constructive management of error (item 11).

Items 12 to 16 were very specific factual-recall questions. In this respect, over 70% of the students' self-appraisal of their own knowledge was 'poor' or 'very poor' (Table 2). However, when asked to rate their own knowledge in a non-specific manner, nearly half of the students rated their own knowledge as 'fair' (item 17).

Over 90% of the students supported, and none objected to the notion that patient safety is an important topic for both physicians and students, and a similar proportion would like to receive further teaching on the subject (items 18-21; Table 3). With regard to the skills that the students would like to acquire, close to 90% considered it important to learn how to analyse the cause of an error, as well as skills in open disclosure (items 22-25).

Discussion

In recent years medical incidents have become an important educational resource, and the introduction of patient safety in the undergraduate

curriculum signifies a major change in culture in many medical schools.[7,8,10-12] Learning how to manage errors effectively should enable future physicians to understand the impact of human limitations on clinical practice, improve patient care, reduce health care burdens, and engage in dynamic as opposed to defensive practice.[13] In contrast, a lack of formal teaching may result in unsatisfactory error reporting or an unwillingness to adopt safety practices.[14] Students have also been found to experience persistent distress after making or observing errors, and those who witnessed appropriate error handling were more likely to recognise the importance of honesty and integrity.[15] Studies comparing students before and after the introduction of formal patient safety information in curricula have demonstrated an improvement in knowledge, skills, and awareness, although not all changes were sustained.[9,10] Interestingly, medical students have also been shown to be valuable participants in ensuring patient safety when given the opportunities and appropriate training.[16]

There is as yet no consensus on what, when, and how much should be taught to medical students about patient safety. It is also unclear how or whether medical curriculum guidelines may be effectively translated into a module with suitable content or deliverable changes in practice.[13] Both brief[8,10] and extended[17] curricula have been described, and the formats may vary from the use of team-based patient safety events[18] to video-assisted simulation.[5] At our institution, a pilot programme in the form of a 2-hour seminar is being introduced for both medical and nursing students. A plan to develop this into a more extended longitudinal programme is underway.

The present study revealed a number of important findings, which may inform the design of our programme. While the majority regarded medical errors as inevitable, more than a fourth of the students opined that competent doctors do not make errors, which indicates a fundamental misconception about the nature and pattern of human error.[19] The number of students who did not see the need to address a 'no-harm' error also reflects a lack of awareness of 'near-miss' events and their potential impact on service improvement.[13] The majority's notions of effective strategies to address error prevention also suggest a lack of appreciation of the significance of system factors, process factors, and medical complexity as potential causes of errors, as well as the important roles played by other allied disciplines and health care management (eg in reporting systems). Perhaps the most interesting of all findings in our 'attitude items' was the one on culture (item 11). This item was admittedly a vague statement to which half of the responses were 'neutral'. It may be conjectured that our students are yet to become aware of a changing culture on how patient care is best provided and what constitutes constructive management of errors. A palpable need for a formal introduction on these issues was apparent.

We did not aim at testing the students' factual knowledge on patient safety. Their self-appraisal nonetheless revealed an important knowledge gap, which a structured curriculum may serve to fill. It was encouraging that the great majority regarded patient safety as an important and welcome addition to the medical curriculum. Their emphasis on root-cause analysis and open disclosure may be considered as important areas of learning in our brief programme.

The main limitation of the present study was the use of a non-standardised survey instrument and a convenient cohort of a single year of medical students. Standardised instruments for the assessment of patient safety culture are mainly catered for health care personnel such as clinicians and managers.[20] It is hoped that similar assessment tools will be developed for medical educators. A longitudinal 'before and after' study could provide valuable insights on how best to incorporate patient safety into our mainstream curriculum in the future.

In conclusion, medical students in Hong Kong were aware of medical errors being an inevitable barrier between what is considered 'best care' and what is being actually provided. There was, however, a lack of appreciation of the multi-factorial mechanisms underlying the occurrence of errors, and the importance of a trans-disciplinary approach for their constructive management. A knowledge gap was found to exist. A formal curriculum on patient safety to bring about and sustain this change in health care culture is urgently needed and was found to be supported by the students.

Acknowledgements

We would like to thank Dr Libby Lee, Quality and Safety Division, Hospital Authority Head Office, Hong Kong; Prof Mary SM Ip, Institute of Medical and Health Science Education, The University of Hong Kong; Ms Gloria KB Ng and Ms NY Choy, Department of Surgery, The University of Hong Kong, Queen Mary Hospital.

References

1. Vincent C. Principles of risk and safety. Acta Neurochir Suppl 2001;78:3-11.
2. Kuhn AM, Youngberg BJ. The need for risk management to evolve to assure a culture of safety. Qual Saf Health Care

2002;11:158-62.
3. Willeumier D. Advocate health care: a systemwide approach to quality and safety. Jt Comm J Qual Saf 2004;30:559-66.
4. Frush KS. Fundamentals of a patient safety program. Pediatr Radiol 2008;38 Suppl 4:S685-9.
5. Flanagan B, Nestel D, Joseph M. Making patient safety the focus: crisis resource management in the undergraduate curriculum. Med Educ 2004;38:56-66.
6. Fischer MA, Mazor KM, Baril J, Alper E, DeMarco D, Pugnaire M. Learning from mistakes. Factors that influence how students and residents learn from medical errors. J Gen Intern Med 2006;21:419-23.
7. Newell P, Harris S, Aufses A Jr, Ellozy S. Student perceptions of medical errors: incorporating an explicit professionalism curriculum in the third-year surgery clerkship. J Surg Educ 2008;65:117-9.
8. Patey R, Flin R, Cuthbertson BH, et al. Patient safety: helping medical students understand error in healthcare. Qual Saf Health Care 2007;16:256-9.
9. Madigosky WS, Headrick LA, Nelson K, Cox KR, Anderson T. Changing and sustaining medical students' knowledge, skills, and attitudes about patient safety and medical fallibility. Acad Med 2006;81:94-101.
10. Halbach JL, Sullivan LL. Teaching medical students about medical errors and patient safety: evaluation of a required curriculum. Acad Med 2005;80:600-6.
11. Paxton JH, Rubinfeld IS. Medical errors education for students of surgery: a pilot study revealing the need for action. J Surg Educ 2009;66:20-4.
12. Paulsen PM, Brattebo G. Attitudes to medical errors and patient injury among doctors and medical students [in Norwegian]. Tidsskr Nor Laegeforen 2006;126:2129-32.
13. Wakefield A, Attree M, Braidman I, Carlisle C, Johnson M, Cooke H. Patient safety: do nursing and medical curricula address this theme? Nurse Educ Today 2005;25:333-40.
14. Vohra PD, Johnson JK, Daugherty CK, Wen M, Barach P. Housestaff and medical student attitudes toward medical errors and adverse events. Jt Comm J Qual Patient Saf 2007;33:493-501.
15. Martinez W, Lo B. Medical students' experiences with medical errors: an analysis of medical student essays. Med Educ 2008;42:733-41.
16. Seiden SC, Galvan C, Lamm R. Role of medical students in preventing patient harm and enhancing patient safety. Qual Saf Health Care 2006;15:272-6.
17. Mayer D, Klamen DL, Gunderson A, Barach P; Telluride Interdisciplinary Roundtable. Designing a patient safety undergraduate medical curriculum: the Telluride Interdisciplinary Roundtable experience. Teach Learn Med 2009;21:52-8.
18. Anderson E, Thorpe L, Heney D, Petersen S. Medical students benefit from learning about patient safety in an interprofessional team. Med Educ 2009;43:542-52.
19. Norris B. Human factors and safe patient care. J Nurs Manag 2009;17:203-11.
20. Romano PS, Mull HJ, Rivard PE, et al. Validity of selected AHRQ patient safety indicators based on VA National Surgical Quality Improvement Program data. Health Serv Res 2009;44:182-204.