

Evaluating the Effects of an Integrated Medical Ethics Curriculum on First-year Students

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Abstract

Introduction: An integrated biomedical ethics track was implemented as part of the new medical undergraduate curriculum at the National University of Singapore Yong Loo Lin School of Medicine in academic year (AY) 2008/2009. This study analyses the effects of the new curriculum on first-year students' knowledge, confidence and opinions in relation to the subject. **Materials and Methods:** In a cohort-based quasi-experimental study, we administered a pre-course and post-course questionnaire to a group of first-year students in AY2008/2009 who underwent the new biomedical ethics curriculum. The same questionnaire was carried out with the first-year cohort of AY2007/2008, who had received only ad hoc teaching in biomedical ethics. The questionnaire focused on the students' opinions on selected taught topics in biomedical ethics and law, and formal ethics education; their confidence in relation to specific clinical ethical competencies; and their knowledge of selected taught topics in the first-year syllabus. **Results:** The experimental cohort acquired more knowledge and confidence. They rated more positively formal ethics teaching and assessment as a requirement of medical education. Attitudes were found to have been 'professionalised' within the experimental group, with significantly greater receptiveness towards ethical codes of the profession and the regulatory role of the Singapore Medical Council. They were found to be more conservative with respect to legislative changes in healthcare. **Conclusion:** The pioneer biomedical ethics curriculum had significant effects on the ethical development of first-year medical students. Longitudinal research through further phases of the integrated curriculum is needed to identify learning issues that affect the consolidation of knowledge, confidence and attitudes in medical ethics, law and professionalism.

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An Overview

What is Already Known About This Subject

Knowledge and confidence, and positive or negative attitudes in relation to medical ethics, are affected by medical ethics education. Mainstreaming and formalising ethics education in the medical school curriculum increases knowledge and confidence, and creates positive attitudes towards ethics education.

What This Study Adds

While the knowledge and confidence of advanced medical students (house officers) has been a subject of earlier studies of the effects of medical ethics curricula, this study

investigates the effects of a new, integrated medical ethics curriculum on entry-level (first-year) medical students and compares the results with first-year medical students without formalised ethics education as a control. The opinions of the experimental and control cohorts with regard to the importance of formal ethics education and formal training for teachers of medical ethics are also compared. Furthermore, the responses of students before and after the intervention have been collected and linked so as to track changes in knowledge, confidence and opinions. 'Maturation effect' (the correlation between knowledge and confidence) was also studied, and the implications of this for shaping ethics curricula were explored.

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Suggestions for Further Research

- (i) The results reported here focus on a comparison of 2 cohorts (experimental and control). The intra-cohort comparison of pre- and post- intervention responses are not reported, but will be the subject of a future paper with a qualitative focus.
- (ii) The impact of the ethics curriculum on medical students' attitudes towards specific behaviours (e.g. ageism), legal and policy proposals (e.g. legalising euthanasia or trade in organs for transplantation) and learning issues (e.g. using cadavers in medical education).
- (iii) Longitudinal studies to track issues that affect the consolidation of knowledge and confidence over the course of different years of medical school education.

Introduction

Medical ethics education is widely considered to have come of age.¹ The American Medical Association and the General Medical Council (UK) have identified ethics as key to undergraduate education.^{2,3} Thus, increasing emphasis has been given to establishing consensus on content across medical schools in, for example, the UK, Australia and New Zealand,⁴⁻⁶ and there have been continuing efforts to enrich the range of teaching and assessment methods for the subject.⁷⁻⁹ In addition, medical schools of repute have taken up the challenge of a rigorous evaluation of the teaching of medical ethics, based on clearly defined outcomes and properly validated assessment methods.¹⁰⁻¹⁸ Arguably, such evaluation is vital if we are to answer the question of whether ethics education can help to produce ethical doctors.

There is a paucity of good evidence about the effect of medical ethics courses, and there are also conflicting findings.⁹ While some studies show that ethics teaching has a positive impact,^{18,19} at least in terms of ethical sensitivity, knowledge and confidence, others seem to suggest limited influence.²⁰ Shorr and colleagues¹⁷ found medical ethics teaching to have little effect on students' ethical attitudes and behaviour. However, this study's design has been challenged because it used a pre-experimental design and was done without a control group.¹⁴ Using a quasi-experimental pre- and post-test design, and a control group consisting of second-year students who had not undergone ethics training in their first year, Goldie and colleagues¹⁴ evaluated the effectiveness of the newly implemented medical ethics curriculum in the Glasgow University Medical School. The authors showed conclusively that teaching given to the first-year group improved their capacity to make behavioural judgements when facing ethical dilemmas.

In view of increasing recognition that rigorous evaluative studies are critical to enhancing medical ethics teaching and

assessment, the authors conducted an evaluation of a new biomedical ethics curriculum at the National University of Singapore's Yong Loo Lin School of Medicine (YLLSOM). An innovative integrated ethics curriculum, supported by valid and consistently applied teaching methods and assessment tools, was proposed at the medical school, and its first phase implemented in AY 2008/09 for incoming first-year medical students. To evaluate the effect of the newly integrated ethics curriculum, a pre-course and a post-course questionnaire was administered to all incoming first-year medical students in AY2008/09.

The objectives of the proposed study were:

- To determine the effects of the new first-year biomedical ethics curriculum on students' knowledge, confidence and opinions on the subject.
- To document the extent to which programme objectives have been met in the trial first year ethics course in AY2008/09.
- To ascertain further specific outcomes for achieving the full set of programme objectives for ethics education at YLLSOM (refer to Figure 1 on the desired outcomes of biomedical ethics education).

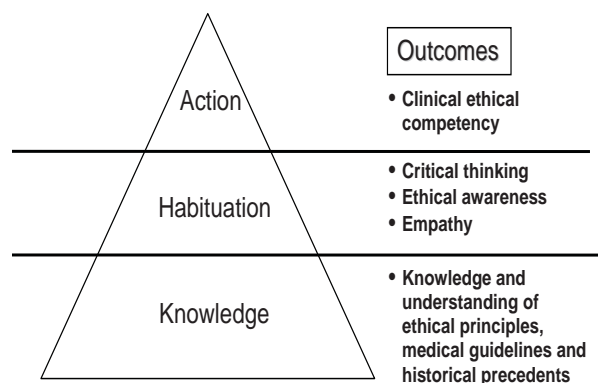


Fig. 1. Learning outcomes in key areas of medical ethics education.

Materials and Methods

The Intervention

The experimental group received ethics teaching in the form of lectures ($n = 12$), and tutorials ($n = 8$) that review reading assignments and that facilitate small group discussion of case studies typically presenting an ethical or legal dilemma. Topics were integrated with the organ system-based medical curriculum (Table 1). For example, within the first-year module on "Blood, Respiratory and Cardiovascular Systems", there are ethics sessions on "The

Table 1. Integration of HELP in Medical Curriculum in Phase 1

Phase 1 Medical Syllabus: Normal Structure and Function	HELP Phase 1 topics
1. Introduction to Health and Disease	1. Introduction to Ethical Theory & Medical Law 2. Respect for the Person — Consent & Confidentiality 3. Justice in the Allocation of Healthcare 4. The Best Interest of the Patient
2. Movement and Musculo-skeletal Biology	5. Respect for the Human Body
3. Blood, Respiratory and Cardio-vascular	6. Value of the Body-Blood and Organ Donation 7. Discontinuing Treatment
4. Renal, Fluid and Electrolyte Balance	8. Rationing Health Care Resources
5. Gastro-Intestinal, Nutrition and Metabolism	9. The Ethics of Health Education and Promotion
6. Endocrine and Reproduction	10. The Ethics of Sex Selection
7. Neuroscience with Head and Neck	11. Brain Stem Death

Value of the Body: Blood and Organ Donation”, and on “Discontinuing Treatment”. In this way, the ethics track (Health Ethics, Law and Professionalism, hereafter HELP), which is taught and assessed throughout the 5 years of the course, is integrated horizontally and vertically to the medical curriculum and is not a mere ‘add-on’. The lectures and tutorials were delivered either by clinical teachers with training in medical ethics or practical ethical knowledge within a topic area, and/or by specialist bioethicists (mainly staff of the YLLSOM Centre for Biomedical Ethics trained in bioethics, philosophy and law). Clinician teachers serve a role-modelling function in the ethics track. The control group received a smattering of ethics lectures in conjunction with lectures in anatomy, genetics and epidemiological research, but did not receive any formalised ethics teaching or assessment as the HELP curriculum was implemented only in AY2008/2009.

Evaluation Design

The design of the study was quasi-experimental in the form of a 26-item pre-course and post-course questionnaire administered to a cohort that received the intervention and a control group comprising a cohort that did not. It is one of the most commonly used designs in educational research.²¹

Subjects

All AY2008/09 first-year students were assigned to the

experimental group on a voluntary basis (n = 119). First-year students of the AY2007/08 cohort who had not undergone any formal course in biomedical ethics were assigned on a voluntary basis to the control group (n = 164).

Hypotheses

The study proposed the following hypotheses to be tested.

- H1: There is a positive correlation between the new first-year ethics curriculum and medical students’ opinions of the value of formal biomedical ethics teaching.
- H2: There is a positive correlation between the new first-year ethics curriculum and medical students’ confidence in taught topics in biomedical ethics.
- H3: There is a positive correlation between the new first year ethics curriculum and medical students’ knowledge of taught topics in biomedical ethics.

The Instrument

The questionnaire covered 3 main areas: (i) 10 multiple choice questions to assess students’ opinions on selected taught topics in biomedical ethics and law, students’ opinions on the importance of ethics education and formal training for teachers of medical ethics; (ii) 6 Likert-scale questions to measure students’ confidence in relation to specific clinical ethical competencies; and (iii) 10 multiple choice questions to measure students’ knowledge of topic areas that fell within the first-year syllabus, including ethical theory, medical law, professional guidelines and good practices, and the role of the Singapore Medical Council. Other information collected included demographic data, viz. age, sex, ethnicity, religion and nationality, all of which could potentially affect students’ responses. A pilot study was conducted to examine the validity and reliability of the questions using a group of fourth year students (n = 28). Content and face validity were reviewed by a panel of biomedical ethics experts and curriculum coordinators (n = 7). The full questionnaire is reproduced in Appendix 1.

Statistical Analysis

All analyses were performed using SPSS 17.0. The dichotomised post-response on Confidence and Knowledge of the 08/09 & 09/10 cohorts were compared to the 07/08 cohort using logistic regression adjusting for the pre-responses. Odds ratios with their 95% confidence interval were presented. Statistical significance was set at $P < 0.05$.

Results

Although 257 completed pre-course questionnaires were returned by the experimental cohort, the number of completed post-course questionnaires dropped to 119 (46.3%). The post-course survey was administered at the final ethics lecture, close to final examinations, and there were no tutorials that day. Lecture attendance is not mandatory. These factors could have accounted for the poor completion rate and consequent loss of data. The response rate of the control group was 73.9% (164/222) as some data were lost through our use of a method of anonymising linked data that asked students to remember a self-chosen

pseudonym for the purpose of survey-taking. The method of anonymization was subsequently changed to one that assigned students a code linked to their matriculation numbers, and the survey was repeated in the following year with the cohort of 2009/10, with similar findings and a completion rate of 59.9%.

No difference is noted in the experimental and control cohorts of AY08/09 and AY07/08, respectively, except that they took the surveys in different but consecutive years, and the cohort which served as the control group had minimal and very occasional exposure to ethics teaching. There were no notable demographic differences between the 2 cohorts.

Table 2. Comparison of 2007/08 & 2008/09, 2007/08 & 2009/10 Cohorts Post-survey Responses for OPINION Questions with Dichotomous Options

Question summary (response)	2007/08 cohort	2008/09 cohort	Odds ratio (95% Confidence Interval)	P	2009/10 cohort	Odds ratio (95% Confidence Interval)	P
1. Ethics education for medical students is (Important as an elective/ required part of medical curriculum)	3.7%	78.8%	107.6 (41.5-279.2)	<0.001	75.7%	87.7 (34.8-221.1)	<0.001
2. Medical teachers from clinical disciplines (Require formal training in medical ethics/ Require certified qualification in medical ethics)	3.1%	58.6%	52.6 (19.6-141.1)	<0.001	56.8%	41.2 (15.8-107.6)	<0.001
3. It is ethically justifiable to lie to a patient about his/her clinical condition (Often/Usually)	64.6%	0%	0	0.995	1.4%	115.9 (27.6-486.3)	<0.001
4. It is ethically justifiable to withhold from patients about his/her clinical condition (Often/Usually)	49.7%	2.6%	0.03 (0.007-0.081)	<0.001	5.4%	16.3 (7.5-35.8)	<0.001
5. It is morally justifiable to breach a patient's confidentiality (When required by law/ to prevent harm to innocent third parties)	94.5%	97.4%	155.9 (36.9-659.3)	<0.001	98.7%	0.024 (0.011-0.055)	<0.001
9. Should the law on active Euthanasia be changed? (With valid consent, law should be changed to allow doctors to end life of persons with intolerable suffering/terminally ill)	82.2%	30.2%	0.3 (0.2-0.6)	<0.001	25.1%	5.7 (3.3-9.7)	<0.001
10. Opinion about possible changes in the law on the purchase and sale of human organs which is presently illegal in Singapore. (Some incentives should be permitted/ Introduce legislation to regulate market/ Law should allow people to sell organ)	90.3%	44.6%	0.3 (0.2-0.5)	<0.001	57.5%	9.3 (5.2-16.4)	<0.001

I. Survey of Opinions

Table 2 summary: opinions on the value of formal ethics teaching, professional conduct, medical law.

Table 2 compares the post-course survey responses of both cohorts for Opinion questions from a dichotomous options standpoint. For example, responses to the question on the importance of ethics education for medical students were categorised according to dichotomous answers: ‘Important as an elective or required part of the medical curriculum’ OR ‘A waste of time or no formal teaching necessary’ — broadly speaking, positive opinions versus negative opinions. Option E (No Opinion) was not included in the analysis.

The results confirm the hypothesis H1. There is a statistically significant positive correlation between the new first-year ethics curriculum and medical students’ opinions of the value of formal biomedical ethics training. The results (Q1) showed the experimental cohort’s strong endorsement of formal bioethics training in the post-survey as 78.8% of the cohort felt that it is an important requirement of medical education, compared with 3.7% of the control group. On requiring trained teachers in bioethics (Q2), 58.6% of the experimental cohort believed that the teachers should be formally trained, whereas only 3.1% of the control group held that belief.

Other significant results included a marked tendency in the experimental cohort towards professionalization of attitudes on matters such as non-disclosure to patients (Q4) and breaching patient confidentiality (Q5). The results showed that the experimental cohort was more receptive to conformity to ethical codes and guidelines of the profession than the control group. Only 2.6% of the experimental cohort after the intervention considered it often or usually ethically justifiable to withhold from patients information about their clinical condition (Q4), whereas 49.7% of students from the control group held this view at the end of their first year without the intervention. On breaching patient confidentiality (Q5), 97.4% of the experimental cohort thought this was ethically justifiable when required by the law or to prevent harm to innocent third parties after the intervention, compared with 94.5% of the control group who thought so at the post-survey. On truth-telling, it is significant that no student in the experimental cohort felt that it was ethically justifiable (often or usually) to lie to patients about their clinical condition (Q3), whereas 64.6% within the control group held this view.

Students in the experimental cohort also became more conservative in their opinions than the control group in connection with proposed changes to current end-of-life decision-making (Q9) and organ transplantation laws (Q10).

With regard to their opinion on changes to the law on active euthanasia (Q9), only 30.2% of the experimental group thought that the law should be changed to allow doctors to end the life of persons with intolerable suffering or terminal illness, while 82.2% of the control group thought so. On changes to organ transplantation laws (Q10), only 44.6% held the view that a regulated market or incentives for donation should be made legal compared with 90.3% of the control group.

Table 3 Summary: Opinions on Cadavers, the Infected doctor and Ageism in Resource Allocation.

In Table 3, a Big Table analysis of student opinions on studying the cadaver, professional responsibility of the HIV-infected doctor, and organ allocation for the elderly, some interesting results suggest possible directions for further research. Post-survey responses of the 2 groups were compared.

While the majority of the control group in the post-survey (73.2%) looked forward to studying the human cadaver, a greater range of opinion was found within the experimental cohort (Q6). Of the cohort, 40.7% reported no particular feelings, and a smaller percentage looked forward to it (30.5% or a difference of -42.7%). More in the experimental group reported in the post-survey feelings of apprehension and anxiety (17.0% or a difference of +11.6%). Further investigation into these results, and their implications for ethics teaching in the Anatomy segment, is planned.

On the HIV-infected doctor’s responsibilities (Q7), there was again a marked professionalisation of student opinions in the experimental cohort, as indicated in their willingness to see doctors come under regulation by the Singapore Medical Council. Of the cohort, 39.5% held that the doctor should be required to disclose this fact to the Singapore Medical Council, while only 4.9% of the control group held this view. Only 1.7% of the experimental cohort held that the doctor should have the right to decide whether or not to continue clinical practice, whereas 34.1% of the control group held this view. Of the cohort, 29.7% of the experimental cohort held that the doctor should be required to disclose the information to patients under his/her care and obtain their consent to continue, whereas 15.2% of the control group held this view.

On organ allocation, a high proportion of the experimental cohort reported a moderately ageist view (65.5% regarding a cut-off age of 60 for eligibility as partially justified) whereas a high proportion of the control group reported a strongly ageist view (54.3% regarding the cut-off age of 60 as completely justified). About equal proportion (26.9% in the experimental cohort and 24.4% in the control group) found the ageist policy ‘seriously questionable’.

Table 3. Comparison of 2007/08 & 2008/09, 2007/08 & 2009/10 Cohorts Post-survey Responses for OPINION Questions Tabulated in Big Table Responses

Question (responses)	2007/08 cohort	2008/09 cohort	Difference between 07/08 & 08/09 cohort	2009/10 cohort	Difference between 07/08 & 09/10 cohort
6. Main feelings regarding studying the human cadaver and being in the Anatomy Theatre:					
A. No particular feelings, seems no problem to me	20.1%	40.7%	20.6%	37.2%	17.1%
B. Looking forward to it	73.2%	30.5%	-42.7%	30.3%	-42.9%
C. Feel anxious, but confident that I can remain detached	3.0%	13.6%	10.6%	15.2%	12.2%
D. Apprehension and uncertainty, don't know if I can cope	2.4%	3.4%	1%	3.4%	1%
E. None of the above	1.2%	11.9%	10.7%	13.8%	12.6%
7. A doctor who is aware that he/she has a serious medical condition that may be transmitted to patients (e.g. tests positive for Hepatitis B or HIV) ...					
A. Should be legally prevented from continuing clinical practice	37.2%	30.3%	-6.9%	26.4%	-10.8%
B. Should be required to disclose this fact to patients under his/her care to obtain their consent to continue under his/her care	15.2%	27.7%	12.5%	36.5%	21.3%
C. Should be required only to disclose this fact to the Singapore Medical Council which has jurisdiction over a doctor's fitness to practice	4.9%	39.5%	34.6%	28.4%	23.5%
D. Should have the right to decide whether or not to continue clinical practice	34.1%	1.7%	-32.4%	6.8%	-27.3%
E. No opinion	8.5%	0.8%	-7.7%	2.0%	-6.5%
8. Under Singapore's Organ Transplant Registry Point allocation system, patients above 60 years of age are not eligible to receive kidney transplants. I believe this is ...					
A. Completely justified because resources are limited	54.3%	5.9%	-48.4%	3.4%	-50.9%
B. Partially justified because resources are limited, but if more resources for kidney transplant became available, the elderly should be made eligible for kidney transplant	16.5%	65.5%	49%	76.7%	60.2%
C. Seriously questionable because one segment of society should not be singled out to be excluded from society's resources	24.4%	26.9%	2.5%	17.1%	-7.3%
D. A moral outrage because the elderly deserve more, not less, of society's resources	3.0%	1.7%	-1.3%	2.1%	0.9%
E. Don't know	1.8%	0%	-1.8%	0.7%	-1.1%

II. Survey of Confidence

Table 4 summary: confidence in recognising clinical ethical problems, decision-making in clinical ethical dilemmas, and communicating bad news to patients.

Cronbach's α of 0.7 to 0.6 showed moderate reliability of the items for the survey of confidence for both the experimental and control group. This confirms the hypothesis H2.

The experimental cohort reported statistically significant improvements in self-perceived confidence in 2 areas, primarily cognitive in nature: ability to recognise a significant ethical problem in clinical practice (Q11); ability to reach a sound decision when facing an ethical problem in clinical practice (Q12). As many as 90.5% of the experimental cohort were at least fairly confident in their ability to recognise a clinical ethical dilemma after a year of

Table 4. Comparison of 2007/08 & 2008/09, 2007/08 & 2009/10 Cohorts Post-survey Responses for CONFIDENCE Questions with Dichotomous Options Standpoint

Question summary	Response: Fairly/ Very confident						
	2007/08 cohort	2008/09 cohort	Odds ratio (95% Confidence Interval)	P	2009/10 cohort	Odds ratio (95% Confidence Interval)	P
11. Ability to recognise a significant ethical problem in clinical practice	59.5%	90.5%	6.5 (3.3-13.1)	<0.001*	91.3%	7.9 (3.8-16.2)	<0.001*
12. Ability to reach a sound decision when facing an ethical problem in clinical practice	38.5%	76.3%	5.2 (3.0-9.0)	<0.001*	81.7%	7.7 (4.3-13.6)	<0.001*
13. Ability to give reasons to your colleagues in support of your decision pertaining to matters of clinical ethics	85.9%	91.5%	1.8 (0.8-3.9)	0.149	90.5%	1.6 (0.8-3.3)	0.219
14. Knowing how to assess a patient's capacity to make informed decisions about his/her health care	63.1%	80.2%	2.4 (1.4-2.3)	0.002*	85.8%	3.6 (2.0-6.6)	<0.001*
15. Knowing how to proceed when a patient is mentally incompetent	75.3%	78.4%	1.2 (0.7-2.1)	0.524	82.5%	2.0 (1.1-3.7)	0.025
16. Ability to communicate bad news to a patient	80.7%	59.8%	0.4 (0.2-0.6)	<0.001*	62.8%	0.4 (0.2-0.7)	0.001

the ethics curriculum, while 59.5% of the control group had the same confidence at the end of the first year. If faced with a clinical ethical problem, 76.3% of the experimental cohort would be confident in their ability to make a sound decision, compared with 38.5% of the control group. Significantly, the experimental cohort (59.8%) reported lower confidence than the control group (80.7%) in a highly performative task normally continuous over time, viz. communicating bad news to a patient (Q16).

III. Survey of Knowledge

Table 5 summary: knowledge in selected areas of biomedical ethics.

The results confirm the hypothesis H1.

The experimental cohort showed significant improvement in the ability of to give correct answers to questions in the Knowledge section of the instrument in 4 out of 10 items (Q17, Q20, Q21, Q23). With 4 other questions in the set, there were a higher or equal proportion of correct responses in the experimental cohort in comparison to the control group, although the change in these cases was not statistically significant (Q19, Q24, Q25, Q26). In 2 cases (Q18 and Q22, on professional handling of the personal beliefs of Jehovah's Witnesses, and the preferences of relatives with regard to disclosing news of a fatal illness to a patient respectively), a higher proportion of the experimental cohort (81.5%) gave wrong answers in the post-survey than the control group (76.2%), although again the change was

not statistically significant. It is nonetheless interesting to note that the ethics of conscientious objection involving a patient's personal or religious beliefs, and the family's role in medical decision-making are highly contentious in the local context.

Discussion

The island state of Singapore has identified the biomedical sciences as one of the 'pillars' of its economy. There has been growth in public awareness of such currents as changes in the doctor-patient relationship and conceptions of informed consent, ageing populations and resource scarcity, and rapid adoption of technologies that service a state-of-the-art practice of medicine that are raising critical ethical challenges. In designing the very first undergraduate ethics curriculum for the medical school at the National University of Singapore, it was important to understand what affects the knowledge, attitudes, beliefs and confidence of medical students concerning ethical issues facing the profession.²² We chose to understand these dimensions at the early stages of ethics education and to measure the curriculum's effects on students based on analogs to our pyramid of outcomes (Fig.1). Knowledge is the main outcome at the earliest stages, while attitudes or opinions are precursors of ethical awareness, perceptual sensitivity and empathy. Confidence is a precursor of clinical ethical competence, ranging from confidence in knowing something to confidence in performing something. Ethics

Table 5. Comparison of 2007/08 & 2008/09, 2007/08 & 2009/10 Cohorts Post-survey Correct Responses for Knowledge

Question summary and correct response	2007/08 cohort	2008/09 cohort	Odds ratio (95% Confidence Interval)	P	2009/10 cohort	Odds ratio (95% Confidence Interval)	P
17. "Utilitarianism" states that a decision is the morally right one if							
C. The greatest good is achieved for the greatest number	28.7%	95.8%	55.2 (21.2-144.0)	<0.001*	82.8%	20.0 (10.3-38.5)	<0.001*
18. Under Singapore law if an adult Jehovah's Witness has a life-threatening bleed in which usual care would include transfusion:							
B. Because it is a life-threatening emergency, you may transfuse the patient if you feel it is medically necessary even if he/she objects	23.8%	18.5%	0.7 (0.4-1.3)	0.297	26.6%	2.3 (1.4-3.8)	0.002
19. Theory of justice attributed to Rawls:							
B. Justice as fairness	5.5%	8.4%	1.7 (0.7-4.4)	0.282	4.8%	1.8 (0.7-4.5)	0.215
20. In Singapore, a doctor may offer to a patient management plans or remedies not generally accepted by the profession							
A. Only in a formal and approved clinical trial	4.3%	44.5%	11.4 (4.6-28.0)	<0.001*	43.7%	28.9 (12.1-68.6)	<0.001*
21. The Medical (Therapy, Education and Research) Act excludes the which source of bodies and parts of bodies for use in medical education and research?							
D. Paid source	1.2%	10.9%	14.1 (2.8-70.6)	0.001*	63.3%	199.4 (44.1-900.8)	<0.001*
22. Good practice guidelines in Singapore require that when a patient's relatives ask that the patient not be told that he/she has a fatal disease,							
D. a doctor may disclose the diagnosis to the patient only if he/she has determined that this would be in the patient's best interest	16.5%	3.4%	0.2 (0.1-0.5)	0.002*	31.1%	3.2 (1.8-5.8)	<0.001*
23. The following statement about patients' capacity to make decisions is FALSE:							
C. All patients suffering from psychiatric illness lack the capacity to make decisions about their treatment	4.9%	49.6%	14.3 (6.3-32.3)	<0.001*	51.1%	13.8 (6.0-31.7)	<0.001*
24. This statement contradicts Kant's vision of deontological ethics:							
C. Acts should be judged right or wrong based on their consequences only	13.4%	27.7%	2.0 (1.0-3.7)	0.039*	31.9%	2.7 (1.4-5.0)	0.002
25. The Singapore Medical Council's role is, among other things:							
C. To ensure that doctors are mentally and physically fit to practice	10.4%	10.1%	1.4 (0.6-3.4)	0.039*	4.3%	0.8 (0.3-2.2)	0.681
26. A physician decides on patient care by following this advice: "You should simply decide what is best for her and tell the others that's what we should do." Which of the following best describes the basis of the decision?							
C. Paternalism	17.7%	31.9%	1.4 (0.7-2.6)	0.322	42.5%	3.6 (2.0-6.5)	<0.001*

education for medical students would seek to shape these early achievements into the integrated competencies of the reflective practitioner at the topmost level of the pyramid.

From our study of the first cohort of medical students in their first year of a new ethics curriculum, we conclude that a formal ethics curriculum has increased entry-level students' knowledge and confidence in medical ethics. The study was in part an extrapolation of the findings of Sulmasy and Marx²³ that extensive curricular intervention in ethics teaching is effective for raising knowledge and confidence of medical students in facing ethical questions, and enhances student approval of ethics as a requirement of medical education.

The evaluation objectives that we set out were to study curriculum effects, document the extent to which programme objectives had been met, and ascertain further specific outcomes for achieving a full set of desired outcomes of medical ethics education. From that perspective, significant findings were gleaned from the survey of students' opinions on a number of ethical and professional issues. With regard to students' opinions on professional conduct and medical law, it appears that the intervention led them to be more receptive to guidance and regulation by codes and regulatory processes of the profession. Another effect of the intervention was to increase conservatism in students with respect to legislative change. In the case of professional responsibilities of infected doctors, our findings point to an apparently higher regard within the experimental cohort than the control group for professional regulation on this issue. The intervention also appeared to mitigate ageist attitudes in students. By far, the most immediately worrying finding was continued and/or increased student anxiety in studying the human cadaver. Further research will be necessary to determine the reasons for this, so as to better address possible difficulties some students face in this area of their educational experience. There is, in addition, a clear possibility that the findings reflect close adherence to the views of curriculum teachers; what has not been studied is the extent to which the students' opinions are critically considered views, an important task for future inquiry.

Significant differences in the confidence of the experimental and control groups were found, with the former being more confident than the latter in self-perceived ability to recognise an ethical problem in clinical practice, and to reach a sound decision when faced with such problems. There were no statistically significant inter-group differences in relation to self-perceived ability to give reasons to colleagues in support of ethical decision making, ability to assess a patient's capacity for informed decision making, and knowing how to proceed when a patient is mentally incompetent. A possible explanation

for this distribution is the discursive nature of the first-year ethics curriculum, which is lecture and tutorial based with no practical skills training (for example, simulated patient exercises) at this stage. This explanation seems to be corroborated by a significant difference between the experimental and control group in their self-perception of confidence in relation to breaking bad news to a patient, with the former indicating less confidence than the latter. In seeing that breaking bad news is less procedural than the assessment of mental competence and steps to take in its absence, and more dependent on personal efficacy of communication with a patient in stages, the experimental cohort may have arrived at a more realistic assessment of their ability in this area.

While knowledge of selected aspects of medical ethics and law — mainly professional and legal requirements, and ethical theory — improved significantly, there are areas of contention such as conscientious objection to medical treatment and the family's role in medical decisions where knowledge appears to be on unsteady ground. It thus appears that ethics education can have a 'destructive' effect upon knowledge,²⁴ creating uncertainty in students over matters of culture, law and regulation. Such destabilisation may help develop the believer, or conversely the skeptic, in medical ethics as reflective practice.

Predictably, no correlation between knowledge and confidence (or 'maturation effect') has been observed after one year of formal ethics teaching. Sulmasy et al²³ in a series of studies on US house officers in Maryland argue that having an effective ethics curriculum in place could be a good explanation of a correlation between knowledge and confidence — the maturation effect. This claim is supported by a 2007 study by Cordingley et al²⁵ which found that that confidence decreases in later years in clinical settings where doubts and dilemmas are not clarified or addressed. It remains a question for future longitudinal research whether this effect will be seen in later years.

Conclusions

In summary, the intervention has provided a means of systematically evaluating the impact of a new integrated medical ethics curriculum on ethical development, highlighting specific attitudinal changes with respect to ethics, professionalism, law and educational practice that call for further investigation. In addition, critically important questions about how various dimensions of ethical development (knowledge, ethical awareness and confidence) might be integrated to fully achieve programme outcomes have arisen, which set a new and exciting agenda for future research in medical education.

Limitations of the Study

This study measures only effects of ethics education on student's knowledge, confidence and opinions in their first year of undergraduate ethics training. Behavioural intentions and future actions of medical students are neither hypothesised nor measured. It was not possible to eliminate self-selection bias in this study which recruited participants from the cohort on a voluntary basis; we have assumed that students who volunteered did so for a diverse range of reasons and gave truthful reports.

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Appendix 1. Questionnaire Instrument

List of questions in survey (students respond by selecting from 5 options)

SECTION A: Opinion

1. In my opinion, ethics education for medical students is
 - A. A waste of time.
 - B. Important, but doesn't need formal teaching, since it can be acquired by working with senior doctors.
 - C. Important enough to be an elective aspect of training for medical students.
 - D. Important and should be a required part of the medical curriculum.
 - E. No opinion.

2. In my opinion, medical teachers from clinical disciplines
 - A. Need not be formally trained in medical ethics.
 - B. Should have some elective training in medical ethics, if possible.
 - C. Should be required to have some formal training in medical ethics.
 - D. Should be required to obtain a certified qualification in medical ethics.
 - E. No opinion.

3. In my opinion, it is ethically justifiable to lie to a patient about his/her clinical condition.
 - A. Never
 - B. Rarely
 - C. Often
 - D. Usually
 - E. No opinion

4. In my opinion, it is ethically justifiable to withhold from patients information about their clinical condition.
 - A. Never
 - B. Rarely
 - C. Often
 - D. Usually
 - E. No opinion

5. I believe it is morally justifiable to breach a patient's confidentiality:
 - i. Never.
 - ii. for purposes of public health reporting or in other circumstances where required by the law
 - iii. in some rare circumstances not specifically required by law but when doing so would prevent harm to innocent third parties
 - A. i only
 - B. ii only
 - C. ii and iii
 - D. iii only
 - E. No opinion

6. In a few weeks, anatomy classes will begin. Which of the following most nearly describes your main feelings regarding studying the human cadaver and being in the Anatomy Theatre?
- No particular feelings, seems no problem to me
 - Looking forward to it
 - Feel anxious, but confident that I can remain detached
 - Apprehension and uncertainty, don't know if I can cope
 - None of the above

Post-course version:

7. A doctor who is aware that he/she has a serious medical condition that may be transmitted to patients (e.g. tests positive for Hepatitis B or HIV).
- Should be legally prevented from continuing clinical practice.
 - Should be required to disclose this fact to patients under his/her care to obtain their consent to continue under his/her care.
 - Should be required only to disclose this fact to the Singapore Medical Council which has jurisdiction over a doctor's fitness to practice.
 - Should have the right to decide whether or not to continue clinical practice.
 - No opinion.
8. Under Singapore's Organ Transplant Registry Point allocation system, patients above 60 years of age are not eligible to receive kidney transplants. I believe this is:
- Completely justified because resources are limited.
 - Partially justified because resources are limited, but if more resources for kidney transplant became available, the elderly should be made eligible for kidney transplant.
 - Seriously questionable because one segment of society should not be singled out to be excluded from society's resources.
 - A moral outrage because the elderly deserve more, not less, of society's resources.
 - Don't know.
9. Active Euthanasia refers to directly and intentionally (i.e. actively) ending the life of ill or suffering persons ("mercy killing"), with or without consent. At present it is illegal in Singapore and in most other countries. In your personal opinion, should the law be changed?
- The law should not be changed
 - Provided valid consent or valid proxy consent are ensured, the law should be changed to allow doctors to actively end the life of persons who are in intolerable suffering (including infants)
 - Provided valid consent or valid proxy consent are ensured, the law should be changed to allow doctors to actively end the life of terminally ill persons (including infants or the permanently unconscious)
- i only
 - ii only
 - iii only
 - ii and iii
 - None of the above describes adequately my moral position.

10. The purchase and sale of human organs is presently illegal in Singapore (as in most other countries). What is your opinion about possible changes in the law?
- A. The law should remain the same.
 - B. Some incentives should be permitted by law, for example, payment of funeral expenses for cadaveric donation.
 - C. Legislation should be introduced to create a regulated market, in which exploitation of providers and recipients would be prevented.
 - D. The law should allow people to sell their organs if they wish.
 - E. None of the above.

SECTION B: Confidence (Students rate how confidently they feel about their abilities or knowledge: ‘Not confident at all’, ‘A little confident’, ‘Fairly Confident’, ‘Very Confident’ or ‘No opinion’)

- 11. Ability to recognize a significant ethical problem in clinical practice.
- 12. Ability to reach a sound decision when facing an ethical problem in clinical practice.
- 13. Ability to give reasons to your colleagues in support of your decision pertaining to matters of clinical ethics.
- 14. Knowing how to assess a patient’s capacity to make informed decisions about his/her health care.
- 15. Knowing how to proceed when a patient is mentally incompetent.
- 16. Ability to communicate bad news to a patient.

SECTION C: Knowledge

17. The ethical theory called “Utilitarianism” states that a decision is the morally right one if
- A. It follows the opinion of the majority in society
 - B. The net good of the most vulnerable members of society is maximized
 - C. The greatest good is achieved for the greatest number
 - D. The good of the decision maker is maximized
 - E. Don’t know
18. The religious belief of Jehovah’s Witnesses prohibits them from receiving blood transfusions. If an adult Jehovah’s Witness has a life-threatening bleed in which usual care would include transfusion, under Singapore law:
- A. In all circumstances, you may not transfuse the patient without his/her consent.
 - B. Because it is a life-threatening emergency, you may transfuse the patient if you feel it is medically necessary even if he/she objects.
 - C. You may transfuse the patient only if you obtain a court order allowing you to do so against the patient’s wishes.
 - D. Special consideration must be given to his/her religious beliefs in exercising clinical judgement.
 - E. Don’t know.

19. Which theory of justice below is attributed to Rawls?
- A. Justice as a virtue, along with wisdom, courage and temperance.
 - B. Justice as fairness.
 - C. Justice as fair equality of opportunity.
 - D. Justice as a balance between utility, individual liberty and responsibility of the individual towards society.
 - E. Don't know
20. In Singapore, a doctor may offer to a patient management plans or remedies not generally accepted by the profession
- A. Only in a formal and approved clinical trial.
 - B. In continuing care, where the doctor deems that the patient's best interests are being served.
 - C. Provided the patient has given valid informed consent.
 - D. In a critical care setting.
 - E. Don't know.
21. The Medical (Therapy, Education and Research) Act excludes which one of the following sources of bodies and parts of bodies for use in medical education and research?
- A. Unclaimed bodies from hospitals, nursing homes or other institutions maintained on public funds.
 - B. Donation by a competent person 18 years of age or above.
 - C. Donation by relatives or persons with obligations for disposal of the body of a deceased person.
 - D. Paid source.
 - E. Don't know.
22. Good practice guidelines in Singapore require that when a patient's relatives ask that the patient not be told that he/she has a fatal disease,
- A. a doctor must ignore the family's request and disclose the information to the patient at the first opportunity.
 - B. should address the family's concern sympathetically and adequately, but nonetheless must under all circumstances eventually disclose the diagnosis to the patient.
 - C. a doctor should recognize that when practicing medicine in an Asian context, the role of the family is paramount in such decisions and should not disclose the information to the patient.
 - D. a doctor may disclose the diagnosis to the patient only if he/she has determined that this would be in the patient's best interest .
 - E. Don't know.
23. Which one of the following statements about patients' capacity to make decisions is FALSE?
- A. Patients have varying levels of capacity to participate in decision making about their treatment.
 - B. A greater level of understanding and competence is required to refuse life-prolonging treatment than will be necessary to refuse a flu vaccination.
 - C. All patients suffering from psychiatric illness lack the capacity to make decisions about their treatment.
 - D. A patient lacks capacity when he/she cannot understand and retain information that is material to his/her treatment.
 - E. Don't know.

24. Which one of these statements contradicts Kant’s vision of deontological ethics?
- A. One should act to treat humanity as an end, never as a means only.
 - B. Some acts are intrinsically right and some are intrinsically wrong.
 - C. Acts should be judged right or wrong based on their consequences only.
 - D. Each person has duties to humanity.
 - E. Don’t know.
25. The Singapore Medical Council’s role is, among other things:
- A. To empower the Coroner’s court to set up the Medical registry, the Specialists registry and the compulsory Continuing Medical Education programme.
 - B. To serve as the public’s guardian of places of practice for doctors.
 - C. To ensure that doctors are mentally and physically fit to practice.
 - D. To ensure that doctors practice competently and ethically according to standards defined in the Private Hospitals and Medical Clinics Act.
 - E. Don’t know.
26. An elderly woman in a nursing home has had advanced dementia, severe difficulty in feeding and significant weight loss over the past 2 months. Her four children are divided regarding the decision to provide artificial feeding through a tube. There is no living will. The eldest son approaches the physician after a family meeting and says, “You should simply decide what is best for her and tell the others that’s what we should do.” Assuming the physician proceeds in this manner, which of the following best describes the physician’s action?
- A. Protecting patient autonomy.
 - B. Preserving fairness in use of resources.
 - C. Paternalism.
 - D. Truth-telling.
 - E. Don’t know.
-