



Research Paper

Development of a public health curriculum based on forensic pathology

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ABSTRACT

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Increase of health awareness is vital for the prevention of occurrences of illness and injury, one of the major tasks in public health. To improve public health awareness, corresponding education programs are necessary. We developed an optional curriculum for non-medical and multi-professional undergraduates in 2018, aiming to teach risk prevention from the forensic perspective. This study introduces the development of a public health curriculum based on forensic pathology, including the pedagogical approach, course contents, evaluation technique and lessons learned from the teaching process.

Key words: Forensic pathology, public health, course construction.

INTRODUCTION

The primary prevention of undesired health outcomes in public health is the prevention of occurrences of illness and injury, by preventing exposure to risk factors (Schneider, 2016). The shortage of health and safety knowledge and awareness, prevalent in public, is responsible for lots of tragedy occurrences, resulting in crippling or fatal consequences. Mahawar et al. (2013) conducted a survey enrolling 159 students within the age range of 16 to 18 years old, and found that only 54% students had knowledge about basic traffic rules. After an education intervention to improve awareness on road safety, the rate increased up to 82.2%. Jevšnik et al. (2008) showed that there were some gaps in food safety knowledge and practices that occurred from shopping to eating, suggesting the need for consumer education regarding safe food handling practices. In a study evaluating Chinese women's awareness of cardiovascular disease, the results showed that cardiovascular disease had become the main killer of Chinese women but preventive and educational programs have not kept pace with this growth (Cao et al., 2008). Besides the examples above, plenty of risk factors, usually neglected, are filled in daily life, such as dietary alcohol, smoking and violation of safety codes. With the improvement of health and safety consciousness, most of risk factors are preventable.

Forensic pathology applies the principle and knowledge of medical sciences to legal issues. One of the main tasks in forensic pathology is to determine the cause of death,

usually falling into 2 categories: injury and disease. Dealt with loads of forensic examinations, appraisers realize that certain deaths can be easily avoided by averting the risk factors of injury and disease. For example, staying inside during the thunderstorm and not touching appliances with wet hands will reduce the risk of electric injury; controlling the salt intake (He et al., 2011) and moderate exercises (Pescatello et al., 2004) benefit the blood pressure, lowering the morbidity of cardiovascular diseases. Conventional forensic practice and education were focused on determining the cause of death. At present, we stress the enormous potential for them to raise the public knowledge and awareness of health and safety by constructing a curriculum about risk prevention.

This study describes the development of the curriculum, named "*Analysis of forensic pathology cases*".

Basic information

As an optional course of 36 credit hours, the curriculum was taken by undergraduates from all professions in our school, most of whom were non-medical students. In 2018, there were 2 classes separately settled in 2 campuses of our school, accommodating 400 students in total.

Given that the course size was great, it was critical to form a teaching team to ensure the educational activities

proceeding. The team consisted of 7 instructors and 8 teaching assistants. While the instructors were in charge of the session contents and lectures, the teaching assistants handled the routine curriculum affairs, including schedule planning, assignments evaluation, feedbacks amassing and teaching materials organizing.

Considering the possible public misunderstanding of forensic pathology, the original curriculum goal was to lead students to see the real-world forensic work. Currently, people have easy access to the knowledge needed when involved in medicolegal expertise, such as procedures of applying for appraisal, attributed to advanced communication and information technology. It seems that investing so many resources in introducing "matters needing attention" and satisfying the curiosity is not cost-effective. Recognizing the importance of public health education, the teaching team reviewed the contents of forensic pathology, selected the most closely linked part to public health, namely cause of death and risk factors of injury and disease, and finalized the curriculum objective: to increase students' health and safety awareness, teach them to recognize and mitigate risks.

Pedagogical approach

Case-based learning is a learning and teaching approach aiming at preparing students for actual practice (Thistlethwaite et al., 2012), by integrating the knowledge points into specific cases. The main reason for our adoption of this approach was its ability to reproduce the scenes of cases. Besides, the benefits of case-based learning such as development of students' motivation (Williams, 2005) were also valued by the teaching team. Certain researches demonstrated students undergoing case-based learning exhibited a greater learning gain and the use of higher-order thinking skills. The concrete methods of case-based learning have been described substantially, the most common of which was group discussion (Thistlethwaite et al., 2012), and some curriculum required students to preview cases before the whole class discussion (Bowe et al., 2009).

In our curriculum, case-based learning in each session was performed as follows: 1) Students reviewed the case by groups in advance; 2) Volunteers from each group represented their points during whole class discussion; 3) Instructors summarized and broadened relative topics.

Curriculum contents

Contents arrangements: Originated from ordinary cases, 5 themes were selected and processed for specific sessions respectively (Table 1). Principles were abided during selection: 1) Close to life: On account of the curricula objectives and targeted multi-professional students, the

teaching team filtered themes relative to daily behaviour and circumstance, dangers in which might be confronted by all and sundry; 2) Able to be prevented: Students could reduce risks to low level using knowledge learnt from the curriculum, with increases of health and safety awareness.

An example of curriculum sessions: Two cases from the appraisal records were prepared, causes of death in which were domestic electricity and lighting, respectively. At the beginning of curriculum, students of each class were divided into 20 groups, each comprising 10 undergraduates. Half of the groups received the domestic electricity case before the whole class discussion, the others received the lighting case. Except for the appraisal conclusion, the details of case, forensic examination results and all information needed for finding out the cause of death were provided for students. As at the time of class discussion, each group was supposed to draw a conclusion about the cause, analyze the risks from multiple angles and propose the possible prevention methods for the tragedy. During the discussion, voluntary students from each group demonstrated their results of teamwork and replied to questions from other students. Thereafter, instructor held a lecture commenting students' opinions, highlighting the novel thoughts and replenishing the missing points. Instructor also broadened the knowledge about electricity, such as characteristics of electricity and mechanisms of electric death.

Evaluation and sustainability

Learning objectives: Pretest and posttest were prepared to assess students' health awareness and knowledge gains. The teaching team designed 2 examinations different in specific items, but based on the same knowledge points. Students were demanded to take the exam at the beginning and the end of the curriculum. By analyzing the test marks, the team had an objective assessment for the educational effectiveness.

Students' perception and satisfaction: A five-point Likert scale was applied to measure students' perception and satisfaction about the curriculum. The questionnaires were administrated to undergraduates for twice, once at the mid semester, again following the posttest.

Team meeting: Three (3) teaching meetings were arranged. The first one was held before the curriculum began, to develop a teaching plan for the whole semester. At the mid semester, the second meeting concentrated on the conduct of the curriculum and the results of the mid-term questionnaire, guiding adjustments to the next half of the course. The teaching team held the final meeting after the final exam and questionnaire, to evaluate the teaching results and summarize lessons, putting forward suggestions

Table 1: Course contents for "analysis of forensic pathology cases".

Theme	Session contents
Introduction	Curriculum objectives; Course schedule; Pedagogical approach and concrete method.
General theory of death	Types of death; Indications of death; Manner of death.
Sudden death from natural causes	Coronary atherosclerosis; Pulmonary thromboembolism; Risk factors and prevention methods of diseases; Sudden death involving other system.
Transportation injuries	Injuries to motorcyclists and pedal cyclists; Injuries to pedestrians; Injuries to vehicle driver and passengers; Risk factors and prevention methods of injuries; Less common injuries involving other transport.
Complications of injury	Infection; Hemorrhage; Risk factors and prevention methods of complications; Other complications of injury.
Electrical trauma	Death from domestic electricity; Death from lighting; Risk factors and prevention methods of electric trauma.
Thermal injury	Scald; Burn; Risk factors and prevention methods of thermal injury.

for the next semester.

Lessons learned

Health and safety awareness: It is inspiring to see students' health consciousness elevation and passions about the curriculum through their test results and questionnaires. Though there is always room to improve, at least the curriculum has proven to be able to awaken the public health to some extent, making the teaching team confident in developing and perfecting a public health curriculum based on forensic pathology.

Curriculum capacity: Students reflected it was difficult to become a member of this course due to the imbalance between supply and demand, though 2 classes accommodating a total of 400 students had been settled. On the one hand, we felt students' great interests, important for effective study, in health and forensic science. On the other hand, we rethought whether the curriculum capacity

was reasonable or not. Under the premise of no weak of the teaching effect, efforts can be done on a larger class (e.g., optimized team division).

Pedagogical approach: Despite students shown their fondness for case-based learning, it was still uncertain whether this approach was better as compared with others, such as traditional didactic teaching. Given the 2 classes settled, 2 pedagogical approaches can be applied at the same time. At the end of the semester, we can pick the better approach for this curriculum by analyzing the students' feedback and their exam performance. Considering an annual curriculum with 2 classes, several studies can be conduct on the pedagogical approach comparison for the best one.

Students' acceptance: To explain cases clearly, the teaching materials adopted images about autopsy and scene investigation. Some students expressed discomforts about certain bloody and horrifying images, and also concerns about the privacy of the victims. In targeting non-medical

students, and focusing on improvement of public health awareness rather than fostering forensic experts, the curriculum does not need to display intuitive images, bloody, which can be processed into other forms, such as cartoon.

Conclusions

In conclusion, we regard this curriculum as a powerful method to awaken public health and safety consciousness, especially in student group. With continuous improvement, this mode can be promoted to other forensic disciplines, such as forensic toxicology and forensic psychiatry, even transformed into an open online course, achieving the education value maximization of public health in forensic science.

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