

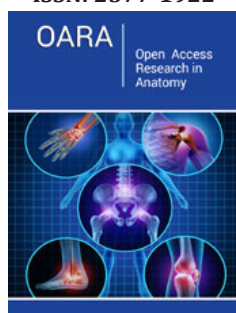
The New Norm of Anatomy Education to Medical Students amidst COVID-19

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Abstract

Background: Anatomy is the core knowledge of the preclinical curriculum for the training of medical professionals. The school provides didactic pedagogy, including lectures, cadaveric dissections and plastinated specimen examinations. Due to the COVID-19 pandemic, many face-to-face teaching activities have been suspended in sudden, commencing early in 2020. It is a new normal response by substituting the synchronous and asynchronous teaching and learning formats to comply with the social distancing measures. There has been a pressing need to review eLearning tools' potential in anatomy education. This study investigates the sudden shift in anatomy learning methods both physical and remote contact during such a new norm situation among medical students to evaluate and understand how technology could facilitate anatomy education along with traditional practices.

Methodology and results: The school held a 2-day dissection workshop to accommodate eighty medical year 2 students. At the same time, the positive cases of COVID-19 infection were dropped to the single-digit at the end of June 2020. An anonymous e-survey has been distributed to participants using e-learning tools for anatomy learning and doing the dissection. The 5-Likert scale was adopted in the questionnaire. Concerning the workshop, there have been positive responses regarding whether medical students think dissection facilitates their understanding of Anatomy, as 74.2% of participants "Strongly agreed" and 25.8% "Agreed" with the statement. Regarding how the medical students learn Anatomy without Dissections during the second term, 90.3% reported that they had used "textbook". In comparison, 80.6% said that they have utilized "the eLearning set up by the teachers". "eLearning from the library" comprises 16.2% and those who studied with "lecture notes only" account for 45.2%. On the other hand, 80.6% reported using "the source from the senior peers" to aid their anatomy learning, and 6.5% indicated "others".

Discussion and conclusion: The new norm changes the pedagogical pattern of anatomy education of medical training in Hong Kong. In the study, the dominant agreed that dissection lessons provide an indispensable platform for equipping students with medical knowledge and humanistic values to become compassionate medical practitioners. Research data has also shown that the shift changes to a student-centred approach. Besides reading textbooks, educators customised eLearning in anatomy education to facilitate and enhance students' learning engagement. Benefits of eLearning include flexibility in study schedules and collaborative learning to achieve better educational outcomes and professional development. In addition, multimedia applications employed in online anatomy education would deliver standardised training and provide students with interactive and convenient learning platforms, regardless of their location and time arrangements. To conclude, cadaveric dissection remains a centerpiece in medical education and eLearning serves as a complement to the regular classes for fulfilling the learning objectives when the COVID-19 pandemic relief.

Keywords: COVID-19; New norm; Remote teaching, Anatomy teaching, Dissection, eLearning

Introduction

Aristotle, the Greek philosopher, said, "Man is by nature a social animal"[1]. we enjoy interacting with others face to face. Traditionally, didactic pedagogy in classroom format is the face-to-face generic delivery in higher education. The teacher can easily communicate with students with body language and voice during class to foster and enrich their understanding [2,3]. Since late December 2019, the World Health Organisation (WHO) named the highly infectious respiratory disease caused by the virus of SARS-CoV-2 as Coronavirus Disease 2019

(Covid-19) [4]. Due to the COVID-19 pandemic, most countries are under travel restrictions and a 'catch and isolate approach' to reduce transmission (Watkins, 2020). We have to keep our social distancing restrictions from each other to prevent the spreading the virus. However, the global pandemic of COVID-19 has led to the closure of nearly all the universities in the world, disrupting the face-to-face teaching and learning in tertiary institutions starting from late January 2020. The rapid technological development makes cyberlearning promising, especially for course teaching and management of the new norm [5]. The Covid-19 pandemic changed the new norm in the preclinical curriculum of the medical training. Due to zero COVID-19 tactics in Hong Kong [6], many teaching activities have been transformed from face-to-face to remote teaching to comply with social distancing measures. Anatomy education has seen significant changes under such panic-driven efforts. In this context, it is one of the core medical sciences knowledge that health professional students can understand the relationship between the structures and functions of different systems in the human body [7]. With the silent teacher donation programme, the cadaveric dissection practical provides an opportunity to well-equip of medical training [8]. However, the COVID halts lectures and dissection for medical students, converting all studies remotely [9]. Students have utilized technological elements of e-learning tools, such as augmented reality and virtual reality, and have exhibited promising prospects in complementing students' learning in anatomy and traditional practices. Concerning the hands-on experiences acquiring the anatomy knowledge in the preclinical curriculum, cadaveric dissection practical's have been arranged for the junior medical students during the lockdown relief in 2020 summer. There are documents to discuss the impact of the COVID-19 on anatomy education globally [10-12], but the student

perceptions in learning have yet been incompletely evaluated in Hong Kong. According to Bloom's taxonomy [13], students may cognitively grasp a better understanding of the three-dimensional human structures during the practical's and their correlations with functions while reflecting on the humanistic aspect of medicine, including end-of-life care. The anatomy educators may doubt the potential dissection disruption for the future clerkship training [14]. In this article, the authors investigated the perspective and challenges of anatomy learning under the impact of the Covid-19 pandemic. Moreover, it can be explored if the potential of technology innovations in eLearning enhances anatomy education. This paper aims to review the different learning methods reported, from traditional to innovative, to discuss the future of anatomy education.

Materials and Methods

Participants and data collection

With the ethnic approval, the scope of the study is medical students from the Chinese University of Hong Kong. From early January to mid-April, dissection classes were cancelled in the second term to delay the COVID 19 further outbreak in 2020. Most of the teaching activities were conducted remoted via Zoom Conferencing system instead of face-to-face teaching mode. The School of Biomedical Sciences held a 2-day dissection workshop to accommodate eighty medical Year 2 students while relaxing the social distancing measures in the summer as the confirmed cases of COVID-19 infection were dropped to the single-digit at the end of June 2020. An anonymous e-survey has been distributed to participants to compare using e-learning tools for anatomy learning and doing the dissection. The 5-Likert scale was adopted in the questionnaire.

Results

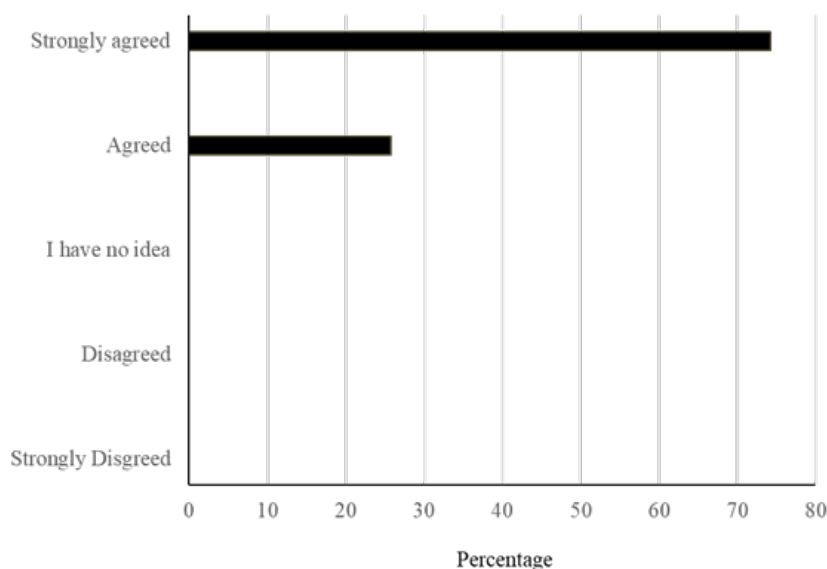


Figure 1: Shows the participants' responses to the question, "Do you think dissection practical facilitates your understanding of Anatomy?".

Concerning the workshop, there have been positive responses regarding whether medical students think dissection facilitates their understanding of Anatomy, as 74.2% of participants “Strongly agreed” and 25.8% “Agreed” with the statement shown in Figure 1. Figure 1 shows the participants’ responses to the question, “Do you think dissection practical facilitates your understanding of Anatomy?”. With regards to how the medical students learn Anatomy without Dissection during the second term, 90.3% reported that they have used “textbook”. In comparison, 80.6% said they have utilized “the eLearning set up by the teachers”. “eLearning from the library” comprises 16.2%, and those who

studied with “lecture notes” account for 45.2%. On the other hand, 80.6% reported using “Source from the senior peers” to aid their anatomy learning, and 6.5% indicated “others”. The highest rank of popular study resources is still the textbook, as indicated in Table 1. The perceptions after joining the workshop are abstracted from some of the participants as below. They felt satisfied with their experiential learning environment, even though they just had a two-day training. From the comments, they showed more empathy from the silent teachers during the dissection, which was more than their expectation (Table 2).

Table 1: Summarizes the participants’ preferences in choosing the study resources without hands-on cadaveric dissections.

Study Resource	Responses (Percentage)	Rank
Textbook	90.3	1
eLearning set up by the teachers	80.6	2
Source from the senior peers	80.6	2
Lecture notes	45.2	3
eLearning from the library	16.2	4
Others	6.50%	5

Table 2: Perceptions after joining the workshop are abstracted from some of the participants.

Participant 1	The teachers were helpful and provided useful guidance for us during the workshop. The smaller dissection groups granted us more opportunities to do dissection and have a closer look at the structures.
Participant 2	Challenging and exhausting but very meaningful. I have acquired many dissection skills and consolidated my anatomical knowledge.
Participant 3	This workshop is excellent because it compensates for the cancelled dissection classes in Term 2. With fewer students, teachers have paid more attention to each group. In addition, their clear elaboration has helped me to understand the anatomical variations and differences, which are seldom seen in textbooks and lecture notes. Moreover, by allowing us to dissect the silent teachers, the workshop has helped me to understand standard textbook figures better. The overall experience is very good.
Participant 4	It gave me the opportunity to revisit the topics in year 2. Facts could be found in lecture notes and textbooks, but dissection allows me to feel how deep or superficial are the structures.
Participant 5	It was great. I learned more about the anatomy of upper and lower limbs and observed the variations in our silent teacher. Lecturers were also patient in helping us and explaining to us. It was very helpful to understand the human structure and organ arrangements.
Participant 6	It was an excellent experience! I was so sad when dissections were cancelled due to COVID-19 as they are precious opportunities. Moreover, as there were fewer students at each table and I had more understanding of the topics after the exam, I got to be more involved in the dissection process and learnt much more skills even when compared to the whole year of dissection lessons. Huge thanks to all the professors/ staff who organised this extra workshop for us even after the school year ended.
Participant 7	It was great! It really enhanced my dissection skills. I loved the experience!!!
Participant 8	Great hands-on experience learning more about different dissection techniques and exploring anatomical structures. Thank you, professors, for their invaluable guidance throughout the workshop! :)

Discussion

It is widely accepted that the human cadaveric dissection process helps students understand the 3D relationships among anatomical structures and reinforces the contents of textbooks and lectures (Aziz et al., 2002; Ghosh, 2016; McLachlan, Bligh, Bradley, & Searle, 2004; Moore, 1998). Under the social distancing restrictions and the class suspension policy in Hong Kong, there is an argument that the traditional cadaveric dissection should not be regarded as a golden standard in anatomy education [10]. The school is ever more challenging to hold cadaveric dissection practical because of COVID-19, as it is nearly impossible for

students to engage in social distancing in that context. Amidst the pandemic, anatomy educators require alternative teaching and learning pedagogical strategies. Most studies have compared one or two newly-developed methods to traditional education, revealing their pros and cons, including the number of students and educators, available specimens, the modalities, spaces, classrooms, and even access to the internet [15]. Therefore, educators should be prepared to use all innovative methods for the sudden highly infectious disease outbreak [16]. In light of the situation, there have been strenuous efforts to explore the potential of eLearning in complementing the traditional approach to medical education.

More than 80.6% of participants reported using “the eLearning set up by the teachers” in the study, and over 16.2% utilized “eLearning from the library”. Interesting, they like to acquire the keynotes of knowledge and hints of examination from their senior peers, which is the rank 2 of their preferences during the irregular arrangement in study strategies. It reflects that near-peer experiences can also deepen their learning approaches [17,18]. Research has shown that eLearning, which is based on the learner-centred approach, would be able to customise anatomy education to accommodate students’ learning pace. Educators’ roles would evolve to become facilitators to enhance students’ learning [19,20]. Benefits of eLearning include flexibility in study schedules and collaborative learning to achieve better educational outcomes and professional development [21]. In addition, multimedia applications employed in online anatomy education would deliver standardised training and provide students with interactive and convenient learning platforms, regardless of their location and time arrangements [22,23]. From the comments after the workshop of the study, all the participants still agreed that other eLearning resources could not substitute the experiential experiences of the dissection. Regarding the medical training in Hong Kong, the traditional cadaveric dissection remains a centerpiece component in the preclinical curriculum, and eLearning tools complement the regular classes for fulfilling the learning objectives [19,24]. From the data analysis, those who strongly agreed and agreed that dissection facilitates their understanding of anatomy account for 74.2% and 25.8%, respectively. Dissection lessons provide an indispensable platform for equipping students with medical knowledge and humanistic values to become compassionate medical practitioners in the future [25].

Through anatomy, medical students could better understand the three-dimensional human structures and their correlations with functions while reflecting on the humanistic aspect of medicine, including end-of-life care [26,27]. Importantly, students can learn empathy and respect from the silent teachers who contributed their bodies to the medical training (Hildebrandt [27]). After class, students could continue to review what they have learnt in dissection lessons with e-learning simulation technology. The augmented reality and virtual reality applications would provide an interactive interface for students to consolidate their three-dimensional knowledge of different anatomical structures with clinical significance [28,29]. eLearning has emerged as an integral part of medical school training [30]. Initially, the tailor-made eLearning tools set up by anatomy teachers are for the students’ self-directed revision after the lectures. Under COVID-19, anatomy education has mostly been transformed from the face-to-face format to the online mode. eLearning has substantial potential in facilitating medical education in terms of applying and integrating scientific knowledge as well as contextualizing anatomical structures [31]. According to the data analysis, the tailor-made eLearning tools, which are one of the highest students’ preferences, for example, micromodules or interactive 3D structures eLearning platform, integrate into intrinsic constitutions for continuing

anatomy education [30]. Nonetheless, dissection remains an essential element in anatomy education since it enables medical students to grasp better three-dimensional knowledge of human structures [32]. Most importantly, it equips students with the appreciation of humanity in medicine [26].

Conclusion

The study has examined how students have adapted their anatomy learning from physical to online form during COVID-19. Students could reap considerable benefits from eLearning in anatomy, knowledge acquisition and personalization of learning experiences. Nevertheless, traditional dissection lessons remain an indispensable part of medical education for equipping students with the essential techniques and virtues to be compassionate doctors in the future. Therefore, dissection lessons and e-learning platforms shall complement each other to deliver the optimal learning experiences in anatomy for medical students.

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Disclosure

Ethical approval: Ethical approval has been obtained from the institutional review board for research involving human subjects.

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