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Short Communication

Managing Emotions in the Face of Death: Human Cadavers, Emotions and Anatomy Education in Medical Trainees

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Anatomy has been an essential component of health professions education for hundreds of years. The study of anatomy supports the development and retention of clinical knowledge and skills [1-3], and is a critical aspect of safe medical practice [4]. Throughout medical institutions, there are various techniques used to teach students human anatomy and physiology, ranging from traditional methods of dissection and prosection to more modern methods of plastic anatomical models, medical imaging, and e-learning. And while the best method to teach anatomy is debated within the literature, the use of cadavers, whether through active dissection or by examination of prosected specimens, is still viewed as a favorable teaching modality to fulfil anatomical learning outcomes [5-6]. Proponents argue that having a cadaveric component enhances learning as it provides visual and tactile experiences of anatomical structures, exposes students to anatomical variability in human morphology, and introduces the concept of dissection prior to their exposure during their surgical rotations [7].

Another unique feature of using cadaveric models to teach anatomy relative to more modern teaching modalities (e.g., 3D plastic models, medical imaging) is the emotional responses of students to human anatomy cadavers. Working with human cadavers, whether through dissection or examination of prosected specimens, can result in a range of emotional reactions in some students [8-10]. Studies conducted across different healthcare trainees describe a variety of negative affective reactions in response to cadaveric specimens, including anxiety, fear, disgust and distress [8-10]. For example, in a German medical school, Bernhardt et al. [11] reported that over a third of students felt anxious prior to their first anatomy lab. In the UK, Snelling and colleagues [12] found that 7% of first year medical students experienced recurring images of cadavers post dissection. A seminal study on American medical students' anatomy room experience reported that 5% of students suffer from symptoms suggestive of Post-Traumatic Stress Disorders (PTSD), such as nightmares, intrusive images and learning impairment [10].

Intrusive symptoms such as recurring visual images of cadavers have been reported more recently in a study of first year medical students in Jordan, with 28.9% of students reporting recurring images of the cadavers, and 19.3% experiencing heart palpitations [9]. And while the prevalence of negative emotional reactions has been well documented, it is important to acknowledge that other studies report positive emotions associated with their first cadaver experience, such as interest, excitement, curiosity and appreciation [13,14]. Together, such studies demonstrate the variability in emotional responses to cadavers in the context of anatomy education. That being said, such emotional reactions to cadavers tend to dissipate over time. For example, studies have shown that levels of anxiety and stress decrease with repeated exposures to cadaveric anatomy lab [11,15]. However, a recent study found that not all students experience such a decrease in emotional responses to cadavers. Wisenden and colleagues [15] found that while most students experienced some level of anxiety during their first exposure to cadaver dissection, those who self-identified non-Caucasian, non-Christian experienced sustained anxiety throughout the semester. Such findings indicate that some students may experience pervasive emotional responses to cadavers during their medical training.

While emotional responses have been well documented in anatomical dissection learning environments, little research has examined when and how emotions influence learning and practice within anatomy lab settings. Such research may be particularly important for trainees who experience emotions that do not dissipate over time and exposure to cadavers. Within educational and cognitive psychology, research has demonstrated that emotions are deeply interconnected with how individuals learn and perform in academic settings. Emotions impact not only what students are motivated to learn, but also how they learn [16]. Emotions influence how individuals encode, retrieve, interpret, and respond to information available in learning and practice situations in a variety of ways [17-19]. Within medical education research, both positive and negative emotions have been shown to play a role in learning and education [20-23]. For example, Fraser et al. [21] found that when teaching medical students using a mannequin that subsequently "died," trainees reported more negative emotions (upset, sad, depressed, and nervous) and received lower scores when presented with a similar simulated case three months later,

relative to trainees whose mannequin "survived" the simulation. More recently, McConnell et al. [23] examined the influence of positive and negative emotions on the acquisition of knowledge of basic physiology laws in novice learners. The authors found that individuals induced to experience either positive or negative emotional states performed significantly worse on both immediate and delayed (e.g. 1 week later) knowledge tests relative to individuals in the neutral emotion condition. Taken together, such findings suggest that emotions experienced at the time of learning can have a measurable influence on knowledge acquisition and subsequent retention.

In addition to influencing cognitive processes, emotions can also impact students' learning and performance by inducing and sustaining interest in learning material [24,25]. Positive emotions in academic settings, such as enjoyment and interest, can enhance motivation and lead to greater engagement in learning activities; conversely, negative emotions, such a hopelessness and boredom, can have detrimental effects on motivation [26]. Research indicates that interest-based learning has many benefits, including promotion of self-regulated learning and enhanced learning outcomes [25].

With the current understanding that the cadaveric anatomy labs can elicit a variety of positive (e.g., interest, excitement) and negative (e.g., anxiety, fear) emotions on medical students, it is worthwhile for anatomy educators to consider the potential influence of such emotional responses on students' learning of anatomy, particularly for individuals whose emotional responses do not dissipate through exposure to cadavers [15]. One strategy described in the literature for reducing cadaver-related emotions involves orientation sessions prior to formal anatomy lessons. Bati et al. [26] suggests that such preparatory sessions can help prepare students emotionally for their first encounter with cadaver dissections, which could thereby ameliorate the potential impact of emotions on students' acquisition of anatomical knowledge.

It should be noted that emotional responses to cadavers are not bad, per se (excluding maladaptive pathologies such as PTSD). Emotions are omnipresent in medicine, and learning to detect, understand, and manage emotions in oneself and others is an important skill for future healthcare providers to develop [27]. Cadaveric dissections and prosections provide opportunities to learn not only about anatomy, but also learn how to identify and manage one's emotions. In a recent editorial in Anatomical Sciences Education, Evans et al. [28] argue that the early placement of anatomy in healthcare curricula positions anatomy to provide initial development of not only knowledge-based competencies, but also human skills such as empathy, resilience, and emotional intelligence. This sentiment echoes previous work by Arráez-Aybar and colleagues [29], who conclude that "the practice of dissection allows the student to learn how to face up to and adapt his or her emotional attitudes and reactions; this gives human cadaver dissection great importance as an educational strategy and as a professional training tool in both technical and emotional skills training".

To conclude, emotions are deeply interconnected with how individuals learn and perform in academic and clinical settings. Cadaveric dissection is saturated with emotional experiences, and as such, understanding the role emotions play in learning anatomy and applying such knowledge to clinical contexts has important implications for anatomical educators. Researchers need to examine emotions within anatomy education settings to understand a number of issues ranging from fundamental learning processes through resilience in medical training and beyond.

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