

Effects of Covid-19: The Need to Assess the Real Value of Anatomy Education

Anatomy educators are focused on designing and developing learning and teaching approaches that provide for the most effective learning experience, lead to measurable learning gain and prepare students for the next phase of their learning journey and career track. The eagerness of educators to evaluate and challenge approaches and pedagogy has seen an exponential increase in scholarship within anatomical education over recent years as demonstrated by the number and quality of published articles across many educational journals including *Anatomical Sciences Education*. Such activity bodes well for the provision of effective learning opportunities for students, the continued advancement of evidence-based practice in the teaching of the anatomical sciences, and the ability to adapt and respond to disruptions within the higher education environment. This latter point has never been more evident than during the Covid-19 pandemic, where committed educators have quickly adapted their typical learning and teaching approaches to accommodate restrictions on facilities and face-to-face opportunities and offer an effective remote learning approach (Evans et al., 2020; Longhurst et al., 2020; Pather et al., 2020). Despite the rapid nature of the change, early evaluation of the adaptations and innovations in learning provision looks promising and suggests that a number of the approaches tried have had degrees of success, although feedback from staff and students has been mixed (Franchi, 2020; Singal et al., 2020; Srinivasan, 2020; Smith and Pawlina, 2021; Yoo et al., 2021).

It is, however, important that the outcomes of evaluation must be viewed within the context of Covid-19. Negative perceptions, for example, are not confined to medical or anatomy education; the recent survey of currently enrolled undergraduate college students in the United States (US), revealed that nearly half of them (49%) think that Covid-19 will negatively impact their ability to complete their degrees or credentials (Marken, 2020). The positive feedback that some students have expressed in recent course evaluations might only be transient and really a demonstration of their tolerance of the situation, recognizing the strains their educators have been under to make such rapid changes. There are various published reports of students and their families from different programs and in different countries demanding tuition fee refunds and reductions as they feel that what has been offered is not value for money or not providing the learning experience they had expected (Chung, 2020; Dickler, 2020; Hubler, 2020; Turner and Rowan, 2020). However, the cost of education (the amount

of money the institution spends providing the education product or instruction) during the Covid-19 pandemic has actually increased (Massa, 2020). This increase is related to purchasing new and updating old technology platforms for remote learning, increased online instructional support, and high cost of updating and maintaining Covid-19 safety environment on their campuses (Massa, 2020).

In some countries, such as the US, this discussion entered into legislative agendas. Several state legislators took an active role in addressing financial challenges of the student population. Bills were introduced and enacted to ensure students receive refunds of tuitions and fees, universities suspend collections of students' payments, financial agencies waive interest for state-run student loan programs, and universities refund charges made for room and board (Smalley, 2021). In addition, the US Government provided significant, although temporary, relief provisions for student loan borrowers that were incorporated into the Coronavirus Aid, Relief and Economic Security (CARES) Act and its extension, the Covid-19 Economic Relief Bill signed into the law on 27 December 2020 (NCSL, 2021a,b).

Some institutional leaders and decision makers may feel that the pivot to a remote learning approach during the pandemic has demonstrated that some traditional and frequently used face-to-face approaches may not be appropriate or needed in the future and that increased online provision will be the long-term replacement. For anatomy, there is danger that such a response is primarily linked to cost, with face-to-face learning activity, which is often cadaveric-based, perceived as too expensive and therefore a target when faced with compromised budgets, exacerbated by the pandemic. This is potentially further compounded by the fact that return to face-to-face learning activity in anatomy appears to be gradual and/or having to be conducted in smaller groups than usual. As such this requires further resourcing to take account of social distancing, additional health and safety requirements and repeated sessions/classes (Bond and Franchi, 2020; Ross et al., 2020; Cheng et al., 2021; Maloney et al., 2021).

The Covid-19 situation therefore clearly demonstrates the need to better understand the real value of the learning approaches employed within anatomical sciences education so that any debate on future provision, particularly post-pandemic is appropriately informed before decisions are made. Although, as already outlined, anatomy educators are increasingly engaged at assessing and evaluating the effectiveness of the learning provision, how many of those meaningfully consider financial cost as part of the value equation. For some such a proposition might be confronting, deemed inappropriate or seen as a threat reminiscent of previous cuts seen in anatomy teaching (Drake et al., 2009; Estai and Bunt, 2016). However, others will likely acknowledge the importance of providing a cost-effective approach to the design and delivery of learning and teaching and are conscious of limited

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resources within institutions, which are now being further constrained. In the past the question of financial cost within educational evaluative studies has been largely an implicit judgment factor due, in part, to the lack of appropriate data. However, this appears to be changing with growing literature in medical education focused on the financial value of teaching provision (Maloney et al., 2015; Tolsgaard and Cook, 2017; Foo et al., 2019; Maloney et al., 2019). By assessing the costs involved in delivering the curriculum does not automatically mean the need to remove or replace proven learning approaches and further reduce anatomy teaching, but instead provides for a more holistic picture on which to make appropriate evaluations and decisions. There is a danger that without the inclusion of economic evaluation, assumptions will continue to be made on the real development and delivery costs of teaching. This could perversely lead to the adoption of approaches that on the surface reach minimum quality effectiveness thresholds and are deemed “good value,” when in reality meaningful analysis might determine they are more expensive than other approaches shown to be more effective. Therefore, if good decision-making is to be empowered, all the relevant value information should be used in evaluating for future provision to maximize the value outcomes.

Outside medical education, the cost of education is not a novel concept. There are several studies that examined cost-effectiveness of online learning as compared to this associated with face-to-face instructions (Jung and Rha, 2000; Bartley and Golek, 2004). Within anatomical education, the question of cost and value is beginning to be investigated and discussed. This issue of *Anatomical Sciences Education* contains two articles that provide for insight, challenge and opportunity in the way we take account of the financial cost of teaching and what this might mean into the future for decision-making (Chumbley et al., 2021; Maloney et al., 2021). Chumbley et al. (2021), have undertaken a cost-analysis of six popular teaching approaches in anatomy and used this in conjunction with known educational effectiveness outcomes of each approach to provide estimations of educational value for learners. Computer-aided learning appeared to have the highest educational value in relation to financial cost for a given unit of effectiveness, whereas dissection appeared the lowest. Such a result may be unsurprising to some and something not to worry about, but to others it is potentially alarming with fears that this information provides ammunition to those wanting to remove cadaveric-based teaching. Instead, this type of analysis should be viewed as providing an essential baseline of information, which is further augmented by additional educational and logistical information. For instance, this might be by demonstrating that the tactile and physical experiences that characterize in-person anatomy learning activities, such as dissection, as well as the exposure to an array of discipline-based and nontraditional discipline-independent skills (NTDIS) cannot be currently replicated in an online environment (Evans et al., 2018; Kumar Ghosh and Ghosh, 2019; Evans et al., 2020). Therefore, the educational outcomes, if appropriately assessed, will help demonstrate increased educational value for dissection and better still, such information should be used as criteria within up-front cost-value analyses in the future. Likewise, if a different approach to teaching anatomy is being considered that does not enable students to develop these skills and attributes then this must be reflected in the analysis. The absence of these learning opportunities will likely diminish the potential

learning gain from the anatomy sessions and the need to provide the opportunities elsewhere within the curriculum simply means the financial implications will be shifted and not relieved.

These and other related themes are picked up in the viewpoint commentary by Maloney et al. (2021), where they highlight the potential application of the concepts of cost and value for anatomical sciences education with particular reference to the use of dissection. The authors use their commentary to explain the basis of cost-value research and to introduce the concept of cost-effectiveness planes which illustrate the integral interplay between effectiveness and cost value when it comes to making informed choices. They demonstrate that a range of factors need to be included in the analyses as many elements affect the cost-value estimate and thus any potential decision. This includes the influence of multiple learning outcomes, multi-modal approaches, shared resources, contributions to programmatic competencies, and different stakeholder perspectives and needs. They point out that using meaningful comparators within the analysis is essential. Overall Maloney et al. (2021) show the importance of delivering maximum value for a given spend and the crucial role that anatomy educators and researchers must play in the decision-making process.

In returning to the current challenge of deciding the post-pandemic approach to anatomy teaching and learning, it is therefore clear that a holistic value-based assessment will be required to best determine future provision. Several authors have reported the concern amongst some educators that the forced move to an online and/or remote delivery during Covid will become the default position for decision makers, especially in terms of cost, and that a meaningful return to face-to-face active learning anatomy sessions might be jeopardized (Evans et al., 2020; Pearson, 2020; Singal et al., 2020; Jones, 2021). If transition back to a predominantly face-to-face delivery using active learning approaches is to be championed, and after all students will return to campuses, educators will need to increasingly defend and justify the educational benefit, while taking into account cost-effectiveness. It is important to note that a return to face-to-face delivery should not suggest an easy opportunity to displace online and distance-learning completely or sideline it as a resource to only supplement learning. Educators must be objective and recognize that many adaptations and innovations to teaching and learning enabled as a result of the pandemic have been positive disruptors that have advanced the use of digital technologies, challenged more traditional approaches and demonstrated that learning anatomy can be achieved effectively in a variety of ways. Such developments need to continue to inform and stimulate changes in anatomical pedagogy, but more importantly where new approaches and resources have demonstrated positive learning outcomes, they should be maintained, adapted and used as collective parts of the future anatomy education delivery, promoting blended learning experiences that lead to enhanced gain and good use of the costs of development (Shah et al. 2020).

The work of Chumbley et al. (2021) and Maloney et al. (2021) provide an excellent basis for helping empower anatomy educators to assess and demonstrate the educational cost and value of learning and teaching provision enabling them to play an important and reliable role in future decision-making processes, where the emphasis on cost-effectiveness will only increase.

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