

Policy Document

Anatomy Curriculum and Body Donation (2022)



Position Statement

AMSA believes that:

1. Anatomy education is a vital and integral part of the medical school curriculum.
2. There is an imperative to develop a national standard for teaching, curriculum and assessment across all Australian medical schools for anatomy education.
3. Anatomy education for medical students should focus on clinical and practical applications that students will encounter in future practice.
4. Medical Schools should strive to deliver anatomy teaching through the gold-standard methods of dissection and prosection, while incorporating newer education modalities
5. Consistent wet laboratory and cadaver access must be guaranteed to medical students during their anatomy learning sessions as a pedagogical tool.
6. Universities, institutions, staff and medical students must follow ethical principles and acknowledge the sensitive nature of body donations. Due ethical course and respect should always be considered with use and attainment of cadaveric specimens, photographing and creating media of donated bodies.
7. Wider societal awareness of body donation for anatomical education should be increased through education.

Policy Points

AMSA calls upon:

- 1) Australian medical schools to:
 - a) Collaborate with the Australian Medical School Assessment Collaboration (AMSAC) to standardise the method of anatomy assessment, particularly for summative assessment;
 - b) Recognise the innate significance of a thorough and comprehensive anatomy curriculum as part of a well-balanced and complete medical degree;
 - c) Guarantee all medical students have access to a wet laboratory with regularly scheduled classes over the period of anatomy teaching that have sufficient numbers of tutors and/or guides;

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- d) Acknowledge wet laboratory access as the best mode of anatomical education and in its absence, include additional modalities of labs as part of a complete anatomy curricula including but not limited to:
 - i) Models;
 - ii) Plastinated specimens;
 - iii) Imaging;
 - iv) Illustrations;
- e) Focus curricula on clinically relevant anatomy in both teaching and assessment including using the Essential Core Anatomy Syllabus of the Generic Surgical Sciences Examination as a guide for necessary content;
- f) Integrate all summative anatomy assessments into clinical scenarios or into assessments of other disciplines;
- g) Use Multiple Choice Questions (MCQs) as the sole summative assessment item when testing students' ability to identify anatomical structures;
- h) Provide wet laboratory based spot-test assessment that are of either formative or non-mandatory pass summative status;
- i) Assure every medical student has access to expertly prosected cadaveric specimens and the ability to dissect cadavers;
- j) Establish that each medical student;
 - i) has the majority of their anatomy education delivered with cadaveric specimen exposure;
 - ii) Is taught the anatomical perspective of each body-system;
- k) Ensure that anatomy is vertically integrated where relevant into other parts of the medical curriculum, including but not limited to:
 - i) Case-based and/or problem-based learning tutorials;
 - ii) Clinical examination;
 - iii) Commonly seen medical imaging interpretation, such as ultrasound, x-rays, CT and MRI;
- l) Actively recruit Medical Doctors to;
 - i) Preferentially fill roles as anatomy tutors in clinical anatomy based roles, whilst still maintaining non-medical anatomical educators;
 - ii) Provide guidance in anatomy wet laboratory sessions with students;
- m) Actively seek regular feedback on the reception of anatomy teaching from students and educators, ensuring that anatomy content is monitored, evaluated and updated as needed;
- n) Acknowledge the difficulty some students face in wet laboratory environments and provide avenues of support and wellbeing;
- o) Deliver memorial ceremonies yearly for students undertaking anatomy classes with cadaveric specimens;
- p) Encourage students to consider donating their bodies to anatomical education

- q) Develop resources for medical students to understand the process and ethical implications of body donation for anatomy education;
- 2) Universities and Research Institutions to:
- a) Diversify the representations of human bodies (including but not limited to cadavers, life models, plastic models, illustration and technological aids) in regards to race, sex, gender, age and body habitus;
 - b) Increase teaching about the range of variations that exist in human anatomy;
 - c) Incorporate the use of neutral and inclusive language, including but not limited to removing eponyms and respecting the gender identity of cadavers
 - d) Invest into research and development consumer-grade technology to depict realistic 3D anatomical models as an adjunct to and not a replacement of traditional anatomy teaching methods;
 - e) Ensure that body donation to cadaver labs follow ethical and legal principles which respect the autonomy, privacy, rights and wishes of the donors and their families, even after they have passed away;
 - f) Develop ethical guidelines and standards that relate to developing multimedia resources around cadaveric specimens;
- 3) The Australian Medical Council (AMC) to;
- a) Develop criteria for anatomy curriculum for accreditation standards in collaboration with The Australian Medical Schools Assessment Collaboration (AMSAC) and the Australian Council for Educational Research (ACER) that includes:
 - i) A focus on clinically relevant anatomy in both teaching and assessment;
 - ii) MCQs used as the sole form of summative assessment for anatomy
- 4) Medical Student Societies and Specialty Interest Groups to;
- a) Develop feedback systems on anatomy education for students to contribute to;
 - b) Advocate on behalf of students' concerns towards anatomy curricula and the facilitation of medical teaching;
 - c) Work collaboratively with anatomy educators to provide elective and extracurricular activities in anatomy including but not limited to:
 - i) Peer-to-peer anatomy tutoring and education;
 - ii) Dissection opportunities;
 - iii) Surgical and medical imaging based clinical skills activities;
- 5) Medical Students to;

- a) Act ethically, respectfully, and with reverence in wet laboratory environments;
 - b) Provide feedback to anatomy staff and their medical schools on the delivery of anatomy;
- 6) The Australian Medical Students Association to;
- a) Advocate for a national standardised assessment criteria for anatomy curriculum;
 - b) Develop resources for medical students to understand the process and ethical implications of body donation for anatomy education;
- 7) The Royal Australasian College of Surgeons to;
- a) Implement Surgical Education and Training (SET) curriculum vitae points towards contributing to anatomy teaching in medical schools;
 - b) Champion for the Essential Core Anatomy Syllabus of the Generic Surgical Science Examination to provide a standard guide of anatomy taught at Medical Schools;
- 8) The Australian Commonwealth Government to;
- a) Undertake public campaigning about the benefits of body donation for anatomy education, ensuring that the respect and wishes of the donor will be maintained while the donor's body is at the university or institution.

Background

Pedagogy of Anatomy Curricula

Anatomy education for primary medical education was reformed in the 1990s to introduce a vertically integrated and problem-based curriculum design, after a long history of separating science-based and clinical subjects into distinct stand-alone subjects [1, 2]. This reform is supported by research that suggests integrated, problem-based learning is the educational gold standard, however, the following years resulted in a dramatic decline in anatomy teaching hours due in part to increasing non-anatomical content load, and concerns that students have been graduating with insufficient anatomical knowledge to enable safe medical practice [2]. Modern medical systems describe the anatomical knowledge of junior doctors to be 'seriously lacking' [3], and though there is a need for empirical data to validate this claim [4], similar concerns for current Australian graduate outcomes are reflected in numerous studies reporting the opinions of anatomists, students and doctors [1-3].

Australian primary medical education programmes are consistently reviewed and restructured by their individual institutions to ensure educational standards are met, as set by the Australian Medical Council (AMC) [5]. However, the AMC does not define specific content requirements for individual subjects such as anatomy, and there is no Australian national body that outlines a core anatomy curriculum [3-5]. Some state and national bodies suggest that the lack of a national

curriculum ensures flexibility in programme design [6]. However, other stakeholders attribute the inadequacy of students' anatomy knowledge to the variation that results from individual institutions having sole discretion over anatomy curriculum content, instruction methodology and assessment [7]. In 2021 the number of teaching hours dedicated to neuroanatomy education across the Australian and New Zealand medical schools varied between 12 and 160 teaching hours [1]. Teaching academics have expressed that a decrease in teaching hours has not been by choice, and has been imposed upon them as a result of funding and resource challenges [6]. Introducing a national standardised curriculum may be one avenue for change; a national curriculum would decrease the teaching academics' workloads in regards to deciding content coverage, potentially increase available teaching hours, and may prompt resource sharing between institutions [1].

A 2014 study required physicians to rate the level of importance of anatomical knowledge and describe what content should be included in a core curriculum; the vast differences in the physicians' opinions herein reveals the challenges of creating a standardised curriculum [8]. In this regard, international efforts to produce nationally-available curricula may offer Australian stakeholders guidance concerning the production and review of current and future anatomy curriculums. The International Federation of Associations of Anatomists (IFAA) is in the process of developing core syllabuses for teaching anatomy as part of their *Core Syllabuses Project*, of which they have currently published Head and Neck, Neuroanatomy, and Musculoskeletal Anatomy syllabuses [9-11]. As part of their *Anatomical Competencies Project*, the American Association for Anatomy has provided American universities with a list of recommended anatomy competencies that students should achieve by graduation and have related learning objectives to corresponding clinical relevance [12-15]. Finally, the Anatomical Society (UK) produced an anatomy syllabus in 2003, which has since been reviewed using the modified Delphi method, a consensus survey research tool that establishes agreement between panel 'experts' [16, 17]. The Anatomical Society reported positive reception of the syllabus by students and anatomists, and that institutions (despite the syllabus being a voluntary application, and not compulsory) performed in-house reviews of learning objectives [3].

Pedagogy of Anatomy Teaching

An anatomical education in a medical degree has become more challenging to implement and deliver in the face of numerous factors, including; an exponential and continual expansion of other medical domains [18], the emergence of new pedagogical tools, improvements in information technology, and the dichotomy of more medical students with a shortage of body donations [19]. It is imperative that in modern primary medical education, anatomy perspectives must change from a boring subject based on rote learning to an engaging and fascinating topic [20]. Modern anatomy should be facilitated through a combination of multiple pedagogical resources that complement each other, with multimodal and system-based approaches showing the most efficacious learning [21]. However, abandonment of old pedagogical styles, such as dissection and prosection of cadavers, should not be a consideration of anatomy teaching moving forward [22].

The best anatomy teaching requires an adaptation of new resources with old methods and considering functionally and clinically relevant anatomy [22, 23].

'Anatomical competency' is defined as the ability of a clinician to assess, interpret and navigate the patients' anatomy terrain to avoid procedural pitfalls and enhance patient outcome [24]. While surgery education and anatomy are seen to be almost synonymous, anatomy has become even more relevant to the non-surgical doctor with advances made in other specialities including interventional radiology, cardiology, and emergency medicine [25]. A study arising from the United Kingdom, that has several parallels to Australian primary medical education and doctor training programmes, found that graduate doctors' current knowledge of anatomy is below an acceptable level [1]. Despite the fact there has been exponential growth in medical knowledge and technologies, this is not justification to dismiss classic anatomy teaching [18]. Whilst there are a plethora of multimodal opportunities to learn anatomy, further research needs to be completed before they can be safely replaced with classic anatomy conventions such as wet laboratories [26].

Dissection

As modern medicine transitions into the twenty-first century, education and teaching has expanded as well. Limitations of curricular time, corrected trained staff, and resources for gross anatomy have led many medical schools to abandon the practice of dissection-based anatomy instruction [21]. Innovations in anatomy education have not replaced perceptions about the importance of dissection to students [27], and traditional resources with dissection at the top of this hierarchy are preferred to computer-assisted teaching of anatomy [28].

The decreased total anatomy laboratory hours have limited students' knowledge of anatomical structures [29]. The experience of 'hands-on' dissection is important for all medical students, but especially those planning to become surgeons based on the resonance gross anatomy has with surgical expertise [30]. Anatomy teaching with dissection cannot be dismissed as purely important for burgeoning surgical students though. Cadaveric dissection continues to be considered the gold standard of anatomy teaching [31], even to this day. Participation in dissection based anatomy teaching is associated with enhanced performance in systems-based unit examinations, with the ability to discriminate items that assess knowledge application being the biggest benefit from dissection [32]. It is postulated that offering extracurricular participation in dissection has large academic benefits [32], however those students willing to engage with dissection may already be anatomically inclined in the first place. Dissection provides unique learning experiences for the contribution towards student development [33].

Dissection as a professional-development tool has exhibited the ability to foster self-confidence to define a medical student's identity as being a future medical provider [33], and it provides an environment where students can integrate true perspective of the human body [33]. Self-reflection, teamwork skills, and coping strategies for emotionally challenging medical situations are attributed as facets

built when undergoing an anatomy teaching course based on dissection [33]. Students have reported that their perceptions on the importance of dissection has not been replaced with interactive technologies and multimedia [27], showing the importance of dissection in anatomy teaching.

Prosection

Students who learnt over two years from prosection over dissection had lower performance on anatomy practical and written examinations [34]. When these students then transitioned into dissection, there was a measurable improvement in both facets of anatomy examination [34]. Another study that investigated the academic performance based on cadaveric instruction highlighted that the prosection group thought there was no significant difference between medical imaging and cadaveric-based teaching [35].

It is noted from the literature that prosection is a valuable alternative when dissection is not available, either through shortage of cadavers or time [36]. Targeted and methodical use of prosection must be considered by anatomists to maximise the potential gains for anatomy students [36]. An excellent prosection; that presents real anatomy, variations of anatomy, and surgical alterations of anatomy, surpasses simulated or synthetically developed anatomical models [37].

Technology use in Anatomy Teaching

The vast majority of anatomy education is now through a mixed-approach of teaching, with electronic blended lecturers, tutorials, web-based applications and use of clinical applications like radiography and ultrasound are gaining traction in teaching over face-to-face anatomy education. The best way forward with modern anatomy is to combine multiple pedagogical resources, including modern technology, with an integrated system-based approach [21].

One proposed replacement for cadaveric teaching of anatomy is using augmented reality. If the medical school could develop consumer-grade technology to depict realistic 3D anatomical models, augmented reality has been acknowledged to be useful in the teaching of anatomy [38]. However, this high level of technology is not common within medical schools, and common augmented reality easily accessed via technologies including iPad and Computers have shown to have no beneficial or disadvantageous impact on anatomy learning, showing that using technology does not impact anatomical knowledge with current studies [39]. A purely hands-off technology based pedagogical approach to anatomy does not have well understood impacts on long-term retention of anatomical knowledge as it is still in its infancy [40]. Virtual anatomy teaching is recognised as a sustainable method of supporting surgical examinations for junior doctors, and to complement independent study of medical students [31], but is acknowledged it is incapable of replicating time in a true anatomical laboratory with wet specimens [33]. Medical students' preferences for using 'traditional' teaching resources like dissection, prosections, and lectures over the use of computer-assisted learning and augmented reality has been exhibited [28].

Another replacement for traditional anatomical wet laboratories derived from technological advances that has been considered is that of radiological integration. Studies show that basic radiological understanding in anatomy teaching enhances visuospatial skills, and enhances effective anatomy education when introduced early in the medical curriculum [41]. Ultrasound workshops have the capacity to enhance the gross anatomy experience for students [42], especially when integrating clinically relevant information with the teaching of anatomy through ultrasound [42]. Using technology based clinical tools, such as radiology and ultrasound provide valuable learning opportunities to understand anatomy, the clinical application of anatomy, and provide clinical practice with common medical technologies, however they should only ever be used as an adjunct with traditional anatomy pedagogies [43].

Vertical Integration of Anatomy

Vertical integration is curricular pedagogy that integrates clinical and basic sciences throughout the primary medical education programme [44]. Vertically integrated curricula imbed a clinical context from the start of the degree [44]. One belief to make anatomy interesting and clinically useful is to facilitate anatomy education through vertical integration, namely problem based learning (PBL) and case based learning (CBL).

Factors that can enhance students' interests in anatomy involve diversifying the modalities of delivery, whilst emphasising the clinical relevance of anatomy in problem-based learning scenarios [45]. Studies show that using PBL to acquire anatomy knowledge does not put students at a disadvantage compared to more traditional programmes [46], however there is still a recommendation for certain aspects of traditional anatomy teaching to be implemented in vertically integrated curriculums, such as the use of wet laboratories [47]. It is suggested that this hybrid model is also incorporated with CBL, with the combination of didactic lectures, laboratories, and CBL tutorials promoting learning capacities and enhancing the academic experience of medical students [48].

Clinical implementation of anatomy serves as a bridge between basic anatomy and the clinician's profession, and reformed traditional anatomy by linking it to clinical practice has great benefits for learning [49]. The application of anatomy principles in the explanation of signs, symptoms, and procedures enhances the motivation of students to learn anatomy [49]. Within a 2017 American study, the clinical application of anatomy was shown to be the biggest deficit in the Medical Residents' medical knowledge and ability [49], based on their former anatomical knowledge being grounded in traditional anatomy instruction. Thus, there is a belief that correlating anatomy and clinical practice through vertical integration is a more stimulating educational practice than traditional anatomy delivery that is distanced from clinical thought [49].

Junior Doctors Contributing to Anatomy Teaching

Instructors who are supportive and enthusiastic to teach are shown to influence the adoption of a deep learning approach among students [45]. Peer teaching over faculty demonstrations is shown to be more beneficial for learning, and the method of having instructors who are not staff themselves decreases the burden on anatomy staff and increases student roles [50].

Prevocational doctors, generally unaccredited registrars, are commonly recruited as anatomy demonstrators [51]. Entry into Surgical Education and Training is highly competitive and an opportunity exists to align anatomy instruction with selection criteria and core competencies of SET programmes. It is proposed that the use of the SET Syllabus of Core Surgical Anatomy as guidance for instruction of student by junior doctors can provide a foundation for robust anatomy knowledge and consolidation [52]. There is also the unique opportunity for prevocational doctors to develop surgical skills and competencies in a non-clinical setting and beneficial to improve anatomical knowledge, teaching skills, and scholarly activity.[51]

COVID-19 Pandemic impact on Anatomy Teaching

The COVID-19 pandemic has resulted in an accelerated attempt by medical schools to develop alternative strategies to cadaveric dissection for anatomy [53]. COVID-19 has resulted in reduced time allocation, and changes in teaching methods that has resulted in anatomy teaching being marginalised [25]. This has implications on patient safety, litigation, student satisfaction and surgical workforce planning into the future. Reduction of contact hours for teaching anatomy has resulted in several studies indicating a decline in anatomy knowledge amongst both medical students and junior doctors [45]. The pandemic has provided the insight in to how an anatomical education would look if the momentum towards off-site, technological based facilitation is still maintained even if face-to-face contact can resume.

Assessment of Anatomy

Although the importance of assessment in teaching and addressing learning needs has long been recognized, assessments in primary medical education are often problematic and according to the 2008 Australian Medical Education Study (AMES), is the least successful aspect of primary medical education [54]. Of note, the report identified anatomy as the number one area that both employers and students' felt was least adequately dealt with in medical school [54].

Variability of Anatomy Assessment

The absence of a standardised national anatomy curriculum, as well as varying opinions among doctors as to what depth of anatomy is essential has been consistently identified as the main obstacle to establishing standardised assessments across Australian and New Zealand Medical schools, as well as the reason for perceived deficiencies in graduates.[[54]. Interestingly, despite the lack of a national curriculum, there have already been attempts to create national

assessment standards for various other aspects of primary medical education for students in Australian medical schools. This included creating and sharing assessments through the Australian Medical Assessment Collaboration (AMAC), a collaboration of 16 medical schools and the Australian Council for Educational Research (ACER) formed in 2010 [55].

The AMAC's latest report in 2012 provided a framework for assessing medical students who are nearing graduation [56]. However, this only prescribed what percentage of a test should be devoted to a particular system or specialty. While these would have likely included the assessment of the anatomy of the relevant system, there was little consideration as to how the framework would address anatomy as being a major area of concern for both students and employers [56]. In 2014, the AMAC network expanded to include all Australian and New Zealand medical schools under the Medical Deans of Australia and New Zealand (MDANZ), and directed focus on assessing core pre-clinical knowledge through multiple-choice question banks, through the MDANZ Project, now renamed as the 'Australian Medical School Assessment Collaboration (AMSAC)-Clinical' Project [56-58]. This project is now managed by the AMSAC. It is yet unclear how the AMSAC-Clinical Project will address the concerns of anatomy assessment, however a 2018 review showed that all Australian and New Zealand medical schools now utilise assessments which integrate anatomy assessments into clinical scenarios or themes, compared to 50% previously, which shows progress towards integrating basic sciences with clinical practice as recommended by multiple reports [3, 54, 55]. Yet, approximately 50% still have a dedicated anatomy assessment, and about 18% still mandate a pass mark in anatomy assessments to progress in the primary medical course, which shows that standardisation is yet to truly occur [3]. Furthermore, the implementation of AMSAC Project's assessment items also varied markedly, with the passing standard varying up to 10% across four medical schools [59].

Assessment Styles of Anatomy

The AMC currently allows primary medical education providers to choose how they assess students, permitting that providers aim to meet the broad Graduate Outcomes of 'demonstrating an understanding' and 'applying' basic sciences such as anatomy [60]. However this has resulted in a vast variability in how anatomy is assessed, the depth of knowledge assessed and the frequency at which these tests are conducted across Australian and New Zealand medical schools, as revealed by a study which surveyed medical schools' anatomy teaching and assessment in 2008 and in 2018 [3, 7]. Multiple choice questions (MCQs) have remained the most commonly used method of assessment with 16 out of 17 medical schools surveyed using MCQs as part of their assessment [3, 7]. Other assessment styles such as modified essay questions and extended matching questions are still prevalent, with some summative assessments also using practicals [3]. The use of these vastly different styles of questions reveals the significant variability in how anatomy is assessed despite all meeting the AMC's graduate outcomes. While it is noted that no method of assessment can assess knowledge in all domains, multiple studies suggest that MCQs are an effective way



of assessing factual knowledge in anatomy, and an effective alternative to free-response tests [61, 62]. Multiple choice questions are also the primary item of assessment created by the AMSAC as the gold standard for anatomy assessment [58, 63]. Therefore, a key step of standardising anatomy assessment should be to standardise the method of assessment, particularly summative assessments, to a MCQ format. This could in turn reduce the burden on staff and resources required to facilitate other forms of assessment [64].

In-laboratory spot-tests are another traditional form of assessment used to facilitate anatomy teaching. Spot tests often involve a pin being placed to isolate a structure within a specimen and asking students to correctly identify the structures [65]. As such, spot-tests are often criticised for only testing recall [66]. However, these tests assess the understanding of spatial relationships of structures and promote learning of basic factual information which form the building blocks for clinical anatomy; some variants also require students to also state the function of the structure [65, 66]. Given the value of spot-tests to promote learning and the competing need to encourage higher-order learning, integration of spot-tests with questions that test the clinical relevance of each structure may provide a useful format of assessment [66]. However, these tests should be formative as the high demand on teaching resources could limit the ability to standardise these assessments currently.

Gender and Body Diversity in Anatomy Teaching

Anatomy teaching is inherently dependent upon using representations of the human body such as through the use of cadavers, simulated patients, plastic models, technology and illustration. However, despite the phenotypic and physical variations that exist amongst different humans through factors such as ethnicity and gender, there is a marked lack of diversity in the representations of human bodies found in anatomy classrooms and in anatomy labs [67]. Caucasian male bodies end up serving as the standard by which the human body is represented. This systematic standardisation thus presents a significant disconnect between what is being represented and taught and the populations that these sources aim to represent.

The most significant areas in which there is a lack of diversity are within race, sex, age, weight and anatomical variations [68]. Anatomy education overwhelmingly presents skin tone as white, with less than 5% of all anatomy textbooks having darker skin tones [69]. This presents a significant concern especially in treating future dermatological conditions which manifest differently with different skin tones, and lead to significant rates of misdiagnosis. Models in anatomical representations also generally are male, and when representations are female, they are often relating to pregnancy and the conditions of the reproductive system. There also is a lack of both teaching and representation on the anatomy of intersex individuals [70]. Most illustrations and models also are of young adults, with very few examples of paediatric or geriatric representations. The lack of paediatric representations is particularly important to note due to the great

variations that occur to the human anatomy between childhood and adulthood [67].

Cadaver labs within Australia are particularly demonstrative of this homogeneity [71]. However this lack of diversity presents itself from practical issues rather than any pedagogical or ideological ones. Within the Western world, body donation is overwhelmingly done by white male donors. Possible reasons for the lack of donation from minority groups include cultural, religious, geographical and community issues. Interestingly, in non-Western nations, there is the reverse problem of having too few white bodies [72].

While there has been a recent increase in the use of diverse representations in anatomy textbooks and resources, the vast majority of resources continue not to accurately reflect the changing and multifold populations in a post-globalised world.

Terminology use in Anatomy

The terminology of anatomy education is complex, reflecting the complicated history of the development and standardisation of anatomy [73]. While most structures have descriptive terms either in English or in Latin/Classical Greek, there still remains a significant number of eponymic terms that were named after the individual who were thought to have discovered or investigated certain structures (although this is a difficult task to confirm). Studies on terminology have found a sheer number of eponyms present even for the same structure, and many different structures that are referred to by the same eponym. This significant volume becomes exacerbated by the variations in spelling and pronunciation and the use of different eponyms across various languages and countries. The magnitudes of these terms has furthermore resulted in cases of medical error due to a confusion about exact structures being referenced [74].

The use of eponyms in anatomical terminology has been criticised for their 'male dominated and paternalistic' undertones in the way that the efforts of non-European and female anatomists are ignored [75]. This is most clearly seen in the eponymous descriptions of the female reproductive system, of which almost all terms are named after men. Most disturbingly, there still exist eponymous descriptions with links to Nazism and eugenics [76].

While arguments have been made that eponyms reflect a long tradition in anatomy education and are convenient terminologies for clinicians, there has been a strong push against the use of these terms in recent years [67].

Body Donation

Cadaveric instruction remains one of the central ways in which anatomical education is carried out, whether through the use of prosected specimens or through dissection. This is facilitated by the generosity of donors who chose to

donate their bodies for teaching or research. While concrete data isn't present upon the number of donors who chose to donate their bodies to science, it is estimated that this figure is less than 2000 within Australia [77]. Unlike the present system for organ donation, there presently does not exist a nationwide system for donating one's body to science. Rather there is a network of university and research institute donation programs/ schemes that are applied to individually. They generally all have certain catchment zones from where they will accept body donations. Each individual university/ institute codifies a different set of rules and requirements for donation depending on the needs and requirements of that particular university or institute [78]. Some common rules and requirements include the absence of infectious diseases (such as human immunodeficiency virus (HIV) or tuberculosis), being above 18, being within a certain BMI, not having surgical scars and not having organs removed for transplantation.

In most cases, the donor must express intent to donate during their lifetime and carries out the necessary arrangements with the universities before they pass away. After the donor has passed away, the executor or Next of Kin notifies the university/institute as soon as possible. For most institutes, the Next of Kin also has the right to object to the donation even if the donor themselves expressed intention to donate. As this is a donation, the university covers the expenses associated with the donation and with any possible burials or cremations [79].

Ethical Considerations When Using Cadavers

The wet laboratory experience has the potential to develop ethical practices within medical students early in the curriculum [80]. Learning anatomy within the boundaries of ethical consideration of the donated body it provides an ideal example for how medical students should practice with reverence through their entire care providing careers [80]. Thus, every activity with human bodies must be handled in an ethical manner to set a standard for students [80]. 'Taceant colloquia. Effugiat risus. Hic locus est ubi mors Gaudet succurrere vitae' is a Latin phrase that is commonly adorned in many anatomy web laboratories around the world, with the translation of 'Let conversation cease. Let laughter flee. This is a place where death delights to help the living' and should be used to set the scene of the ethical conduct expected in the learning environment.[81]

The 'hidden curriculum' aspect of learning ethical consideration and respect within a wet laboratory is an incredibly important facet of anatomy to foster [80]. Within the United States, many anatomy programs hold memorial ceremonies of gratitude towards the body donation [82]. Memorial ceremonies can vary from large scale events to rituals before each anatomy class, and have shown to prevent the decline of the responsibility and respect felt by students during anatomy sessions [30]. These acts of gratitude and respect are mostly student-driven and secular in nature, with speech, music, poetry and essays incorporated to explore ethical themes in the ceremonies [82]. More locally, the Queensland University of Technology implements a Thanksgiving Service and Book of Remembrance within their Body Bequest Program [83], and the University of Queensland holds an annual Thanksgiving Service for Body Donors [84].

Access, privacy, sourcing and representation remain key ethical concerns in the discussion of cadaver-based anatomy education and research. The fraught history of anatomy and medical research pays testament to the ways that grave breaches of ethical misconduct have been performed, ranging from the older practice of grave-robbing and body-snatching to the relatively more recent misuse of HeLa cells from Henrietta Lacks and the 2014 New Zealand case of fake medical students undertaking dissection [85]. The ethical and legal principles by which body donation may take place are codified on a state by state basis within Australia. However generally, it is accepted that the consent, wishes, privacy and rights of the donor are always to be respected and that this respect should be given to these individuals even after they have passed away [80].

With the rise of multimedia and digital technology within the past few decades, specific ethical concerns regarding the recording and imaging of the cadavers of donors have been raised. The use of photographs or other representations serve important roles in educating students, especially with long-distance learning [86]. However, the photographing of specimens remains a contentious point amongst bioethicists, and no present global standards exist. While certain cadaveric donor programs require consent from the donor about whether photos or videos of their bodies may be taken, this is not a standard practice. However, most institutions ban students from video-taping or taking photography of any cadaveric materials during instructional sessions [80].

International Body Donation Campaigns

Most countries, including Australia, do not have a national body donation program [87]. Some nations also lack any well-established body donation programs amid cultural, religious, legal and ethical challenges [87]. Although these challenges are still important when considering the barriers to body donation in Australia, the success from the Australian National Organ Donation program and an increase in body donation following the introduction of a centralised body donation system in Portugal, highlight that establishing a National Body donation program may help to increase body donation from the currently low rates [88, 89].

However, even in the absence of a centralised program, there are examples of Brazil and South Korea that have successfully increased the rates of body donation, despite using University-based body donor programs as Australia; these programs have heavily relied upon public awareness and education as crucial aspects to increasing donation [90, 91]. In Brazil, posters and pamphlets were distributed in large hospitals and to the public within a particular geographical region [91]. In South Korea, shifts in social and religious beliefs together with university programs, nationwide commercials on public radio and celebrity endorsement on television have helped to raise awareness of the program [90]. Moreover, over 2000 body donor organisation centres were reported to be present in the community, to citizens to register their interest to be a body donor [90]. These successes reiterate the findings of another study involving Iranian medical students which identified that low public awareness is likely to be a key factor limiting body donations [91, 92]. A New Zealand study has also shown that

individuals are more likely to register for body donation, if they knew someone who had donated or have registered to be a donor [93]. Currently, there are no publicly disseminated information sources or campaigns in Australia to raise awareness or encourage body donation for education and research. Therefore, national promotions, similar to those aimed at raising awareness of organ donation, created in collaboration with university body-donation programs are crucial to help raise awareness as well as to communicate the value of the donations for primary medical education.

It is essential to work with the public to understand their opinions and cultural readiness when raising awareness about body donation [87]. Body donation still remains a topic of much cultural, religious and ethical conjecture and is further shadowed by earlier body bequeathing programs involving the use of unclaimed bodies [87]. However, there has been a welcomed shift through the International Federation of Associations of Anatomists (IFAA) towards accepting only donated bodies for anatomy teaching [71, 87]. There has also been a greater emphasis on involving the next of kin and in conveying gratitude to the donors and their families [87]. For example, both the Brazilian and South Korean programs ensure that the next of kin are actively involved in the process of donation through written consent, and dedicated ceremonies are held by the Departments to pay respects to donors and their families [71, 90]. In South Korea, the family can choose to reclaim the body after the educational need, alternatively the body can be buried in a dedicated chanel house following a burial ceremony [90]. While most medical schools have an informal way of paying respects to the donor, conducting these official ceremonies can be a valuable way for medical students to convey their deep respect for each donation, but also to build trust within the community and increasing participation in body donation programs [80].

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Policy Details:

Name: Anatomy Curriculum and Body Donation(2022)

Category: B – Medical Education

History: **Reviewed, Council 2, 2022**

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Adopted, Council 3, 2013