



# Regarding the Dead: A Model for Anatomical Gifting Outside the Traditional Medical School Setting

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In 2017, Elon University became one of very few universities in the United States without a medical school to have an in-house Anatomical Gift Program (AGP). The program accepts first-person-consenting individuals only and within 2.5 years has become self-sufficient, supporting anatomy curricular needs of its physical therapy, physician assistant, and undergraduate biology and anthropology programs (n = 21 donors annually). This paper describes the timeline, costs, and benefits of developing an in-house AGP at a university without a medical school. Policy development, public outreach, equipment needs, and cost benefits are discussed. Within 2.5 years of program opening, the AGP Director delivered 161 educational outreach presentations at 86 different venues across the state providing information on anatomical gifting. The program registered 320 individuals (60% female, 40% male) and enrolled 41 deceased donors (69% female, 31% male; average age of 74.6 at time of registration and 74.8 at donation). During the first seven months of the program, donor preparation costs (with outsourcing for transport/donor preparation/document filing/serology testing/cremation) averaged US\$ 2,100 per donor. Over the past 23 months, donor preparation has been completed on site, lowering the cost per donor to US\$ 1,260. Other costs include personnel salaries, legal fees, and outfitting of the anatomy laboratory and preparatory room. Program benefits include support of anatomy education on campus, assurance that all donors have given first-person consent, and faculty/student access to donor-determined health, social, and occupational information. Faculty, staff, and students contribute to the daily operations of the AGP. *Anat Sci Educ* 0: 1–10. © 2020 American Association for Anatomy.

**Key words:** physical therapy education; physician assistant education; anatomical gift program; registered donor; bequest program; anatomy

## INTRODUCTION

As the demand for anatomical specimens increases so does the need for whole-body donation. Body donations are an important contribution to anatomy education, scientific research, and the education of healthcare providers on the use of new surgical technology and techniques (Garment et al., 2007; Gunderman, 2008; Ghosh, 2017). While cadavers have long been used in anatomy education, willed body donation by individuals

specifically to Anatomical Gift Programs (AGPs) is a fairly recent (1968) phenomenon (Dalley et al., 1993; Garment et al., 2007). The past 50 years have seen a significant increase in the number of healthcare education programs, fresh human tissue laboratories, research opportunities, and anatomy education programs, which in turn has caused an increase in the need for human anatomical resources (Berube et al., 1999; Asad et al., 2014).

Anatomical Gift Programs have been in existence since the latter half of the 20<sup>th</sup> century promoting whole-body donation to fulfill the demands for anatomy teaching, skills training, and research (Dalley et al., 1993; Garment et al., 2007; Ghosh, 2015). According to the Anatomical Board of the State of Florida, there are 142 documented body donation programs in the United States (ABSE, 2020), and yet the demands extend beyond the abilities of these entities to secure donations to match the increasing need. In efforts to meet the need for whole-body anatomical donation, researchers around the

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world have assessed donor demographics, reasons for donation and regional cultural differences to develop successful body bequest programs (Park et al., 2011; da Rocha et al., 2013; Bajor et al., 2015; Saha et al., 2015; Jones, 2016; da Rocha et al., 2017; Cornwall et al., 2018; Champney, 2019) outside of for-profit body acquisition entities (Anteby, 2010; Champney, 2016; Champney et al., 2019).

Most US medical schools have their own dedicated AGPs where individuals can register to become anatomical donors after their death. Recent research shows that physical therapy (PT) and physician assistant (PA) education programs, which typically do not have their own AGPs, rely heavily on medical schools and state anatomy boards to support their needs, and very few universities that do not have an on-site Doctor of Medicine (MD) program have in-house willed body programs (Cope et al., 2017; Precht et al., 2017; ABSF, 2020).

Within the context of this manuscript the term “cadaver” is used when it is not known that an individual provided first-person consent to partake in anatomy education or research, whereas the term “donor” is used when first-person consent has been provided by the individual prior to death. The term “registrant” refers to an individual who has registered with an AGP.

In 2015, the State of North Carolina had 13 different universities offering the degrees of PT, PA, MD, and doctor of osteopathy (DO), and had one community college offering degrees in mortuary sciences; all of these programs had required curricula that included learning from cadavers. At that time, there were six AGPs in North Carolina, all housed at the universities with medical schools and the mortuary sciences technical school. All of these entities were members of the North Carolina Commission of Anatomy which was established in 1975 and charged both with ensuring enough human bodies for anatomy education and managing the disposition of the unclaimed dead in the state (NCOCME, 2019). Schools not attached to these institutions were not permitted membership on the commission, and because the schools belonging to the North Carolina Commission of Anatomy were not willing to share cadaver resources with any entity not on the Commission, these non-member schools were forced to seek cadavers from out-of-state sources to meet their anatomy education curricular needs. Elon University, located in North Carolina, was one of these schools seeking cadavers from out-of-state resources.

Elon University had human anatomy curricula at the undergraduate and graduate levels, with two anatomy laboratories employing human anatomical specimens. Human anatomy dissection and prosection laboratory experiences had been integral in the delivery of anatomy curriculum at Elon University since 1999, fulfilling the University’s stated mission to “nurture a rich intellectual community characterized by active student engagement” (EU, 2020). In a given year at Elon, 21 human donors teach anatomy in a variety of both undergraduate and graduate education programs. The School of Health Sciences offered dissection-based anatomy education for Doctor of Physical Therapy (PT) and Master’s in Physician Assistant (PA) study programs. The Biology department offered a prosection-based anatomy education for undergraduate students interested in pursuing graduate work in healthcare professions, as well as an Anthropology department which offered a forensic anthropology course requiring work with donors.

By 2015, Elon University’s PT and PA dissection-based anatomy curricula required 17 donors each year while the undergraduate Biology programs required four donors each year. The anthropology curriculum shared access to donors

assigned to graduate healthcare provider programs. Elon felt strongly that human donor dissection and prosection study was of significant benefit to its students and should be continued, but, because of the North Carolina State Commission of Anatomy’s policies described previously (NCOCME, 2019), the University found its options for obtaining anatomical donors to be quite limited. While medical schools and anatomy boards of some other states had been willing to share their resources in exchange for a cost-recovery expense per donor, this process became quite expensive once transportation costs were considered. In addition, out-of-state human anatomy resources became more and more limited as these states’ own donor needs grew. By this time, some medical schools had eliminated all sharing of their donors to ensure that they were able to meet their own programmatic and research needs. As this shift intensified, critical issues arose related to Elon’s ability to access anatomical specimens in numbers necessary to sustain curricular needs.

In addition to solving its curricular needs, Elon’s anatomists were troubled by the idea of non-consenting individuals (the “unclaimed dead”) being present in their anatomy laboratories, feeling that absence of direct consent was contrary to the ethics of caregiving and patient autonomy being taught to its graduate-level healthcare students (Jones, 1994; Halperin, 2007; Jones and Whitaker, 2012; Jones, 2014; Wilkinson, 2014; Cope et al., 2017). While many AGPs in the United States accept registered donors, they also accept next-of-kin donations as well as unclaimed dead. In 2017, there were eight AGPs operating in North Carolina, six using next-of-kin donations and four using unclaimed dead to meet anatomy education, research and training needs. Two of the schools in North Carolina enlisted only first-person-consenting individuals, Elon University and the Brody School of Medicine at Eastern Carolina University in Greenville.

Sources willing to share cadavers could not guarantee that all individuals were consenting. Utilizing the “unclaimed dead” struck the anatomists as inconsistent with Elon’s stated mission to “foster respect for human differences, passion for a life of learning, personal integrity, and an ethic of work and service” (EU, 2020).

As the issues of donor ethics and availability dovetailed in 2014 and 2015, Elon University formulated several goals regarding anatomical education at the institution. In summary, Elon sought to

- Discontinue the uncertainty of year-to-year out-of-state contracting to access anatomical specimens, and gain more certainty that curricular needs would be met year to year;
- Enroll consenting individuals exclusively, with no ‘unclaimed dead’ or next-of-kin donations;
- Offer autonomy to Elon’s donors regarding the personal/medical information they would be able to share with students.

As these goals were formulated in 2014 and 2015, Elon University saw that while atypical, the creation of a freestanding AGP outside of the traditional medical school setting would be an excellent way to ensure that all these goals would be addressed. The creation of Elon’s AGP is the topic of this paper.

## Physical Therapy and Physician Assistant Anatomy Curricula

There are 239 accredited PT (APTA, 2020) and 250 accredited PA (ARC-PA, 2020) education programs in the United States.

Physical therapy originated out of a need for physical movement experts to help in rehabilitating injured soldiers during World War I (APTA, 2019). The first official US physical therapy training program was opened at Walter Reed Medical Center graduating its first class of PTs in 1923 (USAMD, 2020). The PA profession was founded much later at Duke University in 1965 in response to a growing need for primary care providers (Martin, 2016; AAPA, 2020). Early PT and PA education programs were based on shadowing clinical experts, later adding didactic elements including human anatomy. By the most recent available estimates, anatomy education accounts for approximately 30% of the contact hours in the basic sciences in Physician Assistant education (Hegmann, 2013) and is considered vital for both physician assistants and physical therapists in the United States (Mattingly and Barnes, 1994; Berube et al., 1999; Latman and Lanier, 2001; Precht et al., 2017). In both PT and PA anatomy education, study of the whole body is recommended with musculoskeletal and neurology topic focus for PT students (Mattingly and Barnes, 1994), and a visceral and neurology focus for PA students (Latman and Lanier, 2001).

Despite the agreed-upon importance of anatomy education for both professions (Latman and Lanier, 2001), no consensus exists on the best way for PT (Berube et al., 1999) and PA programs to deliver this content. The 2018 Physician Assistant Education Association's (PAEA) Curriculum Report gives data on the number of hours spent on anatomy education and whether this education is performed in laboratory or lecture setting (PAEA, 2020). With 208 schools responding, PA curricula reported using anywhere from 1 to 180 hours of lecture and 1 to 192 hours of laboratory to instruct students in anatomy. Further assessment of teaching methods showed that 86% of programs used a combination of laboratory and lecture to impart anatomy education with a wide variation between schools on the ratio of each activity; programs (n = 200) provided an average of 54.2 contact hours of lecture with a standard deviation of 28.4 hours, and 52.1 contact hours of laboratory with a standard deviation of 36.3 hours. In addition to this wide range of student laboratory and lecture experiences, no distinction was made in this curriculum report as to whether "laboratory" activity consisted of a physical human dissection laboratory experience or some other laboratory experience, such as a clinical skills laboratory or a virtual dissection laboratory (PAEA, 2020).

Hegmann (2013) assessed PAEA 2010 data reporting a lower percentage of anatomy instruction at private PA institutions (32.7%) was delivered as dissection or prosection than at public institutions (47.2%). Of note, however, is the exponential growth in the number of PA programs in existence since the time of Hegmann's (2013) study. Hegmann's data from 2013 included only 82 participating programs compared to 208 respondents in the 2018 PAEA Curriculum Survey (Hegmann, 2013; PAEA, 2020). In the time since Hegmann's (2013) study, changes in donor availability may have affected these percentages related to student work with cadavers significantly.

Despite the decreased availability of human donors and the expense of maintaining a human dissection laboratory, the anatomists at Elon University's School of Health Sciences have held to the philosophy that gross human dissection anatomy brings valuable, multi-layered lessons to its participating healthcare students. Many authors have extolled the values of teaching professionalism, ethics, empathy, and compassion through the gross anatomy experience (Dyer and Thorndike,

2000; Escobar-Poni and Poni, 2006; Lachman and Pawlina, 2006; Swartz, 2006; Swick, 2006; Moore and Benninger, 2014; Kissler et al., 2016; Rehkämper, 2016). Weeks and colleagues (1995) identified skills that can be learned by PA students in the human anatomy laboratory setting and delineated four strategies for use by faculty including the use of respectful donor terminology, providing specific donor information such as name and cause of death to students, encouraging conversation about dissection, death and dying, and holding a memorial service at laboratory's conclusion to support learning healthy caregiver skills (Weeks et al., 1995). Elon's School of Health Sciences anatomists have incorporated these four strategies in both PA and PT anatomy education since the inception of each program.

Mindful of the University's mission (EU, 2020) and aware that Elon's anatomy programs helped to fulfill that mission, the decision was made to explore the idea of creating its own, non-medical-school-affiliated AGP.

## Exploration of an Anatomical Gift Program Outside of the Typical Medical School Institution

In January 2017, Elon University opened an in-house AGP to meet the anatomy curricular needs of its PT, PA, and undergraduate biology and anthropology programs. The process began in fall of 2014, when an AGP feasibility study committee was formed, comprised of the campus Chaplain, Director of Planned Giving, Dean of the School of Health Sciences, Anatomy Laboratory Coordinator, faculty from the departments of Physical Therapy Education, Exercise Science and Biology, and an outside consultant. The committee was charged with assessing the fit of an Elon University AGP to provide access to first-person-consenting anatomical donors to meet all anatomy curricula on the campus. Work of the committee included assessing the problem (restricted access to donors to meet curricular needs), documenting potential costs and benefits, identifying local organizations for educational outreach, and assessing university support and concerns. Committee members conducted campus conversations and smaller information and feedback sessions with members of the University community. During these sessions, feedback was collected from university personnel, and members of the university community were educated by anatomy students about the difference that dissection anatomy had made in their education experience. Members of the committee spoke to program directors of local organizations (hospice, senior living centers, churches, and local hospital) to assess for potential interest in AGP end-of-life educational outreach. Reaction from the University community and local provider organizations was positive. It was estimated by the committee that an AGP at Elon could become self-sustaining by year 5 of its existence; by March 2017, two months after opening, the program had 10 registrants and 1 enrolled donor.

In Spring 2016, after hearing the report of the AGP feasibility study committee, the Elon University Board of Trustees approved the development of an AGP, and the founding director was hired in May of that same year. The proposed self-sustaining AGP would ensure continued active student engagement with anatomical specimens in both undergraduate and graduate programs and would provide members of the local community with the opportunity to consider anatomical donation as a way to contribute to the education of the next generation of healthcare providers. In April 2016, an AGP Board of Advisors (BOA) was selected and included

key personnel from the local hospital, hospice, and spiritual organizations along with long-standing administrative members of the university, anatomy faculty, and the laboratory coordinator.

The newly created BOA recommended a program be developed that was respectful of the act of donation. First-person consent would be required, and autonomy would be given to individuals who registered with the AGP (registrants) regarding the name that would be used for them by faculty and students in the laboratory. Registrants would also determine specifically the personal and health information to be shared with faculty and students beyond what was required for program registration. Each registrant would be asked if they were willing to teach at other schools in North Carolina.

## DESCRIPTION

A timeline of the development of the Elon University AGP is seen in Figure 1 depicting the essential steps taken from approval by the university Board of Trustees in February 2016, through acceptance of its first donor in February 2017, to full enrollment (able to meet curricular needs of the campus for the coming year) in August 2019. Noteworthy activities included hiring an AGP director, policy and standard operating procedures development, contract negotiations with local mortuary businesses, equipment purchases to outfit the existing laboratory and preparatory room spaces, donor preparation, anatomical embalming training for laboratory personnel and educational outreach. Much of this work was done by the AGP director with support from other members of the AGP Team that included PT and PA anatomy faculty and the anatomy laboratory coordinator. Each of these topics is described below.

### Hiring an Anatomical Gift Program Director

Noteworthy in this timeline was the hiring of an experienced and highly skilled AGP director very early in this process, which was essential to the successful creation and eventual opening of the program one year later. The AGP director had previously held this same role for more than 15 years at a different university. The Director came to Elon with an extensive

understanding and experience in AGP policy development, educational outreach, and registrant records maintenance. In addition, the Director's involvement on the American Association of Clinical Anatomists Anatomical Services Committee (2017–2020) which developed Best Practices Guide for Donation Programs and educational background in grief counseling and death, dying and palliative care was considered highly valuable.

### Policy and Standard Operating Procedures Development

Development of policy surrounding donor registration, acceptance, transport, serology testing, and eventual return to family was initiated by the AGP director with rigorous review and input from other AGP team members. Careful research of best practices was performed by the team to be sure that all legal, health, and privacy guidelines were followed, with an intentional focus on policies and legal guidelines within the United States. The AGP team consulted the Best Practices for the Donation of Bodies of the American Association of Clinical Anatomists and the Donation of Bodies of the American Association for Anatomists (AACA, 2017; AAA, 2020), the recommendations of good practice for donation of the International Federation of Associations of Anatomists (IFAA, 2018), and the existing literature on ethical body donation practices (Garment et al., 2007; Jones, 2016; Habicht et al., 2018; Champney, 2019). The North Carolina Commission of Anatomy (NCOCME, 2019) and state laws (NCGA, 2019) surrounding the disposition of deceased individuals were reviewed and considered during all policy development, and all suggested AGP practices and donor registration documents were vetted and approved by the university's legal counsel.

The AGP director came with extensive policy development experience and the AGP Team set out to research the policies of successful well-regarded AGPs within the United States. Policy development input was sought directly through interview with individuals prominent in the implementation of AGPs at other US institutions including the Executive Director of Anatomical Services, University of California; Director of the Maryland State Anatomy Board; AGP leaders from the University of Massachusetts,

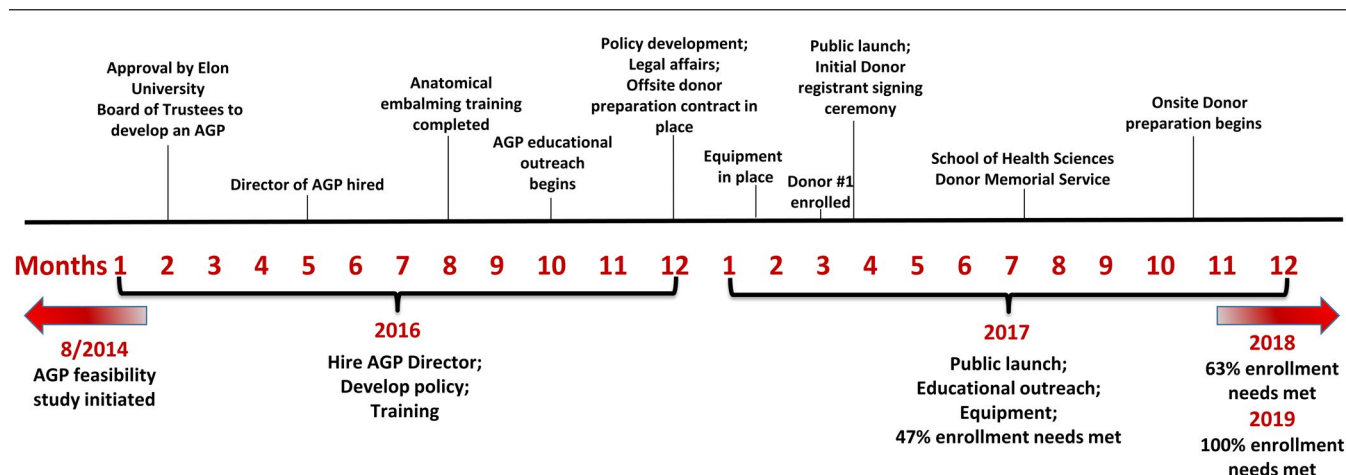


Figure 1.

Timeline representing the anatomical gift program development from the onset of the feasibility study in 2014 to present at full enrollment to meet campus-wide anatomy curricular needs in 2019. Goals for each year are noted below the timeline and landmark events are documented above the timeline. AGP, Anatomical Gift Program.



Minnesota, Vermont, and Missouri, Dartmouth College and the Deputy Section Chief, Epidemiology, Division of Public Health, North Carolina Department of Health and Human Services, who oversaw the North Carolina Commission of Anatomy. All members of the AGP team served on the AGP feasibility study committee prior to creation of the program, so were familiar with the input collected from the Elon community regarding creation of an AGP at the institution. This input assisted in the shaping of the details of many policies.

Policies were created for the following topics:

- donor registration packet and required health and personal information;
- donor acceptance and rejection criteria;
- donor transportation and entry to the university;
- donor preparation;
- mandatory donor serology testing,
- donor privacy policies including restricting the use of photography and admission of visitors;
- donor identification and tracking;
- return to next of kin

Of note, student input was sought by team members to better understand the implications of policies on student learning. This input also assisted in shaping some of the particulars of Elon's AGP policies. One example of the types of student input being sought was on the topic of secure labeling of donors as part of the policy on identifying and tracking individuals from entry into the program through return to their families. When students reported that indelible ink on the skin of donors, toe tags, and ear tags were psychologically disturbing to them, personal identification bracelets (ROAD ID, 2019) were proposed as identification for donors. These bracelets, which are commonly worn by athletes around their wrist or ankle and hold emergency contact and health information, were tested by students in embalming and wetting solutions to ensure that they would be durable in laboratory conditions. This type of student involvement was in keeping with Elon's call for engaged learning experiences (EU, 2020) and helps to decrease potential student distress that policies (such as tagging the donor's ear with a metal tag) might inadvertently create.

Once developed, all policies were submitted to the Assistant Vice President for Business and Finance and then reviewed by the University's legal counsel in October 2016. In November 2016, the provost reviewed all policy development to ensure best practices and legal stamina.

## Standard Operating Procedures

Standard operating procedures (SOP) for all program operations were developed by the AGP Team as topics arose. The SOP was developed for all donor acceptance-related protocols beginning in July 2018 and included items such as the following:

- on-call process for donor acceptance and transport into the AGP, including coverage for on-call and donor preparation in the event of the absence of the AGP director, laboratory coordinator, or both;
- donor acceptance and rejection criteria beyond AGP policy including considering accepting a donor who is slightly

above the typical weight limit, or who has a condition that might cause some circulatory system alteration;

- donor transportation arrangements, including covering the donor with an Elon University blanket for privacy and dignity during transfer through inhabited hallways and other areas;
- arrival and care once at Elon, including notifying faculty, staff, and students of the School of Health Sciences of anticipated donor arrivals so that dignified silence can be offered as the donor comes through an occupied area;
- donor preparation details, including procurement of chemicals, serology testing kits, and identification bracelets.

## Contract Negotiations

Contract negotiations were conducted for all ancillary personnel enlisted to work with the AGP by the AGP director in consultation with the Board of Advisors. The BOA provided critical contact input related to contracting with a local mortuary business. The mortician was originally contracted to transport donors, initiate the process for filing the death certificate, and conducting donor preparation and cremation services.

## Equipment Purchases for the Anatomy Laboratory and Preparatory Room Spaces

While the undergraduate human anatomy laboratory had been in existence since 1999, the School of Health Sciences anatomy laboratory (201 square meters; 2160 square feet) was relatively new (2011) and had a spacious preparatory room (57 square meters; 608 square feet) with two sink areas and an adjoining fresh tissue laboratory space (52 square meters; 558 square feet).

The original AGP laboratory and preparatory room update plan included creating safe storage space for up to 20 donors within the School of Health Sciences and safe storage for embalming chemicals but did not include space or area upgrades for on-site donor preparation (embalming). The mortician service was originally contracted to transport an Elon University AGP decedent from site of death to their own mortuary facility and conduct donor preparation procedures at that location, then transport the prepared donor to Elon University. The contracted mortician had limited space at their facility and could not store large bulk-embalming chemical containers or donors. Though donor preparation was outsourced in this original plan, the equipment and chemicals necessary to conduct such work were purchased by the AGP and stored in the Elon University School of Health Sciences preparatory room.

See Table 1 for startup costs for the anatomy laboratory preparatory room space. Costliest considerations included storage racks to hold 20 individual donors, a hydraulic lift, and an embalming table. In total, US\$ 41,450 was spent on updating the anatomy preparatory room with necessary equipment and adding security to the preparatory room door.

The five-year AGP budget plan included outfitting a larger space for donor storage in the fifth year; however, growth of the AGP was more rapid than anticipated and by year two of operations twenty additional racks for storage were purchased to accommodate donor arrivals. A portion of the fresh tissue laboratory was dedicated to donor storage needs and plans to expand the preparatory room with added donor storage space were initiated.

**Table 1.**

## Anatomy Laboratory and Preparatory Room Updates

Item and Associated Vendor	Number of items	Cost
Donor Storage Racks with Trays (Mortech Manufacturing Inc., Azusa, CA)	20-person unit	\$14,800
Maryland Embalming Solution and Wetting Solution (Express Chemical LLC., St. Louis, MO)	5 items (55-gallon drums)	\$5,500
Duotronic Embalming Unit with Components (Affordable Funeral Supply, Mars, PA)	1 unit	\$3,500
Embalming Table (Mortech Manufacturing Inc., Azusa, CA)	1 unit	\$3750
Hydraulic Lift (Mortech Manufacturing Inc., Azusa, CA)	1 item	\$7300
Security to Preparatory Room (Elon University Physical Plant)		\$500
Additional Ventilation to Preparatory Room (Elon University Physical Plant)		\$6,100
<b>Total Startup Costs</b>		<b>\$41,450</b>
Additional Storage Racks no Trays (Mortech Manufacturing Inc., Azusa, CA)	20 person unit	\$11,000

Equipment and space modification startup costs to support an Anatomical Gift Program at Elon University are documented. Commercial vendors are noted when applicable.

### Donor Preparation Off Site to On Site

In 2015, an AGP feasibility study committee provided initial recommendations regarding developing an AGP suited to the educational philosophy of the University. Cadavers on loan from other universities had been used for teaching on the campus since 1999. While this work with cadavers for teaching was well established, some committee members were concerned that the University's reputation would be at risk if donor embalming was performed on site. In the face of concerns that taking on all operations related to donor care might jeopardize internal support for the program, the initial decision was made to contract out for donor transportation and preparation. The impetus for this university to develop an AGP was to ensure that students would work with only first-person-consenting individuals, and the program would become self-sufficient and sustainable in meeting campus-wide human anatomy curricular needs in the future. Conducting the embalming on site was not critical to the success of the program and was initially put aside.

The AGP contracted with a local mortician to handle donor transportation and preparation. The initial total cost of care to bring a donor into the anatomy laboratory was US\$ 2,100 and included outsourcing for transportation, embalming, death certificate preparation, and document filing, serology testing, and cremation when anatomical studies were complete. However, within several months of opening the program (2017) with seven donors already in house and 73 registrants, the AGP Team reevaluated the need to outsource embalming and suggested to the Dean of the School of Health Sciences and Provost that donor preparation be conducted on site. These AGP team members calculated a savings of more than US\$ 800 per donor and were willing to participate in the care of donors once transported to the anatomy laboratory. In addition to cost savings, the AGP team desired to have increased autonomy in the preparation of the donors. Faculty were interested in access to lightly embalmed tissues for teaching and research and increased fixation techniques for neuroanatomy content.

It was during these internal conversations that the phrase 'donor preparation' was introduced to the campus

administrators. Members of the AGP team were mindful and intentional in the language used throughout the process of developing and delivering this AGP. It is the anecdotal belief of the AGP team that respectful word selection and transparency in communication paired with consistently professional behaviors had a positive impact on both public and internal perception.

To support the notion of conducting on-site donor preparation, the AGP team noted that all necessary equipment and chemicals had already been purchased by the University. As such, there was no additional cost in equipment to bring donor preparation on site. The laboratory coordinator and two PT anatomy faculty attended anatomical embalming training with the contracted mortician in August 2016 in Baltimore, MD. At that time, the AGP Team understood that the local mortician would be completing donor preparation, but the idea of on-site preparation in the future remained a possibility.

### Anatomical Embalming Training for Laboratory Personnel

Anatomical embalming training was provided to the contracted mortician, laboratory coordinator, PT anatomist, and an adjunct PT faculty member at Maryland State Anatomy Board in Baltimore, MD. The training was graciously provided for no cost and took 10-12 hours of time over the course of two days. The donor preparation team was permitted to video record some sessions, and these videos have proved an invaluable resource. Additional support was offered through phone conversations as needed. During the first several on-site donor preparation sessions, 2-3 staff members were present to assist and develop a descriptive donor preparation protocol. At present, the laboratory coordinator handles all donor preparation with support from additional team members in their absence. In total, donor preparation was contracted off site during the first seven months of the AGP opening and then transferred to on-site preparation, saving approximately US\$ 840 per donor in preparation fees and providing ultimate autonomy to the

on-site AGP Team. At present, the total cost of care is US\$ 1,260/donor, including cost of outsourcing for transportation, document filing, serology testing, and cremation (outsourced totals US\$ 975). Donor preparation is handled in house at a cost/donor of US\$ 285, which includes chemicals, draping materials, donor storage bags, and disposables needed to conduct donor preparation.

## Educational Outreach

Educational outreach has been led by the AGP director with input from the Board of Advisors and support from the AGP Team and PT, PA, and biology students. To date, the AGP Director has conducted 161 presentations at 86 different venues across the state of North Carolina to provide educational outreach on anatomic gifting to some 3,303 participants. Some venues were visited on multiple occasions and some participants attended multiple sessions. The director provides educational outreach where and when it is requested with local sites being more active.

The AGP Director provides two different types of educational outreach sessions. One type of session is instruction specific for local healthcare providers on the process at the time of death of an Elon anatomical donor. Healthcare providers are provided with contact information and a list of information that will be required during the initial phone contact. This instruction ensures seamless transition and thereby unencumbers families from potential-added stressors during a difficult time. The other type of outreach is conducted to educate interested North Carolina residents on the history of Elon's AGP,

providing information on how to register to become a donor as well as a step-by-step summary of what to expect at the time of death of an Elon anatomical donor. All outreach sessions include question-and-answer opportunities and discussion. Venues include independent senior living facilities, caregiver expositions, resource fairs, and veterans' events. Some sessions are geared toward professionals who work at hospice and palliative care agencies. Often potential donor registrants will attend sessions with family members to facilitate family discussion around the topic of anatomical donation, and confidential appointments with the AGP Director are also offered (EUAGP, 2020). Local news reporting in both short television pieces and newspaper interviews has supported additional increased community awareness of the Elon University AGP. The AGP team presents at two on-site sessions annually to provide members of the local community an opportunity to meet the anatomists and tour the School of Health Sciences, including its anatomy laboratory. Students join the group for short visits to talk about the value of the anatomy experience with human donors as their teachers. Students also participated in the creation of an informational video that is accessible through the Web site and used by the AGP director at specific venues.

## Donor Demographics

Elon University (EU) Internal Review Board approval was obtained to review de-identified AGP data (IRB ID: 18-131). The following data were reviewed and are summarized herein: number of EU AGP registrants, their demographics, their



**Figure 2.**

Map of North Carolina with outreach site visits denoted in blocks. Numbers within the blocks represent the number of registrants from each county. Burgundy circles represent the number of donors from each county. The lighter tan region represents a 70-mile (112-kilometer) radius from Elon University, where 71% of all registrants and donors originate.



county of residence, and why they donated to the EU AGP. Descriptive statistics were used to report data sets.

As of 31 August 2019, the AGP had 320 registrants of whom more were female (60%) than male, as well as 41 enrolled donors (69% female) with an average age of 74.6 at time of registration and 74.8 at time of donation. These 320 registrants after 3,303 participant contact points during outreach equate to a 9.7% rate of donor registration from educational outreach efforts. See Figure 2 depicting a map of North Carolina that shows the number of registrants depicted in gray blocks and the number of donors depicted in burgundy circles. Most registrants and donors (71% each) originate from within a 70-mile (112-kilometer) radius of the University with a majority of registrants (57%) and donors (54%) originating from within a 40-mile (64-kilometer) distance. Most registrants have had personal contact with the AGP Director in the form of attending outreach session(s), phone conversations, or on-site AGP visits, while a few have registered via the Web site and e-mail with the Director. All registrants have contact with the Director regarding donating to the University. These data reinforce the importance of local educational outreach and availability of an in-person contact for potential registrants.

Registrants ( $n = 320$ ) report reasons for wishing to donate as contributing to student learning (43%), doing something good (39%), and giving back to Elon (9%). Some registrants noted financial reasons (3%) for their registration, some noted the desire to recycle themselves as part of the death process (5%), and some (1.5%) were directly related to PT or PA student members. Registrants' reasons for donation are in keeping with current cultural trends to support education and research (Larner et al., 2015).

## DISCUSSION

Elon University houses health sciences and undergraduate programs which have utilized cadavers to teach gross human anatomy for many years, without having their own AGP. Though other modalities for teaching anatomy exist, Elon's anatomists have felt strongly about the holistic learning that is facilitated by donor dissection including not only anatomical knowledge but empathy, professionalism, fine motor skills required for procedures, and more. As anatomical resources became more difficult to obtain, Elon's anatomists became concerned about the sustainability of their gross dissection programs. They also found themselves faced with the possibility of being unable to limit their cadavers to consented individuals, and the possible employment of the "unclaimed dead" was contrary to both the mission of the University and their own ethics.

The faculty also sought to provide students information about their donors including name, cause of death, age, and profession, feeling that these details increase a student's understanding of the cadaver as a human, or "first patient" (Granger, 2004; Escobar-Poni and Poni, 2006; Bohl et al., 2013; Talarico, 2013; Gerwer and Gest, 2017; Cope et al., 2019). While there is much debate about the topic of sharing cadaver information, especially names, when cadavers are on loan from another facility, one must adhere to the policies of that institution regarding cadaver information. With no ready source for donors, particularly donors that were guaranteed to fit these guidelines, Elon made the decision to create such a source for themselves by establishing their own AGP. As a result, the university now has a sustainable source

of anatomical donors who are first-person consent and for whom some of life's information (name, age at death, vocation, reason for donation) can be shared with the students who learn from them.

Several issues that arose during the development of the AGP include the need to address administrative concerns related to the effects that accepting whole-body donations might have on the university's reputation in a small community; contracting with a mortician to conduct aspects of donor care that Elon University personnel were not initially prepared to do; and identifying and purchasing large equipment items and necessary day-to-day materials needed for donor preparation that the AGP team had no experience with.

Individuals from the original AGP feasibility study committee understood the administrative concerns for reputation in a small community. Several committee members had long-standing ties to the university and were supportive and instrumental in assuaging administrative concerns. Membership makeup of the committee was a key to eventual support by administrators and the board of directors at the university.

The AGP Director was able to contract with a local mortician for a short period of time to support the startup of the program. Because the mortician had space limitations, an agreement was made with the mortician at the outset that they would conduct transport and donor preparation but would not store any of the donors. Elon University purchased all necessary equipment and stored the 55-gallon drums of embalming and wetting solution. This contract was in place for the first 9 months of the program, after which the decision was made for Elon University personnel (laboratory coordinator with support from anatomy faculty) to take on the donor preparation aspects of donor care. This initial nine-month contract provided the critical time needed for Elon personnel to train for the responsibilities of donor preparation and to be sure all details were in place prior to assuming the task themselves.

The AGP team reviewed information about equipment shared by individuals from other AGP programs, compiling a list of necessary large equipment and daily operations materials. Team members met with a variety of vendors to gather information and obtain quotes.

Notably, the path to sustainability regarding number of donors available to the school's laboratories has taken much less time than was originally anticipated. Curricular needs ( $n = 21$  annually) were supported at nearly 50% in the first year and 100% supported by 2.5 years with no projected increase in need through 2022. The cost of creating the AGP has been consistent with expectations and compares favorably to the costs encountered in transporting donors from other states to the university and back.

Thus far in implementation, the program's costs are outweighed by its projected long-term benefits. At present, the AGP is participating in donor sharing with another university in North Carolina to ensure all donors have an opportunity to teach during the two years they are contracted for. In-state sharing provides cost recovery efforts in support of the AGP and provides in-state first-person-consenting donors to other universities in North Carolina. While the North Carolina medical schools manage a large volume of anatomical donations, the universities that do not have medical schools in this state also have curricular needs for human donors and have had to seek anatomical materials out of state. The autonomy of Elon's AGP also allows Elon's anatomists to teach with individuals from the local community and to provide respect and regard for the gift, personal attention to all registrants, and donor



autonomy throughout the process. These goals are easier to ensure in a smaller venue.

The School of Health Sciences anatomy laboratory was recently constructed (2011) with great attention to potential space needs for a long-standing PT program (1998), a newly developed PA program (2013) and the potential for additional health sciences majors to share the anatomy and fresh tissue laboratories. This anticipatory planning has worked quite well for the newly formed AGP. The preparatory room had two autopsy stations with ample storage space to accommodate the addition of donor preparation and now has added storage racks to accommodate 20 donors. Minimal equipment and ventilation investments were needed to support secure donor storage and donor preparation on site.

## Limitations of the Study

It is important to note that this manuscript reflects the process of AGP development at one small private university in one state (North Carolina) within the United States. Laws and policies vary around the globe, from state to state in the United States, and sometimes even from county to county. Thus, some of the decision making described in this manuscript may not translate to other institutions. As a small private university, Elon University may enjoy greater autonomy than similar state-operated institutions, providing more freedoms in developing an AGP. In addition, Elon's limited need for human donors (21 annually) allowed for the possibility of achieving donor autonomy in a rapid time frame that larger institutions might not experience. Since equipment purchases made toward establishing Elon's AGP were tailored to dovetail with the materials already in place at the university, cost analysis in this manuscript should be viewed as descriptive of Elon's experience and not necessarily translatable to all other institutions.

## CONCLUSIONS

While there are international as well as local recommended best practices for developing an AGP, individuals considering AGP program development must design a program to match the specific needs of the institution and be mindful of the willingness of the local community to support such an endeavor. Elon University and members from surrounding community have been involved in the AGP's development from the onset. Administrative/community support was essential in developing a successful sustainable AGP. Start-up costs were phased in to accommodate growth and anatomy faculty/staff were invested in the success of the AGP and contributed to its policy development, outreach, and donor preparation. While it is not typically the role of faculty to participate in donor preparation or educational outreach sessions, or to provide in-house educational outreach sessions, this has proved a successful model for this AGP. Students have also been involved since the program's conception to offer insight and support educational outreach.

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