Development of the Essential Anatomy Survey and Website

Derek J. Harmon (The Ohio State University College of Medicine), Melissa A. Carroll (The George Washington University), Jennfer F. Dennis (Kansas Health Science University), Alan J. Detton (Columbia University), Jeremy J. Grachan (Rutgers University), Mark H. Hankin (University), Pilard A. Hanna (The Ohio State University), Cameron B. Jeter (Kansas College of Osteopathic Medicine), Sarah A. Keim (University of Kansas Medical Center), James R. Martindale (University of Virginia), Madeline E. Norris (University of California San Francisco), Ellen M. Robertson (Randolph-Macon College), Cynthia C. Wingert (Lipscomb University), Rida Adhami (The Ohio State University), Kshitij Soni (The Ohio State University)

Introduction

The four sub-disciplines of anatomy (gross anatomy, embryology, histology, and neuroanatomy) have always been considered foundational courses for health professional programs. Clinicians in these different professional health disciplines (and specialties within a discipline) utilize various anatomical regions and structures with differing emphasis and regularity. Currently, there is no detailed, evidence-based dataset of relevant anatomy for individual health professional educators and clinicians.

AIMS

- Design and distribute a novel survey assessing essential anatomy to clinicians in various health professional programs.
- Develop a website that will allow users to access the data in real-time.

Methods

Four anatomists (MH, DH, AD, SK) developed a novel, adaptive survey through an iterative process in Qualtrics (Qualtrics XM). The survey was organized around THE SEVEN 7 anatomical regions, 48 topics, and 1,156 individual and groups of structures. Due to the large number of structures for each respondent to rate, the structures were organized within specific topics. Users were instructed to first rate the level of importance for each topic on a 1-7 Likert-scale (1 = Not Important, 7 = Essential). After rating each topic for all seven regions, the user was then shown each individual item within the topics they had rated previously, which were now given the same level of importance rating. For example, in the Back region, if a user rated the topic Spinal Nerves, Spinal Cord, Spinal Meninges as a 7 (Essential) (Figure 1), then the individual items within that topic would also be automatically rated as a 7 (**Figure 2**). The user was instructed to review each item and change their individual rating as needed. Figure 3 shows an additional example from the Back region.

Clinicians in the following health professions were recruited: dental, medical (allopathic and osteopathic), physician assistant, physical therapy, and occupational therapy. Clinicians were asked to provide detailed demographic information, including their degree(s), clinical discipline, and specialization (if relevant) (Figure 4). Anatomists were also sent an identical survey to assess their perspective of essential anatomy for students in the same professional health programs.

A website (essential anatomy.com) is in development to provide users with real-time access to the data from this survey. Users will be able to create their own visualization tables based on the health profession, both broadly (e.g., dental) and specifically (e.g., medicine allopathic - anesthesiology critical care medicine) (**Figures 5-7**).

Survey Flow

Please rank the importance of the following anatomical subjects of the Back according to their relevance in your field of clinical practice.

Based on your ranking, individual structures within that topic will be given the assigned rank as a default in the following questions. The default ranking may be adjusted and is only meant to facilitate the completion of the survey.

(More than one item may be ranked with the same level of importance)

(Not	Less	Moderately	Average	More	Verv			Not Important	Less Important	Moderately Important	Average Importance	More Important	Very Important	Essential
Skeleton	Important	Important	Important	Importance	Important	Important	Essential	Extradural (epidural) space	0	0	0	0	0	0	•
and Muscles	0	0	0	•	0	0	0	Dura mater	0	0	0	0	0	0	•
of the Back								Arachnoid mater	0	0	0	0	0	0	•
Spinal Nerves, Spinal Cord, Spinal Meninges of the Back	0	0	0	0	0	0	•	Subarachnoid space	0	0	0	0	0	0	•
									Not Important	Less Important	Moderately Important	Average Importance	More Important	Very Important	Essential
	Not Important	Less Important	Moderately Important	Average Importance	More Important	Very Important	Essential	Arachnoid trabeculae	0	0	0	0	0	0	•
								Pia mater	0	0	0	0	0	0	•
Blood Vessels of the Back	0	0	0	0	0	٠	0	Denticulate ligaments	0	0	0	0	0	0	•
Surface Anatomy of the	0	0	0	0	0	•	0	Filum terminale (internum, externum)	0	0	0	0	0	0	•
Back															

Figure 1. Topics of the Back Region

tebral Column (Location, Structure, Relationship

ase adjust any individual ranking in the list below which you feel differs from the ranking

you providou ior a.	Not Important	Less	Moderately	Average	More	Very	Fasential	THE OHIO STATE UNIVERSITY
Curvatures	0	0	0	•	0	0	0	
Features of a typical vertebra (e.g., spinous process, pedicles, laminae)	0	0	0	•	0	0	0	Medicine Allop Primary Field of C
Regional characteristics of vertebrae (e.g., cervical transverse foraminae)	0	0	0	•	0	0	0	Anesthesiology
Ligaments of the vertebral column (e.g., ligamentum flavum, interspinous)	0	0	0	•	0	0	0	Anesthesiolog
	Not Important	Less Important	Moderately Important	Average Importance	More Important	Very Important	Essential	(only select one)
Craniovertebral joints (atlanto- occipital)	0	0	0	٠	0	0	0	Anesthesiology
Vertebral joints (atlanto-axial, uncovertebral (Luschka), zygapophysial/facet)	0	0	0	•	0	0	0	Clinical Informat
Intervertebral discs (anulus fibrosus, nucleus pulposus)	0	0	0	•	0	0	0	Critical Care Me
Sacro-Iliac joints	0	0	0	•	0	0	0	
	Not Important	Less Important	Moderately Important	Average Importance	More Important	Very Important	Essential	Neurocritical Ca
Nerve supply	0 0		0	•	0	0	0	
Vascular supply	0	0	0	•	0	0	0	Obstetric Anesti
	~	~	~		~	~	~	

Figure 3. Individual Items of the Skeleton and Muscles Topic

Results

The survey has been distributed to over 5,000 clinicians and anatomists. The data is being analyzed to determine differences between groups (anatomists and clinicians), and within groups to determine differences in ratings for anatomical regions. The website will have the data updated regularly which will allow users to visualize, create, and download tables that provide an in-depth evidence-based dataset for curricular design and iteration.

Spinal Meninges (Location, Structure, Relationships)

Please adjust any individual ranking in the list below which you feel differs from the ranking you provided for this topic previously.



Figure 5. Website User for the

Home Generate



Essential Histology

Future Directions

The *Essential Histology* survey was just released to anatomists (scan the QR codes above if you have not completed the survey). The Essential Embryology and Essential Neuroanatomy surveys are in the early stages of development, with distribution planned for late 2025/early 2026.

The Essential Anatomy website will provide anatomists and health professional educators with the first of its kind, granular, evidence-based database of the importance of individual anatomical structures for specific health professional disciplines.



Figure 2. Individual Items of the Spinal Meninges Topic

HE OHIO STATE UNIVERSITY

ledicine Allopathio

rimary Field of Clinical Practice or Training

Please select a sub-specialty if applicable only select one)

Anesthesiology Critical Care Medicine

Clinical Informatics

Critical Care Medicine

Neurocritical Care

bstetric Anesthesiology

Figure 4. Example of Clinical Sub-Specialties



THE OHIO STATE UNIVERSITY

WEXNER MEDICAL CENTER

Essential Anatomy Website

\equiv	Essential Anatomy									
ur report	Select option	ns to ge	enerate y	our rep	ort					
nit to generate a PDF.	Please fill out the following questions and then submit to generate a PDF.									
5										
ofession):	Select the anatomical regions you wish to review:									
	 Back Upper Limb Lower Limb Thorax Abdomen Pelvis and Perineum Head and Neck 									
	Home Generate Report About									
	Figure 6. Website User Selecting Anatomical Regions									
	BACK									
port About	Skeleton and Muscles of	of the Ba	ck	1			-			
	Vertebral Column (Location, Structure, Relationships)	A/AG	A/D n=5	A/M-O	A/PT n=33	C n=272	Total			
Selecting Disciplines	Curvatures	5.73	5.40	6.17	6.48	5.81	5.88			
Data	Features of a typical vertebra (e.g., spinous process, pedicles, laminae)	5.87	5.60	6.11	6.45	5.90	5.95			
	Regional characteristics of vertebrae (e.g., cervical transverse foraminae)	5.40	4.60	5.83	6.03	5.83	5.81			
Isht@I	Ligaments of the vertebral column (e.g., ligamentum flavum, interspinous)	5.67	5.60	6.06	6.03	5.82	5.84			
	Craniovertebral joints (atlanto-occipital)	5.13	5.40	6.06	5.72	5.72	5.71			
	Vertebral joints (atlanto-axial, uncovertebral (Luschka), zygapophysial/facet)	5.47	5.40	6.22	6.17	5.69	5.74			
	Intervertebral discs (anulus	5.32	5.20	5.92	6.17	5.70	5.72			
	Sacro-iliac joints	5.60	4.80	5.67	5.79	5.73	5.71			
	Nerve supply	5.27	4.80	5.72	5.34	5.82	5.73			
<u>∎</u> ∣∴r?,/?P!=et∎	Vascular supply	4.00	4.20	5.17	4.14	5.49	5.27			
═┛┍┓ <u>╷</u> ╺┍┾ [┲] ╾╏╏	Lymphatic drainage	6.07	5.60	6.28	6.72	4.81	5.13			
popular American	Nerve Supply, Blood Supply, Relationships)	A/AG	A/D n=5	A/M-O	A/PT n=33	C n=272	Total			
ssential Anatomy	Extrinsic Back Muscles - Superficial Group (Trapezius, latissimus dorsi, levator scapulae, rhomboids)	5.20	3.80	5.28	5.72	5.67	5.61			
	Extrinsic Back Muscles - Intermediate group (Serratus	5.47	4.20	5.72	5.90	5.57	5.59			
	Figure 7. D	ata T S	Fable election	Outp ons	ut froi	m Us	er			

