

A Comparison of Fourth-Year Health Sciences Students' Knowledge of Gross Lower and Upper Limb Anatomy: A Cross-Sectional Study

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ABSTRACT

Objective: The aim of the study was to assess and compare the knowledge of fourth-year medicine, physiotherapy (PT), nursing, and podiatry students in carpal and tarsal bone anatomy.

Methods: A cross-sectional study was carried out. Based on a nonprobability convenience sampling, 177 fourth-year students (117 women and 60 men, mean age of 23.16 ± 3.82 years) from the podiatry ($n = 39$), nursing ($n = 26$), PT ($n = 73$), and medicine ($n = 39$) schools at a large Spanish university were included. Measurements were taken of their gross anatomy knowledge by means of the carpal and the tarsal bone tests. Students were asked to identify all carpal and tarsal bones in an illustration of the bony skeleton of both regions and were given a maximum of 5 minutes per test.

Results: Of a total of 15 bones to be labeled, the PT (11.07 ± 3.30) and podiatry (9.36 ± 2.93) students had the highest rate of correct answers compared with the medicine (6.13 ± 3.27) and nursing (4.04 ± 3.72) undergraduates. When assessing academic degrees and test scores, significant differences were observed between PT and podiatry participants vs those from the medicine and nursing schools ($P < .001$).

Conclusion: Fourth-year students from the PT and podiatry programs correctly identified a higher number of carpal and tarsal bones than students from the nursing and medicine schools. (*J Manipulative Physiol Ther* 2016;39:450-457)

Key indexing terms: *Anatomy; Knowledge; Medical Students; Nursing Students; Physical Therapy; Podiatry*

INTRODUCTION

Gross anatomy is one of the most relevant basic disciplines of daily clinical activity in health sciences professions.^{1,2} A profound knowledge of human anatomy is expected to be a core component of the academic curricula within medical education programs.^{3,4} However, in recent years, the total number of teaching hours of gross

anatomy has experienced a progressive decrease within the medicine syllabus.⁵ For this reason, more gross anatomy courses are becoming part of an integrated curriculum in some medical schools.⁶

Teaching and learning in anatomy have been the focus of study in medical education.⁷ However, the knowledge of gross anatomy is equally important in the curricula of other health care disciplines.^{8,9} Following the Bologna declaration, profound changes took place in European higher education with a focus on student-centered learning and curricular harmonization to improve student mobility among universities.^{10,11}

Traditional teaching techniques (student-performed dissection, theoretical lectures, living and surface anatomy, and use of models) are giving way to new, more up-to-date ways of learning, such as virtual anatomy and dissection, or computer-assisted learning in the so-called learning by doing.¹² Understanding of anatomy needs a combination of memorization and visualization.¹³ Therefore, teaching anatomy in a clinical context and providing frequent anatomy topics are essential,¹⁴ although methods of instruction such as dissection should be “a rite of passage,” at least for medical students.¹⁵

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Table 1. Gross Anatomy Curricula of the Study Sample

Degree Program	No. of Students (% of the Total)	ECTS Credits in Anatomy	Amount of Theory Lessons (h)	Amount of Practical Lessons (h)	Total Amount of Hours
PT	73 (41.24)	12	95	25	120
Medicine	39 (22.03)	23	182	48	230
Podiatry	39 (22.03)	12	95	25	120
Nursing	26 (14.68)	6	50	10	60

ECTS, European Credit Transfer System; PT, physical therapy.

Strategies to encourage knowledge transmission are as important as educational knowledge testing to ensure the quality standards of the teaching-learning process.^{16,17} Gross anatomy knowledge can be assessed by written, practical, or oral tests.¹⁸ There has been a shift in emphasis from practical and oral evaluation toward written methods, even though it has been advised to preserve the practical test as a key element in the evaluation.¹⁷ Written means of assessment are able to highlight important areas of the curriculum, although they may lack face validity.¹⁷

To such end, several tools have been designed (ie, anatomy spot tests) like the carpal bone test¹⁹ and the tarsal bone test.²⁰ These tests may help to provide a preliminary assessment of bone anatomy knowledge among health care professionals providing care for upper and lower extremity musculoskeletal conditions.²⁰ Previous research shows that medical students report a below-average level of confidence in the region-specific clinical examination of the musculoskeletal system²¹ and that they exhibit worse retention of carpal bones anatomy than physical therapy students.²²

The aim of the study was to assess and compare the knowledge of fourth-year medicine, physiotherapy (PT), nursing, and podiatry students in carpal and tarsal bone anatomy using the carpal and the tarsal bone tests.

METHODS

Design

An observational and cross-sectional study was carried out.

Participants

Based on a nonprobability convenience sampling, 221 fourth-year students from the nursing, podiatry, PT, and medical schools at a large Spanish University were asked to participate as volunteers. Of the total number of eligible participants, 44 of them declined to take part. The study was conducted at the end of May 2014, during the 2013-2014 academic year. The whole sample included 177 students from the podiatry (n = 39), nursing (n = 26), PT (n = 73), and medicine (n = 39) programs. Data collection took place during standard class time, and participants were advised that results from the study were not part of their university assessment.

In Spain, PT, nursing, and podiatry are 4-year degree programs, whereas medical school is a 6-year degree. Therefore, at the time of data collection, PT, nursing, and podiatry participants were about to finish the fourth and last term of their degree and very close to gain licensure, in contrast with students from the medical school. After the 6-year degree program, medical students have to receive residency training for 3 or 4 years before licensure.

All students had passed the gross anatomy examinations in their own degree program. The University of Seville curriculum model, for all assessed disciplines in this study, follows a traditional approach wherein basic science instruction precedes clinical science instruction. The gross anatomy course is taught in the first year of the curriculum for nursing, PT, and podiatry studies, whereas in the medical school, anatomy is included in the first 2 years. In either case, gross anatomy subject is, therefore, prior to the study of diagnosis, pathology, and treatment methods. The same Anatomy department teaches in these 4 disciplines with similar standards and usually with the same professors. However, the total amount of anatomy teaching hours does differ between disciplines (Table 1). Gross anatomy is divided into theoretical and practical lectures. Anatomy practical lessons take place in dissection rooms. After a brief theoretical introduction, students proceed to the recognition of a number of anatomic samples (ie, sheets, models, previously prepared anatomic material, and corpses). In addition, the medical degree includes a significant amount of further training on anatomic and sectional radiology.

Ethical Approval

The study protocol fully complied with the ethical guidelines established by the institutional review board of the University of Seville, Spain. It was designed and conducted according to the Helsinki Declaration. All subjects signed and submitted an informed consent form prior to their inclusion in the study.

Outcome Measures

Carpal and Tarsal Bone Tests. In the carpal bone test (Fig 1),²² participants are asked to label hand and wrist bones. The bones of the carpal region can be easily and objectively examined

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