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IMPACT OF THE TEACHING-LEARNING ANATOMY IN THE TRAINING OF MEDICAL DOCTORS IN MOZAMBIQUE

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ABSTRACT

The study of human Anatomy is an integral component of the training of medical students worldwide and remains one of the most extensive and demanding basic science disciplines due to its immense knowledge base and the diversity of its components. At the Faculty of Medicine of the University Eduardo Mondlane in Mozambique, Anatomy course is expected to teach students the structure of the human body and its functional aspects. The knowledge of the normal structure of the body is considered essential for the understanding of pathological changes which take place within different systems and organs. Therefore, in the context of the teaching and learning Anatomy, and taking into account that the students not only need to know the concepts and principles of the medical sciences, but must also learn how to apply this medical knowledge, the study aimed to evaluate the role of the teaching-learning of Anatomy and to contribute to restructuring the medical curriculum in such way that it better addresses a better quality of medical professional. To this end, a cross-sectional quantitative and qualitative design applying three different instruments, questionnaire, clinical reports and semi-structured interview, were used.

KEYWORDS: Anatomy, teaching-learning, medical curriculum.

1. INTRODUTION

1.1 General Background

In Mozambique, the National Health Service is expected to provide health care to all citizens and it attempts to provide coverage for a large, dispersed, and poor population and it brings enormous challenges in the training of medical personnel. At this stage, medical doctors in

Mozambique are trained in four higher institutions, (three public and one private) geographically located in the three main regions of the country, South (UEM and ISCTEM in Maputo City), Centre (UniZambeze in the City of Tete) and North (UniLúrio in Nampula).

Taking into account that the purpose of a medical education is to graduate individuals well fitted to meet the present and future needs of a society for medical care, the main objective of the medical course is to graduate medical doctors with a high level of technical skills, who are able to: i) give priority to preventive medicine in particular by paying attention to developing community health, nutrition education and environmental sanitation to protect mothers and children, to combat preventable diseases and to organize services for schools and occupational health; ii) organize and conduct curative medicine by providing curative care in rural and urban areas and by helping to prioritize the establishment of health centers and health posts in rural areas; iii) help define a national policy to combat epidemics; iv) assist in developing technical scientific research.

The professional profile of the graduates of these faculties has been defined by specification of the functional areas in which graduates may have to work and the types of activities to be performed therein. The graduate of medicine will be able to execute the activities in both public and private institutions in the sectors such as Health (Hospitals; Health Centres; Sports Medicine; School Health; Joint Health Service Institutes; Research Centres; Centres for Preventive Medicine; Medical Consultations; Home Visits and Sanitation and Environmental Health Centres), Education (Faculties of Medicine; Training Centres) and Defence (Military Medical Service; Justice and Forensic Medicine). Therefore, teaching in this Faculty has the purpose of ensuring that the students gain knowledge and skills that they are able to apply effectively to diagnosing and managing patients.

Despite the fact that in many countries, including the Southern African region, medical curricula has changed over the time to more integrated models, although, at the University Eduardo Mondlane, the main and oldest higher education institution in Mozambique, the curriculum is still organized in separate, independent disciplines (supposedly related to one another at least in a logical sequence). The curriculum consists of six semesters (the first three years) for basic and pre-clinical disciplines, followed by six semesters (the fourth, fifth and sixth years) for clinical disciplines. The clinical phase includes rotations through the departments of Maputo Central Hospital (HCM), during which time students are expected to master basic clinical skills.

The seventh year of training consists of a one-year clerkship program, which includes rotations in the four major clinical areas (Internal Medicine, Surgery, Gynecology and Obstetrics, and Pediatrics) and an integrated rural traineeship (focusing particularly on the national health programs and on how to manage a health facility).

To achieve the aims prescribed by the curriculum, conventional teaching approaches are used, including lectures, non-clinical teaching (seminars, tutorials and laboratory/practical's) and clinical teaching (bed-side and community–oriented medicine approaches). As a result, the medical students are exposed to the basic and pre-clinical sciences in the classroom and to clinical experiences in the main national hospital, the Maputo Central Hospital – HCM, where they are involved in two different settings: patient-based teaching (clinical setting) and theoretical teaching in the classroom.

The main learning resources for the students are books, supplemented by the teacher's handouts (lecturer's notes; copies of overheads shown at lectures). Because the vast majority of the students cannot afford to buy books themselves, they must rely on books offered by the library of the Faculty or borrowed from the classmates or students in higher years. The students' library is located in the building of the Faculty. Departments have their own discipline-oriented libraries. The medical students also have access to a computer room with 25 computers with Internet access but without CD-ROM players.

Teaching approaches are based on a teacher-centered model, with the theoretical components of the courses in both the basic science and the clinical cycles delivered in a large group format, while relatively small groups are used in practical's. Bearing in mind that what the teacher transmits in discipline content is useful only to the extent that it helps the student/doctor to deal effectively with patients and medical problems; the presentation of the subject matter should be aimed at helping the students to relate the subject matter to the problems, and what is examined is the effectiveness of how the students manage health problems. Thus, the current structure of the medical course at UEM is assumed to be organized in such way that it allows the student to deal with Mozambican health problems.

Therefore, regarding Anatomy syllabus, it is expected to teach students the structure of the human body and its functional aspects. The knowledge of the normal structure of the body is considered essential for the understanding of pathological changes which take place within different systems and organs. Thus, the subject matter of the course is assumed to be the first

step towards further medical teaching such as Physiology, Immunology, Path morphology and Path physiology, and this course is also perceived as part of the syllabus leading to integrated knowledge of structure and function of the human organism in both the state of health and illness.

On one other hand, the knowledge of Anatomy is recognized as indispensable in the prospective medical profession, irrespective of the chosen speciality. The understanding of diagnostic procedures, using modern techniques of imaging such as ultrasonography, computer tomography (CT) and magnetic resonance imaging (MRI) are nowadays essential. These techniques enable visualization of not only the fine anatomical structures but also their topographical relations that will, in the future, help students to make diagnoses and planning appropriate medical procedures. While, on the other hand, and, in addition to the regionally descriptive Anatomy based on regions, topographical Anatomy is also included in the curriculum at UEM, allowing the students to understand the spatial relations of various regions of the body and helps them to achieve the general learning objectives and, of course, at the end of their studies, each student should: i) be able to use the common descriptive anatomical terms correctly and appropriately; ii) have acquired a basic understanding of the functional significance of structures, their anatomical relationships, and their developmental history; iii) be sufficiently familiar with surface Anatomy, so as to be able to demonstrate and display by inspection and palpation the most important structures of the body of the living subject; iv) have mastered the basics of diagnostic imaging as an aid in understanding Anatomy; v) be sufficiently skilled in Anatomy to be able to study other basic medical science and clinical courses that require familiarity with human morphology; vi) be able to apply the relevant anatomical information to basic clinical problems.

The practical training in Anatomy of living subjects is complementary to the program of dissection and study of prosected specimens. It is assumed that dissection of the cadavers enables students to understand the complex structure of the living body, to become familiar with the shape, dimensions, structure and functions of organs and systems. For this reason dissection was reintroduced to the Anatomy course in 1997. In a previous study [5], the combination of lectures, tutorials and dissection emerged as being perceived by the students as the most effective teaching approach as compared with other uses of the teaching time. Although, there is a general perception, among the clinical cycle lecturers, that the students in the clinical years at UEM have difficulty in applying the Anatomy learnt in the pre-clinical

years in the context of diagnosing and managing patients, students to proceed to the clinical cycle, they have to pass all the syllabus of the basic cycle, that includes anatomy subject.

1.2 Aim of the Study

In the context of the Teaching and Learning of Anatomy, and taking into account that the students not only need to know the concepts and principles of the medical sciences, but must also learn how to apply this medical knowledge, this study aimed to:

i) Evaluate the role of the teaching-learning of Anatomy in promoting an understanding of what is experienced in clinical practice.
ii) Contribute to restructuring the medical curriculum in such way that it better addresses the current Mozambican health care needs and ensures a better quality of medical professional.

Thus, taken within this perspective and considering the fact that Anatomy is one of the first courses of the medical training and is recognised as an essential component of the foundation for the subsequent training, it was deemed necessary to evaluate if the students have the same feelings as the Faculty staff, particularly regarding the quality of training. To this end the following key questions were addressed

Question 1

Is the Anatomy course perceived by the students to be structured to address their needs regarding medical practice?

Question 2

Is there a relationship between performance in Anatomy and other disciplines as recognized by the students?

2. MATERIAL AND METHODS

The study was carried out in an attempt to evaluate the effectiveness of the teaching-learning of Anatomy for promoting an understanding of what is experienced in the clinical practice, and to contribute to medical curriculum reform regarding the actual health carry needs in the Mozambican social context. To this end, the impact of teaching-learning Anatomy on the medical training/practice at the Faculty of Medicine at UEM was evaluated using a cross-sectional quantitative and qualitative design applying three different instruments (questionnaire, clinical reports and semi-structured interview). Such combination of qualitative and quantitative data-gathering instruments is advantageous, as [6] and [3] argued. The decision to use these

different types of instruments for data collection was reinforced by reference to previous studies, where effective data collection was described by using these types of instruments. As [2] also stated "the qualitative components provide richness to the data and are a valuable source for identifying relevant variables. The quantitative components provide the ***hard*** data necessary to document the degree of the effects". Similarly,[4] describe several reasons for combining qualitative and quantitative instruments: i) the combination of instruments enables a confirmation or corroboration of each other via triangulation; ii) It makes possible an elaboration or development of analysis, providing richer detail (results of the first method inform the second's sampling); iii) Quantitative methods "persuade" the reader through de-emphasizing individual judgement and stressing generalizable results. On the other hand, qualitative research persuades through rich strategic comparisons across subjects, thereby overcoming abstraction inherent in quantitative studies; iv) During analysis, quantitative data can help by showing the generality of specific observations, and verifying or casting new light on qualitative findings. Looked at from the other side, qualitative data can help the quantitative side of a study during design by aiding the conceptual development of the researcher and instrumentation. During analysis they can help validating, interpreting, clarifying, and illustrating quantitative findings.

However, quantitative instruments such as questionnaires have several disadvantages when used alone, since, with such instruments there is no opportunity for asking clarifying questions immediately after a particular response has been given. Particularly in the case of the clinical reports, such instruments are static and give no information about the stability and dynamics of participants' conceptions. Thus, to compensate for these disadvantages, interviews were also used. Therefore, all the instruments contribute in different ways to evaluating the participants' perceptions on the impact of teaching-learning Anatomy on the medical training/practice at UEM.

3. RESULTS

3.1 Characteristics of the Sample

The sample for this study involved students of the clinical years of the medical course (4^{th}, 5^{th}, 6^{th} and 7^{th} years) who filled the questionnaire designed to gather data and junior doctors working at the Department of Casualty and Emergency at HCM. The demographic characteristics of the participants are displayed in Table 1.

Table 1: Number of participants by gender and year of study

	Male (N)	Female (N)	Total by year (N)
4th year students/2012	39	25	64
4th year students/2011	22	21	43
5th year students	42	39	81
6th year students	14	15	29
7th year students	8	14	22
Junior doctors	6	4	10
Total of participants	131 (53%)	118 (47%)	249

Two hundred and forty nine subjects out of a possible two hundred and sixty three completed the questionnaire in two tranches. The first tranche was 185, 4th, 5th, 6th and 7th years' students of 2011 and junior doctors while the remaining 64 were the 4th year students of 2012 academic year. These participants were available on the days that were used for administration of the questionnaire. None of the respondents took the questionnaire home and none of them could discuss the contents of the questionnaire with their colleagues. The participants were 53% male and 47% female. The 4th year cohort of 2012 contained no students who had been in the 4th year class in the previous academic year. All students in the 4th, 5th, 6th and 7th years and all junior doctors filled in the questionnaire. Nine eligible 4th year students in 2011 and 5 of the class of 2012 did not complete the questionnaire, which produced a response rate of 95%.

3.2 Perceived Influence of Teaching-Learning Anatomy on the Quality of Medical Training/Practice

As yet mentioned, one of the aims of the study was to discover if the teaching-learning Anatomy in UEM is aligned with the students' perceived needs regarding their training as medical professionals. The participants of the study were asked to express their opinion on 50 items, which explored their perceptions of the adequacy of the teaching-learning process of Anatomy to the needs of the clinical practice, using items on a five-point Likert-type rating scale. After the questionnaire responses had been entered into a spreadsheet, all 25 negatively worded items were reverse scored before further analysis. Coefficient Alpha was run on all 50 items for the cross-sectional sample yielding an α=0.90 for the total scale (Table 2).

Table 2: Cronbach's Alpha Coefficients of sub-scales and scale by year of study

	4th	5th	6th	7th	Junior doctors	total
Quality of teaching	0.92	0.92	0.90	0.89	0.91	0.91
Teaching strategies	0.86	0.84	0.89	0.88	0.88	0.87
Other medical courses	0.88	0.84	0.88	0.87	0.93	0.87
Benefits of learning	0.93	0.89	0.90	0.91	0.92	0.90
Applying Anatomy	0.88	0.83	0.90	0.90	0.92	0.88
Total Scale	0.90	0.90	0.89	0.87	0.86	0.90

When the items were analyzed in their relevant sub-scales (as intended by the design), the following results were found: "quality of teaching Anatomy at UEM" α=0.91; "efficacy of teaching strategies used in Anatomy at UEM" α=0.87; "Anatomy and related medical courses" α=0.87; "perceived benefits of learning Anatomy to the medical training/profession" α=0.90 and self- reported "ability in applying anatomical knowledge in other medical courses and practice" α=0.88. As can be seen in Table 2, the Coefficient Alpha showed great consistency across the years of study of the cross-sectional sample since there were no values below 0.83 in any of the sub-scales, nor in any of the years of study.

Reliability coefficients were also calculated for the responses of the 4th year students of 2012. These results were compared with the 4th year students of 2011, because each the students could participate only once in this study due the fact that the study was not repeated (see Table 3). From this Table 3 it is evident that the Cronbach' s Alpha Coefficients of each sub-scale and the total scale were similar for both 4th year groups revealing that time (different academic years) did not affect the consistency in rating the items.

Table 3: Cronbach' s Alpha Coefficients of sub-scales and total scale by 4th year of study of the different academic years.

	4th year 2012 n=64	4th year 2011 n=43
Quality of teaching	0.93	0.92
Teaching strategies	0.84	0.86
Other medical courses	0.88	0.88
Benefits of learning	0.92	0.93
Applying Anatomy	0.83	0.88
Total scale	0.93	0.90

3.3 Influence of the Year of Study

One-way analyses of variance were carried out on the five sub-scales and the total scale on the cross-sectional data across the 4 years of study and junior doctors. The results are presented in Table 5. Significant differences were found for "quality of teaching Anatomy at the Faculty of Medicine at UEM" ($F_{(4:180)}$=2.485; p<0.045), "perceived ability in applying anatomical knowledge" ($F_{(4:180)}$=2.830; p<0.026) and the total scale ($F_{(4:180)}$=2.909; p<0.023). As the variances of the groups were statistically equal, Bonferroni '*t*' tests were carried out as post hoc tests in order to establish where the significant differences were. The "quality of teaching Anatomy at the Faculty of Medicine at UEM" sub-scale showed a significant difference between the 4th and 5th year students only, with the 4th year having a significantly higher score than the 5th year students. The "perceived ability in applying anatomical knowledge" sub-scale and the "total scale" had no statistically significant differences in the post hoc analysis.

Table 5: One-way analysis of variance on the sub-scales and the total scale, by year of study

Sub-Scale	4th year Mean(SD)	5th year Mean(SD)	6th year Mean(SD)	7th year Mean(SD)	J. Doctor Mean(SD)	$F_{4:180}$ (p)
1	3.9(0.86)	3.4(0.92)	3.6(0.93)	3.5(0.89)	3.6(1.00)	2.49(0.045)*
2	4.1(0.80)	4.1(0.61)	3.6(0.95)	4.0(0.84)	4.0(0.85)	1.84 (0.124)
3	3.7(0.75)	3.9(0.54)	3.7(0.84)	3.5(0.79)	3.4(1.10)	1.57 (0.185)
4	4.4(0.62)	4.4(0.52)	4.2(0.66)	4.2(0.80)	4.1(0.79)	1.33 (0.260)
5	4.1(0.75)	4.0(0.63)	3.7(1.01)	3.8(0.95)	3.4(1.00)	2.83(0.026)*
6	4.1(0.44)	3.9(0.40)	3.8(0.49)	3.8(0.45)	3.7(0.46)	2.91(0.023)*

1. Quality of teaching; **2**. Teaching strategies; **3**. Other medical courses; **4**. Benefits of learning; **5**. Applying Anatomy; **6.** Total questionnaire; * significant at 5% level

3.4 Cohort Effect

Both the 4th year students in 2011 and in 2012 completed the questionnaire at the end of their second semester. Means of these two groups were compared by using t-tests. These results are presented in Table 6. Two significant differences were found, both at the 5% level.

As can be seen in Table 6, the fourth year students of 2012 scored higher than the previous year's class on the "Anatomy and other medical courses" sub-scale, whilst the roles were reversed on the "perceived benefits of learning Anatomy to the medical training/profession" sub-scale. There were no significant differences in the other sub-scales and in the total scale. Nonetheless, the results showed a degree of consistency across the time.

Table 6: Means and standard deviations by academic year of the 4th year students and *t*-test values for each sub-scale

Sub-Scale	2011 (N= 43)	2012 (N=64)	t_{105} (*p*)
	Mean (SD)	Mean (SD)	
Quality of teaching	3.9 (0.86)	3.8 (1.00)	-0.621 (0.536)
Teaching strategies	4.1(0.80)	4.1 (0.67)	0.058 (0.954)
Other medical courses	3.7(0.75)	4.0 (0.46)	2.491 (0.014)*
Benefits of learning	4.4 (0.62)	4.1 (.75)	-2.092 (0.036)*
Applying Anatomy	4.1(0.75)	4.07 (.67)	-0.492 (0.624)
Total Scale	4.1(0.44)	4.0 (0.49)	-0.380 (0.705)
* significant at 5%			

3.5 Performance in anatomy and perception of students' needs regarding medical practice

Performance in Anatomy was calculated for each group for the cross-sectional sample, considering, means and standard deviations for each sub-scale and for the total scale. Here, the values of the t-test were computed in order to compare the two groups and all of these values are presented in Table 7. There, no statistically significant differences were found between the students who had performed well in Anatomy and those who had performed adequately in any of the sub-scales or total scale in the cross-sectional sample. Thus, for this sample, performance in Anatomy does not seem to impact on the perception of the influence of the teaching-learning process of Anatomy at the Faculty of Medicine at UEM on the medical training/practice.

Table 7: Means and Standard Deviations by performance in Anatomy and t-test values for each sub-scale and total scale of the cross-sectional sample

	Satisfactory (n=158)	Good (n=27)	T_{183} (*p*)
Sub-scale	Mean (SD)	Mean(SD)	
Quality of teaching	3.6 (0.94)	3.7 (0.85)	-0.612 (0.541)
Teaching format	4.0 (0.77)	4.0 (0.75)	0.122 (0.903)
Other disciplines	3.8 (0.58)	3.5 (0.87)	1.745 (0.901)*
Benefits of learning	4.3 (0.62)	4.3 (0.56)	0.363(0.717)
Applying Anatomy	3.9 (0.81)	3.9(0.80)	0.304 (0.761)
Total Scale	3.9 (0.43)	3.9 (0.54)	0.665(0.507)
* unequal variances were found, Fisher-Behrens *t*-test was used			

3.6 Quality of use of anatomical knowledge in clinical practice

To assess the usage of knowledge acquired by the students when learning anatomy two hundred and seventy clinical reports were completed by the 7th year only students (internal students) and junior doctors and then evaluated/analysed for the research purposes. Then, 122

of those clinical reports were used in the establishment of inter-rater agreement. Each senior student therefore generated 10 reports, and each junior doctor 5 reports. Thus, the analysis was based on independent reports, which were produced by the same individuals. Before examining the data of the clinical reports, four domains were selected as they were considered the most important indicators of the quality of the medical record in patient care at the Department of Casualty and Emergency at HCM. All the domains were rated in four categories according to the levels of description in the clinical reports. The frequency distribution of each of the domains in the reports is also presented. Thus, regarding the use of anatomical terms in reporting history taking, only 54% of the reports of the senior students and 62% of the reports of the junior doctors showed a frequent usage of anatomical terms at satisfactory or good level, without significant differences when the comparing the two groups.

On one hand, regarding the description of the physical examination, it was found that more than 50% of the 270 clinical reports analysed showed a level of description with some value since 54% of the clinical reports of senior students and 62% of junior doctors' reports had a description better than "inadequate". It showed that 55% of the total sample described the physical examination at least oriented to the complaints of the patient and based on the description of positive and negative signs. Here, the junior doctors' reports of the physical examination appeared to be more coherent than those of the senior students, although there were no significant differences in any of the categories between the two groups. It is important to note that 21% of the participants did not write anything at all about the physical examination.

On the other hand, when analysing the reports for a probable diagnosis the majority of the reports was consistent in showing a probable diagnosis. Here, as expected, junior doctors, again, were more likely to give such a diagnosis, having done so in 86% of the reports, and senior students in 80%. In contrast to the use of anatomical terms and the report of physical examination, the probable diagnosis was superior in the reports and a good diagnosis was suggested in 80% of the reports. On the other hand, regarding a request of diagnostic/therapeutic procedures, disturbingly, 30% of all clinical reports completed by junior doctors did not request any therapy or mention a further investigation at all. Otherwise, the same pattern prevailed, with the proportion of good reports being higher for the junior doctors than for the senior students.

3.7 Perceived usefulness of anatomy, the effectiveness of the teaching-learning of anatomy and medical practice

The usefulness of the clinical reports showed a range from virtually no use to very useful when they were grouped by using the categories previously defined. In order to understand the reasons for this range of variability the two 7th year students (senior student) and one junior doctor who had the weakest overall quality of clinical reports and the two 7th year students and one junior doctor who had the best overall quality of clinical reports, were selected for an interview. To conduct these six interviews, it was necessary for patients to be available in the "*Balcão III*" room when the senior student/junior doctors were on duty. Each selected senior student/junior doctor was interviewed individually after examining a patient and completing the clinical report. These clinical reports were not part of the 270 analyzed previously. The interviews were conducted in a patient booth with no patient and no one else present. The interviews lasted between 15 and 30 minutes. All of the recorded comments below occurred in at least five of the six interviews. Probably, because the interviews were semi-structured there were no comments outside of the proposed framework. This means that, in general, there were no differences in the participants' opinions. The contents extracted from the interviews is transcribed and presented in Table 8 without separating senior students and junior doctors. These common opinions on the usefulness of the teaching-learning Anatomy at UEM in medical practice justify the categories attributed to the quality of the clinical reports and seem to corroborate the opinions presented in the questionnaire.

Table 8: Interviewees' comments

1. It is necessary to use anatomical terms in the clinical report
2. The use of anatomical knowledge is necessary in conducting the examination of a patient
3. In general, I feel I have good ability in the application of anatomical knowledge in medical practice
4. I feel I am able to apply anatomical knowledge in managing a trauma patient
5. There is a need to perform a physical examination of the patient
6. There is no need to write the full clinical history in the Department of Emergency
7. There is a need to have a different clinical report form in the Department of Emergency because of the time-consuming nature of the current form.
8. It is necessary to strengthen the vertical integration of Anatomy (in clinical disciplines) within the medical training program 9. Most of the repetition of the contents in the medical course are unnecessary since the approaches are at same level of complexity and do not add any identifiable new knowledge 10. With the present timetable related to the high number of courses and number of tests it is not possible to acquire more than the necessary to pass the examinations
11. The content of the Anatomy course is not well-oriented to the clinical practice 12. It is essential to retain the acquisition of basis of the anatomical knowledge as part of the Anatomy course

13. It is always necessary to ask for radiographs when managing trauma patients independently of the clinical reasoning of the doctor
14. The ability of the doctors, including senior students and junior doctors, in interpreting the radiographs is weak
15. There is no possibility to report in detail what has been done when conducting a patient's examination at the Emergency even in the case of there being no evidence of life-threatening situations in the patients at this Department
16. Even in the case of a patient that has to be referred to another doctor there is no need to report the clinical history since it always better to start examining the patient from the beginning, so that logical reasoning will lead to the diagnosis
17. If the patient comes, again to the same doctor because of the same problem a few words could help more than an extensive report.
18. It is evident that there is a need to improve the quality of the clinical report particularly when considering the clinical procedures but it implies a need to improve the medical training.

The extraction of common themes was done following the principles of thematic content analysis.[1] The three major themes, which emerged, are shown in Table 9.

Table 9: Themes based on interviewees' comments

THEMES	Comments
(i) Use of anatomical knowledge in medical practice	1,2,3,4,5,8,11
(ii) Quality of the clinical report affected by the workload	6,7,15,16,17,18
(iii) Medical curriculum and the role of Anatomy	8,9,10,11,12,13,14
Numbers refer to the numbering comments in Table 8.	

These common opinions were supported by specific comments on teaching-learning Anatomy at UEM, which can be exemplified by the comments of the following three interviewees:

Interviewee 1: "When we start the clinical cycle, in general we have forgotten what we have studied in the basic cycle since at the beginning of the course what worried us was to get the necessary mark to pass the disciplines. Only in practice do we realise that it is necessary to know Anatomy in order to understand what is going on. I am confident that I am well prepared to conduct a patient's examination. However, if I could easily remember what I have been taught in Anatomy I would not need to spend the time which I am spending in trying to interpret the clinical findings."

Interviewee 2: "There is a lot of information in Anatomy which I did not use in my practice while there is other information which I passed without understanding that it is necessary for medical practice. I realised that I was using the knowledge of surface Anatomy when carrying out the inspection and palpation during the physical examination only after starting

this talk. Thus, in my opinion, it will be necessary to review not only the content of the Anatomy course but also the relationship between this course and the related ones within the medical course".

Interviewee 3: "Look! I am confident of my abilities in managing trauma patients. It is too frequent here and for this type of patients we act like under a protocol driven since, if there is even a small possibility to have a fracture or severe contusion it is easy to ask for a x-ray and then send the patient to the Orthopaedic Department; if there is a bruise… send to the surgical room to get the necessary attention; meanwhile, if you can convince the patient that there is only a need to rest or take tablets for few days you can reduce the number of contacts with the same patient; i.e. you will not ask for unnecessary laboratory tests; it will be less number of patients at Orthopedic Department; therefore less consumption of time; money and technical resources. It is of importance to note that I feel more confident when I have to apply anatomical knowledge in a surgical context than in an internal medicine context. May be it is a consequence of the generalised idea that Anatomy is related to the surgical interventions. However, I know that I am using Anatomy when even I am proposing a hypothesis of a diagnosis that is based particularly on the findings of the physical examination. If we consider that for example the word knee, which could be considered as a trivial word, is an anatomical term. It means that it is not possible to communicate in medical context without using Anatomy. In addition, it is necessary to remember that the human body has the left and right knee then… neither communicating nor reasoning is possible without Anatomy".

Interviewee 4: "I used the words but I never thought that I was applying Anatomy. Effectively I was applying Anatomy but only now, I have realised it. It is evident that there is no need for me to say good things about the Department of Anatomy, since I will not be a student of this Department anymore and I am not interested in becoming a teacher, but I have to say that Anatomy should be considered as the foundation of the medical course and be exposed to the medical students in a different way from what is used currently. I have learnt Anatomy. I achieved a good mark (more than 14 marks) but I forgot most of the content of the course. I did not recognise the use of medical knowledge in the medical practice. I saw the medical practice as an application of physiology or pathology but… yes! It is Anatomy left/right; kidneys; liver; vertebra; left second intercostals space, jugular vein. You are right! Internal medicine, surgery, paediatrics, whatever in the medical context starts with Anatomy, with communication with the precise anatomical terms and not with inexpressive and vague

words. However it is easier to say upper limb than arm/forearm/hand and it becomes worse if it is necessary to add things like "at the 1/3 superior part of the antero-lateral face of the right forearm" to indicate for example a trauma present at the level of the head of the radius. What worries me in assisting trauma patients is the related inability in interpreting exams like x-ray. Most of the time and more particularly if there is a possibility of the existence of fracture that is not always obvious I use to send the patients to the Orthopedic Department. If I knew more, or in other words, if I was more competent in this issue it could be less expensive to the system in terms of time and resources. Please try to explore aspects like that when reviewing the Anatomy contents".

Regarding the quality of the clinical report affected by the **workload,** the comments suggested that all of the participants agreed that there is no need to write down accurate details of the patients' complaints and physical examination. This is supported by the following quotes:

Interviewee 2: "A very short physical examination could be more useful than a complete one if it is well oriented to the patient's complaints in conjunction with a structured analysis of the possible related consequences (considering the mechanisms of disturbance and the structures affected). I am sure that it is necessary to report in a technical way all what I could collect related to the patient but… look how long could it take? On the other hand, I never saw someone reading the notes from others. Even knowing the shortness of time, everybody prefers to start collecting from the personal details. If I need to see again the same patient, I will need to re-start the history taking; why have I to write adequately? It is enough to think in a right way and… the patient will be safe".

Interviewee 4: "With a short time as we have to assist patients at Emergency only positive information and particularly that which could possibly influence the presence of a life threatening risk should be clearly stated; otherwise small and less important things could take precious time in a highly sensitive Department such as Emergency".

Interviewee 5: "I think that there is no need to explain, for example, that a radiograph was requested only for the patient's satisfaction and not as a necessary investigation. Thus, it is important to keep in mind that use of a few words does not necessarily imply that things were done in an incorrect sequence. Furthermore, the clinical form at the Emergency is used once only. Even if the patient is seen, again after a few minutes a new clinical form has to be used. In these cases, it a waste of time to record in detail what has been done if it will not be used.

On the other hand, if the patient has to be seen by a specialist he/she will re-start the clinical evaluation without considering the notes made by the other clinicians".

Interviewee 6: "Have you seen how many patients do I have to assist? If I try to report everything at what time I will finish? In addition, this type of patient is very common and because of that there is no need to apply deep reasoning in order to establish the most probable diagnosis or to propose a list of probabilities. On the other hand, it is more important to get a correct diagnosis or at least to treat the patient than to show the others that you can write down a lot of information. Sometimes it is possible to help properly a patient without considering all the steps that we needed to learn to pass the examinations. Why do we need to check if the patient is in a good nutritional condition if he/she came only because felt down or had a car accident? I'm working in the Emergency not in the Health Centres".

4. CONCLUSIONS AND RECOMMENDATIONS

From the results yet presented, the study was directed at answering two key questions relating to the role of teaching-learning Anatomy in the medical curriculum in the Faculty of Medicine of the University Eduardo Mondlane. Thus, these results allow concluding: i) Firstly, all the responses on the questionnaire about on teaching-learning process of Anatomy were positive toward each of the sub-scales (quality of Anatomy teaching at the Faculty of Medicine at UEM; teaching strategies used in Anatomy; perceived benefits of learning Anatomy; ability in applying the anatomical knowledge in clinical practice and the usefulness of Anatomy to the other medical courses). The values found suggested that the medical curriculum at UEM met the students' expectations regarding their medical training. However, the in-depth study, through the interviews and evaluation of the clinical reports showed that there is in fact a need to adjust the quality of medical training to meet expectations regarding medical competence. There is a need to review the current medical curriculum in order to achieve better integration between the courses and cycles (basic and clinical) and particularly to improve the efficacy of the teaching-learning process by selecting the content more appropriately and adjusting the assessment procedures; ii) Secondly, when looking at the result on the research question asking about the student confidence with their knowledge of anatomy when dealing with patients in practice, it was found that, Junior doctors' use of anatomical terms in clinical reports was in general better than that of the senior students and the junior doctors' reports of the physical examination was more coherent than that of the senior students. The majority of the reports showed a probable diagnosis based on the clinical

history. It is therefore not so much anatomical knowledge *per se* which is deficient (since the junior doctors would be more likely to have forgotten facts) but the appropriate application of that knowledge which could be improved. Clearly, the superior experience and confidence of the junior doctors have contributed to their ability to apply the knowledge acquired several years previously.

Indeed, from the interviews it was also possible to conclude that the importance of Anatomy is well recognised within the medical training/practice but this importance needs to be adjusted to the real role of Anatomy since the participants reported a lack of ability in applying anatomical knowledge in the clinical context. This suggests that even with more experience, i.e., at the level of the junior doctors, the application of anatomical knowledge in medical practice does not always achieve what might be expected of a qualified doctor. However, it should be noted that the relative differences between the ability of senior students and junior doctors to use anatomical knowledge may indicate the need for different teaching methods in the earlier years with more emphasis on application. Changing the learning experiences of the undergraduate students may enhance the ability of the senior students and thus help to reduce the gap between what the senior students and the junior doctors currently accomplish through experience in the wards. Therefore, the teaching-learning process of Anatomy as well as the structure of the medical course should be changed in order to improve the quality of outcomes gained in the context of Anatomy and, as a consequence, improve the medical competence.

As the end remark, one can conclude that at the Faculty of Medicine of the University Eduardo Mondlane in Mozambique, students start clinical activities in the 4th year at which time they are expected to participate in patient-care activities, including care coordination, data gathering skills and patient-interaction techniques, with minimal time given to diagnostic reasoning. Thus, to meet the real needs of clinical practice, a priority should be the clinical exposure of students by engaging them in clinical problem solving appropriate for their level of training in the basic cycle which would allow them to develop better clinical reasoning. In addition, during the basic cycle it is important to develop and stimulate skills which express the applicability of knowledge as required in medical practice. To this end, horizontal integration of the pre-clinical disciplines (Anatomy, Histology, Physiology, Biochemistry, Microbiology, etc.) should be seen as a necessary action to be implemented in association with the integration of the pre-clinical disciplines with the clinical ones (Surgery, Internal Medicine, Neurology, Infectious Diseases, etc.). More vertical integration would thus also

appear to be indicated. Moreover, further studies are needed to better understand the impact of assessing the outcomes of the basic sciences such as Anatomy on the educational process as well as on medical performance/competency.

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