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Evaluation of Legal Medicine knowledge by medical students in a public university in Brazil's northernmost estate

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Abstract

Introduction: The knowledge hoarded by humanity grows and renews itself at each passing day, reformulating theories and proofing or discarding phenomena that were previously had as anomalies or certainties. Therefore, it is not hard to imagine that the way it is passed on to the subsequent generations has to change and suit new paradigms and available tools, in order to become better and more efficient. After all, at each year, there is more information to be passed on, but there isn't more time to do so. This stands out in the area of medical education, as medicine is a profession that nowadays seeks to exert its office with excellence, always based on solid evidence.

Methodology: The data here presented were collected only after the express consent and authorization of the competent department, the Standing Committee on Ethics and Research of the Federal University of Roraima (CEPE/UFRR) under the reports 3.636.850 of October 11th, 2019, and 3.892.410 of March 02nd, 2020. registered at the CAAE 21975519.7.0000.5302, available for public consultation at https://plataformabrasil.saude.gov.br.

The project was conducted as a transversal, qualitative and quantitative study through the application of standard questionnaires. It gathered a total sum of 203 questionnaires properly filled, throughout five applications. There were 11 invalid questionnaires, even after the five applications. In the end, the sample acquired was: 51 students of the sixth year, 80 students of the third year, and 72 students of the first year, all the samples were statistically representative of their groups according to the official list of enrolling of each respective year, which was provided by the Health Science Centre (CCS/UFRR) regarding the academic year of 2019.

Results: The following confidence intervals to Pearson R 1st year x 3rd year: 0,08403 to 0,7759; 1st year x 6th year: -1,12620 to 0,67720; 3rd year to 6th year: 0,36310 to 0,8695. Nonetheless, the growing performance stands out, as the first year held a mean of 4,708 (SD +/- 1,826) and a median of 5, the third year held a mean of 7,112 (SD +/- 2,407) and a mean of 7 and, at last, the sixth year held a mean of 9,803 (SD +/- 2,702) with a median of 10. Taking into consideration the amount of 20 items and the baseline for approval as 70 %, both third and sixth years had only 3 students, each, who marked at least 14 correct items, representing an approval rate of 3,75 % and 5,88 % respectively.

Conclusion: Based on the aforementioned, the data found suggest that, although students receive formal education and are approved by the Ministry of Education for employability and validation in face of the national scenario, there is evidence of a shortage in the areas of legal medicine, with the evident tendency to grow as the course progresses, but still insufficient when compared to the recently applied medical exams requirements standard.

Keywords: Legal medicine, Medical education, Public health.

Introduction

It is well-known that the quality of medical education is a very important topic since medicine is a career that involves human lives. In Brazil, medical students need to complete six years of theoretical, practical, and clinical classes to consolidate the medical fundamental knowledge. Nevertheless, there is a frequent complaint that the medical programs from the Universities present insufficient or lack of covering a few essential areas to the future physicians **[1–7]**, and Legal Medicine is included in this scenario.

The exact time that Legal Medicine began to exist is unknown. However, activities representing the core of Legal Medicine (i.e., medical knowledge in service of the law) are documented since 475 BC in ancient China, during the Warring-States period, as can be found in *The Book of Rites*, describing activities of physicians inspecting and evaluating the patient underdetermination of an authority. On the other hand, some authors give all the credits of the Legal Medicine to Charlemagne, at the beginning of the ninth century AD, where his *Capitularies* brought instructions to the judges that they must seek the support of medical evidence, especially in some cases (i.e., suicide and rape). Later, in the eleventh century, the French Bishops of Maine and Anjou employed medical experts to serve as consultants in judicial cases **[8–10]**.

It should be noted that Legal Medicine is wrongly considered equivalent to Forensic Medicine, therefore resulting in an unclear idea about its relevance to the medical practice. Legal Medicine applies scientific and medical knowledge to legal problems. In fact, Legal Medicine has greater relevance to civil and tort law, impacting patient care. In contrast, forensic medicine relates to criminal lawand damage to, or by, patients. Indeed, whenever under judicial order, the physician acts as an investigator and descriptor, translating the medical information into clear answers, abstaining from tendentious opinions **[11–15]**.

In Brazil, the history of Legal Medicine began in 1832, when D. Pedro II elevated and reformulated the practical courses of medicine. It focused on the technical practice existing both in Salvador and Rio de Janeiro into the extended curriculum, going from four years into a total of six years, with the mandatory practice of Legal Medicine, following the medical course structure in Europe. Nonetheless, the teaching of Legal Medicine was subject to several controversies along with the history of Brazilian medical education. The Brazilian Society of Neurology, Psychiatry, and Legal Medicine (SBNPML) raised a point of discussion in 1918 after two physicians complained about keeping facultative the Legal Medicine subject in the medical program of the recently founded Public Medicine at the headquarters of SBNPML. The referred discussion ended in favor of keeping the subject, but created precedence for other Medical Courses to make their own decision **[11–13]**

Legal Medicine is not included in the Federal University of Roraima (UFRR) Medical program, which remains the question of whether the learning method applied (Problem Based-Learning, PBL) is capable of promoting Legal Medicine-related knowledge in the medical students **[13,16]**. This study aims to evaluate if the UFRR's medical students present a progressive knowledge of Legal Medicine during the years of the course.

2. Methodology

This study was performed using a previous methodology proposed by **[17]** with minor modifications**[18,19]**. The study presents qualitative and quantitative nature and was conducted through the use of standard questionnaires applied to medical students at the Medical School of the Federal University of Roraima (UFRR). In total, 203 questionnaires were properly filled: 51 students of the sixth year, 80 students of the third year, and 72 students of the first year. All the samples were statistically representative of their groups according to the student's official list of each respective year, which was provided by the Health Science Center of UFRR.

The following criteria were evaluated to include each participant: (1) being a student properly enrolled at medicine course of UFRR at the first, third, or sixth year; (2) presenting 18 years old at least; (3) being not defined as socially vulnerable, such as immigrant, refugee, or indigenous.

For the questionnaire database, different questions regarding Legal Medicine were collected from several exams of selective processes for physicians in Roraima during the period of January 2015 till June 2019 (n= 183). The referred database covered 20 different topics of Legal Medicine (introduction to the legal medicine; medico-legal evaluation; medical anthropology; traumatology; periliation of life and health; work-related diseases and accidents; marriage and divorce; criminal sexology; sexual disorders and sexual identity; pregnancy; parturition and puerperium; abortion; familiar planning; birth control; infanticide; paternity investigation; toxicophilies; alcoholic drunkenness; thanatology; criminal and civil liability; medical deontology and medical diceology).

The questions selected for the study database were then chosen randomly through a ballot algorithm and respecting the ratio of the frequency of each Legal Medicine topic. As a result, a questionnaire within 20 questions was performed **(Table 1)**.

Table 1: Questionnaire composition covering different Legal Medicine topics.

Legal Medicine Topic	Question Number
Traumatology	1 - 6
Sexual disorder and sexual idendity	7
Periliation of life and health	8 - 10
Work-related diseases and accidents	11 - 13
Criminal and civil liability	14 - 15
Pregnancy, parturition and puerperium	16
Medical deontology	17
Birth control	18
Forensic anthropology	19
Alcoholic drunkenness	20

The Standardized Instrument for Knowledge Evaluation (SIKE) was applied as written form in classrooms under controlled conditions, and the students were invited to participate as volunteers, please refer to the supplementary material for a reproduction of the SIKE'S content. The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the Research Ethic Committee (CEP) under the reports 3.636.850 of October 11th, 2019 and 3.892.410 of March, 02nd, 2020, registered at the CAAE 21975519.7.0000.5302, available for public consultation at https://plataformabrasil.saude.gov.br. All the participants provided their informed consent for inclusion before their participation.

The individual results were grouped in a matrix and analyzed using Microsoft Excel (ver. 2016) and GraphPrism version 8.4.3. Different statistical tests were used such as T test for difference of means A/B left-tailed (inferiority) and right-tailed (superiority), One-way ANOVA and Pearson's correlation coefficient.

3. Results and Discussion

Our results demonstrated that the medical students from advanced years presented the highest performance in the Legal Medicine test **(Table 2)**. To facilitate the data interpretation, the comparisons between groups were analyzed using different scenarios, as can be seen below.

Scenario 1

In this scenario, the questionnaire results from medical students from the 1st year were compared with the medical students from the 3rd year. Regarding questions 1, 7, 9, 10, 12, 16, 18, and 19, there was no statistical differences between the tested groups. On the other hand, o 50 % of the questions (n=10), the advanced year (3rd year) presented a higher level of knowledge than the freshman students. There were two questions (questions 11 and 17) in which the students from the 1st year presented significantly higher performance.

Scenario 2

In this scenario, the questionnaire results from medical students from the 1st year were compared with the medical students fromthe 6th year. Regarding questions 1, 2, 6, 10, 11, 16, 17, and 19, there were no statistical differences between the tested groups. On the other hand, o 60 % of the questions, the advanced year (6th year) presented a higher level of knowledge than the freshman students. In none of the questions, the 1st year students presented significantly higher performance than the most advanced medical students.

Scenario 3

In this scenario, the questionnaire results from medical students from the 3rd year were compared with the medical students from the 6th year. Regarding questions 1, 4, 6, 8, 10, 11, 13, 14, 16, and 19, there was no statistical difference between the tested groups. On the other hand, on 45 % of the questions, the advanced year (6th year) presented a higher level of knowledge than the students from the 3rd year. In solely 1 question (question 2) the students from the 3rd year presented significantly higher performance than the most advanced medical students.

Table 2: Legal Medicine knowledge comparison among students in the 1st, 3rd, and 6th year of medical school at Federal University of Roraima.

Question	Scenario 1 1st year *vs* 3rd year	Scenario 2 1st year *vs* 6th year	Scenario 3 3rd year *vs* 6th year
1	*ns*	*ns*	*ns*
2	<	*ns*	>
3	<	<	<
4	<	<	*ns*
5	<	<	<
6	<	*ns*	*ns*
7	*ns*	<	<
8	<	<	*ns*
9	*ns*	<	<
10	*ns*	*ns*	*ns*
11	>	*ns*	*ns*
12	*ns*	<	<
13	<	<	*ns*
14	<	<	*ns*
15	<	<	<
16	*ns*	*ns*	*ns*
17	>	*ns*	<
18	*ns*	<	<
19	*ns*	*ns*	*ns*
20	<	<	<

The data was analyzed using GraphPrism version 8.4.3. using two-tailed hypothesis study by grouped variables through Pearson's correlation for the paired scenarios. Pearson's R interval of confidence: **Scenario 01** (0,08403 – 0,77590); **Scenario 02** (-0,12620 – 0,67720); **Scenario 03** (0,36310 – 0,86950).

ns: not significant

< : represents a statistical difference in favor of the latter group ($p < 0.05$)

> : represents a statistical difference in favor of the early group ($p < 0.05$)

Table 3: Legal Medicine knowledge among students in the 1st, 3rd, and 6th year of medical school at Federal University of Roraima.

	1st year	3rd year	6th year
Mean	4,708 (+/- 1,826)	7,112 (+/-2,407)	9,803 (+/- 2702)
Median	5	7	10
Grade Range	Min: 2 Max: 8	Min: 4 Max: 14	Min: 6 Max: 14

The data was analyzed using Microsoft Excel 2016, ver. 2107. The standard deviation of the mean is represented in brackets.

The growing performance stands out. Taking into consideration the amount of 20 items and the baseline for approval as 70 %, both third and sixth years had each of them only 3 students who marked atleast 14 correct items, representing an approval rate of 3,75 % and 5,88 % respectively, whereas the first year did not achieve approval. Indeed, the data above describes that there is a progressive growth and

accumulation of knowledge in this area, however, it is still far from what is expected of the majority of students at a state level.

Moreover, it is important to notice the intersection of performance on items 1 (of traumatology), 10 (periliation of life and health), 11 (work-related diseases and accidents), 16 (pregnancy, parturition, and puerperium), and 19 (forensic anthropology), as all the classes had globally low performance and had no statistic difference in between while staying below the inferior threshold. The weighted analysis of performance in accord with each topic of Legal Medicine is shown in **Figure 1**.

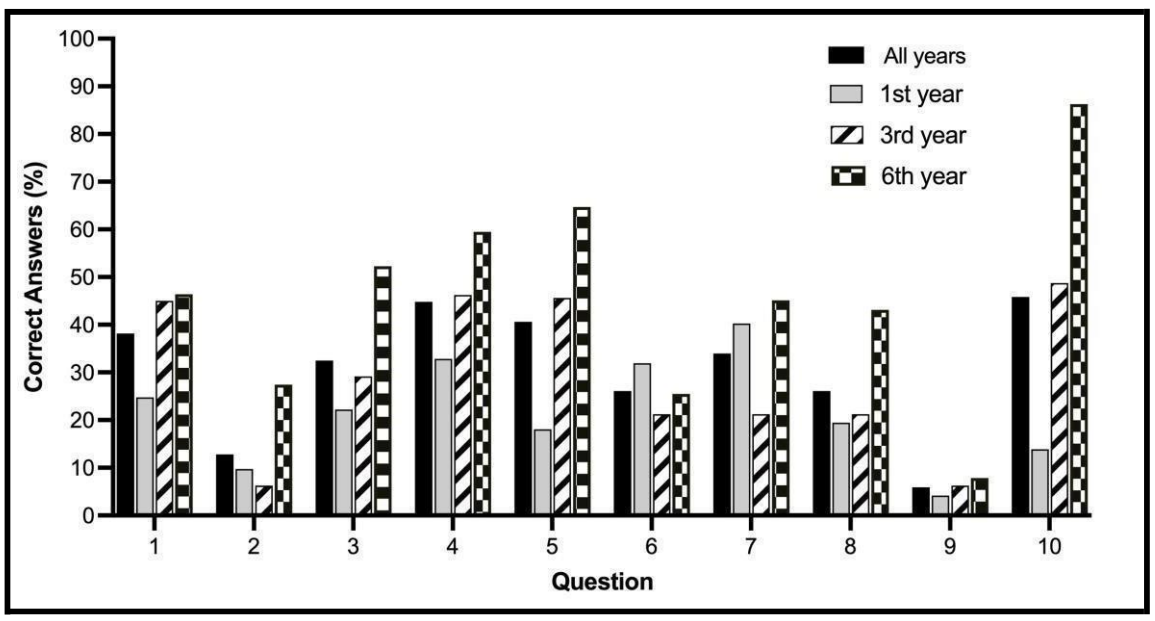

Figure 1. Percentage of correct answers according to Legal Medicine Topic. Numbers represent different topics of Legal Medicine: (1) Traumatology; (2) Sexual disorders and sexual identity; (3) Periliation of life and health; (4) Work-related diseases and accidents; (5) Criminal and civil liability; (6) Pregnancy, parturition and puerperium; (7) Medical deontology; (8) Birth control; (9) Anthropology; (10) Alcoholical drunkenness.

It is interesting to notice the growing tendency of improving performance throughout the course years in themes such as traumatology, periliation of life and health, work-related diseases and accidents, criminal and civil liability, and alcoholic drunkenness. Moreover, it is noticeable that such topics are tightly associated with the interventionist view, being better approached as the course advances and the student is progressively more inserted into the generalist routine, accumulating experience and refining the knowledge acquired through its formation.

It is well known that traumatology (*trauma* = damage/wound + *logos* = study) **[20]** is the area of medicine dedicated to comprehending the different mechanisms and acting forces that can cause a lesion, of temporary or lasting nature, to the human body, as well as how it responds to the most diverse aggressions (signals, symptoms, and repercussion) and how to approach them **[21]**. This area demands from the professional the capacity of recognizing a wound, its biomechanics, kinetics, and the consequences it will imply over the individual, not being excluded from its coverage the organic diseases, which can be from the biodynamic order (e.g., shock and disseminated intravascular coagulation) or from mixed order (e.g., parasites) **[22–24]**

The exact mechanism of a lesion might not be of obvious discernment until one acquires specific knowledge regarding its occurrence, such as the precise description, biokinetics of the trauma and its consequences **[25]**. Therefore, it is possible that the study focused on clinical presentation and management, as well as the lack of traditionally modelled foundation subjects (such as biochemistry, physiology and pharmacology) are influencing factors of the complexity of mechanisms the students are able to comprehend without further orientation.

Yet in the context of providing assistance in the biomedical model, resolutive and mechanistic, integrated into the health service **[26]** are themes that better correlate with the visualization of a chain cause-effect-reaction as in periliation of life and health. According to Brazilian law, this subject is approached in Chapter III under the Title of Special Part, in Crimes Against Person of the Penal Code, articles 130 (venereal contagion), 131 (contagion of serious illnesses), 132 (exposure of danger to the health or life of others), 133 and 134 (exposure or abandonment of incapacitated or newborn), 135 (omission of help) and 136 (abuse/mistreatment) **[27]**. Nonetheless, it is essential to notice that the infraction is not only consequent to damage (respecting the plausibility and causation) but also consequent to intentional exposition or inadequate management (even if said exposition does not result in a definitive outcome). Therefore, the mere fact of imposing risk upon others is considered a criminal outcome **[22,27]**. Whereas some topics, such as venereal contagion or contagion of serious illnesses, omission of help, and abuse/mistreatment are included in the regular syllabus, the study of the causation and the juridical understanding of liability for exposition might escape the student, as they are posterior consequences and of less participation of the physician.

Nonetheless, when the juridic understanding turns into something intrinsic to the content, even if it is not explicit, to know the juridical fundamentals become a part of the building process of the medical

formation, such is common, for example, in criminal and civil liability and in alcoholic drunkenness. On this occasion, the capacity of an individual to be held responsible for their actions is something that occurs in the function of determining if those actions were executed under sound mind and full awareness. Legal medicine approaches situations like this frequently aided by complementary services (e.g., toxicology and forensic psychology) to achieve a better understanding of the case and better determine whether the individual would be unable, momentaneously or indefinitely, of being held responsible for its acts. Such investigation is of utmost importance as there are diseases that affect the perception of reality or cause a too porous state (such as schizophrenia or epilepsy), individuals below legal age, and alcoholic drunkenness, which is frequently associated with a myriad of metabolic and structural damages **[27–30]**.

Therefore, the improvement of the performance of one class in comparison to another occurred primarily on the subjects that have better agreement with the biomedical model of health assistance and, most of the time, agree with the students' own preconception of "what is important for a medic to know". On the other hand, this distribution turns less uniform and cohesive regarding the themes such as pregnancy, parturition, and puerperium; sexual disorders; medical deontology; birth control, and forensic anthropology as many points might be raised in order to better comprehend this phenomenon.

The experience consequent to individual study is something particular to each student and is one of the great characteristics of the active learning methodologies, such as the Problem Based Learning (PBL), employed in the course of medicine at the Federal University of Roraima. This phenomenon occurs in consequence of the incentive the student receives to actively seek out information, guided by a tutor. Nonetheless, even with the attempts of leveling proposed by the method (with collective conferences, practical activities, and cognitive tests), no educational institution has the capability of regulating the whole routine, the academic and personal lives of the students. Therefore, it is necessary to discuss the methodology employed by the educational institution: Problem Based Learning.

This methodology of teaching is proposed as an alternative to the traditional method (where the student finds itself in a passive role of its own formation), thus proposing that the student takes for himself through an active stance. In summary, the PBL methodology stimulates the formation of active agents, capable of dealing with goals and challenges from daily life. Among its various advantages, the capacity of instigating curiosity and promoting a better understanding of the content of interest through a guided study directed by the student, where one can spare more time and resources to the areas that pose more personally challenging, in opposition to the uniform distribution proposed by the traditional methodology **[31,32]**.

In addition, another points capable of generating fluctuations in the diverse environment promoted by the university, thanks to its tripod defined as teaching-research-extension, where occurs the insertion, in the most diverse scenarios, and a heterogeneous experience, which is only possible due to the myriad of extension projects, research groups, and independent study groups added to various other extracurricular projects dedicated proposed by the institution **[33]**. Out from within this context are the so-called "Academic Leagues", entities that come into being due to the students' initiative. They are capable of providing a controlled place where the theoretical and practical learning of its thematic line is stimulated, as well as fomenting research and scientific production as much as it promotes extension actions as means of social contribution **[34,35]**.

f equal importance, is the topic of sexual disorders, especially when referring to sexuality and its expression. In fact, those elements are of fundamental importance in the building and maintenance of a healthy life, on individual formation and integration of a proper identity **[36]**, and are subject to external influences, mainly through values and standards in society that were contemporary to the formation and expression of the individual **[37]**. Therefore, the divergence of opinions and its mutability might turn both the syllabus and traditional literature obsolete regarding this topic.

Whereas society has the capacity of influencing and even determine which factors are considered acceptable, it is necessary to recognize the existence of phenomena and individuals that escape the prevailing standards of what is considered "socially acceptable/ideal".

Nonetheless, it is of great difficulty, nowadays, to define what can be considered normal in detriment of what can be considered a mere deviation of normality, thus creating the definitions of what is called paraphilia **[38]**, at the same time as their understanding tends to evolve alongside society.

One example of the previously cited evolution was the remotion of homosexuality during the *Diagnostic and Statistical Manual of Mental Disorders* update from its second to its third edition **[39]**. Its most recent edition available **[40]** works on sexuality in the section of Sexual disorders (which includes disorders such as alterations of sexual desire and sexual response), Paraphilia and Sexual Identity Disorders, all of them being themes of extremely delicate management and approach **[40–44]**. Hence, due to the recent mutability and required delicacy of the subject, many times the faculty sees itself daunted to approach it, even if the content is already described in official scientific medical literature and an integrating part of the biopsychosocial concept of health. Yet, there are hardships in discussing which tendencies are to be considered pathological or socially acceptable, as this is something highly influenced by personal conceptions. However, the consensus does hold intersections common to certain societies, whereas not necessarily transposable to other societies **[45]**.

Similarly, anthropology (science dedicated to studying man in its social form as an evolving agent) changes with time so much as its object of study evolves. Consequently, it broads itself to embrace new

visions and strategies that allows to understand the evolution of the individual and develop new concrete and abstract theories over the concept of humanity and "family", in a tentative to define what it means to "be human" and how this concept morphs according to its own progression **[46–50]**.

Furthermore, forensic anthropology covers areas related to civil identity and identification, methods of judicial validation, the dynamic changes that permeate the process of living and aging as much as the lasting changes consequent to specific events (i.e., tattoos, congenital diseases, and malformations, chronic-degenerative diseases). Nonetheless, it does not ignore the marks and variations inherent to each human and recognizes the existence of different phenotypic races with different ancestry **[51]**.

Whereas forensic anthropology is mainly exercised by non-medical professionals, such as anthropologists or oral and maxillofacial surgeons, the importance of their understanding on the part of the medical professional is undeniable, in order to better collaborate with the multidisciplinary team **[52]**. That is, the distancing of this knowledge from the generalist routine is combined, as evidenced by the methodology in the construction of the database, with the brief and sometimes insufficient approach of the theme.

However, the existence and formation of the judicial identity are independent of medical knowledge. The construction of civil identity is based on anthropometric and anthropological parameters, employed and designed so as to always seek to comply with the definitions of an ideal means of identification, namely: uniqueness, perpetuity, immutability, classifiable, and practicality. Therefore, several methods have been used over the years, from photographic identification, anthropometric measures proposed by Bertillon to the most recent Vucetich fingerprint method **[53,54]**.

On the other hand, the conjuncture of the study of the themes of pregnancy, parturition, and the puerperium, as well as birth control, diverge from the general notion of labile subjects or, which otherwise would be more marginal to traditional medical learning. Birth control encompasses public measures that seek to control or adjust the number of children born to a single mother, as well as the period of maternity. However, this can occur for different reasons, either as a form of pure population control or as a way of allowing the child to be conceived with the best possible socioeconomic conditions, and through policies aimed at family planning, respecting the individual's free choice. **[55]**.

It is, even more so, essential to understanding that birth control and family planning policies derive from the epidemiological transition and sociodemographic change to which the country is subjected to. Meanwhile, its effectiveness depends on the current state of the familiar structure, its need for a workforce (which can be represented by the children), and its clarification from the educational point of view. Thus, it is the physician's duty to know the current legislation of family planning policies and birth control instruments (whether hormonal contraceptive methods, barrier methods, or definitive surgical procedures) to know how to communicate them to the family and assist in their planning **[55–57]**.

Pregnancy is defined as the physiological state in which the woman carries the product of conception within herself, while parturition is the natural sequence of events through which the woman gives birth to the child. Thereafter, there is the puerperium (which is the final period of this physiological sequence) in which the woman reverses the physiological changes suffered during pregnancy. Also included in this subject is the series of emotional and hormonal fluctuations from the beginning to the end of this whole process **[58–60]**.

Legal medicine addresses, in its competence, the factors of presumption and certainty of pregnancy, the rights and duties in gynecology and obstetrics, the ethical determination behind procedures, and the situations (such as assisted reproduction and interventions) about the mother-fetus binomial **[22]**. Although evident, the importance of forensic gynecology should also be highlighted in cases of sexual violence against women, given the different nuances that permeate the situations that are bound to be better perceived by an experienced and trained professional **[61]**. On another hand, regarding the entire delivery process and its complications, it should be noted that external factors may render the delivery unfeasible or make it premature, which might be characterized as an abortion depending on the gestational age and fetal weight. As for abortion and induced prematurity to define aggravating factors for crimes committed once a causal link is established, the proper observation and analysis is of utmost importance and is also included in forensics gynecology **[62,63]**, even if, didactically, this point is studied in a separate topic in the reference literature **[22]**.

As for birth control, it is observed that there is an expressive gain of knowledge, which acquires greater consistency with the advance of the course year. This happening may be related to the gain of knowledge resulting from the practice of internship in recent years or as a pure consequence of the linear gain of knowledge through the course. Regarding the subject of pregnancy, childbirth, and the puerperium, there was only one issue related to the theme, which stands out for not having a significant difference in the percentage of correct answers between the years. It is also possible to analyze, according to graph 1.2, that the correct marking rate was not linear compared to the years of the course, creating the possibility that there is a greater interest in the theme in the younger classes compared to those that are more advanced in the course.

Finally, the performance in deontology (science that studies the duties and ethics of a profession) is added to the scenario, an instrument that shapes the student and that should guide the professional's decisions. Deontology, by promoting reflection on the professional's commitments, serves as a basis for defining the most appropriate conduct, according to ethics, at any time during professional

practice **[64–66]**. It is also important to emphasize that, as technology and new procedures and scenarios emerge, ethical doctrines must also be updated, in order to better guide and address new cases; determining which postures are or are not recommended for the doctor (trained or in training) **[67,68,68]**

The understanding of non-medical-exclusive knowledge can be hindered by medical learning mostly focused on the pathophysiological aspect of the disorders, which occurs under the justification of meeting the expectations of the population related to the medical profession. Such a phenomenon carries with it the consequence of not providing the appropriate focus on the current legislation over the repercussions that an altered or properly pathological physiological state may have in a legal context. It can be taken as an example: intention to provide benefit, decree liability, and legally authorize or forbid medical interventions that could otherwise constitute an infraction, such as abortion. The increasing judicialization of medicine makes it essential for professionals to know not only about their rights but also about their duties, reinforcing the importance of legal medicine as part of professional training **[69]**

One of the possible factors found for this divergence, in addition to the absence of a specific curricular component, is the university environment itself and the teaching methodology. Within this medium, it is important to remember the supplementary role that academic leagues play in the university environment, allowing students to contact an area of affinity or still unknown. This can even influence the future choice of specialty that the student wants to follow or serve as a complement to a theme that is not much explored by the graduation **[70]**.

It should also be mentioned that the PBL, when used in the health field, stimulates the individual development of fundamental skills for the exercise of the profession, such as leadership, critical analysis of the literature, cooperation, mutual respect, more refined listening, and speaking. And it is also flexible from an institutional point of view, as not only can be used in a myriad of environments according to the available infrastructure, but the syllabus can also be continuously adjusted to keep in focus the most relevant issues for the medical reality that involves the educational institution, and the students are precociously inserted in healthcare activities **[31,71,72]**

In contrast, the active methodology also presents barriers that must be overcome, such as the simultaneous need for a large amount of the same material, books or digital collection, or the fact that students are unlikely to be exposed to the same faculty during the training activity. This detail, in particular, can benefit those who are educated by specialist teachers on the subject or have a greater affinity for the subject. In addition, a common phenomenon is information overload, resulting from the student's uncertainty regarding the volume of information that should be studied in relation to its importance for practical application and the knowledge that will be addressed later in the course in relation to the current moment **[72]**.

Therefore, under the light that different approaches and contents are capable of exerting a notable impact, it is possible to provide suggestions on how to provide a higher level of education regarding the content of legal medicine. As previously done by Madadin et a (2013) l and Feijó et al (2010) **[17,19]** short courses as components of the regular syllabus can be drawn using objective evaluation on pre and post course in order to provide feedback both to the student as to the teacher on where to focus or what to improve, in order to achieve maximum efficiency. Considering the peculiarities of the PBL, it is also possible to integrate legal medicine on the regular syllabus by diluting and linking it’s themes on the greater areas that are already present, thus teaching ethics, traumatology, periliation and many other themes through addition of specific scenarios on the tutorials or conferences throughout the course, which would provide the student with both the clinical and the medico-legal view of the same event, enriching one’s experience.

4. Conclusions

This study showed evidence that although students receive formal education and approved by the Ministry of Education for employability and validation in face of the national scenario, there is evidence of a shortage in the areas of Legal Medicine, with evident tendency to growth as the course progresses, but still insufficient when compared to the recently applied medical exams requirements standard.

Nevertheless, the possibility of repeating studies on pre- and post-intervention parameters, as could be done with a short course or module of forensic medicine as an experimental activity or from basic research itself, are prudent measures that can help to endorse the relevance that has to give more space to this area so essential for routine professional practice as well as even higher quality training.

Although our project had a representative sample of all the student body, it is nonetheless too small to hold definitive value to allow extrapolation to every other university throughout the country, therefore reproduction and increase in sample-size are highly recommended.

The results found here are subject to human bias, as learning is a subjective experience, which must take into account students' preferences and priorities, as well as their physical and mental fatigue, especially considering that the study occurred at the end of the academic year.

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Supplementary Material

1) (UFRR- Medical Residency – Intensive Medicine/2017) In polytraumatized patients, the onset of hypothermia might lead to:

(A) reduction of peripheral vascular resistance

(B) increase of tissue demand of oxygen

(C) metabolic alkalosis

(D) increase of the glomerular filtration rate

(E) increase of the cardiac output

2) (UFRR – Medical Residency – Neonatology/2017) Mark the correct answer. The classic tetrad of congenital toxoplasmosis:

(A) microcephaly, chorioretinitis, splenohepatomegaly, intracranial calcification.

(B) hydrocephalus, chorioretinitis, intracranial calcification, mentalretardation.

(C) hydrocephalus, intracranial calcification, hepatomegaly, mentalretardation.

(D) hydrocephalus, chorioretinitis, intracranial calcification, hepatomegaly.

(E) None of the above.

3) (UFRR – Medical Residency – Mastology/2017) MD. Odair is on his turn at Rorainópolis, countryside, where he has no access to imaginological exams, and is surprised by a rollover of a bus, where 5 passengers have been afflicted by contusive abdominal trauma with suspicion of intra-abdominal lesion. In which of them should the intraperitoneal diagnostic lavage be avoided?

(A) A pregnant patient

(B) A patient also victim of traumatic brain injury

(C) A paraplegic patient

(D) A patient with a fracture of the pelvis

(E) A patient with clinical sign of peritoneal inflammation

4) (UFRR – Medical Residency – Direct Access/2019) A wound on the left parasternal region, near the left midclavicular line, would most probably affect wich structure?

A) Right Ventricle

B) Left Ventricle

C) Right Atrium

D) Left Atrium

5) (TRE-RR - Judiciary Analyst – Medicine/2015) Consider the following clinical and laboratorial data:

I. Elevation of CRL protein and cell count below 10/mm3.

II. Distal areflexia.

III. Fever early on the onset of the disease.

IV. Weakening on inferior limbs with asymmetric persistence.

On the patients afflicted with Guillain-Barré syndrome, there are greater odds of finding:

(A) III and IV.

(B) I and II.

(C) I and III.

(D) II and IV.

(E) I and IV.

6) (UFRR –Medical Residency – Direct Access/2019) Regarding the mental health problems on childhood and teen years, it is possible to affirm that:

A) Are risk factors to the mental health of children and teenagers: inconsistent parental care, educational delay, lack on the sense of belonging, sexual abuse and chronic diseases.

B) The mental health problems in children and teenagers are highly common, with studies indicating a prevalence above 20%.

C) Autism is the most prevailing mental health problem in childhood and teen years.

D) Data from national research indicates that less than 10% of teens regularly use alcoholic beverages.

7) (UFRR – Medic - Psychiatrist/2019) The term “gender dysphoria", which characterizes a new diagnostic class is described in DSM-5 as the cognitive and affective distress of a individual of a designed gender, whose suffering is consequent to the incongruence of the expressed gender and the designed gender at birth. The diagnostic criteria to gender dysphoria are applied to:

(A) Define a clinical problem exclusive to teenagers

(B) Define a clinical problem exclusive to children

(C) Define a clinical problem exclusive to teenagers and adults

(D)Define a clinical problem exclusive to adults

(E)Define a clinical problem in both children, teenagers and adults

8) (UFRR – Medical Residency – Basic Areas//2017) K.S.S, 30 years, female, of brown skin, presenting an ulcerated lesion of 1,5 cm of diameter on the perineum for 7 days, with clean and painless bed. During the differential diagnosis, it should be considered, except:

(A) Sífilis

(B) Gonorrhea

(C) Chancroid

(D) Herpes

(E) Trauma

9) (UFRR – Medical Residency – Neonatology/2017) Newborn of 27 days is brought to the appointment by an aunt, who complains that the baby cries a lot, since the birth, when manipulated and even during active movements. On the eighth day of life, the aunt noticed a decrease in the movements of the left superior limb. Medical assistance as sought, where analgesics and immobilization were prescribed. At the twentieth day of life, an onset of descamation on soles and palms, edema of left wrist and increase on the cries. The mother did not have any prenatal appointment. At the physical exam: infant with important cries, eupneic, acyanotic, normocorated and hydrated. Hypochromic stains of face. Cardiovascular and respiratory tract without changes on examination. Abdomen flacid, with audible peristaltic movements, liver extending 5cm below the right ribcage, spleen extending 1,5cm below the left ribcage. Edema of left wrist, with increased temperature, without erythema. Plain fontanelle, without signs of meningeal affliction. Based on the aforementioned data, the main hypothesis for a diagnosis is:

(A) Staphylococcal infection (Bullous impetigo of the newborn)

(B) Beaten child syndrome

(C) Congenital sifilis

(D) Scurvy

(E) None of the above

10) (IFRR - ADMINISTRATIVE TECHNICAL IN MEDICAL EDUCATION/ GENERAL CLINICIAN/2015)

Male, 32 years, began treatment for HIV infection 3 months ago and feels well. Whereas routine exams evidenced the following: AST 18, ALT 22, Total bilirrubins of 2,8mg%, indirect bilirrubin 2,5, direct bilirrubin 0,3, alkaline phosphatase 210. The medication responsible for the laboratorial alteration is:

(A) ritonavir.

(B) tenofovir.

(C) efavirenz.

(D) atazanavir.

(E) zidovudina.

11) (TRT 11ª REGIÃO - JUDICIARY ANALYST - OCCUPATIONAL MEDICINE/2017) A labourer who has been operating a chainsaw for years and develops pallor and numbness on metacarpofalangeal articulations, whose diagnostic hypothesis is that of Raynaud syndrome, has as probable etiological cause the following occupational exposition:

(A) Electromagnetic radiation exposition.

(B) Hyperbarism on forced compression.

(C) Localized high-frequency vibration.

(D) Repetitive movement of the wrists.

(E) Whole body low-frequency vibration.

12) (TRT 11ª REGIÃO - JUDICIARY ANALYST - OCCUPATIONAL MEDICINE/2017) Is classified as an acute occupational disease of the lower respiratory tract:

(A) mesothelioma.

(B) pulmonary emphysema.

(C) silicosis.

(D) allergic rhinitis.

(E) work-related asthma.

13) (TRT 11ª REGIÃO - JUDICIARY ANALYST - OCCUPATIONAL MEDICINE/2017) Regarding a mason who works on bricklaying and has direct contact with cement. The acute onset of lesions on hands along with dryness of skin, descamation, erythema, fissures and bleeding prompted appointment with dermatologist, who performed a contact-test, negative to all of them. On such a case, the diagnostic hypothesis is:

(A) Dyshidrosis.

(B) Allergic contact dermatitis.

(C) Irritating contact dermatitis.

(D) Tinea manuum.

(E) Psoriasis.

14) (UFRR – Medical Residency – Emergency Medicine/2017) Male, 86 years old, hypertense, with major depression and previous encephalic vascular accident, comes to the emergency of the HGR, brought by his family, with complaint of agitation, aggressiveness and incoherent discourse with onset on the last 24 hours. Did not recognize the people around him nor did he know where he was. The patient makes continuum use of: captopril, aspirin, simvastatin, amlodipine and citalopram. His physical examination was normal except for the aforementioned mental confusion, Complementary exams were normal, except for seric sodium of 119mg/dl. Regarding the aforementioned case, check the correct answer.

(A) The patient is presenting Dementia, of acute onset, being the main hypothesis the Alzheimer Disease.

(B) The patient is presenting psychotic depression, therefore haldol must be used immediately Depressão psicótica, devendo ser iniciado Haldol imediatamente.

(C) The patient is presenting Delirium, with the probable etiology being hyponatremia.

(D) O paciente apresenta Delirium, por provável virada maníaca, pós uso de antidepressivo.

15) (UFRR – Psychiatrist/ 2019) H., mathematics professor of a university at São Paulo, disappeared three days after his wife abandoned him unexpectedly. Three months after, he was found working in a bar at Fortaleza. He said his name was O., not having any memory of his prior life. It is correct to affirm he is presenting:

(A)Dissociative leakage

(B)Dissociative amnesia.

(C)borderline personality disorder.

(D)dissociative identity disorder.

(E)antisocial personality disorder.

16) (UFRR – Medical Residency – Basic Areas/2018) Prolonged pregnancy is the pregnancy that goes further than 42 weeks, also being known as protracted, delayed, post-term and post-maturity. Meanwhile postdates is the pregnancy that goes further than the estimated delivery date. The incidence of prolonged pregnancies oscillates between 3 to 14% and the main factors that influence this rate are irregular menstrual cycles, the use of hormonal oral contraceptives and the lack of a proper prenatal, especially an early ultrasound. Are morbidies expected from prolonged pregnancies, except:

(A) Tachytocit delivery

(B) Oligoamnion

(C) Meconium before and during the delivery

(D) Fetal macrosomia and birth trauma

17) (UFRR – Medical Residency – Basic Areas/2018) During the proper reception at a Basic Unit of Health, there arrives a 47 years old woman, trembling, with dizziness, sweating profusely, with perioral pallor, nauseated and sensation of evacuatory urgency. Furthermore, she presents tachycardia and tachypnea, whereas the other vital signs do not evidence any change. The most probable diagnosis is that of anxiety. In front of the presented case, consider the alternatives to the conduct of the Family and Community Medic

I. Refer the patient to the psychiatrist

II. Prescribe the initial pharmacological treatment

III. Ask for complementary exams in order to tranquilize the patient

IV. Evaluate the correlation of the symptoms with the trigger for the clinical scenario

Which are correct:

(A) Only I and II.

(B) Only II and III.

(C) Only II and IV.

(D) Only III and IV.

18) (UFRR – Medical Residency – Direct Access/2019) MD Dr. Carlos, based on the brazillian legislation, Law 9263/96, which deals the subject of familiar planning, the following situations are forbidden from doing the tubal ligation as definitive method of contraception,except:

A) Patients absolutely incapable, under solicitation of the family, after 45 days of the will's expression

B) Woman under 25, with two living offspring, immediately after uterine curettage due tomiscarriage.

C) During a C-section, to women who expressed their will to undergo the ligation.

D) Paciente de 30 anos, com história de doença genética, sem filhos vivos, após 60 dias de manifestação da vontade.

19) (UFRR – Medical Residency – Emergency Medicine/2017) On the obese patient, it is possible to affirm that there is a reductionof::

(A) Total blood volume

(B) Cardiac output

(C) Muscle mass

(D) Total body water

(E) Glomerular filtration rate

20) (TRE-RR - JUDICIARY ANALYST – Medicine/2015) Etilist patient presents neurologic manifestation characterized by encephalopathy, oculomotor disfunction and ataxia, progressing to amnesia. The main therapeutic conduct to the neurologic manifestation described above is:

(A) Cobalamin.

(B) Diazepan.

(C) Haloperidol.

(D) Rivastigmin.

(E) Tiamin.